Data and Information Committee Agenda
14 September 2022

Meeting held in the Council Chamber, Lvl 2 Philip Laing House
144 Rattray St, Dunedin (Councillors and staff only)
Members of the public may view the meeting live at: Otago Regional Council YouTube Channel

Members:
Cr Alexa Forbes, Co-Chair
Cr Michael Laws, Co-Chair
Cr Hilary Calvert
Cr Michael Deaker
Cr Carmen Hope
Cr Gary Kelliher
Cr Kevin Malcolm
Cr Andrew Noone
Cr Gretchen Robertson
Cr Bryan Scott
Cr Kate Wilson

Senior Officer: Pim Borren, interim Chief Executive

Meeting Support: Liz Spector, Governance Support Officer

14 September 2022 10:00 AM

Agenda Topic — Page

1. APOLOGIES

No apologies were received prior to publication of the agenda.

2. PUBLIC FORUM

No requests to address the Committee under Public Forum were received prior to publication of the agenda.

3. CONFIRMATION OF AGENDA

Note: Any additions must be approved by resolution with an explanation as to why they cannot be delayed until a future meeting.

4. CONFLICT OF INTEREST

Members are reminded of the need to stand aside from decision-making when a conflict arises between their role as an elected representative and any private or other external interest they might have.

5. CONFIRMATION OF MINUTES 3

Minutes of previous meetings will be considered true and accurate records, with or without changes.

5.1 Minutes of the 30 June 2022 DAIC meeting 3

6. OPEN ACTIONS OF DATA AND INFORMATION COMMITTEE RESOLUTIONS 7

Outstanding actions from resolutions of the Committee will be reviewed.

6.1 Action Register at 14 Sept 2022 7

7. MATTERS FOR CONSIDERATION 9

7.1 PM2.5 INVESTIGATION IN OTAGO 9

This paper presents and discusses the results of a PM2.5 air quality monitoring survey undertaken in 14 of Otago's airsheds during winter 2021.

7.1.1 2021 Otago Airsheds Particulate Matter Survey 22

7.2 QUEENSTOWN AND DUNEDIN PATRONAGE REPORT 40

To report on performance of public transport (bus and ferry) and total mobility services for the 2021/22 financial year.

8. CLOSURE

Minutes of a meeting of the Data and Information Committee held in the Council Chamber on 30 June 2022 at 10:00 AM

Membership

Cr Alexa Forbes	*(Co-Chair)*
Cr Michael Laws	*(Co-Chair)*
Cr Hilary Calvert	
Cr Michael Deaker	
Cr Carmen Hope	
Cr Gary Kelliher	
Cr Kevin Malcolm	
Cr Andrew Noone	
Cr Gretchen Robertson	
Cr Bryan Scott	
Cr Kate Wilson	

Welcome

Co-Chairperson Alexa Forbes welcomed Councillors, members of the public and staff to the meeting at 10:03 am. Staff present included Pim Borren (interim Chief Executive), Amanda Vercoe (GM Governance, Culture and Customer), Anita Dawe (GM Policy and Science), Gavin Palmer (GM Operations), Liz Spector (Governance Support), Rachel Ozanne (Sr Scientist - Water Quality), Tom Dyer, (Manager Science), Hugo Borges (Scientist - Lakes), Julian Phillips (Implementation Lead - Transport), and Doug Rodgers (Manager Transport). Nick Donnelly (GM Corporate Services) was present electronically.

1. APOLOGIES

Resolution: Cr Hope Moved, Cr Noone Seconded:
That the apologies for Cr Laws be accepted.
MOTION CARRIED

Crs Scott and Malcolm were present electronically.

2. PUBLIC FORUM

No public forum was held.

3. CONFIRMATION OF AGENDA

The agenda was confirmed as published.

4. CONFLICT OF INTEREST

No conflicts of interest were advised.

5. CONFIRMATION OF MINUTES

Resolution: Cr Hope Moved, Cr Wilson Seconded
That the minutes of the meeting held on 9 March 2022 be received and confirmed as a true and accurate record.
MOTION CARRIED

Resolution: Cr Hope Moved, Cr Wilson Seconded
That the minutes of the meeting held on 9 June 2022 be received and confirmed as a true and accurate record.
MOTION CARRIED

6. ACTIONS

Open actions from resolutions of the committee were reviewed.

7. MATTERS FOR CONSIDERATION

7.1. Contact Recreation Monitoring 2021-2022

The report was provided to update the Committee on details of the contact recreation monitoring programme undertaken by ORC staff for the 3rd quarter of financial year 2021/22 and included information on 29 sites in Otago rivers, lakes, and coastal waters. Rachel Ozanne (Senior Scientist - Water Quality) and Tom Dyer (Manager Science) were available to respond to questions about the report.

Following a discussion of the report, Cr Wilson asked that staff find a way to make the information more easily accessible by the community. Cr Calvert suggested a comms statement be included with the report to facilitate that. Mr Dyer said he would review the best way to accomplish the two requests going forward.

Resolution DAIC22-107: Cr Deaker Moved, Cr Hope Seconded
That the Committee:

1) ***Notes** this report.*

MOTION CARRIED

7.2. Lake Snow Report

The report was provided to update the Committee on Lake Snow-related research, to present monitoring data, and to outline future research for management and mitigation of algal growth in Otago lakes. Hugo Borges (Scientist - Lakes) and Tom Dyer (Manager Science) were present to respond to questions about the report.

Following a discussion of the report, Cr Robertson asked what the next steps should be. She suggested the evidence presented indicated more attention should be focused on the issue. Mr Borges stated costs of remediation would be higher than working first to manage the algal problem. Cr Calvert suggested the Chair and Deputy Chair discuss the issue with their counterparts at other councils and find a way forward.

Resolution DAIC22-108: Cr Calvert Moved, Cr Deaker Seconded

That the Committee:

1) ***Notes** this report.*
2) ***Requests** the Chair, Deputy Chair, and Chief Executive follow up with other councils facing similar issues with a view to jointly requesting help from Central Government on the lake snow problem.*

MOTION CARRIED

7.3. Queenstown and Dunedin Patronage Report

The report was provided to report on performance of public transport and Total Mobility services for the third quarter of financial year 2021/22. Julian Phillips (Implementation Lead - Transport), Doug Rodgers (Manager Transport) and Gavin Palmer (GM Operations) were available to respond to questions about the report.

Cr Deaker asked how the ORC could work to counteract negative publicity surrounding public transport. Mr Rodgers said the best way to counteract negative publicity was to provide the customer with good performance and reliable service. Cr Deaker suggested that transport staff meet with ODT/other media and provide a briefing that includes the positive information from the report.

Following further discussion of the report, Cr Noone moved:

Resolution DAIC22-109: Cr Noone Moved, Cr Kelliher Seconded

That the Data and Information Committee:

*1) **Notes** this report.*
*2) **Requests** a media briefing be provided by Transport staff.*

MOTION CARRIED

Cr Hope left the meeting at 11:24 am.
Cr Hope returned to the meeting at 11:28 am.

Cr Kelliher left the meeting at 11:28 am.
Cr Kelliher returned to the meeting at 11:30 am.

8. CLOSURE

There was no further business and Co-Chair Alexa Forbes declared the meeting closed at 11:49 a.m.

_____ _____

Chairperson Date

Action Register

Search Criteria

Showing Completed Items: Yes
Include Items Completed From: 30/06/2022

Applied Filters

Meeting Types: Data and Information Committee

Generated By: Liz Spector
Generated On: 07/09/2022 at 11:02am

Meeting Date	Item	Status	Action Required	Assignee/s	Action Taken	Due Date
09/06/2021	SPS2132 Coastal Monitoring Programme	In Progress	Present a paper to the Strategy and Planning Committee in 2022 outlining monitoring options for a State of the Environment network and seek Council approval to implement the programme. **Res DAIC21-103**	General Manager Policy and Science, General Manager Strategy, Policy and Science, Manager Science	**09/12/2021 General Manager Strategy, Policy and Science -** On track. **19/01/2022 Governance Support Officer -** Gwyneth Elsum: The Science Team are doing work such as coastal mapping that will provide input into the development of a coastal monitoring programme. **01/09/2022 Governance Support Officer -** July 2022 - GM Policy and Science: The Coastal Monitoring Programme is in place.	30/06/2022
30/06/2022	SPS2221 Lake Snow Report	Assigned	The Chair, Deputy Chair, and CE are to follow up with other councils facing issues like Lake Snow with a view to jointly requesting help from Central Government. **Res DAIC22-108**	Chairperson, Councillor, General Manager Policy and Science, Interim Chief Executive	**04/07/2022 General Manager Policy and Science -** No action required from GM. Will support the CE if required	28/09/2022
30/06/2022	PPT2208 Queenstown and Dunedin Patronage Report	Assigned	Transport staff was requested to provide a media briefing to ODT/other new outlets regarding public transport issues as presented in the quarterly report. **Res DAIC22-109**	General Manager Operations, Implementation Lead - Transport, Manager Transport	**02/08/2022 Executive Assistant, Operations -** To be arranged. **23/08/2022 Executive Assistant, Operations -** We have released a number of positive media releases regarding increased patronage. More recently we have had media releases regarding the effectiveness of the reduced timetable on limiting missed trips. Media releases for positive outcomes have been ongoing. **06/09/2022 Executive Assistant, Operations -** A briefing will be prepared shortly.	14/09/2022

7.1. PM2.5 investigation in Otago

Prepared for:	Data and Information Committee
Report No.	SPS2239
Activity:	Governance Report
Author:	Sarah Harrison, Scientist, Air Quality
Endorsed by:	Tom Dyer, Manager Science, Anita Dawe, General Manager Policy and Science
Date:	14 September 2022

PURPOSE

[1] This paper presents and discusses the results of a $PM_{2.5}$ air quality monitoring survey undertaken in 14 of Otago's airsheds during winter 2021.

EXECUTIVE SUMMARY

[2] $PM_{2.5}$ was monitored in 14 of Otago's airsheds during winter 2021 (July to September, inclusive) using low-cost sensors, ahead of the release of the new National Environmental Standard for $PM_{2.5}$. This was the first time in many years that some of these airsheds have been investigated and the concurrent monitoring allowed for direct comparisons between them.

[3] All airsheds except for Kingston recorded elevated $PM_{2.5}$ concentrations at night, with a secondary spike in the morning, indicating home heating emission sources. The $PM_{2.5}$ concentrations of the airsheds varied; Lake Hāwea, Luggate, Ranfurly and Oamaru had the highest mean concentrations for the monitoring period, and Lake Hāwea recorded the highest 24-hour average $PM_{2.5}$ concentration of 58 $\mu g/m^3$.

[4] Further monitoring and investigations should be considered to understand some of these airsheds in the context of our State of the Environment (SOE) monitoring network, the future NESAQ limits and for future air quality management.

RECOMMENDATION

That the Data and Information Committee*:*

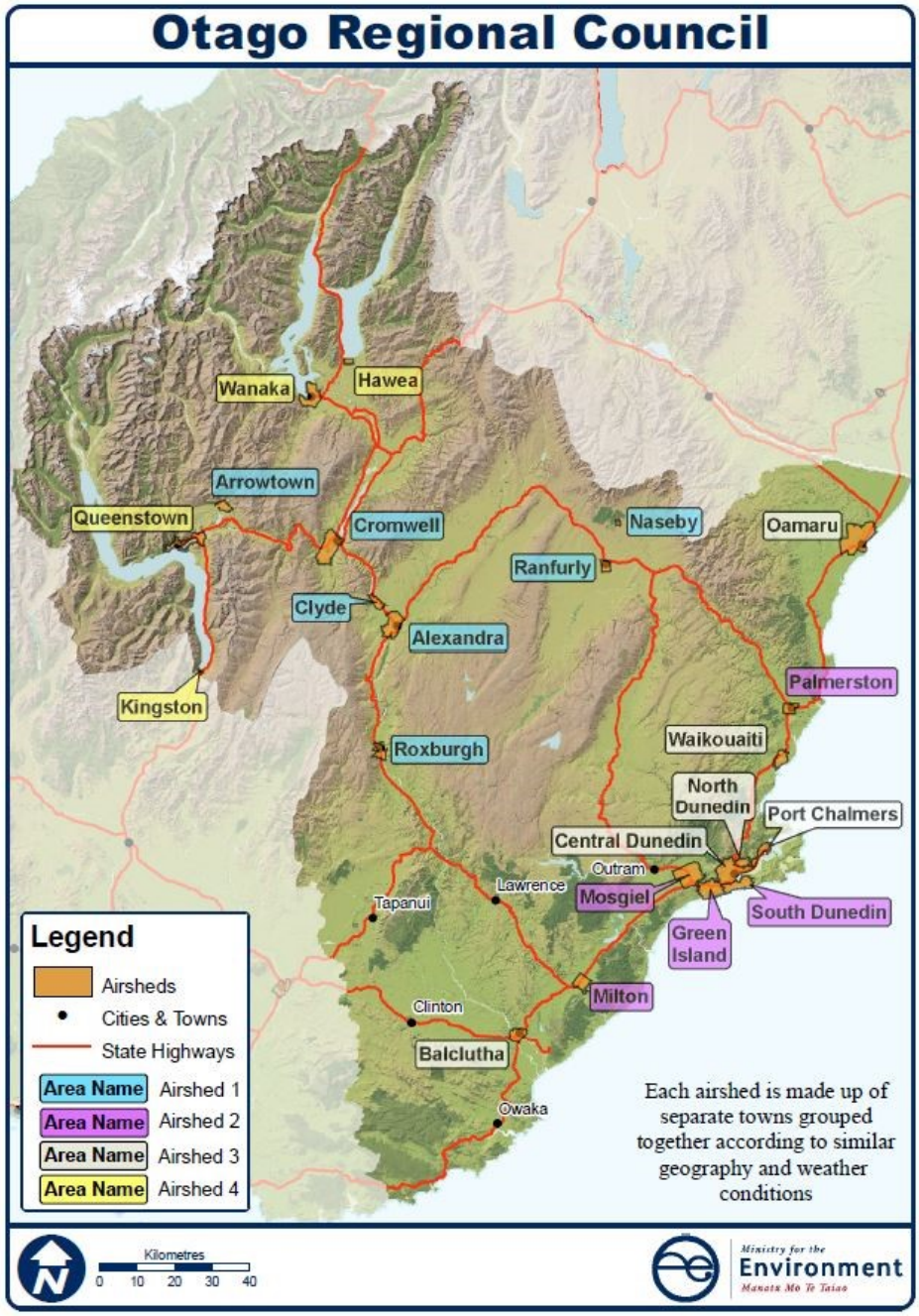
1) ***Notes** this report.*

INTRODUCTION

[5] The Otago Regional Council has 22 gazetted airsheds, seven of which are currently monitored for PM_{10} (particulate matter with a diameter of less than 10 micrometres). Particulate matter is the main pollutant of concern in Otago (Environet, 2019). Of the 22, there are 15 airsheds that have either not been monitored for many years, or at all, due to the high cost of standard method monitoring instruments. Under the National Environmental Standards for Air Quality (NESAQ), ORC is required to monitor any airshed that is likely to exceed any of the limits set out in the NESAQ.

[6] The 22 air sheds are currently organised into groups and given a rating from 1 – 4, indicating highest to lowest potential for degraded air quality (Figure 1). A fifth group encompasses the rest of Otago, rural areas and smaller towns.

Figure 1: Gazetted airsheds in Otago



[7] The grouping of airsheds across Otago allowed ORC to be able to assign key indicators from each category and monitor these as proxies for the rest in the group (currently Arrowtown, Central Dunedin and Mosgiel). The groupings were based on early monitoring data, and geographic or climatic similarities where monitoring data was unavailable. For the purposes of regulation, ORC also further categorised the airsheds into Air Zones (Air Zone 1 – 3). Air Zone 1 is the highest priority for air pollution management and has the strictest rules for wood burning appliances.

[8] Of the 22 airsheds, 12 have not been monitored in many years, and a further three ungazetted airsheds (Lawrence, Luggate and Middlemarch) were added to the study. Lawrence has been the subject of air quality investigations in the past which indicated regular occurrences of PM_{10} exceedances. Luggate is at risk due of air quality issues due to recent urban growth.

Table 1: Otago's airsheds and monitoring history

Airshed	Airshed Number	Air Zone Number	Most recent year of monitoring
Alexandra	1	1	Current
Arrowtown			Current
Clyde			Current
Cromwell			Current
Naseby		2	2007
Ranfurly			2008
Roxburgh			2007
Palmerston	2		2014
Mosgiel			Current
South Dunedin			2009
Green Island			2002
Milton			Current
Balclutha	3		2018
North Dunedin			2007
Central Dunedin			Current
Oamaru			2009
Port Chalmers			NA
Waikouaiti			NA
Hāwea	4		NA
Kingston			NA
Queenstown			To be installed
Wānaka			To be installed
Middlemarch	Not gazetted	3	NA
Lawrence			2012
Luggate			NA

[9] The development of low-cost sensors for air quality monitoring provided a useful opportunity to undertake more widespread monitoring ahead of proposed changes to the NESAQ. These sensors can be used in networks of multiple units to understand spatial patterns and movements of air pollution to a very local level, which is something a single standard method instrument cannot do. However, these instruments are less reliable and have less accuracy than standard method monitoring and must be corrected to a reference instrument. The data quality and reliability issues

associated with low-cost sensors need to be considered when interpreting data, but these drawbacks are offset by the cost of these sensors, and the large number of them which can be deployed. As such, they are well suited to screening studies to determine if an area may have degraded air quality.

METHODS

[10] The study that this paper informs used Outdoor Dust Information Nodes (ODINs), developed by NIWA. ODINs are less accurate than the instruments used in our SOE network, but when used as a network they agree with each other within a range of 20% (NIWA, 2020). Once the data is corrected, it can represent 90% of the variability in $PM_{2.5}$ concentrations from woodsmoke sources (Olivares *et. al*., 2014). ODINs have been used in New Zealand in recent years to investigate variation in particulate matter from home heating emissions, and there were enough of them available to monitor ORC's large number of airsheds simultaneously.

[11] A total of 47 ODINs were installed within 15 airsheds (Figure 2), with at least three ODINs in each airshed. In most cases the ODINs were attached to lampposts at a height of 3 metres, but in towns that didn't have lampposts, alternative mounting structures such as fences were used.

Figure 2: Monitoring locations

[12] The ODINs were installed for a three-month period from the start of July until the end of September 2021. Data were recorded by the ODIN's dataloggers and were downloaded twice: during a mid-campaign retrieval at the start of August, and at the end of the campaign. All the ODINs were placed at the Alexandra air quality SOE site for two weeks during October 2021 as a co-location to compare the instruments and correct the data. The ODIN data was accordingly corrected[1] to the reference instrument (MetOne ES642).

Figure 3: ODIN attached to a lamppost. Source: Bodeker, 2021

RESULTS

[13] Of the 47 ODINs, 29 of them returned at least 50% valid data; and 28 returned over 95% valid data. Consequently, except for Waikouaiti where no valid data was available, every airshed was monitored for the full monitoring period (Table 2). The reasons for missing data included failure to log data either during the monitoring period or the co-location, technical issues with the instruments, or theft/vandalism of the instruments.

Table 2: Data capture results

Airshed name	Number of ODINs installed	Number with data
Green Island	3	3
Hāwea	3	3
Kingston	3	1
Lawrence	3	2
Luggate	3	2
Middlemarch	3	1
Naseby	3	2
North Dunedin	3	2
Oamaru	4	2
Palmerston	3	1
Port Chalmers	3	2
Ranfurly	3	3
Roxburgh	3	3

[1] This process is described in Bodeker, 2021.

South Dunedin	4	2
Waikouaiti	3	0
Total	**47**	**29**

[14] For the airsheds where two or more ODINs returned complete data sets, the set with the highest average concentration was chosen to represent that airshed for the purposes of comparing between airsheds. Most airsheds showed elevated 24-hour average concentrations of $PM_{2.5}$ during the winter months of July and August (Figure 4). The Lake Hāwea site recorded the highest 24-hour average $PM_{2.5}$ concentration of 58 µg/m³, followed by Green Island with 54 µg/m³ (Table 3). The sites with the lowest median concentrations were in Kingston, followed by Middlemarch and Roxburgh (Figure 5).

Figure 4: $PM_{2.5}$ timeseries at each airshed (24-hour average)

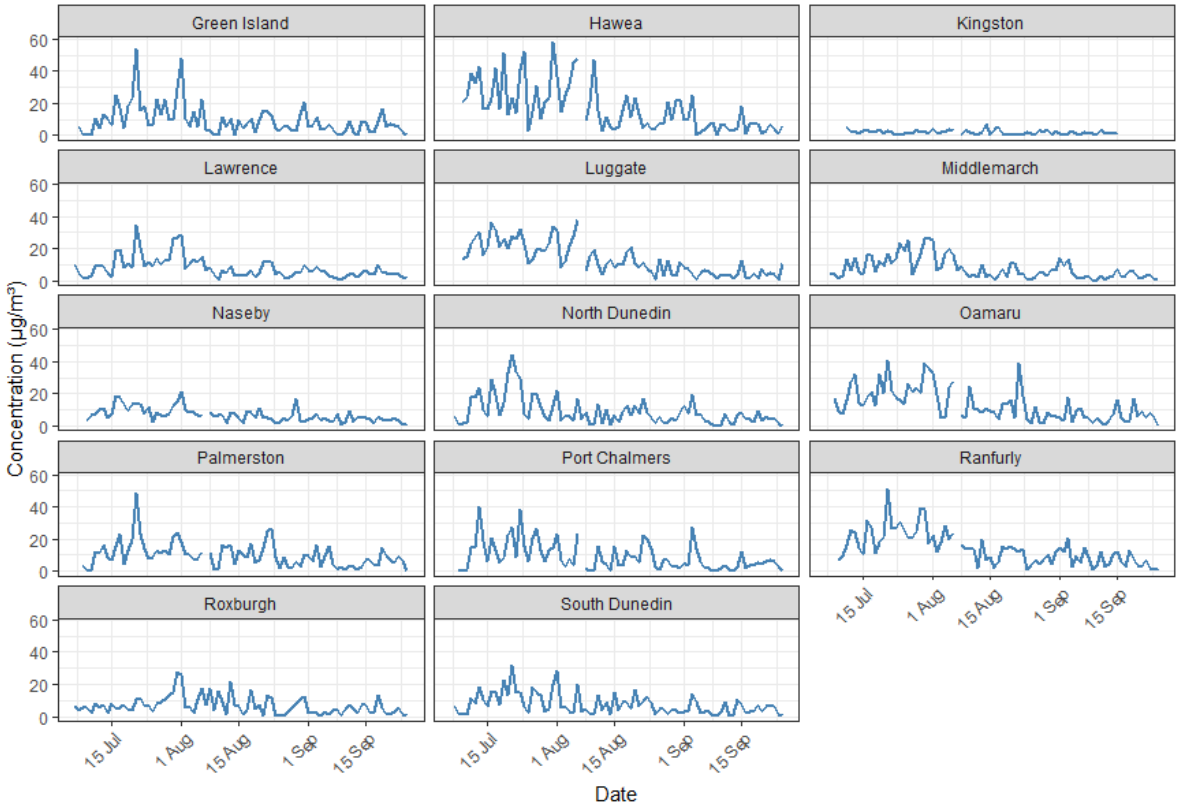
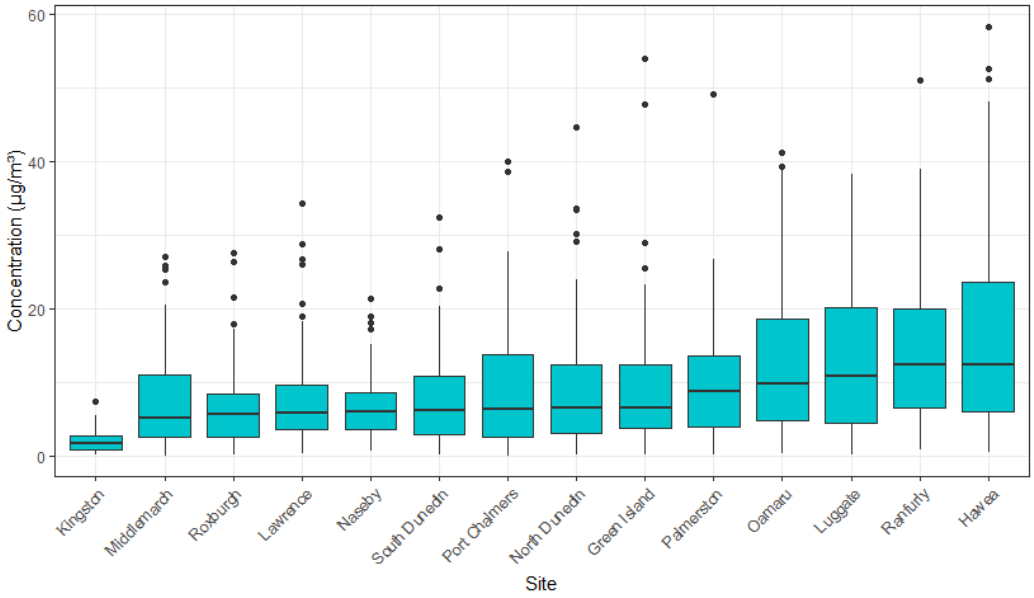


Table 3: Average and maximum concentrations of $PM_{2.5}$ by airshed

Airshed	ODIN number	$PM_{2.5}$ Concentration (µg/m³)		
		Monitoring average	July-August (winter) average	Maximum 24-hour average
Green Island	ODIN013	9	11	54
Hāwea	ODIN032	17	22	58
Kingston	ODIN015	2	2	7
Lawrence	ODIN167	8	9	34
Luggate	ODIN172	13	17	38
Middlemarch	ODIN050	8	9	27
Naseby	ODIN155	7	8	21
North Dunedin	ODIN042	9	11	45
Oamaru	ODIN017	13	16	41
Palmerston	ODIN045	10	12	49
Port Chalmers	ODIN020	9	11	40
Ranfurly	ODIN170	14	17	51
Roxburgh	ODIN065	7	8	28
South Dunedin	ODIN041	8	9	32

Figure 5: Distribution of $PM_{2.5}$ concentrations (24-hour average)

The box represents the interquartile range, with the median represented by the horizontal bar. The whiskers represent the smallest/largest values plus 1.5 times the interquartile range, and outliers are outside the whiskers.



[15] The regional variation of $PM_{2.5}$ concentrations are plotted spatially in Figures 6 and 7. Lake Hāwea, followed by the Luggate, Ranfurly and Oamaru sites had the highest average $PM_{2.5}$ concentrations during the winter months (Figure 6). The highest maximum 24-hour averages occurred in Lake Hāwea, Ranfurly, Palmerston and Green Island (Figure 7).

Figure 6: Mean winter $PM_{2.5}$

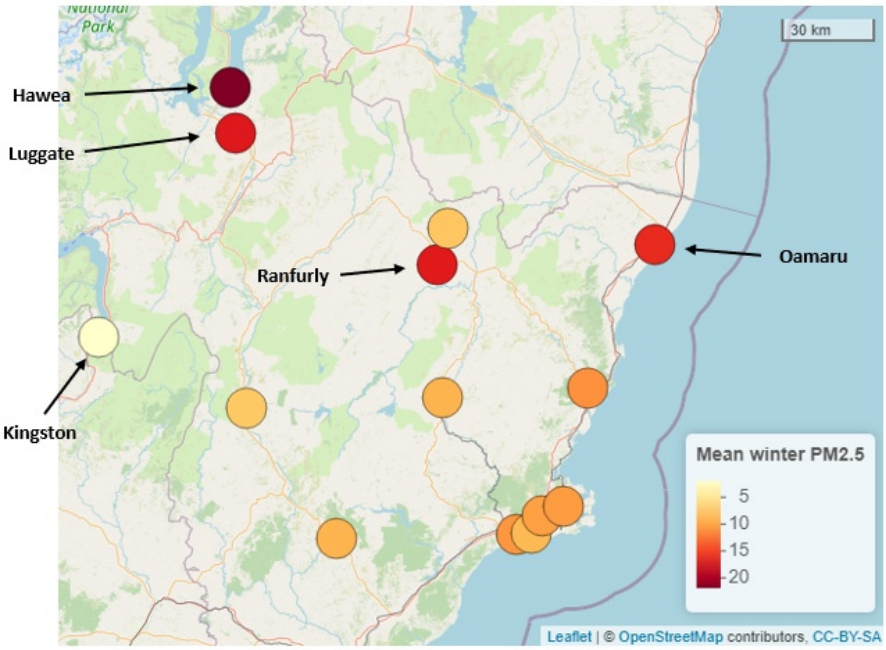
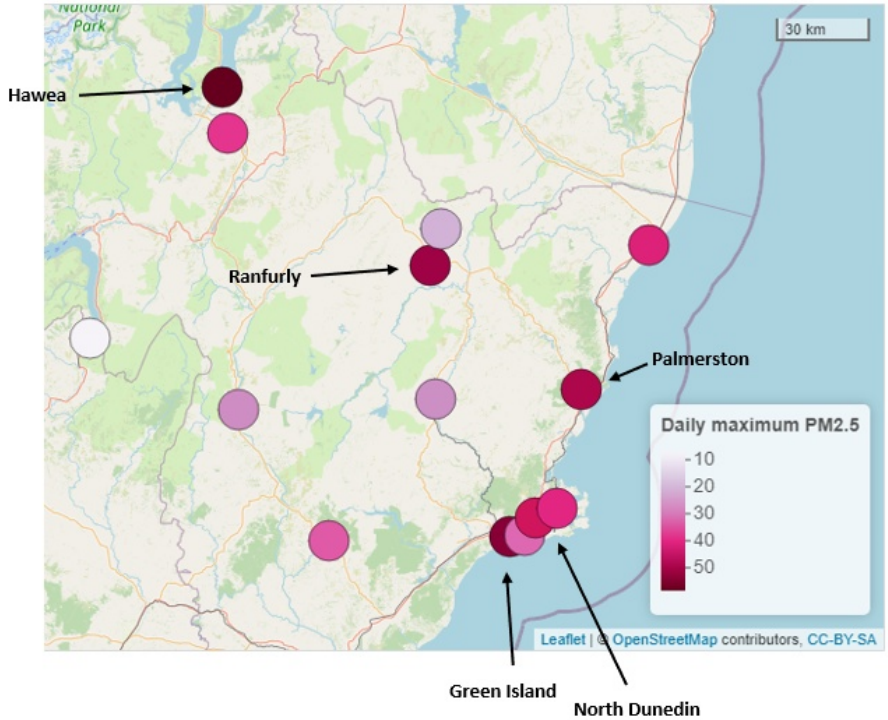


Figure 7: Daily maximum $PM_{2.5}$ concentration



[16] The relationship with wind speed and ambient temperature was examined at the four sites where meteorological data was available (Figures 8 and 9): Middlemarch, Oamaru, Ranfurly and South Dunedin. This data shows that wind speed has a stronger relationship with $PM_{2.5}$ than ambient temperature does for all four sites. Higher concentrations occurred on days with low wind speeds and less dispersion, which

aligns with observations made within the SOE network (ORC, 2021). The relationship with ambient temperature is the least strong at South Dunedin, which is similar to the pattern shown at Central Dunedin (ORC, 2021) and may indicate the presence of other sources of particulate matter, however more data would be needed to confirm this.

Figure 8: Relationship between $PM_{2.5}$ and wind speed

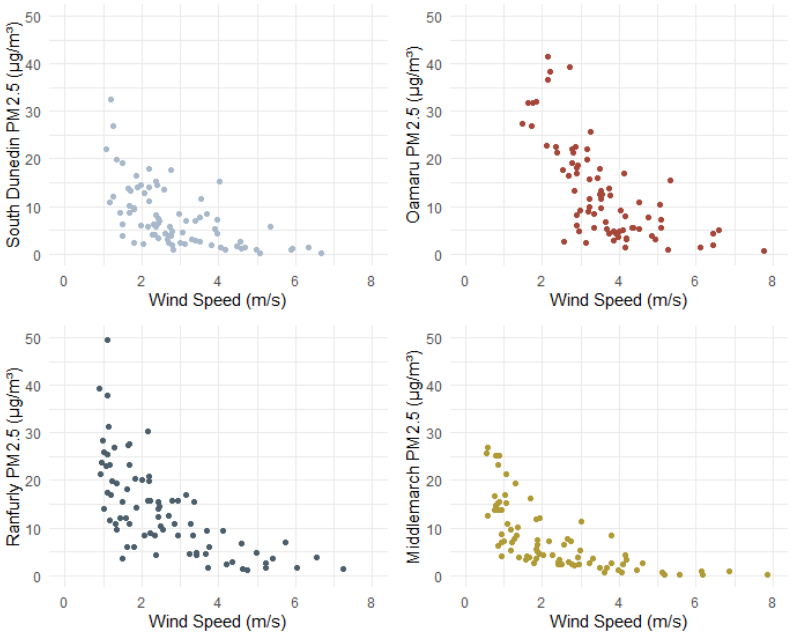
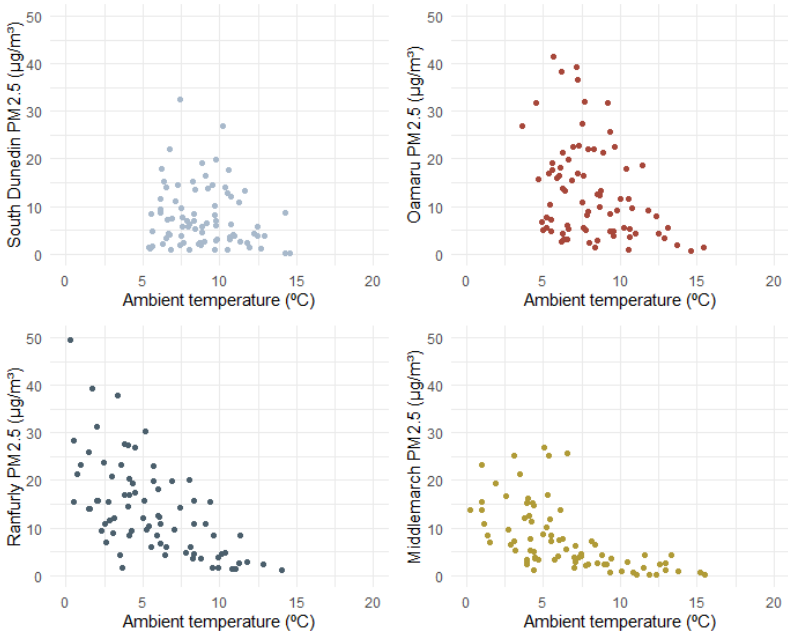


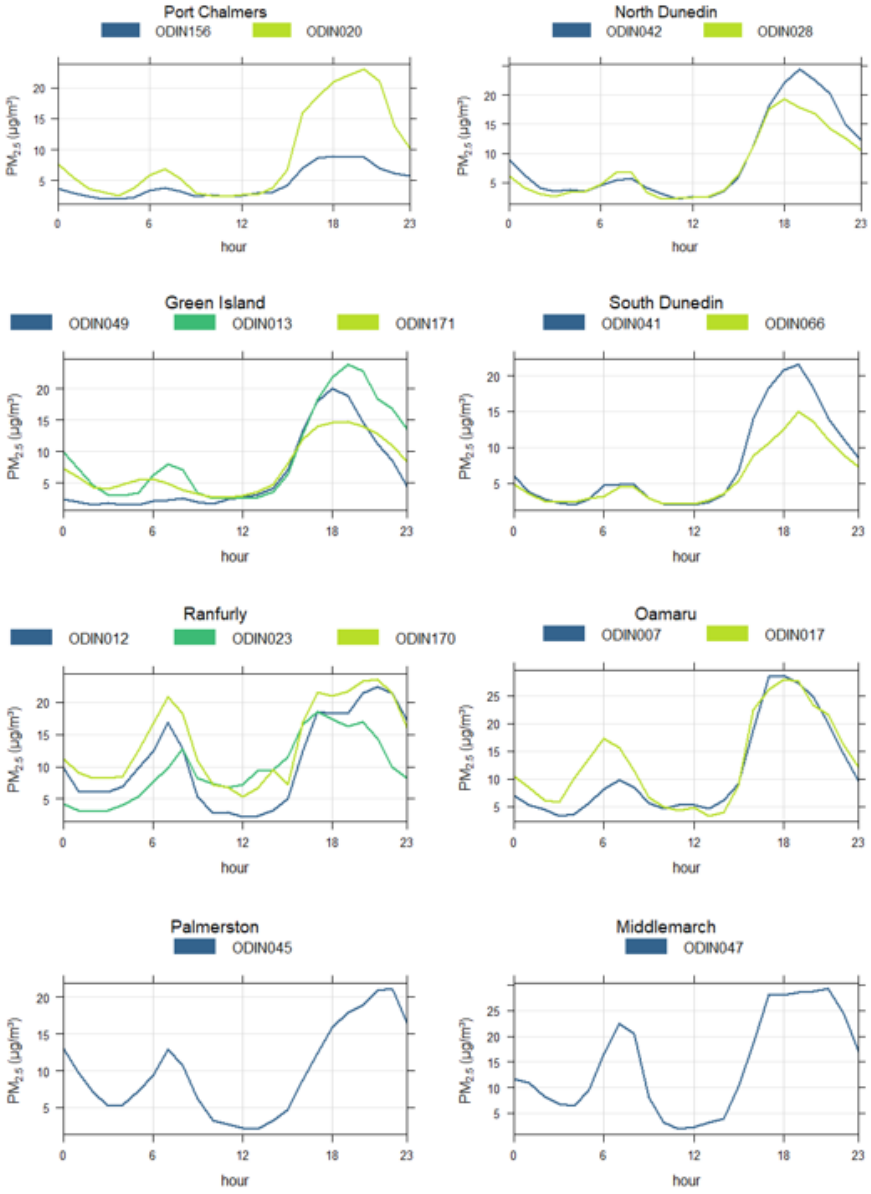
Figure 9: Relationship between $PM_{2.5}$ and ambient temperature

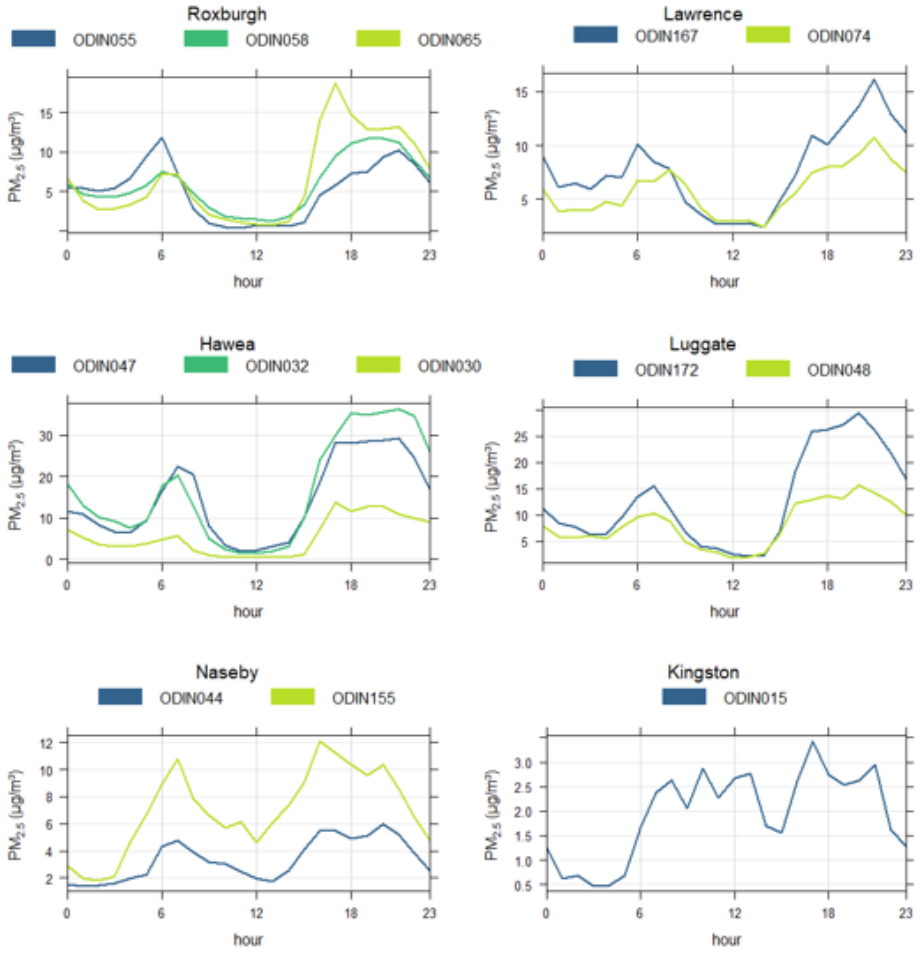


[17] The diurnal data from all ODINs display typical home heating signatures, represented by a large evening peak, and a smaller morning peak (Figure 10). The only site that does not display this pattern is the Kingston site. Further investigation would be

needed to confirm this however possible reasons include Kingston has very few emissions or the site was not located near the source of any emissions and was recording background concentrations. The plots below also demonstrate the spatial variation present in most airsheds, particularly between ODINs placed in Port Chalmers, Lake Hāwea and Luggate. This means these airsheds have more variability of emissions and/or pollutant dispersion. An interesting feature of the Lake Hāwea, Ranfurly and Luggate sites is the presence of a third peak in the late evening. A similar pattern occurs at the SOE site at Alexandra, where the atmospheric processes allow for a brief period of vertical temperature mixing and pollution dispersion before resuming stability for the rest of the night (ORC, 2021).

Figure 10: Diurnal $PM_{2.5}$ concentrations for each ODIN, separated by airshed





DISCUSSION

[18] The results of this study show that there are elevated concentrations of $PM_{2.5}$ in most airsheds in Otago, including non-gazetted airsheds such as Luggate, Middlemarch and Lawrence. The $PM_{2.5}$ data showed higher concentrations during winter months, as well as a diurnal pattern that characterises home heating emissions. These temporal patterns were present in all 29 monitoring locations that returned valid data, except for the site in Kingston.

[19] The $PM_{2.5}$ concentrations varied between and within airsheds, with the highest averages for both the monitoring period and the winter months being measured in Lake Hāwea, Luggate, Ranfurly and Oamaru. Spatial variation of the particulate matter was displayed in many of the airsheds where more than one ODIN returned data. This helped identify areas of high concentrations and/or low dispersion and will be helpful for guiding site locations for future investigations.

[20] The NESAQ is currently being updated to include a limit for $PM_{2.5}$. The proposed 24-hour limit is 25 µg/m³, and the current limit for PM_{10} is 50 µg/m³. The World Health Organization now recommends the $PM_{2.5}$ and PM_{10} limits to be set at 15 and 45 µg/m³ respectively, for 24-hour averages (WHO, 2021).

[21] The uncertainty associated with the higher recorded $PM_{2.5}$ concentrations mean that the data cannot be confidently compared to the proposed limits for the NESAQ. However, considering this uncertainty it is still clear that some of these airsheds are at risk of exceeding the proposed $PM_{2.5}$ limit of 25 µg/m³.

[22] The results of this study will be useful when assessing our existing gazetted airsheds and Air Zones for the upcoming review of the Regional Air Plan. The data supports the need to assess the airsheds to reflect current particulate matter concentrations, and future monitoring would be beneficial to confirm the extent of $PM_{2.5}$ issues and the likelihood of future exceedances of the NESAQ.

[23] The main limitations of this study were timing the co-location and type of reference instrument. The co-location was undertaken in October, with only low concentrations measured. Consequently, the higher concentrations in the dataset from this study have higher uncertainty. The reference instrument used was a hired non-reference method instrument (MetOne ES642), which means the collected data cannot be compared to relevant guidelines and limits, however this correction did allow for the accurate comparison between all ODINs. These limitations can be improved upon in future, by conducting two co-locations instead of one, and making sure one of them occurs during typical winter weather. Another improvement would be to correct the ODINs to an ORC SOE instrument, to be able to best compare with our SOE sites, and to relevant standards and guidelines.

REFERENCES

Bodeker Scientific, 2021. *2021 Otago Airsheds Particulate Matter Survey.*

Environet, 2019. *Wanaka, Cromwell and Clyde Air Emission Inventory – 2019.*

Olivares, G., Edwards, C., Longley, I., 2014. *The Outdoor Dust Information Node - ODIN Development and first tests.* NIWA, 41 Market Place, Auckland, NZ

ORC, 2021. *State and Trends of Air Quality in the Otago Region 2010-2019.*

World Health Organization, 2021. *WHO global air quality guidelines. Particulate matter (PM_{10} and $PM_{2.5}$), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide.*

CONSIDERATIONS

Strategic Framework and Policy Considerations

[24] This information may be useful for the assessment and comparison of airsheds and emission reduction scenarios modelling.

Financial Considerations

[25] NA

Significance and Engagement Considerations

[26] NA

Legislative and Risk Considerations

[27] NA

Climate Change Considerations

[28] NA

Communications Considerations

[29] NA

NEXT STEPS

[30] Further monitoring or investigations should be considered for Lake Hāwea, Ranfurly, Luggate, Oamaru and the Dunedin airsheds.

ATTACHMENTS

1. 2021 Otago Airsheds Particulate Matter Survey [**7.1.1** - 18 pages]

www.bodekerscientific.com

2021 Otago Airsheds Particulate Matter Survey

Introduction

In many of New Zealand's towns and cities air pollution due to particulate matter (PM) is a large health concern (Anderson et al., 2012; Pizzorno and Crinnion, 2017). This issue is exacerbated during winter months when many homes are heated by wood fires that degrade the air quality in New Zealand towns and cities, especially in the Otago region. The poor air quality in some Otago towns in the winter months is primarily caused by meteorological conditions that limit the dispersal of smoke from domestic solid fuel heating. At present, the Otago Regional Council (ORC) accepts that wood-burners are currently necessary to provide residents with adequate heating during winter months, but even with a significant portion of wood-burners being upgraded to MfE-compliant models during the past 15 years, non-dispersing smoke still creates PM levels that regularly exceed the standard set in the National Environmental Standard for Air Quality (NESAQ).

Project outline

While there are 22 airsheds in which PM levels are monitored in Otago, in many of these airsheds the PM levels are not continuously monitored. The purpose of this project was to assess the $PM_{2.5}$ concentrations (the mass concentration per volume of all particles smaller than 2.5 µm) within 15 airsheds across Otago. To understand the impact of winter-time pollution on the air quality around Otago, we conducted a comprehensive 3-month measurement campaign of airsheds that are not normally continuously monitored, across the Otago region, using PM sensors called ODINs (Outdoor Dust Information Nodes).

Airsheds are generally only monitored from a single location using one instrument. However, previous studies (e.g., Dale et al. 2020; Huggard et al. 2019) have shown PM levels can have large variations across an airshed. By using low-cost ODINs alongside a high-quality reference instrument, together with post-processing of the data set collected, we were able to install multiple sensors across each airshed and investigate how PM levels vary across a given airshed. The ODINs were acquired from NIWA and have been used in the MAPM (Mapping Air Pollution eMissions) measurement campaign in Christchurch, New Zealand. An ODIN is a self-contained unit, powered by a solar panel and the data recorded is stored on a SD card. They are relatively low-cost (around NZ$500 each) allowing for a large network of sensors to be installed in the region of interest.

A total of 47 ODINs were installed during the Otago campaign. The instruments were set up across 15 airsheds in the region on 10 July 2021, providing measurements until 27 September 2021 (see Appendix for the exact installation locations).

To ensure the instruments were performing continuously, data were retrieved in the middle of the campaign period (4-12 August 2021), allowing us to identify any ODINs that needed attention and to repair them if required. Where possible, ODINs were installed on roadside light

poles at a height of approximately 3 m. This height was a compromise of allowing the sensor to be well-ventilated while still sampling the air the public is exposed to. A typical installation is shown in Figure 1. In locations where light poles were not available, ODINs were instead mounted on private residential property, generally attached to a fence. For these ODINs, the installation height was often lower than 3 m.

Maps of the instrument locations within the 15 airsheds are shown in the Appendix and a list of the exact longitudes and latitudes of each installation is given in Table A.1. An interactive map of these locations is also available at: https://www.google.com/maps/d/edit?mid=1SIZ1X7oCds--_t2F1aplRz3Tk1MTJz9u&usp=sharing

Figure 1: A typical ODIN installation on a roadside light pole.

A simple pre-screening process was applied to all data obtained from the ODINs to remove erroneous values. Firstly, missing data were flagged as such and secondly, a plausible range ($0 < PM_{2.5} < 500\ \mu gm^{-3}$) was defined for the $PM_{2.5}$ measurement, and values outside that range were flagged. The data correction (details described below) was performed on all un-flagged data, i.e., erroneous data were excluded from the data set before the correction was applied.

As for any measurement, there will inevitably be some variance between the measured PM value and the *true* PM value for that location and time. Because we have no method to measure the *true* PM concentration, we instead aim our efforts at producing a consistent set of PM measurements, i.e., consistent between each instrument as well as consistent through time. To provide an accurate and consistent set of measurements we corrected all ODIN measurements against the best reference available, in this case, a sophisticated PM sensor (ES-642), which was installed at the Alexandra measurement site for this purpose. The ES-642 sensor was provided by Mote Ltd. Like the ODIN sensor, the ES-642 is a nephelometer that measures PM concentration via the scattering of light by the dust particles. The ES-642 uses a physical cyclone filter to filter out particles larger than 2.5 µm at the air intake. The intake air flow rate is monitored by the sensor and this value is used to derive the concentration of PM.

To ensure the best-possible correction of the ODIN measurements, we capitalised on the methodology developed during an earlier campaign: MAPM, which is described in detail in Dale et al. (2020). Briefly, this correction method involved co-locating all ODIN instruments for two weeks in Alexandra alongside the ES-642 instrument, immediately after the main measurement campaign. Using all the data collected during the co-location, a simple regression model was

applied to derive a relationship between the measurements from the ES-642 and the ODIN data obtained during the co-location period. The regression model applied to each individual ODIN was in the form of:

$$PM_{2.5\_ES\text{-}642} = \alpha \times PM_{2.5\_ODIN}$$

where $PM_{2.5\_ES\text{-}642}$ are the hourly $PM_{2.5}$ concentrations measured by the reference instrument, $PM_{2.5\_ODIN}$ are the raw hourly $PM_{2.5}$ concentrations measured by each individual ODIN instrument, and α is the fit coefficient. The application of this model results in one regression model fit-coefficient per ODIN. The fit-coefficients were then used to correct the raw ODIN data that were obtained during the main deployment period. In addition, measurement uncertainty estimates were derived for these corrected measurements.

Unit performance

During the campaign, there were several ODINs that failed to retrieve data for the entire campaign, and some ODINs did not collect data for part of the campaign or during the co-location period. The instrument IDs of these ODINs are listed in Table 1 together with a short note explaining the reason why some data were missing. ODINs failed to retrieve data for a variety of reasons, including:

- Some ODINs had electrical faults that prevented them from retrieving data.
- Some ODINs went missing (presumed stolen) or were vandalised during the campaign and their data could not be retrieved.
- One ODIN was moved by a member of the public, reducing the period in which it was able to collect data.
- Several ODINs had errors in their sensors, so whilst they collected data throughout the campaign, the data was deemed incorrect.

The following table summarises the ODIN instruments for which we were not able to correct the collected data due to the lack of measurements obtained. Note that for some of these ODINs, there are still the raw data available which can provide some information on the $PM_{2.5}$ levels in the location where the instrument was installed.

ODIN	Comment
056	ODIN presumed stolen.
054	ODIN presumed stolen.
034	ODIN only collected a small amount of data during the co-location.
062	ODIN failed to collect data during co-location.

006	ODIN failed to collect data during co-location.
021	ODIN failed to collect data during deployment.
057	ODIN failed to collect data during co-location.
039	Sensor error.
010	ODIN failed to collect data during co-location.
051	ODIN failed to collect data during co-location.
043	ODIN only collected a small amount of data during deployment.
077	ODIN collected erroneous time data during co-location.
033	Co-location data not retrievable due to the corrupted SD card.
072	ODIN presumed stolen.
009	No co-location data due to ODIN being removed and vandalised.
025	ODIN failed to collect data during co-location.
024	ODIN only collected a small amount of data during co-location.
022	ODIN only collected a small amount of data during deployment.

Table 1: A list of the ODIN instruments for which we were not able to provide a corrected data set due to missing data.

Data limitations

Because ODIN measurements are corrected against ES-642 measurements, the accuracy of the corrected ODIN measurements is limited by the accuracy of the measurements of the ES-642. Dale et.al. (2020) found no large systemic biases in ES-642 measurements.

The accuracy of the correction is also limited by the $PM_{2.5}$ concentrations that occurred naturally during the co-location. During the co-location, the highest hourly averaged $PM_{2.5}$ concentration was 15.2 μgm^{-3}. This means that when correcting $PM_{2.5}$ values greater than 15.2 μgm^{-3} we do not have any values from the co-location to compare to when correcting these values, so the regression model is based upon an extrapolation of the co-location data. To minimise potential errors on the corrected PM values due to this extrapolation a relatively simple single coefficient regression model was used.

Together with the corrected data, we also derived uncertainty estimates on each measurement, which account for inherent limitations of the correction between ODIN measurements and measurements from the ES-642 over the co-location period. The uncertainties provided with the

data set represent the prediction interval, i.e. the 95% confidence interval. Each measurement is provided with an upper and lower bound, i.e. if ES-642 was co-located with an ODIN over the deployment period, the ES-642 would report a measurement that lies between the ODIN measurements and the two bounds 95% of the time.

The regression model used to produce the correction and the uncertainty estimates was trained on the data collected during the co-location period. The environmental conditions (temperature, humidity, PM distribution, rainfall, etc.) that were present at each of the 47 sites during the deployment period were not all experienced during the co-location in Alexandra. This means there may be greater uncertainty in the correction applied to the ODIN measurements for periods of more extreme environmental conditions, especially in coastal airsheds such as Dunedin and Oamaru whose climates are significantly different to that of Alexandra. Ideally an additional co-location would have been performed at a coastal site.

The limitations on this data set are typical to what would occur during any similar measurement campaign. Despite these limitations, the data set collected provides insights into the air quality in Otago airsheds and can be used within the provided uncertainties to determine the number of exceedances of national air quality standards, as well as providing a basis for an investigation to the variation of air quality across a given airshed.

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Dale, E. R., Kremser, S., Tradowsky, J. S., Bodeker, G. E., Bird, L. J., Olivares, G., Coulson, G., Somervell, E., Pattinson, W., Barte, J., Schmidt, J.-N., Abrahim, N., McDonald, A. J., and Kuma, P.: The winter 2019 air pollution ($PM_{2.5}$) measurement campaign in Christchurch, New Zealand, Earth Syst. Sci. Data, 13, 2053–2075, https://doi.org/10.5194/essd-13-2053-2021, 2021.

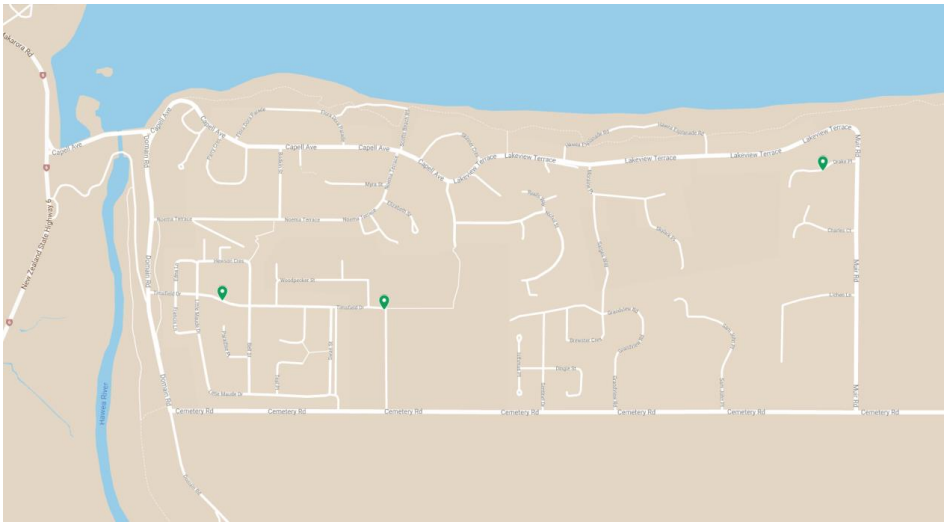
Huggard, H., Koh, Y. S., Riddle, P., and Olivares, G.: Predicting Air Quality from Low-Cost Sensor Measurements, in: Data Mining, Springer Singapore, 94–106, https://doi.org/10.1007/978-981-13-6661-1_8, 2019.

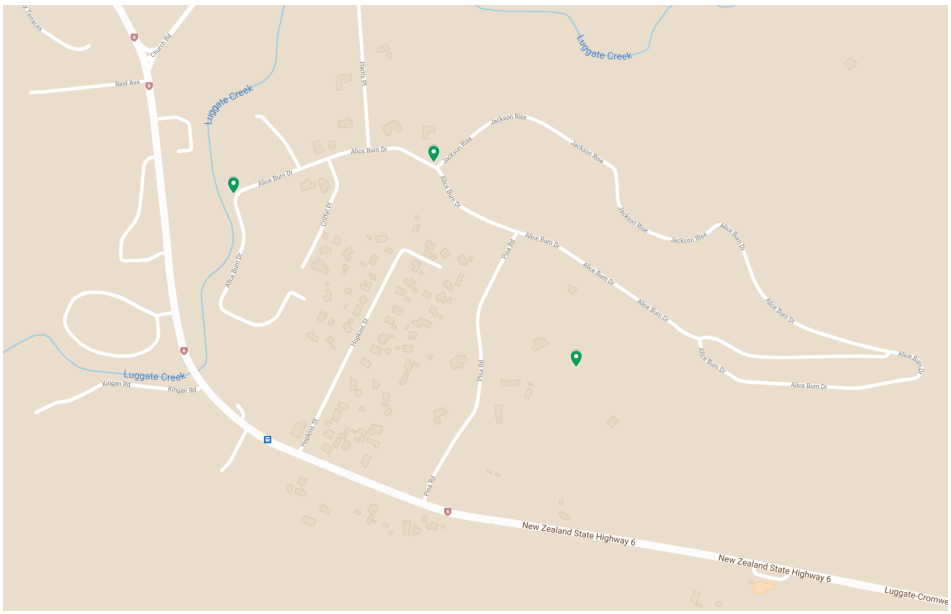
Appendices

A.1 Installation location maps

Table A.1 shows maps of all ODIN installation locations within each airshed. The ODIN installation sites are shown by the green pins. The airsheds that the ODINs were installed in are:

- Hawea
- Luggate
- Kingston
- Roxburgh
- Lawrence
- Naseby
- Ranfurly
- Middlemarch
- Oamaru
- Palmerston
- Waikouaiti
- Port Chalmers
- North Dunedin
- South Dunedin
- Green Island

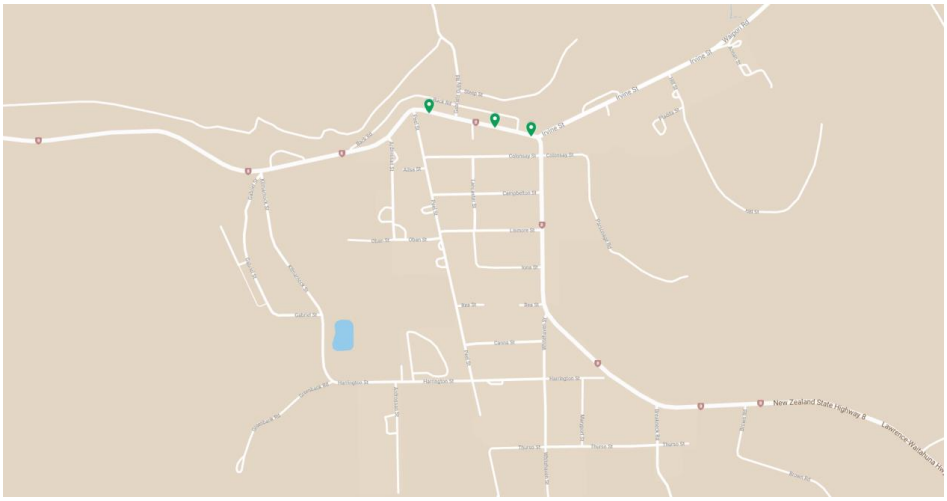
Hawea


Luggate

Kingston


7

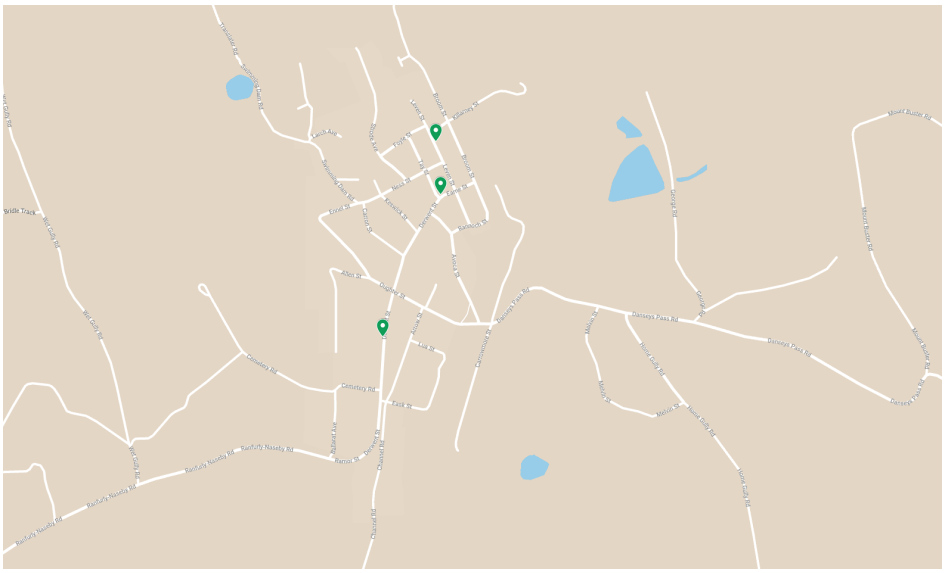
Roxburgh

Lawrence

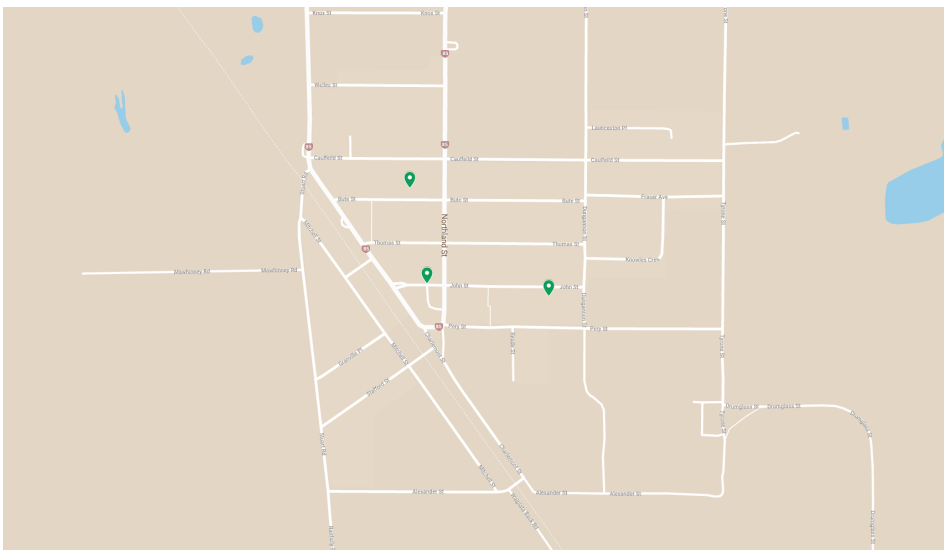


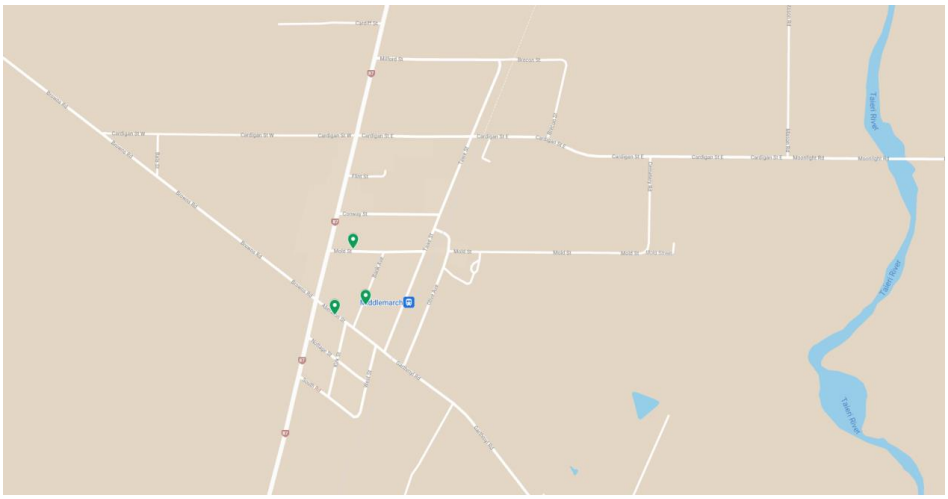
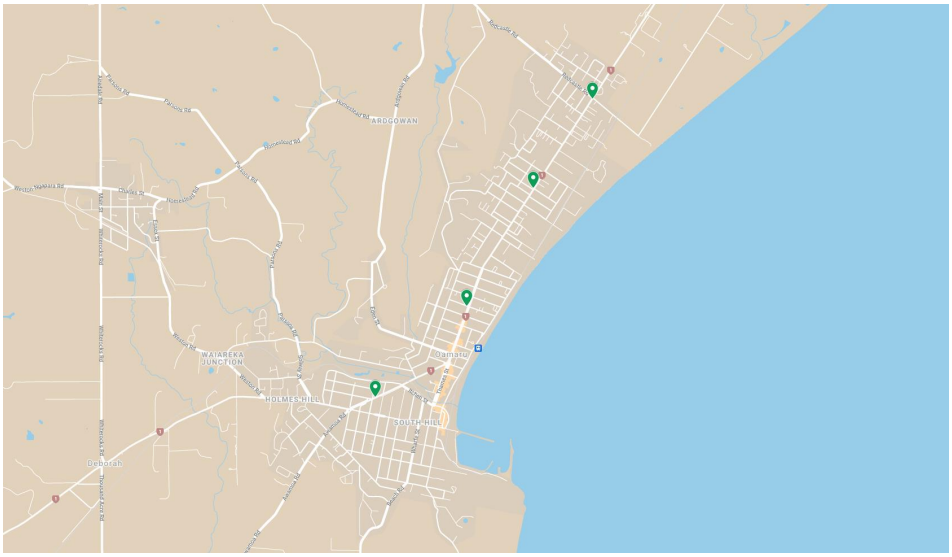
8

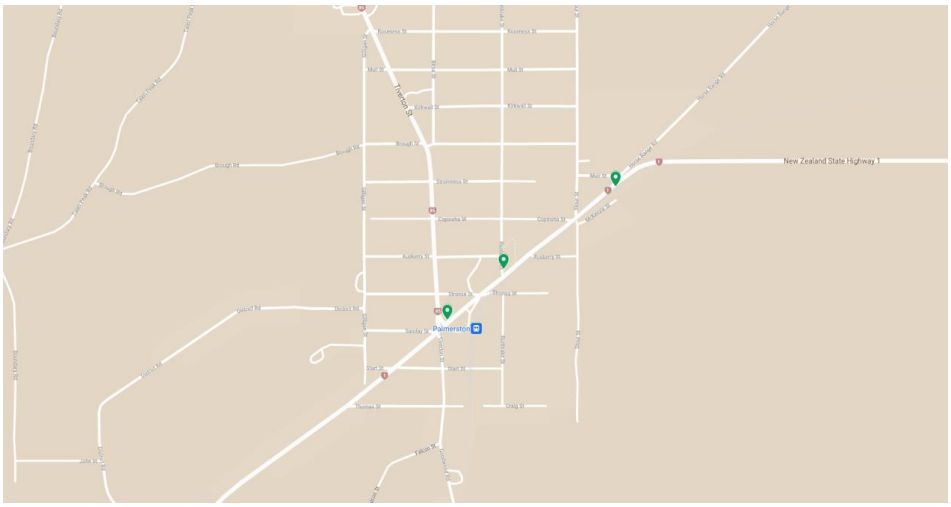
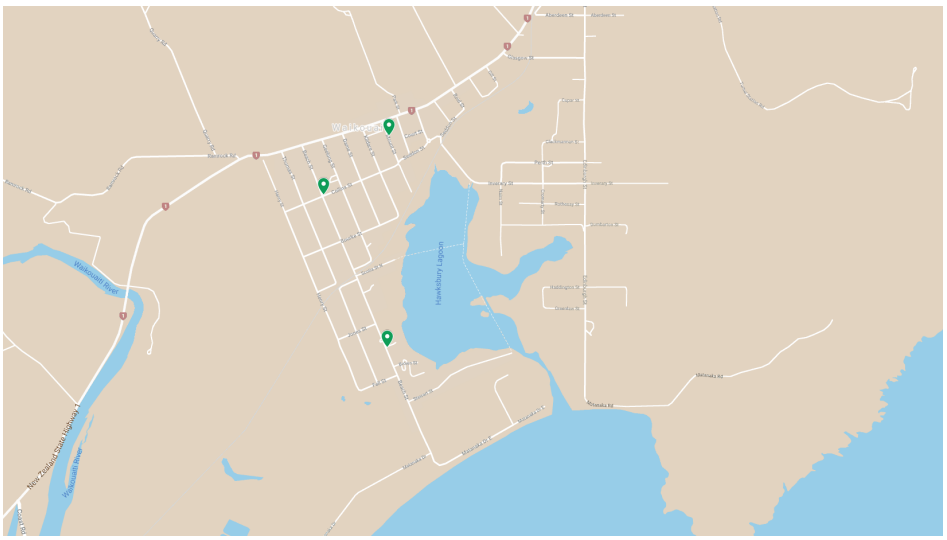
Naseby

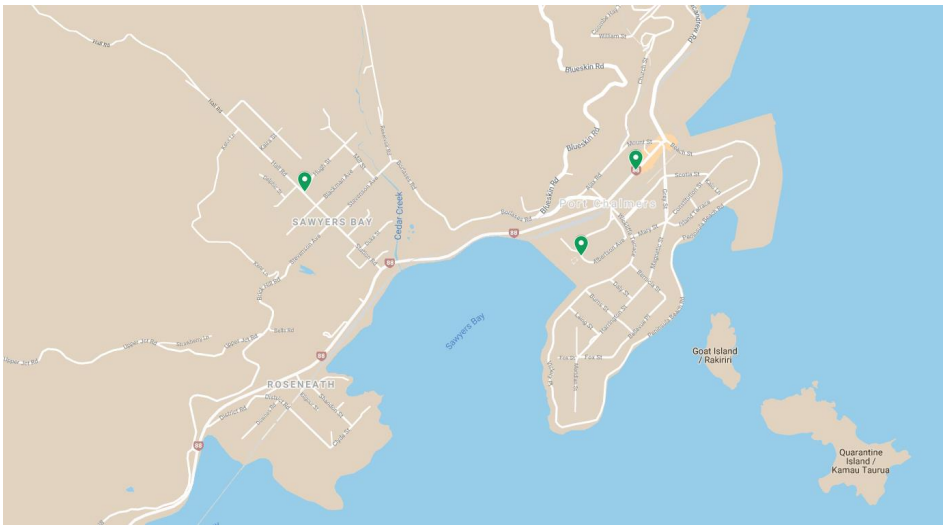
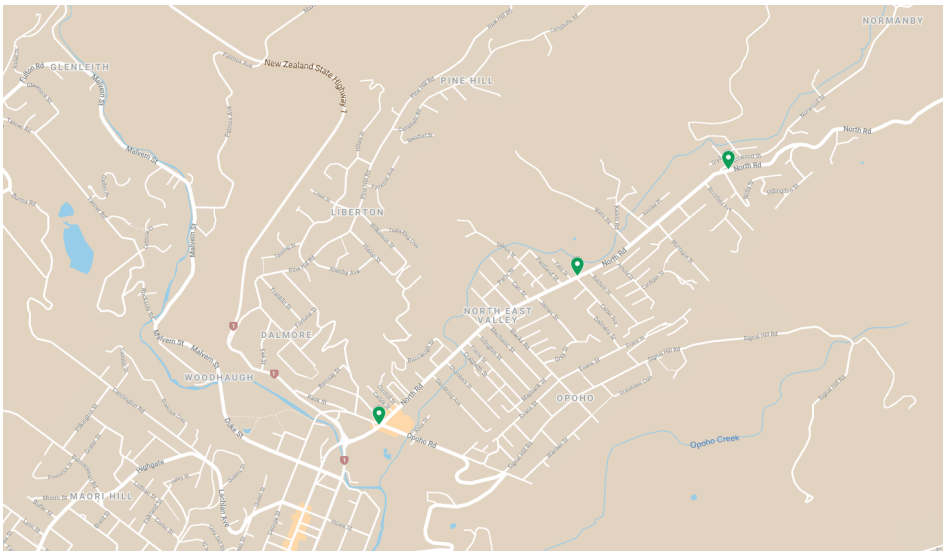


Ranfurly



Middlemarch

Oamaru


Palmerston

Waikouaiti


Port Chalmers

North Dunedin


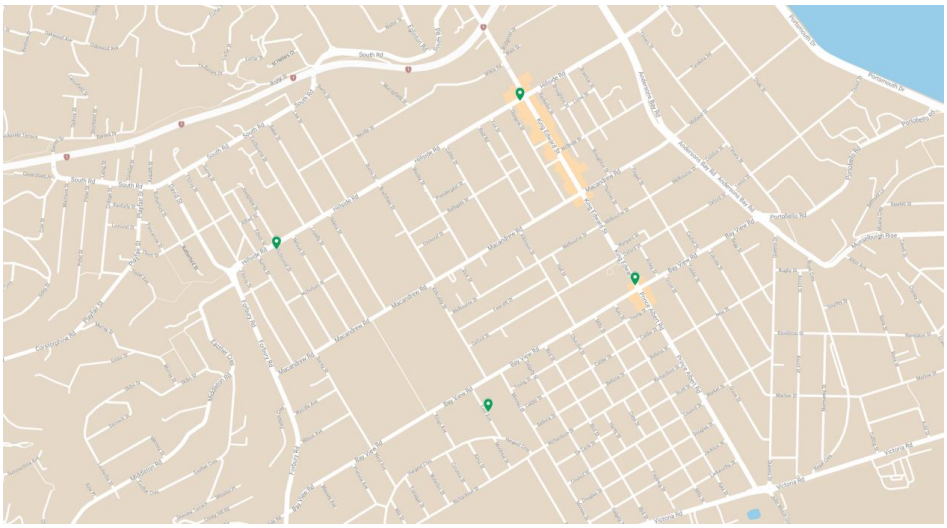
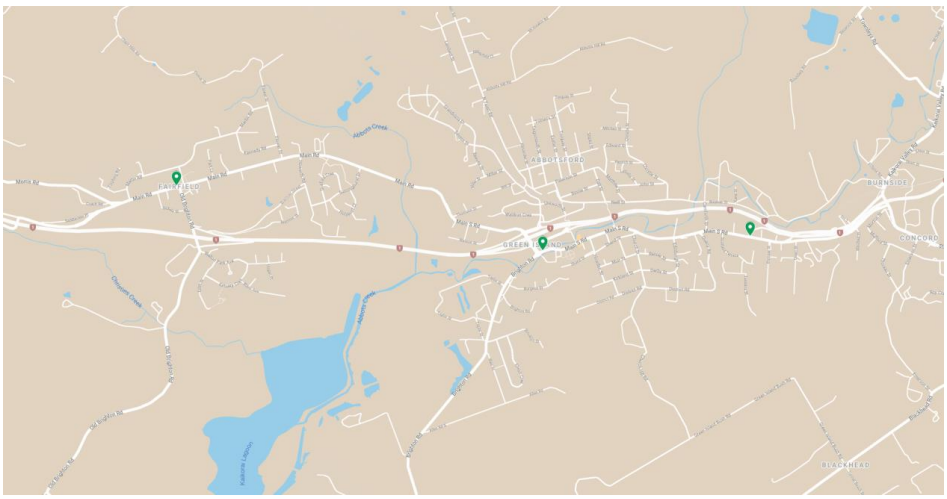
South Dunedin

Green Island


Table A.1: Maps of the installation locations of the ODIN sensors

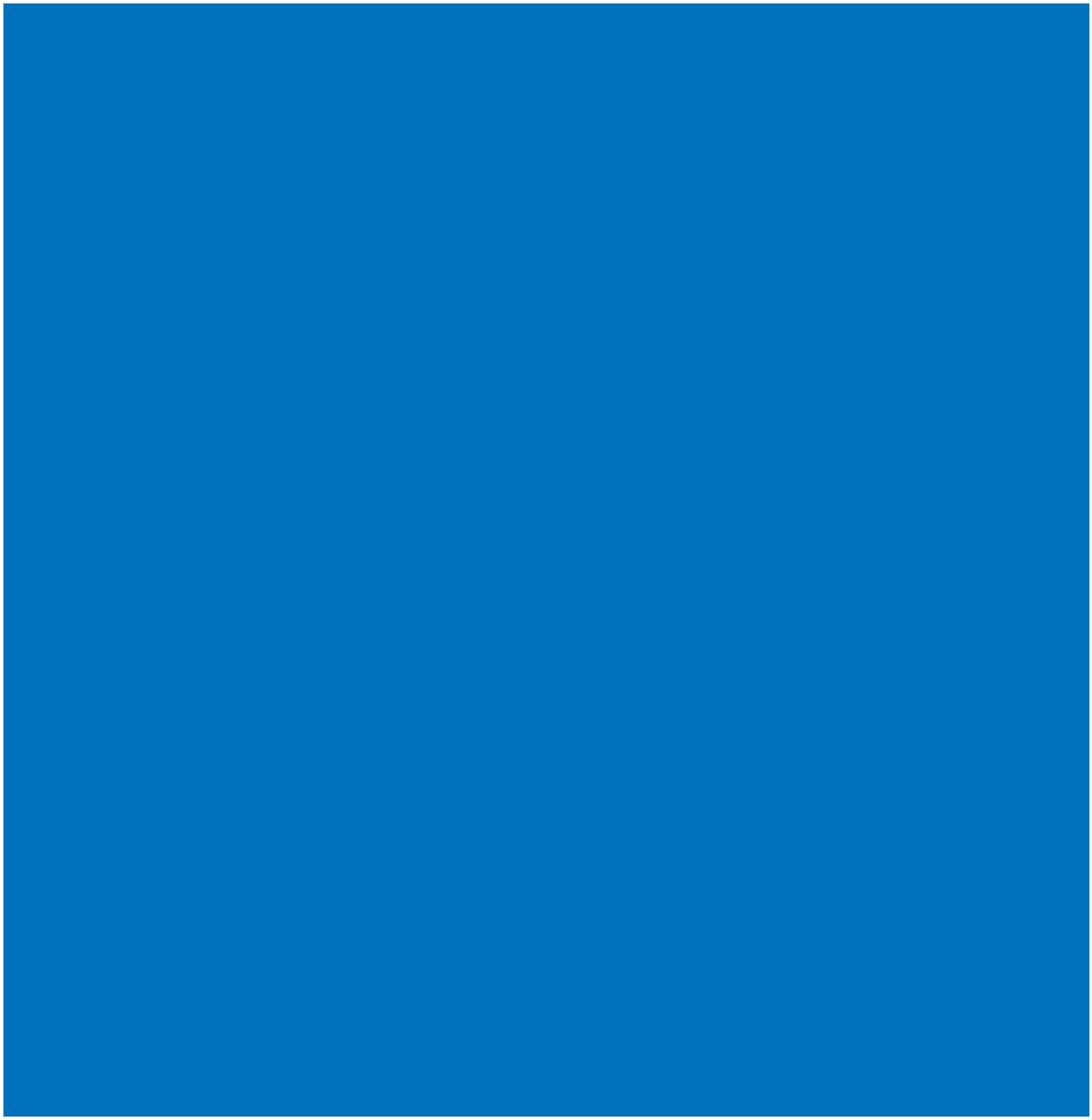
A.2 Table of installation locations

Airshed/ODIN	Latitude [°S]	Longitude [°E]	Altitude [m]
Roxburgh			
ODIN065	45.5426	169.3189	99
ODIN058	45.5401	169.3144	109
ODIN055	45.5352	169.3084	89
Lawrence			
ODIN054	45.9126	169.6844	116
ODIN167	45.9132	169.6887	116
ODIN074	45.9129	169.6872	114
Green Island			
ODIN049	45.899	170.3915	66
ODIN013	45.9025	170.4248	14
ODIN171	45.9022	170.4428	38
South Dunedin			
ODIN041	45.8982	170.4865	16
ODIN034	45.8934	170.4981	17
ODIN066	45.8989	170.503	12
ODIN062	45.9028	170.4957	15
North Dunedin			
ODIN006	45.8548	170.5173	27
ODIN042	45.8483	170.5316	36
ODIN028	45.8432	170.5415	59
Middlemarch			
ODIN021	45.5062	170.1202	213
ODIN057	45.509	170.1209	220
ODIN050	45.51	170.1211	200
Port Chalmers			
ODIN156	45.8165	170.6204	18
ODIN020	45.8204	170.6176	1

ODIN039	45.8168	170.6002	20
Waikouaiti			
ODIN010	45.5962	170.6673	30
ODIN051	45.6074	170.6697	13
ODIN043	45.5979	170.6103	35
Palmerston			
ODIN077	45.4847	170.7152	22
ODIN045	45.4833	170.7174	8
ODIN033	45.4809	170.722	30
Oamaru			
ODIN007	45.1011	170.9601	69
ODIN056	45.0915	170.9737	21
ODIN072	45.0788	170.9838	16
ODIN017	45.0613	170.9928	34
Ranfurly			
ODIN012	45.129	170.0999	439
ODIN170	45.1295	170.1047	451
ODIN023	45.1265	170.0992	443
Naseby			
ODIN044	45.022	170.1466	608
ODIN155	45.0233	170.1466	604
ODIN009	45.0274	170.1445	593
Luggate			
ODIN172	44.7485	169.2762	299
ODIN025	44.7458	169.2735	295
ODIN048	44.7462	169.2698	296
Hawea			
ODIN047	44.6113	169.2799	365
ODIN032	44.6152	169.2557	359
ODIN030	44.6157	169.2685	364
Kingston			

ODIN024	45.3373	168.7217	339
ODIN015	45.3353	168.7189	324
ODIN022	45.3318	168.7143	333

Table A.2: The installation locations of the ODIN sensors



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7.2. Queenstown & Dunedin Patronage Report

Prepared for:	Data and Information Committee
Report No.	PPT2215
Activity:	Transport - Public Passenger Transport
Author:	Julian Phillips, Implementation Lead - Transport, Gemma Wilson – Analyst Transport, Jack Cowie – Total Mobility Coordinator
Endorsed by:	Gavin Palmer, General Manager Operations
Date:	14 September 2022

PURPOSE

[1] To update the Committee on the performance of its public transport (bus and ferry) and total mobility services, for the Financial Year (FY) 1 July 2021 to 30 June 2022.

[2] NOTE: FY refers to the 12-month 2021/22 Financial Year, being 1 July 2021 to 30 June 2022, compared to the equivalent previous Financial Year, 1 July 2020 to 30 June 2021.

[3] July 2022 data is also analysed separately, being the most recently available data, the first month of the new Financial Year, and the month during which reduced timetables were introduced. The impact of reduced timetables on missed trips is also included in this section.

[4] This report also considers the effect of half price fares on patronage.

EXECUTIVE SUMMARY

[5] In Dunedin, FY 2021/22 patronage is lower, at 2,367,099 trips (-13% overall), than for FY 2020/21.

[6] Fare-free travel in July and August 2020 resulted in exceptional levels of patronage during those months, returning to typical levels in September and October 2020.

[7] Comparing FY 2021/22 with pre-COVID FY 2018/19, patronage has decreased by 7%. This figure provides an indication of the impact of COVID restrictions on boardings.

[8] FY 2021/22 fare revenue for Dunedin is significantly higher (+12%) than for FY 2020/21, despite the continuation of the $2 fare trial. This is due to fare-free travel through July and August 2020, with the Bee Card introduced concurrently in Dunedin on 1 September 2020, alongside the introduction of the $2 flat fare trial.

[9] For Queenstown FY 2021/22, patronage is lower, at -9% overall, compared to FY 2020/21.

[10] Fare-free travel in July and August 2020 and up to 15 September 2020 (Bee Card launch date for Queenstown) resulted in higher levels of patronage during those months than might be expected for the period, decreasing in September and October 2020.

[11] Comparing FY 2021/22 with pre-COVID FY 2018/19, Queenstown patronage has decreased by 45%. This figure provides an indication of the impact of COVID restrictions on boardings.

[12] From 1 March 2022 to 30 June 2022 the Dunedin network experienced an average of 50 missed trips per day across 111,686 trips.

[13] The total number of missed trips for Dunedin during this period was 6,104, or 5.47% of trips operated. This compares with a total of 526 missed trips for the preceding 8-month period from 1 July 2021 to 28 February 2022, or 0.23% of trips operated.

[14] From 1 March 2022 to 30 June 2022 the Queenstown network experienced an average of 4.5 missed trips per day across 35,014 trips.

[15] The total number of missed trips was 552, or 4.5% of trips operated. This compares with a total of 42 missed trips for the preceding 8-month period from 1 July 2021 to 28 February 2022, or 0.06% of trips operated.

[16] Reduced timetables were introduced across the network in July 2022. Statistics for missed trips are included in the July section of this report.

[17] As at 25th August 2022, Otago has 83,332 registered Bee Card users. This is an increase of 4,880 cards since May.

[18] 149,426 cards have been issued and distributed in Otago, which equates to more than three-quarters of the combined population of Dunedin and Queenstown. *Note that this is slightly lower than the figure of 156,270 cited in the previous Committee report, due to a ticketing system reporting error.*

[19] The accuracy of Real Time Tracking (RTI) has been increased with the data feed now being derived from a hierarchy of on-bus devices, with the primary source now being the Bus Driver Console (RITS ticketing device), followed by E-Road and Wi-fi hardware.

[20] The Queenstown Ferry service is also included in this report, comparing FY 2021/22 to FY 2020/2021. 2021/22 fare revenue decreased by 3% to $282,585.80. Patronage increased by 15% to 60,054. The reason for the increase in patronage alongside a decrease in revenue may be a result of the service being primarily used by residents whilst tourism levels are low. Locals benefit from a multi-trip card which discounts the total trip cost.

[21] For Total Mobility, there has been a decrease of 18.2% in Otago patronage for FY 2021/22, with 89,705 trips (compared to 108,782 in FY 2020/21).

RECOMMENDATION

That the Data and Information Committee*:*

1) ***Notes** this report.*

BACKGROUND

[22] The Council (ORC) contracts public transport services in Dunedin and Queenstown to two transport operators; Ritchies and Go Bus. Network coverage is shown in Figures 1 and 2 (larger versions are in Attachments).

[23] Each Transport Operator is contracted to operate 'PTOM Units' (each unit being a collection of routes contracted to an operator, as defined by the 2014 Regional Public Transport Plan. PTOM stands for Public Transport Operating Model).

[24] There are 7 Units in total, 2 in Queenstown, both operated by Ritchies; and 5 in Dunedin, operated by both Ritchies and Go Bus.

[25] As can be seen in Figure 1, the Dunedin network comprises 23 routes that extend to Palmerston in the north and Mosgiel in the west.

[26] For FY 2021/22, the Dunedin network carried 2,367,099 passengers. This is 13% lower than FY 2020/21 (2,706,470) and 7% lower than the last pre-COVID period FY 2018/19 (2,548,330). The LTP has a target to increase patronage for 2021/22.

[27] The Queenstown network comprises five routes that extend to Arrowtown in the east to Jack's Point in the south (see Figure 2).

[28] For FY 2021/22, the Queenstown network has carried 806,820 passengers. This is 9% lower than FY 2020/21 (889,063) and 45% lower than the last pre-COVID period FY 2018/19 (1,468,057). As for Dunedin, the LTP had a target for Queenstown to increase in patronage for 2021/22.

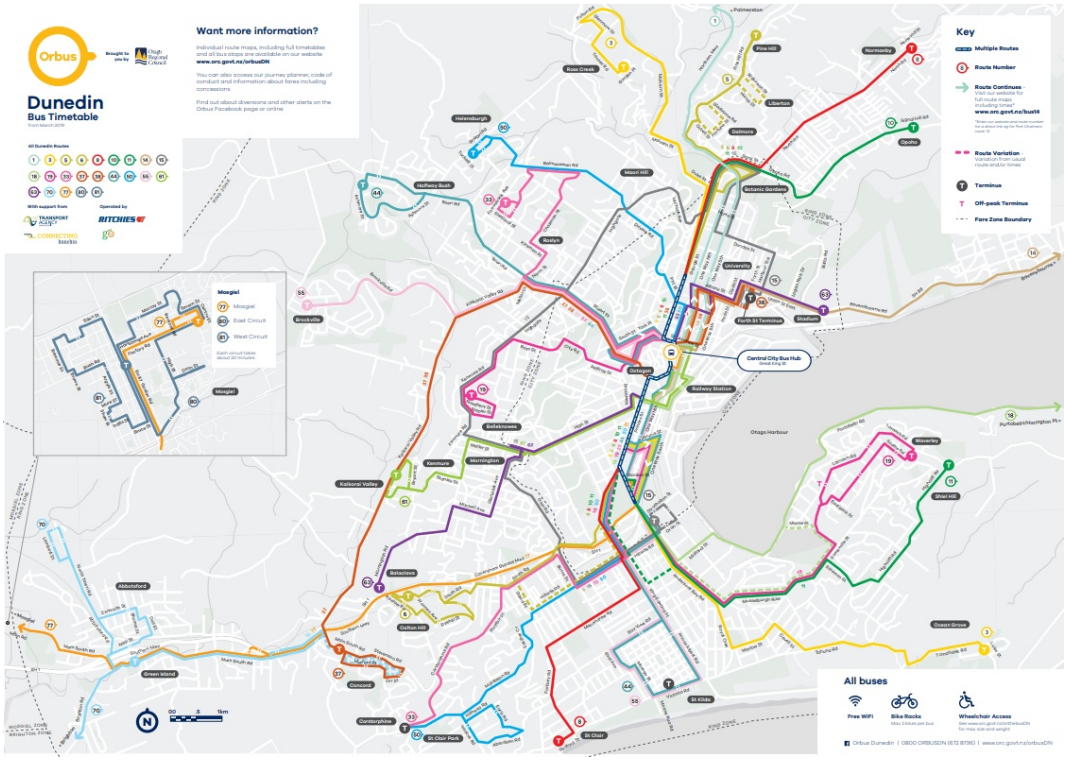


Figure 1: Dunedin network

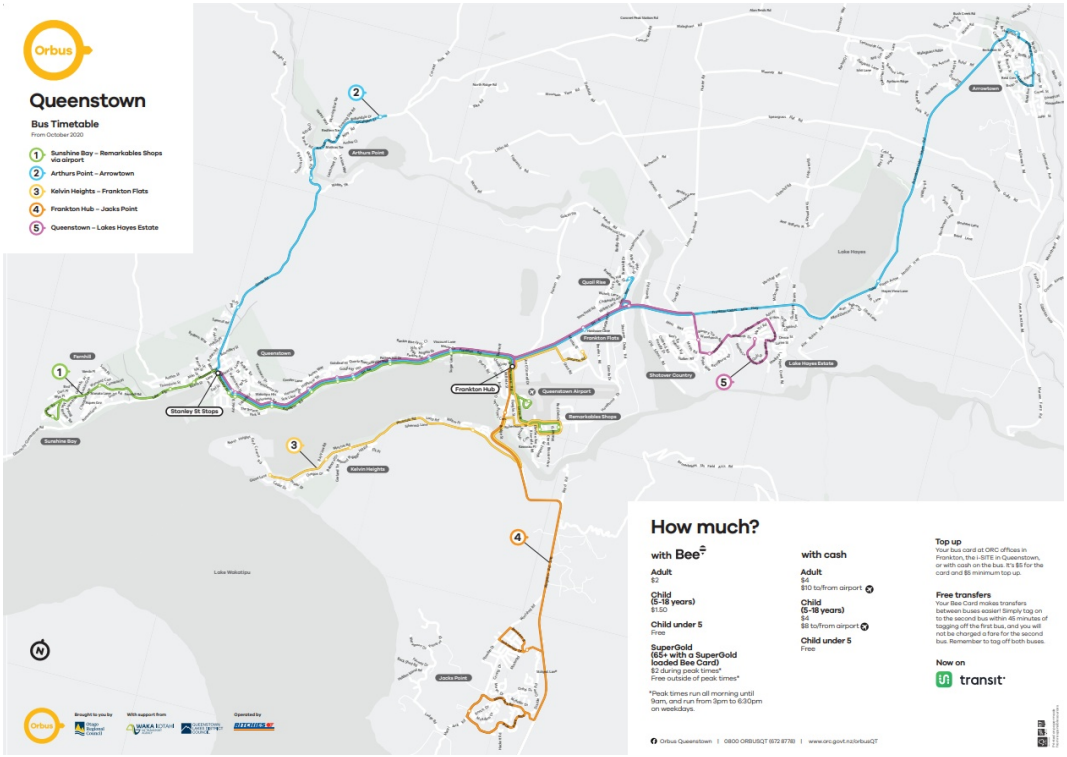


Figure 2: Queenstown network

[29] The following report summarises patronage trends across both networks, comparing the FY 2021/22 to FY 2020/21, with a comparison to the last pre-COVID period, which is FY 2018/19. Additional data is provided to cover July 2022. Monthly statistics comparing the previous years are also provided. It also addresses customer complaints and provides information on the Total Mobility scheme and use of the Real Time information system. Trip cancellation data is also reviewed, in the context of increased levels of missed trips caused by staff absence due to COVID-19 illness and driver shortages.

DISCUSSION

PUBLIC TRANSPORT – DUNEDIN

[30] In Dunedin, the impacts of COVID-19 continue to affect patronage, although it is recovering.

[31] Patronage for the months prior to November 2021 impact the overall FY comparison. These preceding months were affected by the Level 2, 3 and 4 restrictions. Level 3 continued to 7 September 2021 and Level 2 until 1 December 2021, superseded by the COVID-19 Protection Framework which remains in place at the time of writing.

[32] For FY 2021/22, Dunedin is tracking at 87% patronage levels when compared to FY 2020/21, noting that in July and August 2020 travel in Dunedin was fare-free and therefore patronage was atypically higher for this reason.

[33] Comparing FY 2021/22 against FY 2018/19 (the last pre-COVID-19 period), Dunedin is tracking at 93% patronage levels This provides an indication of the relationship between COVID restrictions and Dunedin's performance, being a comparison with a year

unaffected by COVID-19 restrictions. Notably, July, November, December, May and June 2021/22 patronage are all higher than the equivalent pre-COVID period of 2018/19.

Dunedin	July	August	September	October	November	December	January	February	March	April	May	June	Totals
2018/19 Patronage	195,272	235,930	221,438	212,965	223,894	177,520	172,142	213,992	246,593	198,745	245,477	204,362	**2,548,330**
2019/20 Patronage	220,652	235,666	230,329	224,285	226,692	182,910	181,525	228,477	175,526	26,802	68,709	197,681	**2,199,254**
2020/21 Patronage	293,294	278,162	209,278	224,799	223,263	190,821	160,848	201,611	250,266	195,795	243,550	234,783	**2,706,470**
2021/22 Patronage	231,082	144,505	170,397	196,538	223,952	185,219	156,857	190,746	213,639	185,831	246,438	221,895	**2,367,099**
2022/23 Patronage	194,544												

Figure 3: Dunedin patronage statistics Financial Year 2018/19 to date

[34] A new weekend Waitati / Karitane / Waikouaiti / Palmerston service was introduced in June 2022, in response to a request from the Waikouaiti Coast Community Board.

[35] This is the first time a weekend public transport route has serviced this area. Patronage for this service is shown in the table below:

Weekend	4-5 June	11-12 June	18-19 June	25-26 June	2-3 July	9-10 July	16-17 July	23-24 July	30-31 July	Total	Average/day
Patronage	71	39	72	63	53	62	52	52	52	**516**	**29**

[36] Increasing levels of missed trips have been experienced across the network, a nationwide issue due primarily to increased levels of driver absence caused by COVID-19 and seasonal illnesses, exacerbated by the current national driver shortage.

[37] From 1 March 2022 to 30 June 2022 the Dunedin network experienced an average of 50 missed trips per day across 111,686 trips.

[38] The total number of missed trips for Dunedin during this period was 6,104, or 5.47% of trips operated. This compares with a total of 526 missed trips for the preceding 8-month period from 1 July 2021 to 28 February 2022, or 0.23% of trips operated.

[39] Figure 4 tracks daily missed trips, which trend to a peak at end June 2022, prior to the introduction of reduced timetables in July 2022.

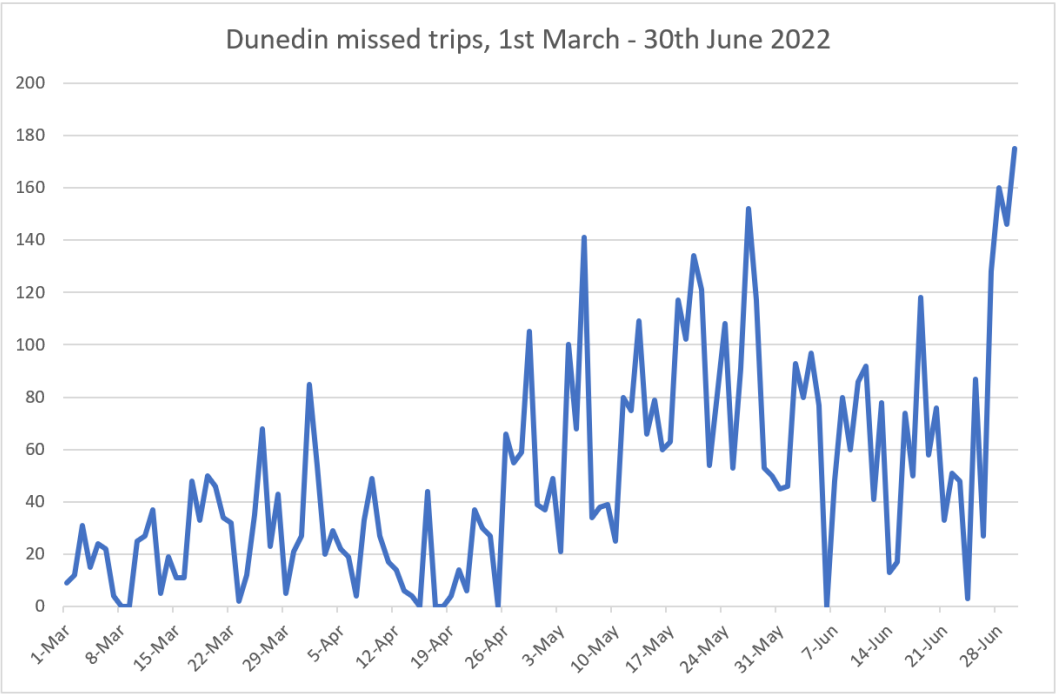


Figure 4: Dunedin missed trips, 1 March 2022 to 30 June 2022

[40] Figure 5 shows the annualised relationship between the varying COVID-19 alert levels on patronage for Dunedin, together with the increases in patronage associated with pre-Bee Card fare-free travel:

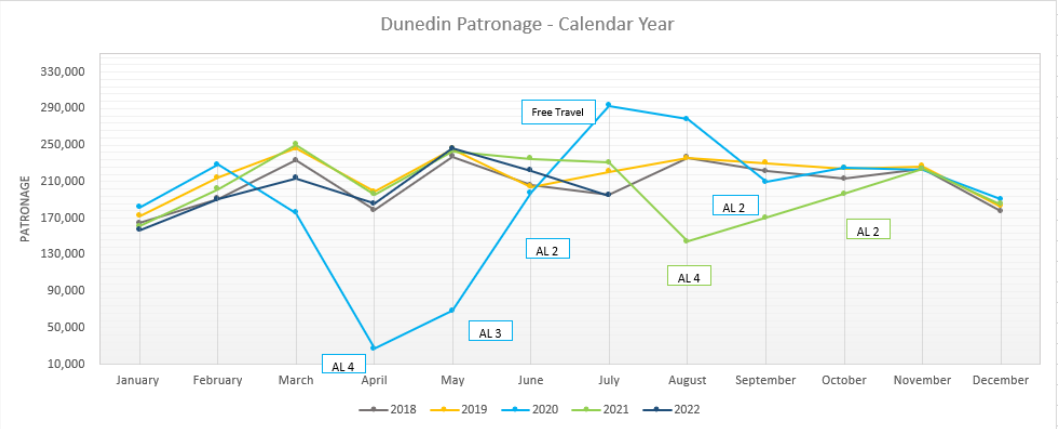


Figure 5: Relationship between COVID-19 alert levels and patronage

[41] Figures 6 to 8 chart FY unit revenue and patronage, as well as detail on the most recent month's data.

[42] Revenue and budgeting assumptions for the Dunedin network are impacted by COVID-19 and the ongoing $2 fare trial in Dunedin.

Dunedin Public Transport Report

June 2022

Dunedin fare revenue and patronage for June 2022 is down compared to June 2021.

Fare revenue for the Financial Year is up 12% compared to the previous Financial Year due to the months July/August 2020 being fare free. Patronage for the Financial Year is down 13%, this is because August and September 2021 patronage was affected by Alert Level 4 lockdowns and comparing this to the 2020/2021 financial year when we had high patronage numbers due to free fares over July/August 2020.

Fare Revenue June 2022

$282,525.74

▼ 4% vs June 2021

2021/22 Fare Revenue
financial year

$2,959,682

▲ 12% vs 2020/2021

Concession Type
June 2022

Adult Card	55%
Adult Cash	4%
Child Card	27%
Child Cash	0.6%
SuperGold	14%

Patronage June 2022

221,895

▼ 5% vs June 2021

▲ 12% vs June 2020

2021/22 Patronage
financial year

2,367,099

▼ 13% vs 2020/2021

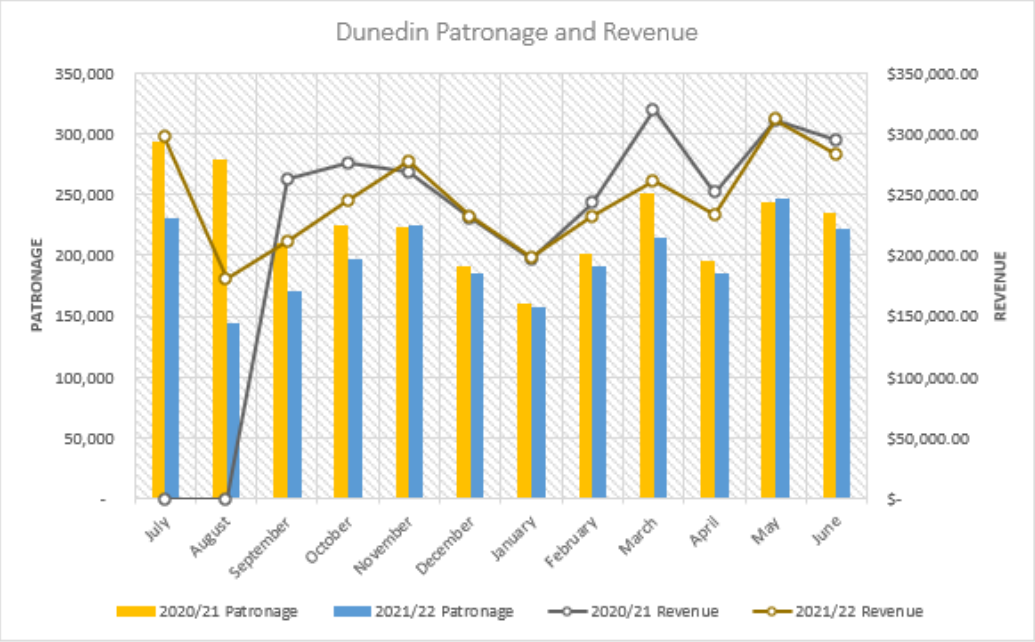


Figure 6: Dunedin Patronage and Revenue, FY 2021/22

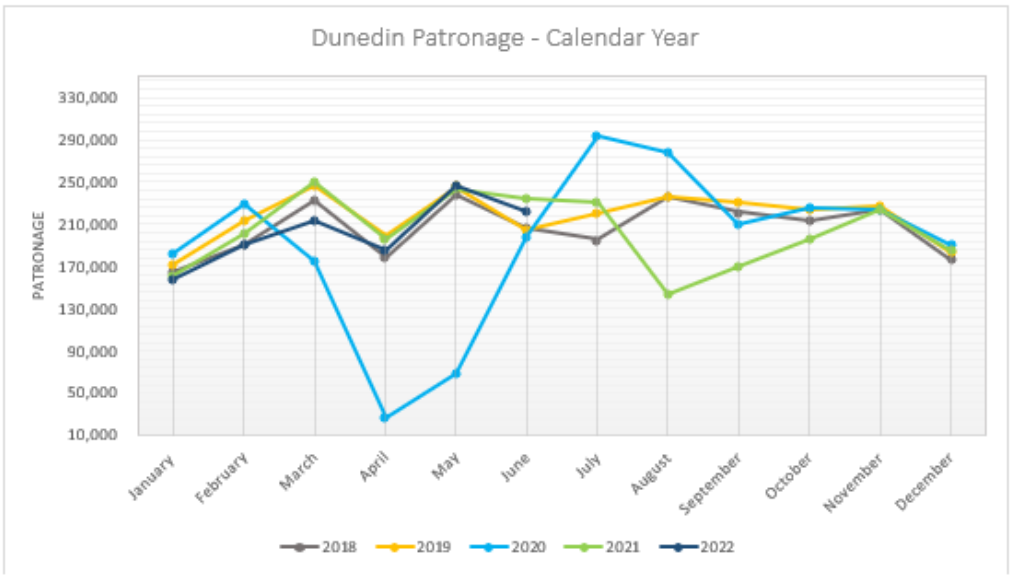


Figure 7: Dunedin weekly patronage, Unit Revenue and Unit Patronage

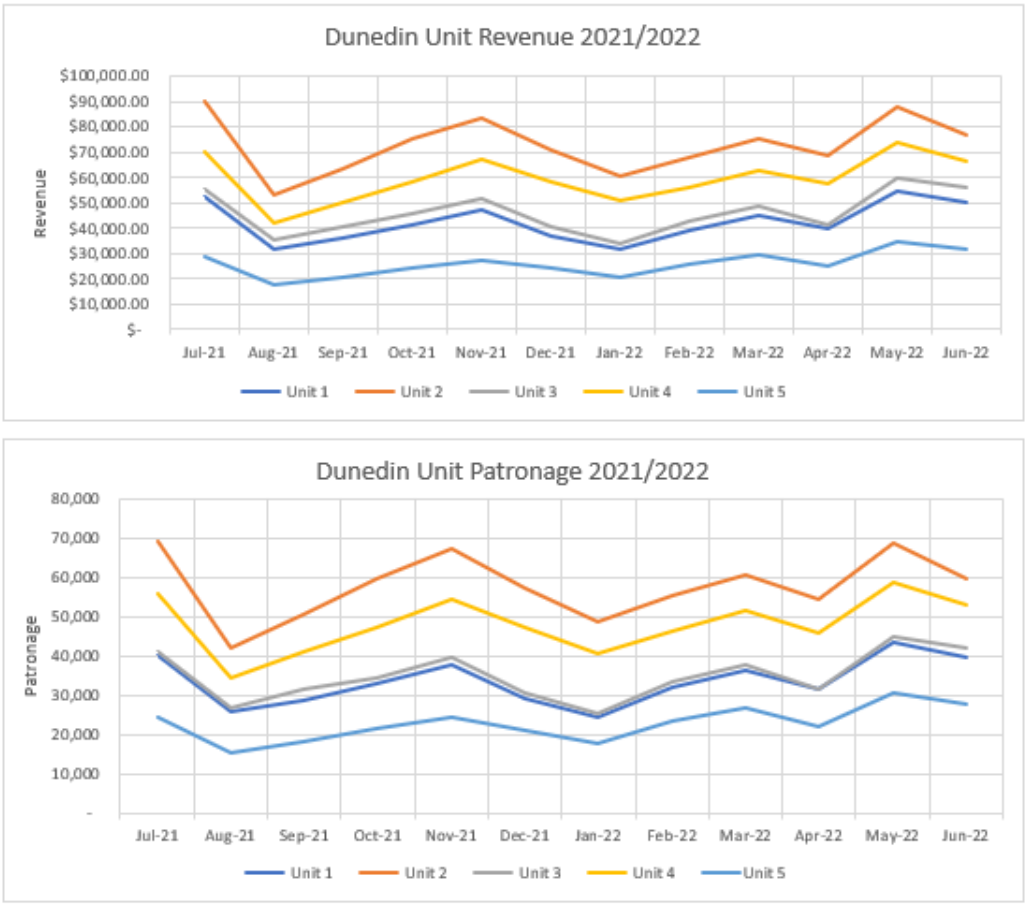


Figure 8: Dunedin Unit revenue and patronage

DUNEDIN SCHOOL SERVICES

[43] As previously advised to Council, towards the end of 2021, Otago Road Services (ORS) decided to cease operating its commercial Dunedin school bus services. Many of the services enabled students to attend a school of choice, rather than the closest school to their home. In recognising that would have an impact on the community, in December 2021, the Council authorised the Chief Executive to approve minor changes to the Dunedin bus network to address resulting school connectivity issues. Solutions that have been put in place to date are:

a. A variation to the Unit 3 contract which provides a service from Green Island to Kings and Queens High Schools (Route 40C).

b. A variation to the Unit 5 contract for a service from Green Island to Kaikorai Valley College (route 70).

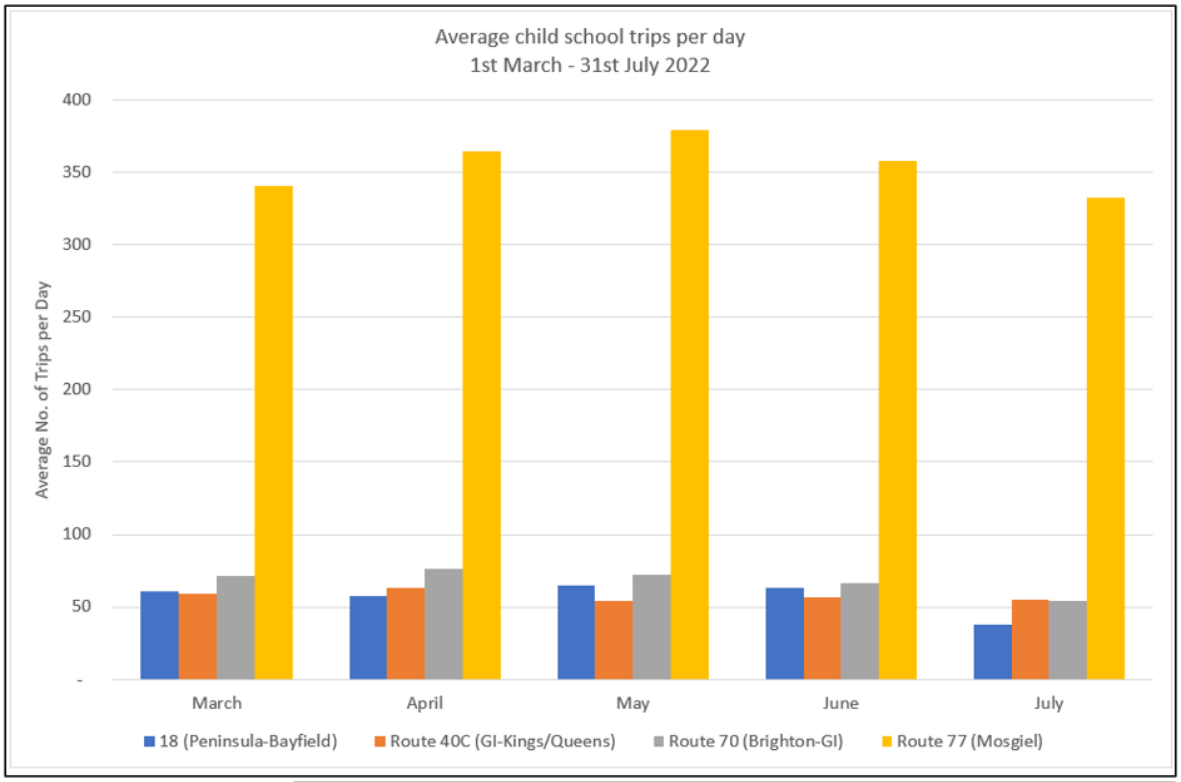
c. Additional overflow buses at peak times as required.

d. An additional morning service is operating from the Bus Hub to Mosgiel via Green Island on weekdays, introduced on 18th August 2022 in response to passenger feedback. This service departs the Bus Hub at 8:12am and provides

an extra connection at Green Island for school pupils traveling to Mosgiel, in addition to increased commuter capacity at peak times.

[44] In combination with pre-existing routes 18C and 18D, which provides a direct connection between the Portobello/Harington Point bus route and Bayfield School, these services (routes 77, 40C, 70 and 18c/d) carried, from March to July 2022, a total of 46,540 child trips. Across 86 total school days for this period, the average daily patronage is 541 children.

[45] The table below shows the total trips by route for each month in this period, together with a chart detailing the average trips per day.



		School Holidays 16-31 April & 1 Public Holiday		*2 Public Holidays*	*School Holidays 9-24 July*	
	March	**April**	**May**	**June**	**July**	**Grand Total**
18 (Peninsula-Bayfield)	1,399	573	1,421	1,262	414	5,069
Route 40C (GI-Kings/Queens)	1,369	628	1,197	1,128	605	4,927
Route 70 (Brighton-GI)	1,642	764	1,584	1,330	600	5,920
Route 77 (Mosgiel)	7,832	3,644	8,334	7,155	3,659	30,624
Totals	**12,242**	**5,609**	**12,536**	**10,875**	**5,278**	**46,540**

Figure 9: Child patronage on Dunedin routes 77, 40C, 70 and 18c/d, 1 March to 31 July 2022: Average trips per day (chart) and total trips (table)

PUBLIC TRANSPORT – QUEENSTOWN

[46] For Queenstown, patronage and revenue continue to be low. An Infometrics report commissioned by QLDC notes that "parts of the transport and logistics industry have been weakened by factors such as reduced commuter travel". Business closures due to the significant reduction in visiting overseas tourists have a knock-on effect on the

demand for public transport. However, the patronage recovery rate has slowly been increasing from October to date. (Source: impact-of-covid19-on-queenstown-lakes-economy-v6.pdf (qldc.govt.nz)).

[47] FY 2021/22, Queenstown is tracking at 91% patronage compared to FY 2020/21, noting that from 1 July 2020 to 15 September 2020, travel in Queenstown was fare-free and patronage atypically higher for this reason.

[48] Comparing FY 2021/22 against FY 2018/19, the last full pre-COVID-19 financial year where patronage was significantly higher, Queenstown is tracking at 55% of 2018/19 figures. This provides an indication of the relationship between COVID restrictions and Queenstown's performance, being a comparison with a year unaffected by COVID-19 restrictions.

Queenstown	July	August	September	October	November	December	January	February	March	April	May	June	Totals
2018/19 Patronage	122,752	117,442	103,974	111,657	125,600	118,997	136,055	129,439	134,084	125,244	118,077	124,736	**1,468,057**
2019/20 Patronage	136,766	129,011	121,416	120,662	128,440	128,282	136,985	131,102	90,746	9,919	42,577	73,597	**1,249,503**
2020/21 Patronage	100,951	98,102	72,143	73,385	71,464	69,096	68,550	60,717	62,613	65,928	66,863	79,251	**889,063**
2021/22 Patronage	95,248	51,010	51,987	66,690	64,895	66,507	69,147	52,471	53,524	68,158	73,786	93,367	**806,820**
2022/23 Patronage	100,966												

Figure 10: Queenstown patronage statistics Financial Year 2018/19 to date

[49] As for the Dunedin network, increasing levels of missed trips have been experienced across the network, a nationwide issue due primarily to increased levels of driver absence caused by COVID-19 and the national driver shortage.

[50] From 1 March 2022 to 30 June 2022 the Queenstown network experienced an average of 4.5 missed trips per day across 35,014 trips.

[51] The total number of missed trips was 552, or 4.5% of trips operated. This compares with a total of 42 missed trips for the preceding 8-month period from 1 July 2021 to 28 February 2022, or 0.06% of trips operated.

[52] Figure 11 tracks daily missed trips, which were minimal until mid-May 2022, at which point the trend has moved significantly upwards.

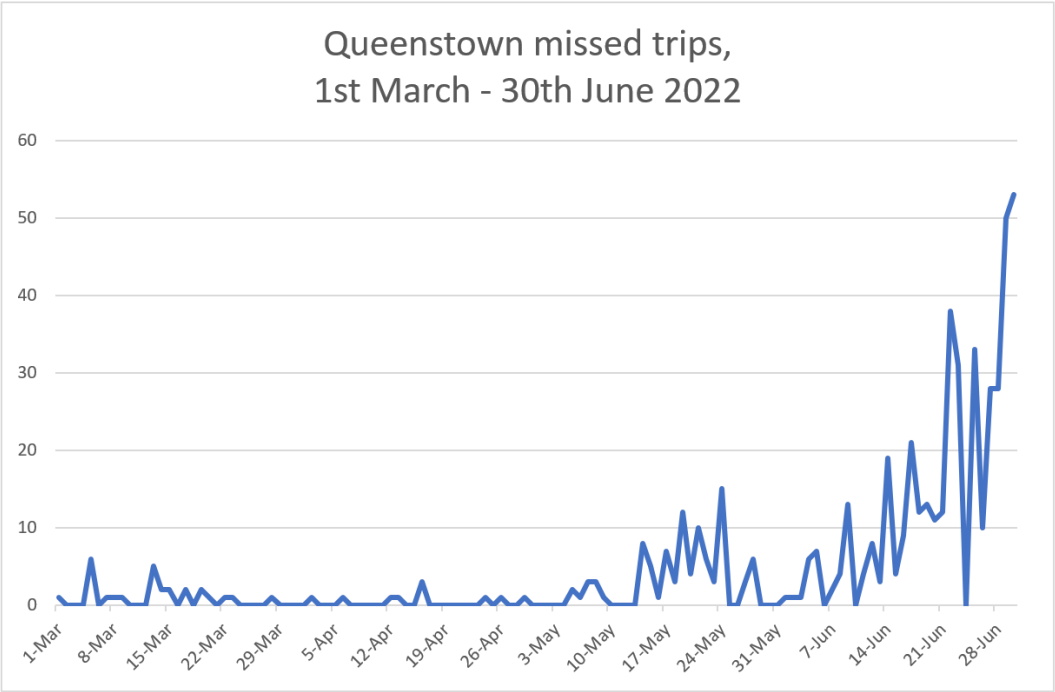


Figure 11: Queenstown missed trips, 1 March 2022 to 30 June 2022

[53] Figure 12 shows the annualised relationship between the varying COVID-19 alert levels on patronage for Queenstown, together with the increases in patronage associated with pre-Bee Card fare-free travel.

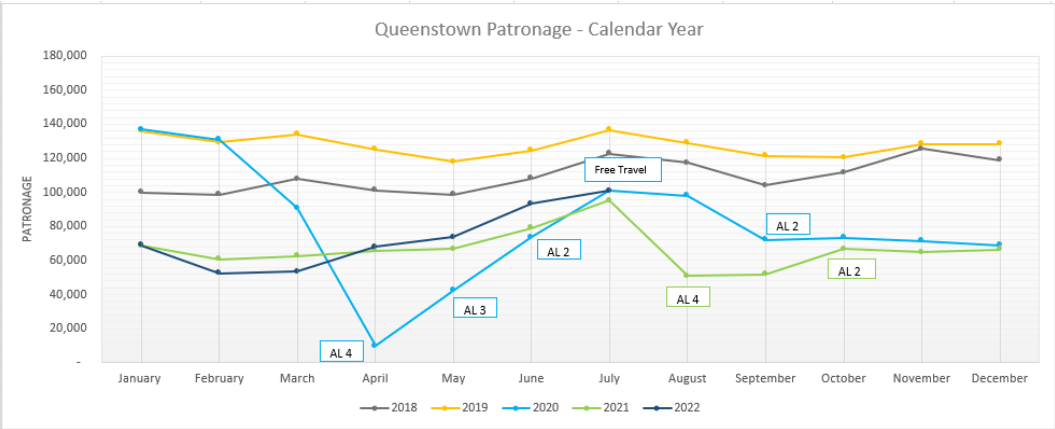


Figure 12: Relationship between COVID-19 alert levels and patronage

[54] Figures 13 to 15 chart FY unit revenue and patronage, as well as detail on the most recent month's data.

[55] Patronage is lower than anticipated, which has led to reduced revenue throughout the year.

Queenstown Public Transport

June 2022

Queenstown patronage and revenue for June 2022 is up compared to June 2021.

Fare revenue for the financial Year is up 22% compared to the previous Financial Year due to the months July/August 2020 when we had free fares. Patronage for the Financial Year is down 9%, this is because August and September 2021 patronage was affected by Alert Level 4 lockdowns and comparing to the 2020/2021 financial year when we had high patronage numbers due to the free fares over July/August 2020.

Fare Revenue June 2022

$169,658.70

▲ 24% vs June 2021

2021/22 Fare Revenue

financial year

$1,358,956

▲ 22% vs 2020/2021 YTD

Concession Type

June 2022

Adult Card	78%
Adult Cash	9%
Child Card	11%
Child Cash	0.3%
SuperGold	2%

Patronage June 2022

93,367

▲ 18% vs June 2021

▲ 27% vs June 2020

2021/22 Patronage

financial year

806,820

▼ 9% vs 2020/2021 YTD

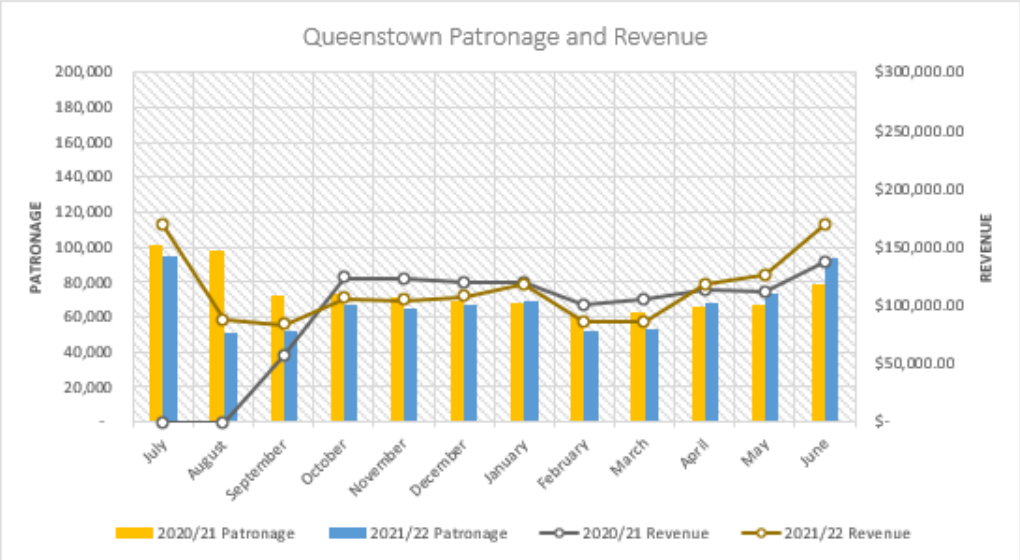
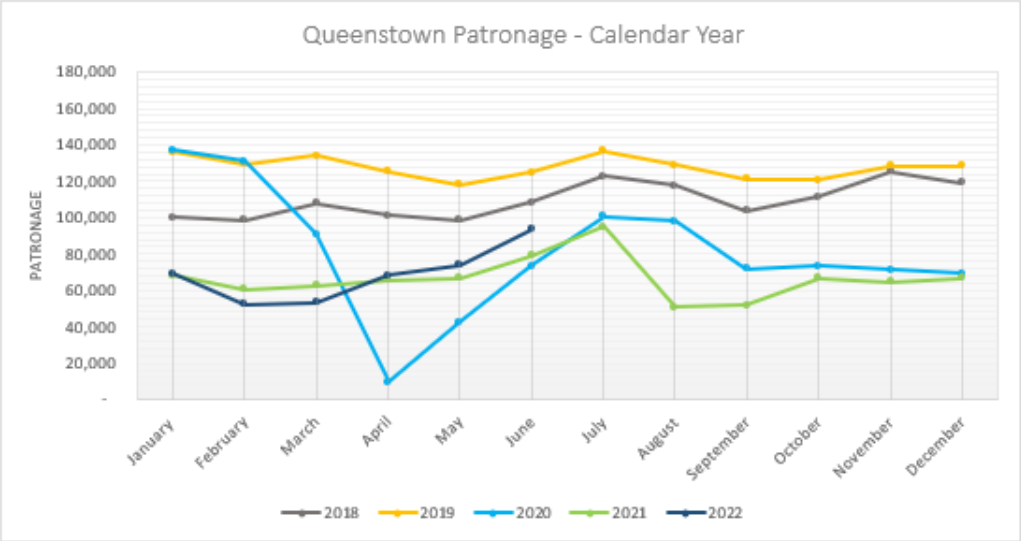


Figure 13: Queenstown patronage and revenue, FY 2021/22



The weekly patronage graph above shows us the full calendar year view of patronage per week.

Unit 6

- Fernhill – Remarkables Park
- Jacks Point – Frankton Hub
- Lake Hayes - Queenstown

Unit 7

- Arthurs Point – Arrowtown
- Kelvin Heights – Frankton Flats

Unit 6 Revenue June 2022
$135,993.91
▲ 25% vs June 2021
Unit 6 Patronage
73,312
▲ 18% vs June 2021

Unit 7 Revenue June 2022
$33,664.78
▲ 17% vs June 2021
Unit 7 Patronage
20,055
▲ 17% vs June 2021

Figure 14: Queenstown weekly patronage, Unit Revenue and Unit Patronage

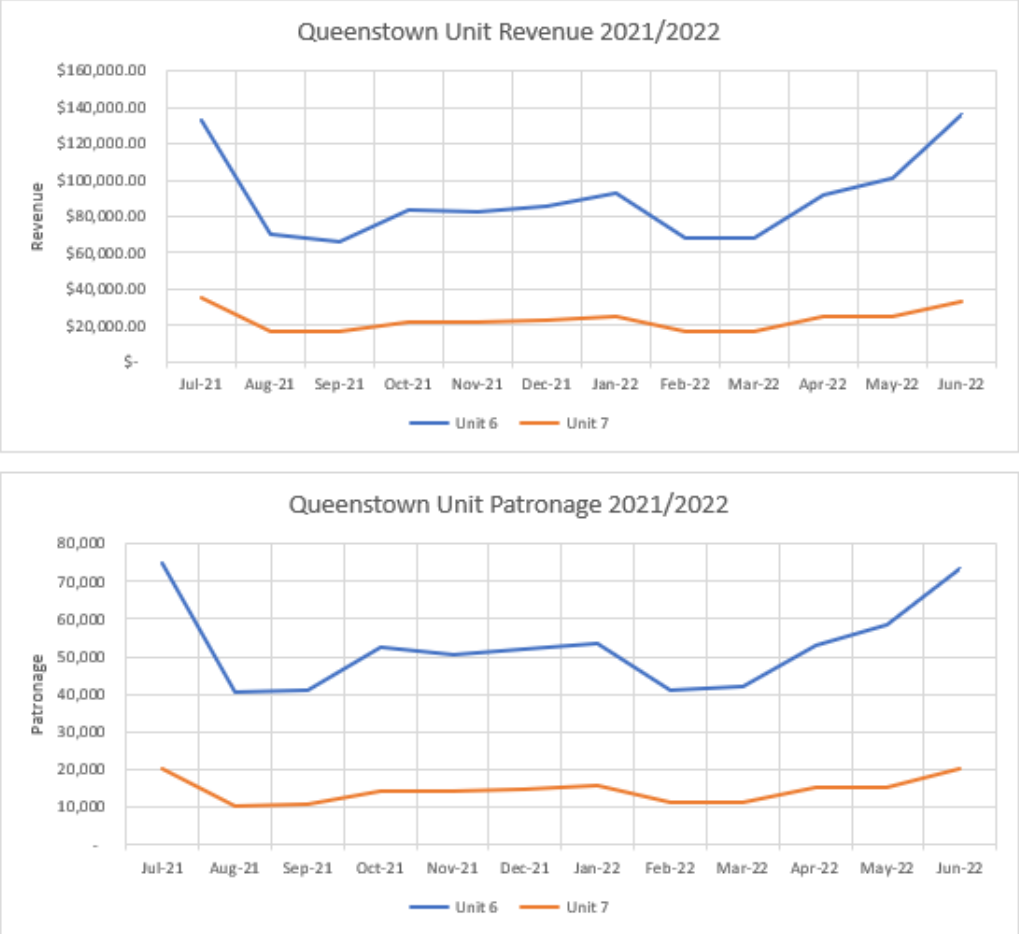


Figure 15: Queenstown Unit revenue and patronage

QUEENSTOWN FERRY

[56] The Queenstown Ferry service provides a daily timetabled ferry service on Lake Wakatipu, contracted between Go Orange (now RealNZ) and ORC from October 2020 to date.

[57] The ferry serves Queenstown Bay (Steamer Wharf), Queenstown Marina, the Hilton Hotel and Bayview (Kelvin Heights), between 7:30am and 10:30pm.

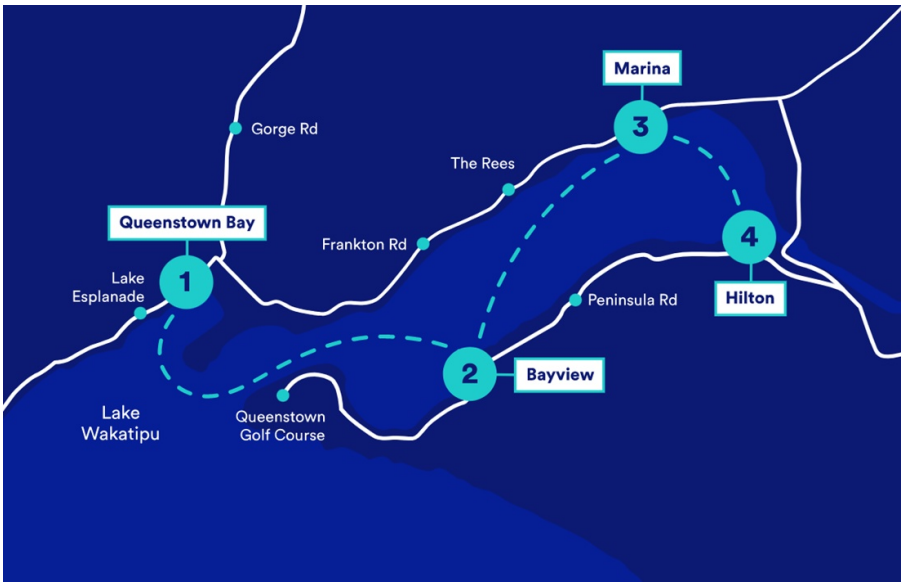


Figure 16: Queenstown Ferry Route Map

[58] FY 2021/22, fare revenue has decreased by 3% and patronage has increased by 12% on the Queenstown Ferry service compared to FY 2020/21.

[59] Fare revenue has decreased by 3% to $282,585.

[60] Patronage has increased by 12% to 60,054.

[61] The reason for the increase in patronage alongside a decrease in revenue may be a result of the service being primarily used by residents whilst tourism levels are low. Locals benefit from a multi-trip card which discounts the total trip cost.

[62] Additionally, a '50% off one-way and return ferry tickets' promotion was in place for April, May and June 2022.

[63] Queenstown water ferries are significantly affected by seasonal/holiday travel patterns, which continue to be affected by COVID 19 restrictions.

[64] New ticketing equipment is being tested for the introduction of the Bee Card onto the ferry network, for September 2022.

Queenstown Ferry

June 2022

Queenstown ferry patronage and revenue for June 2022 is down compared to June 2021.

Fare revenue for the financial Year is down 3% compared to the previous Financial Year and patronage for the Financial Year is up 12%

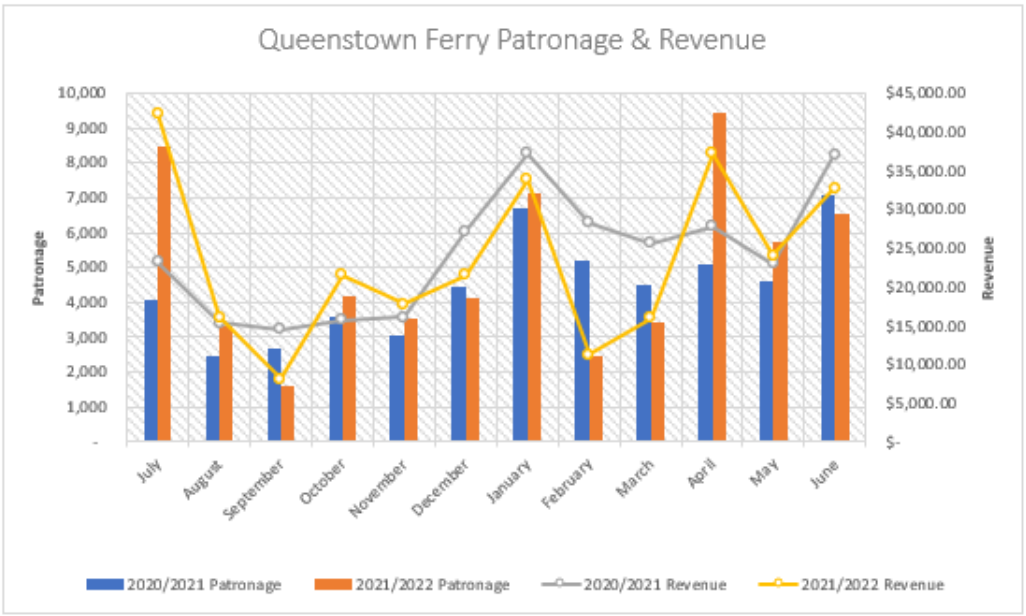


Figure 17: Queenstown Ferry Patronage and Revenue, FY 2021/22

BEE CARD STATISTICS

[65] At 25th August 2022, Otago has 83,332 registered Bee Card users. This is an increase of 4,880 cards since May.

[66] 149,426 cards have been issued and distributed in Otago, which equates to more than three-quarters of the combined population of Dunedin and Queenstown.

CUSTOMER FEEDBACK AND COMPLAINTS

[67] Figure 18 below captures feedback and complaints data, segregated by enquiry type, from November 2020 (when data collection began in this format) to June 2022.

[68] Future reports for FY 2022/23 will be in a revised format which provides a greater level of analysis between operators and the split between Queenstown and Dunedin.

[69] The table also provides for measurements against contractual (annual) KPI's, being:

a. Less than 1 complaint per 1,000 trips regarding vehicle cleanliness and comfort.
b. Less than 1 complaint per 3,000 trips regarding punctuality and driver behaviour.
c. Less than 1 complaint per 3,000 trips regarding incorrect fares.

[70] These are highlighted in yellow in the table and are tracking well within targets.

[71] For FY 2021/22, 3,173,919 passenger trips were recorded. 2,435 complaints have been recorded for this period, representing 0.076% of trips taken. Most complaints were related to missed trip, timeliness and driver behaviour; the latter is a national trend that may be driven by customer frustration with driver shortages affecting service reliability.

[72] Communication of service disruptions has increased across media channels (website, Transit App, Facebook) and implemented on a daily basis. The operators are also required to be proactive in notifying Transport staff of any upcoming disruptions they were aware of.

[73] Complaints are categorised by type, with a new Bus Cancellations category introduced in February 2022 to monitor complaints related to increasing numbers of missed trips. These missed trips are primarily caused by driver absences and customer enquiries for this category contribute to an increase in complaints from February 2022 to date.

[74] An increasing number of complaints about driver behaviour has been noted. A revised set of customer experience-related key performance indicators have been included in the forthcoming Unit 3 PTOM contract, and these will be appended to all existing contracts. These KPIs focus on customer satisfaction, following best practice methodology in use across PTOM contracts in other regions.

[75] Staff continue to follow up all complaints and take operational action where required. To address the concerns of passengers seeking live information related to missed trips, transport staff have introduced live alerts to the Transit app, which ensure passengers received push notifications to their mobile devices.

[76] Recent activity has also included:

a. Arrangement of a series of sessions between transport operators and Blind Citizens Otago Network, regarding driver awareness training;
b. Reinforcing signage related to mask wearing and COVID-19;
c. Reiterating the requirement for transport operators to log trip cancellations well in advance of the scheduled departure time;
d. Improving school connections at Green Island.

Complaints breakdown:	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22
Complaints related to the Bus Hub	2	1	1	2	0	-	-	-		2	-	-	-	-	-	0	0	1	2	0
Complaint about cost	1	1	0	5	2	-	-	1			1	-	-	-	-	0	0	0	0	0
Complaints about drivers	39	28	39	43	55	41	46	38	51	47	33	38	37	50	44	72	78	37	80	54
Complaint about passenger behaviour	1	0	0	5	3	2	5	1		1	2	-	2	1	1	4	1	0	0	0
Complaints about routes and times	17	8	29	24	3	3	5	1	8	3	2	2	4	2	3	44	16	11		
Complaints about ticketing	4	0	5	4	2	8	2	2	10	8	1	3	3	1	1	5	3	3	3	2
Complaints about on-street infrastructure	10	2	6	14	1	7	9	5	9	8	1	2	3	11	9	13	11			14
Complaints about timeliness	23	20	14	62	40	15	27	24	32	16	13	18	55	17	13		10			17
Complaints about timetables/schedules	11	2	7	5	0	10	5	1	7	7	1	1	2	1	-			7		
Complaint about on-bus wi-fi	1	0	1	0	0	1	-	-	1		-	-	1	-	-		1	1		0
Complaints related to other unclassified issues	18	13	34	18	5	7	2	-	14	9	4	9	3	-	3	9	3			
Complaints about cleanliness/condition of bus	-	-	-	6	2	2	3	2			1	1	2	2	-	0	0		1	
Complaints about transfers	-	-	-	4	0	-	-	-			-	-	-	-	-					
Complaints about Information/comms	-	-	-	10	2	5	17	1	2	5	-	2	1	5	1		9			
Complaints related to app/website	-	-	-	4	0	1	5	2	2		1	1	-			7	7			13
Bus cancellations																29	63	34	94	54

Figure 18: Customer Feedback, FY 2021/22

REAL TIME INFORMATION (RTI)

[77] The accuracy of RTI in Queenstown and Dunedin has been increased with the data feed now being derived from a hierarchy of on-bus devices, with the primary source now being the Bus Driver Console (RITS ticketing device), followed by E-Road and Wi-fi hardware.

[78] The device hierarchy means that if one device does not deliver an accurate signal, or fails, the system defaults to the next device in the hierarchy, meaning increased continuity of tracking and significantly less likelihood of unsuccessful vehicle tracking. Previously, the data feed was derived solely from on-bus wi-fi hardware.

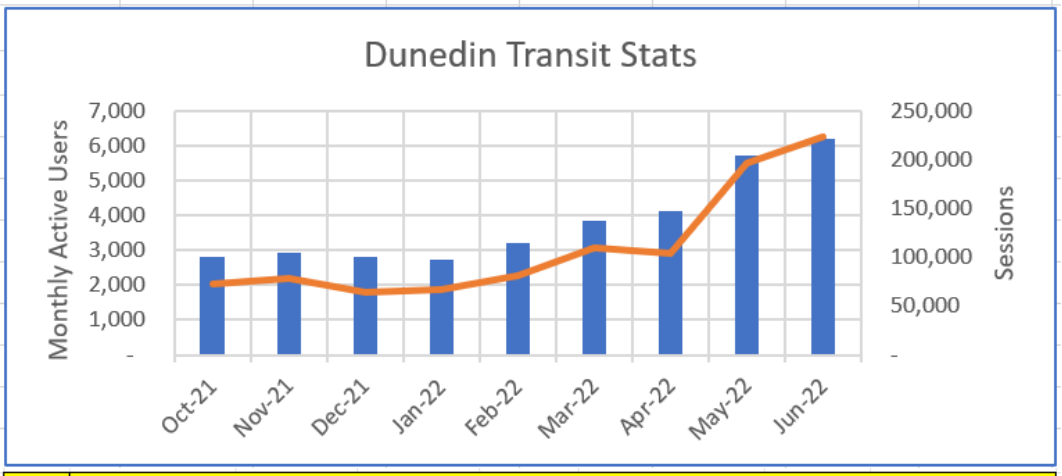
[79] Operators have contractual Punctuality KPIs and are expected to deliver 95% of their trips on time; meaning that 95% or more of their scheduled trips leave the Terminus (origin stop) between 59 seconds before and 4 minutes & 59 seconds after the scheduled departure time.

[80] As at June 2022, Dunedin buses are running at an average of 2.56 minutes to schedule from the Terminus. Queenstown buses are running at an average of 1.24 minutes to schedule from the departure terminus.

[81] Transit, the real time tracking app, remains popular, following a promotional campaign carried out by the Communications team. In the period October 2021 to June 2022, passengers used the app over 1.15 million times (995,056 user sessions in Dunedin and 155,817 in Queenstown).

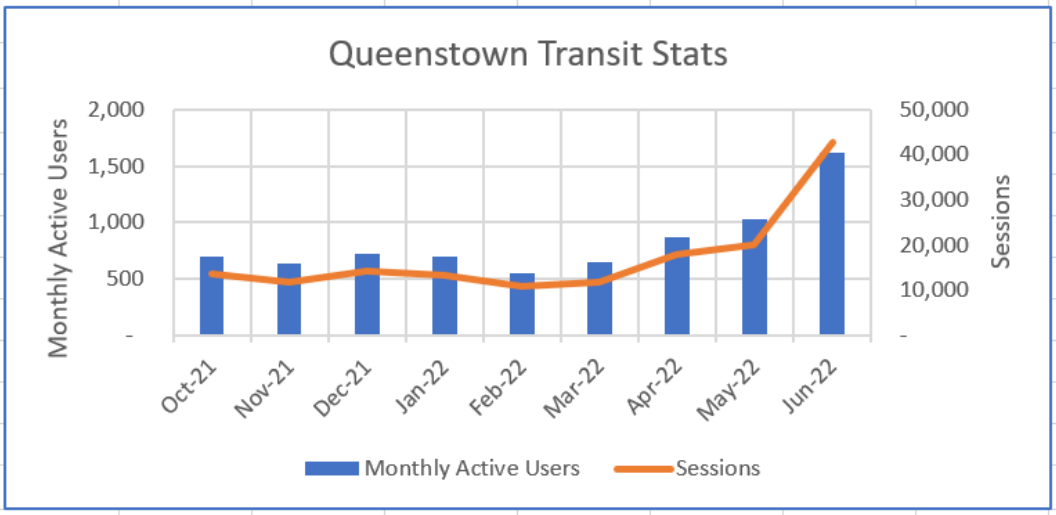
[82] Figures 19 and 20 show Transit app usage for the period October 2021 to June 2022 for Dunedin and Queenstown:

a. 'Monthly Active Users' refers to the number of active users in that particular month. This means opening and the action of using the app, not just having it installed on a device;
b. 'Views refers to the number of times passengers opened Transit in that month;
c. 'Downloads' is the number of new downloads of the app each month;
d. 'Most Popular Lines' are the most popular routes, i.e. the routes for which the most people are using the Transit app;
e. 'Go Trips' refer to passengers utilising additional functionality in the app. The 'GO' feature enables users gets step by step navigation while helping to improve real-time vehicle locations;
f. 'Service alert subscribers' is the total number of users receiving alerts for individual routes (events, delays, roadworks, etc).



	DUNEDIN						
	Monthly Active Users	Sessions	Downloads	DAU's	Most popular lines (taps)	Go Trips	Service Alert Subscribers
Oct-21	2,820	71,970	329	514	8, 63, 3	1,567	973
Nov-21	2,942	77,695	337	553	8, 63, 3	1,667	1,054
Dec-21	2,825	63,947	272	445	8, 19, 63	1,361	1,105
Jan-22	2,722	66,423	351	444	8, 63, 3	1,539	1,182
Feb-22	3,217	80,498	514	588	8, 63, 77	2,013	1,287
Mar-22	3,845	110,225	725	702	8, 63, 77	2,936	1,611
Apr-22	4,125	103,317	411	732	8, 63, 3	2,593	1,713
May-22	5,703	197,025	948	1,292	8, 63, 3	4,184	2,140
Jun-22	6,199	223,956	899	1,492	8, 63, 3	4,196	2,496

Figure 19: Transit app usage, October 2021 – June 2022, Dunedin



	QUEENSTOWN						
	Monthly Active Users	Sessions	Downloads	DAU's	Most popular lines (taps)	Go Trips	Service Alert Subscribers
Oct-21	697	13,581	135	103	1, 2, 5	203	86
Nov-21	635	11,733	100	94	1, 2, 5	178	90
Dec-21	717	14,270	130	98	1, 2, 5	232	102
Jan-22	691	13,290	138	88	1, 5, 2	235	110
Feb-22	555	10,855	76	77	1, 2, 5	267	121
Mar-22	642	11,678	140	86	1, 2, 5	252	158
Apr-22	871	17,789	122	123	1, 2, 5	319	171
May-22	1,028	19,984	154	143	1, 2, 5	487	185
Jun-22	1,615	42,637	467	255	1, 2, 5	863	247

Figure 20: Transit app usage, October 2021 – June 2022, Queenstown

TOTAL MOBILITY

[83] Total Mobility is a nationwide scheme, administered by regional councils, that provides subsidised travel for people who are otherwise unable to access public transport. It does this by providing a swipe card which subsidises taxi travel by 50%, to a maximum of $25 subsidy in Otago. From April 2022 to January 2023, the subsidy has increased to 75%, (a maximum subsidy of $37.50).

[84] The percentage of trips operating within the maximum subsidy is 95.25%, with the remaining 4.75% of trips exceeding a $50 fare and hence having their subsidy capped. Figure 21 below shows the number of trips split by price range.

Trip count per price range 1 July 2021 — 30 June 2022								
$0-$10	**$10.01-$20**	**$20.01-$30**	**$30.01-$40**	**$40.01-$50**	**$50.01-$60**	**$60.01-$70**	**$70.01-$80**	**>$80.01**
20.83%	45.44%	18.90%	6.42%	3.66%	1.64%	1.97%	0.76%	0.38%
95.25%					4.75%			

Figure 21: Total Mobility trips by price range, FY 2021/22

[85] Figure 22 below, shows FY 2021/22 Patronage, whereby 'Trips' includes 'Hoist trips'. 'Hoist trips' refers to trips where one or more customers require a wheelchair-accessible vehicle to travel, for which suppliers receive a separate reimbursement for every hoist performed.

[86] For FY 2021/22, the mean monthly number of trips per month was 7475, and, on average, 13.1% required the use of the hoist for one or more customers.

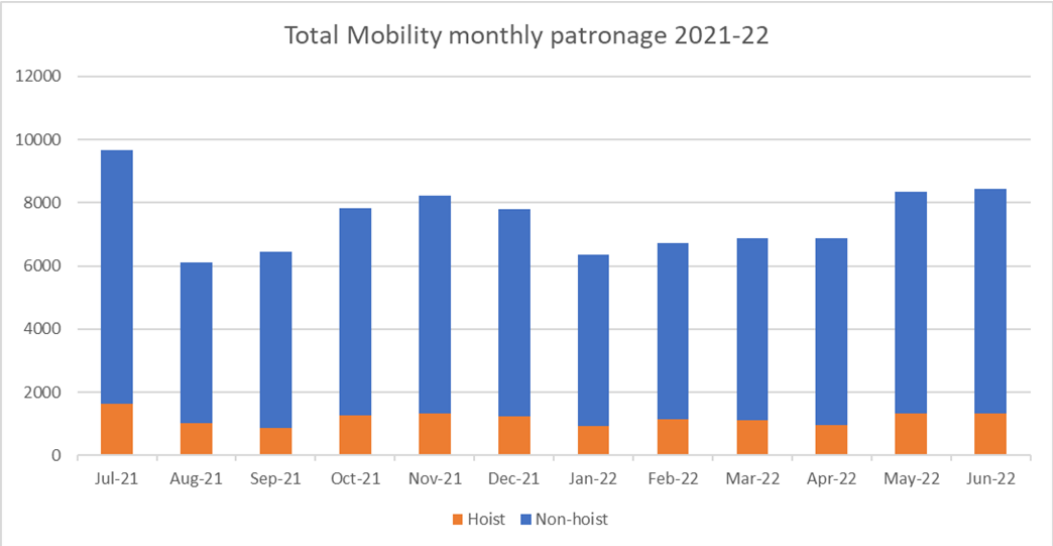


Figure 22: Total Mobility trip statistics

[87] 83.3% of trips take place in Dunedin and Mosgiel, followed by 12.0% in Oamaru, 3.3% in Wanaka and 1.5% in Queenstown.

[88] There has been a decrease of 18.2% in Otago patronage for FY 2021/22, being 89,705 passenger trips vs 108,782 for FY 2020/21.

[89] Between these two periods there is a 23.6% decrease in hoist trips for FY 2021/22, being 11,818 hoist trips vs 15,477 for FY 2020/21.

[90] Whilst data does not support any particular reasoning for the more significant decrease in Hoist trips, a continuing issue is the lack of uptake on hoist installation funding – whereby transport operators have the ability to equip their vehicles with a wheelchair hoist, funded by the Total Mobility Scheme. This means that there are often limited options for wheelchair users, particularly at peak travel times.

[91] The opportunity to receive hoist funding is frequently promoted to transport operators, but in order to facilitate the installation of a wheelchair hoist, the operator must first have a vehicle suitable for conversion. Many transport operators use saloon cars rather than the larger people carriers or minivans that would be suited to a wheelchair hoist.

JULY 2022 DATA AND THE INTRODUCTION OF REDUCED TIMETABLES

[92] At the time of writing this report, patronage data for the first month of the new financial year, July 2022, is available.

[93] In Dunedin, a reduced timetable was introduced on 19th July 2022, designed to offer passengers a more reliable service with fewer cancellations.

[94] A reduced timetable was introduced in Queenstown on 12th July 2022.

[95] The following sections summarise network data for July 2022 and the impact of reduced timetables on service reliability.

DUNEDIN

[96] July 2022 patronage, at 194,544 passenger trips, is 99.6% of the last pre-COVID comparable month, July 2018.

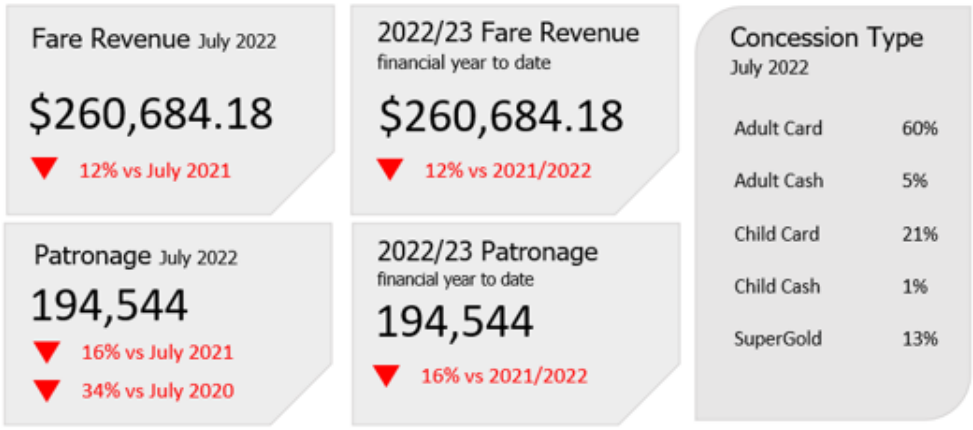
[97] Compared to 2021, patronage is 84.2% and compared to 2020 it is 66.3%.

[98] The data supports the continuing trend of Dunedin patronage recovery to pre-COVID levels.

[99] The 66.3% comparison to 2020 is explainable by the fact that fares were free during July 2020, and the 2020/21 Financial Year experienced atypically high patronage for this reason.

[100] The 84.2% comparison to 2021 is more difficult to determine but is likely due to the high number of missed trips during July 2022, together with the transition from a full timetable to a reduced timetable.

[101] July 2022 fare revenue has fallen by 12% compared to July 2021, in line with the fall in patronage detailed above.



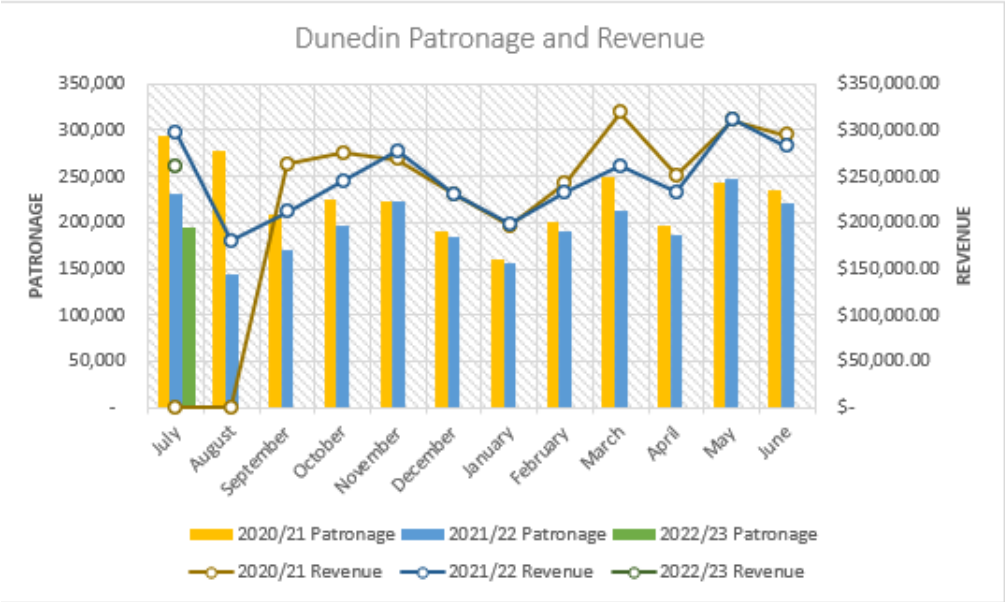


Figure 23: Dunedin Patronage and Revenue, FY 2022/23 (July 2022)

[102] Driver shortages have led to increasing volumes of missed trips in 2022.

[103] Missed trips are where a service does not operate, contractually defined as being where the transport operator "failed to operate a trip in accordance with the timetable".

[104] The chart below details missed trip statistics through July 2022 for Dunedin.

[105] A reduced timetable was introduced on 19th July 2022, designed to offer passengers a more reliable service with fewer cancellations.

[106] From 1st-19th July 2022, missed trips were operating at an average of 13.87%.

[107] Following the introduction of the reduced timetable on 19th July 2022, this has dropped to 3.57%, or 1.55% looking at weekdays only, where the level of service and patronage is higher.

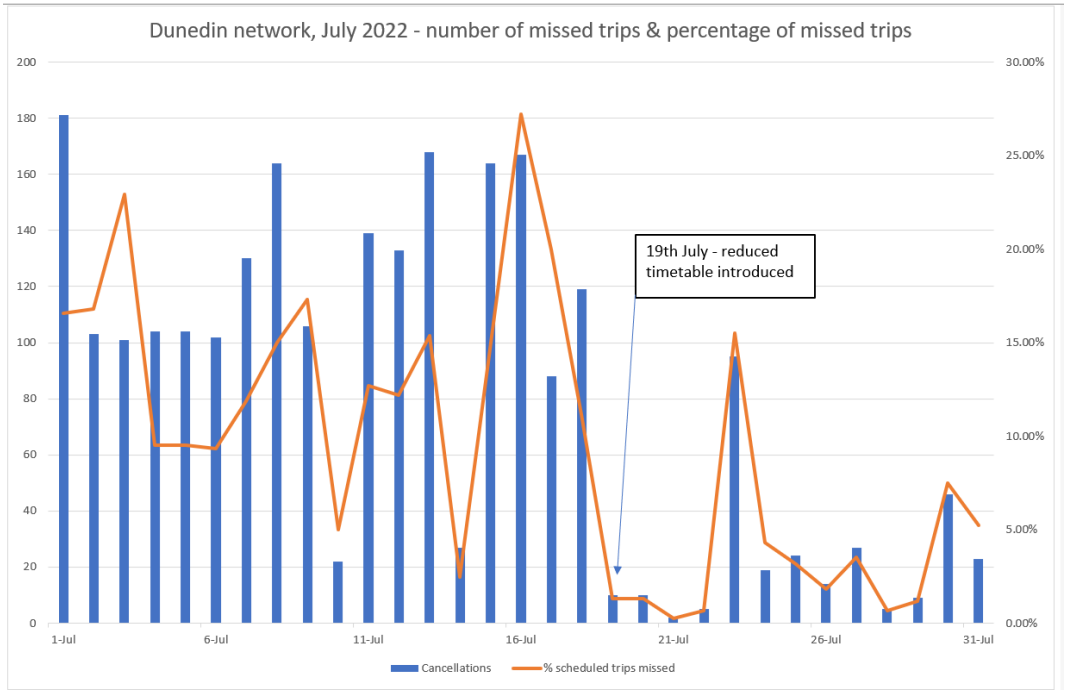


Figure 24: Impact of reduced timetable introduction in July 2022

[108] From 19th July to 31st July, the average weekday missed trip count was 9 trips. This compares to an average of 117 per weekday from 1st July to 18th July.

QUEENSTOWN

[109] July 2022 patronage, at 100,966 passenger trips, is 82.3% of the last pre-COVID comparable month, July 2018.

[110] Compared to 2021, patronage is 106% and compared to 2020 it is 100%.

[111] The data supports the continuing trend of Queenstown being some way behind pre-COVID levels. This is a result of the border closures affecting Tourism-related travel in Queenstown, although patronage is now beginning to recover significantly.

[112] The increases when compared to 2020 and 2021 are due to the opening of the borders to tourists and a continuing upward trend in passenger trips, which began in June 2022. The introduction of reduced timetables in mid-July 2022 has not significantly impacted patronage, with July 2022's figure being the highest point since June 2019.

[113] July 2022 fare revenue has increased by 18% compared to July 2021, associated with the increase in patronage.

[114] July consisted of the final two weeks of school holidays, which has the tendency to increase patronage in Queenstown.

[115] The popularity of the ski season also drives patronage.

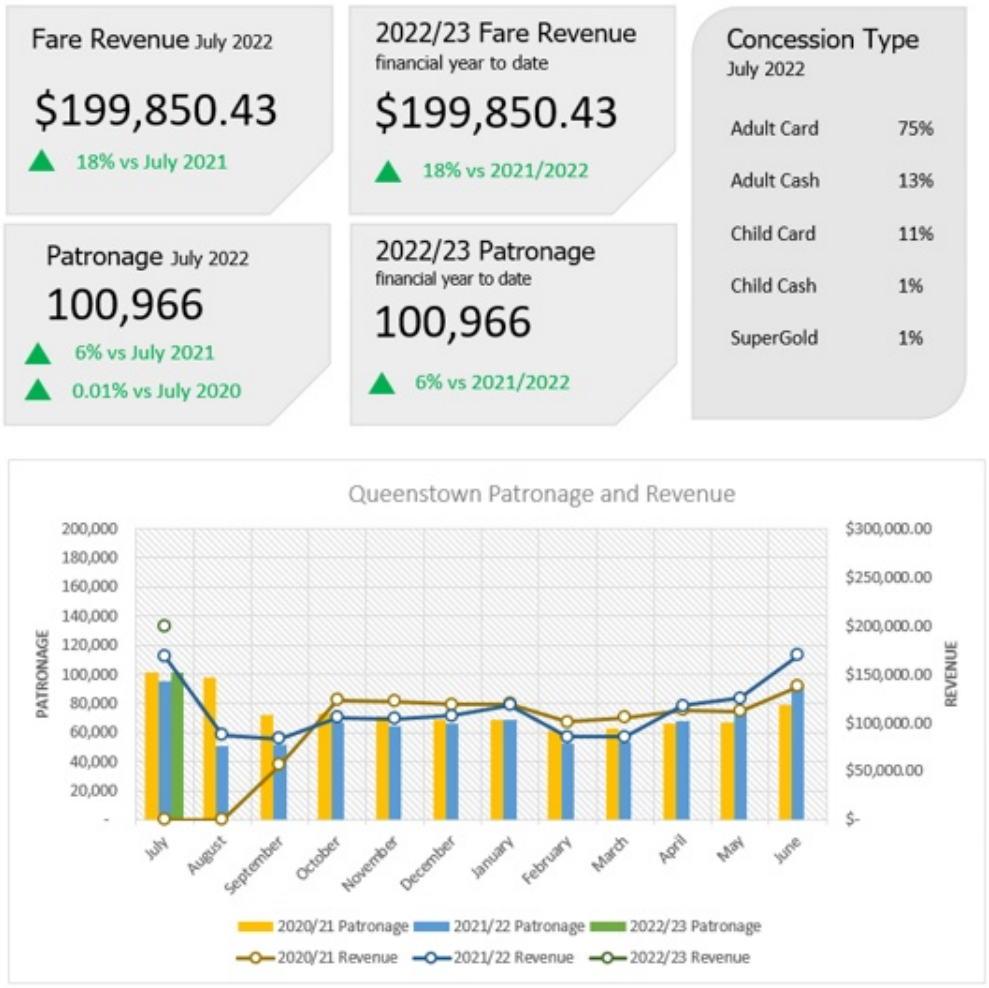


Figure 25: Queenstown Patronage and Revenue, FY 2022/23 (July 2022)

[116] In Queenstown, a reduced timetable was introduced on 12th July 2022, designed to offer passengers a more reliable service with fewer cancellations.

[117] Prior to 12th July, missed trips were operating at an average of 17.74%.

[118] Following the introduction of the reduced timetable, this has dropped to 16.4%, or 15.6% looking at weekdays only, where level of service and patronage is slightly higher due to school services.

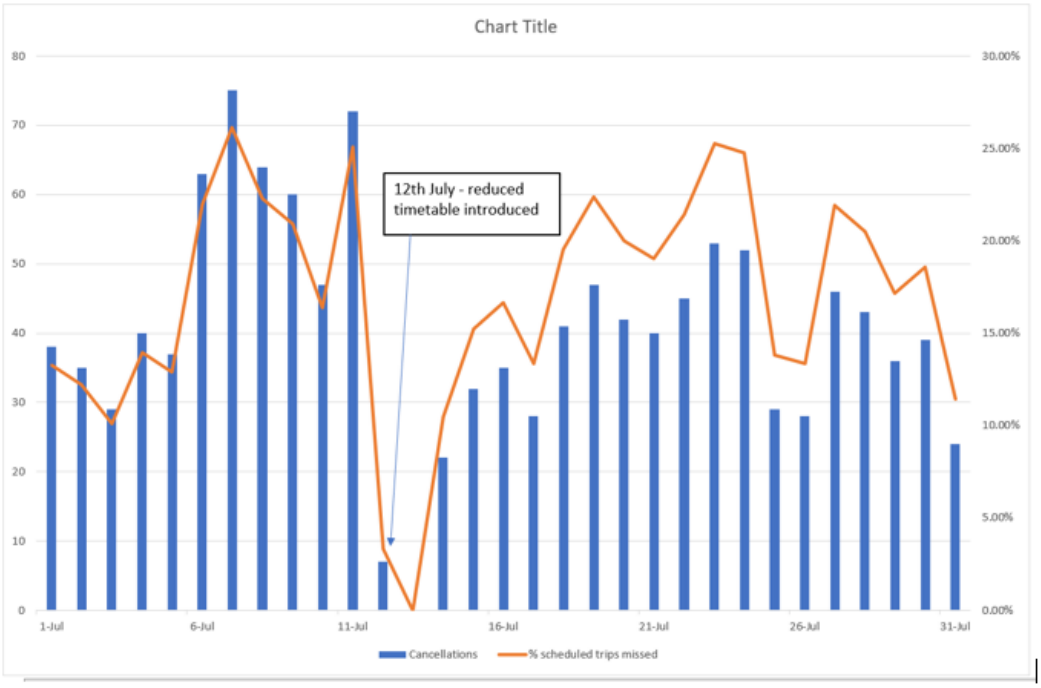


Figure 26: Impact of reduced timetable introduction in July 2022

[119] The situation in Queenstown remains challenging, where - compared to Dunedin - a smaller driver pool is impacted significantly by similar numbers of unavailable drivers.

[120] From 12th July to 31st July, the average daily missed trip count was 34 trips. This compares to an average of 51 per day from 1st July to 12th July.

[121] This demonstrates that, whilst the reduced timetable has had the desired impact of lowering the volume of missed trips, the number of missed trips remains comparatively high, in contrast to Dunedin.

EFFECT OF HALF PRICE FARES ON PATRONAGE

[122] Half price fares were introduced across the Dunedin and Queenstown networks in April 2022.

[123] The half price fare scheme was recently extended to January 2023.

[124] Statistically, it is difficult to ascertain the impact of half price fares on bus patronage, with previous years' data complicated by the impacts of COVID regulations on bus patronage, together with periods fare-free travel.

[125] Patronage follows seasonal trends, with no significant changes from April 2022 to date, although May and June 2022 patronage for Dunedin exceeds the pre-COVID equivalent months in 2019.

[126] Whilst the effect of the introduction of reduced timetables in mid-July may impact longer term patronage recovery, it is possible that the introduction of the half price fare in combination with increased service reliability will help support patronage recovery. A return to full timetables would likely accelerate this recovery.

[127] Total Mobility, which has not been as affected by driver shortages, has experienced some growth due to half price fares. The dollar saving for Total Mobility is significantly greater than for bus transport.

[128] The chart below shows monthly patronage since the 2018/19 financial year.

[129] In recent months the expected seasonal increase in patronage from February to March did not occur, which can likely be attributed to a reluctance to travel due to Covid-19 levels in the community.

[130] However, from April 2022 to date, patronage has increased due to the influence of half-priced fares, and this trend may help return the trip count to 2021-22 levels: August 2022 data is not shown but is on track to be higher than July 2022.

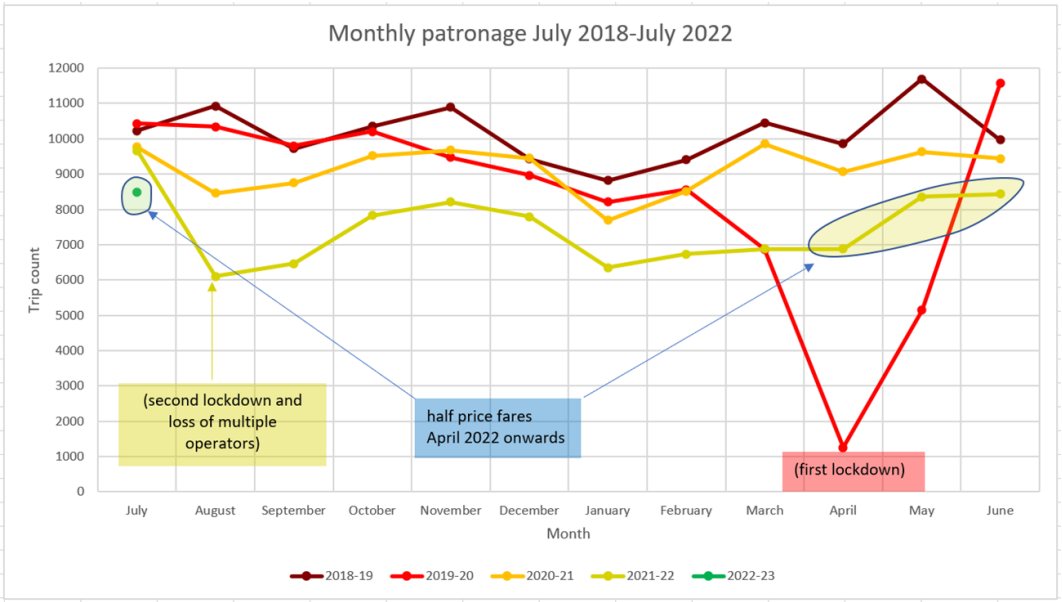


Figure 27: Impact of half price fares on Total Mobility use

[131] The second chart, below, shows how fares and distance travelled have varied across the same time period.

[132] Average fares have been steadily increasing over the past year, especially from April to July 2022 during the half price fare period.

[133] This can be attributed to increased distances of travel, which have also increased, following a similar trend.

[134] Notably, the trend in trip distances is slightly higher than the trend for the increase in average fares, meaning that the price per km of travel is decreasing – i.e. customers are travelling further but paying less on a price-per-km basis to do so.

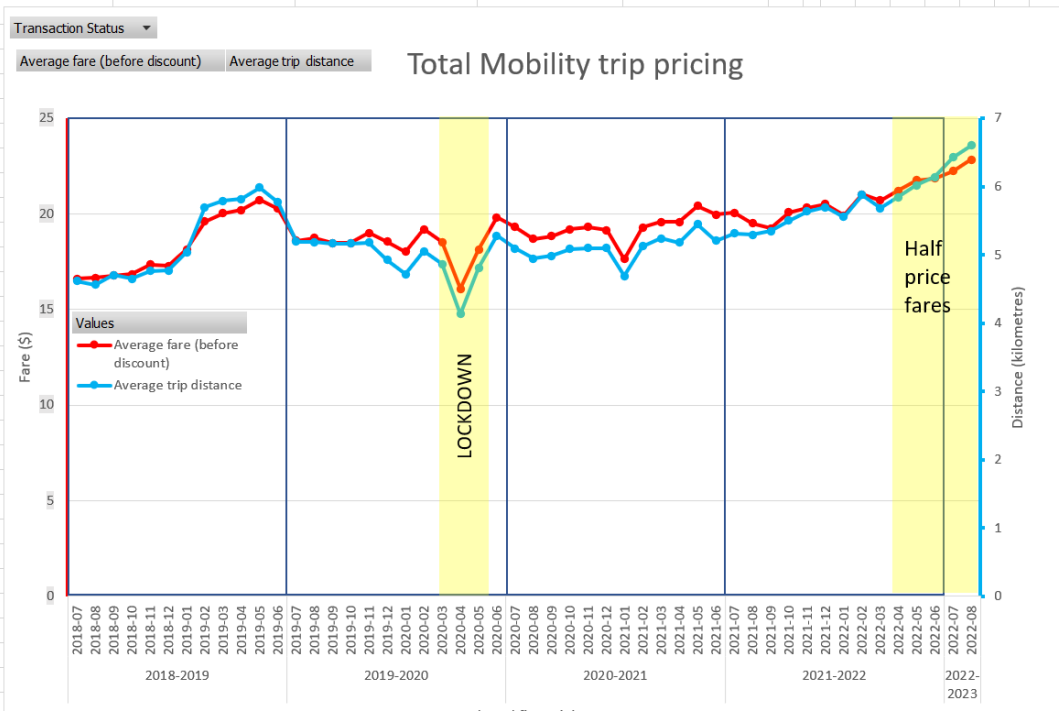


Figure 28: Half price fare impacts: Increased trip distance and fare price

CONSIDERATIONS

Strategic Framework and Policy Considerations

[135] Not applicable.

Financial Considerations

[136] Not applicable.

Significance and Engagement Considerations

[137] Not applicable.

Legislative and Risk Considerations

[138] Not applicable.

Climate Change Considerations

[139] Not applicable.

Communications Considerations

[140] Not applicable.

NEXT STEPS

[141] Provide an update to the next relevant Committee on patronage and revenue for Dunedin and Queenstown.

ATTACHMENTS

Nil