# Preliminary SA1_2021 SI scores (one day only) for 2018, 2019, 2020, 2021, 2022 and 2023

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# *Introduction*

Previous research by **?** developed a transit Supply Index (SI) based on calculating the number of transit arrivals at stops within an area of interest for an entire week, adjusted to account for the typical walk-access catchment for each stop. This document is part of a project to develop R code to calculate the SI directly from GTFS data. This data has been requested by researchers at Deakin University[1].

The current status of this project is that SI scores can be calculated directly from GTFS data, but the calculation currently takes approximately one day to calculate on a standard personal computer for every day of input timetable data. Monash University's PTRG is seeking to improve this performance[2], but in the meantime this paper reports preliminary outputs for researchers at Deakin University. It specifically reports on the calculation of SI scores for Statistical Area Level 1 zones from the 2021 census (SA1_2021) for the years 2018, 2019, 2020, 2021, 2022 and 2023. However, the SI scores presented here are for only one day of timetable data[3]. This document, and the results, are included in a branch of the overall project on github[4]. The SI values are calculated here for a Tuesday in the second week of August of each year[5].

This rest of this document is structured as follows: the next section discusses the research context of transit metrics and the the Supply Index. In the third section the methodology for the code development is outlined, including discussion of the case study GTFS for Victoria, Australia, that was used to test and verify the code output. In the fourth section results are presented, starting with verification of the code output through hand-calculation of SI scores for a SA1 area in the Victorian Alps. SI scores across Greater Melbourne and Victoria are also presented, comparing transit service levels across 2018 to 2023. Mode-by-mode SI scores are also explored. The document then closes with a brief discussion and conclusion.

[1] Specifically, Deakin researchers are seeking SI values for all Statistical Area Level 1 (SA1) zones in Victoria, with the SI calculated using a week's worth of timetable data from each of the years 2018 to 2023 (inclusive).

[2] Options being explored include improving the code's efficiency, and seeking ways to run the code on more powerful hardware.

[3] rather than one week.

[4] The branch can be found at `https://github.com/James-Reynolds/Transit_Supply_Index_GTFS/tree/Deakin_1_day_2018_to_2023`

[5] So as to match the 2021 census date.

# *Research context*

Even a brief search shows that there is a very large number of metrics available for benchmarking transit services[6].The Fielding Triangle (**?**) provides a framework for understanding how such metrics combine service inputs, service outputs and service consumption to describe cost efficiency, cost effectiveness or service effectiveness measures. At a larger scale, **?** and **?** discuss some of the traffic, mobility, accessibility, social equity, strategic planning and other rational decision-making frames that might underlie such transit metrics, while **?** extends this into models of how institutionalism, incrementalism and other public policy models might apply to decision-making processes. Further examples are provided by **?**, who develop a measure of accessibility in the context of policy development and social equity for Latin American Bus Rapid Transit (BRT) based networks, and the street space allocation metrics based around 10 ethical principles introduced by **?**.

[6] For example: the Transit Cooperative Research Program (TCRP) Report 88 provides an extensive guidebook on developing a performance-measurement system (**?**); online databases are provided by the Florida Transit Information System (FTIS) (**?**) and the International Association of Public Transport (UITP) (**?**); while the Transport Strategy Centre of Imperial College London runs extensive annual benchmarking programmes across over 100 transit provides around the world (**?**).

However, many of these metrics appear difficult to calculate, complex to explain or understand, and likely not well suited to communication with those who are not transit planners or engineers, or otherwise technical specialists. Where pre-calculated metrics are immediately available it may not be possible for practitioners, researchers or advocates to independently generate metrics for proposed system changes or to even know exactly how scores for the existing services levels are calculated^{The TCQSM and Transit Score may provide contrasting examples: with respect to the first challenge, TCQSM metrics may require large amounts of network, service, population and other data to be assembled before the indicators can be calculated; whereas Transit Scores are readily available (the **?** website shows scores for locations with a published GTFS feed, eliminating the need for any calculations.). With respect to the second challenge, the meaning of the Transit Score appears easy to explain (the closer to 100, the better), but as the score is calculated by a patented algorithm it may not be easy to understand or explain the connection between real-world conditions and the score, or what might need to be done to improve the score and service levels. Nor does it appear to be possible for Transit Scores to be generated for proposed changes to networks.