Frequency is Freedom

Measuring access to frequent public transport in Melbourne

Purpose

- Melbourne
- ‘Frequent’ PT service
- Walking catchment
- Population

What is ‘frequent’ service?

Definition of minimum service for “high frequency” public transport service	Source
Every 10 minutes from 0700 to 1900 on weekdays	(Department of Transport 2021)
Every 10 minutes	(Australian Transport Assessment and Planning Guidelines 2021)
Every 15 minutes from 0800 to 1800	(Bast and Storandt 4 November 2014)
Every 20 minutes during weekday interpeak	(Brown et al. 2019)
Every 15 minutes from 0700 to 1900 on weekdays **Every 15 minutes from 0800 to 1900 on Saturdays** **Every 15 minutes from 0900 to 1900 on Sundays**	(Transperth 2022)
Every 15 minutes on weekdays	(Translink 2022)
Every 15 minutes or better off peak, every 10 minutes or better peak, 0600 – 2100 on weekdays	(Department of Transport and Main Roads 2011)

Previous studies

- Currie & Loader (2009)
- Scheurer & Woodcock (2018)
- Currie & Senbergs (2007)
- Curtis & Scheurer (2016)

Parameters

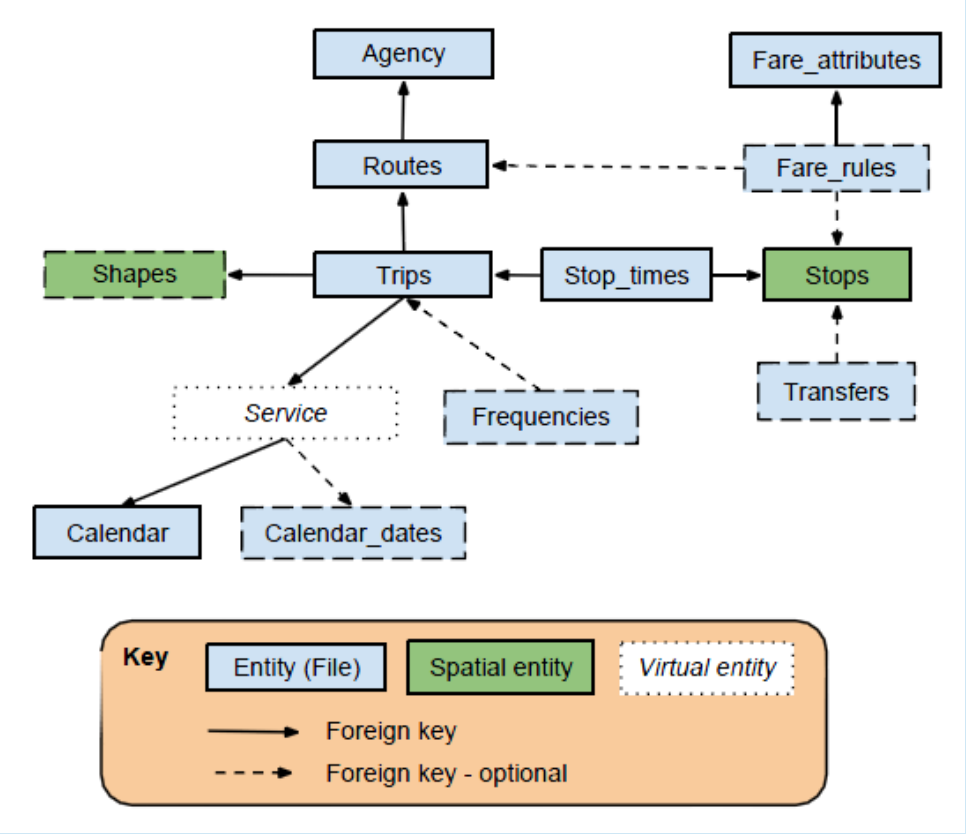
Time period	Name
0700 – 0900 (Weekday)	AM Peak
0900 – 1600 (Weekday)	Interpeak
1600 – 1800 (Weekday)	PM Peak
1800 – 2200 (Weekday)	Evening
0900 – 1900 (Saturday)	Saturday
1900 – 2400 (Saturday)	Saturday
0900 – 1900 (Sunday)	Sunday
1900 – 2400 (Sunday)	Sunday

- Greater Melbourne (ABS)
- 2021 Census Meshblocks
- PTV GTFS (Dec 2023)
- OpenStreetMap (walking routes only)
- 5km/h walking speed
- 800 metre distance

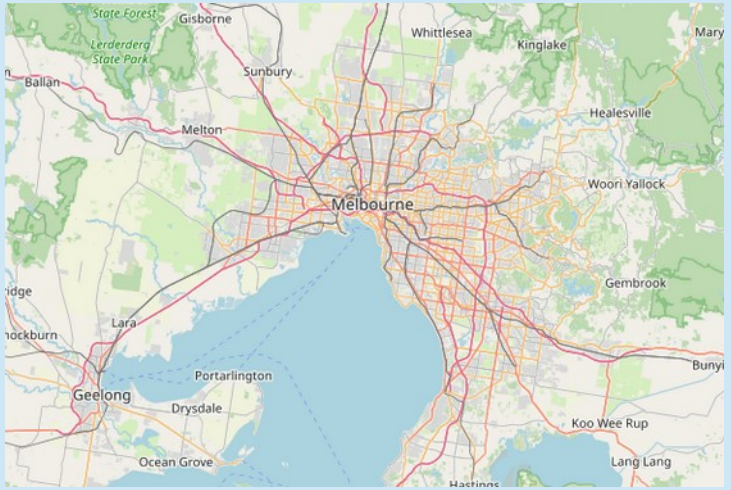
How do we do this?

1) Gather PT service data & extract relevant information
2) Overlay onto ABS Meshblocks
3) Prepare and load walking network
4) Run analysis
5) Map results

Data sources



Name	Description
OpenStreetMap	Free and open source map of the world.
PTV GTFS	General Transit Feed Specification. Standard format to display public transport routes, stops, frequencies, etc. in a spatial format.



Tools

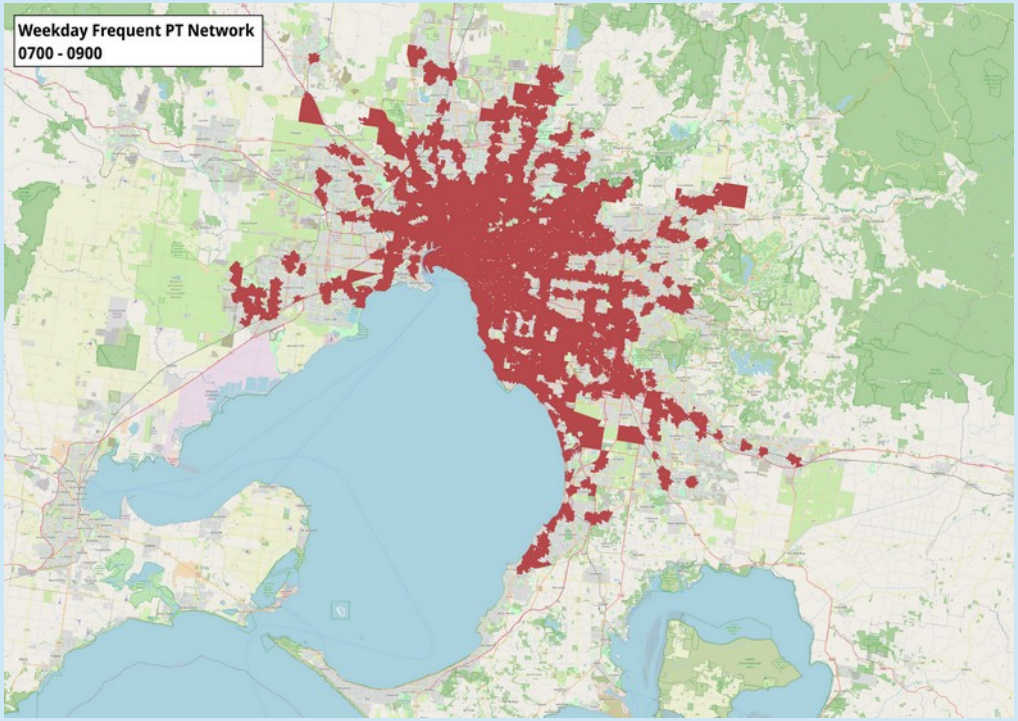
Name	Description
GTFS Functions	The gtfs_functions tool is an open source Python script that is used for preparation and analysis of GTFS data. Due to an upgrade of the ‘pendulum’ Python package breaking a dependency in this script, which is used to read dates, an older version (2.1.2) was used.
QGIS	This is a free and open source Geographical Information Systems (GIS) software used for a geospatial data display and analysis.
Overpass Turbo	A free and open source tool to extract data from OpenStreetMap.
OSMnx	This is a free and open source Python package to download, model, analyse, and visualise street networks and other geospatial features from OpenStreetMap.

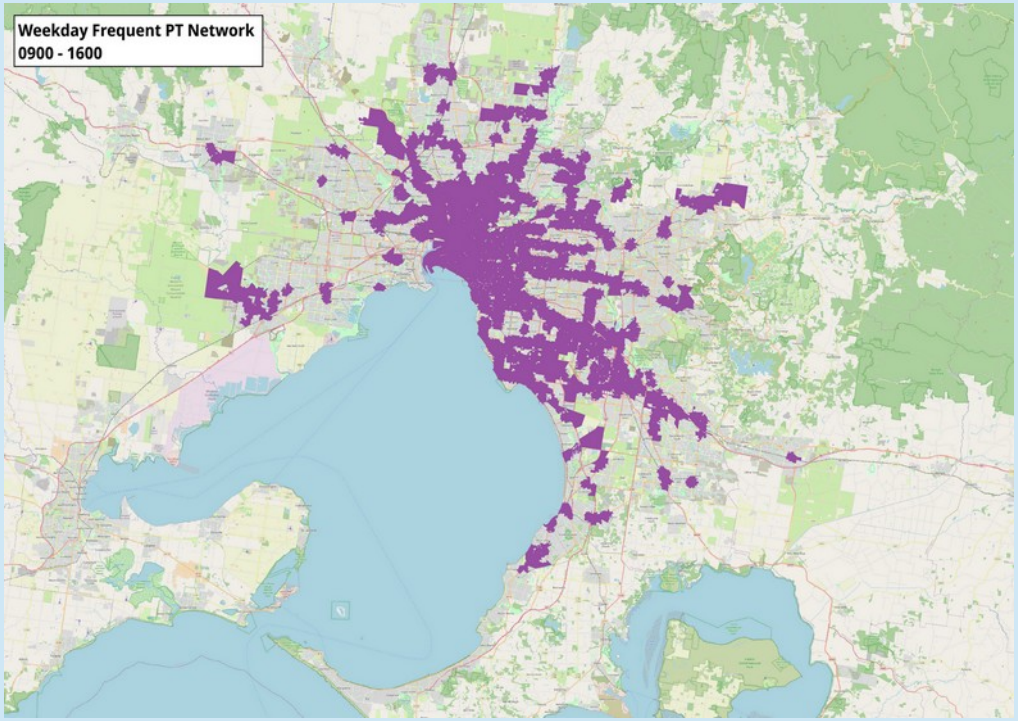
Results

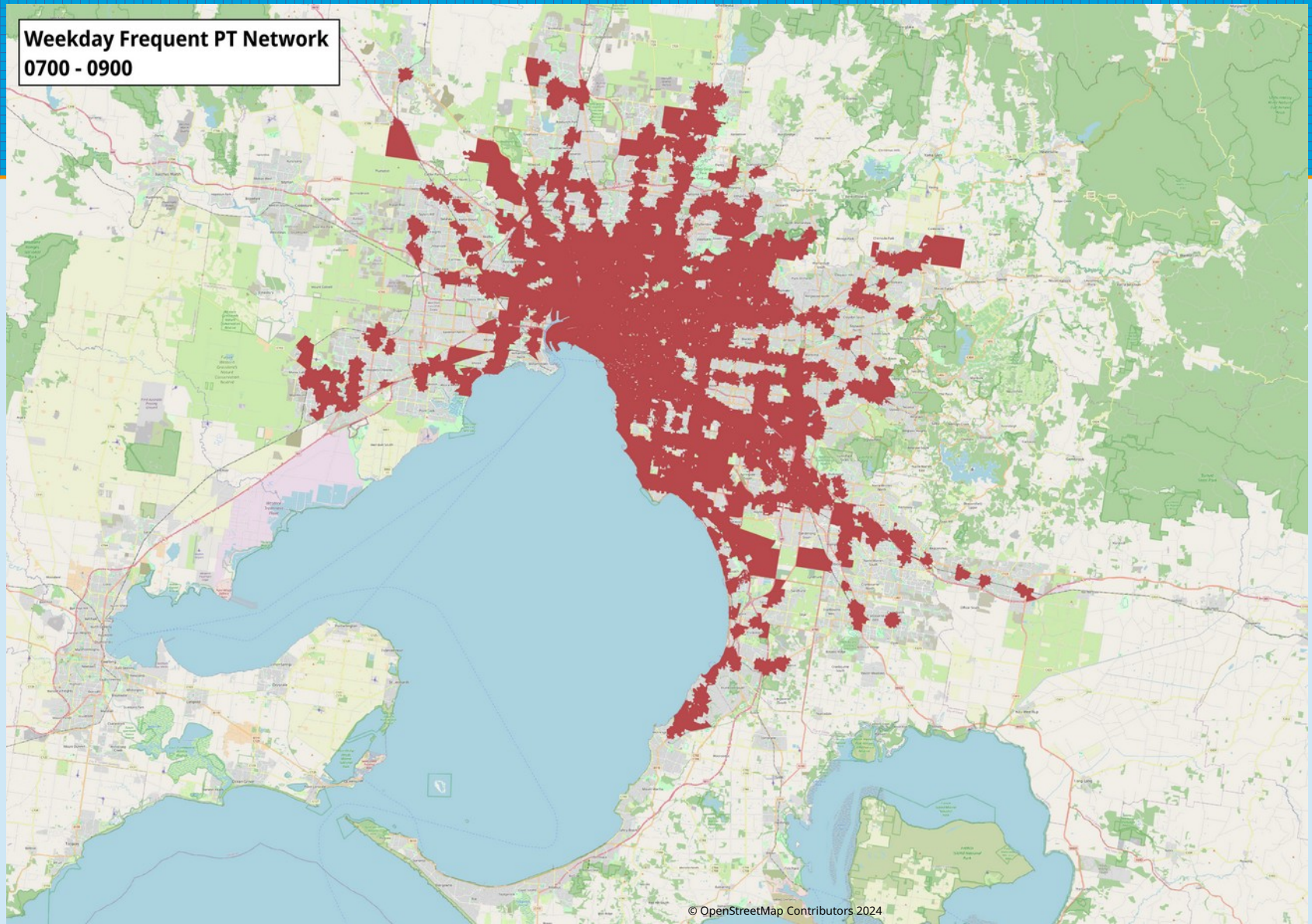
People living within 800m of a frequent public transport service in Greater Melbourne

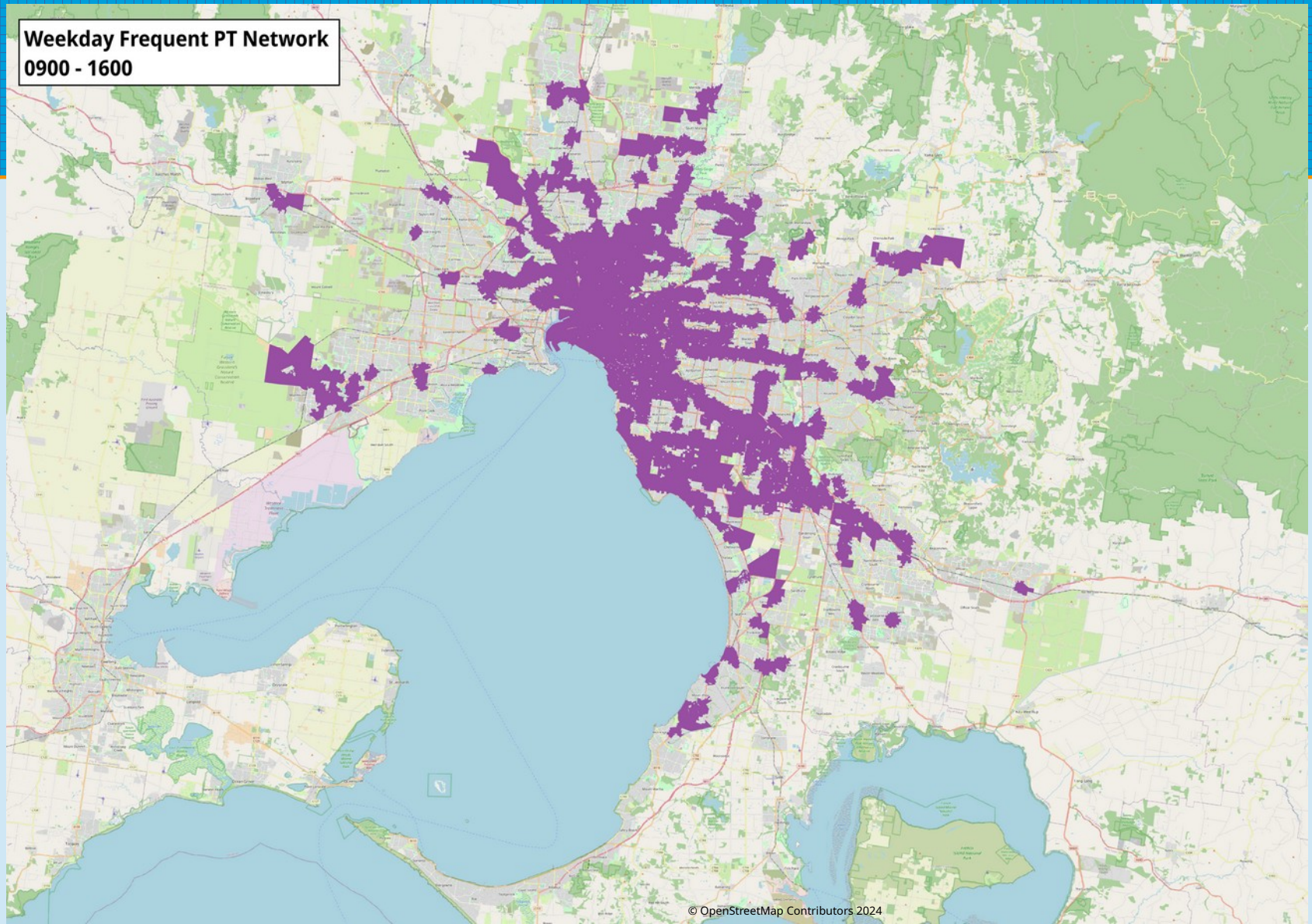
Day	Time window	Total number	% of total pop
Weekday	0000 – 0700	0	0%
	0700 – 0900	2,488,062	50.6%
	0900 – 1600	1,983,635	40.9%
	1600 – 1800	2,467,211	50.1%
	1800 – 2200	1,753,095	36.2%
	2200 – 2400	337,128	7.0%
Saturday	0000 – 0800	0	0%
	0800 – 1900	1,292,973	26.7%
	1900 – 2400	446,744	9.2%
Sunday	0000 – 0800	0	0%
	0800 – 1900	1,094,602	22.6%
	1900 – 2400	253,557	5.2%

Results - weekdays






Weekday Frequent PT Network
0700 - 0900
© OpenStreetMap Contributors 2024


Weekday Frequent PT Network
0900 - 1600
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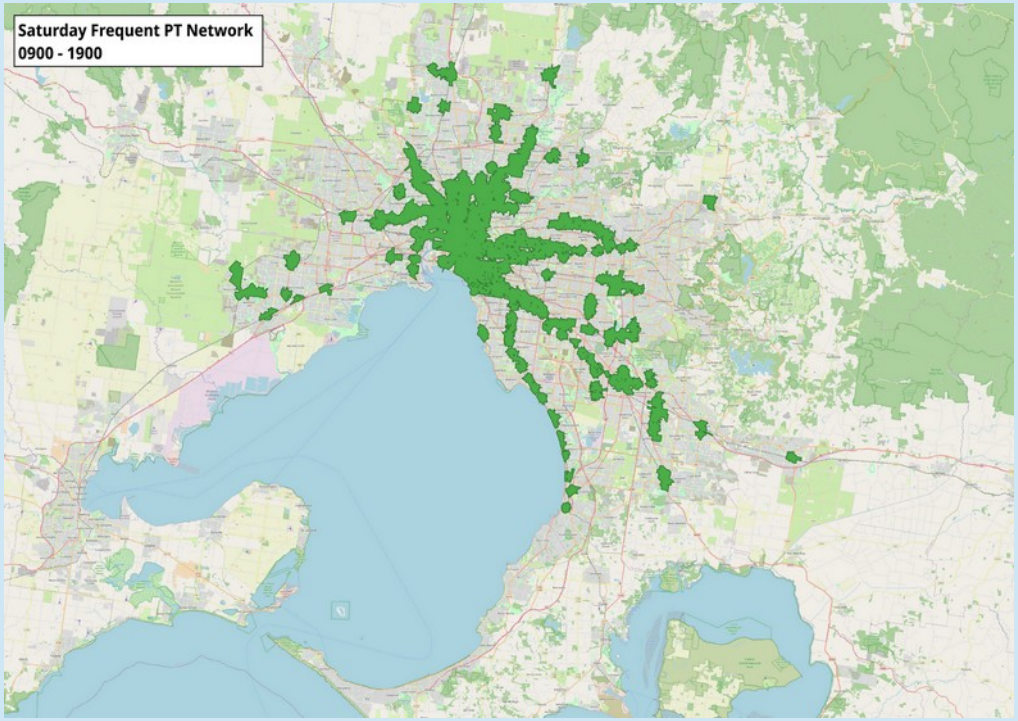
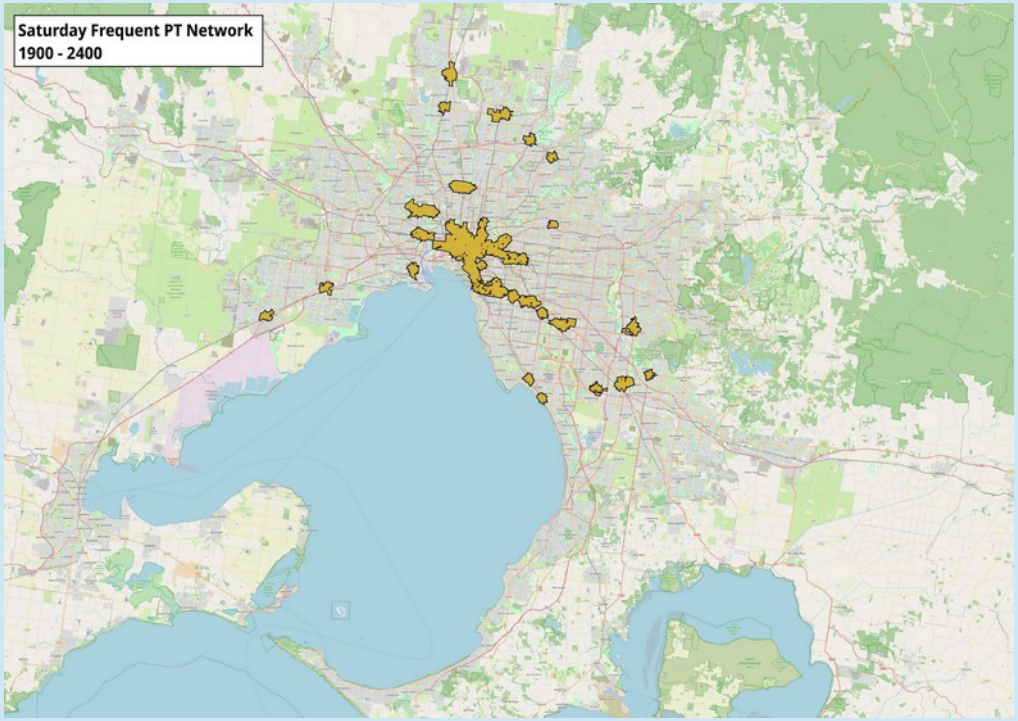
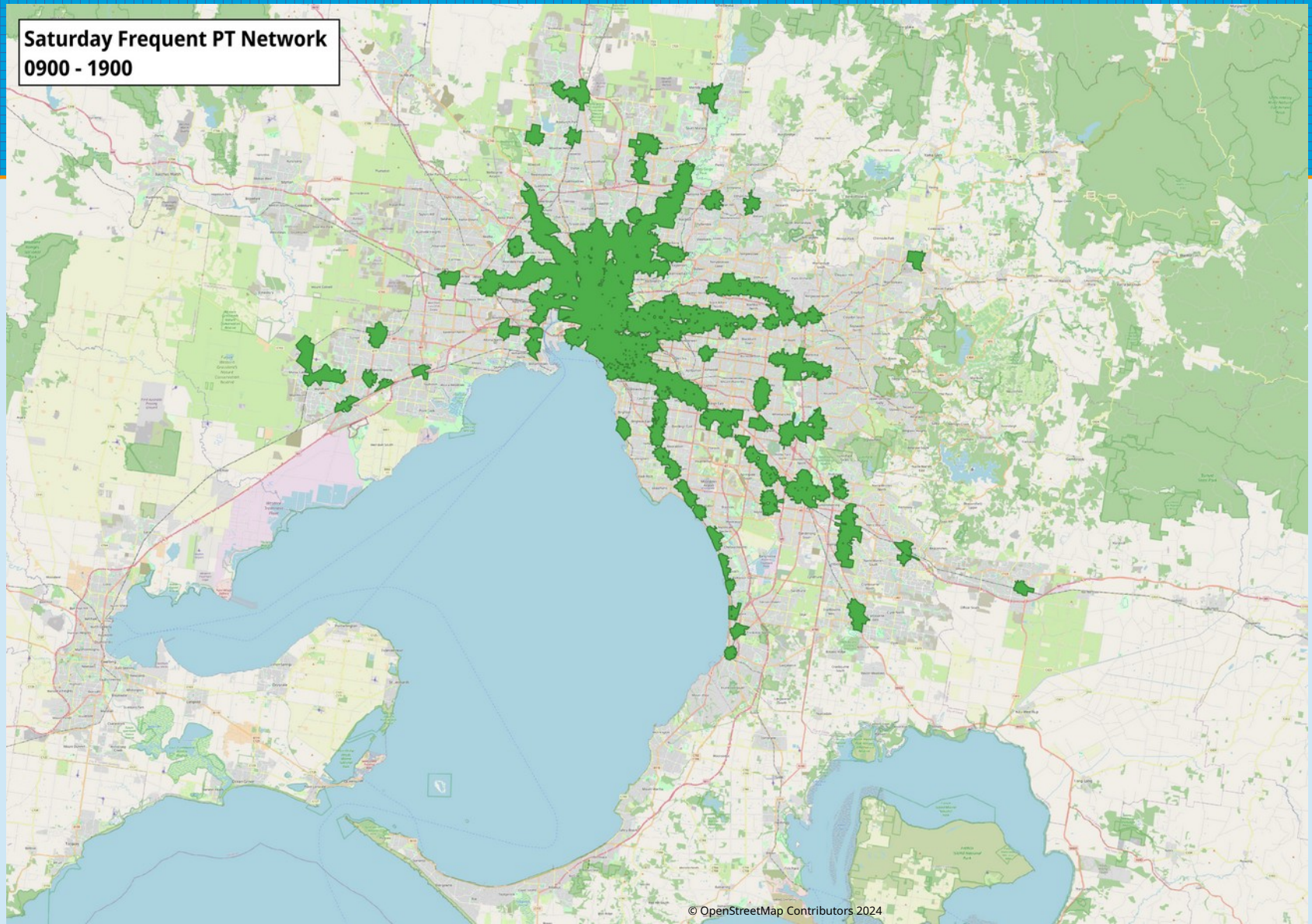
Results - Saturdays






Saturday Frequent PT Network
0900 - 1900
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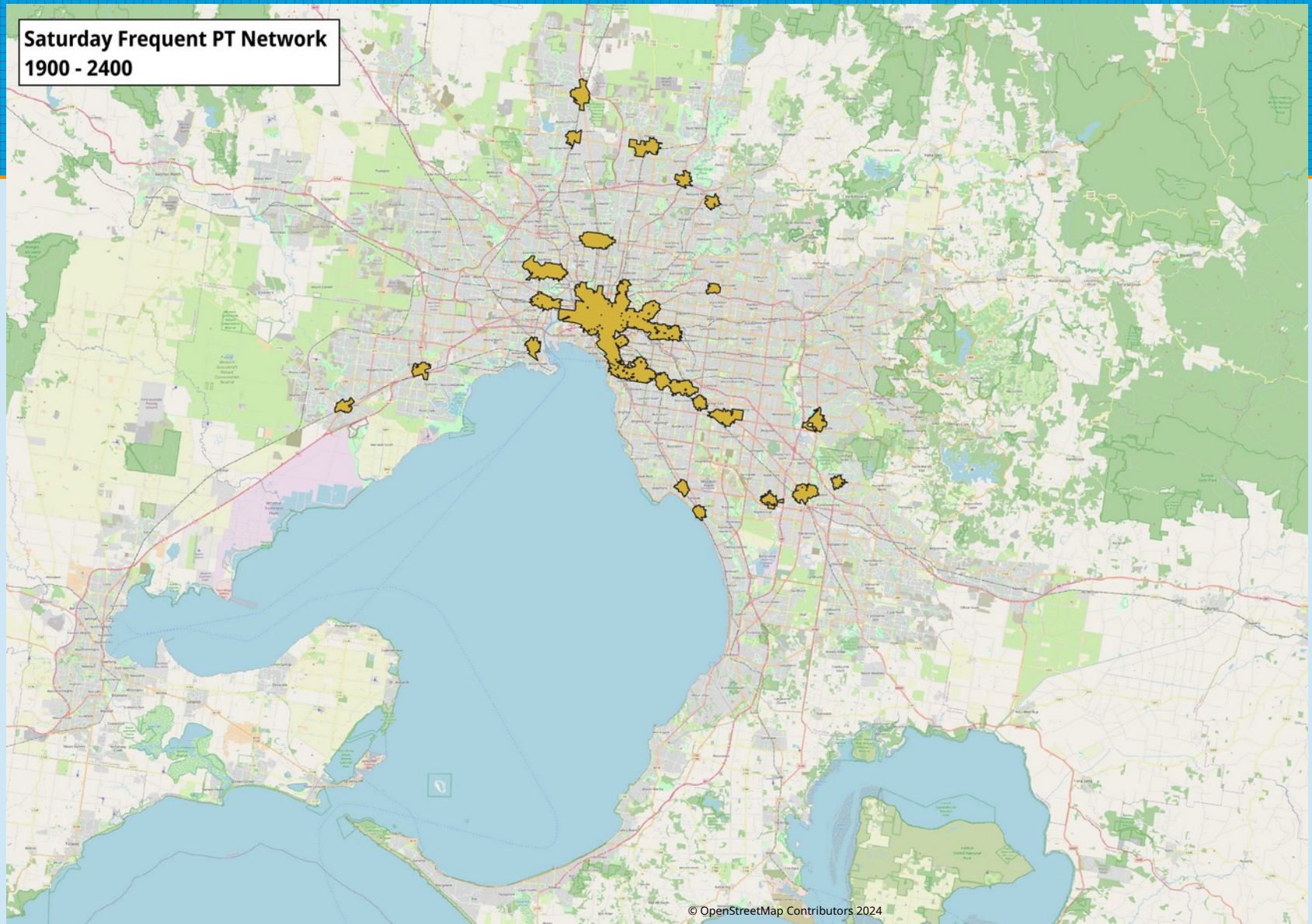
Saturday Frequent PT Network
1900 - 2400
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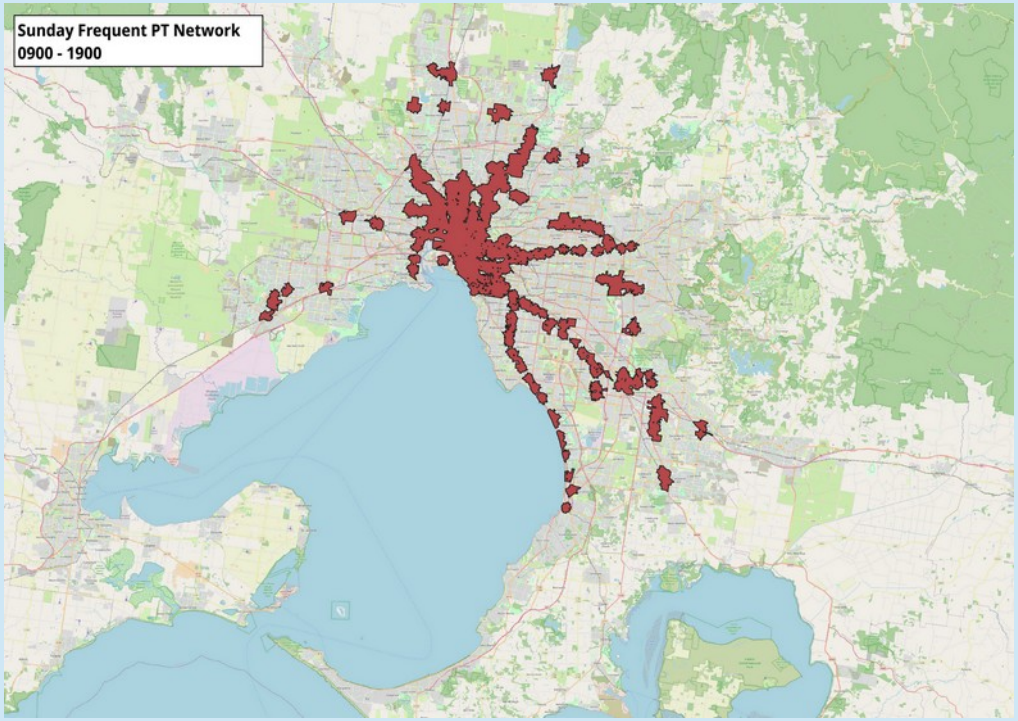
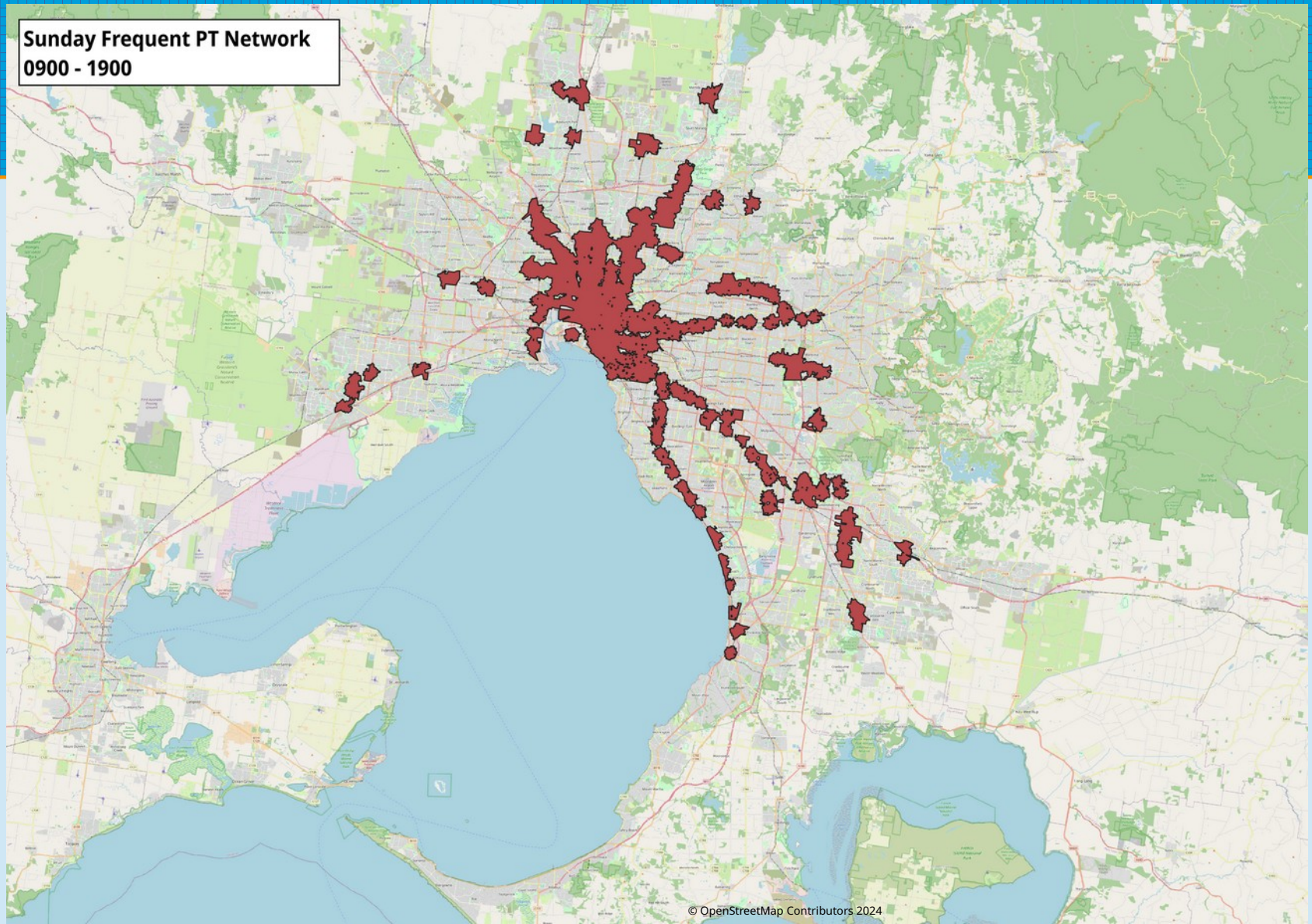
Results - Sundays




Sunday Frequent PT Network
0900 - 1900
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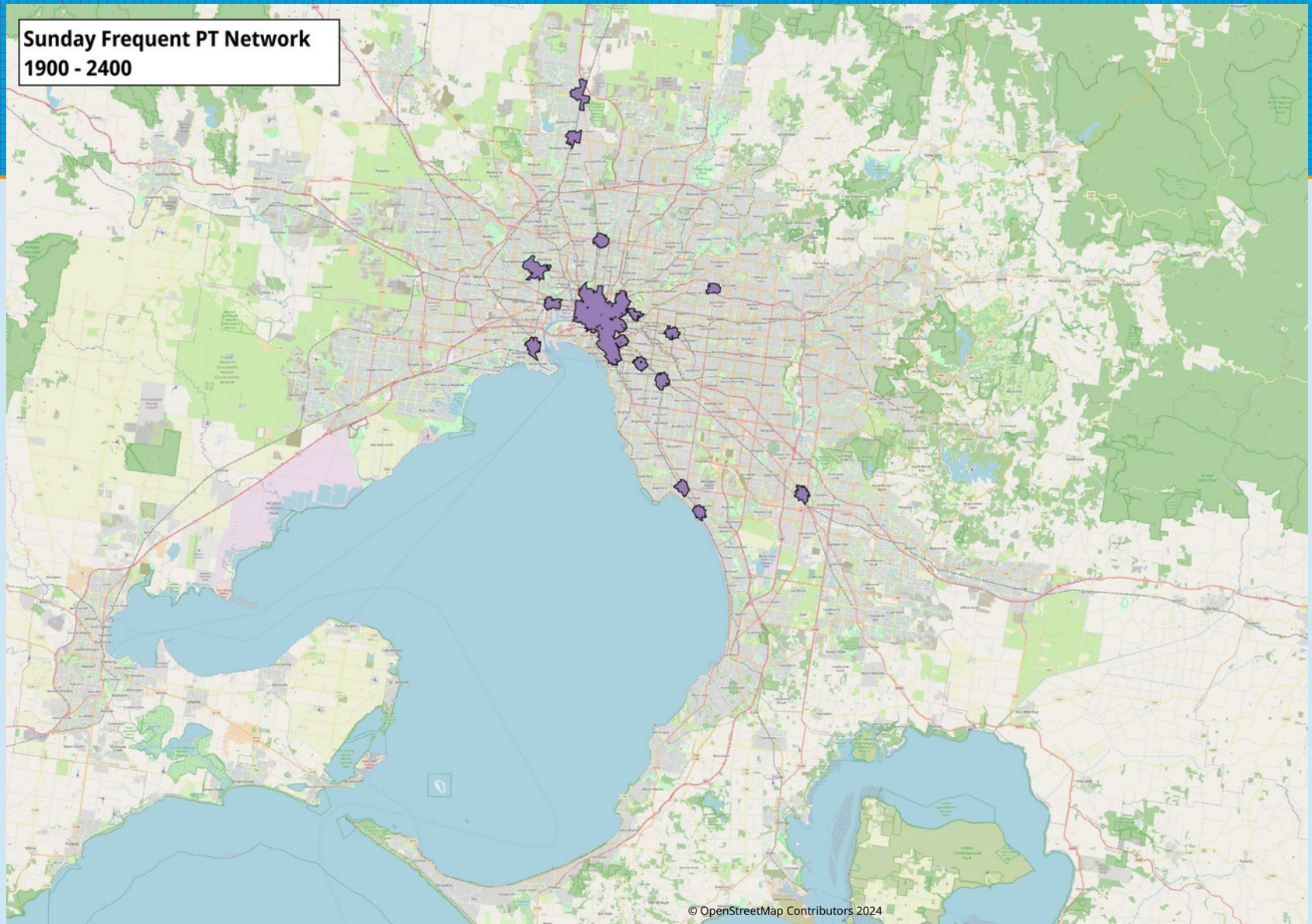
Sunday Frequent PT Network
1900 - 2400
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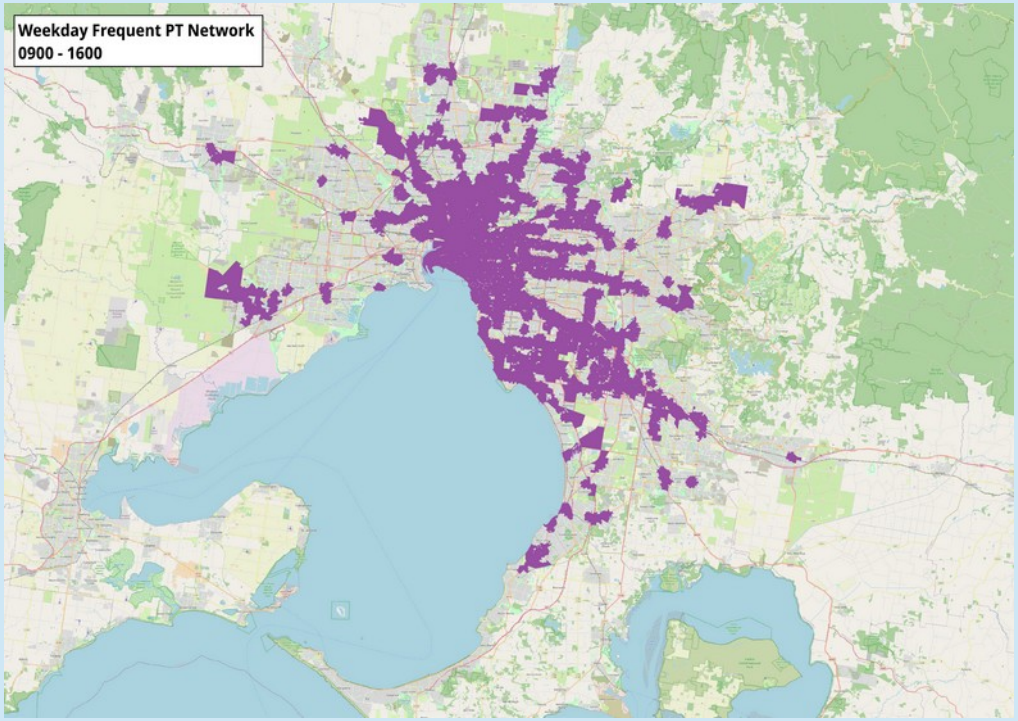
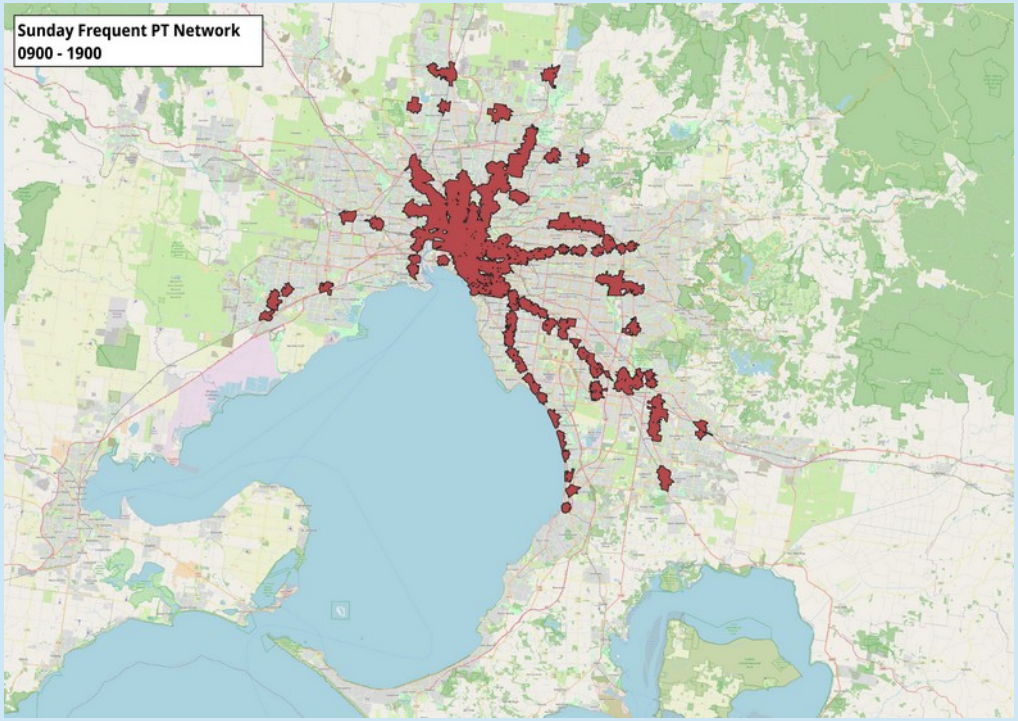
Results – weekday vs Sunday





Limitations

- PTV GTFS
  - Duplicate routes ‘combined’
  - Some other triplicate route error
  - Phantom bus routes
  - Out of date or incorrect bus stop locations
  - One vs. two point problem for bus stops
  - 13,071 validation errors detected

Limitations

- PT disruptions (‘clean’ data)
- Partial Meshblock coverage
- ‘Average’ walking speed
- ‘Lumpy’ timetable
- Defined service periods

Research gap

- 10 minute headways
- Updated data
- Granularity of meshblocks for population
- Walking catchments rather than ‘as the crow flies’
- Including all PT modes
- Using frequency as the determiner of access
- Specific to Melbourne

If you remember only one slide…

At its best (AM peak), half of Melbourne's population lives within walking distance of 'turn up and go' PT

Further research ideas

- Non-residential access
- 'Lumpy' timetables
- Different time periods
- Different walking distance / speed

Questions / discussion

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