Access and Connection

transport choice

Overview

Indicator name	**Public transport accessibility**
Indicator number	4 **Indicator type** Core
Objective	To measure the level of interaction between land use and transport services in terms of how well people are served by public transport.
Application guidance	Providing sustainable transport systems is a key indicator of sustainable cities and communities. Sustainable modes – walking, cycling and public transport – serve people of all ages, and frequent and reliable public transport services, access to public transport stops, and seamless interchanges can help to make sustainable modes the easy and natural choice for all. This indicator will support practitioners to understand the level of connectivity of a place to public transport. Based on the outcome of the assessment, practitioners can determine the Public Transport Accessibility Level (PTAL), which can enable better planning and allocation of limited financial resources to public transport infrastructure to service citizens, especially in high density areas. Practitioners can use the *Public Transport Accessibility Level* (PTAL) metric to measure the frequency and reliability of public transport services at the mesh block level.

Metric

Public Transport Accessibility Level (PTAL)

Related indicators

Access and Connection

2 Walking paths
3 Cycling accessibility
6 Bus and strategic freight reliability

Amenity and Use

10 Local living
12 Transport node facilities

Comfort and Safety

23 Road safety

Recommendation

PTAL can be employed for the following purposes:

- To identify land uses that may gain benefits from transport enhancements
- To assess the likely impacts of plans on places for new routes, stations or roads
- To identify the most suitable locations for medical and other services, so that people can access them easily
- To understand what parts of city are suitable for developing more houses and offices
- To recommend whether different locations need different level of car parking provision

Metric – Public Transport Accessibility Level (PTAL)

Metric unit	Range of index
Description	To measure the distance from a point of interest to the nearest public transport stop and service frequencies at that stop
Spatial coverage	Applicable to all NSW
Spatial application	This metric is most suitable for area-based analysis based on the mesh block level
Calculation methodology	Prepare the input data sets, including data extraction, cleaning and transformation 1. Obtain General Transit Feed System (GTFS) data for Rail, Bus, Ferry and Light Rail, Australian Bureau of Statistics (ABS) Mesh Block and LGA maps 2. Convert the GTFS data into a master table using an automated process, which will show timetables of transport modes (bus, ferry, light rail and train) 3. Create centroids in the mesh block data to calculate the distance matrix using spatial tools 4. Create the concordance table between LGA and mesh blocks by using spatial tool Calculate the walking distance 5. Calculate the walking distance from the site, known as the Point of Interest (POI), to the nearest bus stops and rail stations, known as service access points (SAPs) Calculate the Total Access Time (TAT) 6. The total access time is made up of a combination of factors: combining the walk time from the point of interest (POI) to the service access point (SAP), and the time spent waiting at the SAP for the desired service to arrive *Total Access Time = Walk Time + Average Waiting Time* Calculate the Average Waiting Time (AWT) 7. Waiting time is the average time between when a passenger arrives at a stop or station, and the arrival of the desired service. In PTAL, passengers are assumed to arrive at the SAP at random intervals • For each selected route, the scheduled waiting time (SWT) is calculated, which is estimated as half the headway (ie. the interval between services) *SWT = 0.5 x (60/Frequency)* *Note: For example, a 10-minute service frequency (6 buses per hour) would give an SWT of 5, which translates to an average 5-minute wait for the next bus or train service to arrive* Calculate Equivalent Doorstop Frequency (EDF) 8. Convert access time to an Equivalent Doorstep Frequency (EDF) *EDF = 30/Total Access Time (minutes)* Calculate Accessibility Index (AI) for the Point of Interest 9. Summation of the equivalent doorstop frequency (EDF) values gives the accessibility index (AI) per mode *AImode = EDFmax + (0.5 x All other EDFs)*

Metric – Public Transport Accessibility Level (PTAL) (Cont.)

Calculation methodology

Calculate overall accessibility

10. Sum the individual AIs across all modes

$$AIpoi = \Sigma(AI_{mode1} + AI_{mode1} + AI_{mode2} + AI_{mode3} + \ldots + AI_{mode\ n})$$

Public Transport Accessibility Index (PTAI)

11. The final formula provided above calculates the Public Transport AccessibilityIndex (PTAI)
12. Allocate indices to appropriate band of Public Transport Accessibility Levels (PTALs) asper table below

Data representation

13. Calculate average PTAI for each mesh block for the Morning Peak Hours 6:00 AM to 10:00 AM
14. Assign colour based on the classification below

- Band 1 (1a and 1b) = very little to no access to the public transport network
- Band 6 (6a and 6b) = high access to the public transport network

Note: The output of PTAL index is presented at a strategic level report and the map is available at pre-defined hourly peak periods in the following link: https://geohub.transport.nsw.gov.au/portal/apps/dashboards/38148b9d3ee04d1bb006b74a5d4b5fd5

Assumption

- Geographic centroids of ABS mesh blocks are used as the POI
- Only SAPs within a certain distance of the POI are included (400m for bus stops and 800m for rail stations, which correspond to a walking time of approximately 5 minutesand 10 minutes respectively at the standard assumed walking speed of 66m/min
- In calculating the 'Average Waiting Time', passengers are assumed to arrive randomly atthe service access point (SAP)
- Walking speed for an average person is 4km/h
- Extent of walk catchment for bus is 400m radius
- Extent of walk catchment for train, ferry and light rail is 800m radius
- Travel times between public transport stops are excluded in the calculation of PTAI
- PTAI value range can be aligned with LoS A to F
- Current web based PTAL application uses the most recent GTFS data which was issued inDecember 2019
- Output of services in the PTAL calculation should be validated against the Trip Planner website (transportnsw.info/trip#/), which is used to calculate the number of services atany bus stop, train station, ferry wharf or light rail station, to assess the accessibility in anarea. The higher the frequency, the higher the PTAL value is.

Limitation

- Destinations of public transport services are not considered in the analysis
- Factors such as ease of interchange, levels of crowding on buses and trains, speed of public transport services, or accessibility are not considered in the analysis
- PTAL measure does not differentiate the PTAI values within the same PTAI band level or category in which there can be some significant differences
- Current web based PTAL application only provides the existing condition of PTAI maps
- GTFS data is static
- PTAL is calculated for a particular day of the year
- Absence of adequate and accurate scenario data
- A special computer programming capability is required to estimate or forecast the future conditions of PTAI
- Calculation of PTAL does not include trips made by car

Metric – Public Transport Accessibility Level (PTAL) (Cont.)

Data source

- TfNSW, Public Transport Accessibility Level (PTAL) – December 2021
- General Transit Feed Specification (GTFS)
- ABS Mesh Block 2016: abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/1270.0.55.001July%202016?OpenDocument
- SIX Maps LGA boundaries: maps.six.nsw.gov.au/clipnship.html

Reference

- TfNSW, PTAL – Technical Documentation – PTAL - Technical Documentation v1.0_Jan2023
- Pitot, M., Yigitcanlar, T., Sipe, N. and Evans, R., Land Use & Public Transport Accessibility Index (LUPTAI) Tool - The development and pilot application of LUPTAI for the Gold Coast, ATRF06 Forum Papers (2006): eprints.qut.edu.au/32102/