

Access and Connection



transport choice

Overview



Indicator name	Cycling accessibility		
Indicator number	3	Indicator type	Supplementary
Objective	To measure the connectivity, access, and quality of cycling infrastructure across the State		
Application guidance	Providing sustainable transport systems is a key indicator of sustainable cities and communities. Sustainable modes of transport serve people of all ages and abilities, and where an area is more permeable for bicycle riders, getting around by bike becomes the natural choice. This indicator will support practitioners to understand the availability and accessibility of cycling infrastructure. Based on the outcome of the assessment, practitioners can determine whether additional links could be considered to enhance the connectivity of the cycling network for users. Practitioners can use the <i>connected cycling network</i> metric to measure the individual or multiple components of cycling infrastructure that combine to form a connected network and the percentage of infrastructure classes that comprise that network. Practitioners can use the <i>access to cycling network</i> metric to measure the distance required to travel along the road network to access a cycling specific network. Practitioners can use the <i>cycling infrastructure type and length of cycling infrastructure</i> metrics to measure the desirability and extent of cycling facility, respectively.		

Metric



- Connected cycling network
- Access to cycling network
- Cycling infrastructure type
- Length of cycling infrastructure

Recommendation



N/A

Related indicators



Access and Connection

- 1 Mode share
- 8 Steepness



Amenity and Use

- 12 Transport node facilities



Comfort and Safety

- 23 Road safety
- 25 Safe speed for environment
- 28 Urban heat



Character and Form

- 35 Legibility



Metric – Connected cycling network

Metric unit	Count / percent (%)
Description	To measure the individual or multiple components of cycling infrastructure that combine to form a connected network and the percentage of infrastructure classes that comprise that network
Spatial coverage	NSW urban areas, subject to presence of cycling specific infrastructure
Spatial application	This metric is most suitable for link-based analysis based on the road network
Calculation methodology	Create cycling infrastructure buffer for spatial joining 1. Create 1m buffer placed around all appropriate cycling infrastructure (this is to account for poor topology within the dataset) 2. Dissolve the buffer data and the resulting object ID is replicated as a “Network ID” Join spatially to get count and percentage 3. Buffer data with Network ID is spatially joined back to the underlying cycling infrastructure 4. Unique networks will be created by dissolving based on Network ID 5. Spatially join the unique networks to the original infrastructure dataset using ‘share line segment’ and in the field map sum infrastructure types 6. Add another field that counts individual infrastructure segments 7. Percentage infrastructure types can be calculated with unique network length <i>Note: The underlying network was aggregated and joined to develop class percentages which were calculated through an excel pivot table.</i>
Assumption	• Infrastructure classes used in this analysis include bicycle path, shared path and bicycle lane • Infrastructure classes are accurate and reflect on-the-ground facilities • Connections between infrastructure assets are mapped correctly • Road sections with wide shoulders are excluded from analysis as these are not considered cycling specific infrastructure
Limitation	• NSW Cycleways dataset is accurate as of August 2020. Changes to the cycling network that have occurred since August 2020 are not reflected in the dataset • General routable network is used in the analysis, and is not enhanced for cycling journeys
Data source	• TfNSW Road Track Path Network • TfNSW, NSW Cycleways (August 2020)



Metric – Access to cycling network

Metric unit	Metres (m)
Description	To measure the distance required to travel along the road network to access a cycling specific network
Spatial coverage	NSW Urban areas, subject to presence of cycling specific infrastructure
Spatial application	This metric is most suitable for link-based analysis based on the road network
Calculation methodology	Obtain incident and facility points 1. Create road segment mid-point with unique ID 2. Create end/dangle points from cycling infrastructure with unique ID 3. Use mid-point as incident point for network analysis 4. Use end/dangle points as facility point for network analysis Perform network analysis 5. Conduct “closest facility” function based on network analysis (direction is from incident to facility) 6. Use input from Step 3 and 4 to generate routes 7. Extract the origin and destination ID from the routes attribute 8. Use origin ID to join back the route length to the road segment Data representation 9. Assign colour based on the classification below Unit: Metres (m) < 400 400 – 800 801 – 1,600 1,600 – 5,000 > 5,000
Assumption	• Infrastructure classes used in this analysis include bicycle path, shared path and bicycle lane • Infrastructure classes are accurate and reflect on-the-ground facilities • Connections between infrastructure assets are mapped correctly • Road sections with wide shoulders are excluded from analysis as these are not considered cycling specific infrastructure • A mid-point along routable network links is used, and varies in distance from 10m to over 5km
Limitation	• Rural and regional roads were not considered in this analysis • NSW Cycleways dataset is accurate as of August 2020. Changes to the cycling network that have occurred since August 2020 are not reflected in the dataset • General routable network is used in the analysis, and is not enhanced for cycling journeys
Data source	• TfNSW Road Track Path Network • TfNSW, NSW Cycleways (August 2020)



Metric – Cycling infrastructure type

Metric unit	Type of infrastructure
Description	To measure the type of cycling facility provided for users
Spatial coverage	Applicable to all NSW
Spatial application	This metric is most suitable for link-based analysis based on the road network and off-road cycling paths as per the NSW Cycleways dataset
Calculation methodology	Obtain data on cycling infrastructure 1. Obtain TfNSW NSW Cycleways dataset 2. Identify infrastructure type classification and direction of travel • Bicycle path – directional • Bicycle path – non-directional • Shared path – directional • Shared path – non-directional • Separated path – non-directional • Bicycle lane – directional • Bicycle lane – non-directional <i>Notes:</i> • <i>Bicycle paths are off-road facilities for bicycle use only</i> • <i>Shared paths are off-road facilities shared with pedestrians</i> • <i>Separated paths are off-road facilities</i> • <i>Bicycle lanes are on-road facilities that are separated from other vehicles by road markings (may be located between parked cars and moving traffic lanes)</i> • <i>Directionality means there is a direction of travel indicated for bicycle riders</i> • <i>Directionality improves safety outcomes for bicycle riders by reducing conflicts with other bicycle riders</i> • <i>Hierarchy is based on desirability of cycling facilities in terms of the outcomes for bicycle riders. Guidance on preferred facilities can be found in the Cycleway Design Toolbox, Section 2.2.1</i> Data representation 3. Assign colour based on the classification below Hierarchy (desirability of cycling facilities) Bicycle Path - Directional Bicycle Path - Non Directional Shared Path - Directional Shared Path - Non Directional Separated Path - Non Directional Bicycle Lane - Directional Bicycle Lane - Non Directional
Assumption	Infrastructure classes are accurate and reflect on-the-ground facilities
Limitation	NSW Cycleways dataset is accurate as of August 2020. Changes to the cycling network that have occurred since August 2020 are not reflected in the dataset
Data source	TfNSW, NSW Cycleways (August 2020)



Metric – Length of cycling infrastructure

Metric unit	Metres (m)														
Description	To measure the length of cycling infrastructure provided for users														
Spatial coverage	Greater Sydney and NSW Outer Urban and Bounded Localities														
Spatial application	This metric is most suitable for area-based analysis based on SA2 (Greater Sydney) and Sections of State (rest of NSW)														
Calculation methodology	Obtain data sources 1. Obtain boundary data from ABS, including SA2 and Sections of State for Outer Urban and Bounded Localities Calculate cycleway length 2. Intersect cycling facility data (lines) with the boundary data obtained in Step 1 3. Spatially join the output of Step 2 to the boundaries obtained in Step 1, summing the length of cycling infrastructure using a “contains” border Data representation 4. Assign colour based on the classification below Unit: Meters (m) <table><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>3 – 2,500</td><td>2,501 – 5,000</td><td>5,001 – 20,000</td><td>20,001 – 75,000</td><td>75,001 – 100,000</td><td>100,001 – 150,000</td><td>150,001 – 200,000</td></tr></table>								3 – 2,500	2,501 – 5,000	5,001 – 20,000	20,001 – 75,000	75,001 – 100,000	100,001 – 150,000	150,001 – 200,000
3 – 2,500	2,501 – 5,000	5,001 – 20,000	20,001 – 75,000	75,001 – 100,000	100,001 – 150,000	150,001 – 200,000									
Assumption	Infrastructure classes are accurate and reflect on-the-ground facilities														
Limitation	• Sections of State dataset does not consider location name • NSW Cycleways dataset is accurate as of August 2020. Changes to the cycling network that have occurred since August 2020 are not reflected in the dataset														
Data source	• TfNSW, NSW Cycleways (August 2020) • Australian Bureau of Statistics, SA2 (2016): abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/1270.0.55.001July%202016?OpenDocument • Australian Bureau of Statistics, Sections of State (2016): abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/1270.0.55.004July%202016?OpenDocument#Data														

Reference



TfNSW, Cycleway Design Toolbox (2021):
transport.nsw.gov.au/system/files/media/documents/2021/Cycleway-Design-Toolbox-Web.pdf