Access and Connection

equity

Overview

Indicator name	**Steepness**
Indicator number	8
Objective	To measure accessibility of streets for users based on steepness/slope
Application guidance	A healthy environment is one where the road is safe – reducing the risk of injury by design, where the speed and street environment both minimise the risk of serious injury. Factors like steepness and geometry affect the safety of the community and road users.

Indicator type Supplementary

This indicator will support practitioners to understand whether the slope of streets is accessible for all road users, particularly those with mobility impairments. Based on the outcome of the assessment, practitioners can determine whether alternate routes or facilities could be incorporated into their design or project to enhance accessibility.

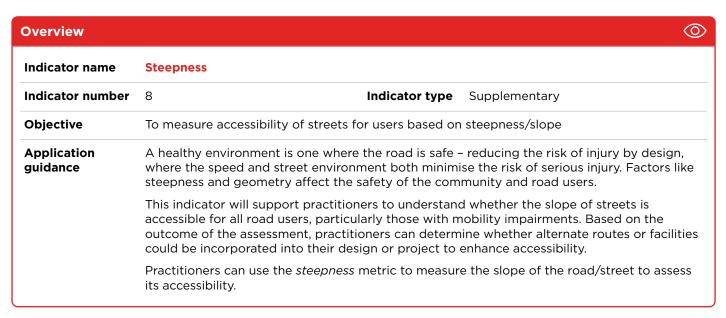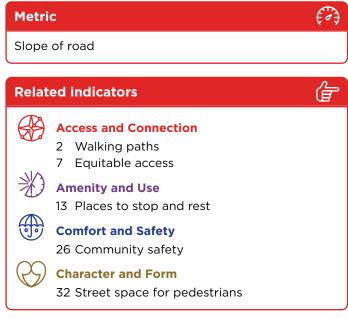Practitioners can use the *steepness* metric to measure the slope of the road/street to assess its accessibility.

Metric

Slope of road

Recommendation

To enrich the analysis, consideration could be given to off-road walking and cycling paths, which provide a vital part of the walking and cycling network

Related indicators

Access and Connection
2   Walking paths
7   Equitable access

Amenity and Use
13 Places to stop and rest

Comfort and Safety
26 Community safety

Character and Form
32 Street space for pedestrians

Metric – Slope of road

Metric unit	Degree (°)
Description	To measure the slope of the road/street to assess its accessibility
Spatial coverage	Applicable to all NSW
Spatial application	This metric is most suitable for link-based analysis based on the road network

Calculation methodology	**Obtain refined road segment data**
	
	1. Split each road segment every 20m
	
	Interpolate segments to surface
	
	2. Obtain 5m Digital Elevation Model (DEM)
	3. Get each 20m segment start and end elevation
	
	Calculate slope in degree
	
	4. Use 20m segment length with start and end elevation to calculate slope degree
	
	Slope = atan (abs(End point elevation – Start point elevation) / length)) x (180/pi)
	
	abs: return absolute value
	
	atan: return the arctangent (in radians) of a number
	
	Data representation
	
	5. Assign colour based on the classification below
	
	Unit: Degree (°)
	
	Walking
	
	`< 3` `3.1 – 5` `5.1 – 7` `7.1 – 10` `10.1 – 12` `> 12`
	
	Cycling
	
	`< 2` `2.1 – 5` `5.1 – 10` `> 10`

Assumption	• After splitting road segments every 20m, segments less than 5m will remain, which can be merged back to its previous 20m • Analysis does not consider other aspects of accessibility that may cause delay or alternate routing such as drainage, crossing facilities, kerb ramps, etc.
Limitation	• DEM data cannot identify the elevation of tunnels (not visible from above) or structures that are small enough to fall between the data points (such as bridges) • DEM uses 5m resolution. To increase accuracy, practitioners can collect higher resolution DEM.
Data source	• TfNSW, Road Track Path Network • Geoscience Australia, Digital Elevation Model (DEM): elevation.fsdf.org.au/

Reference 🔍
N/A