

U-Care



UNIVERSITÀ
DEGLI STUDI
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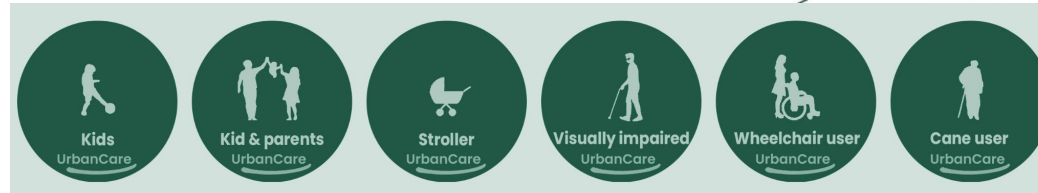
UrbanCare Methodology



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15-minute City



How far do slower paced groups travel in 15-minute Cities?

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Walkability Summary



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Effort

Walkability



Runoff

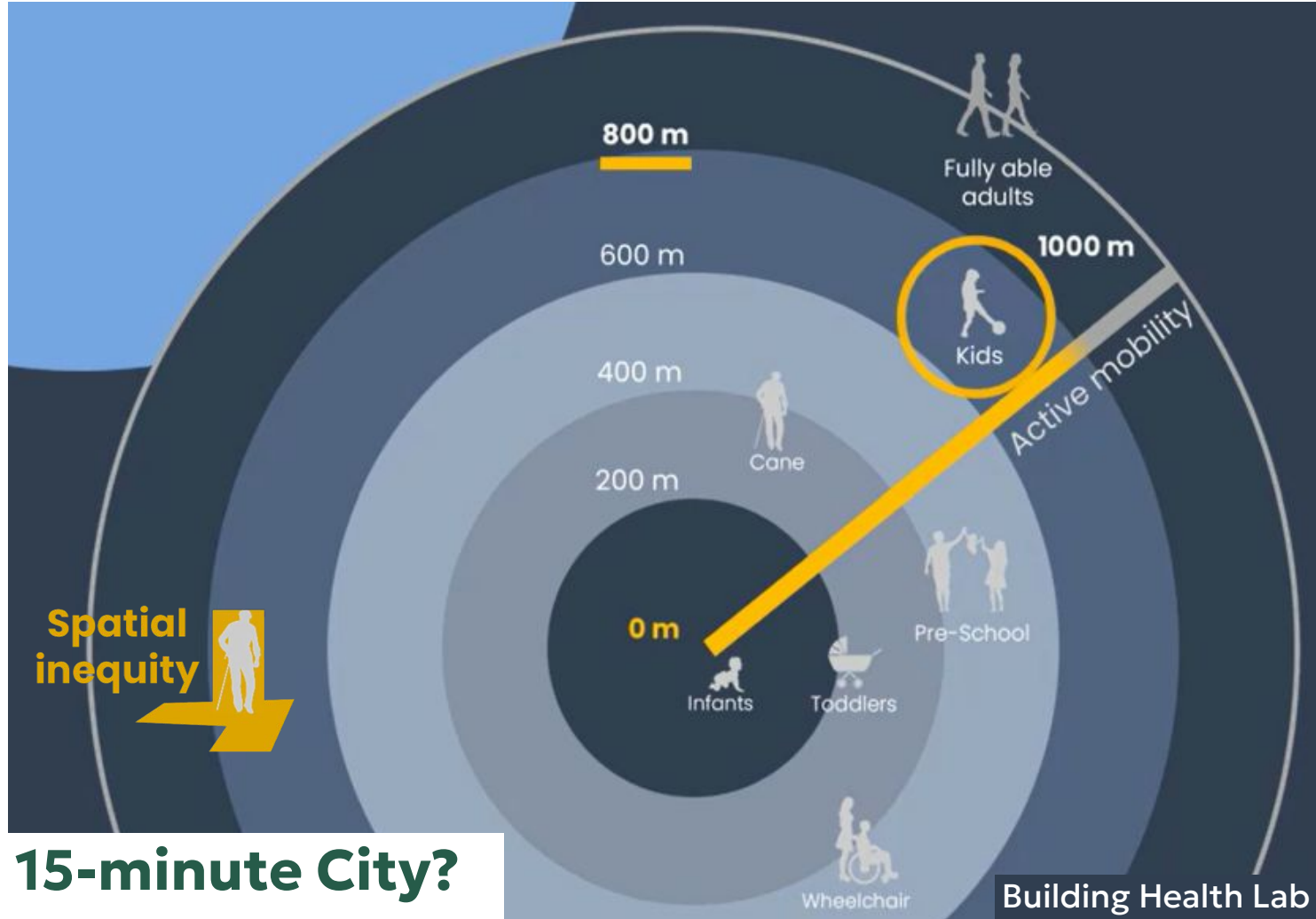


Heat



Biotope

Exposure



15-minute City?

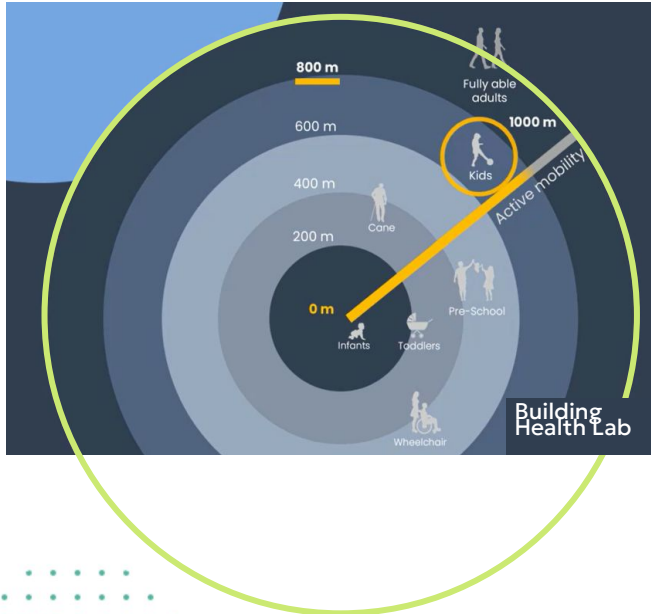
What happens to slower paced groups in 15-minute Cities?

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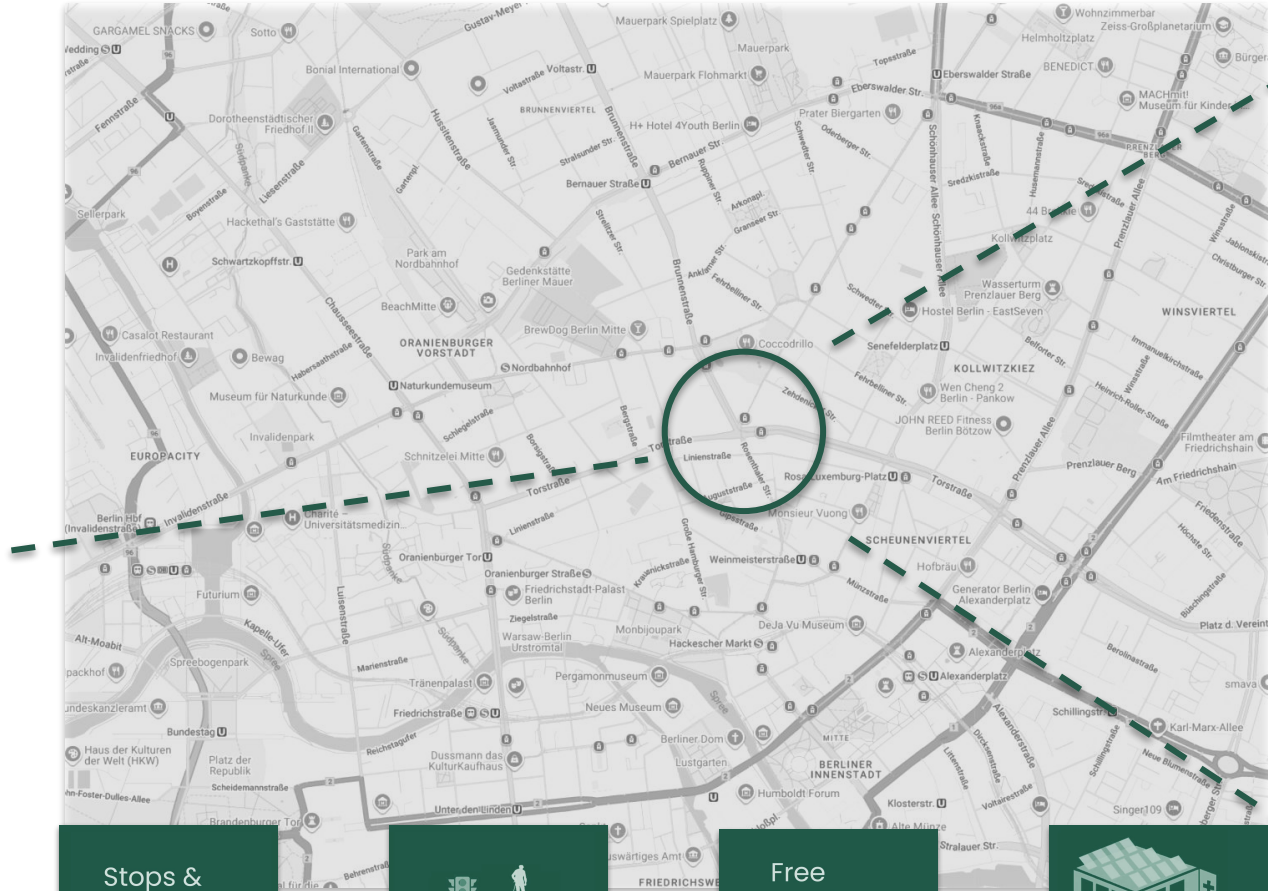
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Small problems here ...



Stops & Stations

Crossings

Free Seating

Priority Entrances

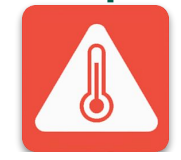


Effort

Walkability



Runoff



Heat



Biotope

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UrbanCare Methodology



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Effort

Walkability



Runoff

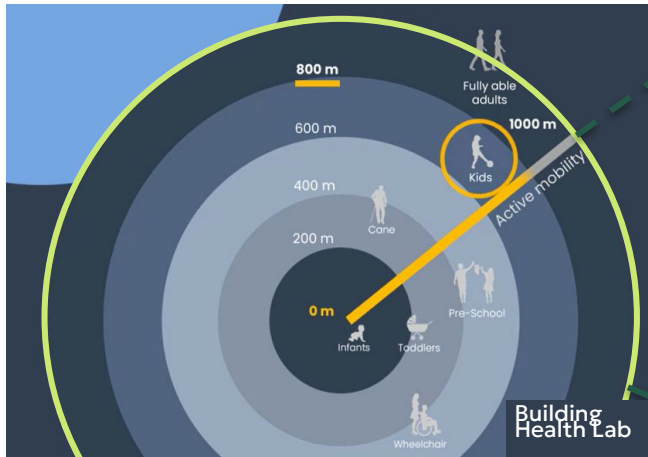


Heat

Exposure



Biotope



Small problems here ...

... and across the city, translates to enormous waste!



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Walkability

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Walkability: Planning & Design Approach



Walkability

- 1. Convenience:**
directness and efficiency of pedestrian environments without detours or interruptions
- 2. Safeness:**
protection of pedestrians from traffic conflicts and environmental hazards
- 3. Comfort:**
physical quality of the walking experience
- 4. Attractiveness:**
elements that make routes inviting and engaging

Convenience



Safeness



Comfort



Attractiveness





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Surface Runoff

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Surface Runoff: Definition



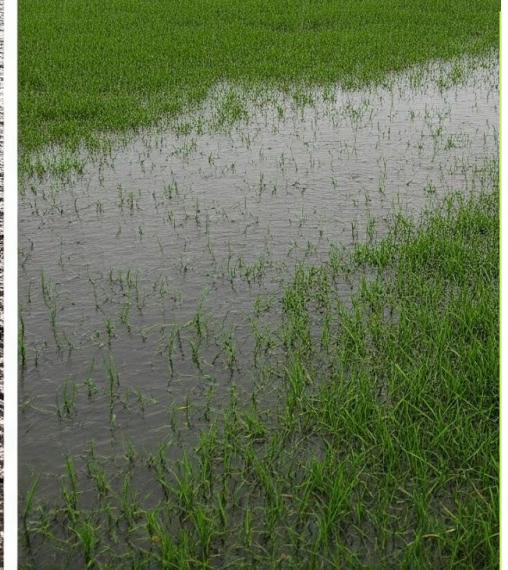
Surface Runoff

- 1. Hortonian runoff** (infiltration-excess)
Rainfall exceeds the soil's infiltration rate.
- 2. Saturation runoff** (soil fully saturated)
Rainfall exceeds the soil's storage capacity.
- 3. Impervious-surface direct runoff**
Where infiltration can't occur, such as roofs, asphalt and concrete.
- 4. Return flow** (subsurface → surface)
When infiltrated water travels laterally underground and resurfaces downslope.

Hortonian Runoff



Saturation Runoff



Impervious-surface Runoff



Return Runoff





Surface Runoff

1. Health:

flood exposure; mobility disruption for vulnerable groups; injury risks at crossings; contamination from combined sewer overflow; mold and dampness in buildings; water-borne and vector-borne diseases from contaminated floodwater

2. Climate:

increased stormwater peaks; reduced infiltration and groundwater recharge; altered local humidity; erosion risk; degraded soil moisture balance

3. Economy:

healthcare and productivity losses from water-related illnesses and injury events; damage to infrastructure; maintenance and drainage costs; avoidable water treatment costs; business interruption; emergency response costs; insurance and repair costs



Surface Runoff

1. Infiltration:

water enters soil or permeable surfaces to reduce surface runoff

2. Retention:

water is held temporarily and released slowly to lessen peak flows

3. Detention:

water is stored long-term on-site to delay or prevent downstream flooding

Infiltration Retention Detention



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Runoff

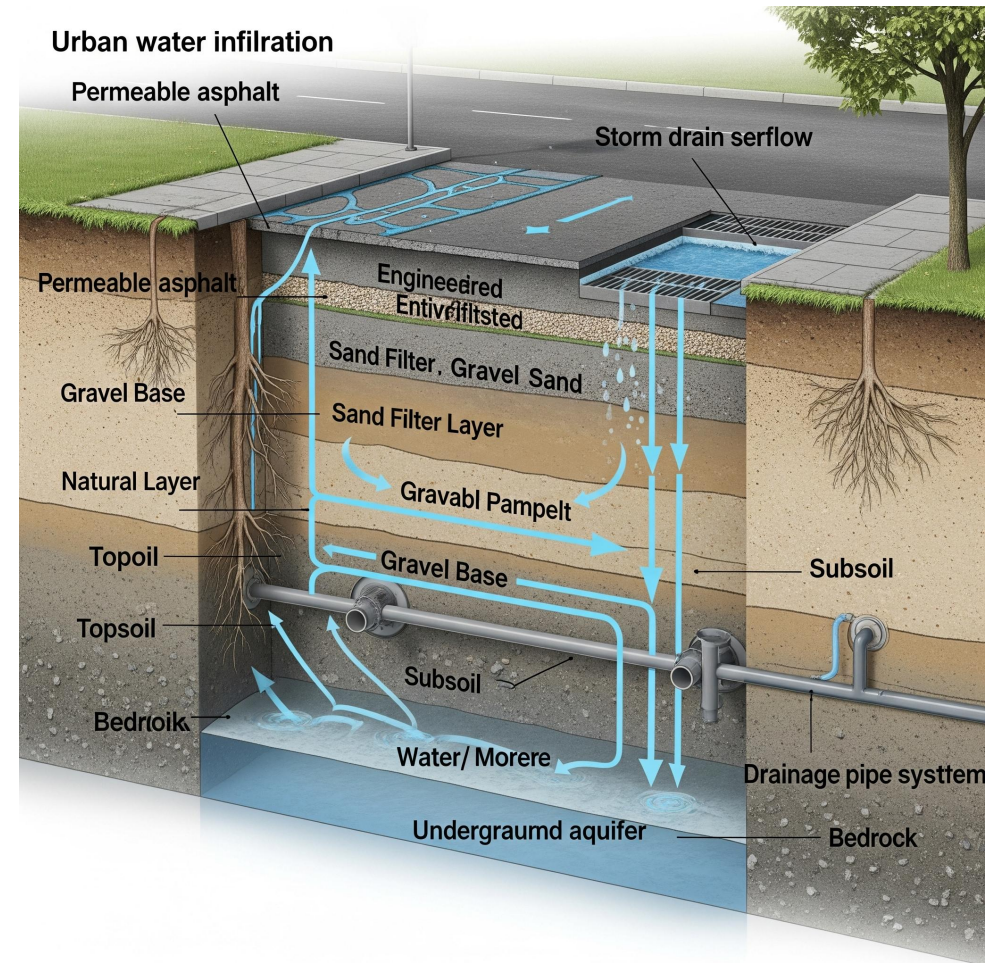
1. Infiltration

Process of allowing runoff to percolate through the soil into the groundwater.

Goal: Recharge aquifers and reduce surface flow.

Examples:

- Infiltration trenches
- Porous pavements
- Bioswales

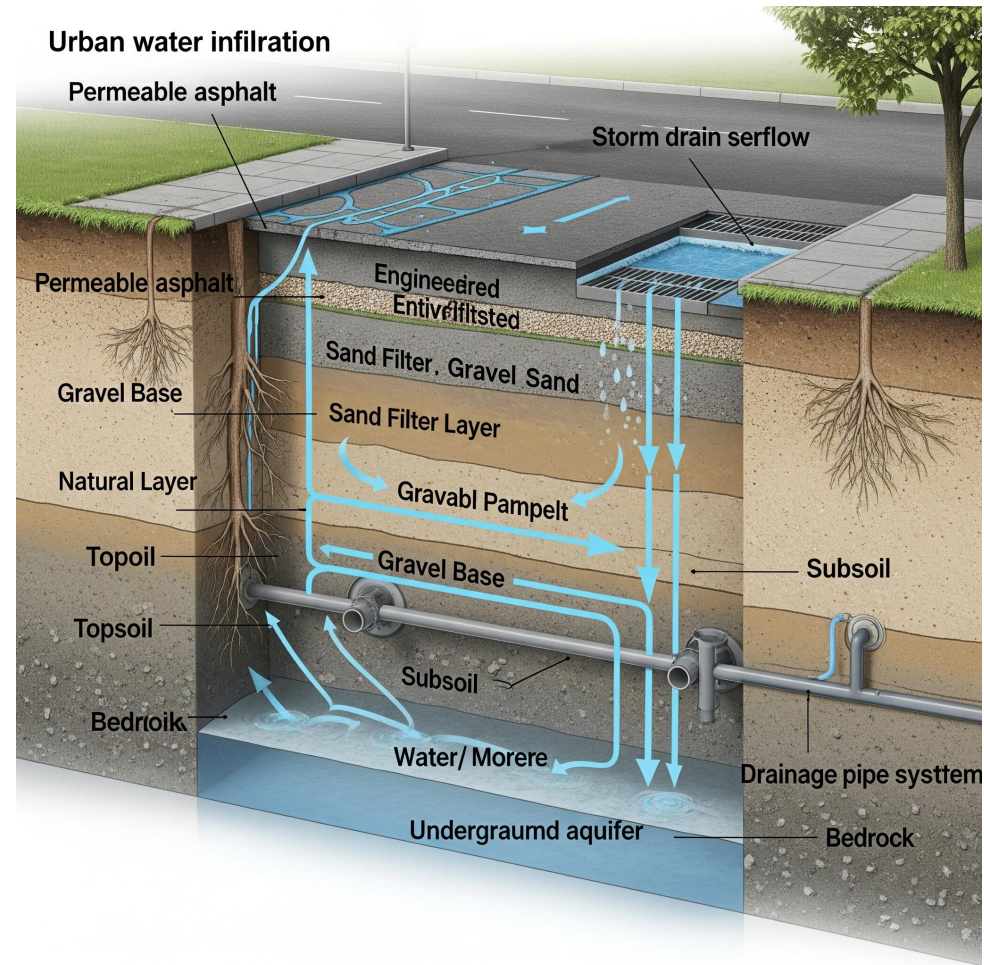




Runoff

1. Infiltration

Allow rainfall to soak into the ground where it falls.





Runoff

2. Retention

Permanent storage of runoff water on-site, preventing release into the drainage system.

Mechanism: Water infiltrates into the soil, evaporates, or is used by vegetation.

Examples:

- Retention ponds
- Rain gardens
- Green roofs
- Constructed wetlands





Runoff

2. Retention

Hold runoff on-site so it can infiltrate, evaporate, or be used by vegetation.





Runoff

3. Detention

Temporary storage of runoff water, allowing delayed release at a controlled rate.

Goal: Reduce peak flow and prevent flooding downstream.

Mechanism: Captured runoff is released slowly via an outlet structure after rainfall events.

Examples:

- Detention basins
- Underground storage tanks
- Permeable pavements with storage layers





Runoff

3. Detention

Capture excess runoff and release it slowly to avoid overwhelming the system.



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Surface Runoff Assessment



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Runoff Score = IR + RR + DR

Combined Runoff Reduction Score

A higher combined score means more capacity to infiltrate, retain, or detain water

Runoff Score Range: 0.0–0.9

Higher scores = stronger capacity to reduce surface runoff.

IR = Infiltration Rating

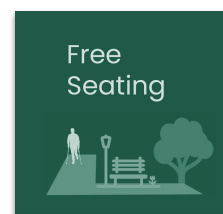
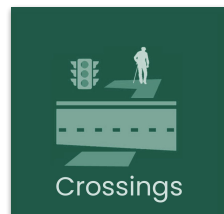
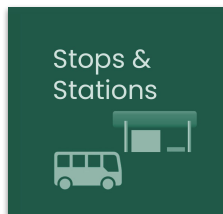
0.0–0.3: Based on the amount and condition of permeable surfaces (soil, grass, gravel, permeable paving).

RR = Retention Rating

0.0–0.3: Assesses the presence of elements that temporarily hold water (tree pits, swales, planters, bioretention areas).

DR = Detention Rating

0.0–0.3: Based on features that store water longer-term (ponds, tanks, infiltration basins, large green open areas).





Runoff

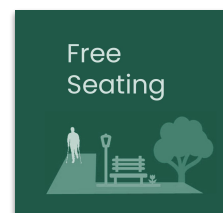
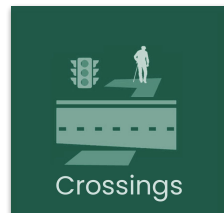
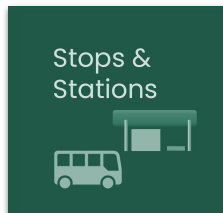
Task A:

Select an Urban Scene type and identify all surfaces and features that influence water movement.

Part 1

Map:

- permeable vs. impermeable surfaces
- elements that infiltrate water (soil, grass, permeable paving)
- features that retain water (tree pits, bioswales, planters)
- features that detain water long-term (ponds, tanks, green area)



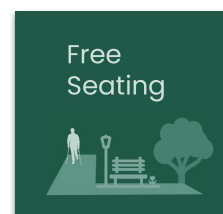
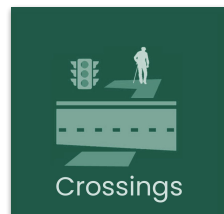
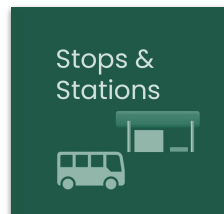


Task A:

Select an Urban Scene type and identify all surfaces and features that influence water movement.

Part 2

- Assign an Infiltration Rating (IR) using the 0.0–0.3 scale.
- Assign a Retention Rating (RR) using the 0.0–0.3 scale.
- Assign a Detention Rating (DR) using the 0.0–0.3 scale.
- Compute the Runoff Index = IR + RR + DR.
- Write a short interpretation (5–7 lines) explaining:
 - degree of infiltration potential,
 - presence and effectiveness of retention features,
 - presence and effectiveness of detention features,
 - one intervention that increases the Index.





Task B:

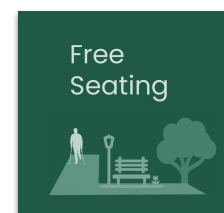
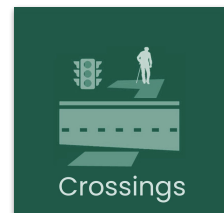
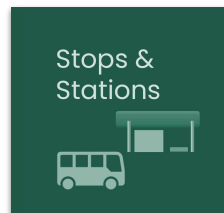
Find quick, reliable evidence showing how poor stormwater management affects economic outcomes.

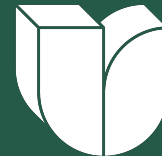
Identify 2–3 reliable sources showing how surface runoff and flooding relate to:

- damage to infrastructure and buildings
- increased maintenance and drainage costs
- higher water treatment / emergency response costs
- business interruption and mobility delays
- healthcare and productivity losses from water-related illnesses

Deliverable:

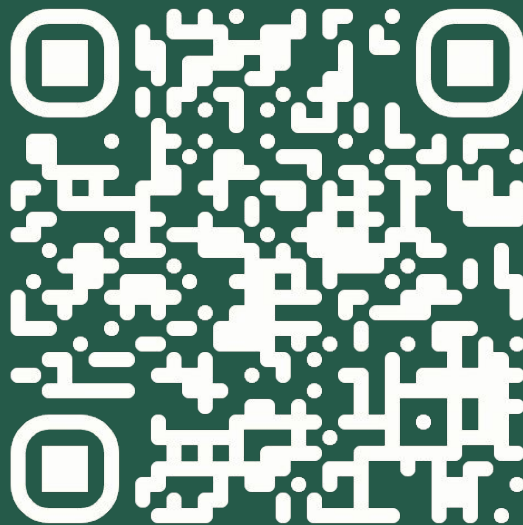
- Write 3–5 sentences summarizing:
 - the main findings from your sources, and
 - how they relate to runoff conditions in your chosen Urban Scene.
- Search keywords: “urban flooding economic impact”; “stormwater management costs”; “surface runoff infrastructure damage”





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