



PART 2

Read the text below and answer questions 14–26.

GREEN INFRASTRUCTURE IN CITIES

A

Green infrastructure (GI) is increasingly framed as a core component of urban systems rather than as optional beautification. In technical usage, it refers to a planned network of natural and semi-natural features—parks, street trees, wetlands, green roofs, vegetated swales, and restored waterways—deliberately designed and managed to deliver ecosystem services within built environments. This definition distinguishes GI from decorative landscaping: vegetation and soils are treated as functioning ecological assets that can moderate microclimates, regulate water flows, improve air quality, and provide habitat, while also generating social benefits such as recreational space and psychological restoration. The central proposition is that cities, dominated by engineered surfaces and hard infrastructure, can be made more resilient when “green” elements are integrated as infrastructure with performance goals, maintenance regimes, and governance responsibilities comparable to those applied to roads or drainage.

B

A major driver of GI adoption is rising concern about the urban heat island effect. Dense districts dominated by impervious materials—concrete, asphalt, and glass—absorb solar radiation by day and re-radiate heat at night, elevating ambient temperatures and increasing heat-related health risks. Vegetation can counteract this in two principal ways. First, tree canopies reduce direct solar exposure through shade, lowering surface and air temperatures in streets and courtyards. Second, plants cool the surrounding air through evapotranspiration, the process by which water moves from soil to atmosphere via plant tissues, consuming energy and thereby reducing heat. Unlike reflective coatings that primarily alter radiation balance, evapotranspiration is an active thermodynamic mechanism whose effectiveness depends on water availability, species traits, and canopy density. Green roofs can contribute to cooling by increasing insulation and shading roof membranes, but their performance varies with design, substrate depth, and local climate. In heatwaves, these cooling pathways can reduce indoor temperatures and energy demand, yet they operate most effectively when vegetation is healthy and adequately maintained.

C

Hydrological management provides a second, equally important rationale for GI. Conventional “grey” drainage systems are designed to move stormwater rapidly into pipes



and channels, which can be effective in moderate rainfall but vulnerable during intense storms when capacity is exceeded. The result may be surface flooding, sewer overflows, and the rapid transport of pollutants into receiving waters. GI offers an alternative logic of stormwater attenuation: features such as permeable pavements, rain gardens, and wetlands slow overland flow, increase infiltration, and filter contaminants through soils and plant root zones. By storing water temporarily and releasing it more gradually, these interventions can reduce the height of flood peaks and moderate erosion in urban streams. Wetlands and vegetated basins can also retain sediment and nutrients, improving water quality downstream. However, the effectiveness of these systems depends on placement, soil permeability, and the integration of multiple features across a catchment rather than isolated installations.

D

Beyond physical risk reduction, GI is frequently associated with psychosocial benefits that shape urban well-being. A substantial body of research links access to nearby greenery with lower reported stress, improved attention, and better self-rated mental health, although causal pathways are complex and may involve multiple mediators. Green spaces can encourage physical activity by making walking or cycling more attractive, and they can support informal social contact, which is protective against loneliness. Even small-scale interventions—street trees, pocket parks, or shaded seating—may contribute to improved mood when they are accessible, perceived as safe, and maintained to invite use rather than avoidance. These benefits are not merely private: healthier populations can reduce pressure on public-health systems and increase social cohesion. Nonetheless, the distribution of psychosocial gains depends on whether green amenities are located near the communities most exposed to stressors such as heat, noise, and overcrowding.

E

The question of distribution brings the “green gap” into focus. Urban canopy cover and park quality often track socio-economic stratification: wealthier districts tend to have more mature trees, safer parks, and greater political capacity to secure investment, whereas lower-income neighbourhoods may experience higher heat exposure, fewer high-quality green spaces, and less protection from traffic-dominated streets. This inequity matters because the hazards GI aims to mitigate—heat stress, flood risk, and psychosocial strain—are frequently concentrated where housing is cheapest and environmental burdens are greatest. As a result, GI can either reduce inequality by targeting underserved areas or reproduce it if projects gravitate toward already advantaged districts. Equity-oriented planning therefore requires explicit metrics: not simply how much greenery is added citywide, but who gains cooling, flood protection, and accessible green space, and whether benefits align with vulnerability.



F

Economic evaluation further complicates decision-making. Some GI benefits can be translated into monetary terms—reduced energy consumption, lower flood damage, or avoided healthcare costs—making them legible in budgets that prioritise measurable short-term returns. Other benefits, including biodiversity, aesthetic quality, cultural value, and psychological restoration, are harder to quantify and may be undervalued in cost-benefit analyses. A related debate concerns “green gentrification.” High-quality parks, waterfront restoration, and tree-lined streets can raise neighbourhood desirability and property values, which may attract higher-income residents and investors. Without housing protections, this can generate displacement pressure, turning environmental improvement into a mechanism of exclusion. The implication is not that greening should be avoided, but that GI policy may need to be paired with affordability measures and community planning so that improvements do not function as a subsidy for speculative redevelopment.

G

Recent advances in data and urban analytics have strengthened the ability of cities to plan GI strategically. Satellite imagery, aerial LiDAR, and street-level audits can map canopy cover, land-surface temperature, and imperviousness, revealing intra-urban patterns that are invisible in citywide averages. These tools allow planners to identify heat hotspots and prioritise interventions where thermal risk is highest and where vulnerable populations are concentrated. Sensors can also monitor performance: surface temperatures before and after tree planting, infiltration rates in rain gardens, or water quality changes downstream of wetlands. Such evidence supports adaptive investment, shifting resources toward designs that demonstrate risk reduction rather than relying on symbolic greening. However, data does not eliminate political choices; it can inform priorities, but decisions about trade-offs, budgets, and land allocation remain contested.

H

The passage also underscores that GI can fail when governance and maintenance are weak. Planting trees is visible and politically attractive, yet survival depends on irrigation, soil volume, protection from damage, and long-term care—conditions that are often neglected after initial funding ends. Wetlands and bioswales require maintenance to prevent clogging and to manage public concerns, while permeable surfaces can lose effectiveness if sediments are not removed. Coordination is a further risk: when separate agencies control roads, parks, and water systems, GI may be installed without clear responsibility for upkeep, leading to gradual underperformance. Overall, green infrastructure is best understood as essential urban infrastructure, but its benefits are conditional. It can reduce heat and flood risk and improve daily well-being, yet only if



design choices match local conditions and long-term governance addresses equity and coordination. The cooling effects of interventions such as green roofs can vary substantially across settings, reinforcing the need for context-specific evaluation.

Questions 14–19

Select the correct answer.

14 What distinguishes green infrastructure from ordinary urban landscaping?

- A** It requires natural features to replace most conventional urban infrastructure.
- B** Its natural and semi-natural elements are deliberately managed to perform ecological and social functions.
- C** It is limited to projects whose main purpose is to control stormwater.
- D** Its primary objective is to increase recreational space in densely built areas.

15 How does vegetation help reduce temperatures in cities?

- A** It blocks some direct sunlight and uses energy as water passes from plants into the atmosphere.
- B** It prevents buildings from releasing stored heat during the night.
- C** It cools streets mainly by increasing the amount of reflected solar radiation.
- D** It lowers temperatures by directing more air through surrounding buildings.

16 How do features such as rain gardens and wetlands help manage heavy rainfall?

- A** They transfer runoff into drainage pipes before these reach capacity.
- B** They prevent pollutants from entering stormwater in the first place.
- C** They increase the amount of water that urban channels can carry during storms.
- D** They delay water movement, encourage infiltration and reduce the severity of peak flows.

17 What concern is highlighted by the “green gap”?

- A** The neighbourhoods with the greatest environmental risks often receive the highest levels of green investment.
- B** Increasing tree cover can transfer heat and flood problems from richer to poorer districts.
- C** Access to effective green amenities may be uneven and related to socio-economic advantage.
- D** Citywide increases in greenery usually make differences between neighbourhoods impossible to measure.

18 Why can green infrastructure perform poorly after installation?



- A** Its effectiveness normally declines once residents begin using the surrounding space.
- B** Necessary upkeep may be neglected and responsibility may be divided unclearly between agencies.
- C** Ecological features generally require complete redesign once their initial funding ends.
- D** Long-term performance depends mainly on replacing natural drainage with engineered systems.

19 Which statement best reflects the writer's view of green infrastructure?

- A** It can provide substantial urban benefits, but these depend on suitable design, equitable planning and effective long-term management.
- B** Its environmental benefits are reliable enough that local conditions have relatively little influence on performance.
- C** Its strongest justification is the financial value that can be assigned to energy and flood savings.
- D** It should be expanded primarily in districts where existing investment makes maintenance easier.

Questions 20–23

Complete the summary below. Choose **ONE WORD ONLY** from the text for each answer.

Functions and planning of green infrastructure

Vegetation can cool urban areas through shade and **20** In managing stormwater, features such as permeable pavements and rain gardens increase **21** Green spaces may also encourage social contact, which can provide protection against **22** For strategic planning, mapping technologies can locate areas described as heat **23**

Questions 24–26

Choose **TRUE** if the statement agrees with the information given in the text, choose **FALSE** if the statement contradicts the information, or choose **NOT GIVEN** if there is no information on this.

- 24** The passage indicates that some benefits can be estimated financially, whereas others are difficult to quantify.
- 25** The passage suggests that greening projects can raise property values and increase displacement pressure.
- 26** The passage suggests that the cooling effects of green roofs are broadly consistent across different settings.



Answer Key

14. B

15. A

16. D

17. C

18. B

19. A

20. evapotranspiration

21. infiltration

22. loneliness

23. hotspots

24. TRUE

25. TRUE

26. FALSE