

Urban Greening Scenarios for Metropolitan Adelaide

A background paper to support the draft Urban Greening Strategy for Metropolitan Adelaide



Acknowledgements

Thank you to Dr Ariella Helfgott, from DPC's Strategic Foresight Unit for leading this strategic foresight process. Thank you also for participants in this process from a diverse range of organisations including, Worpaulai Kumangka, state government agencies, local government, NGOs, industry peak bodies and research institutions.

Get involved and have your say

We want to hear what you think is important for the future urban greening of Adelaide.

Public consultation is open for **8 weeks from 30 April to 28 June 2024**.

For a copy of the full Urban Greening Strategy for Metropolitan Adelaide and to provide a written submission visit:

yoursay.sa.gov.au/Urban-Greening-Strategy

Recognition of Kaurna Miyurna and Yarta

We acknowledge and respect the native title holders and Traditional Owners of the Green Adelaide region – the Kaurna Miyurna (Kaurna people) – and pay homage to their ancestors who maintained the natural processes of the land we are on and whose spirits still dwell on Yarta (Country).

Mutual respect and trust enables us to walk and work side-by-side to restore Yarta.



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Introduction

What is the Urban Greening Strategy?

Green Adelaide has been tasked with bringing together state agencies, local government, non-government organisations, industry peak bodies, the Kaurua community, and the broader Adelaide community to drive an ambitious and coordinated approach to greening metropolitan Adelaide.

In 2021, Parliament passed a motion to:

*Prioritise the protection of existing urban trees and green open spaces; and develop a comprehensive strategy to **increase tree canopy and reduce hard surfaces** (led by **Green Adelaide**) in collaboration with **local government** and **local communities** to create healthy and diverse urban forests across metropolitan Adelaide with the aim to, at a minimum, meet the urban green cover targets of the 30-Year Plan for Greater Adelaide along with a particular focus on areas identified as being most vulnerable to heat.*

This ambitious mission will also help deliver the government's commitment to increase greening in our neighbourhoods, support biodiversity and retain more mature trees.

Purpose of this report

The Department of the Premier and Cabinet (DPC), in partnership with Green Adelaide, has developed a range of plausible future scenarios Adelaide might face in a changing world. This background report outlines:

- key scenario concepts
- how these scenarios were developed
- the 3 final scenarios
- key insights for the Urban Greening Strategy and other sectors.

About scenarios

What are scenarios?

Scenarios are stories that describe alternative ways the future might develop. They can be expressed in words, numbers, or images. In an uncertain world, scenario thinking equips us with the skills and tools to deal effectively with potential opportunities and challenges.

Scenarios offer insights, opportunities, and warnings about what we need to do to achieve desirable futures and avoid undesirable outcomes. Scenarios explore how the future could unfold to help people make better decisions today.

Scenarios are not predictions or prescriptive plans. Rather, they are exploratory tools designed to inform and challenge.

Why are scenarios used?

Scenario development and analysis helps us consider the multiple 'critical uncertainties' that the South Australian society could face over the next 30 years – particularly in relation to what might impact the future of urban greening. These include 'drivers of change' relating to the impacts of climate change, technology and knowledge advancements, water availability and urban development.

Scenarios allow us to engage with the third question in the box on the right – what could possibly/plausibly happen? This allows us to map out the future landscape we will need to navigate, think through different eventualities, ensure our strategy is more robust to a range of future uncertainties, and be more prepared.

This approach has been used in many strategy and policy development processes around Australia and internationally to support the development of strategies designed to build resilience and prepare for uncertain futures.

There are 4 kinds of question we can ask about the future:

1. What will probably happen?

Projections, often mathematical models, and probabilities.

2. What do we want to have happen?

Normative vision, describes what success looks like in detail, provides strategic direction and associated strategic objectives.

3. What could plausibly happen?

Exploratory scenarios, often just called "**scenarios**" in shorthand, allow us to engage with important "what if" questions that could impact the success or failure of our strategy.

4. What are we going to do about it?

Developing pathways to achieve the vision, that work in the context of each future scenario allows us to identify robust strategies, policies, and plans in the face of future uncertainty.

Scenarios and urban greening

The purpose of the scenario development process was to:

- identify critical uncertainties impacting the future of urban greening in metropolitan Adelaide
- explore how multiple drivers of change interact to shape different futures and what this means for urban greening strategies
- enable stakeholders to envisage and engage with future scenarios and provide a way to make realistic assessments of potential impacts on the strategy
- support the co-creation of a desired future that the strategy, and supporting actions, could achieve
- identify 'no-regrets' urban greening actions that are robust in all scenarios, as well as actions that need to occur in some scenarios but not others
- identify which urban greening actions to undertake now to avoid negative outcomes in some of the future scenarios.

Figure 1 below shows how scenarios are used as part of a foresight-guided strategy development process.

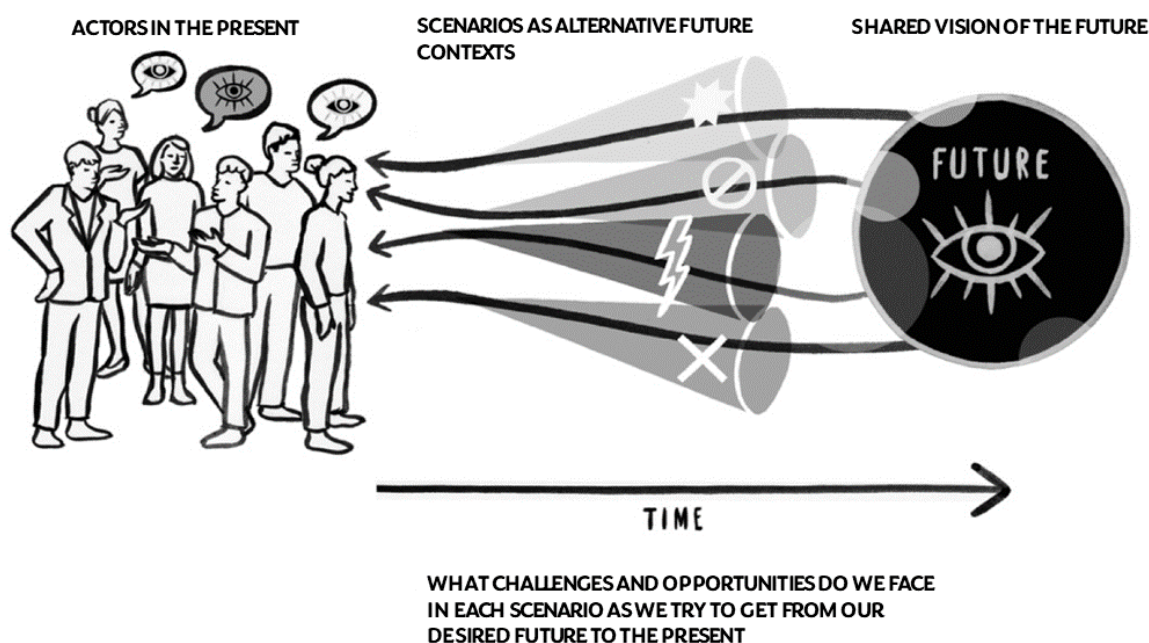


Figure 1: Each scenario contains different challenges and opportunities, and there are different pathways of actions required to achieve desirable outcomes in each. Testing and further developing our strategy in a range of scenarios helps ensure the strategy is robust.

How were the scenarios developed?

As part of a deductive, exploratory scenario development process, DPC's Foresight Unit and Green Adelaide undertook the following:

Step 1: Exploring and identifying critical uncertainties impacting the future of urban greening in Adelaide

A multi-phase process was undertaken to explore and identify critical uncertainties impacting the future of urban greening in metropolitan Adelaide. A comprehensive list of potential critical uncertainties was drawn from the following activities and sources:

- Urban Greening Strategy Practitioner Survey (2021)
- Future of Vegetation Workshop (held by Adelaide University's Environment Institute in December 2021)
- [CSIRO's 'Our Future World' Mega Trends Report \(2022\)](#)
- DPC Megatrends Meta-Analysis (2022)
- [Greening Adelaide Cross-Sector Summit](#)

After compiling a broad list, Green Adelaide and DPC Foresight Unit team conducted a small workshop with the Urban Greening Strategy Government Leadership Group to identify the top critical uncertainties, including the:

- climate change
- liveability of our cities
- biodiversity loss
- changing mobility systems
- land-use patterns (for example, urban development types and population growth)
- declining water quantity, quality and availability
- technology (for example, digitalisation, data availability, artificial intelligence and automation)
- reconciliation.

"Australia is at a pivotal point. There is a tidal way of disruption on the way, and it's critical we take steps now to get ahead of it."

CSIRO Chief Executive Dr Larry Marshall

Refer to **Appendix 1** for further details about these megatrends.

Step 2: Exploring and identifying possible future outcomes

The Government Leadership Group, along with Green Adelaide and the DPC Foresight Unit, explored and identified a range of possible future outcomes (known as 'possible futures states') that describe how each critical uncertainty could turn out by 2050.

Morphological analysis was subsequently used to develop the 4 most diverse combinations of end states, offering 4 plausible scenario skeletons that could be developed into full scenarios.

Step 3: Workshopping scenarios with stakeholders

A workshop covering exploratory scenarios and a shared vision was held on 25 October 2022 with 55 stakeholders from a broad range of agencies, councils, non-government organisations, research institutions and industry peak bodies.

Building on the foundational scenario development activities described above, workshop participants co-created detailed descriptions of what South Australia would look like in the context of the conditions given by each of the scenario skeletons, and explored and described how these conditions would evolve between the present and 2050. Participants developed 6 scenarios during the workshop.

Workshop participants also undertook a visualisation and subsequent co-creation process to develop a shared desirable vision of a greener metropolitan Adelaide in 2050. The outcomes of this visioning exercise were used to develop the 'picture of greening success' section of the draft Urban Greening Strategy (see pages 55 to 58).

The process of creating an aspirational strategic vision was more effective after the exploratory scenario process as participants had effectively engaged with future change, and stretched their thinking about what is possible. Participants then developed pathways to achieving the vision in the context of the scenarios they had developed.

The process supported participants to identify and explore a range of social, technological, economic, environmental and political factors that shape the future of urban greening in metropolitan Adelaide. Participants were encouraged to think about the different ways a range of critical variables could turn out by 2050. Accordingly, these scenarios go to the edges of future possibilities imagined by all of those who participated.

Step 4: Integrating workshop outcomes with other government scenarios

DPC has developed a range of scenarios to support the preparation of various government strategies. To ensure coherence across agencies, and enrich the scenarios themselves, the 6 draft scenarios from the stakeholder workshop were integrated with the outcomes from other scenario investigations, particularly the 3 PLUS (Planning and Land Use Services, within the Department for Trade and Investment) Greater Adelaide Scenarios. These integrated scenarios have been distilled into 3 scenarios that are presented in this report.

How to read the scenarios

The scenarios contained in this document describe diverse plausible futures for urban greening in metropolitan Adelaide in 2050. Each scenario is rooted in the seeds of potential that exist in our present, illustrating futures that could unfold depending on our actions or inactions in the context of a range of external trends and megatrends.

Given the rapid and exponential changes occurring across our economy, society and environment, it is crucial that our scenarios challenge existing assumptions and expand our thinking about what is plausible.

These scenarios consider the interplay of multiple change drivers and span a range of plausible outcomes to help us better understand the landscape we might need to navigate in the future.

They aim to be both plausible and salient, stretching our thinking and challenging our notions about the future.

These scenarios encompass both positive and negative potential outcomes, as each provides insights and warnings essential for informed decision-making and effective strategic planning. Exploring negative scenarios helps identify strategies to mitigate risks and harness them as catalysts for change and innovation, while positive scenarios provide insights into achieving desirable outcomes, highlighting protective measures and enhancements necessary for success.

These scenarios are not predictions, nor are they prescriptive plans. Rather, they are exploratory tools. They are designed to inform and challenge.

These scenarios do not represent government strategy or policy, though they can be used as a mechanism to scrutinise strategies and policies to help make them better, and more fit for the future.

“Powerful currents are shaping our society and economy. Every strong current also generates counter currents, and you can rarely tell in advance which of these will prove to be stronger. There are inevitably multiple different plausible ways the future could develop. Much of this is beyond our direct control and even our own actions can affect the future in ways that may surprise us.

However, while not predictable, neither is the future completely random. It is, therefore, possible to explore plausible futures in a systematic way. This is the art of building scenarios.

Scenarios are the learning tool that helps us to see beyond the horizon of our personal experiences and current circumstances, to help us grapple with perspectives and insights from others, and to help us become better prepared for surprises.”

Dr Jeremy Bentham, Co-Chair of Scenarios, World Energy Council, and former Head of Shell Scenarios

Urban greening scenarios

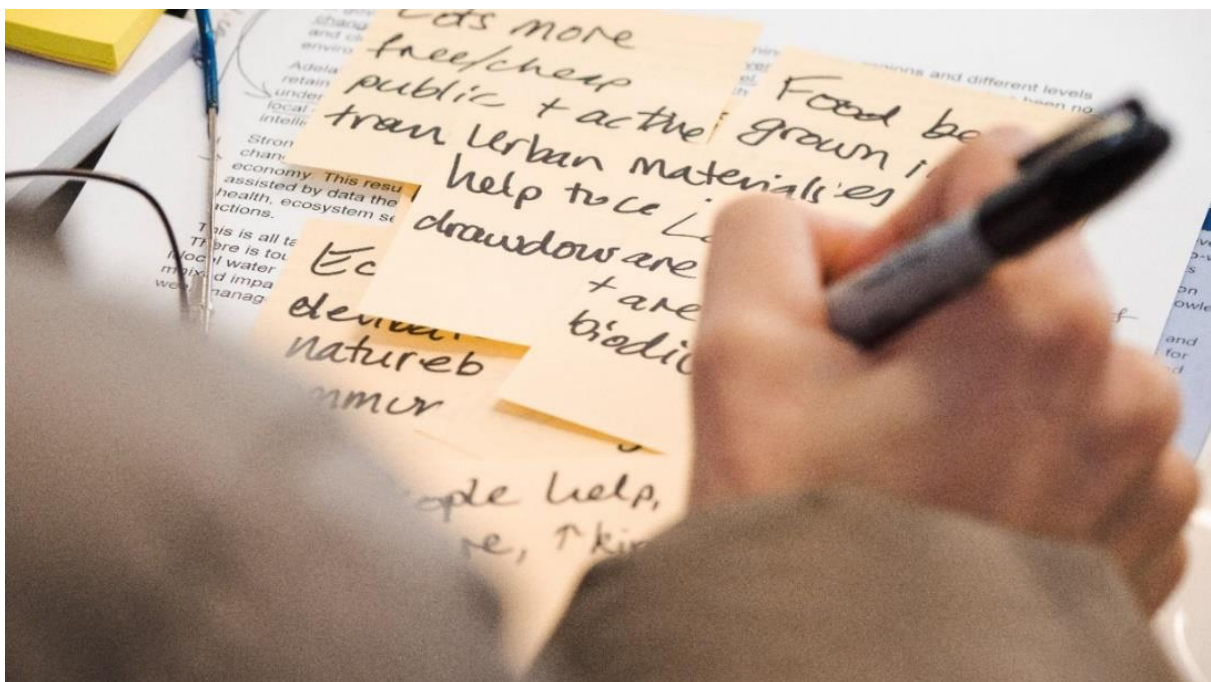
These scenarios describe 3 distinct plausible futures for urban greening in metropolitan Adelaide. They offer insights and serve as cautionary tales. By examining how different futures might materialise, these scenarios empower stakeholders to make informed, proactive decisions today. Each is described below in a short summary, followed by the full detailed scenarios.

Scenario	Summary
1. Paradise Regained	Metropolitan Adelaide is decentralised and digitally enabled, characterised by polycentric nodes and well-serviced neighbourhoods where everyone can access their most important goods and services within a short walk from their homes. There are various reliable and affordable alternatives to private car ownership, and as a result many hard surfaces have been converted into permeable open green spaces. Cool, green, liveable neighbourhoods encourage active transport, community interactions, and build connection to place. Urban greening has been a high priority for leaders at all levels. Policies and planning are evidence-based, long-term and reflect the true economic, social, and environmental value of trees. Widespread adoption of water sensitive urban design and biodiversity sensitive urban design practices has led to an increase in species diversity and sustainable canopy growth, with enormous public health benefits, increased climate resilience and associated economic outcomes. These outcomes are made visible through tech-enabled data collection, use and communication. Technology is leveraged to remotely monitor and maintain the urban landscape, restore ecosystems and biodiversity. There is a high level of community understanding and valuing of urban greening, effective multi-actor collaboration and coordinated action. Over time this has contributed to a cultural shift towards more socially and ecologically regenerative values and the integration of First Nations' wisdom.
2. Fahrenheit 5000-5950	Metropolitan Adelaide's future has been shaped by social fragmentation, short-term financial opportunism, and failure to address climate impacts. The lack of understanding about the importance of urban greening has led to a lack of coherent policies and resources to drive climate resilience, which was further exacerbated by social polarisation.

	Homogenous, low-quality housing developments have encroached on environmental and food production areas. There is limited access to green space, and the open space that remains is degraded. The urban environment is hot with little shade. People don't congregate in the streets and continue to rely on cars and air-conditioned spaces. The failure to address climate impacts, prioritise integrated water sensitive urban design and biodiversity sensitive urban design has led to negative impacts on biodiversity, with associated public health impacts. The declining liveability of metropolitan Adelaide has resulted in poor public health and economic impacts, causing young people and skilled migrants to move to other states. Climate impacts have made some areas of the region unliveable and emergency responses are required, with some communities left to self-organise. There is a focus on individual needs and survival, with little effort towards urban greening. This unequal and unsafe world faces severe climate impacts, biodiversity loss, poor health outcomes and negative economic consequences.
3. A Tale of Two Cities	Metropolitan Adelaide has been shaped by the pursuit of growth-driven innovation. Adelaide, as part of South Australia's 'Proto-State', has become a hub for innovation and technological testing, known for its rapid decarbonisation and high-tech industries. However, the benefits of these are not evenly distributed, and the many pilots and demonstrations have not translated into broad systemic transformation. Lush green innovation belts run from the defence precincts in Salisbury, Edinburgh and from Port Adelaide, through Lot 14 in the CBD and Tonsley, and down to Lonsdale. In the innovation belts, housing, greening and other services are increasingly supported by private companies interested in ensuring they can attract the best talent from around the world to live in the vicinity of their operations. There is investment in greening to improve liveability within these areas, and new technologies are harnessed to incorporate climate resilience measures. Outside of these areas, not much is done as the resources to do so are lacking. In this fast-paced, entrepreneurial world, highly skilled individuals are highly valued. Those outside the innovation belts face disproportionate climate impacts in neighbourhoods with poorer housing and a lack of greening.

	Unequal greening translates into unequal public health and unequal economic opportunity and a range of associated societal impacts. High economic growth achieved at the cost of equity and broader environmental considerations overall, creates economic costs down the track.
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The titles of these scenarios are drawn on literary metaphors - "Paradise Regained" draws on Milton, "Fahrenheit 5000-5950" on Bradbury and "A Tale of Two Cities" on Dickens – emphasising that each scenario is to be read as a story describing a plausible future for urban greening in metropolitan Adelaide, though in this case arrived at through systematic analyses of interacting uncertainties, trends and megatrends.



Scenario 1: Paradise Regained

By 2050 Adelaide continues to score highly in international liveability rankings.

Adelaide's quality of life is underpinned by its greening initiatives. These efforts have expanded the city's shared green spaces, which foster a variety of cultural and recreational activities, and encourage active and public transport. This has enhanced social cohesion and improved public health, while bolstering the city's resilience against heatwaves, flooding, drought and other impacts of climate change.

Urban greening has remained a high priority for leaders since the early 2020s, ensuring long-term planning and decision-making has occurred. Integrated methods of collaboration across state and local government, community organisations and non-government organisations have been effective over the years. Collaborative action has supported changes in planning and development regulations across state and local governments that protect trees and incentivise planting new ones.

Proactive planning has enabled Adelaide to adapt to climate change through well-integrated urban planning, green infrastructure and smart technology.

Adelaide has a good mix of housing types including single family homes, apartments, townhouses, cohousing communities, ecovillages, mixed-use buildings, tiny houses and micro-apartments, and modular prefabricated homes. Infill development is managed to ensure adequate space remains for private gardens and new public parks, and to preserve character and heritage. Across metropolitan Adelaide, there is a balance of preserved historic precincts and character buildings, with modern green architecture. All residents, young and old, can find housing appropriate for their needs, close to work, services, friends, and a supportive community, with plenty of green space around them.

Adelaide is a polycentric city, which means that instead of one central business district there are various business, cultural and sporting districts throughout the region. This leads to the redistribution of population centres. Sustainable densification around nodes that are well-serviced has reduced the pressure on high-quality agricultural land and beautiful natural landscapes at the urban fringe – both of which are important for Adelaide's food and ecological security, climate resilience, health, wellbeing and quality of life.

People across Adelaide are enjoying greater freedom and an increase in transport choices. Public transport has been greatly improved in every part of the city, active transport is a safe and viable option for short and longer distances via green, leafy and cool corridors for walking and cycling. There are also a range of community-owned mobility service providers, including fleets of shared autonomous vehicles. All these changes have resulted in less cars on the roads even as the population of Adelaide has increased, freeing up space for more soft-scaping, water sensitive, and biodiversity sensitive solutions. With less cars, and even some walking streets, children have significantly more opportunity to explore urban neighbourhoods. There are more people on the streets. Some roads and carparks have been transformed into recreational green spaces. Community interactions and social cohesion are

strengthened by shared green spaces for recreation and active transportation, which both enable greater connection.

The city has adopted water sensitive and biodiversity sensitive urban design practices, including permeable surfaces and rain gardens, council tree strategies that include habitat corridors, ecological waterways, constructed wetlands, bioswales and urban food forests. There are even wildlife bridges across arterial roads. All of these initiatives have been critical in protecting threatened species of flora and fauna. Consistent water availability and affordability for these long-term initiatives has been made through investments in alternative water sources, including desalination, as well as stormwater and wastewater reuse. Through integrated investments in distributed renewable energy and distributed alternative water sources, Adelaide has transformed to being water and energy abundant. Collectively, these initiatives have an enormous impact on improving the city's resilience to environmental changes and foster a vibrant urban ecosystem.

Leveraging technology – including digitalisation, remote-sensing, artificial intelligence, and automation – has fostered smart, inclusive and sustainable urban systems. Advanced technologies, such as biosensors, are employed for the continuous monitoring of urban forests, fauna and other green assets, and for automated management, maintenance, and care of these assets.

The use of data-driven decision-making has cultivated a shared understanding of how urban greening and biodiversity contribute to public health, ecosystem services, and economic prosperity. Collective data-sharing agreements have been set up to ensure the best possible use of limited resources and clearly demonstrate the impacts of greening. Artificial intelligence-enabled systems enhance interactions and facilitate data-informed collective decision-making, breaking down historical barriers and boosting wellbeing. Stakeholders in greening initiatives collaborate effectively, pooling their resources and aligning their efforts. The economic, social and environmental value of trees is fully acknowledged in project and business case decisions. Greening efforts are also recognised as crucial to decarbonisation – we collect data that directly links these efforts to our progress towards net zero.

Technology has been used to make systemic impacts visible to community via education, marketing, and communications. The community values urban greening. Homeowners take pride in caring for their gardens, which have increased in biodiversity. Individual allotments retain big native trees. There is greater community connection to local landscapes and engagement with the local environment. The community are increasingly organised in collectives to support and care for their neighbourhoods, streets and public spaces. Various sectors of the community coordinate their efforts at restoring biodiversity, linking existing hotspots and offering credit-funded planting schemes. There is a diversity of planting types depending on whether cooling, biodiversity or amenity is the primary driver in each place.

Greater connection with the natural environment helps to create a deeper respect for Aboriginal people and culture, and their connection to the land. The role of Elders has been elevated, and Aboriginal Cultural Intellectual Property protection is strengthened. Aboriginal knowledge and cultural practices have been integrated into planning and decision-making through cultural land management and 'planning with Country'. Accordingly, real progress

has been made on reconciliation. Connection to Country, and respect for Country are woven into the fabric of our culture. There is shift from behaving as consumers and owners of assets, to custodians of places, projects and resources.

People who seek help for stress, anxiety and other mental health issues are offered access to green (nature) and blue (water) prescriptions or programs, specially formulated to assist in their recovery. The life expectancy of residents has increased, with balanced lifestyles leading to proactive health management. There is a clear understanding of the connectedness of human health and environmental outcomes.

Over time, through coordinated action, data sharing and the right regulations, the region has ensured that it has planted the right tree for the right place. Trees and other vegetation planted have been mapped to match soils, climate, social needs and lifecycle costs across metropolitan Adelaide, rather than a 'one size fits all' approach to trees. Integrated state and local government support through funding for the life cycle of trees (including establishment, maintenance and lifespan costs) has been implemented.

Adelaide's efforts to combat negative consequences of climate change have had a positive effect, motivated private and public sectors, and attracted additional stakeholders to get involved in creating a greener Adelaide. Adelaide's success story serves as an example to other cities worldwide to implement regenerative ecological and social practices to build sustainable and inclusive communities.

Scenario 2: Fahrenheit 5000-5950

By 2050 Adelaide is hot and sprawled.

In the early to mid-2020s, urban greening was a low priority for leaders who were focused on other key political issues. Limiting urban sprawl was also a low priority for leaders who do not see it as an issue. As a result, there were limited resources for greening, including for coordination of multi-actor collaborations and proactive planning. While there was talk about the need for it, without the leadership or the collective efforts required to get behind it, there was no substantive change to current legislation, regulation or policies that would translate into planning and development practices and outcomes.

For the largest part, urban infill was designed to maximise the size and number of houses in developments with limited private green space for residents and limited public open spaces. Developers and homeowners alike were primarily financially motivated, and the bare minimum was dedicated to greening. Income and housing inequality came to define settlement patterns across Adelaide, and cheap houses that were not climate-resilient and lack urban green spaces became the norm for poorer people. 'Grey ghettos' now exist in low socio-economic areas with few trees, and these areas are much hotter than others. Housing made with cheap materials and with a lack of urban greening increased long-term economic costs for disadvantaged people and worsened inequality throughout society.

Pockets of green exist in wealthy neighbourhoods – gated enclaves of high-amenity, leafy streets where residents can afford to pay for water and maintenance. Lush gardens are

hidden away behind high walls. Water for greening is only available to those who can pay for it.

As housing and rental prices continued to rise, and many people continued to struggle to afford to rent or buy, new housing developments were created in the Adelaide Hills, down the Fleurieu Peninsula and through the north of Adelaide. Metropolitan Adelaide became defined by urban sprawl, which spread over important agricultural and natural landscapes, impacting Adelaide's food and ecological security.

The significant investment in new infrastructure to service new suburbs on the fringes of Adelaide was not included in the developers' costs, and in the context of highly constrained availability of public funds, some areas lack the infrastructure they need, or it is not well-maintained. Climate hazards have made this even worse. Even in 2050 there is still inadequate public transport to cover all of Adelaide's spread. Private car use continues to grow for those that can afford it. More roads, to accommodate the growing number of cars, and traffic congestion resulted in further loss of trees and canopy cover.

Poorer people living in fringe suburbs without very regular public transport either became completely car-dependent or excluded from the workforce, as it is often too hot to walk or cycle along inadequately greened transportation routes and the distances are too far. This also increased social isolation amongst the most vulnerable populations. The car-dependent lifestyles encouraged by urban sprawl contributed to health issues such as obesity, heart disease and respiratory issues due to reduced physical activity. The lack of vegetation resulted in a decline in physical and mental health and wellbeing.

Over the decades, climate change has severely impacted the urban greenery that existed. This was due to inappropriate species being planted, inadequate water provision and limited success of other mitigation strategies. There was widespread die-off of vegetation in the 2030s due to days of extreme heat and heatwaves. By 2050 there are very few big or old trees left anymore. The loss of these trees outstrips the regrowth of new trees and canopy cover is decreasing rapidly. There have also been incursions of new pest species and disease, which impacts vegetation particularly where there is an existing low diversity of species. This also resulted in increased erosion and soil loss. Heat stress, soil deterioration and harsher microclimates around trees led to a further reduction in tree lifespans. In this context extreme weather events such as floods, droughts and dust storms are common and poorly managed.

The urban environment is hot, there is inadequate canopy cover to protect people and infrastructure from hot temperatures, sun glare and heat haze. Nobody lingers in the streets due to the extreme heat and all social activities move indoors – people stay inside. With declined amenity, there is an ever-increasing reliance on cars and air-conditioned spaces. This in turn impacts on people's wellbeing. Children have less experience of nature play and a lower relationship with nature overall. Mental and physical wellbeing reflects people's lack of connection to nature and each other. There are higher levels of mental health issues.

This has had a flow on effect with the decline in general health of South Australians. The state government's annual public health expenses increase dramatically and this limits

provision of other basic services. Structural challenges, such as the division of departmental portfolios, and limited resources for cross-agency collaboration, contributed to the historical emphasis on health concentrating on direct medical services such as hospitals, ambulances, doctors and nurses. There has been limited oversight for systemic intervention points – such as equitable urban greening and urban planning that supports active lifestyles – to reduce pressures on the more acute sectors of the healthcare system by supporting better public health and well-being proactively.

Climate related health impacts and hospitalisation rates are disproportionately higher for low socio-economic communities. In some areas of Adelaide, where households can't afford air conditioning, there is a rise in heat related deaths.

With acute societal inequality and hardship comes decreased social cohesion and increased crime. People stay in their own homes and mind their own business more, leading to much less collective action for urban greening. There is degradation of what open space remains available and limited use of public parks, which are poorly maintained and inadequately funded. There are low incentives for keeping and planting new trees on private land, high costs and perceived personal risks with hysteria about falling limbs. In this context there is limited community appreciation or understanding of urban greening and their local environment. Community and government alike have a lack of resources and aspiration to drive urban greening.

Some communities self-organise in pockets in the absence of government services to provide services such as upkeep and maintenance of public open spaces and streetscapes. There are attempts to start greening movements but social media is plagued by misinformation, furthering societal divides. There is no common narrative or values in society, with no individual or group to foster community ties. The community is polarised between those that are attempting to mitigate and adapt to climate change, and those without the resources or interest to do so. Communities are cynical of attempts to provide coordination and leadership. The trust in public institutions continues to decline as the stress on communities rises. Stress levels are high as there is a sense of systems unravelling with existing mechanisms breaking down in the face of increasing climate hazards.

Availability of water is a serious challenge and alternative water sources are expensive. The public green space available is limited to irrigated sporting ovals.

As the regularity and severity of fire events increases, key biodiversity corridors and habitats reduce in size and connectivity. Biodiversity loss is extensive. Extinctions accelerate, and some threatened native species retreat to remaining protected areas. Native species are replaced with pest plants that are suitable to the arid conditions. Even these plants suffer from increasing heat and competing demands for water, such as irrigation. Insect life declines and insectivorous birds, bats and lizards become scarce. The loss of pollinators means it is difficult to grow food. Birdsong, frog calls and cricket sounds are absent in urban areas, and you can only hear the lone call of pigeons and other scavengers.

Throughout all of this, there is very slow progress on action towards reconciliation, and little opportunity for Aboriginal knowledge sharing and involvement in managing the environment, so the benefits in relation to urban greening have not been realised.

Younger and wealthier residents, and skilled migrants, relocate to places with better climates, better cultures, and better economic opportunities. The tax base declines further impacting the state's economy.

In 2050 Adelaide looks and feels nothing like it used to in the early 2020s – it has lost its reputation as one of the world's most liveable cities.

Scenario 3: A Tale of Two Cities

By 2050 South Australia is well-established as a 'Proto-State', an ideal prototype region for piloting and refining new ideas and innovations.

Adelaide's size is particularly advantageous – it is neither overwhelmingly large nor prohibitively small. This ensures that initiatives tested here can be efficiently managed and scaled up if successful, making the state, and its capital city, a predictive microcosm for broader markets. This scalability, combined with safety and relatively low operational and entry costs, makes South Australia, and Adelaide, an appealing laboratory for both local and international companies.

As a result, South Australia promotes a culture of entrepreneurship and experimentation. Over the past 30 years South Australia's economy has undergone rapid decarbonisation and green re-industrialisation, grown significant niches in a range of critical and high-tech sectors, and continued to pilot emerging technologies. The state's appetite for innovation has been driven primarily by the pursuit of economic growth and financial prosperity.

In metropolitan Adelaide the 'Innovation Belts' run from the defence precincts in Salisbury and Edinburgh, and from Port Adelaide, into the CBD and Lot 14, down through Tonsley, to Lonsdale. They are filled with industries that are smart, clean, and quiet, blurring the industrial-age boundaries between industrial and residential areas, and allowing people to live close to work. Everything is co-located in these areas with universities, TAFE, state and local government, and a range of important industries having a presence there.

In this fast-paced environment, highly skilled people are highly valued. Housing, greening and other services are increasingly supported by private companies interested in ensuring they can attract the best talent from around the world to live in the vicinity of their operations. Within the innovation belts there is co-investment supported by state and local government together with private enterprise to build climate resilience and maximise liveability. These measures include virtual power and water – smart, integrated, decentralised energy and water generation and management, localised stormwater catchment and reuse, pockets of biodiversity sensitive and water sensitive urban design, significant greening, and the use of automated technologies to water and maintain trees.

The innovation belts are lush and green, high-amenity, thriving neighbourhoods that are densely developed, full of active transport corridors, as well as public transport that allows people to easily move between districts. In many ways the innovation belts are also demonstration belts of what is possible with the best technology, for those that have jobs in the companies in the belts, and those that can afford it.

Outside of these areas, less investments were made in the intervening decades. Well-established vegetation corridors terminate abruptly at council boundaries. Peri-urban parks have been slowly degrading due to continued biodiversity decline and reduced connectivity. Public open spaces have degraded with few places offering quality recreational amenities. The lack of green aesthetic and recreational spaces correlates with decreased property values, which perpetuates a cycle of economic disinvestment. Hence, these areas also have poorer housing and less public transportation options – though there are routes available for those that come into the innovation belts to work or study, or to access services there. In turn, these disadvantaged areas have poorer participation in the workforce, education or sporting activities.

Unequal greening translates into unequal public health and unequal economic opportunity and a range of associated societal impacts across metropolitan Adelaide. Residents face heightened health risks from poorer air quality and increased vulnerability to climate impacts such as heat waves.

Without the funds to support adequate climate adaptation measures, many council areas outside the innovation belts now face a range of severe climate impacts from coastal inundation, flooding, and bushfires. By 2050, some areas of Adelaide are no longer considered viably insurable and in some other areas communities have been entirely displaced.

Social cohesion is fractured as high levels of income and housing stress, chronic disease and mental health challenges translate into under-employment and unemployment, crime and further entrench intergenerational disadvantage. In this context, people are surviving and have little capacity or inclination for community organising for local greening efforts, though some initiatives do exist in pockets.

This contrasts with affluent areas where people have access to a connected network of high-quality public spaces, there is greater social cohesion, and resident groups are actively engaged in urban greening initiatives that benefit local communities. The difference in the capacity of people in different parts of Adelaide to pay for water on their private properties also makes an enormous difference, as there is a strong relationship between private trees and affordability. Living in Adelaide is like living in 2 different cities.

Accordingly, climate change impacts on urban greenery vary greatly across metropolitan Adelaide with some areas well-managed and others not. This disparity has led to severely fragmented habitat corridors, further exacerbating biodiversity loss. Impermeable surfaces in some areas compound heat, water runoff and flood events that pollute rivers and oceans.

With unequal understanding and appreciation of urban greening, the debate over urban greening has become politically charged. Incidents like tree-related accidents are exploited

by some groups to question the efficacy of urban trees, deepening the divide. While some local councils implement robust greening policies, 'greening' has become politicised resulting in inconsistencies and regular substantial changes to policies and programs. The politicisation of the issue has made the implementation of substantive change to planning and development policies, regulations and legislation at state level very difficult.

At the state level there has been low priority on meeting resource constraints through regenerative social and ecological practices, but rather through technological solutions and growth. South Australia has amazing achievements in synthetic biology, alternative proteins, advanced recycling, and decentralised, digitally enabled net zero energy systems – but this has not translated into improvements in quality of life for all residents of metropolitan Adelaide or its natural environment. Socially, the disparity in living conditions contributes to decreased social cohesion and heightened resentment towards technological and entrepreneurial initiatives perceived as exclusive.

The innovation belts themselves, while lush and thriving, are full of pilots that are predominantly showcases. The leadership and investment needed for less glamorous sets of supportive changes essential for true transformative progress were not implemented. Further, there were not enough incentives in place for collaboration, alongside competition, to ensure the pilots were coherent and where possible integrated into the broader urban fabric. Regrettably this has hindered the capacity of Greater Adelaide to turn pioneering leads into sustainable widespread change that benefits all sectors of society, and for the natural environment.

Along with the many firsts South Australia is famous for, it was the first state to grant First Nations a Voice to Parliament, which is something South Australia is proud of internationally. This is significant, and the formal recognition allows for an ongoing process of truth-telling. However, the lack of formal treaties by 2050 reflect the shortfall in the journey towards genuine reconciliation and equitable partnership. There are no formal negotiated agreements on place-based resource-sharing and management, and this is reflected in the ways that urban greening efforts have not been grounded in place, in community and in respect for Country.

Though there are successful Indigenous businesses that are often showcased, and that demonstrate the entrepreneurial capabilities and cultural richness of these communities, these successes occur within a system that still overwhelmingly favours the existing socio-economic paradigms. This system often fails to fundamentally alter the power dynamics and resource allocations that have historically disadvantaged Indigenous peoples. As a result, while some individuals and businesses thrive, broader systemic changes necessary to uplift entire communities are still lacking.

In the lead up to 2050, international observers and potential investors were wary of the true sustainability and inclusivity of Adelaide's development model, casting doubt on the city's commitment to genuinely transformative progress, risking its position as a global leader in sustainable urban development, and its reputation as a forward-thinking, innovative hub.

Key scenario insights

The insights below have drawn from the opportunities and risks for urban greening based on an analysis of the plausible scenarios. Overall, the plausible scenarios show that urban greening is a critical issue, with fundamental social, economic and even political impacts. The insights were considered when choosing actions for inclusion in the draft Urban Greening Strategy for Metropolitan Adelaide.

1. Valuing green and blue infrastructure equally with grey infrastructure is important

- Metropolitan Adelaide will be affected by climate change in all scenarios, but the effectiveness of mitigation strategies such as irrigated urban green space varies greatly.
- Incorporating green and blue infrastructure into the built environment must be done at a whole-of-city scale, not just where it is most affordable, to ensure that the benefits of cooling for human health and wellbeing are experienced where they are needed most.
- In Scenario 1, the large investment in alternative water resources such as desalination and wastewater reuse, along with high uptake of WSUD (water sensitive urban design) has led to high levels of lush vegetation across all areas of metropolitan Adelaide despite the impacts of climate change because water is low-cost and is readily available. Therefore, urban greening is an option for all income groups and geographical areas of Adelaide. This means that the public realm is cooled by the extensive tree canopy coverage and there are more people out and about walking in their local neighbourhood.
- In Scenario 2 and 3, there is investment in alternative water resources (desalination and wastewater reuse) but only a low uptake of water sensitive urban design. This has led to adequate greening only occurring in areas where local government/residents can afford to pay for it. Additionally, there is competition for the desalination water from private companies. This means that many trees and plants that currently grow well in Adelaide will not be able to survive as the impacts of climate change intensify and the streets and other outdoor spaces will feel a lot hotter than they need too.

2. The way data, artificial intelligence and automation are employed will significantly impact greening outcomes and subsequently, quality of life.

- The scenarios have different levels of uptake of digitisation/technology, which impacts the outcomes on urban greening including how maintenance and monitoring can be efficiently undertaken.
- In Scenario 1, data and technology is used to maximise urban greening outcomes for the benefit of the community as well as to make sure we utilise resources sustainably and equitably. There is consistent data collection across the region with easy and free

access for everyone. The use of technology to monitor, maintain, and manage urban landscapes allows for efficient resource allocation and enhances the effectiveness of greening efforts. Data-driven approaches ensure that policies are evidence-based and reflect the true value of environmental assets. Artificial intelligence can also help in restoring ecosystems and maintaining biodiversity by predicting ecological needs and automating the care of green spaces. This approach has led to shared learnings and efficiencies between the different urban greening actors, which means more can be achieved with less resources and time. This suggests a model where integrated technology not only supports sustainability but actively enhances community engagement and public health through informed urban planning.

- Artificial intelligence and data can enhance community engagement by making urban management more transparent and responsive. Engaging communities through accessible data can help in tailoring greening initiatives to local needs and values.
- In Scenario 2, the lack of investment in data-driven approaches results in poor planning and underestimation of the value of urban greening, contributing to environmental degradation and reduced liveability. This scenario serves as a cautionary tale about the consequences of disregarding the potential of digital tools in planning and maintaining urban spaces, highlighting how essential these technologies are in mitigating climate impacts and enhancing urban resilience.
- In Scenario 3, data and artificial intelligence play a significant role within specific, privileged areas but are absent elsewhere, leading to unequal benefits. In the innovation belts, artificial intelligence and data are likely used to optimise greening efforts and integrate them with urban infrastructure, potentially including real-time environmental monitoring, smart water management, and automated maintenance systems. Some councils utilise advanced technologies, such as remote sensing and artificial intelligence, to improve the management and optimisation of the urban forest and to plant the right tree in the right place. However, not all councils have enough money to utilise new technologies. The limited reach of these technologies leads to unequal greening outcomes, and therefore exacerbates social and economic inequalities, underscoring the necessity of broad access to such tools to ensure equitable urban development.
- If there were limited resources for urban greening, one of the most important things to invest in would be spatial mapping (such as heat mapping and areas of high biodiversity). This would allow government agencies to better allocate the limited resources they had to where it was most needed.
- Effective integration of artificial intelligence and data insights into urban policy-making is crucial. Policy-makers need to leverage these technologies to make informed decisions that align long-term environmental sustainability with immediate urban needs.

3. Equitable greening is important to achieve desirable outcomes

- Inequitable urban greening exacerbates inequality and a range of associated social and economic issues.
- Equitable greening is highly dependent on the scenario, but in all cases is affected by land use development, community attitudes, level of funding available and mobility patterns.
- In Scenario 1, the 30-Year Plan's Urban Green Cover 20% target is met for all land uses and scales. This scenario exemplifies the ideal outcome where equitable greening promotes social cohesion, economic prosperity, and environmental sustainability. By ensuring that all neighbourhoods have easy access to green spaces, active transport is enabled, the scenario illustrates how such inclusivity leads to improved public health, increased climate resilience, and stronger community ties. It shows that equitable greening can drive a cultural shift toward sustainability and regeneration.
- Contrasting sharply with the first scenario, Scenario 2 highlights the negative consequences of inequitable greening. It paints a bleak picture of urban decay, where a lack of coherent policies and underinvestment in green infrastructure leads to social fragmentation, economic decline, and environmental degradation. The scenario serves as a warning that inequitable greening exacerbates climate vulnerability, reduces liveability, and ultimately drives away human capital, such as young people and skilled workers, seeking better opportunities elsewhere.
- Scenario 3 demonstrates a mixed outcome where greening efforts are concentrated in specific, economically prioritised zones. It underscores the double-edged sword of uneven greening initiatives, where regions within the innovation belts flourish with robust economic growth and enhanced liveability, while areas outside these belts suffer from neglect. This disparity results in pronounced social and economic inequalities and suggests that while greening can be a powerful tool for urban improvement, its benefits must be distributed more evenly to prevent creating pockets of disadvantage.
- Providing equal access to green spaces across all urban areas can help reduce social inequities by offering all residents regardless of their economic status, benefits such as improved mental health, stronger community bonds, and recreational opportunities.
- Well-implemented greening can boost economic outcomes by enhancing property values, attracting businesses, and creating job opportunities in green infrastructure and maintenance. Furthermore, greener cities are more attractive to residents and tourists alike, supporting local economies.
- The scenarios collectively highlight how short-term gains from unequal or inadequate greening efforts are ultimately unsustainable and lead to greater costs in terms of public health, economic stability and environmental integrity.

- These scenarios highlight the need for policies that balance economic growth with environmental sustainability and social equity to ensure all residents benefit from greening and urban development, not just those in economically prosperous areas.
- These scenarios teach that equitable greening is not just an environmental imperative but a foundational element for fostering resilient, vibrant and just urban communities. They emphasise the need for inclusive urban planning that integrates the needs and values of all community members to ensure balanced development and the wellbeing of the entire city.

4. High community understanding and value of greening is important

- The scenarios show the positive health impacts of greening and conversely the negative public health, economic and social impacts of lack of greening.
- Everyone has a role to play in improving urban greening outcomes, including government at all levels, the private sector, and the community. However, in the different scenarios, the emphasis and role is likely to be different. In Scenario 1, there is strong government leadership across all areas, while in Scenario 3, it might be more likely to be large corporations driving public realm improvements on their land for their employees. In Scenario 2, supporting grassroots action would be especially important as all levels of government would be under-resourced.
- Scenario 1 shows that by raising community awareness of the value and uses of particular native species, people are motivated to form connections with and care for their local environment. Additionally, Scenario 1 also shows that if people feel empowered and responsible, they are more likely to create coordinated urban greening action. The transformation of values is a critical difference between the scenarios and this makes a significant difference in terms of whether people care about nature and take action.
- Effective urban greening requires ongoing community engagement and education to ensure that all residents understand and value the benefits. Community-informed planning leads to more sustainable and widely supported initiatives. The community's high understanding and valuation of urban greening leads to active participation and support for sustainable initiatives.
- Strong leadership is crucial in advocating for and implementing green policies. Leaders must articulate a clear vision that aligns with community values and demonstrates the long-term benefits of urban greening.
- Policies must be transparent and based on robust data to foster community trust and support. Leaders should use every opportunity to communicate the positive impacts of greening initiatives on public health, economic opportunities, and environmental sustainability.
- From these scenarios, it is clear that the success of urban greening depends significantly on the interaction between leadership and the community. Effective leadership that communicates the value of greening and engages the community can

transform urban areas into more sustainable, resilient, and liveable spaces for everyone.

5. Important to recognise and value Kurna wisdom

- Acknowledging and integrating Kurna wisdom requires respect for their cultural practices and traditions. This involves genuine partnerships and collaborative planning processes that prioritise Indigenous voices in urban development.
- Aboriginal knowledge systems often include sustainable land management practices that have been refined over millennia. These practices can provide critical insights into natural resource management, biodiversity conservation, and ecological resilience.
- Incorporating Kurna wisdom into urban planning can enhance educational opportunities for the broader community, increasing awareness and understanding of Indigenous cultures and their approaches to environmental stewardship.
- Scenario 1 teaches that respecting and incorporating Indigenous ecological knowledge can lead to more sustainable and culturally rich urban landscapes. Indigenous approaches often emphasise the interconnectedness of all life, holistic management practices, and the long-term stewardship of resources, which can significantly contribute to the development of regenerative and resilient urban environments. In this scenario, such integration has contributed to a cultural shift towards more regenerative values and improved community understanding of, and connection to the land.
- Scenario 2 serves as a cautionary tale about ignoring Indigenous knowledge, which could have provided valuable insights into sustainable living and community resilience.
- Scenario 3 suggests a missed opportunity to employ Aboriginal knowledge systems that could foster more inclusive and holistic urban development. Kurna practices could have potentially guided a more equitable approach to greening and urban planning, ensuring that benefits are shared across the entire metropolitan area ensuring vulnerable people are not left behind.
- Policies that integrate Kurna wisdom can lead to more effective and sustainable urban greening initiatives. These policies can help ensure that urban development respects and preserves the cultural heritage and environmental philosophies of Indigenous populations.

6. There is a strong relationship between the use of active and public transport and greening

- In order to encourage people to move about their neighbourhoods using active and public transport, streets need to be green and leafy.

- Scenario 2 and 3 showcase that in areas without greening, the urban heat island effect increases, discouraging the use of active and public transport options. People without access to private cars in such cases are more likely to have difficulty participating in the workforce, particularly when having to travel long distances through a region with poor public transport networks.
- Scenario 1 has reduced reliance on private cars, leading to less space being needed for traffic and car parking, allowing for the revegetation of some hard surfaces. The widespread uptake of public and active transport options allows for more public space for urban greening.

7. Some general observations from the scenarios

- Across all scenarios everyone has a role to play in increasing greening and biodiversity – we need to be engaging in a targeted approach about the benefits of greening (health and wellbeing) and provide information to individuals and business about their role.
- Urban greening has significant public health implications, as it is fundamental in addressing the impacts of increased temperatures and heatwaves. It also increases the use of active transportation along cool green corridors, it has a positive impact on mental health and wellbeing, and builds a positive sense of place, community and belonging.
- Urban greening has significant economic implications. It increases productivity by increasing physical and mental health and wellbeing, it decreases public health costs, and it addresses the cost of living crisis, with houses in green suburbs paying less on their energy bills.
- In Scenario 2, where there are competing priorities/challenges in a society (such as poverty), it might be more challenging to make greening a priority in these circumstances.
- Improving urban greening outcomes is not only the role of Green Adelaide and the Department for Environment and Water, as there are many factors that influence urban greening such as transport, development patterns and education programs.

Conclusion

As we reflect on the rich insights drawn from the 3 urban greening scenarios for metropolitan Adelaide, it becomes evident that the future of our urban landscapes is not preordained but shaped by the decisions we make today – and into the future. The scenarios outlined in this report provide us with a vivid spectrum of potential futures, each underscored by crucial interplays of leadership, collaboration, community engagement, urban planning and development, technological integration, transportation systems and more.

The 'Paradise Regained' scenario paints a hopeful picture of what can be achieved through collective effort, integrated planning and robust use of data and technology. It emphasises the power of urban greening to enhance public health, economic stability, and environmental resilience. Conversely, the 'Fahrenheit 5000-5950' scenario serves as a stark warning of the consequences of neglect, illustrating how a lack of coherent urban greening strategy can lead to degraded living conditions, economic downturn and social strife. Lastly, the 'A Tale of Two Cities' scenario offers a complex narrative of partial success, where innovation leads to growth but also to disparities, reminding us that the benefits of progress must be equitably shared to truly foster a sustainable urban environment.

From these narratives, several key imperatives emerge:

- **Inclusive collaborative strategy:** Urban greening must be integrated into broader urban strategy and policy frameworks to ensure that it is effective and contributes positively to all aspects of urban life.
- **Equitable greening:** Strategies must prioritise accessibility and fairness, ensuring that all community members benefit from green spaces, regardless of their socioeconomic status.
- **Leverage of modern technologies:** Harnessing data, artificial intelligence and other technologies can dramatically enhance the efficiency and effectiveness of urban greening efforts, making them more adaptable and robust against future challenges.
- **Community engagement and leadership:** Active participation from all sectors of the community and strong, visionary leadership are critical to the success of urban greening initiatives, fostering a shared commitment to sustainable development.

The foresight provided by these scenarios is a tool, not for prediction, but for preparation. Engaging with these scenarios allows stakeholders across all levels – government, business, and community – to anticipate potential challenges, innovate solutions and plan for a greener, more resilient Adelaide. As we move forward, let these scenarios inspire not only our strategies and policies but also our actions at all levels of society, enabling us to cultivate a thriving, vibrant urban future for all who call Adelaide home.

Appendix 1: Megatrends impacting urban greening

Land use patterns (e.g. development types and population growth)

Greater Adelaide's population is projected to increase by up to 672,000 people, reaching between 2 and 2.19 million by 2051 – about 86 per cent of the state's population¹.

Traditionally South Australian towns and cities have been low density, dominated by detached houses on large allotments. In recent years the urban form has been changing, with a move to more medium and high-density living. As the city expands, there is a growing focus on sustainable and high-density living, leading to an increase in multi-story residential buildings and mixed-use developments.

In the peri-urban and suburban areas there are significant numbers of small-scale infill development, with single allotments being split into 2 or more dwellings. These trends can have negative impacts on retaining large trees and increasing impermeable surfaces².

Concurrently, there's a trend towards revitalising and repurposing old industrial areas and underutilised urban land, which presents opportunities for creating new green spaces like urban parks, community gardens and green corridors.

Reconciliation

The global megatrend of decolonisation, which involves dismantling colonial practices and mindsets, is fostering a broader recognition of Aboriginal Peoples' wisdom, knowledge, and culture, significantly impacting various fields, including urban greening and land management.

This shift marks a departure from the centuries-long marginalisation of Indigenous knowledge systems under colonial regimes, highlighting the depth and relevance of Aboriginal understanding of land, ecosystems and sustainable land management practices.

The distinctive characteristic of Indigenous stewardship is the focus on humans as caretakers of the land rather than owning and controlling it. There is growing recognition and appreciation of cultural knowledge, skills and perspectives of the Kaurna Miyaurna, and all Aboriginal people.

In urban greening, this translates into a holistic approach that integrates humans with the natural environment, emphasising the interconnectedness of all living beings and the importance of ecological balance. The application of Aboriginal knowledge in urban

¹ PlanSA, Population Projections, <https://plan.sa.gov.au/news/article/2023/population-forecast-projects-sasfuture#:~:text=Greater%20Adelaide's%20population%20will%20increase,per%20cent%20in%202021%2D31> – (published 4 August 2023).

² Preparation of the [Greater Adelaide Regional Plan \(GARP\)](#) is underway, which will replace the [30-Year Plan for Greater Adelaide \(2017 Update\)](#). This will involve making decisions about how and where future population growth is accommodated.

greening, such as the use of Indigenous plant species and land management practices like controlled burning, enhances local biodiversity, restores ecological connections, and contributes to the health and resilience of urban ecosystems.

Additionally, incorporating Aboriginal perspectives in urban greening initiatives promotes cultural sensitivity and inclusivity, facilitating deeper engagement with Aboriginal communities and bridging cultural gaps. This approach not only enriches urban greening projects but also plays a crucial role in the reconciliation process, acknowledging historical injustices and striving towards more equitable and inclusive environmental stewardship. The recognition and integration of Aboriginal wisdom in urban greening is thus not merely an acknowledgment of the value of Indigenous practices but a transformative step towards sustainable, culturally informed and socially cohesive urban environmental management.

Climate change and liveability of our cities

Major cities in Australia face a 2.3% increase in the risk of mortality during heatwaves, with Adelaide facing the greatest increase in the risk of heatwave-related deaths, at 8.3%³.

Climate change is one of the most significant challenges and drivers for growing our urban forest. Projected climate change impacts include hotter summer temperatures with more extreme heat days; more frequent, more severe, and longer heatwaves; reduced annual rainfall; more intense high rainfall and storm events; and increased likelihood of bushfires and droughts⁴.

Climate change is predicted to impact human health, wellbeing, and quality of life. Hotter temperatures have direct impact on mortality rates, and also reduce the uptake of many outdoor activities including active transport such as walking and cycling. SA Health advises that people (especially older and more vulnerable persons) may not be able to remain cool enough to stay healthy on days that exceed 35°C. This is reflected in a 16% increase in GP presentations during heatwaves across Adelaide between 2011 and 2016⁵. An expanded tree canopy will be increasingly important to cool urban areas for liveable outcomes.

Biodiversity loss

Since 2016, threatened species have grown by 8%, such that 21% of Australian mammal species are now threatened⁶.

³ Longden, T, 2018, Measuring temperature-related mortality using endogenously determined thresholds, *Climatic Change*, 150 (3-4), pp. 343 – 375, <https://opus.lib.uts.edu.au/handle/10453/126602>

⁴ Department for Environment and Water, 2022, Guide to Climate Projections for Risk Assessment and Planning in South Australia.

⁵ Department for Environment and Water, Technical Information Supporting the 2024 Urban Heat Environmental Trend and Condition Report Card, https://data.environment.sa.gov.au/Content/Publications/RC2023_TechReport_LIV_UR_UrbanHeat.pdf

⁶ Barraclough, K.A, Carey, M, Winkel, K.D, Humphries, E, Ah Shay, B, Foong Y. C. 2023, Why losing Australia's biodiversity matters for human health: insights from the latest State of the Environment assessment, *Med J Aust* || doi: 10.5694/mja2.51904, www.mja.com.au/journal/2023/218/8/why-losing-australias-biodiversitymatters-human-health-insights-latest-state

Pressures from climate change, habitat loss, pollution, and invasive species are threatening every Australian ecosystem, with 19% showing signs of collapse loss⁷. Moreover, this number is predicted to increase substantially over coming decades, with further extinctions expected unless radical changes are made. As natural habitats are increasingly fragmented and degraded, urban areas are becoming vital refuges for various species. However, the traditional design of cities, often characterised by vast expanses of concrete and limited green spaces, exacerbates the problem of biodiversity loss.

In response, urban greening is gaining momentum as a strategy to counteract this trend, with the potential to create micro-habitats and green corridors that support a range of flora and fauna within urban landscapes. Urban greening offers a unique opportunity to contribute to its mitigation, creating more biodiverse, resilient, and liveable urban environments.

Technology (e.g. digitalisation, data availability, Artificial Intelligence, automation)

While technical advancements have been significant, experts predict that this is just the tip of the iceberg, with the vast majority of digitalisation yet to occur⁸.

Digitalisation, big data, AI, and automation are revolutionising various sectors, including urban planning and development, with significant implications for urban greening. Digitalisation facilitates efficient data collection and analysis for mapping and monitoring urban green spaces, enhancing their maintenance and community engagement opportunities.

Big data's role in analysing environmental conditions and urban ecosystems helps in selecting resilient species and tracking ecosystem changes. AI, with its data processing capabilities, can optimise the creation of new green spaces and aid in their maintenance through technologies like drones. Automation brings in tools for tasks like watering and maintenance, increasing efficiency and reducing labour costs.

These technologies together enhance the planning and design of green spaces, making maintenance more efficient and engaging communities through digital platforms. They play a crucial role in climate adaptation and mitigation, aiding in cooling cities, reducing flood risks, and improving air quality.

Urban greening, powered by these trends, may also support biodiversity, offering habitats within urban areas and contributing to ecological networks. Economic opportunities emerge in sectors like green tech and urban agriculture, while data and AI ensure equitable distribution of green spaces.

⁷ Cresswell I, Janke T, Johnston E. Australia State of the Environment 2021. Commonwealth of Australia, 2021. <https://soe.dcccew.gov.au/>

⁸ Naughtin C, Hajkowicz S, Schleiger E, Bratanova A, Cameron A, Zamin T, Dutta A (2022) Our Future World: Global megatrends impacting the way we live over coming decades. Brisbane, Australia: CSIRO. www.csiro.au/en/research/technologyspace/data/our-future-world

Transport (e.g. changing mobility systems)

The future of how people move around is changing due to trends such as electrification, mobility-as-a-service, micro-mobility, connected and autonomous vehicles and consumer preference for active transport⁹.

Electrification of transport, with an increasing shift towards electric vehicles (EVs), reduces the reliance on fossil fuels, leading to lower emissions and improved air quality in urban areas, thereby creating a healthier environment for urban green spaces.

The rise of autonomous vehicles could lead to more efficient traffic management and potentially less need for extensive parking infrastructure, freeing up space that can be repurposed for green areas like parks and community gardens. Shared mobility, including car-sharing and on-demand transport services, is decreasing the overall number of vehicles on the road, which can reduce urban congestion and pave the way for more pedestrian-friendly and green spaces.

Additionally, the growing popularity of cycling and walking as preferred modes of transport, supported by the development of extensive bike lanes and walkways, not only promotes a healthier lifestyle but also integrates seamlessly with urban greening initiatives, as these modes of transport require green, pleasant, and safe routes.

The integration of technology into mobility, such as smart traffic management systems, can lead to more streamlined traffic flows, decreasing the need for wide roads and allowing for the expansion of green belts and corridors. Furthermore, the emphasis on sustainability in mobility is encouraging the development of green infrastructure, such as green roofs on bus and train stations, or vertical gardens along transit corridors, which contribute to biodiversity, air purification and aesthetic improvement.

Water availability

The demand and supply of water in the future will be impacted by shifts such as dwindling native water resources from climate change, population growth, cultural acceptance of recycled water, technological innovations, demand from water intensive industries of the future, and our ability to maximise use of water where it falls through water sensitive urban design¹⁰. Securing adequate water availability will be a potentially limiting factor for successful greening.

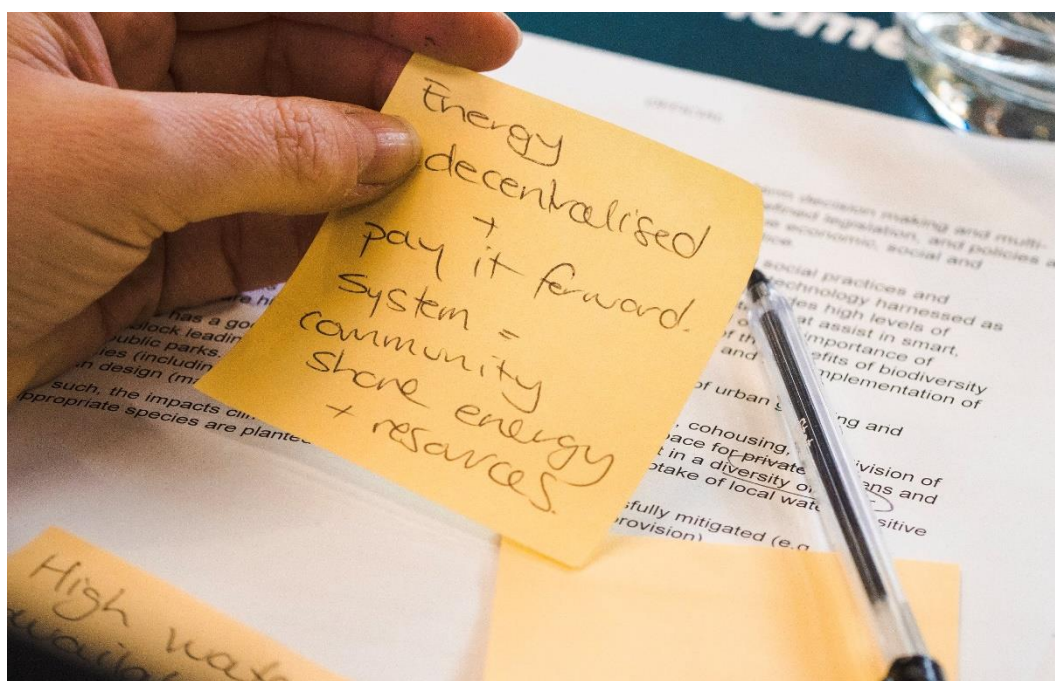
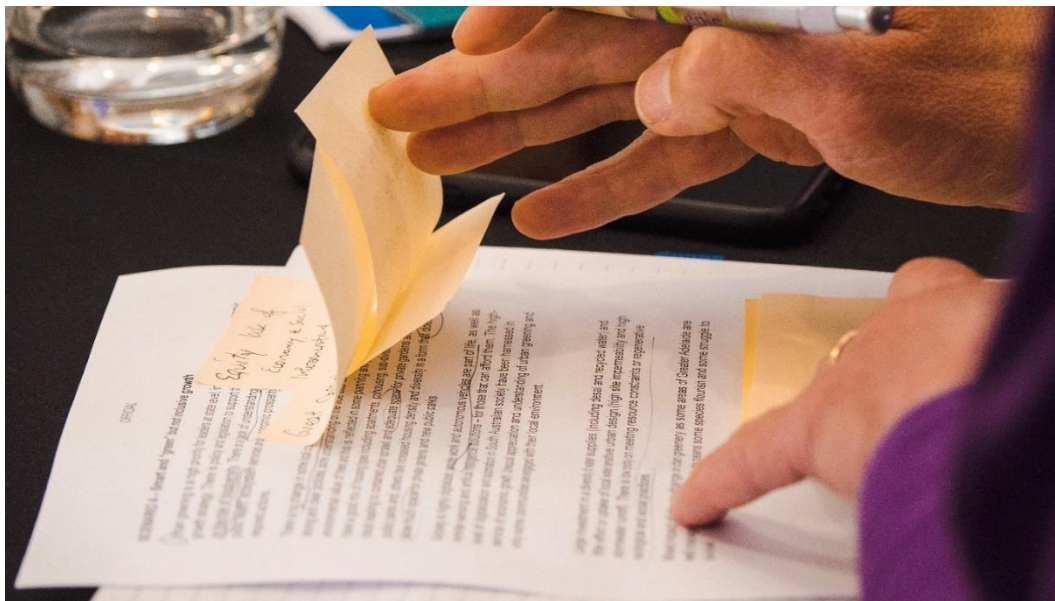
Climate change is leading to significantly dwindling native water sources and less predictable water availability. Urbanisation and the increase in impervious surfaces like roads and buildings exacerbate the issue of water runoff and reduce natural groundwater recharge, impacting both water quality and quantity. This necessitates the creation of alternative water sources which increases cost.

⁹ Heineke, K., Laverty, N., Möller, T. and Ziegler, F. 2023, The future of mobile, McKinsey Quarterly, www.mckinsey.com/industries/automotive-and-assembly/our-insights/the-future-of-mobility-mobility-evolves

¹⁰ SA Water is leading the development of a [Resilient Water Futures Strategy](#) to identify how Adelaide can maintain a secure, sustainable and resilient water supply.

The demand for water in urban areas continues to rise with population growth, putting pressure on existing water resources and infrastructure. This leads to higher costs for water, impacting the budget allocations for maintaining urban green spaces. In response, there is a growing focus on sustainable water management practices in urban greening, such as the use of drought-resistant plant species, rainwater harvesting and efficient irrigation technologies.

The implementation of green infrastructure, such as bio-swales, raingardens, and permeable pavements, is also gaining traction as a means to enhance groundwater recharge and improve water quality. Additionally, the treatment and reuse of wastewater for irrigation is becoming more prevalent as a strategy to conserve freshwater resources.





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