WESTERN SYDNEY CITY DEAL

C4: Smart Western City Program

Co-creating a Digital Western Parkland City

August 2021

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Contents

Executive summary

The Smart Western City Program is part of the planning for the Western Parkland City. It outlines the infrastructure, services and resources needed to ensure the Western Parkland City is a future-focused, digitally enabled city.

The Program will:

- Ensure the benefits of today's technology are realised
- Set up strong foundations to support growth of a digital city into the future
- Establish the right ecosystem for the Western Parkland City to capitalise on future opportunities to innovate.

This program outlines the need for "digital plumbing" to be considered in the planning of the city and deployed across the city as part of construction. High capacity conduit, common access ducts, a network of "smart poles" and smart street furniture are essential foundations for the future city.

It builds on some of the existing connectivity infrastructure that already exists through the NBN, existing mobile and Internet of Things networks and the NSW Spatial Digital Twin.

Growth in demand for data and in the number of connected devices is growing beyond what has ever been envisaged in city planning[1] and this program is designed to support that growth. Connectivity currently thought of as cutting edge is already being superseded. While many countries are working to provide 10 gigabit optical fibre networks to attract investment, business and new jobs, 100 gigabit networks are already being planned across the globe and expected to surpass the 10 gigabit networks in the medium term (two to five years).

The digital plumbing will support new connectivity infrastructure like 5G and 6G radio antennae, sensor networks for monitoring and generating insights on places, cameras, and public Wi-Fi, new IoT and other networks.

The connectivity layers identified in the Program are critical to the success of a digital Western Parkland City. They will be needed to handle the massive growth in data demands resulting from the future, hyperconnected city.

Providing the right environment for a world-class, digitally connected city requires investments to attract investment, spark innovation and support knowledge industries.

High capacity conduit will enable world leading connectivity speeds supporting the requirements of advanced manufacturing, technology sector jobs and advanced research that will be integral to the Western Parkland City.

The Digital Western Parkland City can be a virtual 0.03-second city as well as a 30-minute city, where high quality connectivity supports the operations of the city.

Local Government, the NSW Government, the Australian Government, partners in the technology sector as well as the research and academic sector need to work together to deliver this hyper-connected city.

The Program Strategic Business Case demonstrated a strong economic case for investment and that the greater the technology stack and broader the geographical scale, the higher the return on investment.

The program details a prudent approach, starting with small scale pilots, to seek a State Government co-contribution from the $45 million Smart Places Acceleration Program.

This pilot approach is already being implemented with initiatives identified during the market engagement to develop this Program already being tested, showcasing the opportunities for the Western Parkland City and allowing new initiatives from start- and scale-up companies to be tested and trialled.

A truly smart city will only be delivered if innovative business models and partnerships are in place and the right solutions are delivered in the most efficient ways.

There will need to be policy changes, such are requiring the digital plumbing in development controls, new business models, and a culture of innovation and partnerships to test the limits of and realise the benefits offered by technology.

This investment will support the vision for the city, ensuring it is a great place to live, work and do business for the current and future residents.

Western Parkland City digital vision

The Western Parkland City will be:

- an **inclusive and digitally** capable region, where people are the focus, and everyone has access to technologies that benefit and create opportunities
- a **productive** region with flexible, future-focused communication infrastructure for faster, more reliable and affordable digital connectivity
- a **resilient and sustainable** region that uses technology to help manage natural resources; and
- a **strong and liveable** region, where smart solutions improve the quality and resilience of the local environment and the health and wellbeing of the people in it.

The success of this program will be that the Western Parkland City can boast:

- High levels of digital literacy and participation in the digital economy.
- Increased employment opportunities now and into the future.
- Increased public transport reliability and reduced travel time.
- Increased environmental benefits including improved air and water quality.
- Increased community pride and engagement using digital tools.
- Improved public safety, liveability and usage of public spaces.
- Improved design of government services and policies resulting in improved customer satisfaction.
- Improved access to educational resources and enhanced research and development.

The Program has been shaped by addressing some key questions.

Delivering outcomes for people section	•**What are the outcomes we want to deliver for the people of the Western Parkland City?**
Getting the foundations right section	•**What are the key foundations and enablers that need to be in place for the City to achieve consistency and scale?**
Actions by key theme section	•**What are the key challenges we want to address and opportunities we want to realise in the Western Parkland City?**
Testing new approaches and solutions section	•**How do we pilot technical solutions, and test our foundations and enablers so we learn lessons and nail our approach before we start large-scale deployment?**

The Program acknowledges that delivery of this 22nd century City will take many years and decades and must allow for new solutions and technologies to be introduced, tried, tested and validated before they are scaled, and bigger investments made.

As a result, the Program sets out the full ambitions of the digital City and verifies the economic case for this investment through a Strategic Business Case; and details a 24-month work plan to set the wheels in motion.

The 24-month work plan will deliver the evidence base for a Final Business Case/s to be developed and for smart solutions to be delivered at scale across the Western Parkland City.

It includes work to:

- Build the right foundations
- Grow the evidence base and test
- Establish the case for scale – by developing a Final Business Case/s.

Pilots will also help address challenges and opportunities specific to the Western Parkland City, responding to the needs of its people and help learn lessons to inform scaling delivery or allow us to fail fast.

24-month work plan

Build the right foundations

- Include Smart from the start requirements into the planning for Bradfield City Centre and other **planning instruments and engineering and design standards** for the City.
- Define the open **and interoperable smart city** engineering architecture and framework to guide sustainable and scalable implementation and deployment
- Develop a **Cyber Risk Management Framework** and apply to all projects and entities deploying and managing smart technologies across the City
- Use and **augment the NSW data sharing platforms** consistently across the Western Parkland City
- Trial the **delivery models** for the digital plumbing
- Test the NSW **Smart Places Customer Charter** (under development) and Data Protection Policy

Grow the evidence base and test solutions

- Establish the **Western Parkland City Living Lab** to run pilots and future market engagement
- Deliver selected **Pilots and proof of concepts**, including solutions best aligned to the Digital Action Plan, Smart Western City Program and 5G Strategy and Trials

Establish the case for scale

- Develop the **Final Business Case/s** which set out the investment for scaling of identified smart projects

To deliver this program the NSW Government will commission Information and Communications Technology (ICT) platforms that allow data from any smart platform to be housed in a common way, protected by best practice cyber security systems, and in a way that allows the smart city to grow and evolve over time as technology develops and as needs change.

In 2021 pilot initiatives will be commissioned and delivered to ensure the ICT platforms developed are fit-for-purpose and to test the foundational infrastructure and delivery methods.

Background and context

The Smart Western City Program is one of four Digital Connectivity and Smart Technology commitments in the Western Sydney City Deal (the City Deal). The City Deal is a 20-year-plan agreed by the Australian Government, NSW Government and the eight local councils of the Western Parkland City to deliver transformative change for the Western Parkland City (the City) to become a fully realised 22nd Century City.

The four digital commitments contribute to making the Western Parkland City one of Australia's most connected cities.

Western Parkland City digital vision

The vision for a Digital Western Parkland City is that it will be:

- an **inclusive and digitally** capable region, where people are the focus, and everyone has access to technologies that benefit and create opportunities
- a **productive** region with flexible, future-focused communication infrastructure for faster, more reliable and affordable digital connectivity
- a **resilient and sustainable** region that uses technology to help manage natural resources; and
- a **strong and liveable** region, where smart solutions improve the quality and resilience of the local environment and the health and wellbeing of the people in it.

Figure 1: Western Parkland City digital vision

The four digital commitments that set out to achieve this vision are:

- C3 - **The Digital Action Plan**
- C4 - **The Smart Western City Program**
- C5 - **5G Strategy and trials**
- C6 - **Openly available data** sets

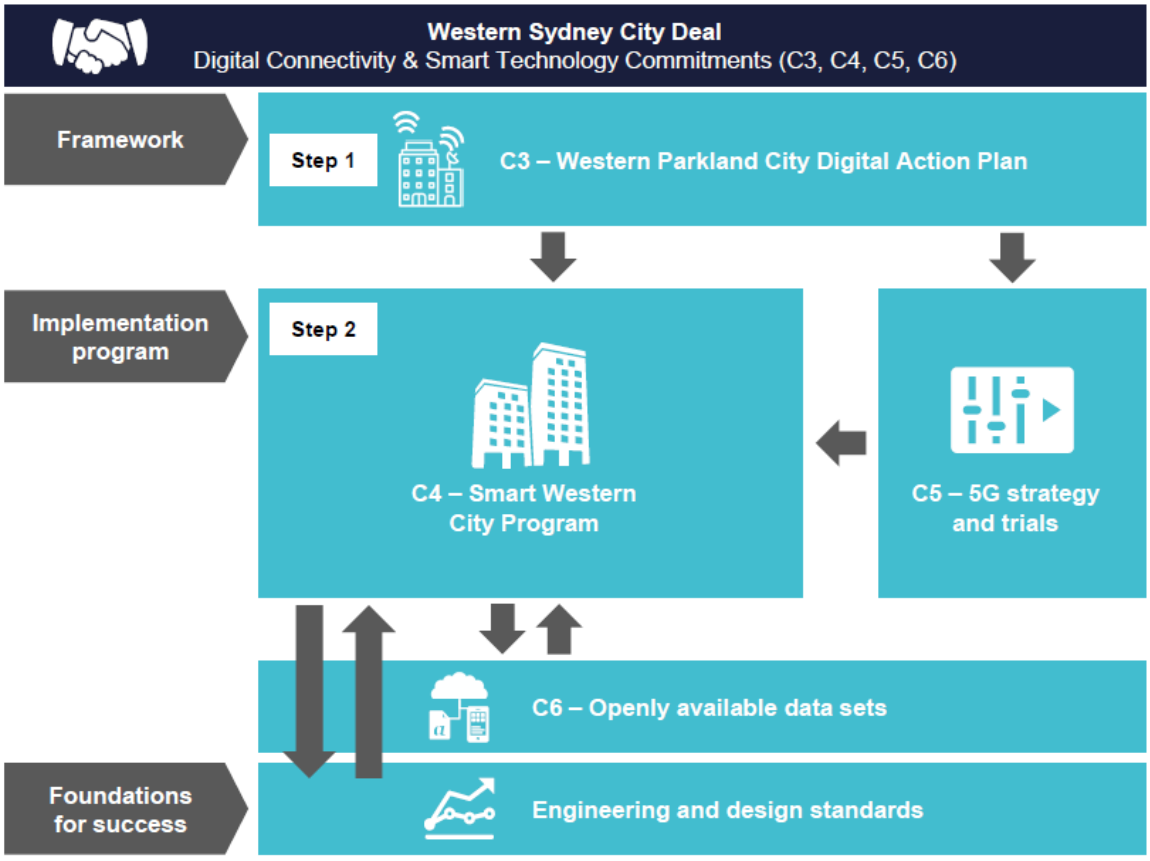


Figure 2: The relationship between the four City Deal digital commitments. *Source: Western Parkland City Digital Action Plan.*

The Department of Planning, Industry and Environment (DPIE) led the development of the Smart Western City Program on behalf of the NSW Government and City Deal partners. The Smart Western City Program is a flagship program for the NSW Government and plays a central role in delivering on the *NSW Smart Places Strategy*, released in August 2020.

Implementation of the Smart Western City Program will improve the quality of life for citizens and address problems and challenges across the Western Parkland City.

Co-creating the Smart Western City Program

Co-creating the Program

The Smart Western City Program (the Program) was developed with input across the City Deal Partners and three tiers of government, industry and academics and using community engagement insights. The process for co-creating the Program is explained in Figure 3.

Program development was supported by:

- Collabor8 – a local government working group, comprised of officer representatives from each of the eight City Deal councils
- A tripartite government Western Sydney City Deal Digital Commitments Steering Committee
- A NSW Government Program Steering Committee consisting of representatives from across relevant State Government agencies.

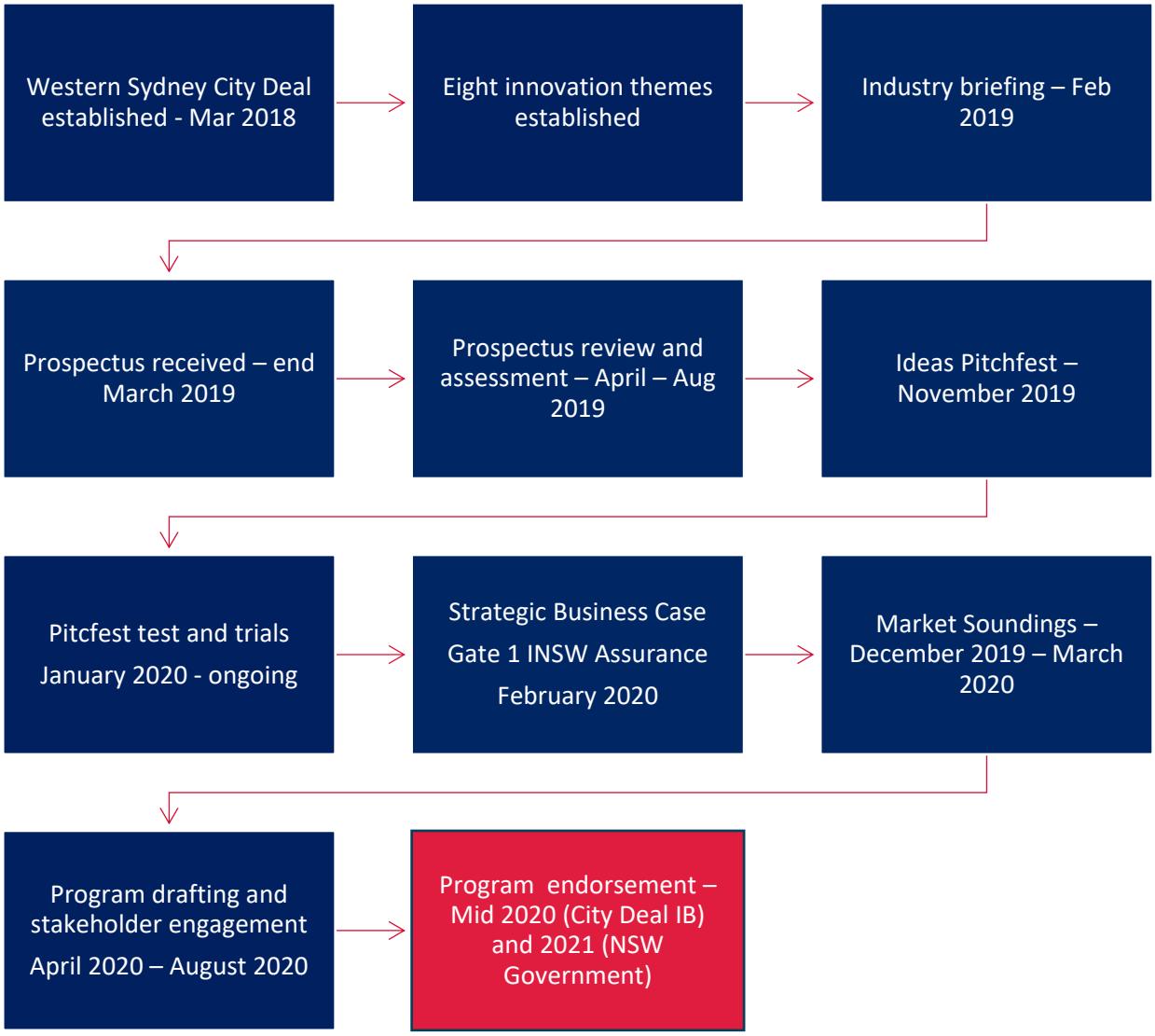


Figure 3 – The process for Smart Western City Program development

Eight innovation themes

Consultation with industry stakeholders, local council partners and key agencies across the NSW Government identified eight key focus areas to drive innovation and explore market possibilities in the Smart Western City Program (Figure 4).

The eight themes were established after reviewing insights from community and business engagement and a challenge was articulated for each theme (Table 1).

The Program is established and centred around these themes, with outcomes and proposed actions identified for each theme.

Figure 4: The eight key focus areas of the Smart Western City Program

Table 1 – Themes and challenges

Theme	Challenge
Internet Connectivity	*How might we provide public Wi-Fi; NBN and mobile coverage accessibility using new and existing infrastructure in a smart way?*
Smart Monitoring	*How might we deliver real-time monitoring of our environment to effectively manage critical events e.g. fires, flooding, etc.?*
Data Sharing	*How might we enable sharing of critical data across government agencies and partners in a safe and secure way to deliver better citizen services, whilst protecting privacy?*
Smart Planning and Management	*How might we deliver greater infrastructure and planning consultation, design and development?*
Smart Public Spaces	*How might we provide smarter public spaces for our citizens including smart CCTV and smart, connected street lighting"*
Smart Transport	*How might we provide smarter transport services, including smart parking; congestion management; and accessible public transport?*
Community Engagement	*How might we engage with the community, provide digital services and improve digital literacy?*
Local Jobs / Work from Home	*How might we provide services that enable citizens access to work closer to home and provide incentive for business to grow in Western Sydney?*

Digital Western Parkland City market engagement

DPIE carried out an extensive market engagement process (Figure 3) to help define the smart cities initiatives to deliver the greatest productivity, social inclusion and environmental outcomes for the Western Parkland City.

It included:

- An industry briefing with over 250 delegates
- A call for ideas, resulting in 114 prospectuses, some containing multiple initiatives
- Evaluation of the prospectuses
- A Pitchfest event, with 10 companies pitching initiatives to 100 representatives from government and private sector.
- A test and trial incubation process, with six pitchees partnering with councils and state Government agencies (see Table 2)
- Market soundings with over 50 organisations presenting to councils and NSW government representatives.

The market engagement process was overseen by an independent probity adviser.

Benefits of market engagement

Shaping program development

- As originally planned, the market engagement provided rich insights on potential technical solutions, partnership and delivery models, the role of government and the actions required to build towards a digitally connected city.

Exposure and support for start- and scale-ups

- Prospectuses were received from companies of all stages of maturity, from Australia and abroad. The market engagement program provided new ideas and new companies the opportunity to showcase their ideas and be supported to test them in partnership with Government, providing exposure and feedback. The program supported and invested in innovation.

Government connection with new ideas

- The market engagement program provided an opportunity for companies to connect their products and services with the right potential customers across government, exposing government to new ideas and innovation solutions.

Driving job creation

- The market engagement program was not a procurement process, however, the ecosystem created by the program led to new initiatives being explored after it was concluded.
- For example, Archistar, Peclet Technology, Growback and Giraffe Technology, have all engaged in discussions with various State agencies and local councils to further explore applications for their initiatives.
- As smart place thinking becomes more embedded across Government the opportunity flow for these companies and the sector will increase further.

Testing new ideas through market engagement

The Pitchfest test and trial process provided a great opportunity for new ideas to be assessed for their viability and ability to scale.

Outcomes of the test and trial are detailed in Table 2.

Table 2 – Pitchfest trials

Company	Smart Western City Program Theme	Sponsor	Trial Scope	Trial Outcome
BIRDI	Local jobs / Work from home	Campbelltown City Council	Drone swimming pool audit and asset management assessments	Campbelltown City Council are currently using the results of the trial to develop a business case for expanding the scope of using drone capture in audit and assessment.
Growback	Data sharing	Department of Planning, Industry and Environment – Greener Cities Liverpool City Council	Using IoT to monitor and manage tree health and develop a dynamic tree register	Nine trees deemed of significance by the Liverpool City Council were identified for spatial data association and tree health monitoring. The trial is on hold due to COVID-19 but will run for 12 weeks and data will be federated to the NSW Spatial Digital Twin.
One WiFi	Smart Public Spaces	Department of Planning, Industry and Environment – Smart Places Wollondilly Shire Council	Providing connectivity to a park and gaining data insights	The trial will run for six months and will demonstrate the viability and utility of smart poles and infrastructure in a recreational area (Telopea Park, Buxton), to increase the experience of a public space for visitors, understand park usage and improve operational efficiencies for council maintenance staff.
The Mobile Apps Man	Community Engagement	Campbelltown City Council	Augmented reality (AR) development approvals	The trial gave Campbelltown City Council a low-cost opportunity to try out mixed reality development feedback, with AR being used to test designs with stakeholders.
VAPAR	Smart Planning and Management	Sydney Water / Fairfield City Council / Liverpool City Council	Using Artificial Intelligence of CCTV / video feeds to assess pipe conditions and defects	This trial was used to assess: Improved efficiency and accuracy of assessing assets and supported-maintenance backlogs Improved fault detection – minor defects, which are key for future and predictive maintenance Potential for quality improvements on current capabilities and operational efficiencies Sydney Water is looking to continue to use the system to augment existing work.
WBS	Smart Public Spaces	Sydney Water	Emergency sign IoT mesh network	Sydney Water intend to test the WSB IoT meshed network to test underground connectivity in a treatment plant and the trial is planned to commence following easing of COVID-19 restrictions.

The case for investment

Smart Western City Program Strategic Business Case

A Strategic Business Case was developed and has been assured to assess the case for investment.

The Strategic Business Case was informed by the market engagement and was independently costed to demonstrate the economic case for the development of the Smart Western City Program.

Four geographic options for deploying smart place initiatives were developed:

- **Maturing City** – Introduction of the smart technologies, discussed below, as pilots in a portion of the Aerotropolis. This option would cover five per cent of the Aerotropolis and is greenfield only.
- **Smart City** – Deployment of the smart technologies in all greenfield areas of the Aerotropolis only.
- **Connected City** – Deployment of the smart technologies in the whole of the Aerotropolis and the Western Parkland City town centres.

- **Seamless City** – Deployment of the smart technologies across the whole of the Western Parkland City.

Against these geographic options a range of increasing smart technology stacks were applied to develop the different Strategic Business Case options and is detailed in the Figure (5) below:

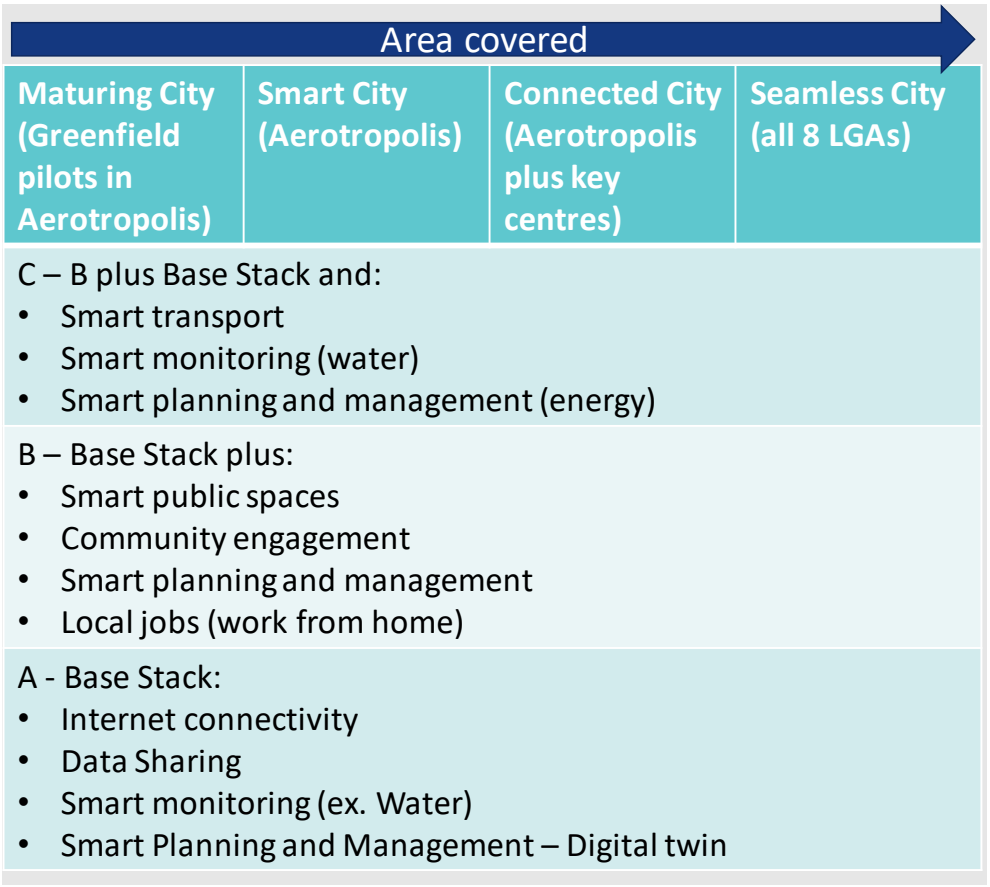


Figure 5: Strategic Business Case options

The Strategic Business Case demonstrated a strong economic case for investment and that the greater the technology stack and broader the geographical scale, the higher the return on investment.

Smart Western City Program Investor Assurance progress to date

The Smart Western City Program is subject to the NSW Government Infrastructure Investor Assurance Framework.

Gate 0: Go/ No Go

The Gate 0 Review focuses on the definition of the problem to be solved, the proposed project's alignment to government policy/strategy and the delivery agency's plan to take the project forward. The Smart Western City Program passed Gate 0 through the NSW Government's commitment to the Western Sydney City Deal.

Gate 1: Strategic Alignment

This gate assessed how well the Smart Western City Program had analysed a range of options to meet the service need and maximise benefits at optimal cost. Gate 1 was passed in late February 2020.

The results of the Gate 1 review were:

- The Smart Western City Program was given an overall HIGH level of confidence that the project is being effectively developed and delivered in accordance with the Government's objectives.
- The INSW Review Team gave the following Key Focus Areas (KFAs) of the Smart Western City Program a rating of STRONG: Service Need, Value for Money & Affordability, Sustainability, Stakeholder Management, and Asset Owner's Needs & Change Management.
- The INSW Review Team gave the following KFAs of the Smart Western City Program a rating of SATISFACTORY: Governance and Risk Management.

Smart Western City Program Investor Assurance next steps

As well as the quarterly reporting required of a project or program with a Tier 2 risk rating, the Smart Western City Program is required to pass through the Gate 2: Business Case gateway review. This gate focuses on how well the Smart Western City Program has proven its preferred option best meets the service need and maximises benefits at optimal cost.

The INSW Review Team recommends that the focus of the Gate 2 Review should be:

- The detailed commercial model developed by Department of Planning, Industry and Environment and advisors for the Final Business Case
- Confirmation that the Final Business Case clearly identifies both the capital and recurrent exposure to the NSW Government, through a detailed Financial Impact Statement
- Updates to the Project Risk Register and Risk Management Plan with a specific emphasis on technology, revenue, and implementation risks
- Confirmation that the Final Business Case clearly identifies the specific handover points and the associated change management processes for projects comprising the agreed Program scope and commercial model
- Confirmation that the Final Business Case presents an appropriately resourced implementation Project Team.

Program design

The Smart Western City Program envisages the Western Parkland City as a digitally enabled, 22nd century, connected place.

The Program has been shaped by addressing some key questions outlined in Figure 6.

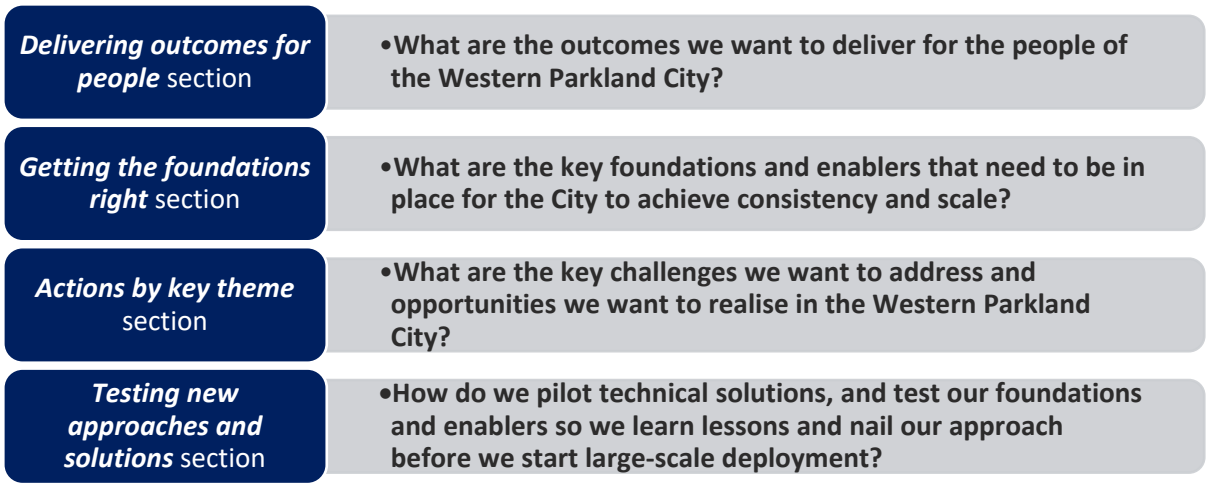


Figure 6: Outlines key questions used to shape the Program

The Program acknowledges that delivery of this city will take many years and decades and needs to be structured to allow for new solutions to be introduced, tried, tested and validated before they are scaled, and bigger investments made.

As a result, the Program sets out the full ambitions of the digital City and verifies the economic case for this investment through a Strategic Business Case; and details a 24-month plan to set the wheels in motion (see ***setting the wheels in motion – 24-month work plan*** section).

The 24-month plan:

- identifies actions and pilots that will allow us to establish great program foundations and new partnership models
- tests and verifies these foundations and enablers through pilot delivery.

Pilots will also help address challenges and opportunities specific to the Western Parkland City, responding to the innovation themes.

The 24-month plan will build the evidence base and establish the best approaches for the full-scale rollout of the Smart Western City Program, which will be assessed through Final Business Case/s at the end of this stage.

Delivering outcomes for people

The Smart Western City Program is designed to deliver for the people of the Western Parkland City, delivering solutions to leverage the technologies available today, while setting up for investment in future solutions.

The Program will deliver outcome related to:

- Productivity and economic growth
- Social inclusion
- Environmental sustainability
- Liveability.

Table 5 provides details on how the Smart Western City Program will deliver against these outcomes.

Outcomes	Objective	How the Program can achieve this
Productivity and economic growth	Ensure that the Western Parkland City is globally competitive, attracting private sector investment and business through the implementation and integration of smart technologies through the city's ecosystem.	• Increased internet and mobile connectivity will contribute to productivity and economic growth. This will be achieved through the initiatives under the *Internet Connectivity* and *Smart Monitoring* program themes. • Smart work hubs will provide an environment for new businesses and skilled residents a place to work closer to home. This initiative, and others supporting City-centric job opportunities, are included under the *Local Jobs/ Working from Home* program theme. • Smart energy technologies will optimise efficient energy usage, in-turn reducing costs of energy bills for the community and businesses. Initiatives under the *Smart Planning and Management* program theme support this outcome. • Technology-enabled safe public spaces, supported by the initiatives under the *Smart Public Spaces* program theme, will attract business, residents and tourists.
Social inclusion	Ensure digital exclusion is addressed, improving digital literacy and including all Western Parkland City residents in the smart city.	• Digital literacy programs for businesses and residents will help close the digital divide and allow greater participation in the digital economy by City residents. These initiatives are driven through the *Community Engagement* and *Local Jobs/Working from Home* program themes. • More mobility options and transport equality across the City, supported through the *Smart Transport* program theme, will provide greater access to job opportunities for socio-economically disadvantaged residents. • Digital technologies will make it easier for residents to engage with government services, City activities and outcomes and will help helping communities stay informed. This is supported through the initiatives under the *Community Engagement* program theme. • *Smart Planning and Management* program theme initiatives will encourage community engagement across a wide range of City planning and development activities, driving increased public participation and acceptance of development within the City.

Outcomes	Objective	How the Program can achieve this
Environmental sustainability	Drive environmental sustainability by utilising smart technology and data analytics to manage natural resources and focus on environmental, air and water quality. Support key outcomes of the NSW Circular Economy Policy, Net Zero Plan Stage 1: 2020-2030 and the NSW Water Strategy and draft 20-year Waste Strategy for NSW.	• Smart technologies will provide better information and insights on energy usage patterns, informing policies and plans to reduce energy consumption and negative environmental impacts. This is driven by initiatives within the *Smart Monitoring* and *Smart Planning and Management* program themes. • Smart technologies, such as environmental sensors will help detect the temperature, humidity and air quality and visibility in urban areas allowing proactive measures to protect people's health and safety to be implemented. The requirements under the *Smart Monitoring* program theme supports this outcome. • Data from environmental sensors aggregated and analysed will provide real time insights on the environment, disaster detection and risk assessment to help in fast communication and critical event response. *Smart Monitoring* and *Data Sharing* program themes support this. • Smart water monitoring solutions, supported through the *Smart Monitoring* program theme, will support water asset maintenance, contributing to water efficiency. • Smart solutions in the *Smart Transport* program theme support the NSW Government goal to move towards net-zero emissions by 2050. This includes digitally driven traffic management systems to reduce congestion and innovative transport solutions such as electric, connected and automated vehicles.

Outcomes	Objective	How the Program can achieve this
Liveability	Deliver enhanced quality of life for Western Parkland City residents through purposeful use of smart technology and data to ensure better decision making around city operations, safety, convenience and time.	• Safe, inclusive and innovative public spaces will drive greater community engagement and promote strong cultural and artistic participation. *Smart Public Spaces, Community Engagement* and *Smart Monitoring* program themes all work towards this outcome. • *Smart Monitoring* program theme initiatives to support the monitoring of the natural and built environment will allow better decision making on the sustainability and resilience of the Western Parkland City. • Smarter transport services, driven by initiatives under the *Smart Transport* program theme, will ensure efficient, safe and accessible movement for people and goods across the Western Parkland City, working towards realising the vision for a '30-minute city' and giving people back time in their day. • Initiatives included in the previous Program Key Outcomes *productivity and economic growth*, *social inclusion* and *environmental sustainability* all contribute to delivering an enhanced quality of life for Western Parkland City residents.

Table 5 – Delivering program outcomes

Getting the foundations right

Regardless of the technology and smart solutions to be deployed across the City, the successful delivery of the Smart Western City Program will rely on strong foundations, applied consistently.

Some of the core foundations have already been developed by the NSW Government and can be applied immediately. This includes the NSW IoT Policy, the Smart Infrastructure Policy and the NSW Cyber Security Policy.

However, more needs to be done so the settings are right for the rollout of pilots and future scaling of smart places initiatives. The 24-month work plan will address these core elements and test them through pilot delivery:

- Consistent architecture
- Robust information and cyber security policies
- Open and available data
- Fast, reliable and affordable connectivity
- Outcomes-based delivery
- Customer acceptance.

Consistent architecture

Deploy an open and interoperable smart city engineering architecture and framework to guide sustainable and scalable implementation and deployment.

ACTION

A consistent architecture includes a structure that incorporates data inputs from all sensors and data generating devices and delivers functional interoperability between different technology providers and systems.

This will be imperative when the Smart Western City Program will be delivered by such a wide range of organisations, agencies and industry players.

This action will deliver outcomes for the *Smart Monitoring* theme and support outcomes under the *Data Sharing* theme to ensure data is accessible through standard machine formats (e.g. API) and follows common data standards and formats.

Robust information and cyber security policies

Develop and apply a Cyber Risk Management Framework, to apply to all projects and entities deploying and managing smart technologies across the City.

ACTION

With large-scale deployment of connected devices, the Digital Western Parkland City will be an irresistible target for malicious actors of all types.

As a result, precautionary actions are required from the outset and will need to be maintained indefinitely. This includes setting common taxonomies and frameworks across the Western Parkland City for government, state-owned corporations and partners to enable effective, interoperable and secure data sharing (based on the Gartner Inc. benchmarks for investment in Information and Cyber Security).

Entities will be responsible for managing their own cyber risk as usual. The Cyber Risk Management Framework will provide them correct and consistent principles to apply at all levels. At a minimum, the framework will define:

- The policies and best practices that should be adhered to.
- The types of projects which will be obliged to follow the framework and what level of cyber risk management is required.
- How to engage with the Cyber Risk Management process.
- Any processes required for risk evaluation and project approvals at various stages.
- How to integrate with stakeholder risk management processes.
- Requirements for ongoing cyber risk management after project delivery.

Open and available data

Use and augment the NSW data sharing platforms consistently across the Western Parkland City.

ACTION

NSW Government platforms, including the NSW Spatial Digital Twin and Data.NSW provide a centralised, consistent way to collate and aggregate data.

Use of these platforms across the Western Parkland City is consistent with the outcomes of the Western Sydney City Deal commitment C6, openly available datasets.

Specific work to ensure this approach is embedded across the Western Parkland City is called out under the *Data Sharing* and *Smart Monitoring* themes and points to the adoption of existing and planned policy developments under the *NSW Smart Places Strategy* and 2018 State Infrastructure Strategy.

This work is further supported through the continued development of the NSW Spatial Digital Twin under the Program's *Smart Planning and Management* theme.

Fast, reliable and affordable connectivity

Deliver key actions from the *Internet Connectivity* and *Smart Monitoring* themes to ensure the digital plumbing for the city is in place to support smart City outcomes.

ACTION

This is critical for the productive, sustainable and resilient growth of the Western Parkland City and acts as the 'digital plumbing' to support smart solutions found under the other key themes.

Coverage needs to be comprehensive, high quality and secure, and able to cater to both brownfield and greenfield areas.

The *Internet Connectivity* and *Smart Monitoring* themes detail the connectivity requirements, like reliable 4G/5G coverage across the City, high quality broadband networks to residential, employment and education lands, public Wi-Fi in all town centres and public open spaces and city wide IoT connectivity (through a low power network).

Outcomes-based delivery

Establish criteria for pilot selection and measurement, ensuring data and insights are captured across the design, delivery and operational phases to develop an outcomes-based delivery framework for future scaling investments

ACTION

A focus on outcomes is needed to stimulate innovation and partnerships, rather than setting a prescriptive product-based processes to procure and deploy smart solutions. Investment will need to be evidence based, with roll out decisions based on business cases.

This includes a ‘System of Systems’ approach, where every investment in a new connected technology, even on small projects, is viewed as one component of a holistic system that is used to drive outcomes.

By using this approach for investments across the Western Parkland City, all new investments will contribute to the future connected state consistently. In addition, the rollout of devices and solutions can be staged over time – enabling more informed and evidence-based decisions and benefits as more systems are connected.

Community acceptance

ACTIONS

Deliver the NSW Smart Places Customer Charter and Data Protection Policy.

Engage, test and refine community acceptance models through smart places initiatives, including 5G trials to ensure the digital future envisaged for the Western Parkland City.

Grow community digital literacy.

Community acceptance and support for technology solutions is pivotal to the success of smart places delivery.

The NSW Government is committed to addressing community concerns and ensuring that smart places programs like the Smart Western City Program are responsive to these. A Community Charter will be developed in the first six months of the program and will be tested with local communities in the Western Parkland City.

In part, growing community trust will be about ensuring cyber security is paramount and data protection and privacy provisions are in place, underlining the importance of other foundations and core elements.

Transparency in solutions deployment is also critical to gaining trust. It will be important for all organisations delivering the program to engage strongly with communities, understanding their needs and concerns and showcasing the ways smart solutions will deliver benefits for them.

Digital literacy programs will also help overcome scepticism and fear of new technologies. The more empowered people feel, the more positive they will feel about the benefits technology can offer.

Actions by theme

To identify solutions relevant to the needs and ambitions of the Smart Western City Program, eight innovation themes were identified (Figure 7).

These innovation themes were used to drive innovation ideas through the market engagement program (see *Co-creating the Smart Western City Program* section).

In this section, for each theme, the Program identifies:

- The current state and opportunities
- Outcomes to be achieved
- Relevant learnings from market engagement
- Actions required to deliver outcomes for the people of the Western Parkland City.

Figure 7 – Eight innovation themes for the Smart Western City Program

Internet Connectivity

Future customer experience

Robert has reliable access to fixed broadband and 4G / 5G internet to work from home and in his local area – it is one of his critical 'utilities'.

Robert feels good because he spends less time commuting and has used the extra time in his day to exercise. He isn't using his car as much – saving the environment and reducing his insurance bills. Robert uses the great internet speeds to access services provided by his local council and State government.

Key outcomes

(1) Fast, reliable and high-speed fixed and wireless internet connectivity across the whole city

- Promoting private investment and job creation, leading to more local opportunities and services to meet customer needs and supporting opportunities being delivered through the Western Sydney Airport and Aerotropolis.
- Enabling citizens to work and learn from home or in their community and seamlessly access a wide range of digital city services and real time information relevant to their lives, regardless of where they are.

(2) A Western Parkland City Internet of Things (IoT) network

- Enabling the rich deployment of connected sensors and devices across the city to create the data critical for a running a smart city.

(3) Building blocks for future seamless connectivity between systems and devices

- Creating the ability for automatic connection and seamless handover to any connectivity network based on best availability for each use type – including voice, high bandwidth data, low bandwidth data.

Current state and opportunities

Across the City, there are regions that currently experience slow, intermittent or unreliable internet connectivity (Deloitte, 2019, *Smart Western City Program - Strategic Business Case*). This level of disadvantage extends to the Western Parkland City's performance on the Australian Digital Inclusion Index (ADII), which measures access to internet, affordability and digital ability. The Outer Western Sydney area has an inclusion score of 58.4, compared to a score of 66.7 for Central Sydney (Roy Morgan, 2018, *Measuring Australia's digital divide – The Australian Digital Inclusion Index).*

The lower ADII in Western Parkland City shows a digital divide persists across different types of technologies across the following dimensions:

- **accessibility**: whether a digital service, via mobile or fixed connection, is available for use in a particular area, and data allowances
- **quality**: the characteristics of a digital service, including speed or reliability
- **choice and affordability (driven by competition)**: competition can provide a greater range of digital services for a cheaper price. A lower score shows less choice and higher prices for digital services.

- **digital inclusion**: the actual take-up and application of digital services by households and businesses and the attitudes, basic skills, and activities of individuals.

This digital divide:

- affects accessibility of services to City residents
- reduces business development and opportunity, and impedes economic growth and investment attraction
- hinders the deployment of smart and connected devices and open, real-time data sharing (see Data Sharing theme).

The DPIE Smart Places team have analysed Connectivity Demand based on research on drivers and forecasts.

Key findings include:

- Massive increase in devices connected–including higher capacity mobile broadband, M2M communications and IoT (drive by industrial and enterprise IoT)
- Massive increase in application usage, and
- Increasing use of high bandwidth applications and momentum growing for low latency use cases:
    - More immersive experiences (e.g. AR / VR becoming normalised)
    - More video and gaming content, including high end content (HD, 4K, 8K etc)
    - Specialised high demand applications (e.g. e-health, autonomous industry (e.g. construction, manufacturing, transport), labour augmentation)
    - Increasing business adoption of key technologies such as cloud computing, data and analytics, ML / AI and remote working and teleconferencing
- Wireless device may be the primary access point–in turn this will drive mobile traffic growth (bandwidth and speed), necessitating rollout of more mobile network which will offload to the fixed line network
- However, drivers of demand remain near term focus and do not capture a true 10 to 20-year view, e.g. quantum computing.

There is significant opportunity for the City to improve internet connectivity, by taking advantage of current and emerging technologies, providing greater levels of customer service to its residents and businesses and supporting deployment of smart and connected devices.

Such technologies include 5G, fibre optic connections, and low powered, long range Internet-of-Things networks, and all will enable faster data sharing and a greater level of reliability and connectivity across the region. The best outcomes will be achieved when coverage is comprehensive, high quality and secure, and considered early in the development of both brownfield and greenfield sites.

A key challenge in achieving seamless connectivity is the City's large geographic area with challenging terrain spanning both brownfield and greenfield areas. As a result, no single connectivity solution will cater to the diverse needs of the region. Rather, a multi-layered, 'system of systems' approach to internet connectivity is required.

Learnings from market engagement

- A coordinated radio frequency map and radio frequency plan should be developed to facilitate the roll-out of comprehensive network coverage.

- An integrated mix of high bandwidth (e.g. 5G) and Low Powered, Wide Area Network (LPWAN) layer
- Solutions should be encouraged for establishing connectivity across the Western Parkland City. These two technologies complement each other and can provide great value when deployed in tandem.
- Master-planning should be undertaken to determine optimal placement of connectivity infrastructure in both brownfield and greenfield areas to ensure uninterrupted coverage and limited public disruption.
- Connectivity providers should be engaged early to ensure coordinated and integrated development of connectivity master plans and deployment of connectivity infrastructure across the Western Parkland City, avoiding infrastructure duplication and 'shadow IoT'.
- The communities of the Western Parkland City should be engaged early to ensure community acceptance of new connectivity solutions, including 5G.
- Small-scale trials that leverage existing connectivity infrastructure should be deployed first. These can be learned from, improved and scaled.

Action plan

Action	Requirements to deliver key outcomes	Role of Government
IC1	Develop a long-term Seamless Connectivity Strategy and Deployment Roadmap	Joint – Commonwealth, State and Local - Policy and regulation
IC2	High quality broadband networks to all new residential developments. Recommend 1Gbps (symmetrical) minimum bandwidth in 2020; Minimum 100 Gbps (symmetrical) per premise in 2040.	Potential policy and regulation
IC3	Ultra-fast and secure broadband networks for employment, education precincts and city centres. Recommend 10Gbps (symmetrical) minimum bandwidth for business in 2020; 1Tbps (symmetrical) per premise in 2040.	Policy and regulation Potential investment
IC4	Provision of above ground, multi-utility smart pole base mounts and smart poles connected by fibre and power (renewable, where possible), and access to fibre and increased duct infrastructure below ground, including to street furniture to facilitate future connectivity needs ('poles as a service'). (Note this is directly linked with Smart Public Spaces).	Policy and regulation Potential investment
IC5	Embed 5G connectivity into the Western Parkland City from the start.	Policy and regulation Potential investment
IC6	Ensure reliable 4G /5G coverage across over 95% of the inhabited areas of the Western Parkland City, including essential service areas (e.g. water treatment plants)	Policy and regulation Potential investment
IC7	Promote improved visual amenity outcomes and enhance community engagement for roll-out of mobile networks.	Policy and regulatory

Action	Requirements to deliver key outcomes	Role of Government
IC8	Deep IoT connectivity (Low Power networks) with robust interoperability and open data sharing across the Western Parkland City (note this is directly linked with Smart Monitoring).	Policy and regulation Potential investment
IC9	Roll out public Wi-Fi in all town centre and public open spaces.	Local council policy and commercial agreements
IC10	High quality connectivity to disadvantaged and low socio-economic communities and schools across the Western Parkland City to promote social inclusion and support learning outcomes	Potential investment
IC11	Investigate satellite uplink and downlink locations in the Western Parkland City with radio quiet zones	Policy and planning – State government
IC12	Facilitate the development of a network of data centres including Edge Compute facilities as the scale of IoT and V2X rollout gathers scale	Planning and approvals/ regulation

Smart Monitoring

Future customer experience

Joan has asthma. Historically, she had trouble managing this, as it was hard to tell what the air quality was like outside. Her local area now has air quality sensors that send her live alerts and warnings on days where air pollution is higher than normal. Joan hasn't suffered a significant asthma event since this service was provided.

Key outcomes

(1) Real-time monitoring of the City's built and natural environment to promote and support resilient and sustainable environments, moderate impacts of climate change, respond to critical events, and operate integrated systems.

- Environmental sensor networks providing valuable insights into parameters like heat, air quality, soil quality, water, waste, weather, noise, congestion (traffic, people, parking etc)
- Real time and interoperable data from sensor networks
- Platforms to capture, exchange and use data securely and communicate and action information and insights.
- Citizens making informed decisions that impact their health, wellbeing and use of resources (such as water), using accessible, real time data
- Place and asset owners using data to plan, deliver, and maintain assets and infrastructure reducing costs and improving efficiencies.

Current state and opportunities

The Western Parkland City is exposed to extreme temperatures at both ends of the spectrum, heat island effects, natural hazard risks and (like all parts of Australia) finite water supply (Deloitte, 2019, *Smart Western City Program - Strategic Business Case*).

The City's climate coupled with the natural landscape create natural hazards such as storms and flash flooding. These natural hazard events create greater risk of injuries, deaths and lower productivity. They also place a strain on assets and infrastructure, utilities, and transport network.

Smart technology can help build the City's resilience to these environmental factors. Data from environmental sensors can provide real time monitoring of key parameters that can assist lead government agencies and place owners with their responsibilities concerning natural disasters and provide risk assessments that will help communities to prevent, prepare, respond to and recover from environmental events.

The temperature reaches of the Western Parkland City and climate variability result in increased energy usage (Deloitte, 2019, *Smart Western City Program - Strategic Business Case*).

The growth of the City will also create additional demand for water and energy and place increasing pressure on waste management.

The City can leverage smart monitoring solutions to make resource use more efficient and sustainable, reducing impacts on the environment and long-term climate outcomes. Smart water monitoring solutions, for example, have been shown to monitor quality water assets and reduce water consumption by 20 per cent on average (Deloitte, 2019, *Smart Western City Program - Strategic Business Case*).

Given the many platforms and offerings currently available, it is important that a holistic approach to Smart Monitoring solutions is considered during City development.

For comprehensive Smart Monitoring to succeed, comprehensive connectivity across the Western Parkland City will be needed (see the *Internet Connectivity* theme).

Existing levels of service

Council sensor networks

The Western Parkland City Sensor Network Project (Sensor Network Project) is delivering Smart Monitoring solutions.[1]

The Sensor Network project is being delivered by a group of councils and partners, deploying a shared, scalable sensing network across the Western Parkland City.

The sensor network will connect to the Internet of Things, enabling data sharing. Data will be used to enhance place-based planning, support more effective infrastructure planning and investment and communicate better with citizens.

The Sensor Network Project includes:

- Monitoring of heat and travel patterns during extreme heat events
- Smart lighting and smart irrigation in public areas
- Monitoring of air and water quality, traffic congestion, tourism traffic.
- A smart pedestrian project
- Building energy monitoring
- Heat sensing, with interventions to address urban heat being assessed.

The Sensor Network Project is creating jobs by providing a network that businesses can use and providing new data assets to drive innovation.

Sydney Water is supporting the Western Sydney Parkland Sensor Network Project both with IoT expertise and low-power network equipment. The gateways being installed will join The Things Network (TTN) and are being installed on Sydney Water or Council properties and offer both private and public LoRaWAN access.

Sydney Water smart monitoring

Sydney Water has installed more than 1500 sensors across its network and has been running IoT technology trials since 2017 to detect service faults before they impact customers. This includes sewer level sensors in high-risk areas and digital flow metres on customer properties.

The expansion of IoT sensing capabilities will provide Sydney Water with data to aid decision-making and to progress more use cases involving artificial and enabling cognitive automation.

Learnings from market engagement

- A standardised assurance process for data quality is needed.
- Vendors require access to government-owned sites and assets to install and roll-out the communication networks to support Smart Monitoring solutions.
- The Western Parkland City should be used as a testbed to develop standards and policies for communications networks and interoperable data platforms infrastructure. If successful, these solutions can then be scaled and replicated across the State.

[1] The Sensor Network Project is funded under the Smart Cities and Suburbs Program Round Two (2018) ($700,000 funding)

- Joint Venture commercial arrangements should be explored for the implementation of Smart Monitoring solutions.
- Small-scale trials of Smart Monitoring solutions should be deployed first, across one or two areas. These can then be improved and scaled across the rest of the Western Parkland City (and beyond).
- Investment is needed to build a culture of cyber security and sound data management. This should include a Cyber Security Incident response plan and capability including defined switch off authority and capability to disconnect some or all systems in the event of a cyber security breach.

Action plan

Action	Requirements to deliver key outcomes	Role of Government
SM1	Develop governance and operating model for deployment of smart monitoring networks.	Update existing Policy (IoT and Smart Infrastructure align) and regulation Department of Customer Service (DCS) to lead
SM2	Develop an open and interoperable smart city engineering architecture and framework to guide sustainable and scalable implementation and deployment. Outline architecture and requirements including: • Data acquisition layer • Network communication layer • Computing and storage layer • Data and services supporting layer • Smart application layer • Security and privacy protection system • Construction system • Operations and maintenance system • Identification system • Positioning system	Policy and regulation
SM3	Deploy environmental sensor networks, including heat, water (including potable and environmental) quality, air quality and pollution, tree health, soil moisture and condition in place-specific public and recreation spaces that are not already covered by pre-existing networks (BoM, SES, WaterNSW etc.). Data should be open and accessible.	Local and NSW Government investment
SM4	Deploy sensor networks to monitor place conditions including resource usage and servicing needs. Data should be open and accessible. Sensors should allow real time bi-directional connectivity as each use case requires.	Local and NSW Government investment
SM5	Secure IoT platform for collecting, storing and processing near and real time data from the sensor networks.	Policy Potential investment

Action	Requirements to deliver key outcomes	Role of Government
SM6	Urban control centre for Western Parkland City: • Centralised and federated views of operations, monitoring feeds and dashboard reporting • Analytic engine using Artificial Intelligence and machine learning for events prediction and actions recommendation • Drive efficient allocation of resources across council and agencies against required actions.	Local council and potential NSW Government investment
SM7	Embed smart solutions in affordable and social housing developments to assist with asset management of properties and living cost management for tenants.	NSW Government investment

Data Sharing

Future customer experience

Donna uses data collected through local sensor networks to help her work out when to open her café and how many staff she will need for each shift.

The NSW Government data portals provide her with great insights on how many people are passing through the park near her café and using the train station next door.

The changes Donna has made have increased her profit margins and provided three new jobs for local people.

Key outcomes

(1) Seamless and interoperable sharing of data across local councils, government agencies and partners in a safe, controlled, timely and secure way, protecting privacy, and providing Western Parkland City communities with world class public services.

- A common data sharing platform to open up previously inaccessible data, break down silos and enable new products and services to be created for community benefit.
- A cyber security and privacy protection system that addresses confidentiality, integrity and availability through authentication, authorisation, non- repudiation, user and role identity management, integrity, audit, security monitoring, incident response and security policy management.
- Place owners and makers using a rich evidence base of data fed by the eight Western Parkland City councils, State and Federal governments and other stakeholders across the region to drive decisions.
- Citizens and businesses accessing a single point of open data to make decisions.

This theme is aligned to the Western Parkland City Digital Action Plan – “Being effective with data” and “Being responsible with Data”.

Current state and opportunities

While it is important to ensure the privacy and security of data is not comprised, data sharing between, and within, government levels can improve business competition, drive efficiency and stimulate innovation through new products and services (Deloitte, 2019, *Smart Western City Program - Strategic Business Case*).

However, the current enabling technology infrastructure across government, coupled with the pace of change in technology, present risks of obsolescence or inoperability of smart solutions within the City. Currently, decisions on technology investment are made at an agency level, although given the interoperability requirements for smart city technologies, there is a high likelihood that collaboration will be required across agencies where it previously was not required.

For example, the narrow-band telecommunication network, also called Low Powered Wide Area Network, needs to be deployed to collect data from sensors. This requires all eight councils and state agencies (e.g. Department of Planning, Industry and Environment and Transport for NSW) to have a compatible network. A preferred approach would be for these organisations to select a common provider to simplify technology architecture, optimise integration and achieve economies of scale.

A further risk to the future inoperability of smart solutions across the City is the lack of applicable data regulatory standards that cut across Government at the state and local council level. For example, the NSW Cyber Security Policy only applies to NSW agencies and does not apply to state-owned enterprises or City's councils. This current use of different standards by different agencies creates risks to security and privacy of data. A more broadly applicable regulatory standard may drive greater coordination of agencies efforts, including cyber security as well as more compatibility of technologies.

Fostering a data sharing culture across the Western Parkland City, where place owners and government agencies are open and transparent with their data, will ultimately provide better liveability outcomes for City communities. The monitoring of key indicators in near to real time across system, agency and jurisdiction boundaries will promote more informed decision making and customer-focused services and solutions.

Learnings from market engagement

- Rather than procuring or developing a single end-to-end data sharing solution, a framework approach should be adopted whereby several best-of-breed solutions are brought together.
- These best-of-breed data sharing solutions should work optimally together and complement the NSW Government's existing capabilities through the Data Analytics Centre and the NSW Spatial Digital Twin.
- Small-scale trials of data sharing solutions should be deployed first, across one or two Local Government Areas. If successful, these can be learned from, improved and scaled across the remainder of the Western Parkland City.
- Ensure an agile approach is taken to the data sharing solutions framework, to ensure flexibility in meeting new needs and overcome new challenges when/if they arise.
- Robust data governance policies and protocols for the Western Parkland City should be developed, and a Data Steering Committee established to ensure data governance policies are understood and used across the three tiers of government. A common data taxonomy should be part of this.
- A review of skills and capability across all Western Parkland City Government agencies should be conducted to identify gaps. An up-skilling program and/or hired resources can be utilised to address any gaps found.

Action plan

Action	Requirements to deliver key outcomes	Role of Government
DS1	Common data standards and formats to minimise cost and complexity of data sharing and integration.	Policy
DS2	Conduct a review of skills and capabilities across all Western Parkland City with local councils to identify gaps.	Potential investment

Action	Requirements to deliver key outcomes	Role of Government
DS3	Enable data to be easily shared between government, industry and customers. Data from government devices and sensors is made available to all parties to stimulate innovation and insight development. Data sharing is coordinated, cross-jurisdictional and collaborative.	Policy
DS4	World class open data sharing and integration platform for access, sharing exchanging of all data made available, including real time sensor data - Data is access controlled, with different levels available for different customers/ partners. • Data is accessible through standard machine formats (e.g. API). • Data is viewable through easily customisable UI / dashboard.	Investment

Smart Planning and Management

Future customer experience

Jessica wants to buy a new home in the Western Parkland City. She has seen a new residential development is being assessed for planning approval and has been able to provide her feedback on the 4D spatial planning approvals platform.

Peter, who is delivering the new development, has used the 4D spatial digital twin to carry out community engagement and the required studies (e.g. traffic and flood impacts).

The approvals process is transparent and efficient. Peter's lower land holding costs means new homes are more affordable for buyers like Jessica.

Key outcomes

(1) Better planning, design, consultation, development, land use and maintenance outcomes using smart and digital tools.

- Digital twin technology to capture and display static, real time and predictive multi-dimensional spatial data. This can be used to model future simulations across any data layer available.
- Better infrastructure planning and delivery, operations and maintenance using digital twin technology.
- A publicly accessible Western Parkland City digital twin (using the NSW Spatial Digital Twin) to help government and developers engage transparently with the community on land use changes, the current built environment and development approvals.
- Virtual reality platforms for citizens to step into a proposed new building or environment and provide direct and real-time feedback to place makers and owners.

(2) Sustainable energy for Western Parkland City communities using smart solutions and increasing City resilience and moderating climate change impacts.

- Supports the Resilient Sydney Strategy and Net Zero Plan (Stage 1: 2020-2030).

Current state and opportunities

A pilot of the NSW Spatial Digital Twin has been deployed for the Western Parkland City.

This initiative upgrades the existing two-dimensional state map to a four-dimensional model (3D and time). This platform provides a digital real-world model of the Western Parkland City, capable of recording past conditions and visualising future scenarios.

The Spatial Digital Twin will enable better planning, design and modelling for the City's future needs. The platform will also provide a common data set for government, developers and City communities, increasing transparency.

Visualisation platforms and Artificial Intelligent (AI) enabled planning processes will lead to better management of development applications by the Government.

ePlanning, assisted by AI and better real time data collection, can reduce the consent timeframe of development applications by 11 days, which means that businesses can reduce their costs

associated with holding the capital required for development (Deloitte, 2019, *Smart Western City Program - Strategic Business Case*).

Through the Program, smart energy solutions can be harnessed to optimise the City's energy use, reduce demand on the main grid and provide alternative sources of power. Smart grids and sensors can optimise energy usage by determining most efficient sources of energy, minimising waste, helping the City move toward a carbon neutral future, reducing climate change impact and promoting more resilient and sustainable communities.

International examples show smart solutions can significantly decrease energy use and increase cost efficiency of infrastructure for businesses and community. For instance, smart energy technologies introduced in Amsterdam reduced costs of energy bills for residents by nine to 40 per cent. The City of Songdo's (South Korea) smart building solution reduced energy consumption by 30 per cent in each building, helping decrease operating costs for tenant businesses (Deloitte, 2019, *Smart Western City Program - Strategic Business Case*).

Learnings from market engagement

- Rather than prescriptive-based procurement processes, outcome-based processes are needed to stimulate innovation and partnerships.
- Infrastructure planning should always consider the customer. Customer journey maps are one suggested approach for this.
- An infrastructure masterplan that spans the entire Western Parkland City should be developed. This would include data on projected growth and density and be open to developers.
- Innovative procurement and partnership models should be explored to give industry the opportunity to present solutions that have not yet been available on the market.
- Innovative solutions to maximising the potential of under-utilised space, such as vertical farming, should be explored as the Western Parkland City develops and evolves.
- Small scale trials are needed to test partnership and commercial models as well as technology solutions. This will help find the optimal mechanism for maximising economic and community outcomes. Successful models can be scaled across the Western Parkland City (and more widely).

Action plan

Action	Requirements to deliver key outcomes	Role of Government
PM1	Continue to develop the Western Parkland City 4D spatial digital twin architecture and technology stack to enable the fusion of static, real-time and predictive data layers	Investment
PM2	Continue to build out data layers and infrastructure information contained in the NSW Spatial Digital Twin.	Investment
PM3	Centralise captured core data inputs such as LiDAR and photography for photo reality mesh into the NSW Spatial Digital Twin.	Policy Investment

Action	Requirements to deliver key outcomes	Role of Government
PM4	Aligned with ePlanning, implement planning reform solutions to further simplify the planning system and improve end to end efficiency and transparency, for example: • automating planning processes to enable real time development assessment • real time scenario modelling for optimal place-based planning outcomes • improved community engagement with virtual reality and 3D consultation platforms. • Blockchain solutions to accelerate better infrastructure and planning design and supply chain engagement and decisioning.	Investment
PM5	Encourage growth of third-party providers that participate in the planning value chain to add service value through linking to NSW Spatial Digital Twin and open data platform.	Policy
PM6	Support deployment of smart energy solutions by private sector and state-owned corporations, such as microgrids and advanced metering infrastructure.	Policy

Smart Public Spaces

Future customer experience

Vivienne is working from the park using the free public Wi-Fi. Her laptop and phone are running low on battery and she charges them inductively at a smart bench.

Afterwards, she walks home and sensor lights come on automatically to light the path. She feels safe knowing that the area is being actively monitored.

A multi-generational family is also at the park, taking advantage of its safe design to share in an evening meal.

Key outcomes

(1) Stronger and more liveable public spaces for our citizens using embedded smart technologies.

- Smart street lighting, CCTV and 'push to talk' emergency systems in public spaces, promoting citizen safety and helping reduce crime and other anti-social behaviour. This can help revitalise areas and drive night-time economies.
- Interactive smart screens around the CBD and tourist areas to help deliver smart and activated public spaces that improve community engagement and information sharing. These screens can also enhance the cultural experience, by celebrating the arts, history and languages of citizens.
- Digitally enabled furniture, such as smart benches, offering citizens services like chair cooling or heating, smart devices charging, Wi-Fi hotspot, LED light, smart sensors and smart screens. The flexible use of street furniture could contribute to deeper community engagement and use of public spaces.
- Smart bins and other smart waste and resource recovery solutions, promoting more efficient, effective and environmentally sound waste management, with the potential to support initiatives under the NSW Circular Economy Policy and planned 20-Year Waste Strategy.

Smart technologies will support delivery of NSW Premiers Priorities 11 and 12, to improve the quality of green public space and increase tree canopy across the City. Technologies will also help monitor and evaluate outcomes.

Current state and opportunities

Providing safe, inclusive and innovative public spaces, with strong cultural, historical and artistic participation is a proven way to attract residents, businesses and visitors. Research shows that poor safety in public places discourages investment, reduces businesses' competitiveness, and creates uncertainty for residents and visitors (Deloitte, 2019, *Smart Western City Program - Strategic Business Case*).

The rate of non-domestic related assaults per 100,000 population in the City ranges from 119.6 in the Wollondilly Shire to 474.5 in Penrith, with an average of 293 per 100,000 population for the City in 2018.

There is an opportunity to reduce crime in disadvantaged areas and increase community cohesion by introducing smart solutions in public spaces across the Western Parkland City. This could

include smart poles with connected CCTV cameras, movement-enabled lights, and assistive and interactive smartphone-based applications.

CCTV solutions in public places across South Korea, resulted in a 47 per cent drop in robberies and thefts in those areas (Deloitte, 2019, *Smart Western City Program - Strategic Business Case*).

These technologies can also lead to the improved amenity and use of public place, with people choosing to walk trips of short distances when they otherwise wouldn't.

Improving the amenity of public places through smart technology has the potential to make the City more attractive to international and domestic visitors. Interactive smart screens in tourist areas can provide wayfinding and other information to help the visitor experience.

Learnings from market engagement

- Master planners, developers and Smart Public Spaces solution providers need to be engaged early to develop a cohesive approach across the Western Parkland City.
- Existing regulation that seeks to create more sustainable public spaces should be promoted more widely. An example is the Environmental Upgrade Agreements (EUAs), which provide individual property owners and managers with help to deliver environmental improvements and maximise the energy efficiency of commercial buildings. EUAs require adoption by individual councils and currently none of the eight councils of the Western Parkland City have passed the resolution for EUAs.
- Policies such as the BASIX Index should be reviewed to provide clear requirements for developers regarding cost-effective low emissions outcomes for residential, commercial and public buildings across the Western Parkland City.
- Baseline standards for public realm surveillance technologies should be reviewed and updated in line with global best practice.
- A clear legislative framework should also be developed to govern the use of facial recognition technologies in the public realm.
- Joint Venture models should be explored with solution providers for operational expenditures of Smart Public Spaces projects.
- Smart Public Spaces solutions should be trialled on a small scale. Successful outcomes can be replicated and scaled across the Western Parkland City (and elsewhere).

Action plan

Action	Requirements to deliver key outcomes	Role of Government
PS1	Community that is aware and understands the use of technology to generate improved safety outcomes.	Policy Investment
PS2	Deliver better visual amenity outcomes despite increased deployment of technology (devices, sensors, communications equipment etc).	Policy and regulation
PS3	Public spaces designed to incorporate digital infrastructure above and below ground – including mobile telecommunications, IoT networks, fibre optic cable and power (Note: this is linked to and aligned under Internet connectivity through 'Poles as a Service').	Policy Potential Investment (linked to IC4)

Action	Requirements to deliver key outcomes	Role of Government
PS4	Public spaces to leverage smart solutions to promote tree health, greener public spaces and increased tree canopy coverage in line with the NSW Premier's Priorities 11 and 12. (Note: this is also captured separately and aligned under Smart Monitoring through 'deep environmental sensor networks')	Local and NSW Government investment
PS5	Improved safety, use and inclusion of public spaces, both during the day and night, through: • Deployment of relevant sensor and technology for real time monitoring of public spaces (such as video, usage, noise and asset monitoring) • Sensor networks should be incorporated into the planning of public spaces • Analytics capability linked to relevant operational centres, e.g. Emergency Service agencies and city operational urban control centre. • Collecting and analysing attendance, foot traffic and dwell time data in public spaces to support ongoing sustainability and programming of public spaces for place owners and relevant agencies.	Policy Investment
PS6	Use of digitally interactive and real time signage and screen solutions to improve citizen information flow and engagement (Note: this is also linked to some Smart Transport requirements).	Policy and regulation Potential investment
PS7	Overlay Augmented Reality systems, data and capability across Public Spaces	Policy and regulation Potential investment
PS8	Establish a working group across Government to navigate the legal implications and admissibility of the CCTV. The working group should also consider the interoperability of systems/platforms during design phase, with agreed specifications developed to enable expansion as required.	Policy and regulation Governance

Smart Transport

Future customer experience

Amit, an office worker in Campbelltown, has an important work meeting tomorrow. His smart alarm tells him the night before that it is predicted to rain in the morning so traffic will be slow, and he should consider getting up 15 minutes earlier.

Amit likes sleeping in, so he declines this option and his smart device instead suggests he pre-book a rideshare (carpool). Due to the number of people electing to ride share on a rainy day the traffic is better, so Amit makes it to his meeting.

Key outcomes

(1) Smarter transport services and solutions to allow people and goods to move efficiently and safely across the Western Parkland City, helping realise the vision for a '30-minute city'.

- Dynamic planning and routing of vehicles/road users and public transport using real time traffic and environmental data, increasing public safety and reducing commuting times.
- Mobility-as-a-Service solutions, including on demand transport options and integrated services to offer end-to-end trip planning, most efficient routing, booking, electronic ticketing and payment services across all modes of transportation, potentially public and private, within the Western Parkland City.
- A smart parking sensor network supplying real-time information about available parking in the City to residents via a mobile app, reducing traffic congestion in town centres and improving economic activation.
- Infrastructure for electric vehicles and future connected and autonomous vehicles.

Current state and opportunities

Legacy transport infrastructure is one of the more challenging factors when developing a Smart City. Congestion increases costs, constrains growth and impacts the health and wellbeing of communities.

Real-time information that helps dynamic planning and routing of vehicles, sensor networks on parking spots and smart traffic signalling can all contribute to managing congestion and improving people's mobility options, giving them time back in their day.

International research shows commute times can be slashed by up to 20 per cent using smart transport technologies. The Smart Western City Program Strategic Business Case assumes smart technologies can reduce travel times by 5.5 per cent.

New smart technologies can be embedded into the Western Parkland City's 'city-shaping transport corridors', 'city-serving corridors' and 'centre-serving corridors' to deliver on the NSW Government's vision for '30-minute cities'.

The NSW Government's *Future Transport Strategy 2056* sets a vision for an integrated network of these corridors across Greater Sydney, where people can conveniently access jobs and services within 30 minutes by public or active transport seven days a week.

Existing level of service

Traffic Volume Viewer

Transport for NSW introduced the Traffic Volume Viewer – an interactive map for people to browse and search available traffic count data in NSW, including non-council roads in the Western Parkland City. Data is available from 2006. The available data includes Annual Average Daily Traffic Volume counts, combined and by direction, and raw hourly counts.

Learnings from market engagement

- The speed of pilots and projects can be improved if procurement processes and procurement cycles are streamlined and shortened for smaller contracts.
- Smart Transport solutions should be trialled on a small scale, such as across one or two areas. Successful outcomes can be scaled across the Western Parkland City (and elsewhere).
- Government should review regulation of kerbside uses and micro-mobility options (like e-scooters).
- The Western Parkland City should be used as a site for connected and autonomous vehicle trials to inform regulation supporting safe commercial deployment.

Action plan

Action	Requirements to deliver key outcomes	Role of Government
ST1	Enabling data captured by / for transport needs (e.g. from CCTV, SCATS, real time transport information) to be accessible to support other themes and across government, such as Smart Public Spaces (e.g. CCTV feeds can be analysed for multiple outcomes, SCATS insights can help shape precinct planning)	Policy Potential Investment
ST2	Lower vehicle emissions by encouraging uptake of lower emissions transport solutions and promoting active transport	Policy Potential investment to enhance walkability/cycle paths
ST3	Public spaces, street side infrastructure (smart poles, street furniture, smart bus shelters etc) and transport corridors designed to accommodate for future system requirements (e.g. EVs, CAVs) and digital connectivity needs, including provision for future deployment of fibre and 5G	Policy Potential investment Local councils and Transport for NSW to include this in planning and specifications Specifications and standards to be taken from progress on IC4
ST4	Deploy sensors and cameras for real-time monitoring of the roads, movement data etc with associate analytic capability linked through to relevant transport control centres. (Note, potential for this to be combined with investments in Smart Monitoring / Smart Public Spaces as CCTV feeds can be analysed for multiple outcomes).	Policy Investment

Action	Requirements to deliver key outcomes	Role of Government
ST5	Deploy a smart parking sensor network and associated API to deliver real-time occupancy information: • Include local and state government parking assets • Seek inclusion of private parking operators • Link with existing app parking app developments, including park n pay to create a single parking solution across the Western Parkland City Ensure information is federated and accessible for other government and 3rd party services, such as journey planning	Local council and potential state investment
ST6	Test and trial a variety of smart transport safety infrastructure, e.g. adaptive signalling, smart speed bumps etc.	Policy and regulation Investment

Community Engagement

Future customer experience

Mattia doesn't speak great English and lives in Wollondilly Shire. Mattia is using the Western Parkland City central feedback portal to let government know there are potholes in her local street. The portal directs Mattia's request to the appropriate council.

The portal and forms are automatically produced in Mattia's preferred language. If Mattia rings for further assistance, the system already knows his preferred language and a translation service is made available.

Key outcomes

(1) Digital technologies making it easier for people to engage with government(s) and stay up to date with activities and outcomes.

- Online community feedback platforms facilitate simple and effective public participation, and adhere to the community's expectations around data gathering, privacy and the ethical use of data.
- Council and NSW Government provide a simple "tell us once" application for citizens to interact with government services and provide feedback, reducing duplicated effort and wasted time.
- Citizen-centric decisions are informed by Artificial Intelligence systems automatically analysing community feedback received through different channels e.g. community feedback platform, website, mobile app, social media to provide insights.
- Systems tailor communication channels and information to the individual, providing them with updates relevant to their likes and interests.
- Digital government services automatically deliver customers information in ways that account for language preferences and hearing or vision impairments.

Current state and opportunities

There are almost 20 government agencies across three tiers of government involved in delivering new infrastructure and services for the Western Parkland City.

Poor coordination across government could result in disjointed, costly customer experiences for the residents and businesses of the City. There is also a risk of "engagement fatigue" as changes take place across the City at a rapid pace.

Smart technologies are available to help manage these risks, and provide robust governance frameworks and consistent, unified and efficient government services.

The NSW Premier's Priorities and *NSW Beyond Digital Strategy* set out the ambitious goal to reform government services so citizens only need to "Tell Us Once" by 2023. This will alleviate a key pain point for people interacting with government.

New digital solutions, covering council and NSW Government can be tested and trialled in the Western Parkland City.

Existing level of service

Digitally enabled community engagement

Currently, councils are exploring smart ways to engage communities in decision-making and civic life. For instance, Wollondilly Shire Council live streams Council meetings – so residents can watch Council meetings from their homes.

Learnings from market engagement

- A cohesive working group across all three levels of government is needed to serve as the governing body for community engagement across the Western Parkland City, as well as the point of procurement.
- A standard, collaborative approach to community engagement should be promoted across agencies and councils, including the use of the NSW AI Ethics Framework as a foundational governing framework.
- Partnership opportunities with peak industry bodies and/or universities should be explored to scope the development of tools required for capturing and generating community insights.
- A centralised portal, which can serve as a one-stop-shop or 'front door' for community information, engagement and feedback should be created for the Western Parkland City.
- Community engagement tools and applications available through existing government enterprise agreements should be explored and assessed for suitability of scaling across the Western Parkland City.

Action plan

Action	Requirements to deliver key outcomes	Role of Government
CE1	Establish a working group across all three tiers of government to serve as the governing body for community engagement initiatives across the Western Parkland City.	Governance
CE2	Enhance existing communication channels (proactive and reactive) tailored to individual citizen needs and interests.	Investment
CE3	Provide customers a simple and integrated coordinated single point for city services (inbound and outbound, if possible) and management to log issues, service requests and manage services (integrated 'front door' service, accessible in a variety of ways –web portal, application, phone, messaging, community screens and in person).	Policy (Digital Action Plan) Service NSW/ Local councils

Action	Requirements to deliver key outcomes	Role of Government
CE4	Deploy a variety of digital community feedback platforms, via digital (app, web, phone etc) and physical means (e.g. screens, installations): • active channels which are community driven • community feedback can be used to complement public space monitoring and management • passive analysis via AI analytics of feedback, community media and social channels. (Note: development of feedback channels, should be linked to first requirement, physical engagement channel can be linked to smart public spaces).	Policy Service NSW/ Local council investment

Local Jobs / Work From home

Future customer experience

Leora is starting a new technology-based business selling supply chain tracking software she developed during her PhD. She works from one of the Western Parkland City's innovation labs, where she can share equipment and explore ideas to test and enhance them, as well as understand the latest thinking in analytics software. A co-worker in the lab suggests Leora try Lookr, an open source big data analytics platform, which speeds up her project.

Key outcomes

(1) Services for citizens to work closer to or from home and provide incentives for business to grow in Western Sydney

- Shared office spaces and start-up / innovation hubs developed close to residential areas and city centres across the Western Parkland City.
- Online training programs to improve the digital literacy of citizens, exposing them to new job opportunities across a digital Western Parkland City.
- Improved internet and connectivity to support more work from home opportunities (see *Internet Connectivity* theme).

Current state and opportunities

A greater level of socio-economic disadvantage in the City compared to other parts of Greater Sydney generates a set of customer expectations in relation to the type, level and quality of services, and availability of jobs.

Approximately 50% of City workers commute, on average, 23.5km to other parts of Greater Sydney. In comparison, only 9% of Eastern Harbour City workers do the same, with an average commute of 6.38km (Deloitte, 2019, *Smart Western City Program - Strategic Business Case*). This is just one aspect of the greater level of socio-economic disadvantage that currently exists in the Western Parkland City compared to other parts of the Greater Sydney region. These statistics indicate a need to transform the Western Parkland City to a more attractive place for investment, businesses and skilled workers, which will minimise the need to travel outside the region for jobs.

This level of disadvantage extends to the City's performance on the Australian Digital Inclusion Index (ADII), which measures access to internet, affordability and digital ability (skills, online activities, and attitudes toward digital technology). Parts of the City show a digital inclusion score of 58.4, compared to a score of 66.7 for Central Sydney (Deloitte, 2019, *Smart Western City Program - Strategic Business Case*). Compared to Greater Sydney, residents of the Western Parkland City cannot take as much advantage of new digital technologies and services. These technologies and services can unlock value for the City's residents and businesses and help drive economic growth and opportunity.

The Smart Western City Program can increase the digital literacy, capability and awareness of the Western Parkland City communities to improve their access to economic opportunities and address the digital divide experienced in the region.

Existing levels of service

Smart work hub

Smart Work Hub pilot was implemented in Penrith CBD in 2014 under the NSW Government's Smart Work Hub Pilot Program. The pilot showed a significant reduction in commuter times and distance for the users. It also demonstrated a wider potential user base, from small businesses and entrepreneurs to large corporations.

Other WCP Councils are currently exploring the opportunities and smart solutions for improving local jobs outcomes.

Learnings from market engagement

- Comprehensive connectivity coverage across the Western Parkland City should be established to attract business, investment and talent (see theme 1).
- Partnership opportunities with the Aerotropolis foundation partners should be explored and potentially leveraged for the resources and investment they have already committed in order to advance the creation of local jobs.
- Collaboration opportunities with the Multiversity stakeholders should be explored, including any programs targeted at skills for the jobs of the future.

Action plan

Action	Requirements to deliver key outcomes	Role of Government
JW1	Development of share / co-working spaces in each District Centre where people can work remotely, and access high quality office suite services close to their homes.	Policy Potential investment
JW2	Development of innovation lab (s) / 'Living Laboratories' in Western Parkland City to investigate and trial new and emerging smart place technologies as well as manage the pilots with the Program. Potential examples of new technology include 'Fibre Network Sensing' for real time data acquisition, Internet of Things and Artificial Intelligence.	Policy Investment in living lab Potential co-development with industry and / or academic sector
JW3	Encourage organisations deploying new digital technologies/solutions in the region to relocate or stand up offices/workspaces within the Western Parkland City.	Potential investment
JW4	Increase the digital literacy, capability and awareness of the community to improve their access to economic opportunities and address digital divide across the region.	Investment
JW5	Deployment of data-driven innovation hackathons events to empower citizens to create new ideas, products and services.	Local council coordination and investment

Action	Requirements to deliver key outcomes	Role of Government
	Note: Delivering on the broad array of digital investments, e.g. internet connectivity, data sharing, smart planning, smart public spaces etc will increase the attractiveness of business to invest in the region	

Testing new approaches and solutions

Establishing pilots

To start realising the benefits of the Smart Western City Program a range of potential pilot opportunities that could be deployed over the next 24 months have been identified in consultation with local and state government.

The long list of pilots includes initiatives that will:

- Support job creation and direct investment by government and industry.
- Create a core smart place capability that can be leveraged for future smart place deployments / outcomes.
- Can be scaled and / or learnings used to replicate for other places.
- Can be started in the next 6 to 18 months.

- Enable knowledge building and evidence to support the Final Business Case/s.

Potential pilots are grouped under key action areas:

- Rapid job creation
- Foundational smart places infrastructure
- Capability building

Pilot initiatives will be spread across the eight local government areas, subject to the relevance and specific requirements of each pilot and council and community needs and preferences.

Funding for priority pilots will be sought as co-investment partnerships with state agencies, local councils and other place owners seeking to drawn from the $45m Smart Places Acceleration Program. This process will ensure that any pilot proceeding has a clear owner, meets approved criteria and passes appropriate governance processes.

Potential pilot: Rapid job creation

Opportunity	Scope	Outcomes
Western Parkland City Living Lab	Create a Living Laboratory to investigate and trial new and emerging smart place technologies as well as manage the pilots with the Program. Such technologies include fibre sensing technologies, terabit networks, smart city cyber security and video AI. Once the concept is proven, there exists opportunity to deploy more than one lab across the Western Parkland City, creating a network of innovation centres, with different MOU partners as lead. A physical Living Lab will include co-working space in the facility, with the option to include accelerator capabilities for local start-ups, scale ups and emerging businesses. The facility will have a suite of connectivity solutions to support the Lab's work. These will include high capacity broadband networks (mobile and fixed) and Internet-of-Things networks. Linked to requirement JW2	• Drive direct job growth through the lab set up and operation • Job creation potential through growth of lab initiatives, including export opportunities • Potential value creation from Lab initiatives supporting localised manufacturing • Direct investment in a community facility • Linkage with WCAA foundation partners and multiversity
Western Parkland City Smart Library	This pilot will leverage existing government assets in new ways to provide a space for local start-ups, businesses, and citizens to work, network and exchange ideas to foster a culture of innovation and entrepreneurialism. The Western Parkland City Smart Hub Pilot will rejuvenate a City library (TBC) to provide services fit for a digital Western Parkland City. Services will include co-working space with access to high-speed broadband and a 'digital makerspace' for learning and using new digital technologies such as virtual reality and 3D printing. Digital education programs for citizens including school children and the elderly will also be run from the Smart Library. Multi-model transport services, such as dockless e-bikes and e-scooters and car share spaces will also be included as services. Linked to requirement JW1	• Drive direct job growth through the set up and operation of the Smart Library • Job creation potential through initiatives arising from digital education programs, 'digital makerspace' and co-working space. • Direct investment in a community facility

Potential foundational smart place infrastructure

Opportunity	Scope	Outcomes
Smart environmental monitoring for Cumberland Plains Conservation Park and South Creek corridor	The smart monitoring networks across these two key regions will act as a flagship example of how smart technologies can be used to manage a complex combination of natural and built environments for better sustainability and resilience outcomes for both. A data visualisation dashboard with analytic capabilities will allow place owners and government agencies to make monitor the real-time condition of the Cumberland Plains and the South Creek corridor, as well as make better informed decisions around its management. Additionally, the networks can assist place owners with early detection of flash flooding, where not already covered by pre-existing monitoring solutions from the Australian Bureau of Meteorology, Water NSW or lead NSW Government combat agencies (SES, RFS). **Cumberland Plains** The Cumberland Plain Conservation Plan is part of the Government's commitment to delivering the Western Parkland City. It will protect the region's threatened plants and animals and support the needs of the community through the creation of conservation lands and green spaces close to homes. The development of the Cumberland Plain Conservation Plan presents an opportunity to showcase the potential impact sensor technology has in environmental sustainability and conservation. This Pilot will trial a network of sensor nodes monitoring key environmental parameters strategically placed across the Cumberland Plains. **South Creek corridor** South Creek flows through one of the flattest, hottest and driest parts of Greater Sydney. South Creek and its tributaries can form the basis for cool, green and attractive urban communities by retaining more water in the landscape and integrating waterways in the design of new neighbourhoods that also support the health and management of waterways. Green spaces around South Creek and its tributaries can be attractive locations for new communities and provide an amenity that supports liveability and productivity. This Pilot will embed environmental sensors throughout the South Creek corridor (natural and built environment, where necessary) to monitor in real-time environmental parameters relevant to the ongoing protection, conservation and enhancement of South Creek, its tributaries and the surrounding green space. Linked to requirements SM3	• Improved flash flood detection • Real-time, local weather, water, soil and air quality data • Improved conservation outcomes through data driven decision making • Infrastructure build • Drive job creation through network and sensor rollout. • Improve health outcomes for Western Parkland City communities • Directly supporting Premiers Priorities of Greener Public Spaces and *Greening our City*

Opportunity	Scope	Outcomes
Real-time monitoring of development environmental controls	Developers are required to demonstrate compliance with applicable legislation/guidelines around water and air quality and noise pollution, amongst other parameters potentially harmful to the health of citizens and the environment. Monitoring of these parameters to ensure compliance is typically undertaken manually and infrequently. Not only is the process labour intensive, but it risks environmental and human harm due to the lack of real-time data to assist in fast and effective remediation if the parameters exceed safe levels. This pilot will test the capacity of smart monitoring solutions to demonstrate the attainment of required environmental quality outcomes for developments in real-time, supporting proactive incident management and reduced risk. Linked to requirements SM3, SM4	• Enhance environmental conservation across Western Parkland City • Reduce noise and water/air pollution risk for communities during development phases. • Increased community acceptance of development • Labour cost savings for developers
Smart DA checker	This pilot will explore the feasibility of Artificial Intelligence (AI) and Machine Learning (ML) algorithms to undertake 'first pass' compliance checks on standardised development application (DA) submissions across Western Parkland City councils. Linked to requirement PM4	• Increase council efficiency with DA submissions • Reduce lead times for developers • Improve customer service of councils

Smart water uses across the Western Parkland City	Additional water will be required to enable increased greening, cooling and to service growth in Western Sydney. Infrastructure NSW estimates that an additional average 47 GL of water per year will be required to achieve the 'Parkland City' vision for Western Sydney. This pilot will trial a suite of smart water saving initiatives that focus on understanding household water use, promoting its reuse and driving smarter irrigation practices through smart technologies. **Smart water metering and end user analysis** This pilot will use water smart meters and develop technology to enable the analysis of end use consumption, to better understand how water is used within a home. This pilot will inform the review and refinement of current BASIX requirements for new homes and alternations. Smart meters (high resolution digital meters) with logging technology, enables water data to be collected at short intervals and then stored for analysis. There is currently limited ability to identify the water use patterns in the data, with expertise sitting within a few universities. The pilot will comprise the collection of water data, development of a tool to analyse the data and provide insights into modifications to BASIX that will enable significant future water savings. **Modular greywater treatment** Reducing the use of potable water for household irrigation, toilet flushing and clothes washing helps to defer the cost of additional water source infrastructure. Reusing water on site also negates the need for wastewater to be transported, often long distances, for discharge into waterways or the ocean. This pilot will test new onsite household greywater treatment technology, coupled with smart water metering technology, to reduce household potable water use and make additional water available for irrigation. Coupled with the Premiers Priority to plant many more trees in western Sydney, this pilot could test the concept of a household gaining a subsidised greywater treatment facility, in exchange for adopting one or more street or public land trees that is fed irrigation water from the 'host' household greywater system. **Smart irrigation** A thriving, liveable Western Sydney needs publicly accessible green spaces for local communities, trees for cooling and increased amenity. Additional water will be required to enable increased greening and cooling in Western Sydney. Much of the discretionary water use in urban areas is used outdoors. This pilot will test the use of smart irrigation systems that can drive the efficient use of water on private gardens, public gardens, parks and ovals. The pilot will use technology that has	• Increase understanding of how people use water within a home for better decision-making concerning water consumption forecasting, water restriction designing and reforming government policy. • Increased efficiency in water usage across a wide range of use cases. • Directly supporting Premiers Priorities of Greener Public Spaces and Greening our City • Drive job creation through pilot infrastructure build • Healthier coastline and waterways through reduced greywater release.

Opportunity	Scope	Outcomes
	recently become available to leverage available weather information to reduce water wastage. Linked to requirement SM4	
Smart greenfield development	Working in partnership with landowners and developers in the Western Parkland City to set up a flagship testbed(s) for trialling smart place technologies. This testbed will allow the eight councils of the Western Parkland City, the NSW Government and relevant parties to 'test and learn' with smart technology in a managed and geographically contained area. Such technologies could include smart poles, high-bandwidth connectivity including supporting 5G trials, smart transport and public space solutions (smart furniture, smart meters and energy solutions, adaptive signalling and signage) and IoT connectivity and sensor deployment. Linked to multiple requirements across the eight themes	• Direct investment • Drive direct job growth through site development and build • Increase area attractiveness for business investment and research sector • Direct jobs growth through the testbed set up and management • Facilitate a wide variety of outcomes including improved public safety, place use and amenity
Smart affordable and social housing	This Pilot will test the applicability of smart solutions embedded within affordable and social housing developments (either greenfield, if timelines align with 24-month work plan, or brownfield) to more effectively monitoring property assets and deliver reduced living costs to tenants. Linked to requirement SM9	• Reduced asset management costs for NSW Government • Reduced living cost for socially disadvantaged communities • Reduced water and power consumption, depending on smart solutions trialled. • Directly supporting Premiers Priorities of protecting our most vulnerable children, increasing permanency for children in out-of-home care and *reducing homelessness*

Opportunity	Scope	Outcomes
Smart kerbs	This Pilot will trial a digital inventory of kerbside space allocation and use for centres in one or more of the eight Western Sydney City Deal council areas (TBC). This will use a range of innovative technologies and digital systems to collect and collate data on kerb space allocation and usage from a range of sources, and support real time data from intelligent sensors, cameras and vehicle data. The pilot will gather digital records on current kerb space allocation (e.g. parking, bus stops, taxi and loading zones) for each road, by time of day and day of week. Related kerb usage data and roadside infrastructure such as signs, poles, and shelters could also be captured for added value, as could 'popup' elements such as kerb widening and cycleway trials. Linked to requirements ST3, ST5	• Reduce reliance on cars leading to less traffic, noise and air pollution, emissions and lower household and business transport costs. • Increase walking, cycling and public transport use. • Drive job creation through infrastructure build required for pilot • Improve asset utilisation
Smart public spaces	This Pilot will trial smart solutions across key public spaces within the Western Parkland City. These demonstration sites will showcase how smart technology can transform the traditional user experience (safety, amenity, value and use) and enhance to capacity of public space to support 22nd-century city living. Smart solutions embedded in the demonstration sites will vary depending on place owner and user needs, as well as geographical location and primary purpose of the space. Solutions may include: CCTV and 'push to talk' emergency systems; smart lighting; Interactive smart screens; digitally enabled furniture and smart device charging; and Wi-Fi hotspots. Linked to multiple Smart Public Spaces requirements	• Promote deeper community engagement and use of public space • Promote greater citizen safety and work towards reducing crime and other anti-social behaviour • Improve information sharing • Promote sustainable and resilient waste, energy and water management • Improve public space amenity
Smart city engineering architecture	This pilot will design and develop the open and interoperable smart city engineering architecture and framework to guide sustainable and scalable implementation and deployment. Linked to requirement SM2	• Enhance internal government capability

Opportunity	Scope	Outcomes
Data sharing and integration platform	The Western Parkland City Councils have selected a data-sharing solution for the Sensor Network project using both OpenDataSoft and Ubidots platforms which will be federated to the NSW Spatial Digital Twin. This is an Australia first that eight councils will use one system that can: • Enable the community to access open data and develop their dashboards within the system • Councils can bring the data to life by creating storyboards around the data and display summary tiles and dashboards to show impacts • Roll-up Council datasets into the Western Parkland view This pilot will test the opportunity to further scale and deploy this tool for Government to create a world class open data sharing and integration platform for access, sharing exchanging of all data made available, including real time sensor data Linked to requirement DS4	• Enhance internal government capability • Scale existing council development
Smart Lighting trial	Upgrade of street lighting to include smart controllers, smart meters and micro grids in key locations across the Western Parkland City. Opportunity to co-deliver with Department of Planning, Industry and Environment – Environment, Energy and Science Branch. Possible integration with below Smart Pole trial and smart greenfield development Linked to requirements PS5, IC5	• Infrastructure build • Enhance environmental outcomes • Improve City resilience and sustainability
Smart Pole trial	Develop the standards for the mounting plates, passive infrastructure elements for the provision of above ground, multi-utility smart poles connected by fibre and power. Test standards with Smart Lighting trial, smart greenfield development and 5G Trials Linked to requirement IC5	• Infrastructure build
IoT network	Secure IoT network (Low Power network) deployed across the Western Parkland City to enable the connectivity for a wide variety of sensors across a long range Linked to requirement IC9	• Infrastructure build
IoT platform	Secure IoT Platform for collecting, storing and processing near and real time data from sensor networks. Trigger actions and workflows based on data received. Linked to requirement IC9, SM2	• Infrastructure build

Potential pilots: Capability building

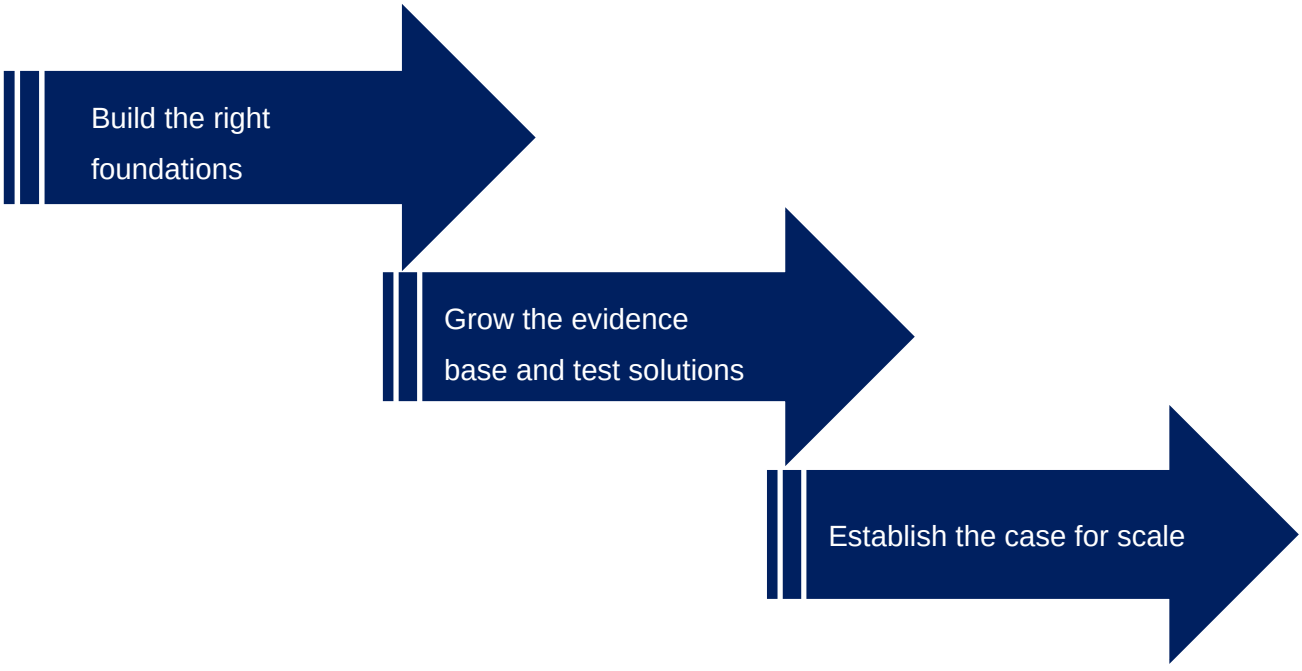
Opportunity	Scope	Outcomes
Building Western Parkland City's digital fitness	A digital Western Parkland City must address digital literacy as a core enabler to take advantage of smart place solutions. This Pilot aims to educate and upskill both citizens and government workers of the Western Parkland City with a series of digital literacy programs. Citizens will need a high level of digital literacy to capitalise on employment and liveability opportunities. Digital literate government staff is key to ensuring government can capitalise on opportunities, manage the procurement of smart solution and work with industry to provide the right operating environment for smart solutions to be introduced to the City. Linked to requirement JW4	• Increased business attractiveness • Increased digital usage • Increased digital capability • Increased government customer service • Attract and retain talent across the Western Parkland City workforce • Directly supports the Premier's Priority World Class Public Service
Disadvantaged and low socio-economic community connectivity and digital education trial	Upgrade and establish free community Wi-Fi, possible computer equipment and digital literacy training to low socio-economic and disadvantaged communities (including under-utilised schools in such communities) across the Western Parkland City. Connectivity will then be used to trial Department of Education digital education initiatives. Linked to Internet Connectivity requirements	• Drive direct job growth through the lab set up and operation • Direct investment in the community • Increase digital capability • Increased connectivity infrastructure in remote regions of the Western Parkland City • Increased digital capability • Increased digital usage • Building capacity within Aboriginal communities • Directly supports Premier's Priority *Increasing the number of Aboriginal young people reaching their learning potential*

Opportunity	Scope	Outcomes
Building resilience and sustainability with the NSW Spatial Digital Twin	This pilot will test the ability of the NSW Spatial Digital Twin to drive sustainability and resilience across NSW, by first focusing on the development of spatial layer and modelling algorithms on key liveability indices within pilot regions in the Western Parkland City. These may include climate change modelling, tree canopy visualisation, heat island modelling, water sensitive urban design and flood modelling for the Hawkesbury-Nepean catchment, green space proximity and demand, and transport proximity and active transport connectivity. Linked to requirement PM1	• Increased resilience and sustainability outcomes for the Western Parkland City • Potential to assist combat agencies in understanding and managing natural hazards such as flood and bushfire events. • Better decision-making concerning heat island effect and climate change impact.

Subject to funding an additional two more significant infrastructure capability workstreams could be established as part of COVID-19 stimulus recovery, but are beyond the current scope or scale of the pilots currently envisaged:

Opportunity	Scope	Outcomes
High capacity fibre deployment	Deploy fast and secure broadband networks for employment lands and city centres: • Partner with a telecommunications provider to provide high-speed and high-performance fibre optic data network and services • Focus on existing centres first and build in greenfield employment lands as they are developed	• Direct investment in the region • Increase area attractiveness for business investment • Infrastructure build of a core smart place enabler
Mobile network coverage: WPC blackspot eradication program	Facilitate reliable 4G coverage across over 95% of the inhabited areas of the Western Parkland City by providing 4G internet in blackspots or incentivising the mobile network operators to do so. This initiative would seek to align with similar programs at a Commonwealth or State level. • Fast, reliable and high-speed wireless internet connectivity is a key enabler to promote private investment and job creation • For citizens, access to broadband and 4G will enable them to work from home / remotely and seamlessly and access a wide range of digital services • Can be delivered through traditional blackspot grant funding mechanisms or test the market to provide via a wholesale network model • Utilise existing work under the 5G Strategy & Trial	• Direct investment in the region to reduce the digital divide (geographically) • Increase area attractiveness and improve the amenity of the place • Support the deployment and use of government digital service delivery (e.g. Tele Health)

Setting the wheels in motion – 24-month work plan



The 24-month work plan will deliver the evidence base for a Final Business Case to be developed and for smart solutions to be delivered at scale across the Western Parkland City.

It includes work to:

- Build the right foundations – drawing on actions from ***Getting the foundations right*** section
- Grow the evidence base and test solutions – drawing from the ***Testing new approaches and solutions*** section
- Establish the case for scale – by developing a Final Business Case/s.

Figure 8: 24-month work plan

24-month work plan

Build the right foundations

- Include Smart from the start requirements into the planning for Bradfield City Centre and other **planning instruments and engineering and design standards** for the City.
- Define the open **and interoperable smart city** engineering architecture and framework to guide sustainable and scalable implementation and deployment
- Develop a **Cyber Risk Management Framework** and apply to all projects and entities deploying and managing smart technologies across the City
- Use and **augment the NSW data sharing platforms** consistently across the Western Parkland City
- Trial the **delivery models** for the digital plumbing
- Test the NSW **Smart Places Customer Charter** (under development) and Data Protection Policy

Grow the evidence base and test solutions

- Establish the **Western Parkland City Living Lab** to run pilots and future market engagement
- Deliver selected **Pilots and proof of concepts**, including solutions best aligned to the Digital Action Plan, Smart Western City Program and 5G Strategy and Trials

Establish the case for scale

- Develop the **Final Business Case/s** which set out the investment for scaling of identified smart projects

To deliver the full extent of work in the Smart Western City Program would require substantive, long-term investment, with the role of Government and delivery models being flexible and as innovative as the solutions delivered. This includes exploring direct investment, procuring solutions “as a service” and partnership procurements with local councils and the private sector.

The initial stage of program delivery will be being managed within existing resources while a Final Business Case/s is prepared. This is required before significant financial investments by the State.

Funding for pilots will be sought from the Smart Places Acceleration Program, whilst funding to develop a Final Business Case/s will be managed within existing operating budgets.

Each pilot will be assessed on its own merit against the Smart Places Acceleration Program criteria and funding administered through the Smart Places Acceleration Program, which will ensure that appropriate governance and controls are in place to select and deploy the pilots.

Program governance

The overall governance arrangements to support Program delivery are detailed in Figure 9.

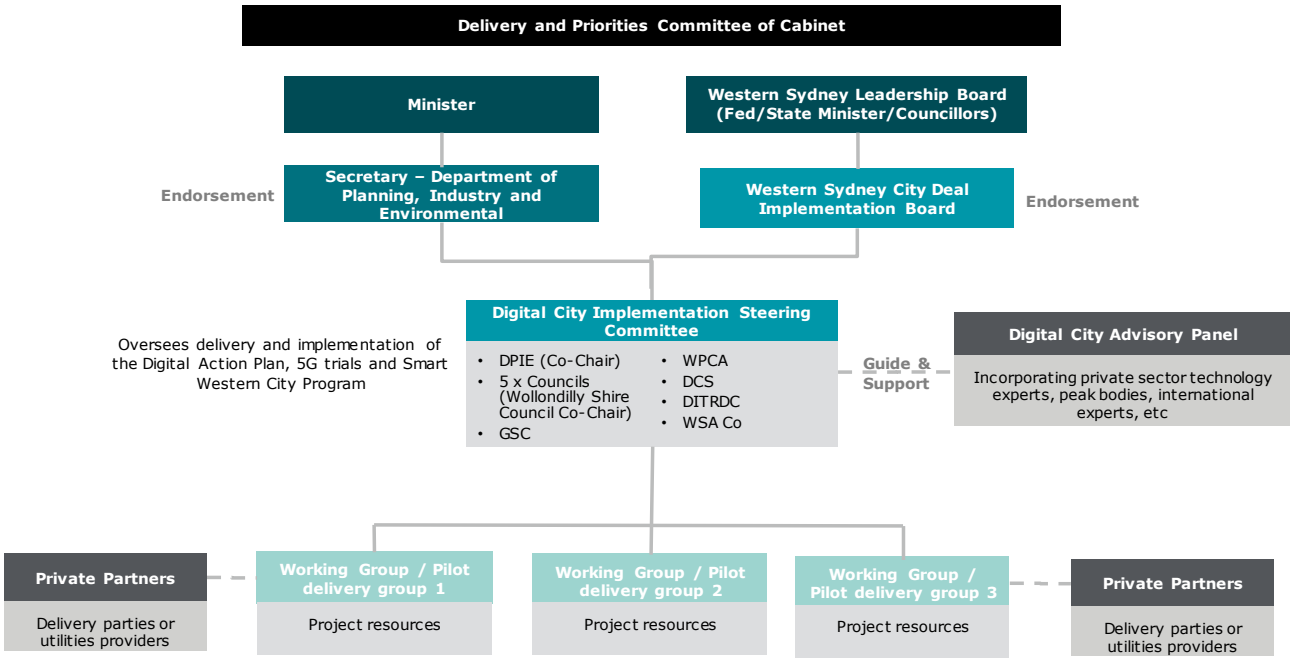


Figure 9: Governance structure for Smart Western City Program delivery

Digital Implementation Steering Committee

Development of the Smart Western City Program was supported through a tripartite Digital Commitments Steering Committee and separate local government and NSW Government committees.

To support the shift to implementation, a new governance committee, the Digital City Implementation Steering Committee has been established with a mandate to drive delivery.

The Implementation Steering Committee includes representation from the three levels of Government and members are responsible for:

- Providing input on behalf of their agency/ organisation to the development and implementation of policies, guidelines and plans
- Playing a coordination and liaison role with their tier of government to ensure appropriate dissemination of information and inputs for Digital City Implementation.
- Developing and driving necessary reform proposals and funding submissions to support the development and implementation of the Digital City program
- Proactively sharing information that is relevant to the development and implementation of the Digital City
- Making recommendations in relation to funding and resourcing requirements to deliver and implement the program.

Working groups

Working groups will drive work outcomes for specific actions and pilots identified in the Digital City Implementation Program. These groups will be governed and report to and through the Implementation Steering Committee.