Westmead South Smart City Study

Cumberland City Council Westmead South Masterplan

Prepared by Delos Delta for Cumberland City Council

April 2024

Acknowledgment of Country

Cumberland City Council acknowledges the Traditional Custodians of the land on which Cumberland stands, the Darug People, and pays respects to elders past, present and emerging.

We acknowledge the Aboriginal and Torres Strait Islander Peoples as the First Peoples of Australia.

Cumberland City Council also acknowledges the Aboriginal and Torres Strait Islander Peoples living in the Cumberland Local Government Area and reaffirms the important work with all Aboriginal and Torres Strait Islander Communities to advance reconciliation.

Contents

Delos Delta

This Study was prepared by Delos Delta, in collaboration with Cumberland City Council, to inform smart city considerations in the Westmead South Master Plan.

Executive Summary

Cumberland City Council have engaged Delos Delta to produce a precinct-specific Smart City Study (the Study) for Westmead South.
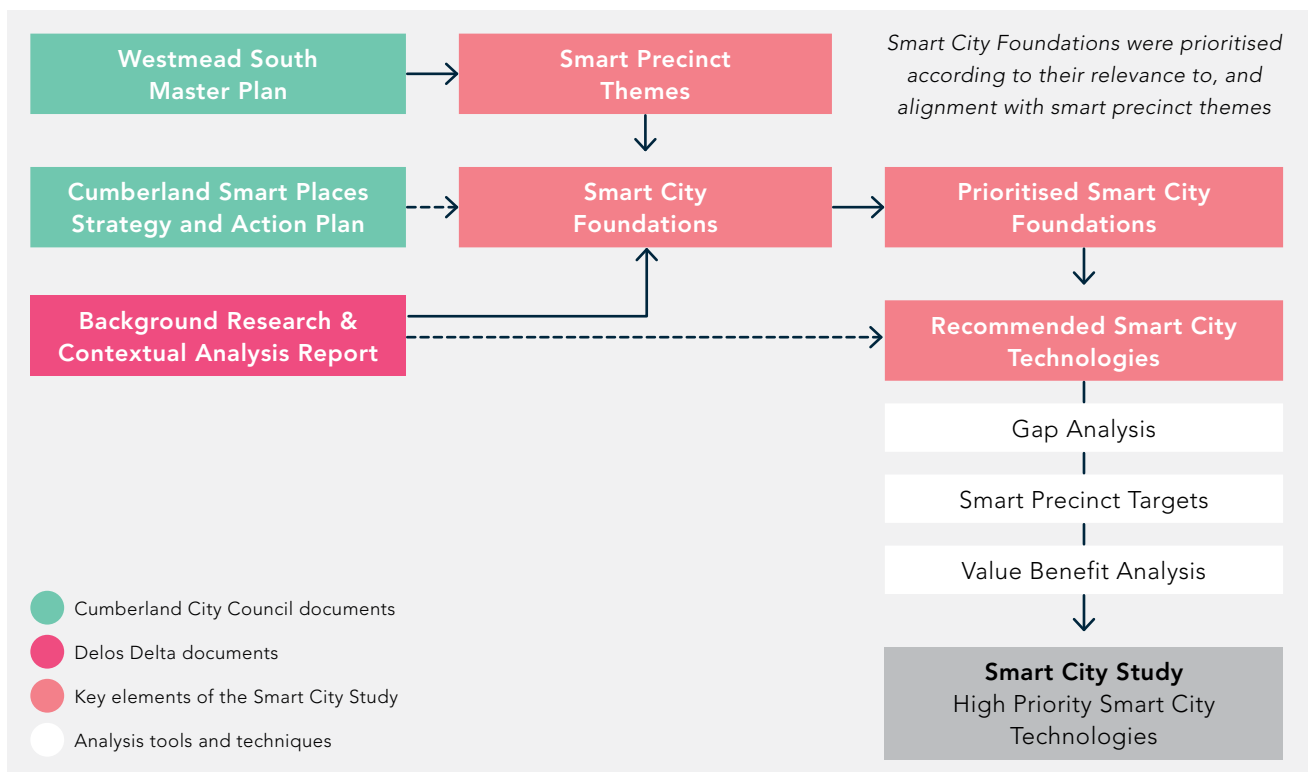
The purpose of the Study is to inform the application of broader smart places strategic thinking from the *Cumberland Smart Places Strategy and Action Plan 2023* (Smart Places Strategy), in Westmead South. The application of smart city foundations discussed in this Study may also support Council as they advance their smart places program throughout the City.

Study Approach

The approach taken by Delos Delta to develop this Smart City Study is outlined below, with key steps extrapolated for clarity.

Figure 1: Smart City Study Approach

Westmead South Master Plan → Smart Precinct Themes

Smart City Foundations were prioritised according to their relevance to, and alignment with smart precinct themes

Cumberland Smart Places Strategy and Action Plan ⇢ Smart City Foundations → Prioritised Smart City Foundations

Background Research & Contextual Analysis Report → Recommended Smart City Technologies

Gap Analysis

Smart Precinct Targets

Value Benefit Analysis

Smart City Study
High Priority Smart City Technologies

● Cumberland City Council documents

● Delos Delta documents

● Key elements of the Smart City Study

○ Analysis tools and techniques

Informing Documents

This Study was informed by the *Westmead South Master Plan (Master Plan)* and the Smart Places Strategy. It also leverages best practice research contained in the *Background Research and Contextual Analysis Report* (Background Report) prepared by Delos Delta, as well as additional research on precinct-specific smart technology trends.

This approach ensures recommendations for smart technology align with Council's vision for Westmead South and deliver maximum value to the community.

Smart Precinct Themes

The application of smart technology in Westmead South is grouped into four smart precinct themes, depicted in Figure 2.

As highlighted in Figure 1, these smart precinct themes are derived from the priorities and smart places of the Master Plan so that smart technology can be applied strategically throughout the precinct.

Figure 2: Smart Precinct Themes

Connectors and Spines | Open Green Spaces | Activity Nodes | Neighbourhoods and Communities

GOVERNANCE

Smart City Foundations

Smart city foundations are adapted from best practice principles identified in the Background Report. Smart city foundations are listed for each smart precinct theme, prioritised according to their relevance to the goals of the theme. A list of the smart city foundations, and the themes that they apply to, is provided below.

Table 1: Priority smart city foundations and their alignment across the smart precinct themes

SMART CITY FOUNDATIONS	SMART PRECINCT THEMES			
	Connectors and Spines	Open Green Spaces	Activity Nodes	Neighbourhoods and Communities
Community engagement and co-creation				✓
Identity and culture			✓	
Safety (physical)	✓	✓	✓	
Service personalisation				✓
Social cohesion		✓		✓
Wellbeing		✓		
Accessibility			✓	
Environmental management and sustainability		✓		
Resilience	✓			
Resource use and monitoring				✓
Multifunctionality			✓	
Real-time information	✓		✓	

Recommended Smart Technologies

Smart technologies recommended in this Study are listed below. These technologies are prioritised according to their ability to support the goals and objectives of key locations and their associated smart city foundations, and their alignment to the Smart Places Strategy. The key below outlines how each of these technologies have been categorised.

PRIORITISATION KEY

● Highly recommended, should have	● Recommended, could have	● Recommended, nice to have

The table also indicates where a recommended smart technology aligns to a direct action in the Smart Places Strategy, and its potential inclusion in a future smart Development Control Plan (DCP).

Table 2: Westmead South recommended smart technologies in priority order

Technology	Smart Places Strategy Alignment	Smart DCP	Priority
Fibre Optic Network Expansion	• Smart Communities • Smart People • Smart Spaces	✓	●
Smart Safety (CCTV)	• Smart Communities • Smart Services	✓	●
Smart Lighting	• Smart Communities • Smart Services	✓	●
Smart Poles	• Smart People • Smart Services	✓	●
Digital Wayfinding and Signage	• Smart Communities • Smart Movement	✓	●
Public Wi-Fi	• Smart People • Smart Economy	✓	●
Smart Furniture	• Smart Communities • Smart Spaces	✓	●
Smart Irrigation	• Smart Services • Smart Spaces	✓	●
Smart Parking	• Smart Communities • Smart Movement	✓	●
Smart Meters	• Smart Spaces	✓	●
Digital Services	• Smart Services		●
Open Data Platform	• Smart Spaces • Smart Movement • Smart Economy		●

Technology	Smart Places Strategy Alignment	Smart DCP	Priority
Electric Vehicle (EV) Charging Infrastructure	• Smart Movement	✓	🔴
Asset Monitoring with Artificial Intelligence (AI)	• Smart Services • Smart Spaces		🔴
Flood Monitoring Sensors	• Smart Spaces	✓	🔴
Tree Canopy Mapping	• Smart Spaces		🔴
Environmental Sensors	• Smart Spaces	✓	🔴
Place Utilisation and Smart Monitoring	• Smart Movement		🔴
Smart Bins	• Smart Services	✓	🔴
Digital Art	• Smart People • Smart Spaces		🔴
Micro-Mobility Transport Options	• Smart Movement		🔴
Traffic Monitoring Technology (with TfNSW)	• Smart Movement		🔴
Smart Outdoor Work Hubs	• Smart Economy	✓	🔴
Smart Cool Playgrounds	• Smart Communities		🔴
Digital Innovation Lab	• Smart Economy		🔴

Importance of Connectivity

Connectivity and networks include fibre, telecommunications, electricity, Internet of Things (IoT) and other local wireless networks. These components enable other smart technologies to perform their function.

Particularly, fibre connectivity enables more users and more data at higher speeds. This is critical for Westmead South as a smart precinct. As such, this Study recommends the expansion of foundational fibre connectivity as a critical enabler of other recommended smart technologies.

Introduction

Cumberland City Council have engaged Delos Delta to produce a precinct-specific Smart City Study (the Study) for Westmead South.

The Study closely considers Council's vision and key priorities for the precinct, as outlined in the *Westmead South Master Plan* (Master Plan), alongside reports by other consultancies engaged as part of the Westmead South Master Plan project. It also builds on internal stakeholder engagement outcomes and best practice smart city principles and benchmarks identified in the Background Report, to recommend the highest value smart city applications for the precinct.

Key components in the Study include:

- Review and analysis of key smart precinct trends
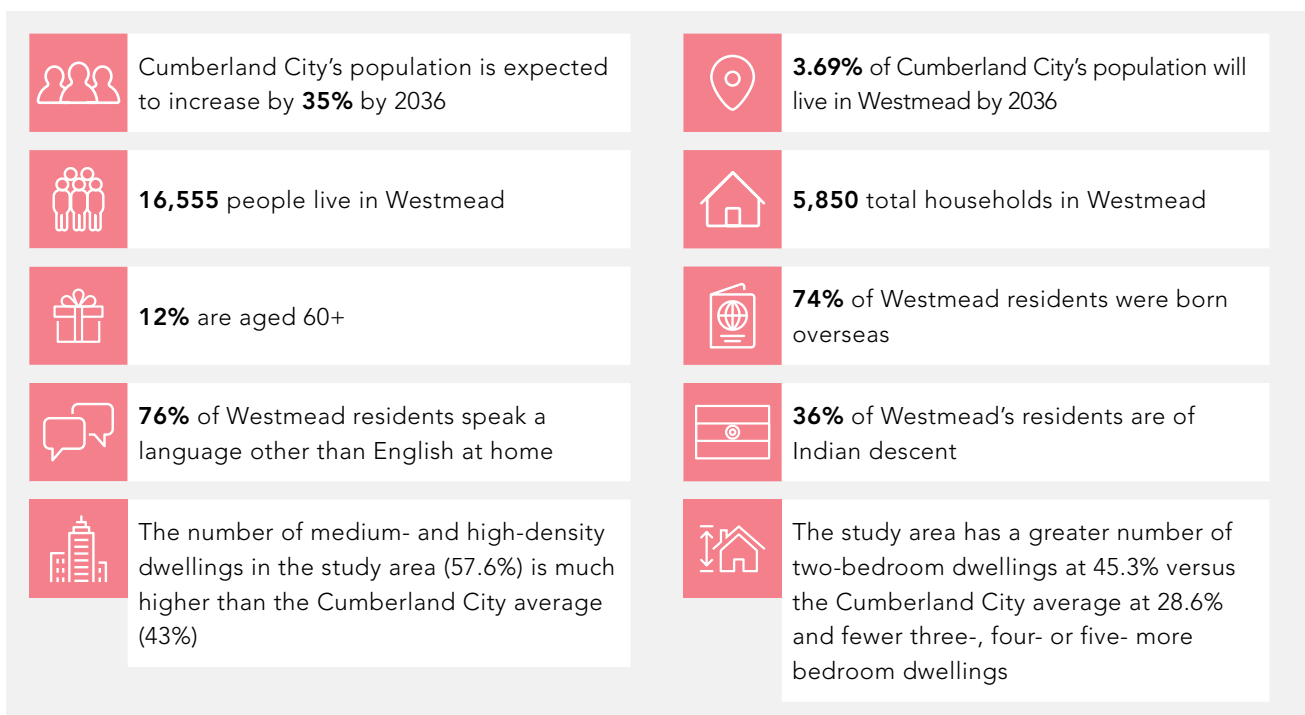- Westmead South smart precinct themes and recommended smart technologies
- Smart precinct targets
- Gap analysis of Master Plan to support smart city targets
- Value benefit analysis of select priority smart technologies

Westmead in Context

This Study acknowledges and builds on the swathe of detailed analysis undertaken to inform the Master Plan. However, the statistics noted below provide a small insight into the make-up of Westmead South as we consider how smart technologies are applied.

Reflective of the broader population in Cumberland City, Westmead South is a diverse and growing population. It is home to a comparably higher number of medium- and high-density dwellings reflecting the proximity to key travel routes.

Figure 3: Key demographic and economic indicators for Westmead South[1]

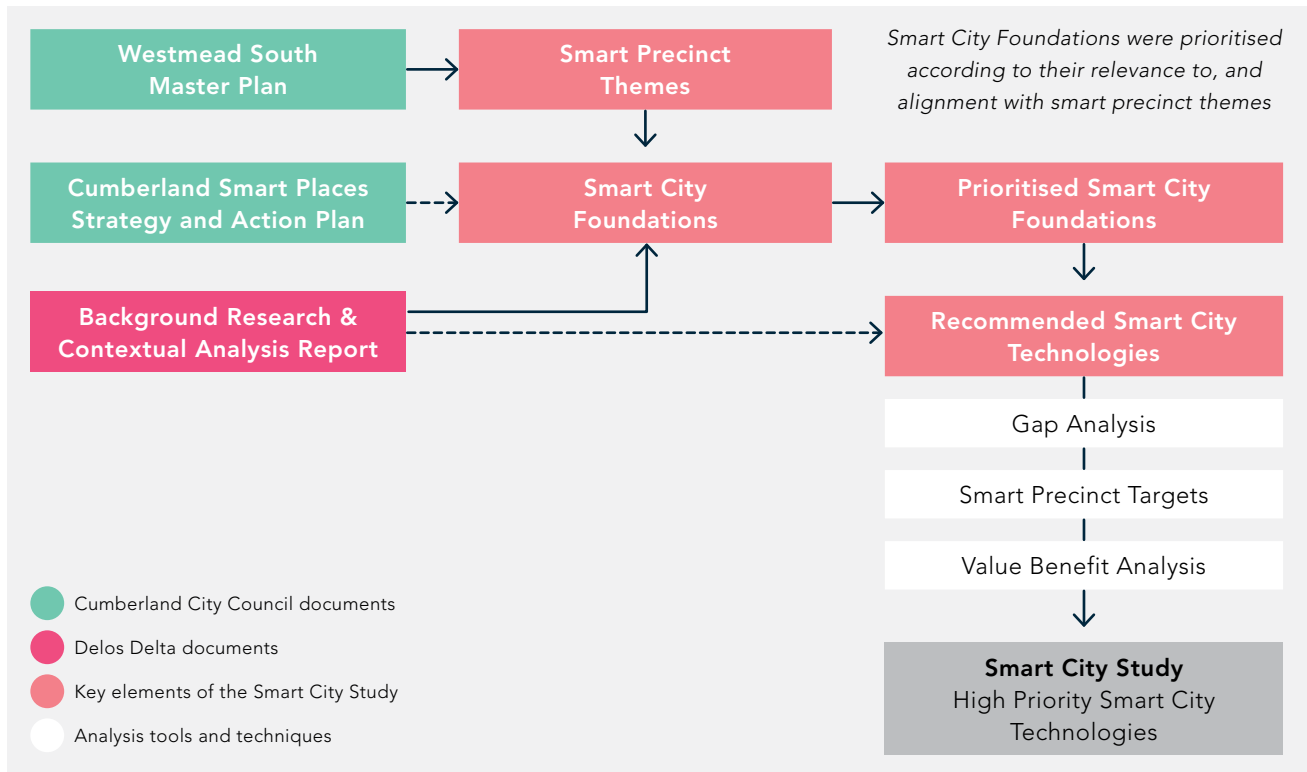|	
Cumberland City's population is expected to increase by **35%** by 2036	**3.69%** of Cumberland City's population will live in Westmead by 2036
16,555 people live in Westmead	**5,850** total households in Westmead
12% are aged 60+	**74%** of Westmead residents were born overseas
76% of Westmead residents speak a language other than English at home	**36%** of Westmead's residents are of Indian descent
The number of medium- and high-density dwellings in the study area (57.6%) is much higher than the Cumberland City average (43%)	The study area has a greater number of two-bedroom dwellings at 45.3% versus the Cumberland City average at 28.6% and fewer three-, four- or five- more bedroom dwellings

1. Westmead South Master Plan April 2024

Study Approach

The approach taken by Delos Delta to develop this Smart City Study is outlined in Figure 4, with key steps extrapolated for clarity.

Figure 4: Smart City Study Approach

Smart City Foundations were prioritised according to their relevance to, and alignment with smart precinct themes

- Westmead South Master Plan → Smart Precinct Themes
- Cumberland Smart Places Strategy and Action Plan → Smart City Foundations
- Background Research & Contextual Analysis Report → Smart City Foundations
- Smart Precinct Themes → Smart City Foundations
- Smart City Foundations → Prioritised Smart City Foundations → Recommended Smart City Technologies
- Gap Analysis
- Smart Precinct Targets
- Value Benefit Analysis
- **Smart City Study** High Priority Smart City Technologies

Legend:
- 🟢 Cumberland City Council documents
- 🔴 Delos Delta documents
- 🔴 Key elements of the Smart City Study
- ⚪ Analysis tools and techniques

Informing Documents

The development of the smart precinct themes and smart city foundations used in this Study have been directly informed by three key documents, two developed by Council (the Master Plan and the Smart Places Strategy) and one developed by Delos Delta (the Background Report). A breakdown of the elements from each document adopted in this Study is outlined in Table 3 overpage.

Smart Precinct Themes

This Study organises the key places and location characteristics from the Master Plan into four themes. This approach aims to support technology considerations as they apply to the most appropriate use case.

Table 3: Summary of informing documents and input into this Study

Document	Adopted Elements	Result
Background Research & Contextual Analysis Report	• Principles for best practice smart precinct development and operation, drawn from literature reviews, case studies, and relevant standards • Principles were organised across four areas: people, place, technology, and governance	The smart city foundations upon which this Study draws directly reflect the smart city best practice principles identified during background research and contextual analysis
Westmead South Master Plan	8.0 Master Plan Priorities: Priority 1 – Evolved Diverse and Affordable Housing, Priority 2 – Evolved Open Space and Public Domain, Priority 3 – Evolved Transport and Access, Priority 4 – Evolved Infrastructure and Facilities, Priority 5 – Key Places	The four key smart precinct themes, developed by grouping characteristics identified across the priorities and key places
Cumberland Smart Places Strategy and Action Plan 2023	Alignment with Cumberland City Council's vision for Cumberland as a smart place	The smart city foundations were reviewed for their alignment with the vision of the Cumberland Smart Places Strategy and Action Plan

Smart City Foundations

Smart city foundations are listed for each smart precinct theme. These foundations were prioritised according to alignment with the characteristics and priorities of each theme. The application of these foundations through actions and objectives outlined in the Smart Places Strategy was also considered in this process. This Study applies the foundations considered highest priority during this process.

Four enabling smart city foundations were also identified as critical to the success across all areas of smart city application in the Master Plan. The four enabling smart city foundations are:

• Connectivity and Networks
• Extensibility and Scalability
• Interoperability
• Quality and Reliability

Recommended Smart Technologies

Smart technologies recommended for each smart precinct theme are prioritised according to their alignment with the smart city foundations. Smart technologies considered to have high alignment with one or more of the smart city foundations are considered priority and are recommended to be pursued as such.

Cumberland Smart Places Strategy and Action Plan 2023

Smart technologies recommended in this Study are aligned to priorities in the *Cumberland Smart Places Strategy and Action Plan 2023*. Where a smart technology directly aligns to a specific action area this is indicated by reference to the corresponding smart places pathway.

Smart City Study: Conclusions and Recommendations

This Study recommends the application of the top six priority smart technologies noted in Table 4 (below) in Westmead South. These technologies have been prioritised based on their ability to advance Westmead South as a smart precinct, and support Council in its broader smart places agenda.

Future Smart Development Control Plan

Indication is made when a recommended smart technology should be considered for inclusion in the future smart Development Control Plan (DCP).

Table 4: Priority technologies for inclusion in Westmead South

Technology	Smart Places Strategy Alignment	Smart DCP	Priority
Fibre Optic Network Expansion	• Smart Communities • Smart People • Smart Spaces	✓	🟢
Smart Safety (CCTV)	• Smart Communities • Smart Services	✓	🟢
Smart Lighting	• Smart Communities • Smart Services	✓	🟢
Smart Poles	• Smart People • Smart Services	✓	🟢
Digital Wayfinding and Signage	• Smart Communities • Smart Movement	✓	🟢
Public Wi-Fi	• Smart People • Smart Economy	✓	🟢

PRIORITISATION KEY

🟢 Highly recommended, should have	🔴 Recommended, could have	🟠 Recommended, nice to have

Research Summary

The recommendations made in this Study are based on research into best practice policies and standards for precinct-specific smart place design, contained in the Background Report.

The Study also considers trends in the application of smart technologies in precincts across Australia, as relevant to Cumberland.

Best Practice Research

In this Study, best practice foundations for the application of smart technologies are based on findings from the Background Report. This research outlines principles, indicators, and best practice standards relevant to the precinct-specific design and implementation of smart technologies.

Best practice smart city foundations included in this Study are listed below, and can be considered across four broad areas.

Table 5: Smart city foundations identified through best practice research

PEOPLE	PLACE	TECHNOLOGY	GOVERNANCE
• Citizen-centric technology • Community engagement and co-creation • Gamification and activation • Identity and culture • Outcomes-based technology choice • Safety (physical) • Service personalisation • Social cohesion • Wellbeing	• Accessibility • Attractiveness • Environmental management and sustainability • Integration of digital and physical assets • Resilience • Resource use and monitoring	• Connectivity and networks • Data-driven decision-making • Extensibility and Scalability • Interoperability • Multifunctionality • Quality and reliability • Real-time information	• Culture and capability • Identity and privacy management • Regulatory and strategic foundations • Security and digital safety

For descriptions of each smart city foundation, please see Appendix A.

Precinct Trends Research

New and developing smart precincts continue to implement technologies that will improve the liveability, sustainability, and connectivity of the precinct. Specifically, smart technologies can make urban precinct more safe, accessible, inclusive, and environmentally friendly.

Background research indicated six clear smart precinct trends, which align with the planned developments at Westmead South. Key smart technology trends that are most relevant to the future Westmead South precinct are outlined in Figure 5.

The insights, considerations, and technologies identified in the below smart precinct trends have informed the themes outlined in this Study. These best practice trends will help ensure that the smart initiatives incorporated within the Westmead South precinct are future-focused, contemporary, and relevant, positioning Westmead South as an industry leader, and providing the Cumberland community with the best possible benefits, both now and into the future.

Figure 5: Summary of key precinct trends and example technologies

Integrated transport hubs

Central urban spaces connecting different forms of transport, including pedestrian, micro-mobility, vehicular, and public

EXAMPLE SMART TECHNOLOGIES
- Smart parking
- Digital wayfinding

Connected open and green spaces

Parks and reserves that incorporate smart technology to monitor environmental conditions and manage water use

EXAMPLE SMART TECHNOLOGIES
- Smart irrigation
- Smart furniture

Connected town squares and community precincts

Multifunctional urban centres for community aggregation, connection, recreation, and knowledge sharing

EXAMPLE SMART TECHNOLOGIES
- Smart safety
- Smart place monitoring

Smart intersections

Intersections that leverage smart technology to ensure traffic flows efficiently and congestion is reduced

EXAMPLE SMART TECHNOLOGIES
- Smart traffic lights
- Sensor technologies

Sustainable and environmental initiatives

Smart technologies that help Council to make Westmead South as sustainable and environmentally focused as possible

EXAMPLE SMART TECHNOLOGIES
- Environmental sensors
- Smart waste systems

Community and social connection

Smart technologies that support community interaction and engagement by sharing information and updates

EXAMPLE SMART TECHNOLOGIES
- Digital signage
- Smart playground equipment

Technology Trends: Smart Poles vs Multi-Function Poles

Electrically and network-enabled poles have long been a backbone of smart city functionality. A growing trend is the installation of Multi-Function Poles (MFPs) which require electrical and network connection but are also set up to aesthetically incorporate a host of additional technologies. Due to the costs associated with MFPs a strategic and considered approach should be taken to their implementation. As such this Study refers to smart poles in the general connectivity sense which includes MFPs.

Enabling Infrastructure

A cross-cutting smart city foundation, connectivity and networks are crucial to the function of all smart technologies.

Appropriate consideration of the location, reliability and accessibility of telecommunications and electrical connectivity should be considered alongside the technologies themselves.

Connectivity in Westmead

Connectivity demand is growing nationally, with 83% of Australian adults using internet-connected smart devices in 2022[2]. With Cumberland set to grow by almost 14% by 2036[3], planning for growing connectivity demand is critical to future-proofing Westmead South.

The *Existing Utilities and Infrastructure Audit* (Infrastructure and Development Consulting) finds Westmead South to be well serviced by telecommunications infrastructure including Telstra 5G mobile coverage and NBN fixed-line coverage. A summary of key connectivity information related to Westmead as a suburb is outlined in Table 6.

To support a smart precinct approach, fibre optic network expansion alongside electrical capacity should be considered in key locations such as critical intersections, parks and reserves along the green spine and community centres/plazas. This expansion enables servicing of public places, provision of public Wi-Fi for digital inclusion, and a Council-owned or controlled IoT network.

Connectivity is a high priority for all themes and is integrated into all recommendations of smart technology in the precinct.

Table 6: Summary of connectivity in Westmead

	Fixed Line	Mobile
Provider	NBN Co	Telstra
Primary Connection Type	Hybrid Fibre Coaxial (HFC)	5G
Access Score	100	77

2. Australian Communications and Media Authority (2022), How we use the internet
3. Forecast.id (2024)

Technology Standards

Through the implementation of all technologies in new developments such as Westmead South, considerations should be given to the following enablers:

Extensibility and Scalability

Extensibility ensures the sustainability and reusability of technologies and infrastructure. Integrated smart technologies should be capable of being adapted for size, purpose, and scope, expanding their useable functionality and lifespan.

Interoperability

Interoperability refers to the capacity of technology to work seamlessly with the complex and multi-layered ecosystems of digital services, applications, and platforms. The capacity for technologies and systems to work in conjunction is fundamental to Council's ongoing investment in digital services.

Quality and Reliability

Procurement and implementation costs needs to be balanced against quality and reliability considerations. The benefit of technology in a precinct is lost if there is low uptake due to poor quality of connectivity or devices.

Connectors and Spines

Evolved transport and access are critical to the liveability and sustainability of Westmead South.

This theme encapsulates smart technology that will improve places of thoroughfare and enhance connectivity between key places in the precinct.

Focus Points

This theme aims to support the following objectives for the precinct:

- Improving road functions and traffic flow
- Promoting public and active transport uses (walking and cycling)
- Supporting community safety and public amenity
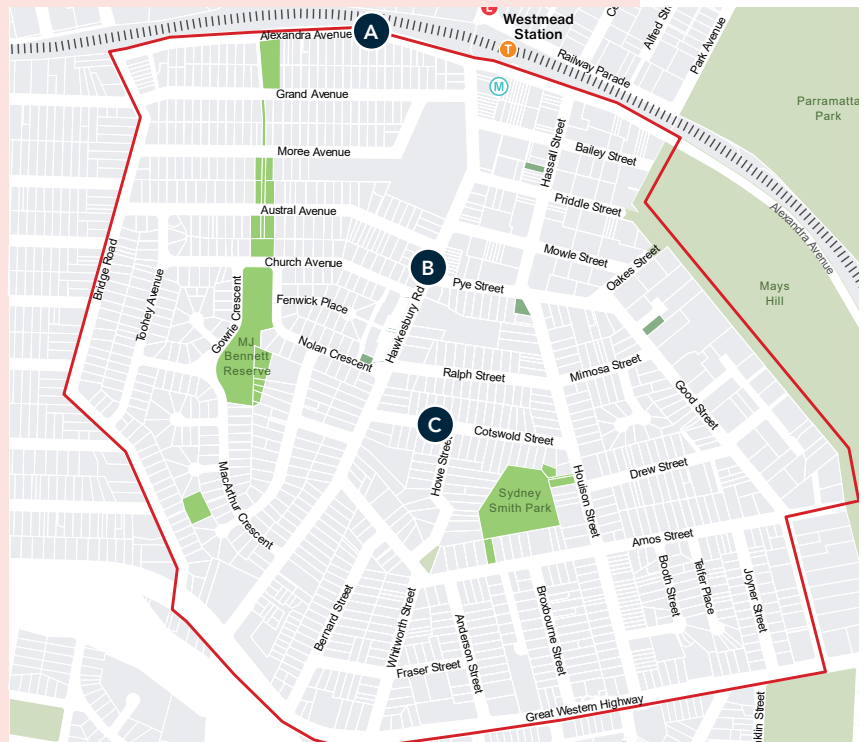
Source: Westmead South Master Plan April 2024

Key Places

A Alexandra Avenue

B Hawkesbury Road
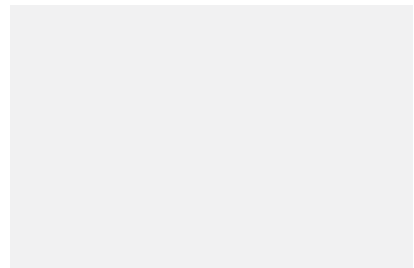
C East-West 'Green Link'

Smart City Foundations

When applying smart technologies in connectors and spines, the smart city foundations that align with the objectives and goals of the Master Plan and our Smart Places Strategy include:

- **Safety (physical)**
  Smart technology will: Support the physical safety of people on and nearby connectors and spines

- **Resilience**
  Smart technology will: Enhance adaptability and longevity of assets along connectors and spines, by monitoring and predicting changing conditions

- **Real-time information**
  Smart technology will: Use up-to-date information to reduce congestion, improve traffic flow, and enhance user experience

Recommended Smart Technologies: Connectors and Spines

Smart technologies recommended below are prioritised in line with the focus points and key aligned smart foundations for this theme. The table also indicates where a recommended smart technology aligns to an action in the Smart Places Strategy, and where it could be considered for a future smart Development Control Plan (DCP).

Table 7: Recommended technologies aligned to the smart city foundations for connectors and spines

Technology	Smart Places Strategy Alignment	Smart DCP	Priority
Smart Safety (CCTV) Smart safety systems inform police/security of situations in real-time, enhancing public safety, emergency responses, and crowd management along connectors and spines.	• Smart Communities • Smart Services	✓	🟢
Smart Lighting Smart streetlights improve safety in connectors and spines with sensor operability.	• Smart Communities • Smart Services	✓	🟢
Smart Poles Smart poles are valuable foundation infrastructure for connectors and spines, allowing easier installation of additional technologies, such as Wi-Fi, CCTV, and EV charging.	• Smart People • Smart Services	✓	🟢
Smart Parking Smart parking systems use sensors and real-time data feeds to increase parking efficiency, thereby improving traffic flow, and reducing costs and environmental impact from vehicular traffic.	• Smart Communities • Smart Movement	✓	🟢
Electric Vehicle (EV) Charging Infrastructure Accessible EV charging stations incentivises EV uptake, attracts EV owners, and future-proofs connectors and spines against evolving transport dynamics.	• Smart Movement	✓	🔴

Technology	Smart Places Strategy Alignment	Smart DCP	Priority
Asset Monitoring with Artificial Intelligence (AI) Sensors installed on public assets, such as buses, can gather footage and information to track and analyse the condition of roads or other assets along connectors and spines. AI technology can predict deterioration and required maintenance, preventing accidents, and reducing maintenance costs.	• Smart Services • Smart Spaces		🔴
Flood Monitoring Sensors Flood monitoring sensors receive accurate and reliable information that can aid in early warning systems for flood-prone areas along connectors and spines.	• Smart Spaces	✓	🟠
Micro-Mobility Transport Options Micro-mobility transport options encourage active transport along connectors and spines.	• Smart Movement		🟠
Traffic Monitoring Technology (with TfNSW) This technology monitors traffic and analyses transport usage, which can inform future transport infrastructure planning.	• Smart Movement		🟠

PRIORITISATION KEY

🟢 Highly recommended, should have	🔴 Recommended, could have	🟠 Recommended, nice to have

THEME 2

Open Green Spaces

Improvements to existing, and delivery of new open green spaces in the public domain are critical to the living amenity of Westmead South.

This theme encapsulates smart technology that will improve the quality and enjoyment of open green spaces within the precinct.

Focus Points

This theme aims to support the following objectives for the precinct:

- Improving quality, accessibility, and attractiveness of existing and new green spaces
- Promoting a sense of place and community
- Celebrating Indigenous culture and heritage
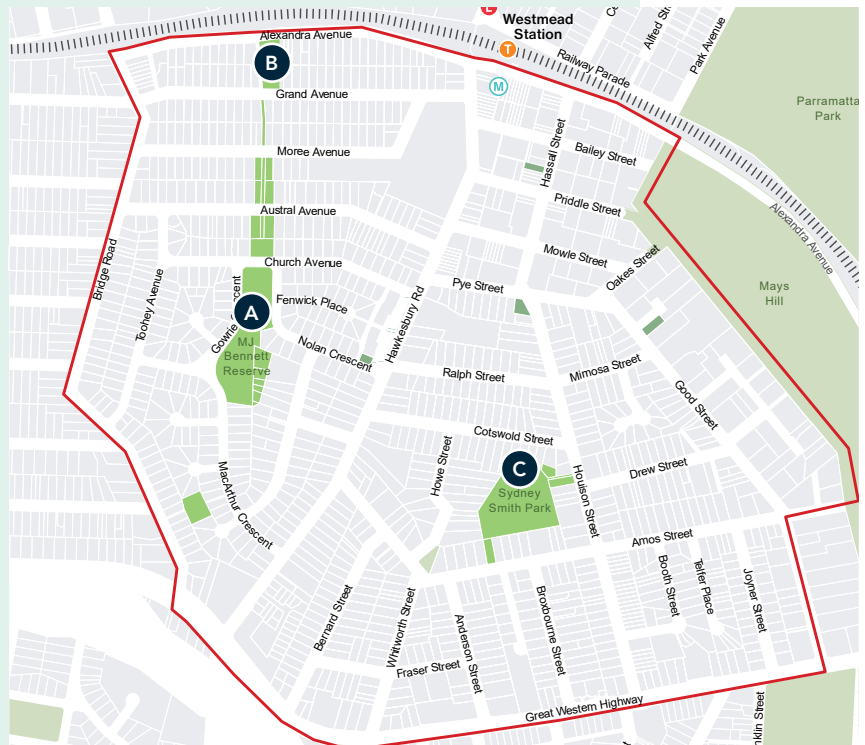
Source: Westmead South Master Plan April 2024

Key Places
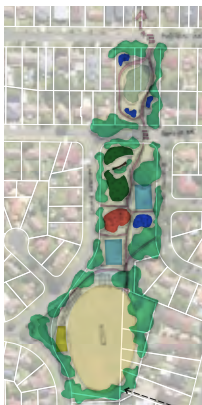
A **M.J. Bennett & Austral Avenue Reserve**

B **Alexandra Avenue Local Park**

C **Sydney Smith Park**

Smart City Foundations

When applying smart technologies in open green spaces, the highest-priority smart city foundations to consider are identified below.

- **Wellbeing**
  Smart technology will: Improve the quality and enjoyment of open green spaces

- **Safety (physical)**
  Smart technology will: Help to maintain safety of community in open green spaces

- **Environmental management and sustainability**
  Smart technology will: Manage, monitor, and inform environmental impacts and outcomes in open green spaces

- **Social cohesion**
  Smart technology will: Promote social interaction and inclusion in open green spaces

Recommended Smart Technologies: Open Green Spaces

Smart technologies recommended below are prioritised in line with the focus points and key aligned smart foundations for this theme. The table also indicates where a recommended smart technology aligns to an action in the Smart Places Strategy, and where it could be considered for a future smart Development Control Plan (DCP).

Table 8: Recommended technologies aligned to the smart city foundations for open green spaces

Technology	Smart Places Strategy Alignment	Smart DCP	Priority
Smart Safety (CCTV) Smart safety technology enhances safety and safety perceptions in open green spaces, encouraging social inclusion and active community participation.	• Smart Communities • Smart Services	✓	●
Smart Lighting Smart, sensor operated streetlights improves safety and environmental savings in open green spaces, promoting their use.	• Smart Communities • Smart Services	✓	●
Digital Wayfinding and Signage Digital wayfinding and signage provide community with real-time information, such as air quality, which enhances safety in open green spaces. Digital wayfinding and signage can also show interactive content, such as QR codes to promote Indigenous history and stories in open green spaces.	• Smart Communities • Smart Movement	✓	●
Smart Furniture Smart furniture enables Wi-Fi, USB connection and device charging, improving the amenity of open green spaces. Smart furniture can be integrated with other smart technology such as environmental sensors.	• Smart Communities • Smart Spaces	✓	●
Smart Poles Smart poles support a multitude of smart technologies and can therefore be tailored to the needs of various open green spaces, now and into the future.	• Smart People • Smart Services	✓	●

Technology	Smart Places Strategy Alignment	Smart DCP	Priority
Smart Irrigation Smart irrigation enables automated water management, optimising usage and improving the sustainability of open green spaces.	• Smart Services • Smart Spaces	✓	🟢
Tree Canopy Mapping Innovative mapping software enables efforts to retain and increase tree canopy cover in open green spaces.	• Smart Places		🔴
Environmental Sensors Environmental sensors enable monitoring and predicting of factors such as air and water quality, and pollution, allowing timely notification to community of potential hazards or concerns.	• Smart Spaces	✓	🔴
Open Data Platform An open data platform provides accessible real-time data on environmental conditions, such as air quality, shaded areas, and tree assets. Community can share their observations, encouraging engagement.	• Smart Spaces • Smart Movement • Smart Economy		🔴
Smart Outdoor Work Hubs Smart outdoor work hubs have high-speed connectivity, device charging, and shelter to provide a functioning outdoor workspace. Smart outdoor work hubs can improve amenity of open green spaces, encouraging broader community use.	• Smart Economy	✓	🌸
Smart Cool Playgrounds Council created a prototype smart cool playground in Merrylands Memorial Park, which retrofit the playground with heat-smart materials to improve safety and enjoyment. This prototype can be applied to playgrounds in open green spaces throughout the precinct.	• Smart Communities		🌸

PRIORITISATION KEY

| 🟢 Highly recommended, should have	🔴 Recommended, could have	🌸 Recommended, nice to have

Activity Nodes
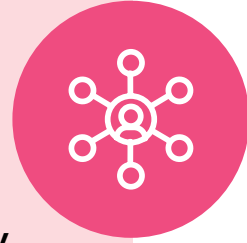
Activity nodes are areas of concentrated community and commercial activity in the public domain.

This theme encapsulates smart technology that will integrate into high activity areas, supporting the precinct in providing services and infrastructure that existing and future residents need.

Focus Points

This theme aims to support the following objectives for the precinct:

- Promoting community life and function
- Improving delivery and maintenance of assets
- Celebrating Indigenous culture and heritage
- Supporting safety and public amenity
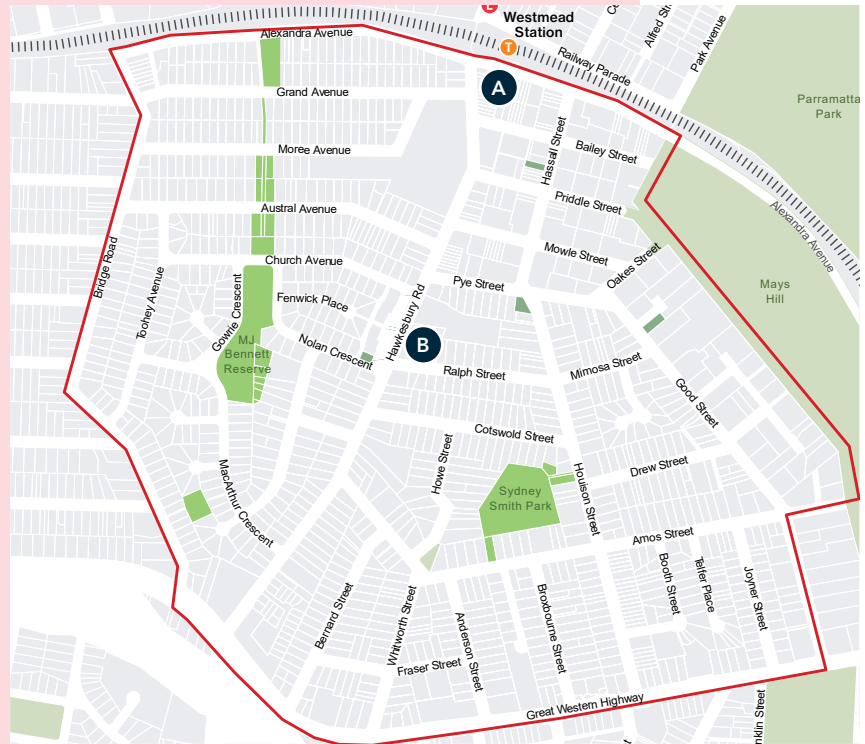
Key Places

Source: Westmead South Master Plan April 2024

Ⓐ **Metro Station Block**

Ⓑ **The Oakes Centre Plaza**

Smart City Foundations

When applying smart technologies in activity nodes, the smart city foundations that are most important to consider are identified below.

- **Safety (physical)**
  Smart technology will: Promote safety of community

- **Accessibility**
  Smart technology will: Enhance physical, social, and cultural accessibility

- **Real-time information**
  Smart technology will: Provide community with relevant, up-to-date information

- **Multifunctionality**
  Smart technology will: Be adaptable to support multiple uses

- **Identity and Culture**
  Smart technology will: Encourage learning and celebration of precinct history and culture, including Indigenous heritage

Recommended Smart Technologies: Activity Nodes

Smart technologies recommended below are prioritised in line with the focus points and key aligned smart foundations for this theme. The table also indicates where a recommended smart technology aligns to an action in the Smart Places Strategy, and where it could be considered for a future smart Development Control Plan (DCP).

Table 9: Recommended technologies aligned to the smart city foundations for activity nodes

Technology	Smart Places Strategy Alignment	Smart DCP	Priority
Smart Safety (CCTV) Community safety is critical in high activity areas of the precinct, such as Westmead Hospital. Smart safety technology promotes safety and safety perceptions in activity nodes.	• Smart Communities • Smart Services	✓	●
Public Wi-Fi Public Wi-Fi plays a critical role in ensuring digital equity and accessibility in areas of high economic and community activity.	• Smart People • Smart Economy	✓	●
Smart Lighting Smart lighting with sensor operability will promote the safe use of activity nodes.	• Smart Communities • Smart Services	✓	●
Digital Wayfinding and Signage Digital wayfinding and signage provide real-time content such as timetables and wayfinding, enhancing accessibility of activity nodes. Digital wayfinding and signage can also be interactive, such as QR codes to share Indigenous history and stories in activity nodes.	• Smart Communities • Smart Movement	✓	●
Smart Poles Strategically deployed smart poles support a multitude of smart technologies, such as Wi-Fi, and can therefore be tailored to the needs of activity nodes, now and into the future.	• Smart People • Smart Services	✓	●

Technology	Smart Places Strategy Alignment	Smart DCP	Priority
Place Utilisation and Smart Monitoring Monitoring of activity nodes enables understanding and analysis of its space use, enabling place-based improvements and activation.	• Smart Movement		🔴
Smart Bins Smart bins improve maintenance efficiencies and lower costs of waste disposal in high-activity areas.	• Smart Services	✓	🔴
Digital Art Digital art encourages learning and appreciation of Westmead South's culture and history, including Indigenous history and stories, promoting social inclusion and wellbeing.	• Smart People • Smart Spaces		🟠
Digital Innovation Lab A digital innovation lab or co-working space facilitates partnership development, economic activity, and innovation in Westmead South, accelerating its position as a health and innovation district.	• Smart Economy		🟠

PRIORITISATION KEY

| 🟢 Highly recommended, should have	🔴 Recommended, could have	🟠 Recommended, nice to have

THEME 4

Neighbourhoods and Communities

Westmead South will be promoted as a place of diverse and affordable living.

This theme encapsulates smart technology that will enhance longevity and liveability of neighbourhoods, and encourage active participation in the community, allowing diversity of character areas to flourish.

Focus points

This theme aims to support the following objectives for the precinct:

- Providing tailored services
- Enabling community participation and engagement
- Improving sustainability and resource use
- Celebrating Indigenous culture and heritage
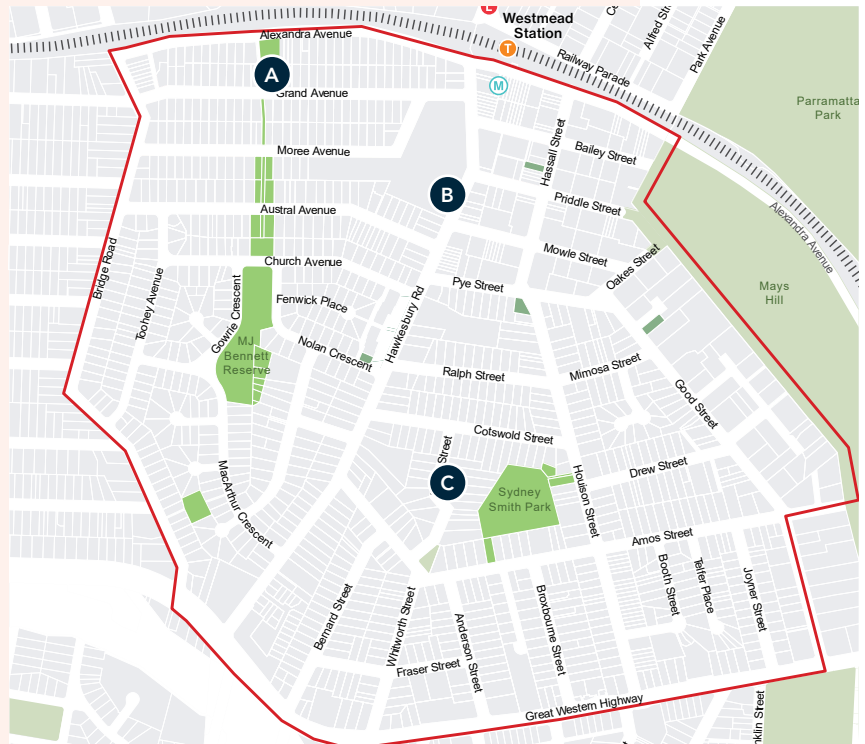
Source: Westmead South Master Plan April 2024

Key Places

A Northern Living Character Area

B Hawkesbury Road High Street Character Area

C Central Living Character Area

Smart City Foundations

When applying smart technologies in neighbourhoods and communities, the smart city foundations that are most important to consider are identified below.

- **Community engagement and co-creation**
  Smart technology will: Incorporate engagement and feedback mechanisms to support community-led initiatives and design
- **Service personalisation**
  Smart technology will: Enable delivery of tailored messaging and services within communities
- **Social cohesion**
  Smart technology will: Promote social interaction and inclusion within communities
- **Resource use and monitoring**
  Smart technology will: Provide communities with information on environmental impacts and outcomes

Recommended Smart Technologies: Neighbourhoods and Communities

Smart technologies recommended below are prioritised in line with the focus points and key aligned smart foundations for this theme. The table also indicates where a recommended smart technology aligns to an action in the Smart Places Strategy, and where it could be considered for a future smart Development Control Plan (DCP).

Table 10: Recommended technologies aligned to the smart city foundations for neighbourhoods and communities

Technology	Smart Places Strategy Alignment	Smart DCP	Priority
Smart Meters Intelligent design that reduces base load electricity can reduce whole-of-life cost of housing. Smart meters are strongly recommended for implementation in Westmead South, in Council owned buildings and spaces.	• Smart Spaces	✓	🟢
Digital Services Digital technology can improve the accessibility of Council services, catering to diverse languages, cultures, ages, and abilities.	• Smart Services		🟢
Open Data Platform An open data platform provides real-time information to residents on city environmental outcomes, allowing residents to share their own observations.	• Smart Communities • Smart Services		🟢
Digital Wayfinding and Signage Digital wayfinding and signage provide community with up-to-date information, including alerts, acquire feedback, and personalised services and messaging. Digital wayfinding and signage can also be interactive, such as QR codes to share Indigenous history and stories in character areas.	• Smart Communities • Smart Movement	✓	🔴
Smart Bins Strategic deployment of smart bins improves maintenance efficiencies and lowers costs of waste disposal in neighbourhoods and communities.	• Smart Services	✓	🔴
Digital Art Digital art supports community cultural production, such as celebration of Indigenous culture and heritage, by providing local artists access to city digital platforms to showcase original creative content.	• Smart People • Smart Spaces		🟠

PRIORITISATION KEY

🟢 Highly recommended, should have   🔴 Recommended, could have   🟠 Recommended, nice to have

Governance

Council's ability to deliver smart technology and related services will be critical to the success of Westmead South as a smart, evolved, and liveable precinct.

This theme encapsulates elements that will support Council to effectively govern, manage, and monitor smart technology, enabling ongoing smart precinct progress.

The below elements should not only be considered within the realms of the Westmead South strategic planning process. To be effective, governance elements should be addressed by Council on a municipality-wide level.

Focus Points

This theme aims to support the following objectives for the precinct:

- Ensuring cyber security and privacy
- Encouraging collaboration and coordination
- Promoting transparency and accessibility
- Communicating benefits of smart technology
- Open data to support decision-making
- Supporting innovative thinking

Smart Places Strategy Alignment

Governance for smart technologies in Westmead South must be delivered alongside systems, processes, and policies in the Smart Places Strategy.

Table 11: Actions supporting the governance and delivery of smart technology in Westmead South noted in the Smart Places Strategy

Theme	Actions
Smart Communities	• Leverage digital tools, technology, and hardware to increase community engagement opportunities • Develop smart places communication campaign to build awareness and understanding of the smart places program specifically around safety in the community
Smart Spaces	• Explore how we can leverage innovation to improve affordability and sustainability of city utilities • Undertake place activations in partnership with TAFE, universities, or cultural organisations by engaging local creatives to create digital art in public spaces (e.g., laneways, town centres, and open spaces)
Smart People	• Develop digital and data literacy programs for Council and the community in local languages, to increase skills, confidence and support multicultural literacy • Adopt a communications and education program to increase understanding of cyber security and privacy
Smart Movement	• Improve the accessibility of our transport system and mobility in our city • Support the uptake of active transport through digital technology
Smart Services	• Support Council's internal Digital Strategy and prepare smart places training program for indoor and outdoor staff • Maintain working relationships with all levels of government and solidify commitment to becoming a leading smart place • Explore options to develop an open data platform (e.g. parking, traffic and pedestrian information, development application statistics, and air quality and temperature)
Smart Economy	• Work with government, education providers and emerging industries to ensure our community can access the necessary education pathways to create the future digitally enabled workforce • Work with local chamber of commerce to explore smart solutions for businesses

Smart Precinct Targets

Smart technologies in Westmead South should ultimately contribute towards its vision as an evolved, liveable precinct.

Looking ahead from the current state to this desired future state enables targets to be set for Westmead South as a smart precinct. These smart precinct targets, or key performance indicators (KPIs), are outlined for each precinct theme in Table 12.

Table 12: Smart precinct targets for Westmead South

Connectors and Spines

CURRENT STATE
- Westmead South enjoys good access to public transport, including T-ways and train services
- Pedestrian and cycle links run north and south of the precinct, although some are disjointed
- Hawkesbury Road is currently a vehicle-dominated corridor, and can be challenging to traverse along and access

FUTURE STATE
- Public transport can be accessed and safely used
- Active transport, including walking and cycling will be encouraged throughout the precinct, improving residents' wellbeing
- Improved road function and traffic flow will connect Westmead South internally and externally with the surroundings
- Hawkesbury Road will be a safe, people-centric corridor, promoting community life

PRIORITY SMART CITY APPLICATION
- Smart Safety and Movement (CCTV)
- Smart Lighting
- Smart Poles
- Smart Parking

KPIs
- Improved community safety perceptions
- Increased use of active and public transport
- Reduced traffic congestion in key locations

Open Green Spaces

CURRENT STATE
- Westmead South currently has ten parks and open green spaces, used for a diversity of sporting, recreation, and community activities
- There is a need for greater accessibility of open spaces
- Certain areas are prone to flooding, and higher temperatures due to low tree canopy cover
- Westmead South has a rich Indigenous and historical heritage

FUTURE STATE
- Westmead South will provide a network of accessible and attractive open green spaces that promote social cohesion
- Improved flood monitoring and water management will increase safety and amenity of open green spaces
- Indigenous heritage will be celebrated in new and existing open green spaces, where appropriate

PRIORITY SMART CITY APPLICATION
- Smart Safety and Movement (CCTV)
- Smart Lighting
- Smart Furniture
- Digital Wayfinding and Signage
- Smart Poles
- Smart Irrigation

KPIs
- Improved community safety perceptions
- Increased use of open green spaces
- Faster response times to flooding events
- Number of public spaces acknowledging, celebrating, or educating on Indigenous heritage of the area

Activity Nodes

CURRENT STATE
- Certain high-activity areas have been identified as having potential for further activation for community and local businesses
- There is currently limited public Wi-Fi in Westmead South
- Westmead South has a rich Indigenous and historical heritage

FUTURE STATE
- Westmead South will accommodate high quality, vibrant urban spaces that provide much needed community and retail facilities
- Digital equity and accessibility will be enhanced in activity nodes
- Indigenous and historical heritage will be celebrated in activity nodes, where appropriate

PRIORITY SMART CITY APPLICATION
- Smart Safety and Movement (CCTV)
- Public Wi-Fi
- Smart Lighting
- Digital Wayfinding and Signage
- Smart Poles

KPIs
- Improved community safety perceptions
- Number of locations with public Wi-Fi
- Number of public spaces acknowledging, celebrating, or educating on Indigenous heritage of the area

Neighbourhoods and Communities

CURRENT STATE
- Westmead South is predominantly a residential suburb
- The precinct is home to a highly culturally diverse population
- Council offers many of its services digitally for residents
- Some residents are concerned that new development will create an uninviting neighbourhood

FUTURE STATE
- Accessible, tailored digital services will cater to Westmead South's diverse community
- Residents will have opportunity to engage with Council on various aspects of the precinct, including environmental outcomes, enhancing community cohesion and participation

PRIORITY SMART CITY APPLICATION
- Smart Meters
- Digital Services
- Open Data platform

KPIs
- Number of Council services offered digitally
- Increased digital community engagement and participation

Gap Analysis & DCP Recommendations

To apply smart technologies in Westmead South and achieve smart precinct targets, consideration towards their implementation is required at a strategic planning level.

A gap analysis was undertaken to determine the extent to which the Master Plan addresses elements relating to the application of smart technologies, summarised in the table below. The table also indicates where a smart technology should be considered for a future smart Development Control Plan (DCP).

It is worth noting that this Study assumes the inclusion of most high value smart technologies in the future smart DCP, per industry and local government standards. In private developments, the Study also assumes allowances for high value smart technologies including fibre optic network, building management systems (BMSs), electric vehicle charging stations, and smart meters (as part of BMSs). This Study suggests a review of the standard inclusions for private developments in line with these assumptions.

Table 13: Smart technology recommendations and gap analysis

Technology		Consideration in Master Plan	Smart DCP	Priority
Fibre Optic Network Expansion	➕	Many areas of Westmead South have existing fibre optic connectivity. Consideration could be given to expansion of this network in key areas throughout in the precinct	Include	🟢
Smart Safety (CCTV)	✓	Promoting pedestrian and community safety is highlighted, which could be achieved through smart safety systems	Include	🟢
Smart Lighting	✓	Enhancing safety and public amenity are key principles, which lighting could contribute towards	Include	🟢
Smart Poles	➕	Delivery of smart poles align with many priorities in the Master Plan, including increasing accessibility of open spaces	Include	🟢
Digital Wayfinding and Signage	➕	Digital wayfinding and signage have high value potential for several areas, including the proposed transport interchange and the Oakes Centre	Include	🟢
Public Wi-Fi	➕	Provision of public Wi-Fi aligns to the project vision for Westmead South as an evolved, smart precinct with quality public spaces	Include	🟢
Smart Furniture	➕	Could be considered for future developments, or be an add-on to obtain development incentives	Include	🟢

Technology	Consideration in Master Plan		Smart DCP	Priority
Smart Irrigation	✔	Water Sensitive Urban Design (WSUD) and smart water technologies considered by ARUP (Environmentally Sustainable Development [ESD] consultant)	Include	🟢
Smart Parking	✔	Improving traffic flow is highlighted, which smart parking could help to achieve	Include	🟢
Smart Meters	✔	Smart meters are considered by ARUP (ESD consultant)	Include	🟢
Digital Services	➕	Provision of digital services aligns with the project vision for Westmead South as a smart precinct	N/A	🟢
Open Data Platform	➕	An open data platform aligns with the project vision for Westmead South as a smart, evolved precinct	N/A	🟢
Electric Vehicle (EV) Charging Infrastructure	✔	EV infrastructure considered by ARUP (ESD consultant)	Include	🔴
Asset Monitoring with Artificial Intelligence (AI)	✔	Improving the efficient delivery of infrastructure is a key principle, for which asset monitoring with AI could help to achieve	N/A	🔴
Flood Monitoring Sensors	✔	Certain areas in the precinct are prone to flooding. This technology could be included in development considerations for specific flood-prone areas	Include	🔴
Tree Canopy Mapping	✔	High-level tree canopy cover mapping is included Opportunity to increase tree canopy cover in streets, parks and private development is noted	N/A	🔴
Environmental Sensors	✔	Urban heat is an ongoing issue in Western Sydney Living amenity of new development will be improved via air quality measures, which environmental sensors could help to achieve Urban heat island effect monitoring considered by ARUP (ESD consultant)	Include	🔴
Place Utilisation and Smart Monitoring	✔	Place activation and public domain delivery that responds to context, historical storytelling, and diverse residential profiles is a priority Place utilisation and smart monitoring could aid in achieving this	N/A	🔴
Smart Bins	✔	Improving waste collection efficiency considered by ARUP (ESD consultant) Could be considered for future developments of a particular size, or be an add-on to obtain development incentives	Include	🔴
Digital Art	➕	Valuing and preserving Indigenous and historical heritage are highlighted, which could be achieved through digital art	N/A	🟠

Technology	Consideration in Master Plan		Smart DCP	Priority
Micro-Mobility Transport Options	✓	Active transport, including cycling will be encouraged throughout the precinct	N/A	🔴
Traffic Monitoring Technology	✓	Providing traffic infrastructure upgrades is highlighted, for which traffic monitoring technologies could be utilised	N/A	🔴
Smart Outdoor Work Hubs	➕	Smart outdoor work hubs align with key priorities of the Master Plan, including evolved open space and public domain	Include	🔴
Smart Cool Playgrounds	➕	Smart cool playgrounds align with key priorities of the Master Plan, including evolved open space and public domain	N/A	🔴
Digital Innovation Lab	➕	Provision of a digital innovation lab aligns with the broader health and innovation character of Westmead	N/A	🔴

CONSIDERATION IN MASTER PLAN KEY

✓ Currently included	➕ Potential to be included

PRIORITISATION KEY

🟢 Highly recommended, should have	🔴 Recommended, could have	🔴 Recommended, nice to have

Smart Technology Value Benefit

Cumberland City Council have committed to creating a 'smart place' for the benefit of their community, businesses, visitors, investors, and organisation.

Westmead South is one of many opportunities to build, expand and accelerate the implementation of this vision.

In consultation with Council, six smart technologies were selected for further value benefit analysis to determine their potential value generation for community and efficiencies with Council.

Some high priority smart technologies were considered essential to the success of Westmead South as a smart precinct, and likely to become fundamental in future developments following inclusion in the smart DCP. For the most part these technologies will generate value and incur minimal risk, and therefore will not require further assessment to determine their viability:

- Fibre Optic Network Expansion
- Smart Safety (CCTV)
- Smart Lighting

Table 14: Value benefit analysis of select smart technologies

	Expected Benefits	Cost Considerations	Case Studies & Examples	Application in Westmead South	Value Benefit Analysis
Smart Poles	Social and community: Smart capabilities such as Wi-Fi enhance public safety, improve user experience, and encourage community participation Economic: Improves liveability and innovation capability Financial: Cost-effectively builds smart capability by utilising existing infrastructure already connected to the grid, is scalable and flexible Environmental: Can optimise energy consumption Urban design: Reduces street clutter	Initial investment costs include materials (fibre optics, antennas, associated ancillary), construction and engineering costs, and technical services (commissioning and integration). Ongoing costs include maintenance, updates, repair, and electricity.	Delos Delta analysis (2022) indicated initial capital and installation cost for a single Multi-Function Pole (MFP) to be between $20,000-$25,000 (excluding in-built applications) Installation costs for a smart pole to be significantly lower, as it negates the need to install an entirely new structure.	Possible disruption to roads and traffic congestion must be considered during construction Optimal locations include activity nodes.	High value benefit: Smart poles achieve many of the smart capabilities of MFPs, but at significantly lower costs. Adapting existing Council poles to be 'smart' future-proofs these assets for further smart enhancements and value generation.
Digital Wayfinding and Signage	Transport: Improves accessibility, time savings, improves user experience for public transport, promotes active transport Social and community: Encourages active transport, improves safety and security Economic: Increases visitation, increases turnover in high-activity areas Financial: Cost-efficiently deliver signage infrastructure, is adaptable and versatile, provides opportunity to advertise local businesses and attractions Environmental: Reduces car use and pollution Urban design: Reduces street clutter	Initial investment costs include hardware, software, and installation. Ongoing costs include maintenance, updates, repair and electricity.	A business case for city-wide improvements to wayfinding and signage in Melbourne indicate positive cost-benefit ratios.[4] Private sectors cite payback periods of between 1-2 years (Noting, the public sector will likely experience a longer payback period due to lack of revenue generated from this technology).	Potential locations include the Metro Station Interchange, and Oakes Centre Plaza.	High value-benefit: Despite upfront and ongoing costs, this innovative technology has a multitude of benefits that are likely to generate significant value in the precinct.

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4. SGS Economics & Planning (2015) Wayfinding in Melbourne: Business case scoping report

	Expected Benefits	Cost Considerations	Case Studies & Examples	Application in Westmead South	Value Benefit Analysis
Public Wi-Fi	Social and community: Improves digital inclusion, accessibility, and enhances civic engagement Economic: Drives economic activity, encourages innovation, increases visitation and tourism, complements other smart technologies Financial: Creates avenues for revenue generation, including advertising and extended services, interoperability (network can be shared with CCTV, augments IoT) Environmental: Augments environmental monitoring technologies Urban design: Shares access points with other smart applications	Initial costs include establishing and installing access points. Ongoing costs include service, maintenance, and repair.	Depending on the size of the network, installation of a single access point can range between $6,000 - $10,000, with operational costs around $480 per month[5] Delos Delta analysis (2022) indicated public Wi-Fi could generate between $258M - $370M of revenue for a capital city over a 20-year period.	Wi-Fi site survey and planning tools can help identify optimum areas for access points. Potential locations include high-activity areas (Metro Transport Interchange, Oakes Centre Plaza), open space near Council buildings and libraries Council must consider legal obligations, including record/ metadata retention and other management controls.	High value benefit: With thoughtful implementation and engagement, provision of public Wi-Fi will provide significant societal and economic benefits, and possible avenues for revenue generation.
Smart Meters	Social and community: Enhances electricity service provision Economic: Enhances data-driven decision-making with detailed, real-time information Financial: Generates cost savings on connections, and meter reading fees and charges, faster repairs Environmental: Optimises energy use, improves integration of distributed energy supply and storage options (such as PV generation and battery storage)	Initial installation costs include materials (meter board), possible electrical work. Ongoing costs include connections and disconnections (which are cheaper than traditional meters), maintenance and repair.	A detailed cost benefit study estimated the Net Present Value of smart metering in NSW was between $212M and $1.38B (over 20 years).[6] Smart meter capital cost is around $230, with installation costs estimated between $169-$247.[7] It is worth noting that many efficiencies and benefits such as avoiding meter readings, outage management, theft detection, and optimal capital investment planning, require market saturation to be realised.[8]	To achieve maximum efficiencies, accelerated rollout of smart meters throughout the precinct is recommended.	Medium-high value benefit: Smart meters offer significant financial and environmental benefits, however maximising these benefits requires an accelerated rollout, giving this technology a medium-high value benefit potential.

5. MAV Technology (2014), Implementing Public Wi-Fi Services for Local Government
6. NERA Economic Consulting (2008), Cost Benefit Analysis of Smart Metering and Direct Load Control: Overview Report for Consultation
7. Oakley Greenwood (2022), Costs and Benefits of Accelerating the Rollout of Smart Meters
8. Delos Delta (2018), The Smart Meter Revolution

	Expected Benefits	Cost Considerations	Case Studies & Examples	Application in Westmead South	Value Benefit Analysis
Smart Irrigation	Economic: Generates efficiencies from remote operability, collects environmental data enhancing data-driven decision making Financial: Generates cost savings from optimised water usage, improves labour efficiency and streamlines maintenance Environmental: Improves water efficiency, protects local biodiversity and waterways Social and community: Promotes awareness of sustainability initiatives, enhances enjoyment of open green spaces	Initial installation costs include materials (in-ground sensors), network, server, software. Ongoing costs include maintenance, repair, electricity.	Delos Delta analysis (2020) indicated initial capital expenditure to be around $75,000, with an annual operating cost of $15,000 (over 5 years). Case studies indicate payback period for smart irrigation technologies to be 12 months or less.[9,10] Water efficiency savings can be up to 50% compared to traditional systems.[11]	Planning, site evaluation and efficient design are key components of implementation Optimal locations include open green spaces.	High value benefit: Instant cost savings and efficiencies and relatively fast payback periods result in smart irrigation being a highly valuable investment for the precinct.
Smart Cool Playgrounds	Social and community: Encourages outdoor play, and enhances community safety, social connection, and physical health and wellbeing Economic: Increases utilisation of public assets, drives visitation and tourism Financial: Cost-efficiently enhances infrastructure with retrofitting capabilities, and enhances adaptability of new infrastructure Environmental: Increases local resilience to climate change	Initial installation costs include site analysis, materials (advanced thermal resistant shades), and any construction. Ongoing costs include maintenance and repair, and water.	A recent study in the City of Parramatta indicated significant benefit of investing in open green spaces, with a social return on investment of $10 for every $1 spent on parks and sports grounds.[12] Cumberland City Council retrofitted unshaded playgrounds with elements, successfully reducing UV exposure using both low-cost (planting trees) and more expensive options (artificial shade structures).[13]	Council can leverage existing heat mapping study to identify potential playgrounds for retrofitting within the precinct. Smart cool elements can be considered in future design of playgrounds in the precinct.	Medium value benefit: This technology offers significant social benefits, at potentially low cost. Given Council has already implemented this technology, there are additional value efficiencies to its installation in Westmead South.

9.   MAIT Industries (2008), Case Study: Smart Irrigation
10. Cardenas, B., Migliaccio, K.W., Dukes, M.D., Hahus, I., Kruse, J.K. (2020), Irrigation Savings from Smart Irrigation Technologies and a Smartphone App on Turfgrass
11. UtilitiesOne (2023), Smart Irrigation Solutions Geolocation Water-Saving Potential
12. Western Sydney Local Health District (2019) Valuing Our Green Places
13. Cumberland City Council (2020), UV Smart Cool Playground Project

Next Steps

This Study has outlined a range of smart technologies that will add benefit to Council, and the community, investors, and visitors of Westmead South.

While categorised across 3 levels of prioritisation, the technologies presented in this document have already been undergone a broader prioritisation process. As such, these technologies all represent valuable inclusions for Westmead South, and have been arranged to present the most advantageous outcomes for Council while still supporting flexibility over times as funding and investment opportunities present.

This Study is accompanied by appendices to support further reading for necessary stakeholders. Appendices include:

• Appendix A: Smart City Study Glossary

• Appendix B: Smart City Study Resources

• Appendix C: Smart Precinct Trends Summary

This Study was also supported by the following internal documents:

• Appendix D: Background Research Report

• Appendix E: Westmead South Smart Technology Prioritisation

Recommendations outlined in this Study have been considered in the Westmead South Master Plan and supporting infrastructure schedule.

Appendix A: Smart City Study Glossary

To support the delivery of the Smart City Study (the Study), a comprehensive glossary has been included. The glossary provides definitions for key terms used throughout the Study.

Accessibility	The quality of being easy to access, understand, appreciate, or use
Activation	The process of making something active or operative with the addition or integration of smart technology
Aggregation	The accumulation of several things into one entity or cluster
Amenity	The pleasantness, desirability, or usefulness of a place or area
Citizen-centric	An approach to smart technology that prioritises citizen participation, and the interests of local citizens, in how decisions are made and the design of smart city initiatives
Co-creation	A smart city design and development process which works with the community, stakeholders, and Council to collaboratively create processes, systems, and solutions
Connectivity	The capability, quality, or state of smart technology being connected to the internet
Data-driven	Processes or systems that use data and the analysis of that data to drive decision-making and planning
Extensibility	The capability for smart technology to be extended to accommodate additional or new functionalities, software, systems, or operations
Gamification	The addition of typical game elements (such as competition, points scoring, rules of play, levels progression, etc.) to systems, technologies, or processes, to support engagement and involvement
Interoperability	The capacity for technologies and systems to work harmoniously in conjunction with one another
Liveability	The extent to which a place or area is considered suitable for living or spending time
Micro-mobility	Small, lightweight, personal-mobility vehicles such as scooters or bicycles, often powered by electricity
Multifunctionality	The capacity of smart technology to perform more than one function
Open Data	Data that is publicly available to view, analyse, and use
Personalisation	The process by which an object, system, or process is designed or tailored to address the unique needs of an individual
Reliability	The extent to which a piece of technology, process, or system is consistent in its delivery of its intended outcome or result
Scalability	The capability of smart technology to be adapted, changed, or extended to accommodate a smaller or larger scale

Smart city	A city that incorporates digital technology, data, and innovation to improve the liveability, sustainability, and wellbeing of its citizens
Smart technology	Digital devices, sensors, and systems that use internet connectivity, data, and artificial intelligence to deliver outcomes and services that are intentionally sustainable, informed, and coordinated
Social cohesion	The connectedness and coordination of a group of people, particularly within one community or area
Sustainability	Practices, processes, or systems that support long-term environmental, human, and economic health
Wayfinding	The process of being able to find one's way in a space or area, often at the aid of directions or signage

Source: Delos Delta

Smart City Foundations

This section defines the smart city foundations used throughout the Study. Definitions are given in the context of smart places, and smart technologies that may feature in them. Smart city foundations are grouped across four broad categories: people, place, technology, and governance.

	Smart City Foundation	Description
PEOPLE	Citizen-centric technology	Community needs, values, and priorities lead and determine which technology is introduced in a smart place, as well as when and how.
	Community engagement and co-creation	A smart place is designed on behalf of residents, stakeholders, and the broader community with mechanisms for ongoing engagement and feedback.
	Gamification and activation	Gamification refers to the ability to promote activation of spaces by creating 'games' out of everyday activities, or simply to encourage excitement and fun.
	Identity and culture	Smart places embrace the history and culture of a place, including recognition of Traditional Owners and First Nations culture. Local diversity is celebrated, allowing both individuals and collectives to identify with a place.
	Outcomes-based technology	Outcomes-based technology choice refers to Council's approach to the prioritisation and selection of technologies focused on the impact or benefit they are hoping to achieve in a place.
	Safety (physical)	Smart technologies such as CCTV, lighting, speakers, and predictive analysis, where appropriate can enhance physical safety and safety perceptions.
	Service personalisation	Data and technology provision can support Council to deliver targeted and tailored messaging and services to their community.
	Social cohesion	Smart places are about social interaction, and social cohesion is important to ensure all people can participate in a place.
	Wellbeing	Wellbeing refers to the overall quality of life for residents of a city or place, influenced by factors such as education, access to opportunities, and liveability.

Smart City Foundation		Description
PLACE	**Accessibility**	Public spaces should be culturally, physically, and socially accessible and technology can help people connect with public spaces to allow this.
	Attractiveness	Technology is often an afterthought of place design and can create unsightly 'add-ons' in carefully considered spaces.
	Environmental management and sustainability	The environment and ongoing sustainability are critical pillars of activity for Council and play a role in community wellbeing and amenity of places.
	Integration of digital and physical assets	Smart places seamlessly integrate the physical and the digital, connecting assets through sensors and communication networks.
	Resilience	Smart places and their integrated technologies can adapt and respond to disruptions, threats, or challenges.
	Resource use and monitoring	Smart places deliver real-time insights into city performance on key priorities for resource use, including water, energy, and materials.
TECHNOLOGY	**Connectivity and networks**	A smart place is contingent on its backbone of technology communications channels.
	Data-driven decision-making	Strategic decision-making processes are guided by insights gleaned from data and analysis.
	Extensibility and scalability	Extensibility ensures the sustainability and reusability of smart technologies and infrastructure, delivering long term application and viability. It also enables the 'scaling up' of successful technologies after the pilot phase.
	Interoperability	Interoperability refers to the capacity of smart technology to work seamlessly with the complex and multi-layered ecosystems of digital services, applications, and platforms.
	Multifunctionality	Multifunctionality refers to the capacity for smart technology to fulfil and deliver several functions, or be adapted to different functions, to optimise broader network processes.
	Quality and reliability	Success and uptake of technology in a place context is dependent on the quality and reliability of both the technology and the connection.
	Real-time information	Real-time data collection, visualisation and communication are a key component of smart places for both Council and place users.
GOVERNANCE	**Culture and capability**	Smart places are supported by Council's ability to leverage technology and innovation by driving a culture that embraces the benefits, risks and skills required to maximise investment.
	Identity and privacy management	Identity theft and data privacy is a growing community concern for smart places due to the rapid rise in digital activity.
	Regulatory and strategic foundations	Technology is an evolving concept with new applications and concepts constantly being introduced to the marketplace. Regulations, policies, and a clear strategic direction ensure the appropriate use of these new technologies.
	Security and digital safety	Smart places can present heightened risks in terms of data security and privacy.

Source: Delos Delta

Appendix B: Smart City Study & Appendices Resources

A summary of all resources used throughout the development of the Smart City Study (the Study) is outlined on the following pages in this Appendix B.

This includes references used in the development of the *Background Research and Contextual Analysis Report* (the Report), as well as all appendices which accompany the Study.

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Appendix C: Smart Precinct Trends Summary

Cumberland City Council have engaged Delos Delta to deliver a Smart City Study (the Study) to guide the integration of best practice smart city principles in Westmead South via the *Westmead South Master Plan* (the Master Plan).

The insights and outcomes of this Study may also have broader applications to future precinct developments.

This Smart Precinct Trends Summary (the Summary) supports the Study by providing additional research into informing trends related to smart precincts and their associated technologies. The purpose of this document is to ground the Study in industry-leading approaches and support the selection of appropriate technologies.

Smart Precinct Trends

Smart precincts are an evolving and growing phenomenon, adapting, and refining their inputs to reach the best outcomes for their communities.

This Summary brings together trends relevant to Westmead South, providing an overview of key enabling technologies and use cases including outcomes and lessons to help guide technology selection in Westmead.

The trends explored in this document include:

1. **Integrated transport hubs**
2. **Connected open and green spaces**
3. **Connected town squares and community precincts**
4. **Smart intersections**
5. **Sustainable and environmental initiatives**
6. **Community and social connection**

Technology Trends: Smart Poles vs Multi-Function Poles (MFPs)

Electrically and network-enabled poles have long been a backbone of smart city functionality. A growing trend is the installation of Multi-Function Poles which require electrical and network connection but are also set up to aesthetically incorporate a host of additional technologies. Due to the costs associated with MFPs a strategic and considered approach should be taken to their implementation. As such this Summary and the Study refers to smart poles in the general connectivity sense which includes MFPs.

1. Integrated Transport Hubs

Integrated transport hubs are central urban spaces that connect and facilitate the use of different modes of transport. This could include linking pedestrian and other forms of active transport, micro-mobility, car travel, ride-sharing and public transport.

By connecting transport networks with the desired infrastructure for walking or cycling, public transport, or last-mile mobility options transport hubs facilitate ease of movement across, to and from the precinct. This has flow-on economic and social impacts, transforming transport hubs into commercial, retail, or social destinations, uplifting local economic activity and promoting longer dwell times.

Integrating transport offerings with supporting smart technologies can transform these precincts, creating more accessible, connected, and sustainable transit space, while also facilitating community engagement.

Key Smart Technologies

Integrated transport hubs are a natural occurrence in master planning, allowing residents or visitors to move seamlessly through the precinct via a range of transport options. Smart technology provides Council with the opportunity to bring these options together, encourage alternative transport modes, and enhance the amenity and usability of such locations.

Some key smart technologies often seen in integrated transport hubs include:

Digital Kiosks & Wayfinding

Digital wayfinding leverages technology to assist the community in conveniently accessing information about a specific area such as integrated transport hubs. Infrastructure such as digital kiosks, electronic display screens, smart furniture, and interactive maps linked to mobile applications, provide a convenient, visible and accessible mechanism by which users can engage with precinct information. This could include: local shops or cafes, real-time public transport updates, car share or micro-mobility options, or traffic data, ultimately streamlining processes for both transport providers and passengers.

Smart Parking

By combining sensor technologies and communication systems, real-time data on parking availability can be obtained. Smart parking helps to reduce traffic congestion around densely populated areas and busy transport networks. An example of this is Cumberland City Council's current application that provides real-time information on available handicapped parking spots in Council car parks. This application could be expanded for wider use across Westmead.

Electric Vehicle (EV) Charging

Electric vehicle (EV) charging stations are designated points at which EVs can be parked and recharged. The strategic implementation of EV charging stations at key public locations, such as carparks, integrated transport hubs, public parks, etc, helps facilitate the uptake of EVs, and promotes sustainable transport practices throughout the precinct.

Micro-Mobility

Micro-mobility transport options include e-bikes and e-scooters. The devices enable middle-distance and last mile-mobility, reducing community reliance on less sustainable transport options such as cars. Integrating micro-mobility transport options into the broader integrated transport network can help to alleviate traffic congestion, as well as reduce harmful emissions within the local community. Being easily accessible through mobile applications, residents are encouraged to participate in physical exercise, contributing to improved health and well-being outcomes.

Examples of Integrated Transport Hubs

Some notable examples of integrated transport hubs employing the above smart technologies are provided below.

Parramatta Transport Interchange, City of Paramatta

The Parramatta Transport Interchange is an example of an integrated transport hub, recently redeveloped to link train and bus connections, create easier access to pedestrian transit options, and improve passenger facilities. The Interchange is equipped with smart signage, providing passengers with real-time information and transport updates. It is also fitted with integrated digital platforms to facilitate smooth transfers between different modes of transportation. Additionally, the Interchange features a vibrant, pedestrian-friendly public space which connects the urban centre, contributing to improved accessibility. The Interchange is a termination point for the Liverpool-Parramatta T-Way, and provides a wide array of bus shelters, pedestrian paths, and various other modes of public transport integrated with central technology platforms. This delivers a coordinated and seamless transport experience to the Parramatta community.

Flinders Street Station Micro-Mobility Links, City of Melbourne

Melbourne's Flinders Street Station has transformed into a comprehensive integrated transport hub, linking commuters with public and active pedestrian transport options.

The area features e-scooters and e-bicycles which are available for public use, with dedicated cycle lanes supporting pedestrian mobility around the precinct and CBD.

The close linking of public transport options such as trains and trams with smaller-scale micro-mobility devices provides passengers with a range of transit options, and reduces reliance on vehicles in densely populated urban centres.

2. Connected Open and Green Spaces

Smart technology is highly valuable in the management and use of urban green spaces. Devices such as sensors and data platforms can enable Council to more efficiently manage water use and deliver maintenance services. These technologies help to ensure open and green spaces remain vibrant places for communities to visit.

Integrating smart technologies into green spaces can help support sustainability outcomes, including:

- Water management
- Efficient delivery of resources
- Green space analysis
- User safety
- User experience optimisation

Key Smart Technologies

By integrating smart technologies in existing green spaces, or embedding them in newly developed open spaces, sustainability outcomes can be enhanced, and Council's service delivery and resource management processes can be streamlined.

Some of the smart technologies used in connected green spaces include:

Smart Irrigation

Smart irrigation technology utilises sensors to share data about soil moisture, temperature, and ambient humidity. This information can be shared with a central data platform to provide real-time updates on water usage requirements and weather conditions.

By using the data provided by sensors, these systems enable efficient watering schedules for green and open spaces, facilitating efficient irrigation and reducing water wastage.

Smart irrigation also supports heat management by aiding in place cooling efforts.

Smart Street Furniture

Smart furniture refers to public infrastructure, such as benches, picnic tables, bus stops, desks etc which are equipped with device charging, internet connectivity and lighting and other capabilities.

Smart street furniture aims to enhance digital accessibility of cities by providing locations where communities can connect digitally.

Smart furniture may be equipped with solar panels to support the delivery of these technological services, promoting sustainable outcomes.

Examples of Connected Open and Green Spaces

Key examples of smart technologies being implemented to support connected open and green spaces include:

Bicentennial Park, Sydney Olympic Park

Bicentennial Park has implemented the Smart Irrigation Management for Parks and Cool Towns (SIMPaCT). This technology integrates environmental monitoring processes with artificial intelligence (AI) to analyse soil moisture and air temperature alongside weather forecasts. In doing so, SIMPaCT predicts the most effective watering schedule for the park.

This not only minimises water wastage but enhances the park's appeal by optimising its cooling features and delivering cooler spaces. The system also alerts authorities to potential environmental factors that could affect the area, such as urban heat.
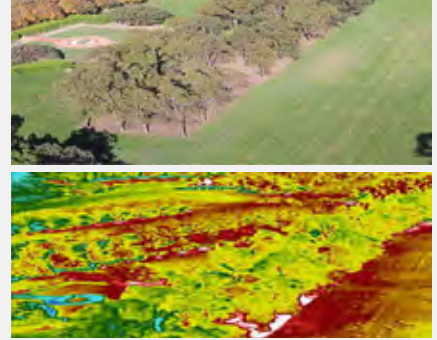
Smart Solar Benches, Yarra City Council

Yarra City Council have implemented a range of smart solar benches across the local government area. The benches use environmental sensors to gather real-time data about air quality, temperature, and humidity, which are then shared with Council.

Powered by solar energy, the benches also provide Wi-Fi hotspot and device charging for users, promoting sustainability as well as community connectivity.

3. Connected Town Squares & Community Precincts

Central town squares and precincts serve as focal points for community aggregation. By seamlessly integrating these spaces with modern and evolving smart technologies, Council can create unique urban environments that draw both locals and visitors. These versatile hubs are designed to be multifunctional, offering opportunities to strengthen key smart city principles like community culture and identity.

Key Smart Technologies

Implementing smart technologies within community hubs can help to create central spaces that foster community exchange, the sharing of ideas, and community connection.

Additionally, when creating connected community precincts, incorporating smart technologies can support ongoing education about the significant history and storytelling of the First Nations people in the area. For instance, using QR codes that the community can scan and access this information, and take part in celebrating and honouring the First Nations' heritage and culture in Westmead.

Examples of smart technologies that support connectedness in town squares and community precincts include:

Place Utilisation Analysis

Precincts play a crucial role in community life, serving various purposes and providing opportunities for connection and expression. The key to their success lies in the adaptability and flexibility of these spaces to adjust to specific local needs.

Technologies such as CCTV with anonymised software overlays, and sensors, can provide real-time data about how the community are interacting with and using public spaces.

This information can be used to inform the management of other infrastructure, such as street lighting and the regularity of seating.

Digital Gamification

Gamification refers to technologies such as Augmented Reality (AR) and Virtual Reality (VR) which are used in conjunction with interactive mobile applications to provide place-specific games for the community.

Games might highlight the First Nations history or heritage of the precinct, important facts about the area, or encourage community connections and explorations.

Gamification technologies can also be delivered through smart furniture, digital wayfinding and signage, or interactive art displays.

Smart Safety and Security

While traditional security measures like CCTV and motion-sensor or ambient-sensor lighting are effective in the management of precincts, incorporating new, evolving technologies can enhance community safety in overlooked areas.

Initiatives such as a 'safe city' or 'precinct' platform, which centralises local issue reporting and provides real-time updates, may include features like a panic or emergency assistance button that promptly alerts authorities to potential incidents.

More broadly, IoT-enabled emergency response systems can monitor the precinct for risks such as fire or crime, ensuring timely alerts to appropriate authorities. This technology serves as both a rapid response system and a deterrent to crime in the area.

Examples of Connected Town Squares & Community Precincts

Key examples of smart technologies being used in practice to deliver connected town squares and precincts include:

City Symphony Application, Brisbane

The City Symphony mobile application uses AR to provide users with a personalised and place-specific soundtrack as they walk through various streets in Brisbane.

Applications such as this are likely to appeal to diverse demographics, promoting increased visitation to key sights in the area. In addition, it is likely to boost foot traffic throughout the city, enhancing local knowledge and exploration. Applications such as City Symphony highlight the positive impact gamification technology can have in engaging and connecting communities with their precinct.

YourGround NSW

YourGround NSW was developed in collaboration with Crowd Spot, Monash University, XYX Lab, and NSW Government, and identifies and shares areas that make communities feel unsafe.

The crowd mapping website encourages women and gender diverse people to pin safe and unsafe experiences, providing a platform to advocate for change, and data for local governments to act on.
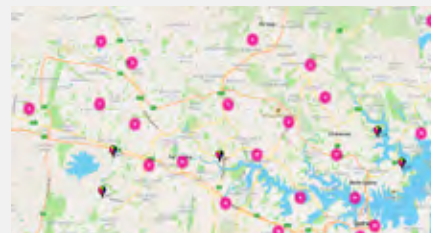
4. Smart Intersections

Smart intersections leverage advanced technologies such as AI with machine learning capabilities and sensors to understand traffic trends and conditions and alter variables to support traffic efficiency and safety.

Key Smart Technologies

Incorporating smart technologies, allows government to pinpoint and resolve common traffic issues. This can help improve traffic flow, reduce congestion, and enhance safety for all road-users.

Some key smart technologies commonly used throughout smart intersections include:

Smart Traffic Lights and Sensor Technologies

Smart traffic lights use real-time data monitoring and radar sensors to dynamically adjust their timing schedules and optimise traffic flow. This technology is particularly effective in easing congestion during peak hour or in response to traffic accidents.

Additionally, specific traffic lights can be programmed to establish connections with emergency service vehicles and identify large freight vehicles. This ensures these vehicles receive priority at intersections, reducing the risk of significant delays. Additional functionality could be considered to identify cyclists or other micro mobility modes to enhance safety.

This technology is best suited to the NSW Government who coordinate traffic management, however exploration of partnership opportunities with the Coordinated Adaptive Traffic System currently being used across Sydney could be beneficial.

Communication Infrastructure

Dedicated Short Range Communication (DSRC) is a technology that extends the capabilities of Wi-Fi to facilitate communication between vehicles as well as between vehicles and infrastructure within the confines of an intersection environment.

DSRC considers future transport modes such as autonomous vehicles that could communicate and analyse key intersection data.

Examples of Smart Intersections

Some key examples of these smart intersection technologies being implemented in practice include:

The 'Intelligent Corridor', Nicholson Street, Carlton

Nicholson Street in Carlton, Victoria, leverages sensors, cloud-based AI, predictive models, real-time data, and machine learning algorithms to enhance the efficiency of traffic flow.

This coordinated approach to intersection management not only ensures optimal conditions for pedestrians, cyclists, and motorists but also helps to reduce vehicle-related emissions.
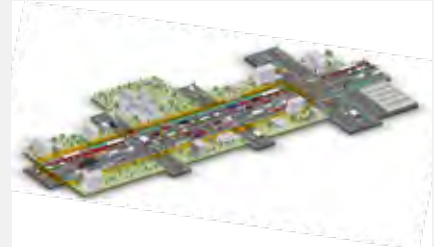
Ipswich Connected Vehicle Pilot

The Queensland Government and Ipswich City Council collaborated with various entities to conduct a trial of Cooperative Intelligent Transport Systems. This system utilised sensor technologies connected to infrastructure, such as DSRC, enabling vehicle-to-vehicle and vehicle-to-infrastructure communications for sharing road awareness messages including:

- In-vehicle speed
- Red light warnings
- Road hazard warnings
- Back-of-queue warnings
- Turning warning for bicycles and pedestrians
- Road works warnings

This trial, which took place in 2020-2021, revealed that incorporating this technology could reduce collisions on the road by up to 20%. The success of the pilot project prompted the inclusion of a commitment in Queensland's updated Road Safety Strategy to implement smart infrastructure state-wide, in a bid to improve road safety.

5. Sustainable and Environmental Initiatives

Environmental sustainability is a key priority for Council and is a core consideration in the ongoing development and renewal of Cumberland and Westmead South. Smart technology can provide sustainable solutions, but also help measure, analyse, and adjust activities to best meet Council's broader environmental objectives. Council as a part of their broader Master Plan have engaged four proposed initiatives regarding this area:

• Intelligent Building Management System (BMS)

• Virtual power plants

• Community batteries

• Digital tools for assessing Urban Heat-Island Effect

These projects alongside other proposed smart technologies can help facilitate the achievement of Council's wider sustainable and environmental initiatives.

Ecologically Sustainable Development

ARUP has developed an Ecologically Sustainable Development Options Paper to inform the Westmead South Master Plan. This Options Paper overlaps and aligns with a range of the technologies explored in this Summary and accompanying documents.

While initiatives such as community batteries, and virtual power plants could be considered from a smart city perspective, they lie primarily in the energy policy and infrastructure domain, and hence are best discussed between Council, NSW Government, and utility companies. In the context of this Summary, smart energy technologies are recommended as they apply within the public domain.

Additionally, Intelligent Building Management Systems (BMS) have been considered from a place-based Council-influenced perspective (e.g. asset and facility management). Application of BMS in the broader domain could be considered from a policy, reform, or guidelines perspective for private buildings.

Key Smart Technologies

Smart technologies may promote the involvement of the community in pursuing environmental objectives, engaging members in sustainability practices, and demonstrating Council's inclination to do the same. Smart technology effectively monitors environmental conditions, supporting the sustainable allocation of resources, and improving daily practices around waste management and emissions reduction.

Key smart technologies which help promote sustainable practices include:

Smart Waste and Service Personalisation

Smart personalised waste collection can be facilitated by creating a request platform where residents can specify their waste needs, such as hard waste disposal. If an area generates enough requests, Council can organise targeted collections, saving costs and time.

Another example is the implementation of a collaborative consumption or sharing platform. This digital space allows community members to exchange items, optimising the lifespan of goods and minimising unnecessary waste easily, centrally, and safely. These platforms encourage more sustainable and resource-efficient ways of managing community waste.

Environmental Sensors

Sensors can be installed in various locations to detect a range of environmental conditions, such as air quality, humidity, temperature, and precipitation. Sensors provide detailed data on conditions such as pollutants, carbon dioxide levels, water quality, and other potential threats to liveability and wellbeing. This information plays a crucial role in not only analysing and responding to environmental trends but also evaluating public health risks in the area. Other sensors measure the intensity of sound in community spaces, including industrial and traffic noise and volume from community events. This information can be tracked over time, helping to inform decision-making about scheduling events or works to prevent significant disruptions within the community. Smart irrigation, water monitoring systems and other automated asset management systems also leverage sensors to respond to real-time trends and conditions, keeping Council and community up to date on potential weather hazards in drought and flood prone areas.

Smart Waste Management Systems

Smart waste management systems leverage various technologies to enhance efficiency and accuracy within the waste collection and disposal process. Sensors in smart bins provide information to collection agents on the real-time capacity of bins, notifying authorities when bins require collection. Information can also be provided to the community to deliver guidance on correct waste disposal practices. Additionally, smart bins often feature advanced compacting capabilities, enabling more waste to be accommodated before collection. Smart recycling stations, and the increased adoption of initiatives like New South Wales 'Return and Earn', serve to streamline and simplify the recycling process, improving community accessibility through interactive displays or guides, and accessible collection points. Smart recycling stations employ sensors to monitor bin fill levels and sort recyclables, improving system efficiency.

Examples of Sustainable and Environmental Initiatives

Some key smart sustainable technologies that have been successfully trialled and implemented include:

Smart Bins, Merrylands Civic Square

Smart bins have been successfully deployed throughout Merrylands Civic Square. These solar-powered smart bins are equipped with compacter capability, enabling them to store greater volumes of waste and notify Council when they are approaching full, optimising waste collection services. Smart bins have improved the efficiency of waste collection processes across Merrylands, and reduced overflow and maintenance requirements.

Smart Recycling System, Hong Kong

Hong Kong has introduced smart recycling stations that utilise IoT and sensor technologies. These stations encourage self-service recycling and include a rewards system to incentivise proper disposal waste. The community earn points that can be redeemed for discounts on everyday items.

6. Community and Social Connection

Smart technologies have the capacity to encourage interactive engagement from community members within precincts. By providing information about community events, organisations, and local updates, outreach and inclusivity may be improved, promoting involvement in community activities and engagement with others.

Technology-Free Zones

As the digital age continues to evolve, promoting social connection through technology is becoming increasingly prominent. However, it is important to acknowledge that technology is not always the answer to fostering social inclusion. Technology-free zones can encourage spending time away from devices, outdoors, and may promote wellbeing and social inclusion in communities. This concept could be explored when applying smart technology in Westmead South.

Key Smart Technologies

Deploying smart technologies in community spaces can contribute to connectedness and foster social cohesion through initiatives such as digital community bulletin boards, smart/interactive playgrounds, digital arts, and cultural heritage and storytelling.

Some of the following smart technologies may support enhanced social connectedness and cohesion:

Digital Signage and Community Bulletin Boards

The use of dynamic signage serves as an effective way to promote outdoor activities and facilitate simple wayfinding in open green spaces. This ensures timely information about events, reducing the risk of community members missing out. Furthermore, the technology aids in directing individuals to specific spaces, whether they are seeking shelter, transport, or services.

Additionally, it is evident that over time community bulletin boards have been a focal point for local information, engagement, and activity promotion. By digitising and strategically placing them in key open spaces or community precincts, people can effortlessly access information, announcements, calls to action, and upcoming events in a subtle yet effective manner.

Smart Playground Equipment

The inclusion of interactive play equipment featuring technology such as touch-sensitive panels, lights, AR games, or educational content related to the area may prove beneficial in public playgrounds. This promotes enhanced usage of playground equipment and in turn, public spaces.

Interactive playground technologies encourage a stronger sense of engagement by fostering active play and childhood wellbeing.

Examples of Promoting Social Connection

Key examples of technology used in promoting community wellbeing, social connection, and community-focused outcomes include:

Community Digital Noticeboard, Federation Council

Federation Council has introduced digital noticeboards across Corowa in New South Wales. These noticeboards are available for free use by not-for-profit organisations, community groups, and local sporting clubs to promote events, projects, and programs accessible to the community.

This initiative encourages community members to seize local opportunities, step outside, engage with surroundings, and contributes to improving the local economy and optimising space utilisation.

On a larger scale, Federation Square in the City of Melbourne features a three large scale screens which display content 24/7. The content of these screens is curated for particular events and features art, live news, sporting and cultural events.

UV Smart Cool Playground Project, Cumberland City Council

In partnership with Western Sydney University, Cumberland City Council recently retrofitted the Memorial Park Playground with updated technological features, to improve thermal comfort for children and families using the space.

Following a heat mapping study, Council introduced heat resistant materials, additional water access points, an improved green canopy, and educational materials, to deliver a more sustainable, protective, and future-focused playground for Cumberland's community.

Interactive Way Finder Signage, Sunshine Coast Council

The Sunshine Coast Council has introduced interactive wayfinding signage throughout the Maroochydore City Centre. This signage is designed to enhance navigation for both locals and tourists, streamlining their interaction with the community. By doing so, it promotes more efficient engagement with community resources and local businesses.

In turn, this stimulates activity within the local economy and directs individuals to potentially overlooked areas that offer valuable opportunities. Additionally, the signage serves as a source of information about community resources and smart technologies that can further enrich their local experience.

Appendix D: Background Research and Contextual Analysis

Westmead South Smart City Study

Prepared by Delos Delta for Cumberland Council

April 2024

Contents

Delos Delta

Acknowledgment of Country

Cumberland City Council acknowledges the Traditional Custodians of the land on which Cumberland stands, the Darug People, and pays respects to elders past, present and emerging.

We acknowledge the Aboriginal and Torres Strait Islander Peoples as the First Peoples of Australia.

Cumberland City Council also acknowledges the Aboriginal and Torres Strait Islander Peoples living in the Cumberland Local Government Area and reaffirms the important work with all Aboriginal and Torres Strait Islander Communities to advance reconciliation.

Introduction

The City of Cumberland have engaged Delos Delta to deliver a *Smart City Study* (the Study) to guide the integration of best practice smart city principles in Westmead South via the *Westmead South Master Plan* (the Master Plan). The insights and outcomes of this Study may also have broader applications to future precinct developments.

This Background Research and Contextual Analysis Report (the Report) summarises key informing documents and research relevant to the integration of smart places in Westmead South. It forms the foundation of the Study by consolidating critical policies and standards and establishes a framework through which technologies can be organised and prioritised.

This Report contains a review of relevant literature, an overview of smart place case studies, and a summary of critical success factors. It consolidates these findings with best practice standards and guidelines to provide a recommended list of relevant principles and practices to guide technology integration. These principles and practices form the smart city foundations through which technology will be prioritised in the Study.

Key sections of this report include:

- Literature review
- Case studies
- Best practice foundations
- Key findings and results

The findings of this Report were used to guide engagement with the Project Working Group in order to consolidate the vision, direction, and desired outcomes for smart city integration in Westmead South.

This Appendix provides a clear guide to the foundations and concepts underlying the broader Study.

1. Literature Review

This section presents a summary of high priority literature relevant to the implementation of smart infrastructure in Westmead. Brief summaries of the key information of each document and critical learnings are included.

1.1   Regional Literature

The City of Cumberland is a focus for regional planning and coordination. Documents guiding regional direction for smart technology consideration in Westmead South include:

TABLE 1.   SUMMARY OF REGIONAL STRATEGIES AND PLANS RELEVANT TO WESTMEAD SOUTH

Document	Source	Year	Key Information
Greater Sydney Region Plan: A Metropolis of Three Cities	Greater Sydney Commission	2018	• Outlines the future vision for Greater Sydney Region • Seeks to distribute service equitably across region • Identifies investment in a variety of future-proofed infrastructure and services • Discusses structural and service-based requirements needed to accommodate future growth
Our Greater Sydney 2056: Central City District Plan	Greater Sydney Commission	2018	• Intended to guide implementation of Region Plan • Assists councils with planning for growth • Outlines 22 priorities for Central City District • Supporting the achievement of a liveable, productive, and sustainable District
Six Cities Region Discussion Paper	Greater Cities Commission	2022	• Outlines a transformation plan of Six Cities Region toward a dynamic global city • Key outcomes towards economic development, infrastructure, sustainability, and quality of life • Key elements that may inform approach taken when adopting smart infrastructure

1.2   State Government Literature

The NSW Government has established itself as a smart places leader, providing a range of resources to support technology uptake in NSW. Literature containing key directions from the State Government for consideration in Westmead are summarised in the table below.

TABLE 2.   SUMMARY OF STATE STRATEGIES AND PLANS RELEVANT TO WESTMEAD SOUTH

Document	Source	Year	Key Information
Smart Places Strategy	NSW Government	2020	• Positions NSW Government to engage in collaboration with local governments in plans for Smart Places • Outlines clear values and priorities among skills, safety, environment, equality, and health • Highlights the need for clear foundations, partnerships, and programs in smart city development

SmartNSW Roadmap 2022-2027	Transport for NSW	2022	• Importance of digital literacy and upskilling in smart places
			• Key targets in:
			  o Social cohesion
			  o Biodiversity
			  o Reducing congestion
			  o Urban heat
			  o Carbon emissions
			  o Zero-waste

Staying Ahead: State Infrastructure Strategy 2022-2042	Infrastructure NSW	2022	• Aids in the direction of infrastructure growth and development • Highlights the value of smart infrastructure investments
NSW Public Space Charter: Ten Principles for Public Space in NSW	NSW Department of Planning, Industry and Environment	2021	• Framework of principles to ensure high-quality public spaces • Reflect priorities surrounding climate, landscape, amenity, population density and social/cultural demographics
Deploying Multi-Functional Poles – Technical Guidance	Cities and Active Transport	2023*	• Proposed deployment method of MFPs in public spaces • Outlines services that could be incorporated into the modular design of MFPs • Outlines considerations for implementation

1.3 Cumberland City Council Literature

Westmead South will be guided by the direction and objectives set by Council and its local planning agenda. This section summaries key Council documents relevant to the integration of smart technology in Westmead South.

Document	Source	Year	Key Information
Community Strategic Plan 2017-2027	Cumberland City Council	2017	• Outlines the direction of the Cumberland area and community over 2017-2027 through illustrating key priority areas
Cumberland 2030: Our Local Strategy Planning Statement	Cumberland City Council	2020	• Articulates the land use planning vision for Cumberland, outlines the unique characteristics of the area, identifies shared values, directs the management of future growth and change, implements relevant plans, and identifies and further strategic planning needed
Smart Places Strategy and Action Plan	Cumberland City Council	2023	• Integration of innovation, technology, and data to enhance safety, connectivity, and accessibility • Promotion of inclusivity, diversity, and unique context • Driving sustainability and enabling a vibrant, attractive, and efficient region
Cumberland Cultural Plan 2019-2029	Cumberland City Council	2019	• Roadmap for how cultural outcomes can be collectively achieved by Council in future development projects like Westmead South • Outlines the key priorities and actions needed to ensure a continuously evolving, supportive, culturally active, and vibrant community
Cumberland Employment and Innovation Lands Strategy 2019	Cumberland City Council	2019	• Establishes a framework for employment and innovation lands management over a ten-year period, by identifying key strategic considerations in Cumberland to support ongoing actions • Outlines key focus areas and their subsequent actions which must be considered in the development of the Precinct
Cumberland City Council Open Space and Recreation Strategy 2019-2029	Cumberland City Council	2019	• Establishes a clear ten-year direction for open space, sport/recreation services, and facilities by outlining guiding principles and strategic directions • Particularly discusses increasing the quality and capacity of existing open space and recreation facilities, and protecting the natural environment and increasing resilience
Cumberland Community Facilities Strategy 2019-2029	Cumberland City Council	2019	• Ensure that the development of community facilities meets growing and changing interests, aspirations and needs of Cumberland • Outlines key principles and actions to support the achievement of this goal

Cumberland Local Infrastructure Contributions Plan 2020	Cumberland City Council	2020	• Outlines the authorisation process of Council or an accredited certifier to impose conditions on Development Consent or Complying Development Certificates requiring 7.11 contributions or 7.12 fixed levies from development under the EPA • Outlines some implications for local infrastructure that should be accounted for in development
Cumberland City Council Submission on the Sydney Metro West Stage 3 EIS	Cumberland City Council	2022	• Provide feedback to the NSW Government on the Environmental Impact Statement released for the Sydney Metro West project

1.4   Precinct-Specific Literature

Westmead South has been flagged as a precinct of local, state, and regional opportunity. Below are summaries of literature relating specifically to the Westmead South Precinct.

TABLE 4.   SUMMARY OF KEY WESTMEAD SOUTH STRATEGIES, STUDIES, AND PLANS

Document	Source	Year	Key Information
Westmead Place Strategy 2036	NSW Department of Planning, Industry and Environment	2022	• Aims to provide a guideline for the future transformation of Westmead into a leading innovation, education, and health precinct by 2036 • Outlines five 'Big Moves' and twelve corresponding directions to inform the future planning process of Westmead South • Aligns with the Environmental Planning and Assessment Act (EPA), which governs areas of planning administration, development assessments, community amenities, heritage preservation, open spaces, and place-based sustainability
Westmead Place-Based Transport Strategy	Transport for NSW	2022	• Outlines and establishes the case for greater public and active transport connections across Westmead, to better service the community and local economy • The vision of the strategy is grounded in principles of connectivity, productivity, liveability, and sustainability, directly transferable to principles that may inform future developments
Westmead South Land Use Capability Study	SGS Economics Planning and Hill Thalis	2021	• Analyses how future housing and employment can be accommodated in future developments to ensure Westmead South continues to become a more liveable and sustainable place • Provides a clear framework and relevant scenarios for suitable and liveable development that may occur with Council's future development
Westmead South Community Needs and Social Infrastructure Assessment	GHD	2022	• Determine appropriate amendments for social infrastructure and housing affordability to support the provision, funding, and delivery of social infrastructure in reflection of the NSW Department of Planning and Environment's vision across Westmead South • The Report outlines relevant opportunities to the smart development of the Precinct, particularly regarding social, cultural, and local empowerment, as well as amenity and infrastructure
Westmead South Centre Traffic and Transport Study	SCT Consulting	2022	• Provide transport initiative recommendations in consideration to land use and planning outcomes in the Westmead South corridor based on evidence of current traffic and traffic modelling for potential growth

2. Case Studies

This section outlines six case studies of various Councils and precincts in New South Wales and beyond that have successfully adopted a smart places approach. It explores key smart places components employed in each case and examines their resulting impacts and outcomes.

2.1   City of Parramatta, Parramatta Square Precinct

In 2015 the City of Parramatta endorsed their Smart City Masterplan, which has since been refreshed to reflect the changing urban challenges.[1]   This Masterplan has guided their integration of smart technologies across a range of precincts in the city, including the Parramatta Square Precinct.

2.1.1   Key Smart City Components

Paramatta Square is home to a range of commercial, government and university buildings with a dynamic community space for social, entertainment, event, and festival activities. Notable smart city components seen in the Parramatta Square Precinct are provided in the table below.

TABLE 5.   SMARTY CITY COMPONENTS IN PARRAMATTA SQUARE PRECINCT

Smart City Component	Elements	Impacts and Outcomes
Smart Parking	- Mobile application 'Parramatta Parking Finder' - Input destination, outputs close parking spots	- Improve traffic flow, reducing travel times in the city - Convenience for community, positive Council engagement - Real-time data and insights to identify trends in peak usage
Free Public Wi-Fi	Accessible Wi-Fi for visitors of Parramatta Square Precinct's common areas	- Convenience for community to stay connected - Economic benefit of city promotion when signing up
Smart Planning	70 environmental sensors that monitor temperature, humidity, air quality, noise, and stormwater	- Ability to capture, analyse and visualise local environmental data - Information allows action on environmental challenges that affect the community, especially climate responsive areas

[1] City of Parramatta (2015) *Smart City Masterplan*, report to the Parramatta City Council, accessed 4 October 2023. https://www.cityofparramatta.nsw.gov.au/sites/council/files/2018-12/PCC_Smart_City_Masterplan-12.08.15S.pdf

2.1.2   Key Lessons and Critical Success Factors

Key observations and lessons from the Paramatta Square Precinct smart technology integration that could be applied in Westmead South include:

Citizen-Centred Approach	Data-Driven Decision-Making
The adoption of public Wi-Fi demonstrates a commitment to community connectivity and betterment. It promotes the importance of taking a centralised approach to the needs of the community, with the added benefit of Council promotion.	The City of Parramatta has adopted the use of smart technologies that adapt data and insights to improve decision-making within future Council plans, supporting efficiency in projects.

2.2   City of Newcastle, Smart City

The City of Newcastle adopted a Smart City Strategy in 2017 to improve liveability, sustainability, and economic diversity through digital transformation.[2] At the centre of their strategy is a people-centred approach jointly promoting community and smart technology.

2.2.1   Key Smart City Components

The City of Newcastle have taken a whole-of-city approach to their smart city program. As a smart city, notable smart technology components seen in the City of Newcastle are provided in the table below.

TABLE 6.   SMARTY CITY COMPONENTS IN CITY OF NEWCASTLE

Smart City Component	Elements	Impacts and Outcomes
Smart Parking	• Mobile application Easy Park • Provides real-time information into parking availability, payment, and extensions	• Improve traffic flow, reducing travel times in the city • Convenience for community, positive Council engagement • Real-time data and insights to identify trends in peak usage
Smart Poles	• Provides access to free Wi-Fi • Access to real time environmental data • Efficient street lighting	• Convenience for community to stay connected (Public Wi-Fi) • Economic benefit of city promotion when signing up (Public Wi-Fi) • Saving energy costs on lighting • Environmental data can gauge soil moisture, air quality
IoT Sensor Lab	• Integrated product that provides sensor access to the City Centre	• Address city challenges and prototype new technologies based on data gathered
City Mobile Application	• Mobile application that provides a directory of relevant City information	• Information about 'what's on', and available facilities, announcements etc. can be promoted to the community • Easily accessible

[2] Newcastle City Council (2017) *Newcastle City Council: Smart City Strategy 2017-2021,* report to the City of Newcastle, accessed 4 October 2023.
https://newcastle.nsw.gov.au/Newcastle/media/Documents/Strategies,%20Plans%20and%20Policies/Strategies/2752_Smart-City-Strategy-FINAL-WEB.pdf

2.2.2 Key Lessons and Critical Success Factors

Key observations and lessons from the City of Newcastle's smart technology integration that could be applied in Westmead South include:

Citizen-Centred Approach	Data-Driven Decision Making
The City of Newcastle highlight the importance of community engagement in smart city development, and the subsequent prioritisation of their feedback when implementing smart technologies. This is an effective way to ensure maximum citizen satisfaction throughout the project's development.	The use of smart parking and poles enable the City of Newcastle to make informed decisions that optimise city services based on data insights. This lesson illustrates the importance of collecting data through smart technology to optimise resource allocation, ultimately improving Council provision of services.

2.3 Lake Macquarie, Smart City

Beginning in 2016, Lake Macquarie Council has engaged with their community to begin integrating smart technologies in key locations, aiming to become a more connected, sustainable, and innovative city.[3]

2.3.1 Key Smart City Components

Lake Macquarie have a range of LGA-wide initiatives that build on the strong connectivity foundations established. Key smart city components seen in Lake Macquarie are provided in the table below.

TABLE 7. SMARTY CITY COMPONENTS IN LAKE MACQUARIE

Smart City Component	Elements	Impacts and Outcomes
Electric Vehicle (EV) Charging	• Stations located at parking points throughout the city where EVs can recharge	• Promoting EV transition, reducing emissions throughout the community • Generate revenue through fees and taxes that can be reinvested into other infrastructure
Smart Waste	• Embedded Food Organics, Garden Organics (FOGO) service • Procurement standards for reuse of recycled materials	• Reduction in landfill waste • Lower greenhouse gas emissions • Public awareness and education of recycling • Regulatory compliance with Council initiatives
Smart Energy	• Community-led solar uptake • Solar panels on public and Council facilities • LED streetlights	• Greater grid stability, the more solar panels are implemented • Lower energy costs for Council and community • Energy efficiency, improved lighting quality
Smart Hub Workspace	• Platform DaSH (www.dashcowork.com) • Modern co-working, private office, virtual office, and meeting room hire for residents	• Encourage community engagement and participation, greater networking and collaboration • Access to community amenities • Urban revitalisation of precinct

[3] Lake Macquarie City (2016), *Lake Mac Smart City, Smart Council*, report to the Lake Macquarie City Council, accessed 4 October 2023. https://shape.lakemac.com.au/smart-city

2.3.2 Key Lessons and Critical Success Factors

Key observations and lessons from Lake Macquarie City Council's smart technology integration that could be applied in Westmead South include:

Citizen-Centred Approach
A prominent lesson from this case study is the importance of active community engagement when implementing smart technology. Through robust community input, Council was able to align their implementations with the needs of residents, underscoring the significance of co-creation when building a smart precinct.

2.4 City of Adelaide, Smart City

As one of the world's top 7 smart cities in 2020, the City of Adelaide has been leading innovation and technology integration in their precincts and communities.[4] The City have strategically invested in network connectivity projects, aiming to establish Adelaide as the most connected city in Australia.

2.4.1 Key Smart City Components

Building on over a decade of investment in digital infrastructure, partnerships and connectivity, notable smart city components seen in the City of Adelaide are provided in the table below.

TABLE 8.   SMARTY CITY COMPONENTS IN CITY OF ADELAIDE

Smart City Component	Elements	Impacts and Outcomes
Public Wi-Fi	• Fast paced, readily available network access to community	• Provides platform for efficient delivery of services
Smart Parking	• Parking Adelaide Mobile App that links 2800 in-ground sensors to a mobile application	• Allows visitors to find available on-street parking bays, pay and then extend parkin sessions remotely • Reduces traffic congestions • Convenience for community
Smart Bins	• Network sensors and solar-powered compact bins in high traffic areas	• Efficient was collection, leading to greater cost savings and time management • Reduced overflow and litter
Smart Poles/Lighting	• Network of interoperable multi-function poles with sensors	• Can easily trial new technologies • Provide Wi-Fi access points
IoT Technology	• Devices connected to the IoT can monitor the environment, Council assets and the way the community uses the city	• Leads to greater sustainable and efficient management of resources • Provides greater access to data driven insights to adapt and change to

[4] City of Adelaide (2023), *Smart City Adelaide*, The City of Adelaide, accessed 4 October 2023. https://www.cityofadelaide.com.au/about-adelaide/smart-city-adelaide/

2.4.2 Key Lessons and Critical Success Factors

Key observations and lessons from City of Adelaide's smart technology integration that could be applied in Westmead South include:

Coordination and Collaboration
The key lesson from the Smart City Adelaide case study is the importance of ensuring and fostering continuous collaboration among multiple and diverse stakeholders. Adelaide's immense success can be largely attributed to the facilitation of effective coordination between the City and private sector companies. In doing so, the expertise of these organisations can be effectively leveraged to deliver the best possible smart technology outcomes.

2.5 City of Monash, i-Sense Oakleigh Precinct

A collaboration between Monash Council and Monash University, i-Sense Oakleigh is a Smart Connected Precinct that provides a range of smart technologies around the suburb of Oakleigh.[5] It aims to build a precinct underpinned by advanced sensors and data communication networks.

2.5.1 Key Smart City Components

The technologies integrated in the precinct build on Council's ability to analyse and improve productivity, accessibility, and liveability for their community. Notable smart city components in the i-Sense Oakleigh Precinct are provided in the table below.

TABLE 9. SMARTY CITY COMPONENTS IN I-SENSE OAKLEIGH PRECINCT

Smart City Component	Elements	Impacts and Outcomes
Connected Internet of Things (IoT) Platform	• Sense, collect and analyse relevant data • Sensors to collect and fuse data on community mobility	• Improve community liveability • Improve use of public spaces, e.g., parking
Smart Poles/Lighting	• Base for the smart connected sensing array platform	• Reduction in energy and carbon emissions • Lowers electricity and maintenance costs • Improves lighting conditions at night increasing public safety
Smart Bins	• Bins have sensors that send messages requesting service when needed	• Reduction in collection costs • Productivity improvements • Optimised scheduling of garbage trucks • Contributes to greater urban cleanliness

2.5.2 Key Lessons and Critical Success Factors

Key observations and lessons from the City of Monash and Monash University's smart technology approach that could be applied in Westmead South include:

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[5] City of Monash and Monash University (2023) *i-Sense Oakleigh: The Smart Connected Precinct,* report to the City of Monash, accessed 4 October 2023. https://www.monash.vic.gov.au/Planning-Development/Council-Projects/i-Sense-Oakleigh-The-Smart-Connected-Precinct

Data-Driven Decision-Making	Environmental Sustainability
This case study highlights the importance of utilising data and advanced sensor technologies to inform decision-making throughout the precinct. Through the IoT network this also promotes informed decision-making toward community liveability and the use of public spaces.	The i-Sense Oakleigh precinct promotes the effectiveness of sustainable smart technologies to contribute to effective and efficient use of Council services and public assets.

2.6 Barcelona City Council, Digital City

As one of the most prominent smart cities in the world, Barcelona has been at the forefront of implementing smart technologies to continuously adapt to evolving society needs.[6]

2.6.1 Key Smart City Components

Barcelona have seen the evolution of smart technology approaches and have adapted over time to critical lessons, taking a strategic, coordinated, and prioritised approach. Key projects that have contributed to the long-term success of Barcelona as a smart city are noted in the table below.

TABLE 10. SMARTY CITY COMPONENTS IN BARCELONA

Smart City Component	Elements	Impacts and Outcomes
IoT Platform	• Municipal platform 'Sentilo', with managed sensors and actuators relaunched and expanded across the City • Mobile application with real-time information gained	• Promotes information on attractions, events, and transportation available
Smart Irrigation	• Using Supervisory Control and Data and Data Acquisition (SCADA) technology to extend irrigation to be supported by information systems • Weather data and soul sensors to optimise watering schedules	• Reduced water usage by 25% • Improves efficiency on fixing potential issues • Saves Council costs by forgoing prior excess water usage and energy losses
City Digital Platform	• CityOS is a transversal platform for management and analysis of city data	• Data governance, quality controls, privacy, and security of City Council data • Management of internal City Council data and external agencies under municipal control
Open Data Ecosystem	• Storage infrastructures and support tools to work with data acquired from IoT	• Promotes use and discover of new sets of data • Transparent, open, and accountable city data infrastructure

[6] Barcelona City Council (2016) *Mesura de govern: Transició cap a la Sobirania Tecnològica*, report to the Barcelona City Council, accessed 3 October 2023. https://ajuntament.barcelona.cat/digital/sites/default/files/pla_ciutat_digital_mdgovern.pdf

2.6.2   Key Lessons and Critical Success Factors

Key observations and lessons from the City of Barcelona's smart technology approach that could be applied in Westmead South include:

Defining Clear Objectives/ Data-Driven Decision-Making
The City of Barcelona's comprehensive Digital City Strategy highlights the importance of identifying and pursuing clear objectives in the implementation of smart technologies. It is evident throughout the Strategy that open and transparent access to the IoT and acquired data is its clear purpose, subsequently moulding implementations to align with that prospective goal.

3. Best Practice Foundations

This section details best practice foundations as they relate to the development of the Westmead South Precinct. Best practice foundations have been drawn from key literature reviews, best practice case studies, and relevant standards. These best practice foundations have been organised across four themes:

- People
- Place
- Technology
- Governance

3.1 People: Best Practice Foundations

Foundations identified under the theme of 'people' refer to the community-based outcomes, impacts or benchmarks technology aims to achieve. This could include how people interact with a space, Council, or each other within the Precinct.

TABLE 11. BEST PRACTICE FOUNDATIONS FOR 'PEOPLE'

Foundation	Description	Rationale	Source
Citizen-centric technology	Community needs, values, and priorities lead and determine which smart technology is introduced, as well as when and how.	Technology introduced for the sake of technology often fails to address community needs or solve real problems. Implementation of technologies that are not required, or do not make direct contributions to the community, can unnecessarily burden the finances of government.	- Lake Macquarie Smart City - City of Newcastle - Cumberland Community Facilities Strategy 2019-2029
Community engagement and co-creation	A smart place is designed on behalf of residents, stakeholders, and the broader community with mechanisms for ongoing engagement and feedback.	Digital technology should be deployed in line with community expectations to address challenges and further strengths. Smart places should also consider ongoing place-based feedback and engagement mechanisms to support rapid response to issues.	- NSW Government Smart Places Customer Charter - Cumberland Cultural Plan 2019-2039
Gamification and activation	Gamification refers to the ability to promote activation of spaces by creating 'games' out of everyday activities, or simply to encourage excitement and fun.	Smart technologies can support the convenience of activities and services, with the added bonus of 'gamifying' them. They can also be used to encourage place activation through engagement with users.	- NSW Public Spaces Charter - Cumberland Cultural Plan 2019-2029

Identity and culture	Smart places embrace the history and culture of a place, including recognition of Traditional Owners and First Nations culture. Local diversity is celebrated, allowing both individuals and collectives to identify with a place.	Cumberland is home to a culturally diverse community and rich cultural heritage, including First Nations heritage. Smart technology can encourage appreciation, celebration, and engagement with culture and identity at an individual and community level.	• NSW Public Spaces Charter • Cumberland Cultural Plan 2019-2029
Outcomes-based technology choice	Outcomes-based technology choice refers to Council's approach to the prioritisation and selection of technologies focused on the impact or benefit they are hoping to achieve.	The digital marketplace is constantly evolving with vendors selling 'new and shiny' products. Being clear about the outcomes you are aiming to achieve through technology integration provides Council with a clear direction when conversing and procuring technology options.	• Walker, Jarrett, Human Transit: How clearer thinking about public transit can enrich our communities and our lives • ISO/TS 37107:2019 (E); Sustainable cities and communities – Maturity model for smart sustainable communities • Westmead Place-Based Transport Strategy
Safety (physical)	Smart technologies such as CCTV, lighting, speakers, and predictive analysis, where appropriate.	Smart technologies can help maintain safety in public spaces, helping communities feel more secure.	• NSW Government Smart Places Strategy • AS ISO 37122:2020; Sustainable cities and communities – Indicators for smart cities • ISO/TS 37107:2019 (E); Sustainable cities and communities – Maturity model for smart sustainable communities • Westmead Place Strategy 2036 • Westmead Place-Based Transport Strategy
Service personalisation	Data and technology provision can support Council to deliver targeted and tailored messaging and services to their community.	Personalised service provision improves convenience and efficiency of service delivery. Technologies could target services based on place information including the potential for on-demand delivery of transport or facility hire.	• Walker, Jarrett, Human Transit: How clearer thinking about public transit can enrich our communities and our lives
Social cohesion	Smart places are about social interaction, and social cohesion is important to ensure all people can participate in a place.	Supporting inclusion and social cohesion requires considered implementation of smart technology through data-driven planning and community consultation.	• ISO/TS 37107:2019 (E); Sustainable cities and communities – Maturity model for smart sustainable communities • SmartNSW Roadmap 2022-2027

| Wellbeing | Wellbeing refers to the overall quality of life for residents of a city or place, influenced by factors such as education, access to opportunities, and liveability. | When used safely and effectively smart technology can improve outcomes for citizens and improve wellbeing measures. | • ISO/TS 37107:2019 (E); Sustainable cities and communities – Maturity model for smart sustainable communities |

3.2 Place: Best Practice Foundations

Place-based foundations identify technology benchmarks that influence the infrastructure, design, and considerations of a place.

TABLE 12. BEST PRACTICE FOUNDATIONS FOR 'PLACE'

Foundation	Description	Rationale	Source
Accessibility	Public spaces should be culturally, physically, and socially accessible and technology can help people connect with public spaces to allow this.	Digital technology can be used in the design, planning, communications, and implementation of public spaces to ensure they are accessible across a diverse range of users.	• NSW Government, Smart Public Spaces Guide • NSW Government, Smart Places Design Technical Guidance • Cumberland Community Facilities Strategy 2019-2029
Attractiveness	Technology is often an afterthought of place design and can create unsightly 'add-ons' in carefully considered spaces.	Considering the aesthetics, positioning, or disguisable nature of technologies during planning and design can better support the overall feel of a precinct.	• ISO/TS 37107:2019 (E); Sustainable cities and communities – Maturity model for smart sustainable communities
Dig once and digital plumbing	Smart places should consider existing and future digital requirements alongside other utilities.	Forward planning including considering unknown digital requirements in utility/foundation design aims to reduce the cost and impact of digital 'plumbing' integration.	• NSW Government, Smart Places Design Technical Guidance
Environmental management and sustainability	The environment and ongoing sustainability are critical pillars of activity for Council and play a role in community wellbeing and amenity of places.	Smart places can manage, monitor, and inform environmental impacts and outcomes. Key areas of focus for smart places could include air and water quality, and ambient temperatures.	• ISO/TS 37107:2019 (E); Sustainable cities and communities – Maturity model for smart sustainable communities • AS ISO 37122:2020; Sustainable cities and communities – Indicators for smart cities • SmartNSW Roadmap 2022-2027 • Westmead South Land Use Capability Study
Integration of digital and physical assets	Smart places seamlessly integrate the physical and the digital, connecting assets through sensors and communication networks.	Digitally-enabled and connected physical assets are critical to building smart places that can deliver real-time insights on the status and performance of place assets.	• ISO/TS 37107:2019 (E); Sustainable cities and communities – Maturity model for smart sustainable communities • Cumberland Community Facilities Strategy 2019-2029

Resilience	Smart places and their integrated technologies can adapt and respond to disruptions, threats, or challenges.	Planning for and introducing processes which govern how risks are mitigated and managed is essential alongside the integration of smart technology. Resilience planning should also be prioritised across all asset and infrastructure types.	• ISO/TS 37107:2019 (E); Sustainable cities and communities – Maturity model for smart sustainable communities • Infrastructure NSW State Infrastructure Strategy • NSW Government, Smart Places Design Technical Guidance
Resource use and monitoring	Smart places deliver real-time insights into city performance on key priorities for resource use, including water, energy, and materials.	The ability to monitor and evaluate resource use through smart technology is essential for improving city outcomes across the environment, economy, and community.	• ISO/TS 37107:2019 (E); Sustainable cities and communities – Maturity model for smart sustainable communities

3.3 Technology: Best Practice Foundations

Technology foundations identify approaches and consideration specific to prioritisation of digital devices, networks, data etc.

TABLE 13. BEST PRACTICE FOUNDATIONS FOR 'TECHNOLOGY'

Foundation	Description	Rationale	Source
Connectivity and networks	A smart place is contingent on its backbone of technology communications channels.	It is imperative that a smart place plans for and selects the right networks to meet existing and future technology needs.	• NSW Government, Smart Places Playbook • NSW Government, Smart Places Design Technical Guidance
Data-driven decision-making	Strategic decision-making processes are guided by insights gleaned from data and analysis.	Using data to lead decision-making processes ensures that Council's strategic direction aligns with current community behaviours and delivers transparent, realistic, and applicable outcomes. Our data collection and prioritisation should accord with the outcomes, and impacts we aim to measure and achieve.	• City of Parramatta, Parramatta Square Precinct • Barcelona Digital City • i-Sense Oakleigh Precinct • Infrastructure NSW State Infrastructure Strategy
Extensibility and scalability	Extensibility ensures the sustainability and reusability of smart technologies and infrastructure, delivering long term application and viability. It also enables the 'scaling up' of successful technologies after the pilot phase.	Integrated smart technologies should be capable of being adapted for size, purpose, and scope, expanding their useable functionality and lifespan.	• Barcelona Digital City • Smart City Adelaide

Interoperability	Interoperability refers to the capacity of smart technology to work seamlessly with the complex and multi-layered ecosystems of digital services, applications, and platforms.	The capacity for smart technologies and systems to work in conjunction with one other is fundamental in the continued provision of access to digital services.	• Australian Registrars' National Electronic Conveyancing Council (ARNECC), Model Operating Requirements Reforms • Infrastructure NSW State Infrastructure Strategy
Multifunctionality	Multifunctionality refers to the capacity for smart technology to fulfil and deliver several functions, or be adapted to different functions, to optimise broader network processes.	Smart technology is most useful when it is integrated in a way which aligns with existing Council infrastructure, is adaptable to changing community and Council needs, and can respond to future changes.	• Cumberland Community Facilities Strategy 2019-2029 • Deploying Multi-Functional Poles – Technical Guidance • Cumberland Local Infrastructure Contributions Plan 2020 • NSW Government, Smart Places Design Technical Guidance
Quality and reliability	Success and uptake of technology in a place context is dependent on the quality and reliability of both the technology and the connection.	Procurement and implementation costs needs to be balanced against quality and reliability considerations. The benefit of technology in a precinct is lost if there is low uptake due to poor quality of connectivity or devices.	• Walker, Jarrett, Human Transit: How clearer thinking about public transit can enrich our communities and our lives • ISO/TS 37107:2019 (E); Sustainable cities and communities – Maturity model for smart sustainable communities
Real-time information	Real-time data collection, visualisation and communication are a key component of smart places for both Council and place users.	Technology can help stakeholders understand key place elements in real-time including traffic conditions, transport options, weather, place usage etc. to inform responsive decision-making.	• AS ISO 37122:2020; Sustainable cities and communities – Indicators for smart cities

3.4 Governance: Best Practice Foundations

Governance foundations refer to the critical elements that should be in place to ensure the safety and success of smart places.

Foundations	Description	Rationale	Source
Culture and capability	Smart places are supported by Council's ability to leverage technology and innovation by driving a culture that embraces the benefits, risks and skills required to maximise investment.	Investment in smart places and associated technologies requires commitment from Council to continue to build the skills, experience and innovation potential of staff and stakeholders to ensure opportunities are realised with impact.	• NSW Government, Smart Places Playbook • Infrastructure NSW State Infrastructure Strategy
Identity and privacy management	Identity theft and data privacy is a growing community concern for smart places due to the rapid rise in digital activity.	Identity and privacy management is critical when implementing smart technologies that collect citizen data, to support data privacy and reduce risk factors.	• ISO/TS 37107:2019 (E); Sustainable cities and communities – Maturity model for smart sustainable communities
Regulatory and strategic foundations	Technology is an evolving concept with new applications and concepts constantly being introduced to the marketplace. Regulations, policies, and a clear strategic direction ensure the appropriate use of these new technologies.	Smart places need to be supported by appropriate regulations and policies that respond to new trends. They should be pre-emptive to reduce risks and maximise the benefits of new technologies.	• Sadik-Khan, Janette and Solomonow, Seth, Street Fight: Handbook for an urban revolution
Security and digital safety	Smart places can present heightened risks in terms of data security and privacy.	Integrating clear data governance procedures and best practice cybersecurity protocols can help reduce the likelihood of data mismanagement or security breaches.	• ISO/TS 37107:2019 (E); Sustainable cities and communities – Maturity model for smart sustainable communities • Cumberland Community Facilities Strategy 2019-2029

4. Key Findings and Results

This section details a summary of the key findings, lessons, and critical success factors for smart places based on findings from this Report.

4.1   Critical Success Elements

The key factors and foundations repeated throughout the literature that should be considered in the development and implementation stages of smart places in the Westmead South Precinct to ensure alignment with Council, NSW Government, and best practice standards.

4.1.1   People-Centric Approach

Community engagement is an ongoing effort with a focus on problem-solving, managing perceptions, and maintaining a social license. Additionally, there are commitments to enhancing citizens' digital literacy to ensure that the adoption of smart technologies is inclusive and accessible to community members.

4.1.2   Clear Objectives & Desired Outcomes

Council has developed a Smart Places Strategy and Action Plan which provides strategic direction for the integration of digital aspects in the Westmead South Precinct. Precinct-specific objectives will support further prioritisation and maximise investment through procurement channels.

4.1.3   Inclusivity and Accessibility

The development of a smart precinct must prioritise accessibility for all community members, including those with low incomes or disabilities. This involves embracing diverse cultures and heritage, which emerged as critical theme in the literature. By focusing on inclusivity and accessibility the development and process can foster positive community satisfaction and precinct activation.

4.1.4   Environmental Quality and Sustainability

Environmental quality emerged in the literature as a cornerstone of promoting community well-being, closely tied to the overarching principle of sustainability. Smart technologies can support environmental monitoring, and smart waste management systems can contribute to maintaining a clean and eco-friendly precinct.

The literature also emphasises the importance of aligning infrastructure development within smart precincts with relevant statutes and regulations. This not only ensures a smooth and legally sound development process but establishes essential baseline standards for development.

4.1.5   Health and Wellbeing

The literature strongly advocates for the implementation of initiatives that promote community health and well-being. Enhancements such as walking tracks, cycling paths, and reduced road congestion can significantly improve liveability, foster a healthier community, and enhance accessibility within the precinct.

4.1.6   Safety and Security

The literature consistently underscores the importance of creating a safe and secure environment within a smart precinct. Smart infrastructure, particularly advanced lighting capabilities and CCTV plays a pivotal role in the safety of the community.

4.1.7   Maintenance and Futureproofing

To enhance sustainability, it is essential that infrastructure, particularly smart technologies, has built-in flexibility to accommodate future expansions. Ongoing maintenance and preparations for environmental factors that may deteriorate infrastructure over time should be integral to their development to ensure long-term viability.

4.1.8   Data-Driven Decision-Making

Leveraging data as a strategic asset can support optimised decision-making within a smart place. Importantly, good data governance is crucial to ensuring effective use, storage, and retirement of data beyond its collection. Open-source data that is both secure and available for use will also encourage engagement and innovation within the community.

4.1.9   Coordination and Collaboration

Effective collaboration with partners across various sectors is essential for achieving productive outcomes. Such collaboration ensures efficient utilisation of time and resources while also facilitating the creation of clear strategic frameworks and the delivery of effective outcomes for the community. It ultimately promotes synergy and efficiency.

4.2   Next Steps

The findings, insights and consolidated smart city foundations outlined in this Report will form the basis for ongoing analysis and prioritisation of smart technology applications in Westmead South.

Appendix E: Smart Technology Application

Westmead South Smart City Study

Prepared by Delos Delta for Cumberland Council

Contents

Delos Delta

This Study was prepared by Delos Delta, in collaboration with Cumberland City Council, to inform smart city considerations in the Westmead South Master Plan.

Note. This Appendix is for internal reference.

Acknowledgment of Country

Cumberland City Council acknowledges the Traditional Custodians of the land on which Cumberland stands, the Darug People, and pays respects to elders past, present and emerging.

We acknowledge the Aboriginal and Torres Strait Islander Peoples as the First Peoples of Australia.

Cumberland City Council also acknowledges the Aboriginal and Torres Strait Islander Peoples living in the Cumberland Local Government Area and reaffirms the important work with all Aboriginal and Torres Strait Islander Communities to advance reconciliation.

Introduction

The City of Cumberland have engaged Delos Delta to deliver a *Smart City Study* (the Study) to guide the integration of best practice smart city principles in Westmead South via the *Westmead South Master Plan* (the Master Plan). The insights and outcomes of this Study may also have broader applications to future precinct developments.

This document outlines the process undertaken by Delos Delta in prioritising smart technologies for recommendation to Cumberland City Council as part of the *Smart City Study* (the Study). This process builds on the *Background Research & Contextual Analysis Report* (the Report) to apply the findings from a technology perspective.

This document demonstrates the alignment and prioritisation of smart city foundations, and how these link to recommended smart technologies for each smart precinct theme.

Specifically, this document details:
- Key documents (both developed by the Cumberland City Council and Delos Delta) which have informed the study approach used in the Study
- A summary of the rationale behind the Smart Precinct Themes
- The information supporting the development of the smart city foundations, and their prioritisation
- The logic used to determine those smart technologies most suitable for Westmead South

Study Approach

The approach taken by Delos Delta to develop this Study is outlined below, with key steps extrapolated for clarity.

SMART CITY STUDY APPROACH
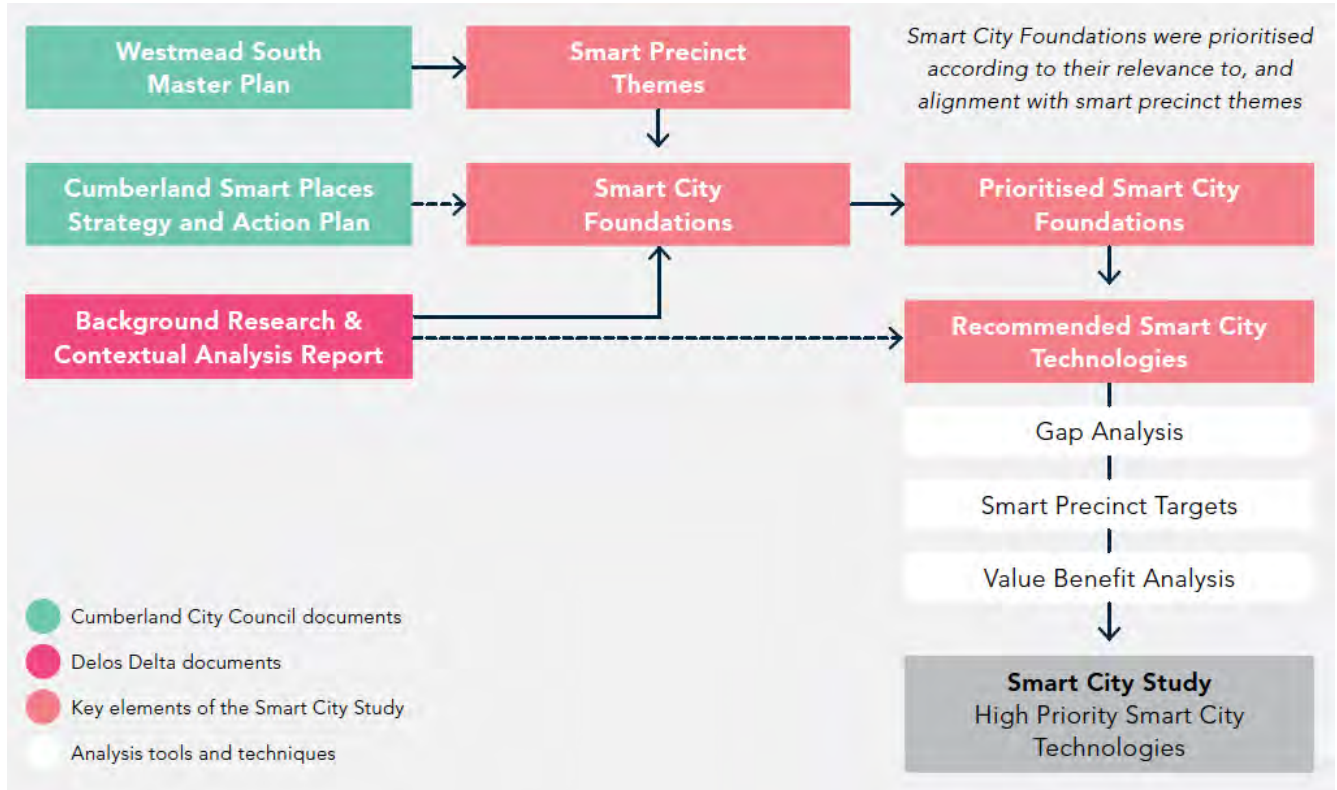
Informing Documents

The development of the smart precinct themes and smart city foundations used in this Study have been directly informed by three key documents, two developed by Council (the *Westmead South Master Plan* and the *Cumberland Smart Places Strategy and Action Plan 2023*) and one developed by Delos Delta (the *Background Research and Contextual Analysis Report*). A breakdown of the elements from each document adopted in this Study is outlined below.

TABLE 1.   SUMMARY OF INFORMING DOCUMENTS AND INPUTS INTO THE STUDY

Document	Adopted Elements	Result
Background Research & Contextual Analysis Report	• Principles for best practice smart precinct development and operation, drawn from literature reviews, case studies, and relevant standards • Principles were organised across four areas: people, place, technology, and governance	The **smart city foundations** upon which this Study draws directly reflect the smart city best practice principles identified during background research and contextual analysis

South Master Plan	and Affordable Housing, Priority 2 – Evolved Open Space and Public Domain, Priority 3 – Evolved Transport and Access, Priority 4 – Evolved Infrastructure and Facilities, Priority 5 – Key Places	developed by grouping characteristics identified across the priorities and key places
Cumberland Smart Places Strategy and Action Plan 2023	• Alignment with Cumberland City Council's vision for Cumberland as a smart place	The **smart city foundations** were reviewed for their alignment with the vision of the Cumberland Smart Places Strategy and Action Plan

Smart Precinct Themes

This study organises the key places and location characteristics into four smart precinct themes, with governance operating horizontally across. This approach aims to support technology considerations as they apply to the most appropriate use case.

SMART PRECINCT THEMES FOR SMART TECHNOLOGY

Connectors and Spines

Open Green Spaces

Activity Nodes

Neighbourhoods and Communities

GOVERNANCE
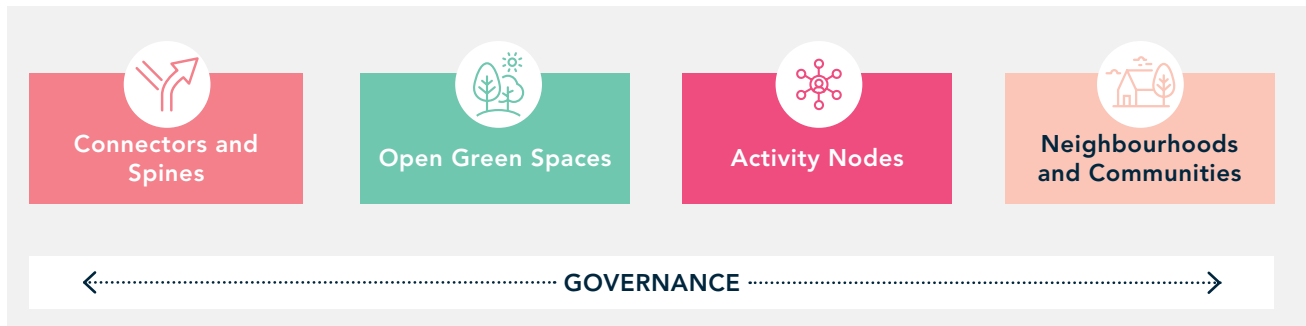
Smart City Foundations

Smart city foundations are based on best practice principles for smart cities, places, and precincts, as outlined in the Report. The Report draws on key literature, best practice case studies, and relevant standards.

A summary of smart city foundations considered throughout the Study is outlined below. The smart city foundations have been organised into four themes: people, place, technology, and governance.

TABLE 2. THEMES OF SMART CITY FOUNDATIONS

People		Place	
• Citizen-centric technology • Community engagement and co-creation • Gamification and activation • Identity and culture	• Outcomes-based technology choice • Safety (physical) • Service personalisation • Social cohesion • Wellbeing	• Accessibility • Attractiveness • Environmental management and sustainability	• Integration of digital and physical assets • Resilience • Resource use and monitoring
Technology		**Governance**	
• Connectivity and networks • Data-driven decision-making • Extensibility and Scalability	• Interoperability • Multifunctionality • Quality and reliability • Real-time information	• Culture and capability • Identity and privacy management	• Regulatory and strategic foundations • Security and digital safety

To support the prioritisation of smart technologies, smart city foundations were prioritised according to alignment with the characteristics and priorities of key places noted in the Master Plan, the *Cumberland Smart Places Strategy and Action Plan* (Smart Places Strategy) and engagement. Each precinct theme has between 7 – 10 smart city foundations which are tiered using the below framework:

Prioritisation Key

● Highly recommended, should have	● Recommended, could have	● Recommended, nice to have

It is important to acknowledge the interrelated nature of smart city foundations. Many smart city foundations work in tandem or alongside each other. For the purpose of this Study, foundations are prioritised to recommend the highest value smart technologies for Westmead South.

Enabling Smart City Foundations

Four enabling smart city foundations were also identified as critical to the success across all areas of smart city application in the Master Plan. The four enabling smart city foundations are:

CONNECTIVITY AND NETWORKS

Connectivity and networks include fibre, telecommunications, electricity, Internet of Things (IoT) and other local wireless networks. A cross-cutting smart city foundation, connectivity and networks are crucial to the function of all smart technologies. Connectivity and networks are high priority for all themes and are integrated into all recommendations of smart technology in the precinct.

EXTENSIBILITY AND SCALABILITY

Extensibility ensures the sustainability and reusability of smart technologies and infrastructure. Integrated smart technologies should be capable of being adapted for size, purpose, and scope, expanding their useable functionality and lifespan.

INTEROPERABILITY

Interoperability refers to the capacity of smart technology to work seamlessly with the complex and multi-layered ecosystems of digital services, applications, and platforms. The capacity for smart technologies and systems to work in conjunction with one other is fundamental in the continued provision of access to digital services.

QUALITY AND RELIABILITY

Procurement and implementation costs needs to be balanced against quality and reliability considerations. The benefit of technology in a precinct is lost if there is low uptake due to poor quality of connectivity or devices.

Recommended Smart Technologies

Smart technologies recommended for each smart precinct theme are prioritised according to their alignment with the smart city foundations. Smart technologies considered to have high alignment with one or more of the smart city foundations are considered priority technologies and are recommended to be pursued first.

Prioritisation Key

● Highly recommended, should have	● Recommended, could have	● Recommended, nice to have

Smart Precinct Applications

This section provides detail on the tiered smart city foundations for each smart precinct theme, and how these inform the recommended smart technologies. It also considers the governance elements required across smart precinct applications.

Smart Precinct Theme 1: Connectors and Spines

Evolved transport and access are critical to the liveability and sustainability of Westmead South. This theme encapsulates smart technology that will improve places of thoroughfare and enhance connectivity between key places in the precinct.

Focus Points

This theme aims to support the following objectives for the precinct:
- Improving road functions and traffic flow
- Promoting public and active transport uses (walking and cycling)
- Supporting community safety and public amenity

Key Places
- Alexandra Avenue
- Hawkesbury Road
- East-West Green Link

Smart City Foundations

When applying smart technologies in connectors and spines, the smart city foundations that align with the objectives and goals of the Master Plan and our Smart Places Strategy include:

TABLE 3.   ALIGNED SMART CITY FOUNDATIONS FOR CONNECTORS AND SPINES

Tier 1		
Safety (physical)	**Resilience**	**Real-time information**
Smart technology will: Support the physical safety of people on and nearby connectors and spines	*Smart technology will:* Enhance adaptability and longevity of assets along connectors and spines, by monitoring and predicting changing conditions	*Smart technology will:* Use up-to-date information to reduce congestion, improve traffic flow, and enhance user experience
Tier 2		
Citizen-centric technology	**Multifunctionality**	**Environmental management and sustainability**
Smart technology will: Be purposeful and easy to use for commuters and travellers	*Smart technology will:* Serve related functions along connectors and spines	*Smart technology will:* Manage, monitor, and inform environmental impacts and outcomes along connectors and spines

Tier 3
Attractiveness

Smart technology will: Consider visual appeal in its positioning along connectors and spines

Recommended Smart Technologies

Smart technologies recommended below are prioritised in line with the focus points and key aligned smart foundations for this theme. The table also indicates where a recommended smart technology aligns to an action in the Smart Places Strategy, and where it could be considered for a future smart Development Control Plan (DCP).

TABLE 4.   RECOMMENDED SMART TECHNOLOGIES FOR CONNECTORS AND SPINES

Technology	Key Aligned Smart City Foundations	Smart Places Strategy Alignment	Smart DCP	Priority
Smart Safety (CCTV)	• Safety (physical) • Resilience • Real-time information • Multifunctionality • Environmental management and sustainability	• Smart Communities • Smart Services	✓	●
Smart Lighting	• Safety (physical) • Resilience • Real-time information • Environmental management and sustainability • Multifunctionality	• Smart Communities • Smart Services	✓	●
Smart Poles	• Citizen-centric technology • Multifunctionality • Attractiveness	• Smart People • Smart Services	✓	●
Smart Parking	• Real-time information • Citizen-centric technology • Environmental management and sustainability	• Smart Communities • Smart Movement	✓	●

Electric Vehicle (EV) Charging Infrastructure	• Resilience • Environmental management and sustainability • Citizen-centric technology	• Smart Movement	✓	●
Asset Monitoring with Artificial Intelligence (AI)	• Resilience • Real-time information • Safety (physical)	• Smart Services • Smart Spaces		●
Flood Monitoring Sensors	• Safety (physical) • Resilience • Real-time information • Environmental management and sustainability	• Smart Spaces	✓	●
Micro-Mobility Transport Options	• Citizen-centric technology • Environmental management and sustainability	• Smart Movement		●
Traffic Monitoring Technology (with TfNSW)	• Resilience • Real-time information	• Smart Movement		●

Smart Precinct Theme 2: Open Green Spaces

Improvements to existing, and delivery of new open green spaces in the public domain are critical to the living amenity of Westmead South. This theme encapsulates smart technology that will improve the quality and enjoyment of open green spaces within the precinct.

Focus Points

This theme aims to support the following objectives for the precinct:

- Improving quality, accessibility, and attractiveness of existing and new green spaces
- Promoting a sense of place and community
- Celebrating Indigenous culture and heritage

Key Places

- M.J. Bennett & Austral Avenue Reserve
- Alexandra Avenue Local Park
- Sydney Smith Park

Smart City Foundations

When applying smart technologies in open green spaces, the highest-priority smart city foundations to consider are identified below.

TABLE 5.   ALIGNED SMART CITY FOUNDATIONS FOR OPEN GREEN SPACES

Tier 1			
Wellbeing	**Safety (physical)**	**Environmental management and sustainability**	**Social cohesion**
Smart technology will: Improve the quality and enjoyment of open green spaces	*Smart technology will:* Help to maintain safety of community in open green spaces	*Smart technology will:* Manage, monitor, and inform environmental impacts and outcomes in open green spaces	*Smart technology will:* Promote social interaction and inclusion in open green spaces
Tier 2			
Identity and culture	**Gamification and activation**	**Citizen-centric technology**	**Resilience**
Smart technology will: Engage community with cultural heritage of open green spaces	*Smart technology will:* Support convenience of activities and place-based services, encouraging fun in open green spaces	*Smart technology will:* Prioritise community needs, improving community experience in open green spaces	*Smart technology will:* Be adaptive and responsive to changing conditions, ensuring its longevity in open green spaces
Tier 3			

Integration of digital and physical assets	Attractiveness
Smart technology will: Integrate seamlessly with physical and natural assets in open green spaces	*Smart technology will:* Consider aesthetics and visual appeal in its placement in open green spaces

Recommended Smart Technologies

Smart technologies recommended below are prioritised in line with the focus points and key aligned smart foundations for this theme. The table also indicates where a recommended smart technology aligns to an action in the Smart Places Strategy, and where it could be considered for a future smart Development Control Plan (DCP).

TABLE 6. RECOMMENDED SMART TECHNOLOGIES FOR OPEN GREEN SPACES

Technology	Key Aligned Smart City Foundations	Smart Places Strategy Alignment	Smart DCP	Priority
Smart Safety (CCTV)	• Safety (physical) • Wellbeing • Social cohesion • Citizen-centric technology	• Smart Communities • Smart Services	✓	●
Smart Lighting	• Safety (physical) • Environmental management and sustainability • Wellbeing • Social cohesion	• Smart Communities • Smart Services	✓	●
Digital Wayfinding and Signage	• Social cohesion • Safety (physical) • Identity and culture • Gamification and activation • Citizen-centric technology	• Smart Communities • Smart Movement	✓	●
Smart Furniture	• Environmental management and sustainability • Citizen-centric technology • Integration of digital and physical assets	• Smart Communities • Smart Spaces	✓	●

Smart Poles	• Wellbeing • Environmental management and sustainability • Citizen-centric technology • Resilience	• Smart People • Smart Services	✓	🟢
Smart Irrigation	• Environmental management and sustainability • Wellbeing • Resilience	• Smart Services • Smart Spaces	✓	🟢
Tree Canopy Mapping	• Environmental management and sustainability • Wellbeing • Resilience	• Smart Places		🔴
Environmental Sensors	• Environmental management and sustainability • Wellbeing • Attractiveness • Resilience	• Smart Spaces	✓	🔴
Open Data Platform	• Environmental management and sustainability • Gamification and activation • Citizen-centric technology	• Smart Spaces • Smart Movement • Smart Economy		🔴
Smart Outdoor Work Hubs	• Social cohesion • Citizen-centric technology • Gamification and activation	• Smart Economy	✓	🟠
Smart Cool Playgrounds	• Safety (physical) • Wellbeing • Gamification and activation	• Smart Communities		🟠

Smart Precinct Theme 3: Activity Nodes

Activity nodes are areas of concentrated community and commercial activity in the public domain. This theme encapsulates smart technology that will integrate into high activity areas, supporting activity nodes to provide services and infrastructure that existing and future residents need.

Focus Points

This theme aims to support the following objectives for the precinct:

- Promoting community life and function
- Improving delivery and maintenance of assets
- Celebrating Indigenous culture and heritage
- Supporting safety and public amenity

Key Places

- Metro Station Block
- The Oakes Centre Plaza

Smart City Foundations

When applying smart technologies in activity nodes, the smart city foundations that are most important to consider are identified below.

TABLE 7.   ALIGNED SMART CITY FOUNDATIONS FOR ACTIVITY NODES

Tier 1				
Safety (physical)	**Accessibility**	**Real-time information**	**Multifunctionality**	**Identity and culture**
Smart technology will: Promote safety of community in activity nodes	*Smart technology will:* Enhance physical, social, and cultural accessibility to activity nodes	*Smart technology will:* Provide community with relevant, up-to-date information in activity nodes	*Smart technology will:* Be adaptable to support multiple uses of activity nodes	*Smart technology will:* Encourage learning and celebration of precinct history and culture, including Indigenous heritage

Tier 2		
Gamification and activation	**Service personalisation**	**Citizen-centric technology**
Smart technology will: Support convenience of activities and place-based services, encouraging fun in activity nodes	*Smart technology will:* Enable delivery of tailored community messaging and services in activity nodes	*Smart technology will:* Prioritise community needs, improving community experience in activity nodes

Tier 3
Social cohesion
Smart technology will: Promote social interaction and inclusion in activity nodes

Recommended Smart Technologies

Smart technologies recommended below are prioritised in line with the focus points and key aligned smart foundations for this theme. The table also indicates where a recommended smart technology aligns to an action in the Smart Places Strategy, and where it could be considered for a future smart Development Control Plan (DCP).

RECOMMENDED SMART TECHNOLOGIES FOR ACTIVITY NODES

Technology	Key Aligned Smart City Foundations	Smart Places Strategy Alignment	Smart DCP	Priority
Smart Safety	• Safety (physical) • Accessibility • Data-driven decision-making • Citizen-centric technology • Social cohesion	• Smart Communities • Smart Services	✓	●
Public Wi-Fi	• Accessibility • Multifunctionality • Citizen-centric technology • Gamification and activation • Service personalisation	• Smart People • Smart Economy	✓	●
Smart Lighting	• Safety (physical) • Real-time information • Multifunctionality • Citizen-centric technology • Social cohesion	• Smart Communities • Smart Services	✓	●
Digital Wayfinding and Signage	• Accessibility • Identity and culture • Real-time information • Service personalisation • Citizen-centric technology	• Smart Communities • Smart Movement	✓	●

Smart Poles	• Multifunctionality • Real-time information • Data-driven decision-making • Accessibility	• Smart People • Smart Services	✓	🟢
Place Utilisation and Smart Monitoring	• Data-driven decision-making • Real-time information • Gamification and activation • Identity and culture	• Smart Movement		🔴
Smart Bins	• Real-time information • Data-driven decision-making • Citizen-centric technology	• Smart Services	✓	🔴
Digital Art	• Identity and culture • Gamification and activation • Social cohesion	• Smart People • Smart Spaces		🟠
Digital Innovation Lab	• Service personalisation • Gamification and activation • Citizen-centric technology	• Smart Economy		🟠

Smart Precinct Theme 4: Neighbourhoods and Communities

Westmead South will be promoted as a place of diverse and affordable living. This theme encapsulates smart technology that will enhance longevity and liveability of neighbourhoods, and encourage active participation in the community, allowing diversity of character areas to flourish.

Focus Points

This theme aims to support the following objectives for the precinct:

- Providing tailored services
- Enabling community participation and engagement
- Improving sustainability and resource use
- Celebrating Indigenous culture and heritage

Key Places

- Northern Living Character Area
- Hawkesbury Road High Street Character Area
- Central Living Character Area

Smart City Foundations

When applying smart technologies in neighbourhoods and communities, the smart city foundations that are most important to consider are identified below.

TABLE 9.   ALIGNED SMART CITY FOUNDATIONS FOR NEIGHBOURHOODS AND COMMUNITIES

Tier 1			
Service personalisation	**Community engagement and co-creation**	**Social cohesion**	**Resource use and monitoring**
Smart technology will: Enable delivery of tailored messaging and services within communities	*Smart technology will:* Incorporate engagement and feedback mechanisms to support community-led initiatives and design	*Smart technology will:* Promote social interaction and inclusion within communities	*Smart technology will:* Provide communities with information on environmental impacts and outcomes
Tier 2			
Identity and culture	**Outcomes-based technology**	**Data-driven decision-making**	**Wellbeing**
Smart technology will: Embrace history and diverse culture of various neighbourhoods and communities	*Smart technology will:* Solve real problems and deliver tangible benefits to the community	*Smart technology will:* Ensure decision-making is responsive, accurate, and tailored to community needs through data analysis	*Smart technology will:* Enhance quality of life and opportunities for neighbourhoods and communities
Tier 3			

Resilience	Accessibility
Smart technology will: Be adaptive and responsive to disruptions and threats, ensuring consistent delivery of services to the community	*Smart technology will:* Enhance physical, social, and cultural inclusion within neighbourhoods and communities

Recommended Smart Technologies

Smart technologies recommended below are prioritised in line with the focus points and key aligned smart foundations for this theme. The table also indicates where a recommended smart technology aligns to an action in the Smart Places Strategy, and where it could be considered for a future smart Development Control Plan (DCP).

TABLE 10. RECOMMENDED SMART TECHNOLOGIES FOR NEIGHBOURHOODS AND COMMUNITIES

Technology	Key Aligned Smart City Foundations	Smart Places Strategy Alignment	Smart DCP	Priority
Smart Meters	• Resource use and monitoring • Outcomes-based technology • Data-driven decision-making • Wellbeing • Resilience	• Smart Spaces	✓	●
Digital Services	• Service personalisation • Community engagement and co-creation • Social cohesion • Outcomes-based technology • Accessibility	• Smart Services		●
Open Data Platform	• Community engagement and co-creation • Resource use and monitoring • Social cohesion • Data-driven decision-making	• Smart Communities • Smart Services		●

Digital Wayfinding and Signage	• Service personalisation • Community engagement and co-creation • Identity and culture • Wellbeing • Accessibility	• Smart Communities • Smart Movement	✓	●
Smart Bins	• Resource use and monitoring • Data-driven decision-making • Outcomes-based technology	• Smart Services	✓	●
Digital Art	• Community engagement and co-creation • Identity and culture	• Smart People • Smart Spaces		●

Governance

Council's ability to deliver smart technology and related services will be critical to the success of Westmead South as a smart, evolved, and liveable precinct. This section encapsulates elements that will support Council to effectively govern, manage, and monitor smart technology, enabling ongoing smart precinct progress.

Focus Points

- Ensuring cyber security and privacy
- Encouraging collaboration and coordination
- Promoting transparency and data accessibility
- Communicating benefits of smart technology
- Enhancing service delivery
- Supporting innovative thinking

Systems, Processes, and Policies

- Cyber security policy
- Data management framework
- Open data platforms
- Digital literacy and skills training
- Ongoing community engagement

Smart City Foundations

TABLE 11. ALIGNED SMART CITY FOUNDATIONS FOR GOVERNANCE

Tier 1				
Data-driven decision-making	Regulatory and strategic foundations	Security and digital safety	Community engagement and co-creation	Identity and privacy management
Tier 2				
Culture and capability		Citizen-centric technology		Outcomes-based technology choice