



This technical guide outlines the proposed treatments for the application of digital infrastructure to different place types. It includes general treatments for greenfield and brownfield/infill, as well as public open spaces, data-intensive industrial areas, and central business and commercial precincts. It should be read in conjunction with the relevant standards and legislative requirements.

Digital infrastructure is fundamental to providing the capacity for flexible, future-focused digital connectivity to support smart, place-based solutions for the urban environment ranging from dynamic wayfinding to autonomous vehicles, as shown in Figure 1. Enabling digital infrastructure can be described as ‘digital plumbing’ because it is best planned for with other utilities such as water and electricity and deployed across cities and regions as part of construction wherever possible. Digital plumbing includes the provision of high-capacity conduit and common access pits and may also include a network of multi-function poles (MFPs) and smart street furniture.

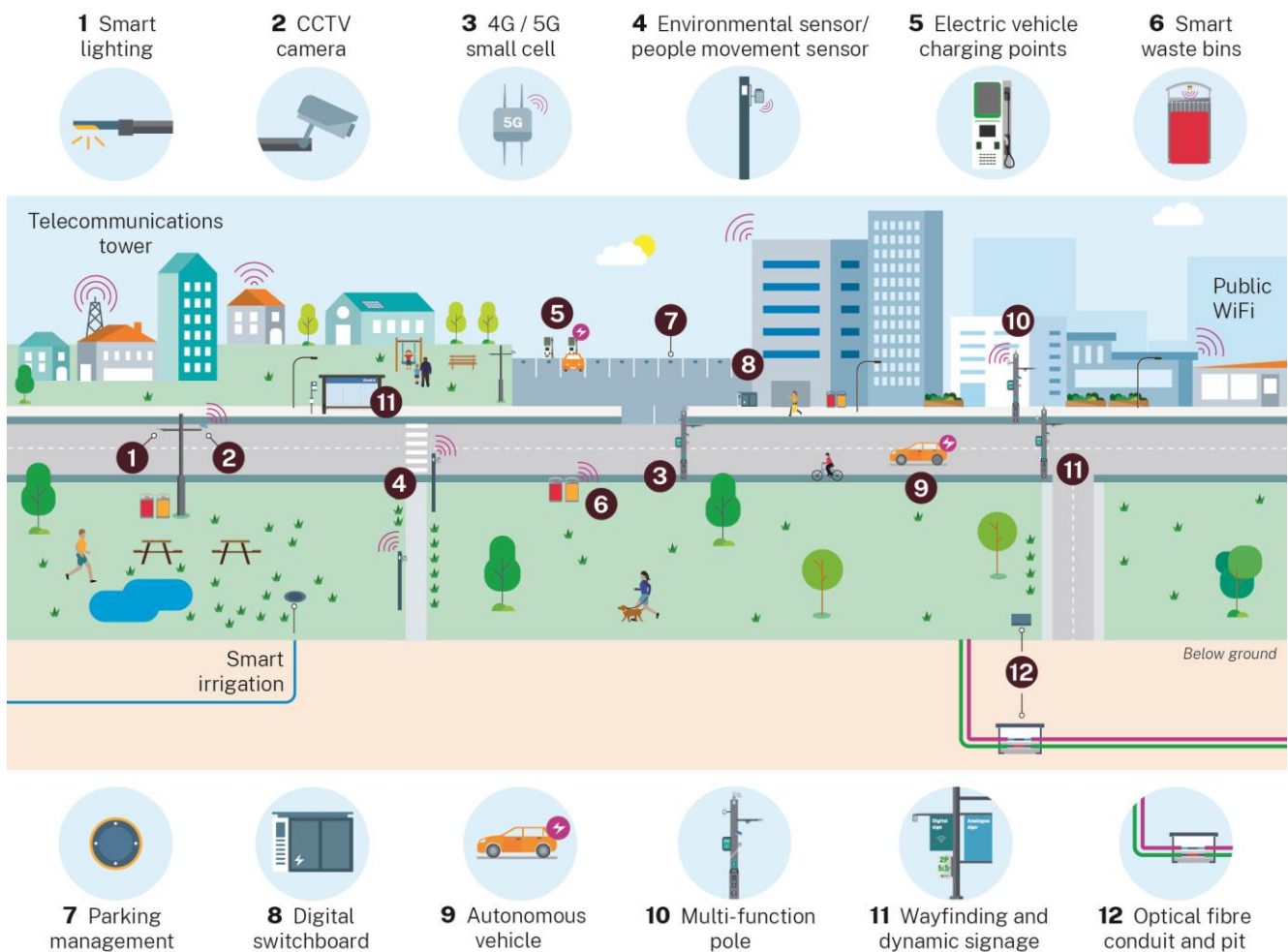


Figure 1 Examples of smart technologies

The desired outcomes and planned uses for a place may change the recommended capacity and types of



enabling digital infrastructure. For example, industrial areas could see an increase in connectivity and capacity demand as they become more data intensive and shift to automated processes and machine-to-machine operation. The data exchange occurring in parks and public spaces is also likely to increase significantly as technology is embedded to collect place data to support decision making about the place – from people counting sensors to automated irrigation systems. Therefore, an approach that considers the digital connectivity demands for different place types, now and in the future, is needed.

## General proposed treatments

The general proposed treatments for the application of enabling digital infrastructure in **greenfield** and **brownfield/infill** developments are outlined below.

### Greenfield

For areas where new roadways and service installations are still to be completed, the telecommunication conduit should be installed in a shared trench with the capacity proposed in this technical guide and Technical Guidance DI02: Digital Plumbing Requirements.

Pits will typically be installed after the shared trench, but pit locations should be defined before work begins on the trench to ensure all current and future potential service locations can be connected.

The following outlines the proposed treatments for telecommunication conduit in shared trench areas:

- **express, connector and distribution conduit** wherever electrical distribution is being installed (the electrical design will define the routes). This includes where the route will be extending existing telecommunication infrastructure. These sections should allow for cables to be installed on alternate paths in the future as required
- **lead-in conduit** wherever electrical distribution is being provided to a building. If the site does not have a building, 'starter conduit' (conduit that leads out of the pit to the property boundary) approximately one metre in length should be installed and sealed
- **facility conduit** wherever electrical distribution is proposed to other locations such as street lights, traffic lights, water and sewerage, and transformers, a continuous conduit from the nearest pit to the new location should be installed.



#### Greenfield

An area with no existing infrastructure or buildings.

### Brownfield or infill

Telecommunication conduit in brownfield areas should comply with the general standards and capacity definitions, and is proposed to be installed as follows:

- **express and distribution conduit** when installed on the designated telecommunication infrastructure alignment
- **lead-in conduit:**
  - If the site does not have a building, starter conduit approximately one metre in length should be installed and sealed
  - If the site has a building, a lead-in conduit with bend that complies with general standards should be installed
- **facility conduit** should be installed as required by following the telecommunication infrastructure alignment until adjacent to street furniture and then using an appropriate bend to align with the base of the element.



#### Brownfield

An area with existing infrastructure and buildings.



#### Infill

Development of new dwellings on vacant or under-utilised land in existing built-up areas.

Additional proposed treatments for specific place types are outlined in the next sections.



## *Place type 1: Public open space*

### **Brownfield, infill and greenfield**

It is assumed that public open space will be located adjacent, within or in close proximity to other places and/or corridors and that these will follow the proposed treatments for enabling digital infrastructure as outlined in this technical guidance and Technical Guidance DI02: Digital Plumbing Requirements.

Enabling digital infrastructure should be extended into the public open space. In addition to the general proposed treatments in the previous section General proposed treatments:

- **facility conduit** is proposed to be installed to all planned facilities such as park or street furniture and MFPs. A continuous conduit is to be installed from the nearest pit to the new location.

For more detail on proposed treatments for MFPs, refer to Technical Guidance DI04: Deploying Multi-function Poles.

The installation of smart monitoring equipment should be considered in public open space. This includes but not limited to, equipment for water quality, ambient temperature, tree canopy cover and soil moisture content, and, bicycle, pedestrian and car movements. Specific monitoring needs for each development should be decided and provided by the relevant authority and parties involved.

The following smart technology solutions could be considered for installation in key locations in public open spaces, noting that system interoperability for both technology and data solutions is highly recommended:

- dedicated internet or fibre connection points
- public Wi-Fi network that provides sufficient coverage to the whole public space, such as within the community's parks, sporting areas or courts, or youth spaces
- smart lighting where key locations may be used at night-time for active uses, ensuring lighting is adequate for active and passive uses
- security cameras at key locations to ensure coverage within the public space
- smart bin with rubbish capacity sensors
- smart park furniture with USB-charging capacity and potentially Wi-Fi connectivity
- digital display screen, linked to a relevant accessible networks to share key community information, data, and activities
- weather monitoring network or devices to monitor temperature and weather within the park, with the information being accessible to the public.



#### **Multi-function poles (MFPs)**

Poles designed to accommodate various functions at the same time; usually designed to enhance visual amenity by internally accommodating most or all functions.



## Place type 2: Data intensive industries (such as agribusiness, advanced manufacturing, quantum computing and robotics)

This place type requires fast, reliable and high quality connectivity and capacity to support the data intensive nature of the activities undertaken. These activities are likely to include highly automated processes and machinery operation, advanced manufacturing such as 3D printing, quantum computing and robotics and will continue to evolve. In addition to the general proposed treatments, the enabling digital infrastructure that may support this place type include dimensioning for lead-in conduit from street (Table 1, left) and in-premise specifications (Table 1, right).

### Brownfield, infill and greenfield

Table 1 Lead-in specifications (left)

Description	Dimension
<b>Lead-in from street</b>	
Number of lead-in conduits	4
Size of lead-in conduits	P100
Type of pit	Minor Pit Type 1 P6

In-premise specifications (right)

Description	Dimension
<b>In-premise</b>	
Number of racks	6
Room dimension	3600mm x 2000mm
Max number of GPOs	9
Number of cables to be accommodated	6

Lateral (within building floors) paths should be dimensioned to allow for a minimum of two small diameter (5 millimetres) optical fibre cables per premise beyond the current position.

A lead-in connection or change of direction **pit** should be positioned in one of the following ways:

- for all non-single living unit buildings, at one of the building property alignments to allow **lead-in conduit** connection (note: provision is to be made for connection to lead-in conduit when a building design is known)
- where a significant change of direction is required
- at locations that ensure there is no greater than 200 metres of street conduit without a pit.

The size of the lead-in conduit is defined by the number of premises within the building to be connected. Lead-in conduit or **facility conduit** can be connected to either a joint pit or a lead-in pit.

Facility conduits should connect to street furniture and should be extended to any street network element that has an electrical connection provided or planned. Unless a significant multi-connection requirement is known, all facility conduit should be P20 (20 millimetres diameter).

#### **General power outlet (GPO)**

Commonly known as a power point or socket outlet.

#### **Lead-in conduit**

A conduit from the street to a building.

#### **Facility conduit**

A conduit which connects to non-premises, such as street furniture.

#### **Pit**

A wiring enclosure that provides space for placing and joining cables, pulling cables,





## Technical Guidance: Developing Places

The equipment room must be a controlled environment ensuring cooling and minimising humidity; and adhere to the relevant Australian Standard.

The equipment room must have a clear and protected path to the building riser or lateral cable management infrastructure. The equipment room location and construction shall be in accordance with AS/NZS 3084, and:

- equipment rooms should have a minimum standard ceiling height of 2,400 millimetres
- each telecommunication cupboard shall have a minimum total door opening width of 1,600 millimetres.



### Street furniture

Objects and pieces of equipment installed along streets and roads for various purposes, which can also host telecommunications infrastructure including antennas and radio units for mobile networks such as 5G, Wi-Fi access points, and IoT sensors.



Figure 2 Aerial of Bradfield City Innovation Square (artist impression). Credit: Western Parkland City Authority.



### Place type 3: Central business district and commercial precincts

This place type supports general business and commercial activities, which may be adjacent to transport hubs, with high-quality connectivity and coverage to meet growing populations and forecasted bandwidth capacity demands. In addition to the general proposed treatments, the enabling digital infrastructure that may support this place type is outlined below.

#### Brownfield, infill and greenfield

Number of premises beyond end of conduit section requirement		Minimum radial clearances 300 mm	Number of premises		Size of lead-in conduit
Low	High		Low	High	
0	3000	1	1	2	P20
3000	6000	2	3	100	P50
6000	8750	3	Greater > 100		P100
8750+		4			

Table 2 Radial clearance specifications (left)

Lead-in conduit specifications (right)

A lead-in connection or change of direction pit should be positioned in one of the following ways:

- for all non-single living unit buildings, at one of the building property alignments to allow lead-in conduit connection
- where a significant change of direction is required
- at locations that ensure there is no greater than 200 metres of street conduit without a pit.

The size of the lead-in conduit is defined by the number of premises within the building to be connected. Lead-in conduits or facility conduit can be connected to either a joint pit or a lead-in pit.

Facility conduits should connect to street furniture and, with an accompanying minor pit, should be extended to any street network element that has an electrical connection provided or planned. Unless a significant multi-connection requirement is known, all facility conduit is to be P20 (20 millimetres diameter).

The equipment room must be a controlled environment ensuring cooling and minimising humidity; and adhere to the relevant Australian Standard.

The equipment room must have a clear and protected path to the building riser or lateral cable management infrastructure. The equipment room location and construction shall be in accordance with AS/NZS 3084, and:

- equipment rooms should have a minimum standard ceiling height of 2,400 millimetres
- each telecommunication cupboard shall have a minimum total door opening width of 1,600 millimetres.



## ***More technical guidance***

Unlock the full potential of connected smart places with our [SmartNSW Playbook](#) and other Technical Guidance documents. Consult your organisation for the relevant industry standards that apply to your development.



### **Resources**

- AS/NZS ISO/IEC 14763.3 Telecommunications installations Implementation and operation of customer premises cabling Testing of optical fibre cabling
- AS/NZS 2053.1 Conduits and fittings for electrical installations General requirements
- AS/NZS 24702 Telecommunications installations Generic cabling Industrial premises
- AS/NZS 3080 Information technology Generic cabling for customer premises
- AS/NZS 3084 Telecommunications installations Telecommunications pathways and spaces for commercial buildings
- AS/NZS 3085.1 Telecommunications installations Administration of communications cabling systems Basic requirements
- AS/NZS ISO/IEC 14763.2 Information Technology Implementation and operation of customer premises cabling Planning and installation
- SAA HB243 Communications cabling manual Module 1: Australian regulatory arrangements
- SAA HB29 Communications cabling manual Module 2: Communications cabling handbook
- TIA/EIA568 Commercial Building Telecommunications Cabling Standard