



# New Developments - Deployment of the nbn Pit and Conduit Network Standards

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|--------------------------|---------------------------|
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## Document control

### Revision history

| Date      | Revision | Details                                                                                                                 |
|-----------|----------|-------------------------------------------------------------------------------------------------------------------------|
| 22 FEB 24 | 12.0     | Refer to section 1.6 Changes in this revision, in revision 12.0, for details of changes between revision 11.0 and 12.0. |
| 30 SEP 22 | 11.0     | Refer to the <i>Revision history</i> in revision 11.0 for details of changes between revision 10.0 and 11.0.            |
| 13 APR 22 | 10.0     | Refer to the <i>Revision history</i> in revision 10.0 for details of changes between revision 9.0 and 10.0.             |
| 02 JUL 21 | 9.0      | Refer to the <i>Revision history</i> in revision 9.0 for details of changes between revision 8.0 and 9.0.               |
| 08 JAN 18 | 8.0      | Refer to the <i>Revision history</i> in revision 8.0 for details of changes between revision 7.0 and 8.0.               |
| 18 AUG 16 | 7.0      | Refer to the <i>Revision history</i> in revision 7.0 for details of changes between revision 6.0 and 7.0.               |



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# 1 About this document

## 1.1 Purpose

The purpose of this document is to specify **nbn**'s requirements for the deployment of appropriate **nbn**<sup>™</sup> pit and conduit infrastructure in New Developments for the **nbn**<sup>™</sup> Fibre to the Premises (FTTP) network.

## 1.2 Scope

### 1.2.1 In scope

- New Single Dwelling Unit (SDU) developments
- New Development Super Lots, Horizontal Multi Dwelling Units (HMDUs), commercial and vertical MDU (lead-ins)
- New Development Estates and Infill

### 1.2.2 Out of scope

- Brownfield MDU and SDU pit and conduit builds

### 1.2.3 Project specific requirements

The standards contained within this document make clear and transparent information available to parties involved in the design and build of Pit and Conduit infrastructure to support the **nbn**<sup>™</sup> Fibre to the Premises (FTTP) network in New Development projects.

**nbn** recognises that bespoke design and build requirements may exist in some projects. In these cases, **nbn**'s dedicated Relationship Managers and Deployment Specialists will work with the Developer and builder to ensure project requirements and needs are understood, and that the best possible outcomes can be achieved for the project in accordance with the appropriate standards and codes.

## 1.3 Audience

This document is intended for:

- New Development site developers, designers and planners
- **nbn** Delivery Partners
- **nbn** Networks and Operations

## 1.4 Assumptions and constraints

It is important to comply with the requirements described in this document.

Failure to do so may result in delays in connecting the premises to the **nbn** or result in **nbn**'s inability to make a network connection to the new premises.



These requirements are, for the purposes of the Developer agreement, a part of the **nbn** Specifications ('New Developments: Deployment of the nbn Conduit and Pit Network - NBN-TE-CTO-194') and must be complied with to the extent specified in the Developer agreement.

The Developer and/or their representative should have a sound level of knowledge, understanding and experience/accreditation for installing any telecommunications pit and conduit for **nbn** to use in its network.

## 1.5 Referenced documents

**Note:** The table below only contains documents referenced within this document.

| Document number | Document name                                                                                                                 | Owner                                           |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|
| [1]             | <i>AS/CA S008 Requirements for customer cabling products</i>                                                                  | Standards Australia and Communications Alliance |
| [2]             | <i>AS/CA S009 Installation requirements for customer cabling (Wiring rules)</i>                                               | Standards Australia and Communications Alliance |
| [3]             | <i>C524 External Telecommunication Cable Networks</i>                                                                         | Communications Alliance                         |
| [4]             | <i>G645 Fibre Ready Pit and Pipe Specification for Real Estate Development Projects</i>                                       | Communications Alliance                         |
| [5]             | <i>AS 3600 Concrete structures</i>                                                                                            | Standards Australia                             |
| [6]             | <i>AS 3996 Access covers and grates</i>                                                                                       | Standards Australia                             |
| [7]             | <i>AS/NZS 1477 PVC pipes and fittings for pressure applications</i>                                                           | Standards Australia                             |
| [8]             | <i>AS/NZS 2032 Installation of PVC pipe systems</i>                                                                           | Standards Australia                             |
| [9]             | <i>AS/NZS 4586 Slip resistance classification of new pedestrian surface materials</i>                                         | Standards Australia                             |
| [10]            | <i>NBN-COO-EDS-017 New Development Pit &amp; Pipe Design Guidelines</i>                                                       | <b>nbn</b>                                      |
| [11]            | <i>NBN-DES-STD-0011 Residential Preparation and Installation Single Dwelling Units (SDUs) and Multi Dwelling Units (MDUs)</i> | <b>nbn</b>                                      |
| [12]            | <i>NBN-TE-CTO-284 MDU Building Engineering and Design Standard – New Developments</i>                                         | <b>nbn</b>                                      |



## 1.6 Changes in this revision

Changes in this document revision 12.0 dated 22 FEB 24 compared to the previous revision 11.0 dated 30 SEP 22 are summarised below:

| Section                                 | Details                                                                                                                                                                                                                                                                                                                                                            |
|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| All                                     | <ul style="list-style-type: none"> <li>Transferred document to new template and replaced the word 'guidelines' with 'requirements' or 'specifications' throughout document.</li> </ul>                                                                                                                                                                             |
| 1.1 Background                          | <ul style="list-style-type: none"> <li>Deleted section.</li> </ul>                                                                                                                                                                                                                                                                                                 |
| 1.1 Purpose                             | <ul style="list-style-type: none"> <li>Rephrased and moved some content to section 1.4 Assumptions and constraints.</li> </ul>                                                                                                                                                                                                                                     |
| 1.2.1 In scope                          | <ul style="list-style-type: none"> <li>Added New Development Estates and Infill.</li> </ul>                                                                                                                                                                                                                                                                        |
| 1.2.2 Out of scope                      | <ul style="list-style-type: none"> <li>Deleted: <ul style="list-style-type: none"> <li>New Developments outside the <b>nbn</b> FTTX footprint,</li> <li>New Developments within the <b>nbn</b> satellite footprint</li> <li>New Developments within the fixed wireless footprint</li> </ul> </li> <li>Added Brownfield MDU and SDU pit and pipe builds.</li> </ul> |
| 1.2.3 Project specific requirements     | <ul style="list-style-type: none"> <li>Added new section.</li> </ul>                                                                                                                                                                                                                                                                                               |
| 1.3 Health, Safety & Environment (HS&E) | <ul style="list-style-type: none"> <li>Deleted section and created new HSE section in section 2.1 Health, safety and environment (HSE).</li> </ul>                                                                                                                                                                                                                 |
| 1.3 Audience                            | <ul style="list-style-type: none"> <li>Updated list.</li> </ul>                                                                                                                                                                                                                                                                                                    |
| 1.4 Assumptions and constraints         | <ul style="list-style-type: none"> <li>Updated text.</li> </ul>                                                                                                                                                                                                                                                                                                    |
| 1.5 Referenced documents                | <ul style="list-style-type: none"> <li>Added [5] <i>AS 3600 Concrete structures</i>.</li> </ul>                                                                                                                                                                                                                                                                    |
| 2 Assets                                | <ul style="list-style-type: none"> <li>Moved – now section 4.</li> </ul>                                                                                                                                                                                                                                                                                           |
| 2 Before you start                      | <ul style="list-style-type: none"> <li>Added new section.</li> </ul>                                                                                                                                                                                                                                                                                               |
| 3.3 Telecommunications pits             | <ul style="list-style-type: none"> <li>Moved to section 4 Assets. Now sub-section 4.2 Telecommunications pits.</li> </ul>                                                                                                                                                                                                                                          |
| 3.4 Telecommunications conduits         | <ul style="list-style-type: none"> <li>Moved to section 4 Assets. Now sub-section 4.3 Telecommunications conduits.</li> </ul>                                                                                                                                                                                                                                      |
| 3.3 Premises                            | <ul style="list-style-type: none"> <li>Added new section.</li> </ul>                                                                                                                                                                                                                                                                                               |



| Section                                                                 | Details                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3.4 Multi Dwelling Unit (MDU) and Horizontal Multi Dwelling Unit (HMDU) | <ul style="list-style-type: none"> <li>Added new section.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 3.5 Network design guidelines                                           | <ul style="list-style-type: none"> <li>Moved to section 5 Network design requirements.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 3.6 DN guidelines                                                       | <ul style="list-style-type: none"> <li>Moved to section 5.1 DN requirements.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 3.7 LN guidelines                                                       | <ul style="list-style-type: none"> <li>Moved to section 5.2 LN requirements.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 4 Assets                                                                | <ul style="list-style-type: none"> <li>Moved - previously section 2.0.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 2.1.1 Verification                                                      | <ul style="list-style-type: none"> <li>Deleted section.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 2.1.2 Installation                                                      | <ul style="list-style-type: none"> <li>Deleted section.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 4.1 Design documentation                                                | <ul style="list-style-type: none"> <li>Renamed - previously 'Asset identification'.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 4.2 Telecommunications pits                                             | <ul style="list-style-type: none"> <li>Added new section (previously under FTTP network overview).</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 4.3 Telecommunications conduits                                         | <ul style="list-style-type: none"> <li>Added new section (previously under FTTP network overview).</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 4.4 Service drop conduit                                                | <ul style="list-style-type: none"> <li>Added new section.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 5 Network design requirements                                           | <ul style="list-style-type: none"> <li>Previously section 3.5 under 'FTTP network overview'.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 5.1 DN requirements                                                     | <ul style="list-style-type: none"> <li>Previously section 3.6 under 'FTTP network overview'.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 5.2 LN requirements                                                     | <ul style="list-style-type: none"> <li>Previously section 3.7 under 'FTTP network overview'.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 5.2.2 Laneways                                                          | <ul style="list-style-type: none"> <li>Added the words 'where single or dual deployments are not possible' to the last sentence.</li> <li>Added 'Barrier Kerb' as third option for developments with a laneway.</li> <li>Deleted 'Rear loaded deployment'.</li> <li>Added 'Trafficable pits' as fourth option.</li> <li>Added note: 'For a developer to implement a subsequent preference, the developer must provide a justification as to why the preceding preference could not be met. This justification may be requested during the design review'.</li> </ul> |
| 5.2.2.2 POS deployment                                                  | <ul style="list-style-type: none"> <li>Changed title from 'Front loaded using POS' to 'POS deployment' and added the words 'pits located within' to the description.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                      |
| 5.2.2.4 On boundary deployment                                          | <ul style="list-style-type: none"> <li>Renamed section to 'On boundary deployment'.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |



| Section                                                | Details                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5.2.3 Road crossings                                   | <ul style="list-style-type: none"> <li>Added bullet point: 'All laneway crossings must use a minimum of P50 conduit'.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                               |
| 5.2.2.2 POS deployment                                 | <ul style="list-style-type: none"> <li>Changed title from 'Front loaded using POS' to 'POS deployment' and added the words 'pits located within' to the description.</li> </ul>                                                                                                                                                                                                                                                                                                                                                |
| 5.2.2.5 Trafficable pit deployment                     | <ul style="list-style-type: none"> <li>Added new section.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 5.2.2.5 Conduit selection laneways                     | <ul style="list-style-type: none"> <li>Deleted requirement for 'A P100 express conduit to be installed between the LN connection pits' in first paragraph.</li> <li>Removed 'first boundary' from the pit requirement in second paragraph.</li> <li>Removed 'boundary' from the pit requirement in the third paragraph.</li> <li>Updated last requirement to say 'cross a laneway' instead of 'connect a service pit to the boundary pit. Only one connection is permitted between a boundary pit and service pit.'</li> </ul> |
| 5.3 Super lots                                         | <ul style="list-style-type: none"> <li>Moved - previously section 3.7.4 under 'LN Guidelines'.</li> <li>Added definition, examples of what they contain, and connectivity options in order of preference.</li> <li>Added information about support pit infrastructure and how to apply for this.</li> </ul>                                                                                                                                                                                                                    |
| 5.3.1 Front loaded deployment                          | <ul style="list-style-type: none"> <li>Added new section.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 5.3.2 Pit and conduit internal reticulation deployment | <ul style="list-style-type: none"> <li>Added new section.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 5.3.3 POS deployment                                   | <ul style="list-style-type: none"> <li>Added new section.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 5.3.4 Barrier kerb deployment                          | <ul style="list-style-type: none"> <li>Added new section.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 5.3.5 External enclosures deployment                   | <ul style="list-style-type: none"> <li>Added new section.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 5.3.6 Trafficable pits                                 | <ul style="list-style-type: none"> <li>Added new section.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 5.3.5 External enclosures                              | <ul style="list-style-type: none"> <li>Added new section.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 5.7.3.4 Pit selection – laneways                       | <ul style="list-style-type: none"> <li>Deleted section.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 7 Underground network components                       | <ul style="list-style-type: none"> <li>Previously section 4.</li> <li>Deleted 'Overview' heading.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                   |



| Section                           | Details                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 7.2 Pit requirements              | <ul style="list-style-type: none"> <li>Adjusted some of the headings and location of content for better flow.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 7.2.1 Pit types                   | <ul style="list-style-type: none"> <li>Added 'Trafficable Pit' to Table 4. Pit types.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 7.2.2 Pit                         | <ul style="list-style-type: none"> <li>Added 'Trafficable Pit' to Table 5. Pit sizes (minimum internal and nominal external dimensions).</li> <li>Added two new bullet points: <ul style="list-style-type: none"> <li>'The pit shall be able to allow <b>nbn</b> equipment brackets to be installed easily on the side wall.</li> <li>Plastic pits shall be designed: <ul style="list-style-type: none"> <li>to accommodate 2x fibreglass support bars for installation of <b>nbn</b> equipment that can be tied to the support bar.</li> <li>to have vertical and lateral strength to withstand lateral forces from the ground and vertical forces from lid and frame, due to pedestrians, mobility equipment and occasional lawn mowers for Class A and vehicles for Class B pits. The pit manufacturer should a test method that can supplied to <b>nbn</b> when requested.'</li> </ul> </li> </ul> </li> <li>Added 'LN, DN and service drop' to bullet point for pit lid specifications.</li> </ul> |
|                                   | <ul style="list-style-type: none"> <li>Updated bullet point with requirements for trafficable pit lids.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                   | <ul style="list-style-type: none"> <li>Added 'LN, DN' to bullet point for pit lid lifting tool hole.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                                   | <ul style="list-style-type: none"> <li>Added to bullet point for Class D that 'trafficable lids will be hinged at one end CUBIS steel lids'.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 7.2.4 Pit installation            | <ul style="list-style-type: none"> <li>Updated 4<sup>th</sup> bullet point to include 'MCU deployments' and updated requirement to specify that 'CUBIS concrete 5 pits with steel lids can be deployed in trafficable areas adjacent to buildings, designed such that pits will reside in areas of least vehicle interaction.</li> <li>Updated 7<sup>th</sup> bullet point by replacing the words 'ensure a minimum of one' with 'Recommended'.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 7.2.4.2 Backfilling/reinstatement | <ul style="list-style-type: none"> <li>Changed section title – previously 'Practices'.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |



## 2 Before you start

### 2.1 Health, safety and environment (HSE)



**Note:** The information below is for internal **nbn** employees and Delivery Partners. It is expected that Developers, Builders and anyone else following the requirements in this document will comply with relevant HSE legislation, and their own HSE processes.

**nbn** takes health, safety and environment management very seriously, and expects the same with all internal employees and our Delivery Partners. Whilst undertaking the activity associated with this document, all workers (both **nbn** employees and delivery partner's employees) must comply with relevant HSE legislation, their own HSE processes, contractual HSE obligations and **nbn**'s HSE Critical Risk Controls.

The Critical Risk Controls (CRC) set out **nbn**'s minimum expectations for carrying out work where there is a risk of exposure to one or more HSE critical risks. The mandatory requirements specified in the **nbn**<sup>TM</sup> HSE Critical Risk Controls are in addition to other requirements under legislation and do not replace or limit any **nbn** or Delivery Partner obligation to manage HSE risks. It is also important to note that the Critical Risk Controls are not exhaustive of all controls required to manage HSE risks.

The information within this document has been prepared with an understanding that HSE risks may be evident and will require assessment with due consideration to CRC requirements by **nbn** or the Delivery Partner participating in any activity prescribed within the document and controls are documented in relevant safe work systems (e.g. SWMS, Procedure etc.) and adhered to.

## 3 FTTP network overview

The **nbn**™ FTTP network is designed to provide full fibre connectivity to premises within New Development projects.

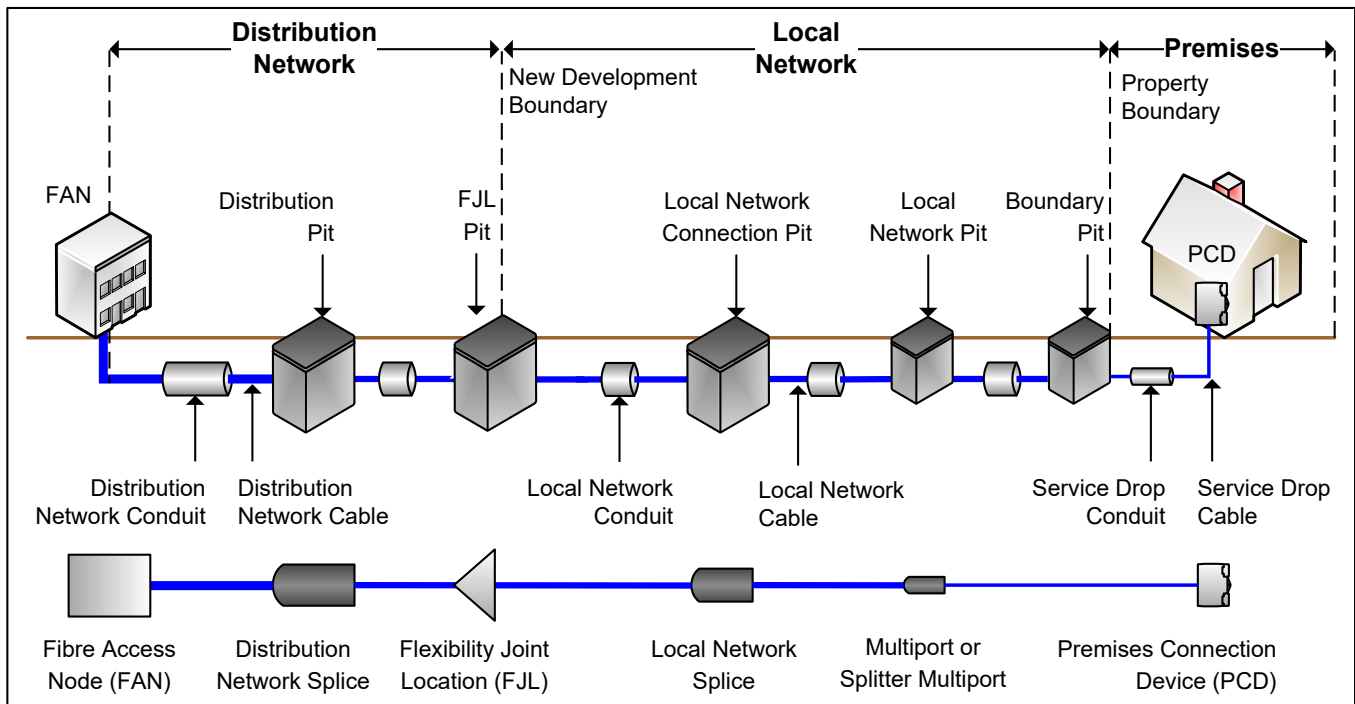


Figure 1. FTTP network

The FTTP network is divided into hierarchical components which assist in the planning, design and implementation of the FTTP network.

Network components (refer to Figure 1) relevant to New Development project deployment of fibre ready facilities, are described in more detail below.

### 3.1 Distribution network (DN)

The DN provides connectivity between the **nbn**™ Fibre Access Nodes (FANs), where the active equipment is located, and the Flexibility Joint Location (FJL). The FJL represents the demarcation point between the DN and the Local Network (LN). The DN will also be installed between all FJLs in the new developments, as shown in Figure 1.

### 3.2 Local network (LN)

The LN is installed between the FJL and the associated telecommunication pits located outside property boundaries.

### 3.3 Premises

The premises is connected to the LN via a starter conduit that connects to the service drop conduit within the property boundary.



## 3.4 Multi Dwelling Unit (MDU) and Horizontal Multi Dwelling Unit (HMDU)

MDUs are defined as a building containing multiple dwellings within a single lot, with ownership managed by a body corporate, strata, owner's corporation or other similar structure.

For MDUs or MCUs which require internal pathways to each dwelling refer to [12] *NBN-TE-CTO-284 MDU Building Engineering and Design Standard – New Developments* which details **nbn's** internal pathway requirements.

HMDUs are defined as an MDU serviced by pit and pipe works located on part of the site for which ownership will be transferred to a body corporate, strata, owner's corporation or other similar structure and can be either multi commercial units (MCUs) where the premises intended use is commercial such as retail, manufacturing or service, or a combination of residential and commercial units.

For HMDUs with individual dwellings being street facing please refer to section 5.3 Super lots.



## 4 Assets

The assets described below are required to be provided by the Developer to support provisioning of the **nbn**<sup>TM</sup> FTTN network.

### 4.1 Design documentation

All design documentation (including initial development documentation, pit and conduit design and as-built or other documentation) prepared by the Developer and its contractors must identify the proposed location of all network infrastructure and addresses and, as a minimum, the following:

- location of pits and conduits, including measurements in metres or parts thereof
- positioning information relative to known fixed assets (e.g. kerb lines, property boundaries)
- locations of roads, driveways and proposed roads and driveways
- depth of cover for conduits
- trench cross-sections, showing all services within the same alignment
- identification of conduits (e.g. local or distribution)
- service drop locations and either local pit or boundary pit pre-allocations

**Note:** The final positioning of **nbn**<sup>TM</sup> network infrastructure is determined by **nbn**.

Specific drafting standards apply to both pre-construct and as-built documentation for **nbn**<sup>TM</sup> pit and conduit network designs.

**nbn**'s requirements and Computer Aided Design (CAD) standards - including the approved template, symbols and Assisted Drafting Tool (ADT) can be found in [10] *NBN-COO-EDS-017 New Development Pit & Pipe Design Guidelines*.

### 4.2 Telecommunications pits

**nbn** requires approved pits for:

- managing connections between conduits
- housing fibre optic cabling and splice closures
- housing the Small Footprint Multiport (SFM) and Splitter Multiport (SMPs) required to connect End User Premises (EUP) to the LN

### 4.3 Telecommunications conduits

Conduits provide the pathways for the subsequent installation of fibre optic cabling.



The DN fibre and the LN fibre may be contained within the same conduit.



## 4.4 Service drop conduit

The service drop conduit is located between the telecommunication pit and either the property boundary location or the end user premises (EUP).

It can be the starter conduit which exits from the pit to the property boundary and is provided as part of the LN by the Developer; or it can be the lead-in conduit within the property boundary which is provided by the builder of the dwelling in the lot.

Refer to [11] *NBN-DES-STD-0011 Residential Preparation and Installation Single Dwelling Units (SDUs) and Multi Dwelling Units (MDUs)* for requirements for the Lead-in conduit.



## 5 Network design requirements

The design of the network begins at individual lots and follows a modular approach. Lots (typically four but up to a maximum of eight) are allocated to a service drop access pit or boundary pit, accessible by the local conduit network (refer to Figure 1. FTTP network).

### 5.1 DN requirements

The DN requires a single P100 conduit installed between the entrance to the development and the first FJL.

Further FJLs may require a separate P100 conduit (express conduit) installed between them, with the last planned FJL requiring a P100 conduit to the development exit. **nbn** planning would provide feedback on the express conduit routes and FJL requirements. Feedback will be provided to the Developer and/or design consultants.

The express conduit can share, or where required bypass, LN pits, but must connect to pits where the express conduit changes direction or exceeds 250m.



**Important:** The DN must also provide connectivity to the adjoining stage(s).

#### 5.1.1 Distribution entry and exit locations

A distribution pit will be installed at the DN entry and exit boundary locations of the development to provide a connection location between the development DN and the **nbn**<sup>TM</sup> DN, when available.

For developments that have an entry and exit on the same road, a minimum of one P100 conduit should be installed (unless otherwise specified by **nbn**) between the two distribution pits across the entrance road to the development, to allow for cables to be installed past the development.

### 5.2 LN requirements

The LN requires a minimum of one P100 conduit. The conduit is installed along the property boundary before connecting into pits situated at, or near, each shared street facing the property boundary.

In a cul-de-sac scenario, the last section of the pit and pipe can utilise P50 to a P5 or P2 pit, if no further network is required.



**Important:** The LN must also provide connectivity to the adjoining stage(s).

#### 5.2.1 LN Deployment

There are two methods permitted for deploying the local duct network, depending on available trenches in the development:

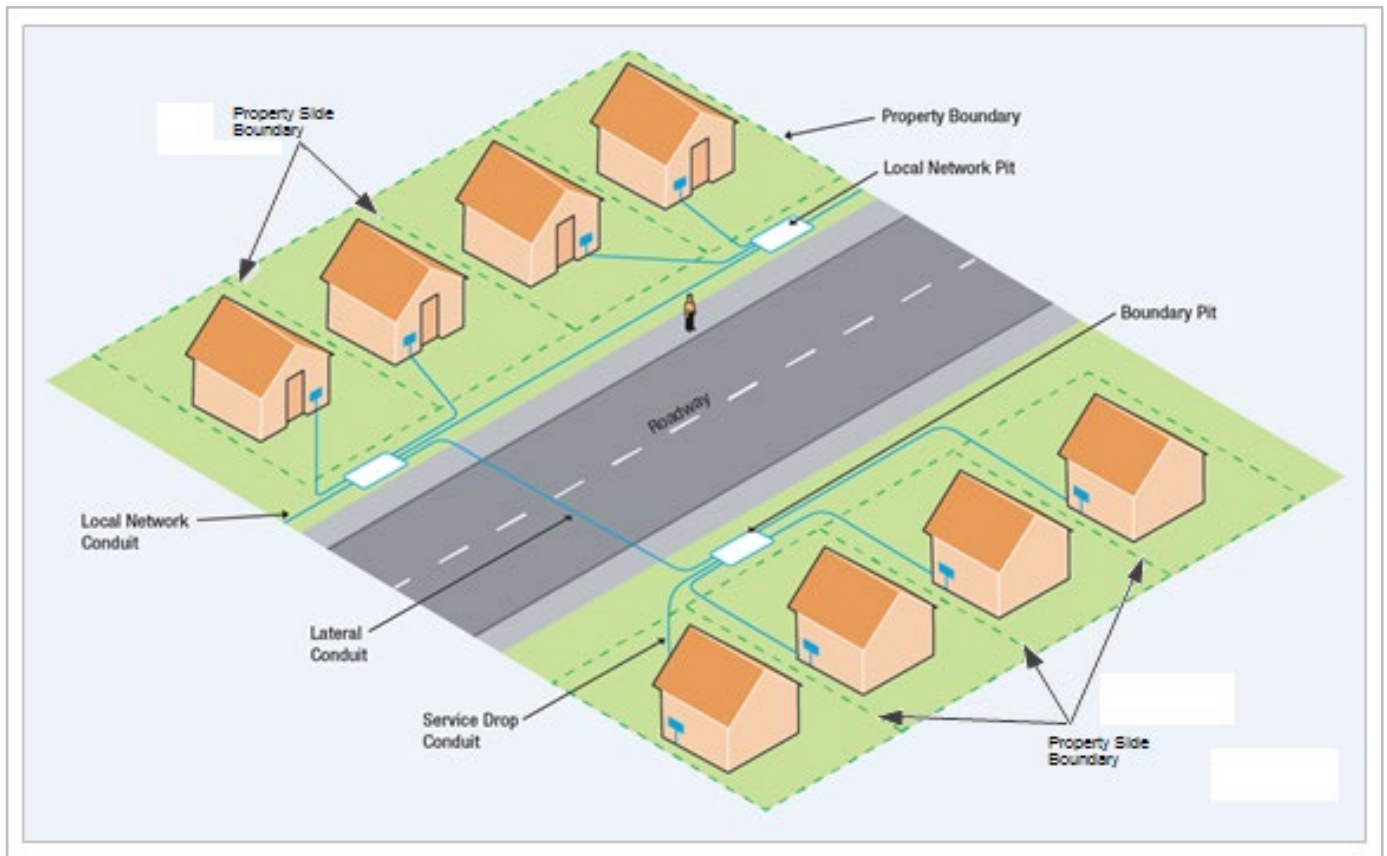
- single side deployment
- dual side deployment

### 5.2.1.1 Single side

Single side deployment is where the P100 LN conduit is installed on one side of the road only, as shown in Figure 2.

This conduit is installed into pits located between property boundaries with the pits being offset from the side boundary which separates two properties. This is to avoid installing pits in driveways or proposed driveways.

A P50 local lateral conduit is installed under the road between the LN pits on one side of the road and smaller boundary pits on the opposite side.

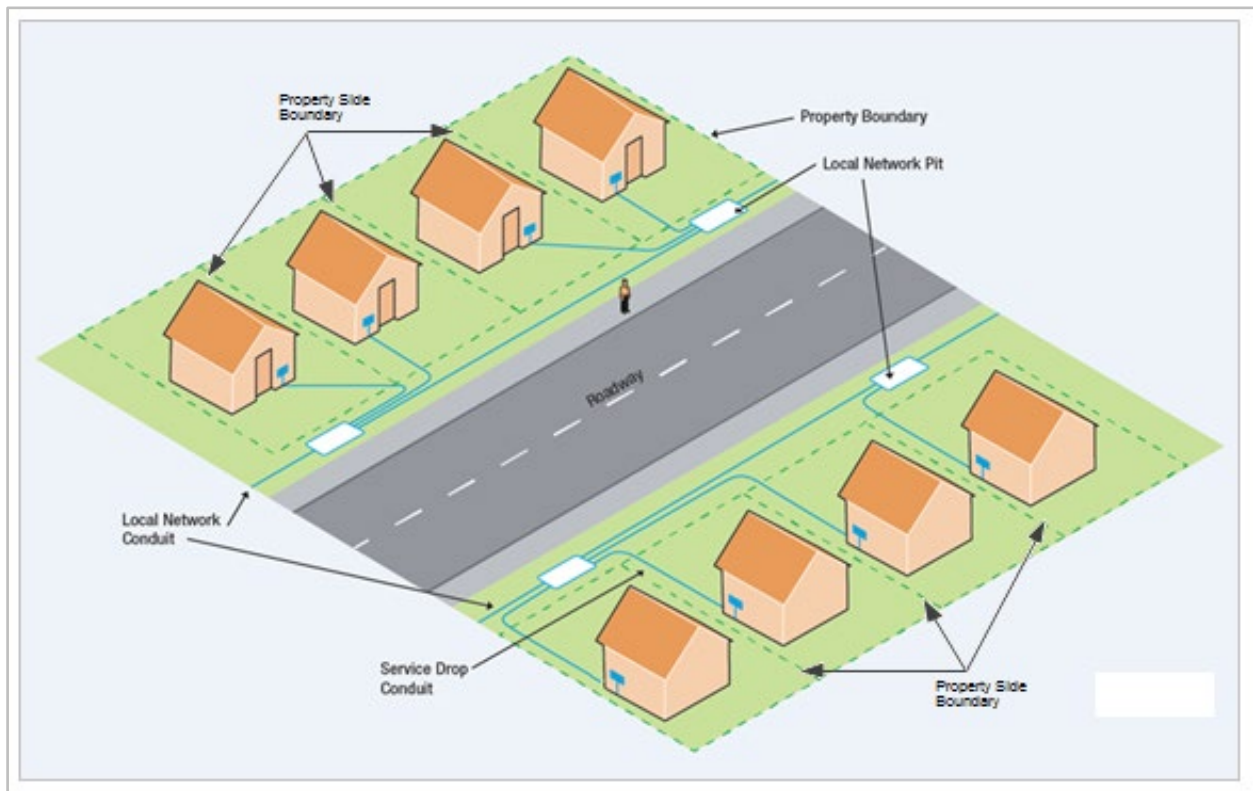


**Figure 2. Single side deployment**

### 5.2.1.2 Dual side

Dual side deployment is where a P100 LN conduit is installed in the following locations, as shown in Figure 3:

- on both sides of the road
- into the LN pits located between property boundaries



**Figure 3. Dual side deployment**

### 5.2.2 Laneways

A laneway is identified as having no verge available to install pit and conduit as per **nbn**'s requirements outlined in section 5.2.1 LN Deployment.

To provide connectivity for developments situated with a laneway, the following options are available and listed in order of preference:

1. Front loaded deployment
2. Public Open Space (POS) deployment
3. Barrier kerb deployment
4. On boundary deployment
5. Trafficable pit deployment



For a developer to implement a subsequent preference, the developer must provide a justification as to why the preceding preference could not be met. This justification may be requested during the design review.

### 5.2.2.1 Front loaded deployment

Premises are serviced from the street and must follow the single or dual sided deployment rules.

### 5.2.2.2 POS deployment

Premises are serviced from the pit located within the POS and must follow the single or dual sided deployment rules.

### 5.2.2.3 Barrier kerb deployment

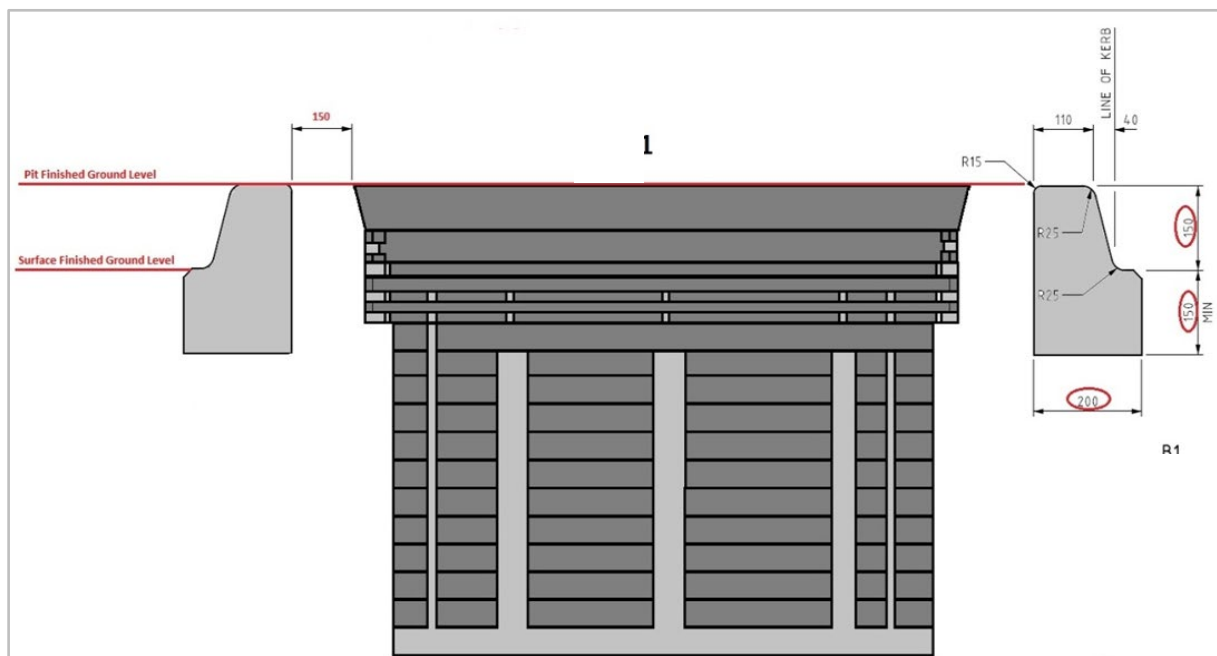
Pits are located within a super lot and must be protected by a barrier kerb.

Barrier kerb is for the protection of pits and is to be used within super lots, only where suitable pit locations such as raised garden beds are not available.

The barrier kerb type is B1 or similar (all dimensions are shown in millimetres).

Maintain a minimum of 150 mm separation from the back of the barrier kerb to the outer edge of the pit, along all exposed sides of the pit (refer to Figure 4).

The top of the pit must be level with the top of the barrier kerb.



**Figure 4. Barrier kerb dimensions**

#### 5.2.2.4 On boundary deployment

Either service or boundary pits must be installed on the customer boundary as per Figure 5.

Service easements must be provided by the Developer inside the rear of the lots to allow pits and conduits to be installed.

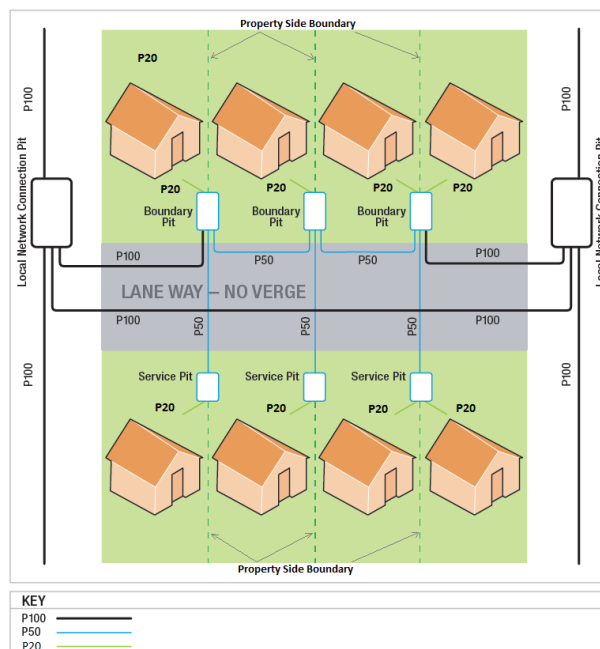
Service or boundary pits are to be installed:

- perpendicular to the street property boundary to maintain appropriate separation from other services (e.g. gas, power, water) Note that the conduit must still enter at the narrow end of the pit
- a minimum of 100 mm inside the property boundary

This solution allows the Developer to service a laneway of up to a maximum of 24 lots in total.

An **nbn** device is installed in the LN connection pit and service drop cables are reticulated through each connected pit.

If the number of lots requires the use of a second SFM or SMP, this will be housed in the local connection pit at the other end of the laneway.



**Figure 5. On boundary deployment**

### 5.2.2.5 Trafficable pit deployment

Pits are placed within a laneway and must be adjacent to the property boundary. Pits must be CUBIS concrete pits with Class D steel lids.

The lane way deployment can be single or dual sided as per local duct methods (refer to section 5.2.1 LN Deployment).

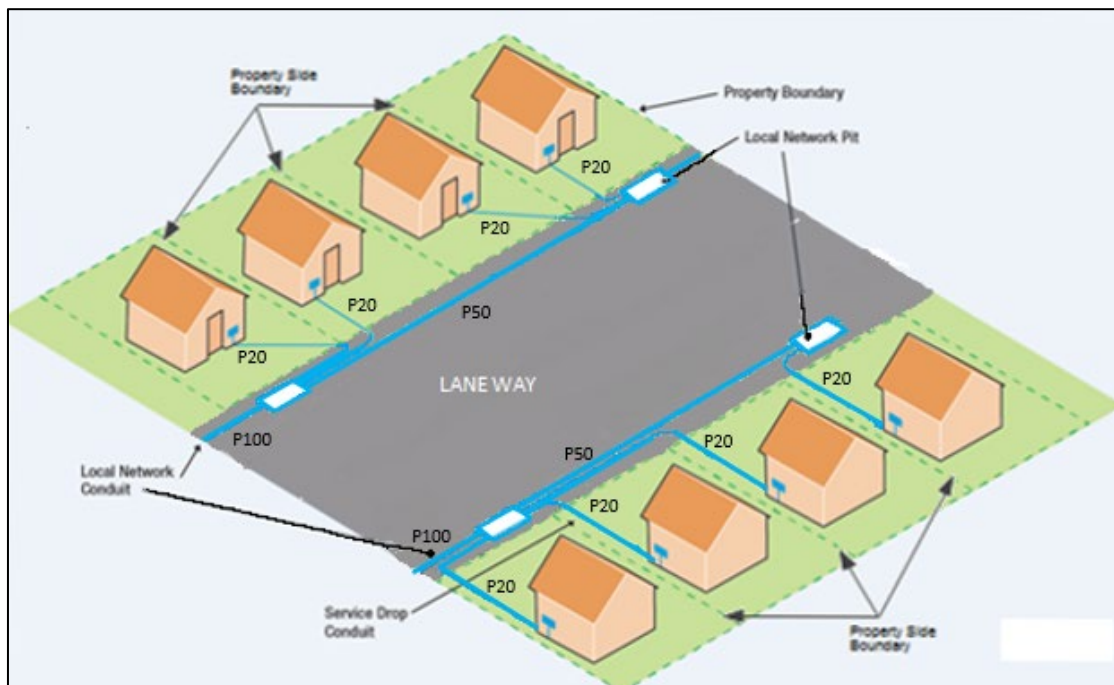


Figure 6. Dual sided lane way

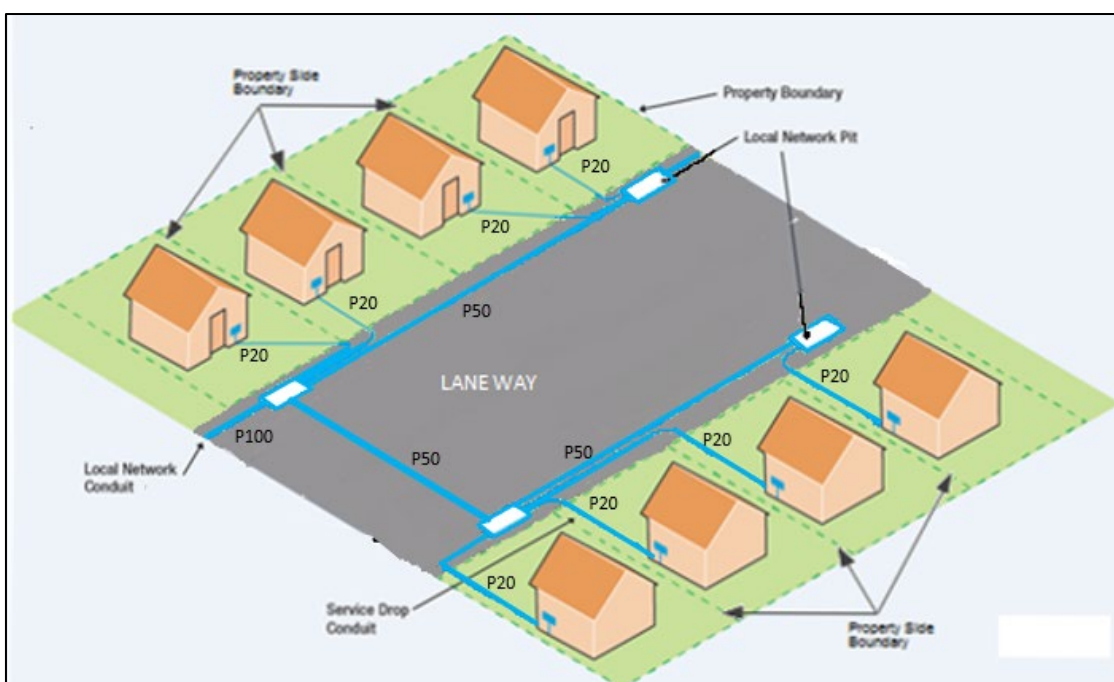


Figure 7. Single sided lane way



### 5.2.2.6 Conduit selection laneways

The first conduit at either end of the laneway linking the LN connection pit to the pit within the laneway **must** be a P100.

A P50 conduit **must** be installed from the first pit within the laneway to the remaining pits within the laneway.

A P50 conduit **must** be used to cross a laneway.

All P50 and P100 conduit bends **must** be long radius 90 degree bends.

## 5.2.3 Road crossings

All road crossings associated with the LN must use P100 conduits.

All road crossings connecting to a service drop access pit or boundary pit used solely for service drops must use P50 conduits.

All laneway crossings must use a minimum of P50 conduits.

## 5.3 Super lots

A super lot is defined as any lot created by the Developer for the purpose of future subdivision which will be developed by a third party developer.

They contain multiple individual dwellings or multiple adjoining dwellings, such as HMDUs or MCUs and are normally larger than a building lot allocated to an SDU. They are not used for an SDU.

To provide connectivity for a super lot development, single or dual deployment options must be applied.

The following options are available and listed in order of preference:

1. Front loaded or pit and pipe internal reticulation deployment
2. Public Open Space (POS) deployment
3. Barrier kerb deployment
4. External enclosures deployment
5. Trafficable pits (MCU only) deployment

Any pits to support the connection of a super lot that require installation over existing **nbn** network must be installed by **nbn** at the Developer's cost.

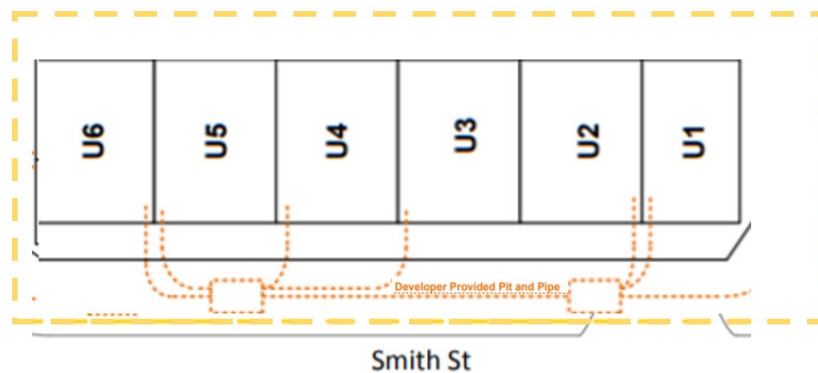
Apply online to **nbn** Relocation Works. ([Link to Modifying nbn™ infrastructure | nbn \(nbnco.com.au\)](https://nbnco.com.au))

### 5.3.1 Front loaded deployment

When provisioning a super lot as part of a new development or development stage the following applies:

- Dwellings that are street facing should have a connection to a pit or pits located either within or adjacent to the super lot.

- All sides of the super lot that are street frontage must be adequately serviced by locating pits and minimum P100 conduit along the road reserve on all relevant sides connecting into the current stage/s of the LN as shown in Figure 8.
- All new street facing dwellings must be interconnected via existing or new pit and pipe. **nbn** provides a single point of connection to service all individual dwellings.

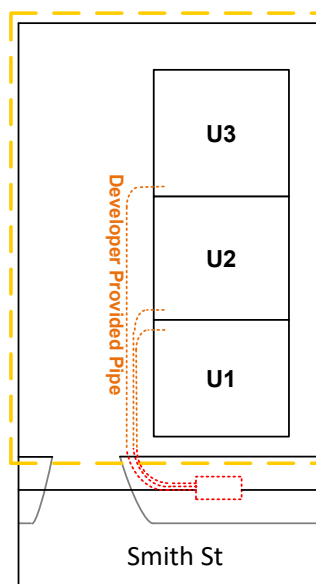


**Figure 8. Example of super lot with four (4) or more dwellings**

### 5.3.2 Pit and conduit internal reticulation deployment

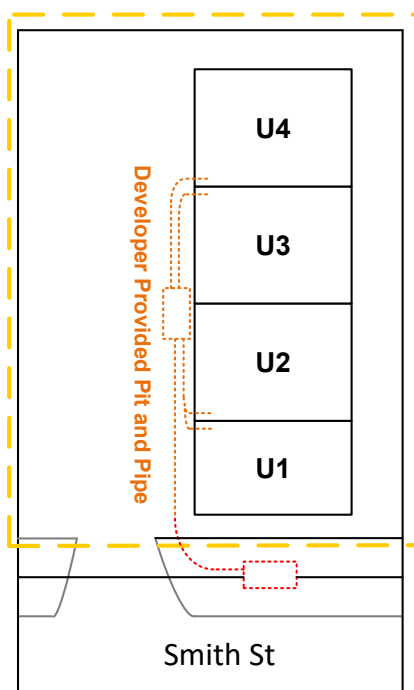
Internal pit and conduit:

- Where the super lots yield is three (3) or less internal premises, the premises can be serviced by three (3) individual P20 lead-in conduits located in common property (refer to Figure 9).



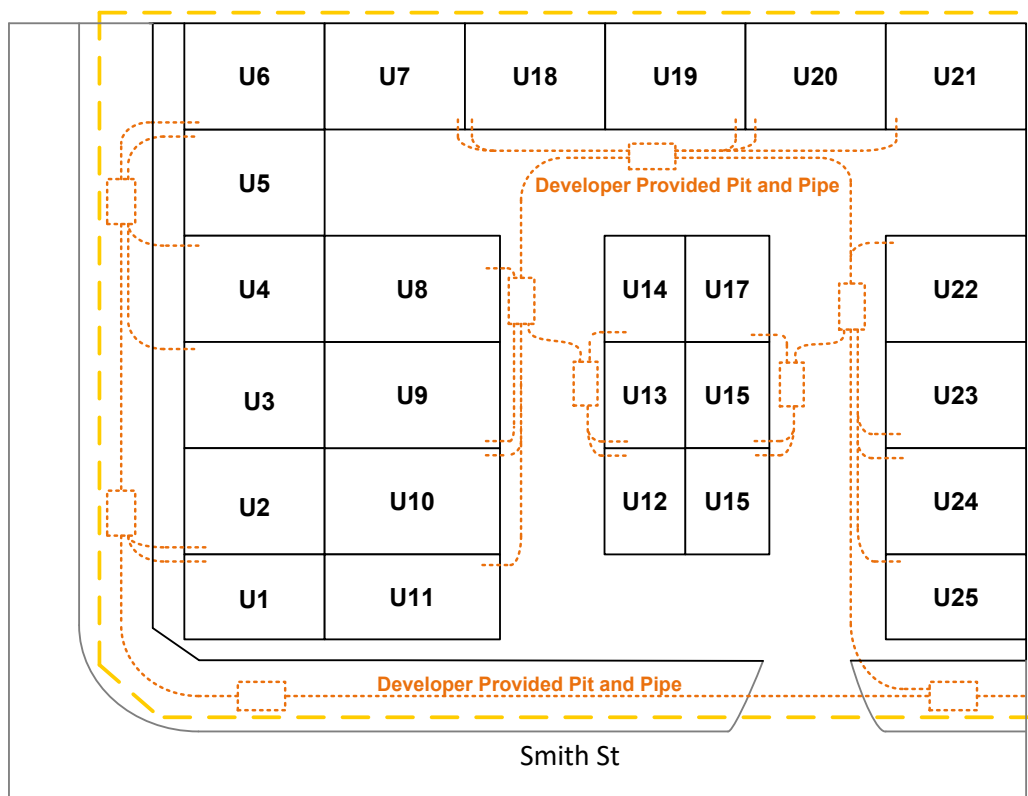
**Figure 9. Example of super lot with three (3) or less than premises**

- Where a super lots yield is four (4) to 24 internal premises it would require the installation of an internal pit and conduit network. This internal network will require P50 conduit, including lateral crossings to smaller pits on the other side to support service drop conduits and lead-ins to each dwelling (refer to Figure 10. Example of super lot with four (4) to 24 premises).



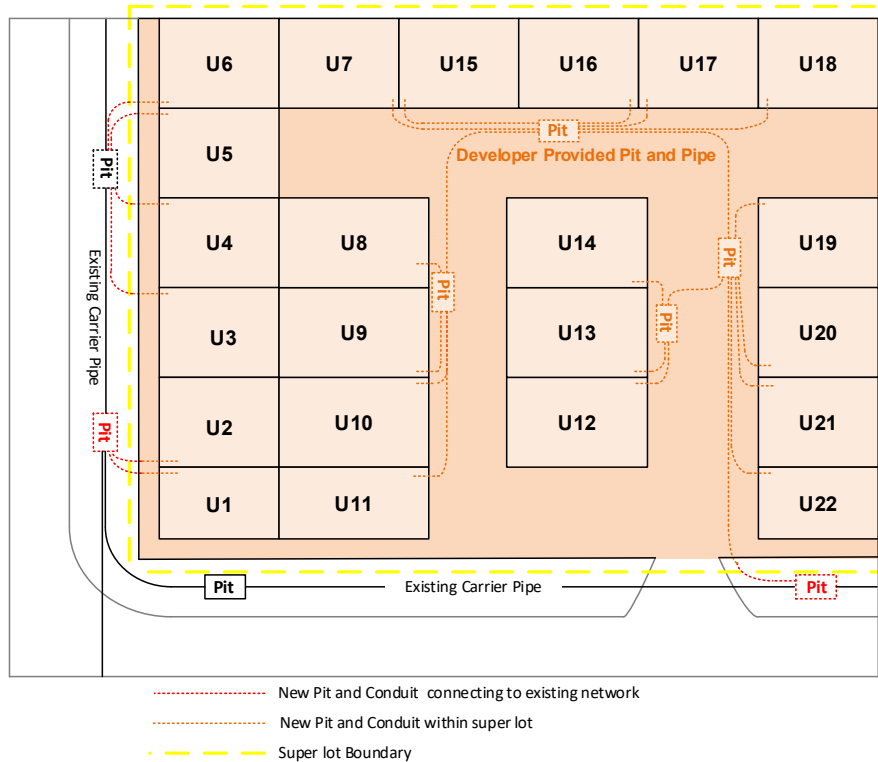
**Figure 10. Example of super lot with four (4) to 24 premises**

- Where a super lots yield is 25 or more internal premises, it will require the installation of an internal pit and conduit network. This internal network will require P100 conduit for the LN, with P50 lateral crossings to smaller pits on the other side to support service drop conduits and lead-ins to each premises (refer to Figure 11. Example of super lot with 25 or more premises).
- The installation of the internal pit and conduit must reflect either single side or dual side deployment as per Section 5.2.1 LN Deployment.
- Pits must be installed within the super lot in a suitable area not trafficable to vehicles as preference
- Where pits are unable to be installed in landscaped areas or internal footpaths, they must be installed within barrier kerb for protection (refer to section 5.3.4 Barrier kerb deployment).
- Laneway deployment methods as per 5.2.2 Laneways can be deployed when verge, POS , barrier kerbs are not feasible.
- Pits and conduits must not be installed in or cross individual titles within the super lot.



**Figure 11. Example of super lot with 25 or more premises**

- Where new pit and LIC interconnection is required to existing network, apply online to **nbn** Relocation Works. ([Link to Modifying nbn™ infrastructure | nbn \(nbnco.com.au\)](https://nbnco.com.au)) (refer to Figure 12Figure 12).



**Figure 12. Example of pit and conduit interfacing with existing network**

### 5.3.3 POS deployment

Premises within the super lot are serviced from the pit located within the POS and must follow the single or dual sided deployment rules.

### 5.3.4 Barrier kerb deployment

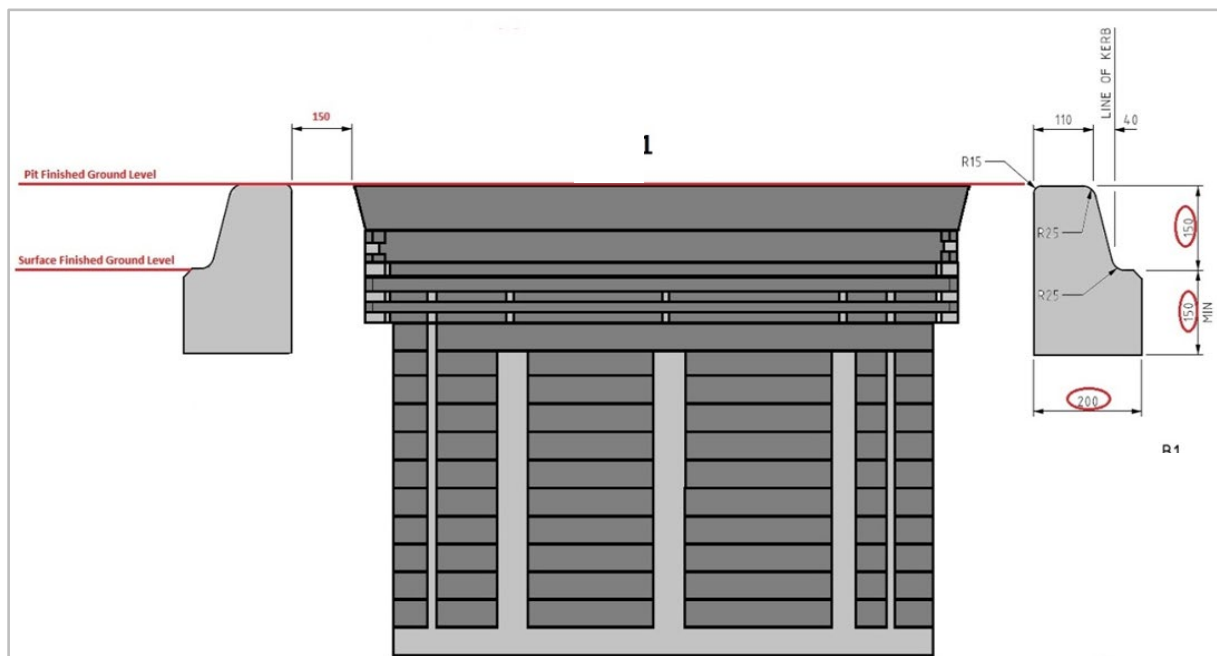
Pits are located within a super lot and must be protected by a barrier kerb.

Barrier kerb is for the protection of pits and is to be used within super lots, only where suitable pit locations such as raised garden beds are not available.

The barrier kerb type is B1 or similar (all dimensions are shown in millimetres).

Maintain a minimum of 150 mm separation from the back of the barrier kerb to the outer edge of the pit, along all exposed sides of the pit (refer to Figure 13).

The top of the pit must be level with the top of the barrier kerb.

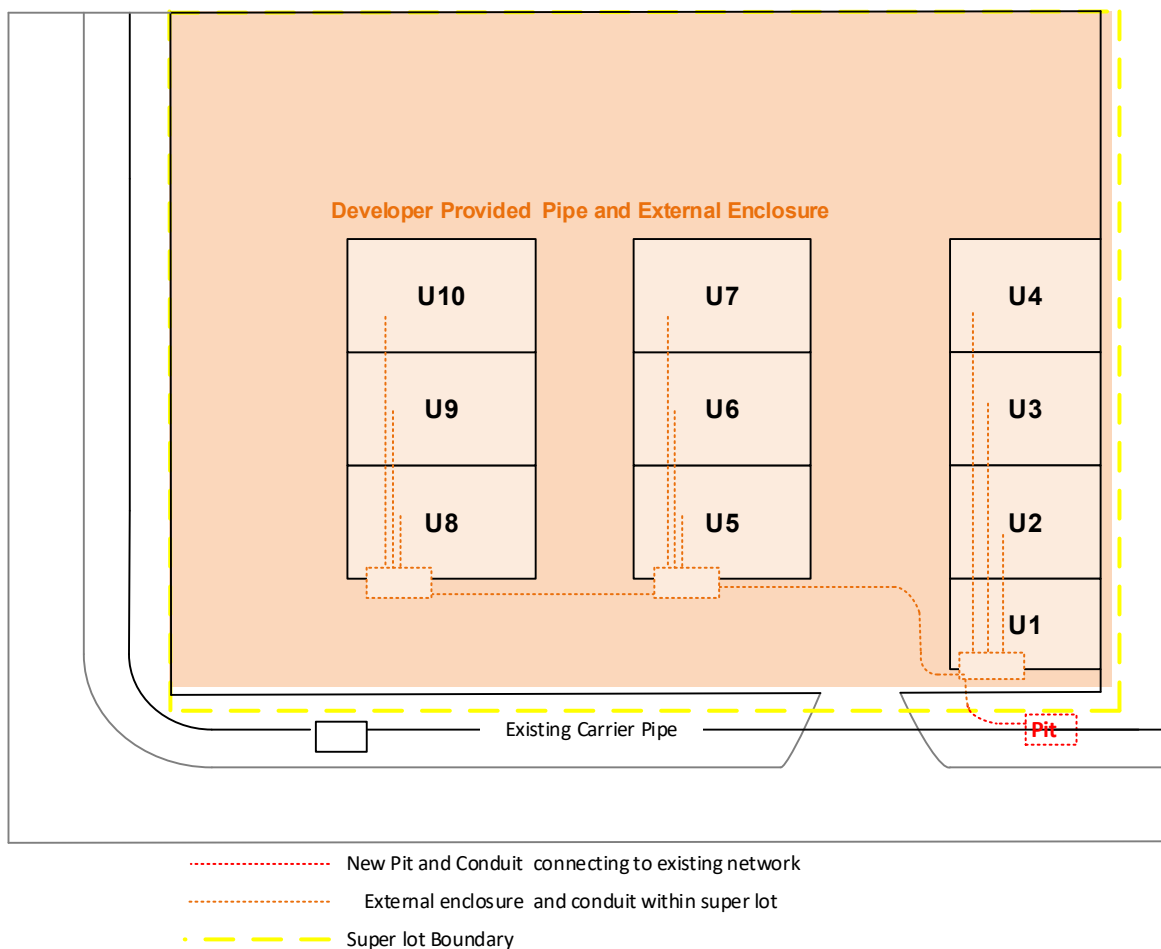


**Figure 13. Barrier kerb dimensions**

### 5.3.5 External enclosures deployment

The use of external enclosures is not preferred by **nbn**, but can be used when there is no alternative to Pit and conduit on small super lots four (4) to 24 internal premises and is limited to the following:

- MDU or MCU Buildings only within a super lot
- All Buildings within the super lot must have ownership transferred to a single body corp or owners corporation.
- Maximum of one enclosure per building
- All units / EUP are supported with a dedicated and direct P20 conduit from the enclosure to the EUPs/NTD location.
- Maximum of Three (3) Individual Buildings linked via express P50 conduit
- Individual Building Unit Count must not exceed 16.
- Total lot size must not exceed 24.



**Figure 14. External enclosures within Super lots**

### 5.3.5.1 Purpose

The enclosure should be used for the following purpose:

- to house the passive fibre devices in small MDUs
- suitable lead-in conduit transition point, e.g. P50 to P20
- to act as the building entry point for **nbn**'s lead-in cable
- to provide additional security of **nbn** passive fibre products
- to allow for a more visually appealing cabinet, that can colour match the premises.
- For a development of 1 – 4 SLs deployment, the minimum external cabinet size of 600mm (h) x 600mm (w) x 300mm (d) can be utilised to manage a PCD and a single SDT if required,
- For developments greater than 4 will need to accommodate a Budi Building fibre device and max two SDTs, the minimum cabinet size of 800mm (h) x 800mm (w) x 300mm (d) can be utilised.

Minimum internal mounting requirements of 760 mm (h) x 760 mm (w) x 250 mm (d)

### 5.3.5.2 Location

The enclosure must be installed on an external wall, 'in a safe and readily accessible location. The enclosure can be recessed within a cavity wall.

Enclosure location must be set back from trafficable areas and must not block building walkways or encroach exit pathways, parking spaces or driveways

The cabinet must be positioned on the wall at a maximum height of 1800mm from finished floor level to the top of enclosure and must be a minimum 400 mm from ground level with 900mm front access as shown in Figure 15. Enclosure clearances

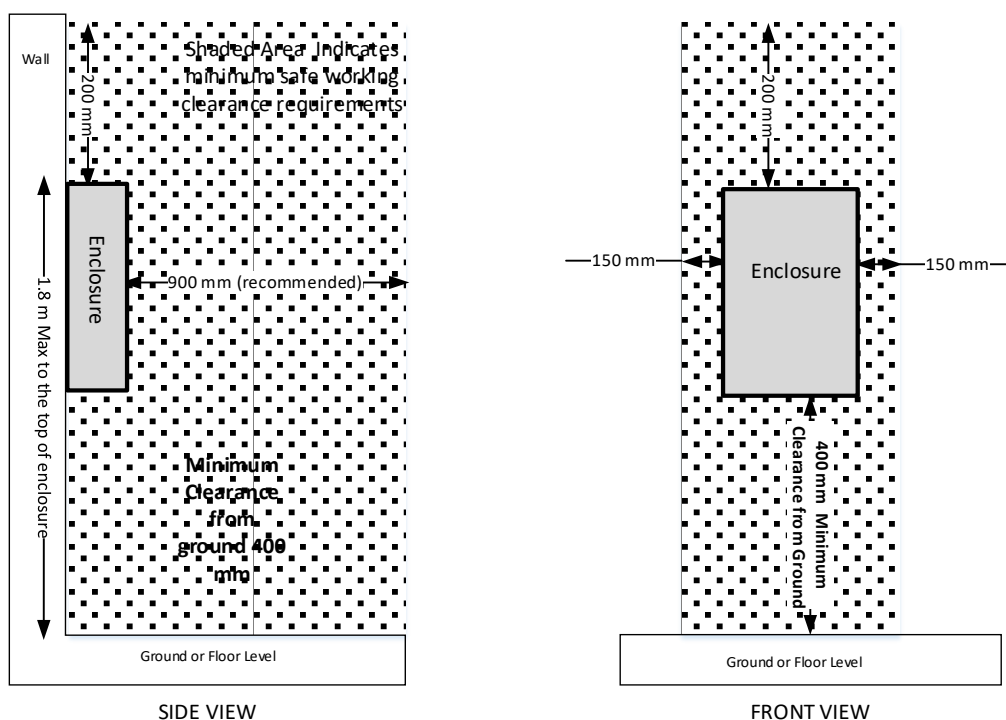
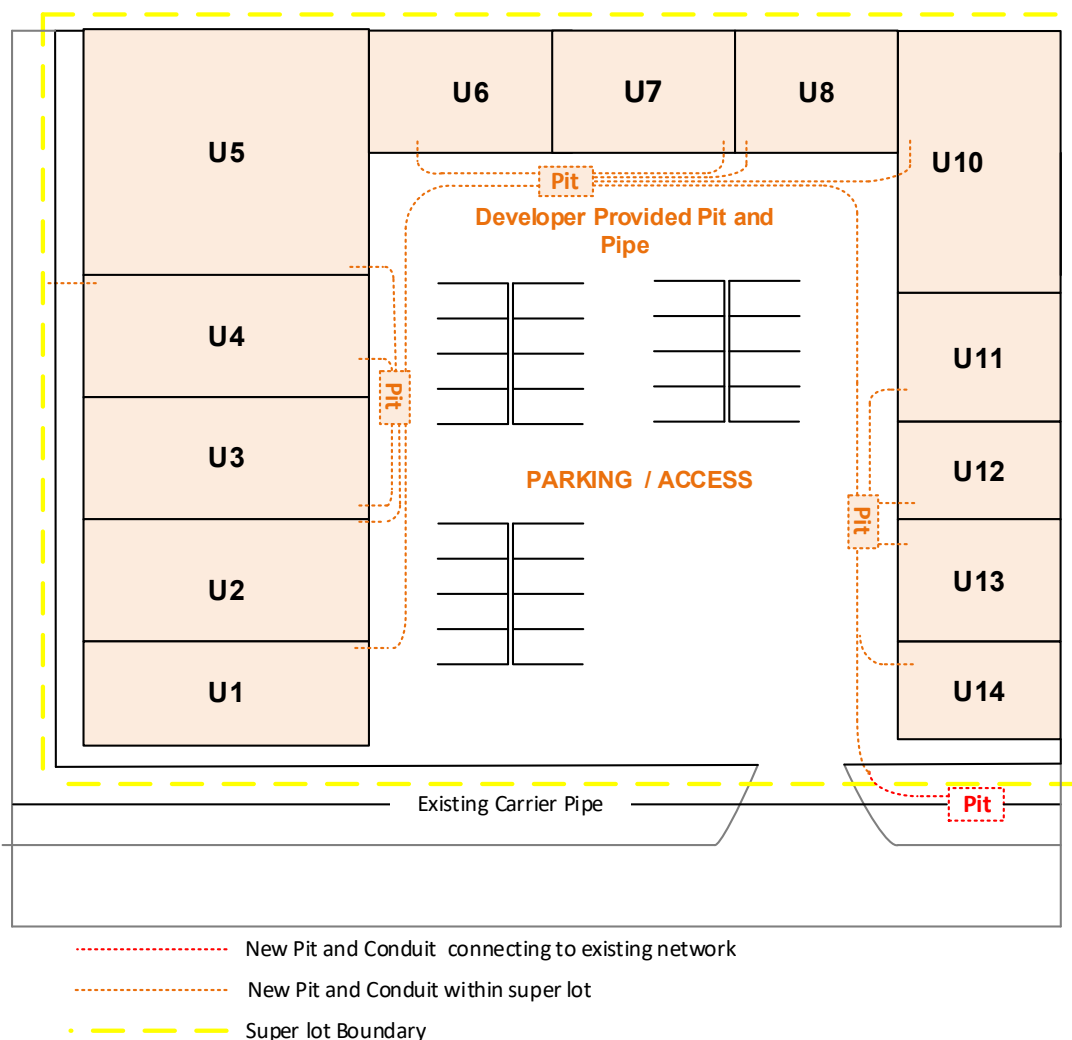


Figure 15. Enclosure clearances

### 5.3.6 Trafficable pits (MCU only) deployment

When no POS or verge areas are available commercial super lots pit and conduit must be deployed as follows:

- The installation of the internal pit and conduit must reflect either single side or dual side deployment as per Section Local duct network methods.
- Pits must be installed within the commercial super lot in a suitable area not trafficable to vehicles as preference
- Where pits are unable to be installed in landscaped areas or internal footpaths, they must be installed within barrier kerb for protection (refer to section 5.3.4 Barrier kerb deployment).
- Laneway deployment methods as per 5.2.2 Laneways can be deployed when verge, POS , barrier kerbs are not feasible.
- Pits and conduits must not be installed in or cross individual titles within the super lot.
- Where new pit and conduit interconnection is required to intersect existing network (refer to Figure 12) they must be installed by **nbn** at the Developer's cost. Apply online to **nbn** Relocation Works. ([Link to Modifying nbn™ infrastructure | nbn \(nbnco.com.au\)](https://nbnco.com.au)).



**Figure 16. Example of pit and conduit on MCU**

## 6 Smart places

Smart places (also known as non-premises locations or NPLs) products enable connection to locations that are not classified as premises.

These locations can be:

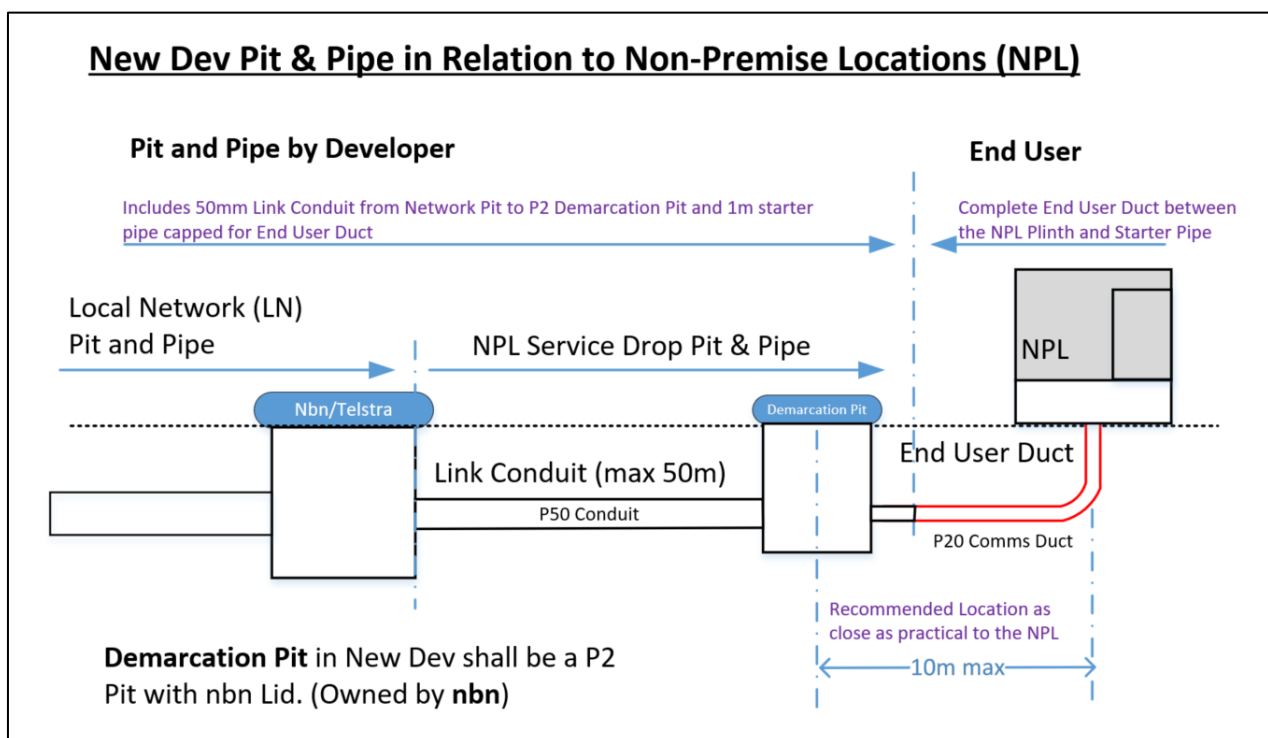
- Traffic Light Controller Cabinet
- Cameras
- Utility Sensors
- Electronic Signs

Where a smart place is required in the estate, a P50 link conduit is required to connect a customer demarcation pit. This demarcation pit must be a type 2 pit.

The following design requirements must be followed:

- One demarcation pit for one End User.
- Demarcation pit location should be as close as practical to the NPL (maximum distance of 10m).
- A P20 starter pipe should be installed with the demarcation pit, to a length of 1m and capped.
- The link conduit should have a maximum distance of 50m.

**Note:** Where this cannot be achieved, extend the local network pit and pipe closer to the demarcation pit.



**Figure 17. Pit and pipe overview for NPL**

## 7 Underground network components

All pits and conduits must be installed within the designated telecommunications alignment established by any of the following:

- state and federal governments
- street opening conference(s)/local council(s)
- in any shared trench

If for any reason this alignment cannot be used, a suitable alternative must be determined prior to design and installation, with approval from **nbn**.

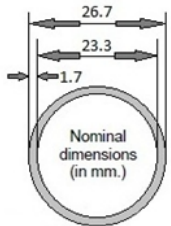
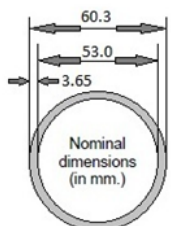
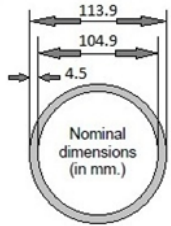
### 7.1 Conduit requirements

#### 7.1.1 DN and LN conduits

**nbn** requires the following for both DN and LN conduits:

- 50mm and 20mm nominal diameter conduits as detailed in [7] *AS/NZS 1477 PVC pipes and fittings for pressure applications*, Table 4.2(A) for wall thickness tabled under PN12 nominal sizes (DN) of 20 and 50mm, referred to as P50 and P20.
- 100mm nominal diameter conduits as detailed in [7] *AS/NZS 1477 PVC pipes and fittings for pressure applications*, Table 4.2(A) for wall thickness tabled under PN9 nominal sizes (DN) of 100mm, referred to as P100.
- The conduit is white and labelled as required by [1] *AS/CA S008 Requirements for customer cabling products*, as it applies to customer cabling products.
- The conduit meets the minimum requirements of:
  - [1] *AS/CA S008 Requirements for customer cabling products*, as it applies to customer cabling products
  - [3] *C524 External Telecommunication Cable Networks*
- All road crossing conduit installations are installed as close to 90° to the line of the road under which the conduits are being installed.

Conduit dimensions:

| Conduit Dimensions                                                                  | Nominal Size (Inside Diameter)                                | Conduit Dimensions                                                                  | Nominal Size (Inside Diameter)                                | Conduit Dimensions                                                                    | Nominal Size (Inside Diameter)                                |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------|
|  | <b>20 mm</b><br><b>PN 12</b> AS/NZS<br>1477:2006 table 4.2(A) |  | <b>50 mm</b><br><b>PN 12</b> AS/NZS<br>1477:2006 table 4.2(A) |  | <b>100 mm</b><br><b>PN 9</b> AS/NZS<br>1477:2006 table 4.2(A) |

**Figure 18. Nominal conduit dimensions**



**Important:** Conduits should not be installed in runs greater than 250m without transitioning through either local or distribution pits. If the distance is greater, too much stress might be placed on cable when it is hauled through the conduits.

### 7.1.2 Lateral conduits

**nbn** requires the following for lateral conduits (i.e. conduits that feed across streets for service drop cables):

- The lateral conduits must be P50 - 50mm nominal diameter conduits as detailed in [7] *AS/NZS 1477 PVC pipes and fittings for pressure applications*, Table 4.2 (A) for wall thickness tabled under PN12 nominal size (DN) of 50mm.
- The conduit must be white and labelled as per [1] *AS/CA S008 Requirements for customer cabling products*, as it applies to customer cabling products.
- The conduit meets the minimum requirements of:
  - [1] *AS/CA S008 Requirements for customer cabling products*, as it applies to customer cabling products
  - [3] *C524 External Telecommunication Cable Networks*
- All road crossing conduit installations are installed as close to 90° to the line of the road under which the conduits are being installed.

### 7.1.3 Local duct network conduit

**nbn** requires the following for local duct network conduit:

- The short run bend radius may be used on road crossings and starter conduit.
- The short run bend radius should only be used near a pit or opening of a conduit (e.g. turning up a building wall).
- Elbows (i.e. a sharp 90° change of direction) must not be used.
- P50 conduit bends used for local lateral conduits use a 90° x 305 mm radius bend where required.
- The bend radius of the P20 conduit bends to be a minimum of 15 times the outer diameter of the conduit.

### 7.1.4 Service drop conduits

**nbn** requires the following when installing service drop conduits to residential and commercial premises:

- For SDUs (including duplexes and triplexes), one P20 service drop conduit is required per premises.
- For small commercial premises (i.e. small strip shops), one P20 service drop conduit is required per premises.
- For all other commercial/industrial premises, a minimum P50 service drop conduit is required per premises.
- For a vertical MDU (such as an apartment building or office block) of up to 60 internal premises, a P50 service drop conduit is required per premises.

- For a vertical MDU with more than 60 internal premises, a P100 service drop conduit is required and should meet the minimum requirements of:
  - [1] AS/CA S008 Requirements for customer cabling products, as it applies to customer cabling products
  - [3] C524 External Telecommunication Cable Networks
- The conduit is labelled as per [1] *AS/CA S008 Requirements for customer cabling products*, as it applies to customer cabling products
- All service drop conduits are sealed at both ends using conduit plugs located within the pit, and conduit caps at the stub end of service drop conduits are fitted with a 3mm draw cord rated at a minimum 90 kg break force or similar.

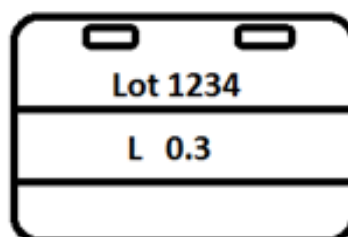


All draw cords must be of a synthetic material such as polypropylene.

#### 7.1.4.1 Installation

To prevent future access issues, service drop conduits must not cross into neighbouring private property. Specifically, for New Development deployment:

- The service drop conduit is extended from either the LN or boundary pit (depending on whether it is a single or a dual side deployment) to the lot boundaries.
- The start of the conduit should be installed 1m inside the lot and sealed with an end cap. At the pit, the end of the conduit should be sealed with a plug and labelled for builders to easily locate.
- It must be labelled with the following information:
  - the lot which it is feeding (e.g. Lot 1234)
  - the position from the boundary (e.g. right = R or left = L)
  - the distance it can be located from the boundary in metres
- The label must be water resistant (typically nylon based) and can be handwritten using permanent marker or printed if desired.
- The label must be securely affixed to the end of the drawstring itself, located inside the pit.



**Figure 19. Example service drop stub label**

- The furthest run of service drop conduit from the pit to the property boundary entry must not exceed 25m.
- Where practical to do so, multiple individual service drop conduits should share property boundary pits.

- The conduit will be extended to the premises at a future date and should be located in a position to facilitate this
- If the service drop conduit is less than 3m from the pit to the property boundary entry, the minimum cover is 300mm.
- If the service drop conduit is more than 3m from the pit to the property boundary entry, the minimum cover is 450mm.

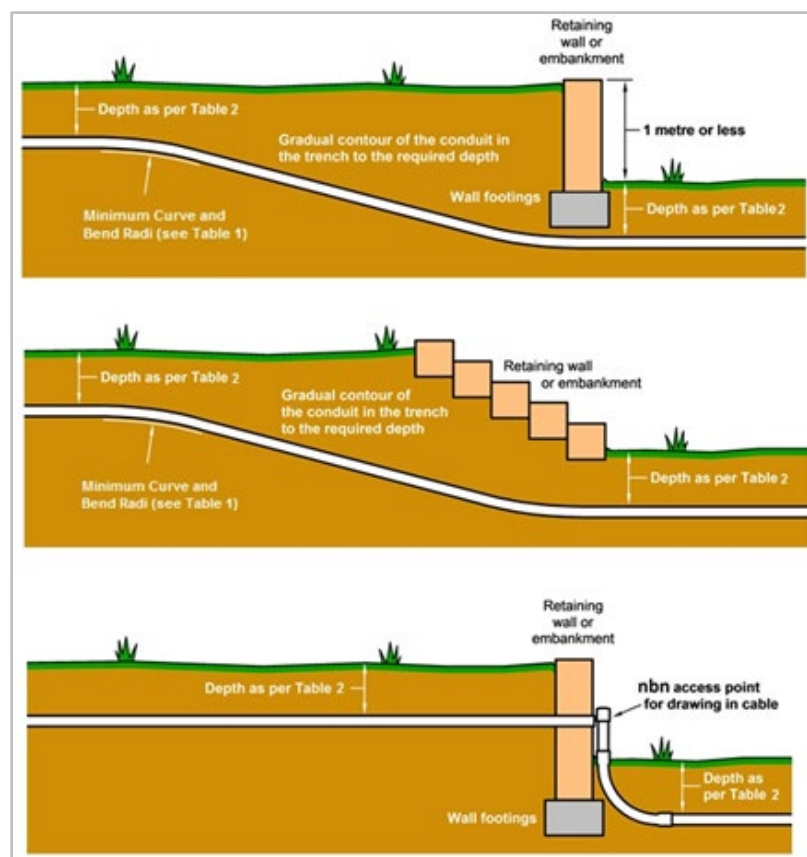
#### 7.1.4.2 Retaining walls

Service drop conduits (P20) must be installed under a retaining wall prior to the installation of the retaining wall. It is allowable to sleeve through a small section of P50 conduit from the property boundary.

**i** The P50 conduit would add some form of protection from the retaining wall/footings. Refer to the examples in Figure 20.

The service drop conduit should be installed to the acceptable minimum depth of cover within the lot (refer to Table 2), taking into account accessibility from the property boundary and connection of the future lead-in conduit.

**i** A minimum curve or sweep can be applied to the P20 conduits (refer to Table 1).



**Figure 20. Examples of service drop conduits under retaining walls**



## 7.1.5 Conduit bends

nbn requires the following for conduit bends:

- prefabricated
- of the same material and structure as the conduit
- a maximum sum of 180° of bend is allowed between pits

**Note:** If this figure is exceeded, a pit needs to be installed as centrally as possible in the conduit run in order to bring the sum of bend angles into compliance.

The long run bend radius with manufactured or pre-formed bends (also referred to as cold form bends) are typically in multiples of 22.5° for P100 conduit.

The long run curve radius with no manufactured or preformed bends may be used on all conduit runs, including trunk runs (e.g. where there is greater than 100m between pits).

A larger curve radius is required on long runs because there is typically more cable mass to haul through a conduit.

The short run bend radius is not to be used on express conduit routes.

Elbows (i.e. a sharp 90° change of direction) must not be used.

**Table 1. Minimum curve and bend radii**

| Minimum internal conduit diameter | Minimum curve/bend radius         |                                      |                                       |
|-----------------------------------|-----------------------------------|--------------------------------------|---------------------------------------|
|                                   | Long run (mm) no pre-formed bends | Long run (mm) using pre-formed bends | Short run (mm) using pre-formed bends |
| 100 mm                            | 13,000                            | 5,000                                | 800                                   |
| 50 mm                             | 6,500                             | 800                                  | 300                                   |
| 20 mm                             | 2,600                             | not applicable                       | 300                                   |

To change the direction of a P100 conduit, use only combinations of bends with angles of:

- 30° x 5m radius
- 45° x 5m radius



**Important:** Short radius 90° conduit bends are not to be used for P100 conduit in the DN or LN when changing direction. However, a 90° P100 1200mm sweeping bend may be used to change direction for the DN or LN. A short run is up to 90m. A long run is between 90-250m.

## 7.1.6 Conduit joints

Conduit joints for PVC pipes are achieved using 'socket and spigot' or 'coupler' and sealed with solvent cement.



## 7.1.7 Conduit installation

**nbn** requires the following when installing a conduit:

- Conduits are installed into trenches and must be supported with the appropriate bedding and suitable backfill for their length between pits, in accordance with the following Standards (or as required by the relevant local government authority):
  - [8] AS/NZS 2032 *Installation of PVC pipe systems*
  - [3] C524 *External Telecommunication Cable Networks*
  - [2] AS/CA S009 *Installation requirements for customer cabling (Wiring rules)*
- Conduits are installed in trenches with the minimum separation from other utilities, as per applicable local utility requirements, legislative requirements and shared trenching agreements (refer to Table 3 for information on clearances from other carriers and services).
- When multiple conduits are installed in one trench, the largest conduits are installed at the bottom of the trench.
- To facilitate future cable installation, conduits are placed as straight as possible within the trench.

## 7.1.8 Conduit testing

All installed conduits (except the service drop conduit) require testing via the use of a mandrel with a diameter of no less than 80% of the internal conduit diameter. This mandrel is hauled through to check for conduit concentricity and continuity.

After conduit testing has been performed:

- a 3 mm draw cord rated at a minimum 90 kg break force or similar (suitable for use as a cable hauling aid) must be installed within each service drop conduit
- a 6-6.5mm draw rope rated at a minimum 595 kg or equivalent must be installed for all other installed conduits

 All draw cords must be of a synthetic material such as polypropylene.

## 7.1.9 Conduit sealing

Once testing is finished and the conduit integrity has been identified as acceptable, all conduits are to be plugged within pits and conduit stubs capped (capped conduits include stage boundary and service drops).

### 7.1.10 Conduit minimum cover

The **nbn** minimum depth and cover of conduits in New Development sites are listed in Table 2.



**Table 2. Conduit depths and cover**

| Location                                                                | Minimum Cover               |
|-------------------------------------------------------------------------|-----------------------------|
| Service drop conduit - less than 3 m from the pit to the boundary entry | 300mm                       |
| Service drop conduit - more than 3 m from the pit to the boundary entry | 450mm                       |
| Verge (walkways, footpaths)                                             | 450mm                       |
| Road (non-state or territory)                                           | 600mm                       |
| Road crossing                                                           | 800mm to 1200mm (typically) |

### 7.1.11 Conduit marker tape

Conduit marker tape is not required to be installed above the conduit.

### 7.1.12 Clearances from other carriers and services

**Table 3. Clearance from other carriers and services**

| Service item             | Minimum radial clearances *1 |
|--------------------------|------------------------------|
| Gas pipe                 | over 110 mm                  |
|                          | 110 mm or less               |
| Power                    | high voltage                 |
|                          | low voltage                  |
| Water mains              | high pressure/capacity       |
|                          | local reticulation           |
| Sewer                    | main                         |
|                          | connection pipe              |
| other telecommunications | 100 mm*1                     |

\*1 Reduced separation is possible where all parties (including nbn) are consulted, and agreement is reached.

\*2 Only where protection barriers are used, for example: conduit, bedding, marker tape and cover batten.



## 7.2 Pit requirements

### 7.2.1 Pit types

The following table lists the pit types and definitions as a guide only:

**Table 4. Pit types**

| Pit type                | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Service drop access pit | <ul style="list-style-type: none"> <li>Provides an access location between the LN conduit and the service drop conduit.</li> <li>Only used to provide an access location for service drop fibre cable.</li> <li>Not to be used for any planned LN fibre cabling.</li> </ul>                                                                                                                                                                                                    |
| Boundary pit            | <ul style="list-style-type: none"> <li>Provides an access location between the LN conduit and the service drop conduit.</li> </ul>                                                                                                                                                                                                                                                                                                                                             |
| LN pit                  | <ul style="list-style-type: none"> <li>Located on the LN duct.</li> <li>Provides an access location between the LN conduit, local lateral conduit and the service drop conduit.</li> <li>Houses an SFM.</li> </ul>                                                                                                                                                                                                                                                             |
| LN connection pit       | <ul style="list-style-type: none"> <li>Located on the local duct network.</li> <li>Houses a fibre splice enclosure.</li> </ul>                                                                                                                                                                                                                                                                                                                                                 |
| Distribution pit        | <ul style="list-style-type: none"> <li>Located on the DN conduit.</li> <li>Provides mid-point hauling locations.</li> <li>Houses distribution splice enclosures.</li> <li>Also installed at entry and exit locations of the new development to facilitate cable installation.</li> </ul>                                                                                                                                                                                       |
| FJL pit                 | <ul style="list-style-type: none"> <li>Houses a fibre splice enclosure.</li> <li>Provides a demarcation point between the DN and LN.</li> </ul>                                                                                                                                                                                                                                                                                                                                |
| Manhole                 | <ul style="list-style-type: none"> <li>Located on the DN conduit.</li> <li>Can house additional P100 and P50 conduit combinations that are over and above the standard pit conduit configuration.</li> <li>Provides mid-point hauling locations.</li> <li>Can be used in road infrastructure projects. Houses distribution splice closures.</li> <li>Can also be installed at the entry and exit locations of the new development to facilitate cable installation.</li> </ul> |
| Trafficable Pit         | <ul style="list-style-type: none"> <li>Concrete Cubis P5 with Class D Steel Lid,</li> <li>Used as LN Pit or Service drop Pit within Laneways and Commercial MDUs Only</li> </ul>                                                                                                                                                                                                                                                                                               |



## 7.2.2 Pit dimensions



Important: Internal dimensions are measured using the following methodology only.

Depth is measured by the distance from the inside of the pit base to the surface below the pit lid.

Length and width are measured as follows:

- along the centreline of the pit
- on the inside of the base
- at right angles to each other
- with no internal protrusions on the surface

**Table 5. Pit sizes (minimum internal and nominal external dimensions)**

| Pit purpose                                        | Minimum internal dimensions (mm) |       |       | Nominal external dimensions (mm) |       |       | Industry pit type naming convention |
|----------------------------------------------------|----------------------------------|-------|-------|----------------------------------|-------|-------|-------------------------------------|
|                                                    | Length                           | Width | Depth | Length                           | Width | Depth |                                     |
| Service drop access pit                            | 490                              | 150   | 500   | 650                              | 280   | 565   | Type 2                              |
| Service drop access pit or boundary pit or FJL pit | 510                              | 290   | 540   | 700                              | 450   | 650   | Type 5                              |
| Service drop access pit or LN pit or FJL pit       | 1130                             | 340   | 600   | 1360                             | 555   | 650   | Type 6                              |
| Distribution pit or LN connection pit              | 1130                             | 390   | 820   | 1360                             | 555   | 860   | Type 8                              |
| Distribution network manhole                       | 2460                             | 1100  | 1325  | 2600                             | 1240  | 1490  | Manhole                             |
| Trafficable Pits                                   | 510                              | 290   | 540   | 840                              | 590   | 925   | Concrete 5                          |

Pits and lids selected must meet the following minimum requirements:

- Pit dimensions must meet the requirements listed in Table 5.
- The pit construction must ensure that the top rim of the lid will not warp or bend when installed as per the manufacturer's specifications.
- The pit must be able to allow **nbn** equipment brackets to be installed easily on the side wall.
- Plastic pits must be designed:
  - To accommodate 2x fibreglass support bars for installation of **nbn** equipment that can be tied to the support bar.



- To have vertical and lateral strength to withstand lateral forces from the ground and vertical forces from lid and frame, due to pedestrians, mobility equipment and occasional lawn mowers for Class A and vehicles for Class B pits. The pit manufacturer should provide a test method that can be supplied to **nbn** when requested.
- The pit and its fittings must not have exposed sharp edges.

### 7.2.3 Pit lids

- LN, DN and service drop pit lids must be concrete and weigh no more than 38 kg each, except where composite pit lids are installed by a Developer. In these instances, **nbn** will accept the installation providing the lid meets the [6] *AS 3996 Access covers and grates*, Class B classification.
- Trafficable pit Lids must be Concrete Cubis type 5 with a Cubis Steel Class D Lid.

**Note:** Composite pit lids are not to be used as covers for manholes.

- LN and DN pit lids must have a pit lid lifting tool hole at each end of the lid, capable of being used with an industry accepted standard lifting tool.
- Trafficable lids will be hinged at one end and be Cubis Steel Class D
- Pit lid lifting holes must be designed to prevent the insertion of materials including needle sharps (e.g. by fitting a gasket).
- Pit lid surfaces must be designed to prevent water gathering/pooling and have a slip resistance rating for wet conditions compliant with [9] *AS/NZS 4586 Slip resistance classification of new pedestrian surface materials*. A certificate of compliance from the pit lid supplier must be available as evidence, if requested by **nbn**.
- Pits and pit lids must have a load rating suitable for the location it is installed in as per [6] *AS 3996 Access covers and grates* Section 3.1.
- **nbn** pit lids must be manufactured as per [6] *AS 3996 Access covers and grates* and must be permanently labelled with:
  - Manufacturer's name or registered trademark.
  - The number of Australian Standard e.g. AS3996 – 2019.
  - Load classification e.g. Class B.
  - Weight of the lid e.g. 18 kg.
  - Carrier i.e. **nbn**.
- The pit lids must be embossed with the descriptor '**NBN**'. The descriptor should resemble the format displayed in Figure 21.
  - The descriptor must:
    - be positioned in the centre of the lid
    - be embossed in alignment with the longest side of the pit lid
    - be approximately 200mm in length with the height dictated by the typeface used
    - use the typeface Arial
    - use capital letters

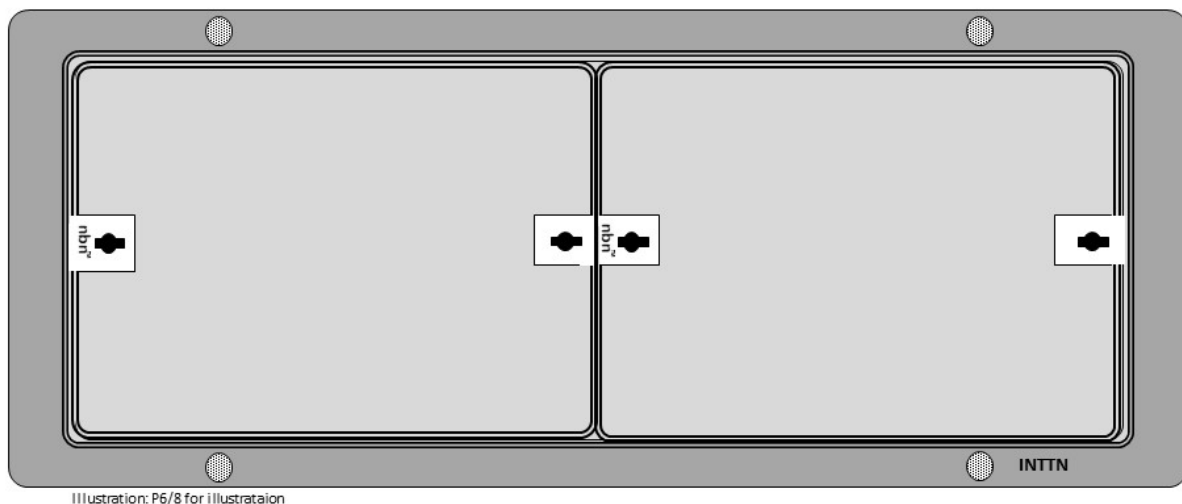
# NBN

**Figure 21. Required descriptor format**

### 7.2.3.1 Recessed pit lid

**nbn** will only allow recessed pit lid(s) if the following requirements are met:

- the Developer must provide written agreement from the local council, that the council will accept liability and to source and replace the infill material, when it fails. Therefore every recessed pit lid request will require nbn approval, to capture contacts and agreement for replacement of infill materials. nbn reserve the right to replace any broken recessed pit lid with Class B composite lid(s).
- Allowed only for class B P5 and P6/8/9.
- Approximate mass of the cover including any infill must be displayed as outlined in [6] AS 3996 Access covers and grates.
- The structural Infill must be placed, compacted, finished and cured in accordance to [5] AS 3600 Concrete structures.
- The pit lids must be embossed with the descriptor 'NBN'. The descriptor should resemble the format displayed in Figure 21.
- Combined weight of recessed pit lid with infill material should be less than 70kg.



**Figure 22. Example of a recessed pit lid**

Option for recessed pit lids can be used in accordance with applicable requirements outlined in [6] AS 3996 *Access covers and grates*.

The following requirements for recessed pit lids can be found in [6] AS 3996 *Access covers and grates*:

- Pit frame must have features to enable it, to be mechanically secured to the pit collar.
- Infill material, depth and bonding must be suitable to ensure durability and suitable to the place of installations.



- Approximate mass of the cover including any infill must be displayed as outlined in [6] AS 3996 *Access covers and grates*.
- The structural Infill must be placed, compacted, finished and cured in accordance with [5] AS 3600 *Concrete structures*.

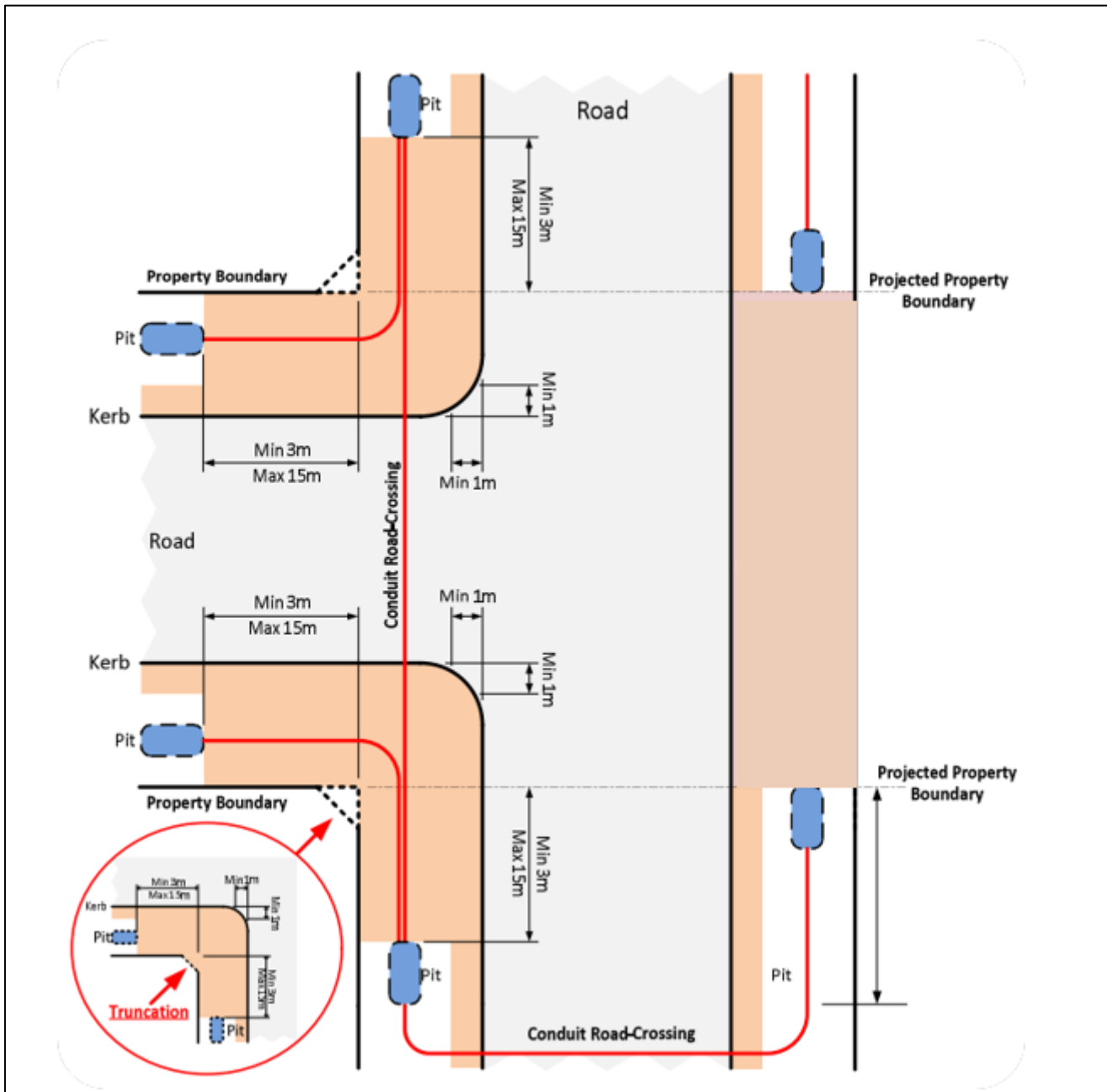
## 7.2.4 Pit installation

### 7.2.4.1 Location

nbn requires the pit to be **sited in accordance with the standards** below:

- Install pits in an easily accessible location to facilitate installation and operational tasks.
- The conduit network should be designed such that pits will reside in either a pathway/verge or in a garden bed. The installation of a pit across both a pathway/verge and a garden bed should be avoided.
- For single side and dual side deployments, position pits with their long side parallel to the adjacent property boundary or roadway.
- For laneway and MCU deployments, Cubis Concrete P5 with Class D Steel Lids can be deployed in trafficable areas adjacent to buildings, and designed such that pits will reside in areas of least vehicle interaction.
- Pits are to be offset from the boundary so as to not interfere with any driveways or proposed driveways.
- Where practical, the longest side of the pit is to be offset 350mm from the street facing property boundary.
- Recommended 3m separation from any pole without a transformer and/or street light or from any pole with an associated EPR zone, with minimum clearance 1m as specified in [2] AS/CA S009 *Installation requirements for customer cabling (Wiring rules)*.
- Ensure a minimum of 15m separation from any pad mounted transformer or pole with a transformer (Earth Potential Rise [EPR] Zone), as specified in [2] AS/CA S009 *Installation requirements for customer cabling (Wiring rules)*.
- Where practical, a minimum of 1m separation from the Back of Kerb (BoK).
- A pit must be installed within 6.5m of where a street conduit changes direction (measured from the outside edge of the preformed bend socket) by an angle equal to or greater than 90°.  
**Note:** Where the 6.5m conflict with other requirements, install the pit at the nearest safe location but no further than 15m.
- Pits must be placed in line with the conduit they connect with.
- A pit must be installed at the intersection of conduit runs that require a change in size of the conduit, where the alignment continues into a street crossing or bends around a street corner. In this instance, the pit(s) must be installed not less than 3m and no further than 15m along the alignment, from the corner of the adjacent property (refer to Figure 23).

- Where practical, pits must not be placed within driveways. The conduit network should be designed such that pits will not reside in driveways or part thereof. Where no alternative location is available the High Strength P5 Pits must be used.



**Figure 23. Example pit alignment for crossings/street corners**

Pits must not be installed:

- in unmade sections of carriageways
- outside a doorway
- in roadways areas
- on road edges (this includes parking bays)
- within a swale (i.e. open storm water drain, culvert or similar)



- in a hazardous area
- in areas that may be subject to EPR, as specified in [2] *AS/CA S009 Installation requirements for customer cabling (Wiring rules)*.

**Note:** Pit risers must not be used on any pit within a New Development.

#### 7.2.4.2 Backfilling/reinstatement

**nbn** requires the following practices to be adopted:

- The use of pit bedding and backfill is required prior to pit installation. Specifically, the foundation will comprise of sand, stabilised sand or fine crushed rock approximately 100mm in thickness. After installation, the foundation must bring the top of the pit level with the surrounding area/final ground area. Additionally:
  - the backfill material must not contain contaminants, debris, vegetation or waste
  - pits must not be distorted by the backfill process
  - all backfilling must be compacted using handheld rammers in layers not exceeding 150mm in thickness, to minimise the risk of subsidence
  - in grassed areas:
    - backfill material must stop within 50 mm of the finished surface level
    - a suitable top dressing must be used to complete the reinstatement to the finished surface level
  - after installation, the pits must conform to the surrounding soil and ground level or slope when reinstating
  - where the slope of the pit does not exceed a 1 in 8 gradient, the pit must be installed so the top of the pit:
    - is flush with the ground level or pavement
    - conforms to the general slope of the ground level or pavement on all sides



- If the backfilling practices are not adhered to, the pits may buckle as soil subsides.
- If the pits buckle, the pit lids will no longer fit.
- Where a concrete collar surrounds the upper rim of the pit, it is important that its depth is constant.

For further information on backfilling, refer to [4] *G645 Fibre Ready Pit and Pipe Specification for Real Estate Development Projects*.

#### 7.2.5 Conduit installation into pits

**nbn** requires the following when installing conduits into **nbn**™ pits:

- Install all conduits within a single trench into the pit located in the trench.
- Conduits:
  - That are distribution or local through conduits, are placed at the lowest point of the pit end wall.



- That are road crossing or direction change conduits, are placed roadside.
- That are service drop conduits, are placed property side and above all local and distribution conduits.
- Must not be installed within 50mm of any vertical or horizontal internal corner of the pit and all entries must be via the pit end only (the narrow end) (refer to [4] *G645 Fibre Ready Pit and Pipe Specification for Real Estate Development Projects*).
- Are located centrally with at least 50mm of space between the conduit exterior and the internal pit floor.
- Where multiple ducts enter a pit, 25mm minimum separation is required between each duct.
- Have a draw string or similar installed (suitable for use as a cable hauling aid).
- Are sealed with duct plugs.
- Where required, conduits from the trench should be gradually reduced from the minimum cover to align with the pit wall entry, so that any and all conduits do not have a reduced cover of 450mm even when multiple conduits are stacked at either pit wall ends.
- Conduit ends:
  - Finish square and flush with the pit end walls.
  - Are fitted with bushes flush with the pit wall ends.
  - Adhere to the conduit.



**Important:** Holes in plastic pits for conduits must be cut with the correct size hole saw to ensure a tight fit for bushes.



## 7.2.6 Maximum pipe combinations at each end of the pit

**Table 6. Maximum pipe combinations at each end of the pit**

| nbn™ pit type                                     | Industry pit type naming convention | P100 | P50 | P20 (LIC) |
|---------------------------------------------------|-------------------------------------|------|-----|-----------|
| Service pit                                       | Type 2                              | 0    | 1   | 2         |
|                                                   |                                     | 0    | 0   | 3         |
| Service pit or boundary pit or FJL pit            | Type 5                              | 1    | 2   | 0         |
|                                                   |                                     | 1    | 1   | 2         |
|                                                   |                                     | 1    | 0   | 4         |
|                                                   |                                     | 0    | 3   | 0         |
|                                                   |                                     | 0    | 2   | 2         |
|                                                   |                                     | 0    | 1   | 4         |
|                                                   |                                     | 0    | 0   | 4         |
| LN connection pit                                 | Type 6                              | 2    | 0   | 2         |
|                                                   |                                     | 1    | 2   | 2         |
|                                                   |                                     | 1    | 0   | 4         |
|                                                   |                                     | 0    | 4   | 0         |
|                                                   |                                     | 0    | 2   | 2         |
|                                                   |                                     | 0    | 1   | 4         |
|                                                   |                                     | 0    | 0   | 6         |
| LN connection pit and distribution pit (standard) | Type 8                              | 4    | 0   | 0         |
|                                                   |                                     | 3    | 2   | 0         |
|                                                   |                                     | 3    | 0   | 4         |
|                                                   |                                     | 2    | 4   | 0         |
|                                                   |                                     | 2    | 2   | 4         |
|                                                   |                                     | 1    | 4   | 4         |
| Distribution network                              | Manhole                             | 6    | 0   | 0         |
|                                                   |                                     | 4    | 2   | 0         |



## 7.2.7 Pits in reactive soils

In some locations there are reactive soils, which are clay-type soils also called black soils that swell when wet and shrink on drying; this causes the pit walls to be crushed inwards damaging the pit and movement of the ducts at the entry point into the pit.

To prevent pit crushing and duct movement which will damage **nbn** cables inside the pits and ducts, pits which achieve Class 3 according to Load Classification [6] *AS 3996 Access covers and grates* are to be installed. These pits are a steel reinforced concrete pit or high strength module polymer pits, which allows 5.000kg loading.

The pits are to be laid as per 7.2.4.2 Backfilling/reinstatement, in crushed rock or other types of fill as specified by the pit manufacturer and or the local authority. The specifics of handling and placing the pit are detailed in the installation specifications supplied by the manufacturer of the pit type used.

Conduit ends are to be flush with the pit internal end walls are fitted with bushes for sealing.

Refer to Table 6 for setting the duct entry combination. The high strength polymer is to be drilled with a suitable hole-saw as with plastic pits and ensure the concrete pit knock outs fit the desired duct entry combination.

Follow pit sizing in Table 7.

**Table 7. Reactive soils pits**

| Pit purpose                                        | Minimum internal dimensions (mm) |       |       | Nominal external dimensions (mm) |       |       | Industry pit type naming convention |
|----------------------------------------------------|----------------------------------|-------|-------|----------------------------------|-------|-------|-------------------------------------|
|                                                    | Length                           | Width | Depth | Length                           | Width | Depth |                                     |
| Service drop access pit or boundary pit or FJL pit | 510                              | 290   | 540   | 840                              | 590   | 925   | Concrete 5                          |
| Service drop access pit or boundary pit or FJL pit | 510                              | 290   | 540   | 760                              | 583   | 412   | High Strength 5pit                  |
| Service drop access pit or LN pit or FJL pit       | 1130                             | 340   | 600   | 1465                             | 741   | 650   | High Strength 6pit                  |
| Distribution pit or LN connection pit              | 1130                             | 390   | 820   | 1395                             | 580   | 900   | Concrete 8                          |
| Distribution pit or LN connection pit              | 2040                             | 670   | 920   | 1800                             | 575   | 900   | Concrete 9                          |
| Distribution pit or LN connection pit              | 2040                             | 670   | 920   | 2200.50                          |       | 971   | High Strength 9Pit                  |
| Distribution network manhole                       | 2460                             | 1100  | 1325  | 2600                             | 1240  | 1490  | Concrete Manhole                    |



## 8 Glossary

| Term | Description                                                                                                                                        |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| ADT  | Assisted Drafting Tool                                                                                                                             |
| AER  | Architectural Exemption Request. It is an nbn process where proposals are reviewed by the Engineering team, during planning and design phase.      |
| BoK  | Back of Kerb                                                                                                                                       |
| CAD  | Computer Aided Design<br>A format developed by Autodesk and used by the AutoCAD software application for 2D and 3D design and drafting.            |
| DBYD | Dial Before You Dig                                                                                                                                |
| DN   | Distribution Network<br>The part of the network that connects the FAN to the FDH.                                                                  |
| DP   | Delivery Partner                                                                                                                                   |
| EPR  | Earth Potential Rise                                                                                                                               |
| EUP  | End User Premises                                                                                                                                  |
| FAN  | Fibre Access Node<br>A facility that houses the active equipment providing services to a FSA. Urban FANs may also provide a POI to access seekers. |
| FJL  | Flexibility Joint Location<br>The demarcation point between the DN and LN networks.                                                                |
| FSA  | Fibre Serving Area                                                                                                                                 |
| FTTP | Fibre To The Premises<br>The network design in which the fibre network is deployed to each premises.                                               |
| HMDU | Horizontal Multi Dwelling Unit                                                                                                                     |
| HS&E | Health, Safety & Environment                                                                                                                       |
| LN   | Local Network<br>The part of the network from the FDH down each street.                                                                            |
| MCU  | Multi Commercial unit (MDU made up of commercial units)                                                                                            |
| MDU  | Multi Dwelling Unit<br>A premises that contains more than one dwelling unit. This term is interchangeable with MPS.                                |



| Term             | Description                                                                           |
|------------------|---------------------------------------------------------------------------------------|
| MPS              | Multi Premise Site                                                                    |
| <b>nbn</b>       | National Broadband Network                                                            |
| SFM              | Small Footprint Multiport                                                             |
| SMP              | Splitter Multiport                                                                    |
| New developments | A new or undeveloped piece of land that represents the growth of the premises market. |
| POI              | Point Of Interconnect                                                                 |
| POS              | Public Open Space                                                                     |
| SDU              | Single Dwelling Unit                                                                  |
| WSE              | Workplace Safety & Environment                                                        |