New Developments: Deployment of the nbn Conduit & Pit Network

Engineering - FTTx - External Networks

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Disclaimer

nbn has prepared this document as a guideline to the installation of pit and conduit infrastructure in new developments (also known as Greenfields developments). You should also refer to all relevant legislation, including the requirements in relation to fibre-ready facilities contained in the Telecommunications Act 1997.

nbn has no control over new laws. nbn cannot and does not make any promises about the contents of new laws and how they will affect you. nbn has used its best efforts to prepare this document to provide you with an indication as to how installation of pit and conduit infrastructure may occur. If new laws are passed, substantial changes may be required to the guidelines and technical details set out in this document.

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Revision history

<table>
<thead>
<tr>
<th>Date</th>
<th>Revision</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>09 JUL 2015</td>
<td>4.0</td>
<td>Change Management Forum (Quality Assurance)</td>
</tr>
</tbody>
</table>
Contents

1 About this document .............................................................................................................. 6
  1.1 Purpose .......................................................................................................................... 6
  1.2 Related documents ......................................................................................................... 6
  1.3 Changes in this revision ............................................................................................... 7
2 Before you start .................................................................................................................. 9
  2.1 Safety ............................................................................................................................. 9
3 Assets .................................................................................................................................. 10
  3.1 Asset protection ............................................................................................................. 10
    3.1.1 Verification ............................................................................................................ 10
    3.1.2 Installation .............................................................................................................. 10
  3.2 Asset identification ....................................................................................................... 10
4 FTTP Network overview ..................................................................................................... 12
  4.1 Distribution Network ..................................................................................................... 12
  4.2 Fibre Distribution Hub ................................................................................................. 13
  4.3 Local Network ............................................................................................................... 13
  4.4 Telecommunications Pits ............................................................................................. 13
  4.5 Telecommunications Conduits ...................................................................................... 13
    4.5.1 Telecommunications Service Drop Conduit .......................................................... 14
  4.6 Network design guidelines ............................................................................................ 14
  4.7 Distribution Network guidelines .................................................................................. 14
    4.7.1 Distribution entry and exit locations ..................................................................... 14
  4.8 Local Network guidelines ............................................................................................. 14
    4.8.1 Road crossing guidelines ...................................................................................... 15
    4.8.2 Local Duct network methods ................................................................................. 15
      4.8.2.1 Single side deployment ...................................................................................... 15
      4.8.2.2 Dual side deployment ....................................................................................... 16
    4.8.3 Local Duct network methods – Laneways .............................................................. 16
      4.8.3.1 Front loaded deployment ................................................................................... 17
      4.8.3.2 Front loaded using Public Open Space (POS) ..................................................... 17
      4.8.3.3 Rear loaded deployment .................................................................................... 17
5 Underground Network components ................................................................. 23
  5.1 Overview ........................................................................................................... 23
  5.2 Conduit guidelines .......................................................................................... 23
      5.2.1 Distribution and Local Network Conduits .............................................. 23
      5.2.2 Lateral Conduits .................................................................................... 24
      5.2.3 Conduit bends ....................................................................................... 24
      5.2.4 Distribution and Local Network Conduit .............................................. 24
      5.2.5 Local Duct Network Conduit ................................................................. 25
      5.2.6 Conduit Joints ......................................................................................... 25
      5.2.7 Conduit installation ................................................................................ 26
      5.2.8 Service Drop Conduits .......................................................................... 26
          5.2.8.1 Service Drop installation ................................................................. 26
          5.2.8.2 Retaining walls ............................................................................... 27
      5.2.9 Conduit testing ......................................................................................... 28
      5.2.10 Conduit sealing ....................................................................................... 28
      5.2.11 Conduit depths and cover ..................................................................... 28
      5.2.12 Conduit marker tape ............................................................................. 29
      5.2.13 Clearance from other Carriers and Services ....................................... 29
  5.3 Pit guidelines .................................................................................................... 30
      5.3.1 Pit types ................................................................................................... 30
      5.3.2 Pits and Lids ............................................................................................ 30
      5.3.3 Pit installation .......................................................................................... 32
          5.3.3.1 Location ............................................................................................ 32
          5.3.3.2 Practices .......................................................................................... 34
      5.3.4 Conduit Installation into nbn Pits ............................................................ 34
5.3.5 Maximum Pipe Combinations at each end of Pit .......................................................... 36

6 Glossary .................................................................................................................................. 37

Figures

Figure 1. Fibre to the Premises Network .............................................................................. 12
Figure 2. Network Hierarchy and FDH Topology ................................................................. 12
Figure 3. Example FDH Cabinet ......................................................................................... 13
Figure 4. Single Side Deployment ....................................................................................... 15
Figure 5. Dual Side Deployment .......................................................................................... 16
Figure 6. Service Easement Deployment .......................................................................... 18
Figure 7. Barrier Kerb dimensions ...................................................................................... 20
Figure 8. Distance from intersection ................................................................................ 21
Figure 9. Nominal Conduit Dimensions ............................................................................ 24
Figure 10. Example Service Drop Stub Label ................................................................. 27
Figure 11. Examples of service drop conduits under retaining walls ................................. 28
Figure 12. Required Descriptor Format ........................................................................... 32
Figure 13. Example Pit Alignment for Crossings / Street Corners ..................................... 33

Tables

Table 1. Minimum Curve and Bend Radii ......................................................................... 25
Table 2. Conduit Depths and Cover .................................................................................. 29
Table 3. Clearance from Other Carriers and Services ...................................................... 29
Table 4. Pit Types .............................................................................................................. 30
Table 5. Pit Sizes (minimum internal and nominal external dimensions) ...................... 31
Table 6. Maximum Pipe Combinations at each end of the Pit .......................................... 36
1 About this document

Audience

- New Development Site Developers
- New Development Site Designers.

1.1 Purpose

This document, in conjunction with documents listed in Section 1.2, provides guidelines for developers installing nbn pit and conduit infrastructure in real estate Development projects.

This document provides guidelines and technical details for New Development site developers and designers to install the pit and conduit infrastructure required for the nbn™ Fibre to the Premises (FTTP) network.

Note: The developer is responsible for installing pit and conduit to nbn guidelines. nbn will only supply the fibre and other elements of a complete FTTP solution once fibre ready facilities are prepared to nbn guidelines.

Important Note: These Guidelines are a guide for undertaking Pit and Conduit Works installation for the National Broadband Network in New Developments.

These Guidelines are, for the purposes of the Developer Agreement, the nbn’s Pit and Conduit Specifications and must be complied with to the extent specified in the Developer Agreement.

These Guidelines should not be relied upon by any Contractor or any other person as a substitute for knowledge, experience, care and skill or any other contractual obligation or as a guide to your rights and obligations under laws concerning the roll out of fibre by nbn to new developments.

The regulatory environment in connection with the installation of fibre ready facilities in real estate development projects is not yet settled. It is the responsibility of the Developers and their contractors to become familiar and comply with all applicable laws and contractual obligations.

Nothing in these Guidelines will affect any rights nbn has (whether at law or under contract), or any obligations or warranties given by the Contractors to nbn.

1.2 Related documents

<table>
<thead>
<tr>
<th>Document</th>
<th>Owner and link</th>
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</thead>
<tbody>
<tr>
<td>[1] AS/ACIF S008: 2010 Requirements for Customer Cabling</td>
<td>Communications Alliance</td>
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</table>
1.3 Changes in this revision

Changes in this document revision 6.0 dated 23rd Oct 2015 compared to the previous revision 5.0 dated 10th Jun 2015 are summarised below:

<table>
<thead>
<tr>
<th>Section</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.2 Asset Identification</td>
<td>Directs the reader to the Assisted Drafting Tool (ADT) can be found in NBN-COO-EDS-017 New Development Pit &amp; Pipe Design Guidelines.</td>
</tr>
<tr>
<td>4.8.2.1 Single Side Deployment</td>
<td>Updated graphics to reflect the guideline</td>
</tr>
<tr>
<td>4.8.2.2 Dual Side Deployment</td>
<td>Updated graphics to reflect the guideline</td>
</tr>
<tr>
<td>4.8.2.3 Rear Loaded Deployment</td>
<td>Updated graphics to reflect the guideline</td>
</tr>
<tr>
<td>4.8.4 Super Lot</td>
<td>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 local network.</td>
</tr>
<tr>
<td>4.8.5 Super Lot Pit and Conduit Internal Reticulation</td>
<td>Explains the various internal pit and pipe requirements for the super lot.</td>
</tr>
<tr>
<td>4.8.6 Barrier Kerb</td>
<td>The requirement for barrier kerb to be used inside super lot development</td>
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<td>Section</td>
<td>Details</td>
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<tr>
<td>4.8.8 FDH Location</td>
<td>New siting distances from intersections 15m from any intersection including a roundabout and 20m from a signalised intersection. A new diagram reflecting the distances.</td>
</tr>
<tr>
<td>5.2.1 Distribution and Local Network Conduits</td>
<td>A new diagram reflecting the conduit dimensions and nominal size i.e. P100, P50, and P20</td>
</tr>
<tr>
<td>5.2.8 Service Drop Conduits</td>
<td>The addition of a 3mm draw cord rated at a minimum 90kg rot proof break force or similar. The addition of small commercial, Commercial and industrial service drop conduit size.</td>
</tr>
<tr>
<td>5.2.8.2 Retaining walls</td>
<td>3 diagrams have been added to the document and the allowance to sleeve the P20 through a small section of P50 to protect the P20 under the retaining wall / footings.</td>
</tr>
<tr>
<td>5.2.9 Conduit testing</td>
<td>Addition of a 6 - 6.5mm draw rope rated at a minimum 595kg or equivalent includes the reference to a service drop draw cord.</td>
</tr>
<tr>
<td>5.3.2 Pits and Lids</td>
<td>Reference to concrete lids. Refers to section 3.1 of AS 3996 which is a table used to identify the appropriate lid for the location being used.</td>
</tr>
<tr>
<td>5.3.3 Pit Installation / Location</td>
<td>A new diagram reflecting the truncation of a corner property 6.5m conduit road-crossing change in direction (b) remove should insert Shall</td>
</tr>
<tr>
<td>5.2.7 Conduit Installation</td>
<td>Removed reference to Developer to obtain a shared trench agreement</td>
</tr>
<tr>
<td>5.8.8 FDH Location</td>
<td>Removed reference to Recreation 1 area.</td>
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2 Before you start

2.1 Safety

nbn is subject to the Work Health and Safety Act 2011 (Cth). However, it is recognised that Developers and their contractors may be subject to different health and safety legislation in place across the various jurisdictions in Australia. This includes relevant regulations, standards and codes of practice.

These Guidelines provide guidance to assist nbn, the Developers and their contractors to exercise due diligence in relation to safety practices. To this end, without limiting Developer’s obligations under law:

- Developers are expected to have developed, to understand and comply with their own Health, Safety and Environment policies and procedures.
- Consistent with Commonwealth and State and Territory Occupational Health, Safety and Environment legislation, it is expected that Developers and their contractors consider the risks associated with their development that may impact on later stages of the asset lifecycle (including inspection/assurance, use, operation, construction and maintenance). Specific aspects which the Developer and their contractors must consider include (but are not limited to) risks associated with the selection of pit and conduit components, and risks associated with the method of construction/installation selected by the Developer.
3 Assets

3.1 Asset protection

3.1.1 Verification

Prior to any excavation work being undertaken, all existing underground services within the proposed work zone must be identified via Dial Before You Dig, council plans and all other parties, services or contacts that may not be represented by the Dial Before You Dig services. These may include:

- Main road authorities.
- Rail services.
- Gas suppliers.
- Water utilities.

Any pre-existing services in an area where pit and conduit works are to be deployed must be identified visually prior to commencement of the pit and conduit works in that area, using methods such as strip exposure and non-destructive digging.

3.1.2 Installation

All nbn assets must be installed within the designated telecommunications alignment, established by any of the following:

- State and Federal Government.
- Street Opening Conference/Bodies.
- Local Council(s).
- A Shared Trench Agreement.

3.2 Asset identification

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 address, as a minimum, the following:

- The location of pits and conduits, including measurements in metres or parts thereof.
- Positioning information relative to known fixed assets, for example, kerb lines, property boundaries.
- Locations of roads, driveways and proposed roads and driveways.
- Depth of cover for conduits.
  
  **Note:** Depth of cover is the actual soil or backfill from the top of the conduit.

- Trench cross sections, showing all services within the same alignment.
- Identification of conduits, for example, local or distribution.
- Service drop locations and either local pit or boundary pit pre-allocations.
- The final positioning of nbn Network Infrastructure is determined by nbn at its sole discretion.

Specific drafting standards apply to both pre-construct and as-built documentation of nbn conduit and pit network designs. nbn's requirements and required use in relation to these CAD standards - including the approved template, symbols and Assisted Drafting Tool (ADT) can be found in NBN-COO-EDS-017 New Development Pit & Pipe Design Guidelines.
4 FTTP Network overview

The nbn New Development Fibre to the Premises (FTTP) network is designed to provide fibre connectivity to premises within New Development projects.

The FTTP network is divided into hierarchical components which assist in the planning, design and implementation of the FTTP network. Network components shown in Figure 1 that are relevant to New Development project deployment of fibre ready facilities are set out below.

4.1 Distribution Network

The Distribution Network (DN) provides connectivity between the nbn™ Fibre Access Nodes (FANs), where the active equipment is located, and the Fibre Distribution Hubs (FDHs) which connect the DN to the local network. The DN will also be installed between all FDHs in the new developments as shown in Figure 2.
4.2 Fibre Distribution Hub

Fibre Distribution Hubs (FDHs) are unpowered, street-side cabinets used to provide an optical connection point between the distribution and local networks.

![Figure 3. Example FDH Cabinet](image)

4.3 Local Network

The local network is installed between the FDH and the associated telecommunication pits located outside property boundaries.

4.4 Telecommunications Pits

nbn requires pits for several distinct purposes including:

- Managing connections between conduits.
- Housing fibre optic cabling and splice closures.
- Housing Multiport Terminals (MPTs) required to connect end-users’ premises to the local network.

4.5 Telecommunications Conduits

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

**Note:** The Distribution Network fibre and the Local Network fibre may be contained within the same conduit.
4.5.1 Telecommunications Service Drop Conduit

The service drop conduit is located between the telecommunication pits and either the property boundary location or the end-user premises.

4.6 Network design guidelines

The design of the network ideally begins at individual lots and follows a modular approach as shown in. That is:

- Lots (typically four but up to a maximum of eight) are allocated to a local access pit accessible by the local conduit network.
- This location will house the Multiport Terminal (MPT) when the Fibre Network is installed.
- **Note:** It is not always possible to get four lots per pit. Conversely, there will be situations where the trenching is designed (for electrical reticulation, etc.) such that it may be expedient to service a fifth or sixth lot from a pit.
- A maximum of ten MPT locations are connected back into a local network splice closure. The local network splice closure will splice the MPT cables into the Local Fibre Network.
- Typically, a maximum of five local network splice closures are connected to an FDH.

4.7 Distribution Network guidelines

The DN requires a single P100 conduit installed between the entrance to the Development and the first FDH.

Further FDHs may require a separate P100 conduit (express conduit) installed between them, with the last planned FDH requiring a P100 conduit to the Development exit - refer to Figure 2. nbn planning would provide feedback on the express conduit routes and FDH requirements. Feedback will be provided to the developer and/or design consultants.

The express conduit can share or where required bypass local network pits but must connect to pits where the express conduit changes direction or exceeds a distance of 250m.

4.7.1 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™ 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.

4.8 Local Network guidelines

The local network 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 property boundary.
Important Note: 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.

4.8.1 Road crossing guidelines

- All road crossings associated with the local network use P100 conduits.
- All road crossings connecting to a service drop access pit or boundary pit that are used solely for service drops use P50 conduits.

4.8.2 Local Duct network methods

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

- Single side deployment.
- Dual side deployment.

4.8.2.1 Single side deployment

A P100 local network conduit is installed on one side of the road only, as shown in Figure 4. This conduit is installed into pits located between property boundaries.

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

The Multiports are housed within the Local Network pits. The service drop cable fibres are then extended from the Multiport, through the Local Network lateral conduits, to the property.

Figure 4. Single Side Deployment
4.8.2.2 Dual side deployment

As shown in Figure 5, a P100 local network conduit is installed in the following locations:

- On both sides of the road.
- Into the local network pits located between property boundaries.

The Multiports are typically housed in every second pit within the local network. The service drop cable fibres are then extended from the Multiport to the property.

![Figure 5. Dual Side Deployment](image)

4.8.3 Local Duct network methods – Laneways

It is anticipated that in a small number of cases it may not be possible to deploy a single or dual sided local network. This will typically be as a result of physical access limitations to the premises; generically this is termed a laneway.

A laneway is identified as having no verge available to install pit and conduit as per nbn’s requirements outlined in Section 4.8.2

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

- Preference 1: Front Loaded Deployment (most preferable)
- Preference 2: Public Open Space (POS) Deployment
- Preference 3: Rear Loaded Deployment (least preferable).
**Note:** For a developer to implement a subsequent preference, the developer must provide a justification to nbn as to why the preceding preference could not be met. This will then be presented to nbn for endorsement.

### 4.8.3.1 Front loaded deployment

Premises can be fed by the Local Network conduit. In this instance, the developer should service the property from the street and follow the single or dual sided deployment rules.

### 4.8.3.2 Front loaded using Public Open Space (POS)

Premises can be fed by a POS. In this instance, the developer should service the premises from the POS and follow the single or dual sided deployment rules.

### 4.8.3.3 Rear loaded deployment

In this instance, either Service, Boundary or Local Network pits will be required to be installed on the customer boundary. Refer Figure 6.

Service easements should be provided by the developer inside the rear of the Lots to allow pits and conduits to be installed. Service Boundary or Local Network pits are to be installed:

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

This solution allows the developer to service a laneway of up to a maximum of 24 Lots in total.

A multiport is installed to the Local Network Connection Pit and service drop cables are reticulated through each connected pit.

If the number of Lots requires the use of a second multiport, this will be housed in the Local Connection Pit at the other end of the laneway.
Important Note: In the laneway scenario, Boundary and Service pits shall be installed correctly on service easements provided by the Developer.

4.8.3.4 Pit Selection – Laneways

Local Network Connection Pit: Located at either end of the laneway and connecting the distribution conduit reticulating the remainder of the Stage.

Boundary Pit: All Boundary Pits within a laneway are to be orientated as described in 4.7.3.3.

Service Pit: All Service Pits within a laneway are to be orientated as described in 4.7.3.3.

Note: Refer to Table 5 in Section 5.3.2 for details on Pit Dimensions.

Important Note: Pits shall not be located in driveways or proposed driveways.
4.8.3.5 Conduit selection – Laneways

A P100 express conduit is installed between the Local Network Connection Pits. This is mandatory.

The first conduit at either end of the laneway linking the Local Network Connection Pit to the first Boundary Pit within the laneway shall be a P100.

A P50 conduit shall be installed from the first Boundary Pit within the laneway to the remaining Boundary pits within the laneway.

A P50 conduit shall be used to connect a Service Pit to the Boundary Pit. Only one connection between a Boundary Pit and Service Pit is permitted.

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

4.8.4 Super Lot

When servicing a Super Lot as part of a new development or development stage the following will apply:

- 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 local network.
- Service drop requirements - refer to section 5.2.8.

4.8.5 Super Lot Pit and Conduit internal reticulation

Internal Pit and Conduit:

- Where the Super Lots yield is three or less internal premises, the premises can be serviced by three individual P20 lead-in conduits located in common property.
- Where a Super Lots yield is 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.
- 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 local network, with P50 lateral crossings to smaller pits on the other side to support service drop conduits and lead-ins to each premises.
- The installation of the internal pit and conduit will reflect either single side or dual side deployment as per section 4.7.2.
- Pits will be installed within the Super Lot in a suitable area not trafficable to vehicles
- Pits and conduits shall not be installed in or cross individual titles within the Super Lot (excluding laneways section 4.7.3.3).
- 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 4.7.6.
4.8.6 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 pit outer edge along all exposed sides of the pit: refer to Figure 7.

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

![Figure 7. Barrier Kerb dimensions](image)

4.8.7 Fibre Distribution Hubs

Each FDH provides connectivity for several hundred premises and is located as centrally as possible within a catchment area. The final location is dependent on both the total number of lots to be serviced and the New Development build stage.

An FDH Pit is installed within five metres of the FDH location, and a single P100 conduit is installed between the FDH pit and the FDH.

The space allocation for the FDH mounting plinth is approximately 1 m². The following should be put in place:

- A single P100 starter conduit extended from the FDH pit to an easily accessible location and capped. This location should be outside of any area requiring future specialised reinstatement (paving, concrete, etc.) when the FDH is installed.
### 4.8.8 FDH location

**nbn** requires the following when locating a position for the FDH and its plinth:

- Ensure the proposed FDH plinth location will be level.
- Ensure the proposed distance from a roadway is as per local council requirements for street furniture, or a minimum of one metre from BoK.
- Ensure the location distance is a minimum of 15 metres from the projected property boundary at any road intersection, including the entry or exit point of a roundabout.
- Ensure the location distance is a minimum 20 metres away from the projected property boundary at any signalised intersection.

![Figure 8. Distance from intersection](image)

- Ensure the future working conditions at the cabinet are safe. For example, no worker should be standing on or very close to a proposed roadway or driveway.
- Plan FDH sites where the cabinet will be placed on a legal road reserve, public open space or within an existing easement or alignment.
- It is preferred to locate the cabinet within sight of dwellings / buildings and will be reasonably lit by street lighting. This is for cabinet security to discourage vandalism.
- Propose to locate the cabinet where it will be visually unobtrusive, for example on the long side of a corner lot, and not interrupt pedestrian flow.
- Ensure the FDH location will not obstruct traffic visual lines-of-sights, for example, at intersections / drives.
- Plan FDH sites where the cabinet will be placed on stable ground and is unlikely to slip.
- Plan the cabinet such that it is unlikely to get flooded after heavy rainfall.
- Do not allocate an FDH in an Earth Potential Rise (EPR) area being 15m minimum from any existing or known Substations, HV Earths, transformers etc. As specified in AS/CA S009:2013.
- Plan FDH sites where the cabinet will not block future driveways on undeveloped land.
- Ensure the FDH is located at least 3m from the edge of a driveway.
- Ensure easy access to the cabinet. For example, ensure the cabinet is not situated behind security gates in a subdivision when the cabinet also serves outside that subdivision.

⚠️ **Important Note:** While FDH installation is not required as part of the pit and conduit deployment, the location and allocation of sufficient space is vital to the future installation of the passive fibre network.
5 Underground Network components

5.1 Overview

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

- 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, and approved by nbn.

5.2 Conduit guidelines

5.2.1 Distribution and Local Network Conduits

nbn requires the following in connection with both distribution and local network conduits:

- 50 mm and 20 mm nominal diameter conduits as detailed in AS/NZS 1477:2006 table 4.2(A) for wall thickness tabled under PN12 nominal sizes (DN) of 20 and 50 mm referred to as P50 and P20
- 100 mm nominal diameter conduits as detailed in AS/NZS 1477:2006 table 4.2(A) for wall thickness tabled under PN9 nominal sizes (DN) of 100 mm referred to as P100
- The conduit is white, and labelled as required by AS/ACIF S008: 2010 as it applies to customer cabling products.
- The conduit meets the minimum requirements of:
  - AS/ACIF S008: 2010 Requirements for Customer Cabling as it applies to customer cabling products.
- All road crossing conduit installations are installed as close to 90° to the road under which the conduits are being installed.
- Conduit dimensions:
5.2.2 Lateral Conduits

nbn requires the following in connection with lateral conduits, that is, conduits that feed across streets for service drop cables:

- The lateral conduits are P50 - 50 mm nominal diameter conduits as detailed in AS/NZS 1477:2006 table 4.2(A) for wall thickness tabled under PN12 nominal size (DN) of 50 mm.
- The conduit is white and labelled as per AS/ACIF S008: 2010 as it applies to customer cabling products.
- The conduit meets the minimum requirements of:
  - AS/ACIF S008: 2010 Requirements for Customer Cabling as it applies to customer cabling products.
- All road crossing conduit installations are installed as close to 90° to the line of the road under which the conduits are being installed.

5.2.3 Conduit bends

nbn requires the following for conduit bends:

- All conduit bends are prefabricated.
- Conduit bends need to be of the same material and structure as the conduit.
- A maximum sum of 180° of bend is allowed between pits. 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.

5.2.4 Distribution and Local Network Conduit

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 100 m 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**

<table>
<thead>
<tr>
<th>Minimum internal conduit diameter</th>
<th>Minimum curve / bend radius</th>
<th>Long run (mm) no pre-formed bends</th>
<th>Long run (mm) using pre-formed bends</th>
<th>Short run (mm) using pre-formed bends</th>
</tr>
</thead>
<tbody>
<tr>
<td>100mm</td>
<td>13,000</td>
<td>5,000</td>
<td>800</td>
<td></td>
</tr>
<tr>
<td>50mm</td>
<td>6,500</td>
<td>800</td>
<td>300</td>
<td></td>
</tr>
<tr>
<td>20mm</td>
<td>2,600</td>
<td>Not applicable</td>
<td>300</td>
<td></td>
</tr>
</tbody>
</table>

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 Note:** Short radius 90° conduit bends are not to be used for P100 conduit in the distribution or local network when changing direction. However a 90° P100 1200mm sweeping bend may be utilised to change direction for the distribution or local network. Short run is up to 90m. Long run is between 90m – 250m.

### 5.2.5 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 in close proximity to 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 utilised for local lateral conduits use a 90° x 305 mm radius bend where required.
- The bend radius of the P20 conduit bends is to be a minimum of 15 times the outer diameter of the conduit.

### 5.2.6 Conduit Joints

Conduit joints for PVC pipes are achieved using ‘socket and spigot’ or ‘coupler’ and sealed with solvent cement.
5.2.7 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 or as a stub for an FDH or future stage boundary, in accordance with the following guidelines (or as required by the local government authority):
  - AS/CA S009: 2013 Installation Requirements for Customer Cabling (Wiring Rules) as it applies to customer cabling products.
- Conduits are installed in trenches with the minimum separation from other utilities, as per any applicable local utility requirements, legislative requirements and shared trenching agreements – refer to Table 3. Clearance 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.

5.2.8 Service Drop Conduits

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

- For Single Dwelling Units (including duplex, triplex), 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 Multi Dwelling Unit (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 required.
- This conduit should meet the minimum requirements of:
  - AS/ACIF S008: 2010 Requirements for Customer Cabling as it applies to customer cabling products.
- The conduit is labelled as per AS/ACIF S008: 2006 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 service drop conduits are fitted with a 3mm draw cord rated at a minimum 90kg break force or similar. All draw cord must be rot proof i.e. be of synthetic material (e.g. polypropylene).

5.2.8.1 Service Drop 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 local network or boundary pit (depending on whether it is a single or a dual side deployment) to the lot boundaries.

The starter conduit is to be installed one metre inside the lot. The location of the service drop conduit should be labelled for builders to locate and be sealed.

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 or R / Left or L.
- The Distance it can be located from the boundary in meters.

The label must be water resistant (typically nylon based) and can be handwritten using permanent marker or printed if desired.

The label shall be securely affixed to the end of the drawstring itself located inside the pit.

Figure 10. Example Service Drop Stub Label

- The furthest run of service drop conduit from the pit to the property boundary entry shall not exceed 25 m.
- Where practical, multiple, individual service drop conduits should share property boundary pits.
- The conduit is 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 3 m from the pit to the property boundary entry, the minimum cover is 300 mm.
- If the service drop conduit is more than 3 m from the pit to the property boundary entry, the minimum cover is 450 mm.

5.2.8.2 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. Note: - The P50 conduit would add some form of protection from the retaining wall / footings. Refer to examples in Figure 11.

The service drop conduit should be installed to the acceptable minimum depth of cover (refer to Table 2) within the Lot, from the property boundary for accessibility and connection of the future lead-in conduit. Note: - A minimum curve or sweep can be applied to the P20 conduits refer to Table 1.
5.2.9 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 6 - 6.5mm draw rope rated at a minimum 595kg or equivalent, a service drop conduit will have a 3mm draw cord rated at a minimum 90kg break force or similar (suitable for use as a cable hauling aid), shall be installed within each conduit. All rope and draw cord must be rot proof i.e. be of synthetic material (e.g. polypropylene).

5.2.10 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).

5.2.11 Conduit depths and cover

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

<table>
<thead>
<tr>
<th>Location</th>
<th>Minimum Cover</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Drop Conduit</td>
<td></td>
</tr>
<tr>
<td>Less than 3 m from the pit to the boundary entry</td>
<td>300 mm</td>
</tr>
<tr>
<td>Service Drop Conduit</td>
<td></td>
</tr>
<tr>
<td>More than 3 m from the pit to the boundary entry</td>
<td>450 mm</td>
</tr>
<tr>
<td>Verge (walkways, footpaths)</td>
<td>450 mm</td>
</tr>
<tr>
<td>Road (Non-State or Territory)</td>
<td>600 mm</td>
</tr>
<tr>
<td>Road Crossing</td>
<td>800 mm to 1200 mm (typically)</td>
</tr>
</tbody>
</table>

5.2.12 Conduit marker tape

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

5.2.13 Clearance from other Carriers and Services

Table 3. Clearance from Other Carriers and Services

<table>
<thead>
<tr>
<th>Service Item</th>
<th>Minimum Radial Clearances*1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas Pipe</td>
<td></td>
</tr>
<tr>
<td>Over 110 mm</td>
<td>300 mm</td>
</tr>
<tr>
<td>110 mm or Less</td>
<td>150 mm</td>
</tr>
<tr>
<td>Power</td>
<td></td>
</tr>
<tr>
<td>High Voltage</td>
<td>300 mm</td>
</tr>
<tr>
<td>Low Voltage</td>
<td>100 mm*2</td>
</tr>
<tr>
<td>Water Mains</td>
<td></td>
</tr>
<tr>
<td>High Pressure/Capacity</td>
<td>300 mm</td>
</tr>
<tr>
<td>Local Reticulation</td>
<td>150 mm</td>
</tr>
<tr>
<td>Sewer</td>
<td></td>
</tr>
<tr>
<td>Main</td>
<td>300 mm</td>
</tr>
<tr>
<td>Connection Pipe</td>
<td>150 mm</td>
</tr>
<tr>
<td>Other Telecommunications</td>
<td>100 mm*1</td>
</tr>
</tbody>
</table>

* 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.
5.3 Pit guidelines

5.3.1 Pit types

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

Table 4. Pit Types

<table>
<thead>
<tr>
<th>Pit Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Drop Access Pit</td>
<td>Provides an access location between the local network conduit and the service drop conduit, only used to provide an access location for service drop fibre cable. Not to be used for any planned local network fibre cabling.</td>
</tr>
<tr>
<td>Boundary Pit</td>
<td>Provides an access location between the local network conduit and the service drop conduit.</td>
</tr>
<tr>
<td>Local Network Pit</td>
<td>Located on the local network duct. Provides an access location between the local network conduit, local lateral conduit and the service drop conduit. Houses an MPT.</td>
</tr>
<tr>
<td>Local Network Connection Pit</td>
<td>Located on the local duct network. Houses a fibre splice closure.</td>
</tr>
<tr>
<td>Distribution Pit</td>
<td>Located on the distribution network conduit. Provides mid-point hauling locations. Houses distribution splice closures. Also installed at entry and exit locations of the new development to facilitate cable installation.</td>
</tr>
<tr>
<td>Fibre Distribution Hub (FDH) Pit</td>
<td>Located within five metres of the FDH. A single P100 conduit is installed between this pit and the FDH.</td>
</tr>
</tbody>
</table>

5.3.2 Pits and Lids

⚠️ Important Note: Internal dimensions are measured as follows:

Depth is measured by the distance between the inside of the pit base to the surface below the pit lid. Length and Width are measured:

a. along the centreline of the pit;

b. on the inside of the base;

c. at right angles to each other; and

d. with no internal protrusions on the surface.
Table 5. Pit Sizes (minimum internal and nominal external dimensions)

<table>
<thead>
<tr>
<th>Pit Purpose</th>
<th>Minimum internal dimensions (mm)</th>
<th>Nominal external dimensions (mm)</th>
<th>Industry pit type naming convention</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Length</td>
<td>Width</td>
<td>Depth</td>
</tr>
<tr>
<td>Service Drop Access Pit</td>
<td>490</td>
<td>150</td>
<td>500</td>
</tr>
<tr>
<td>Service Drop Access Pit or Local Network Pit or Boundary Pit</td>
<td>510</td>
<td>290</td>
<td>540</td>
</tr>
<tr>
<td>Distribution Pit or Local Network Connection Pit</td>
<td>1130</td>
<td>390</td>
<td>820</td>
</tr>
<tr>
<td>Fibre Distribution Hub Pit</td>
<td>1820</td>
<td>370</td>
<td>840</td>
</tr>
</tbody>
</table>

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 and its fittings must not have exposed sharp edges.
- Pit lids must be concrete and weigh no more than 38 kg each (which may mean larger pits have multiple lids), with the weight of the lid clearly labelled on the lid.
- Pit lids must have a pit lid lifting tool hole at each end of the lid/s, capable of being used with an industry accepted standard lifting tool.
- Pit lid lifting holes must be designed to prevent the insertion of materials including needle sharps (for example, 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 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 AS 3996 Access covers and grates Section 3.1.
- The pit lids shall be embossed with the descriptor of ‘NBN’. The descriptor should resemble the format displayed in Figure 12.
The descriptor shall:

- Be positioned in the centre of the lid.
- Be embossed in alignment with the longest side of the pit lid.
- Be approximately 200 mm in length with the height dictated by the typeface used.
- Use the typeface Arial.
- Use capital letters.

![NBN](image)

**Figure 12. Required Descriptor Format**

### 5.3.3 Pit installation

#### 5.3.3.1 Location

*nbn* requires the pit to be **sited in accordance with the standards** listed in 1.2 Related Documents. Furthermore, the pit location should adhere to the following:

- 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 or verge or garden bed. Where possible, the installation of a pit in both pathway and verge or garden bed simultaneously 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 deployments, the boundary and service pits may be rotated 90 degrees from the current standard of longest side parallel to the roadway.
- Pits are to be offset from the boundary 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.
- Ensure a minimum of 1 m separation from any pole without a transformer and/or street light as specified in AS/CA S009:2013.
- Ensure a minimum of 15 m separation from any pad mounted transformer or pole with a transformer (EPR Zone) as specified in AS/CA S009:2013.
- Where practical, a minimum of 1 m separation from the Back of Kerb (BoK).
- A pit shall 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°.
  - Where the 6.5m conflict with other requirements, install the pit at the nearest safe location but no further than 15m.
• Pits shall be placed in line with the conduit they connect with.

• A pit shall be installed at the intersection of conduit runs that require a change in size of the conduit, where the alignment:
  a. continues into a street crossing; or
  b. bends around a street corner then pit(s) shall be installed not less than 3m and no further than 15m, along the alignment, from the corner of the adjacent property – refer to Figure 13.

![Figure 13. Example Pit Alignment for Crossings / Street Corners](image)

Pits shall not be installed:

• In unmade sections of carriageways.
• Outside a doorway.
• In driveways.
• In an area that is, or is to be, for use as a driveway.
• 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.
• Pits shall not be placed in areas that may be subject to EPR as specified in AS/CA S009:2013.
• Pit risers shall not be used on any pit within a new development.

5.3.3.2 Practices

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 100 mm in thickness. Once installed the foundation shall bring the top of the pit level with the surrounding area / final ground area. In addition:
  • The backfill material shall not contain contaminants, debris, vegetation or waste.
  • Pits must not be distorted by the backfill process.
  • All backfilling must be compacted using hand held rammers in layers not exceeding 150 mm in thickness, to minimise the risk of subsidence.
  • In grassed areas:
    a. backfill material shall stop within 50 mm of the finished surface level; and
    b. a suitable top dressing shall be used to complete the reinstatement to the finished surface level.
  • Following installation, the pits shall conform to the surrounding soil and ground level when reinstating.

Note: If the backfilling practices are not adhered to, the pits may buckle as soil subsides. If pits buckle, pit lids 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 backfill, refer to Communications Alliance G645:2011.

• Conform to slope and ground level when reinstating
• Where the slope of the pit does not exceed a 1 in 8 gradient the pit shall be installed so that the top of the pit:
  a. is flush with the ground level or pavement; and
  b. conforms to the general slope of the ground level or pavement on all sides.

5.3.4 Conduit Installation into nbn Pits

nbn requires the following when installing conduits into nbn pits:

• Install all conduits within a single trench into the pits located in that trench. Avoid bypassing the pit with a conduit.
• Conduits:
- That are distribution or local through conduits, are placed at lowest point of 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.
- Shall not be installed within 50 mm of any vertical or horizontal internal corner of the Pit and all entries shall be via the pit end only (the narrow end). Refer to G654:2011.
- Are located centrally with at least 50 mm of space between the conduit exterior and the internal pit floor.
- Where multiple ducts enter a pit, 25 mm 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 450 mm even when multiple conduits at 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.
- Adhered to the conduit.

⚠️ **Important Note:** Holes in plastic pits for conduits shall be cut with the correct size hole saw to ensure a tight fit for bushes.
### 5.3.5 Maximum Pipe Combinations at each end of Pit

Table 6. Maximum Pipe Combinations at each end of the Pit

<table>
<thead>
<tr>
<th>nbn Pit Type</th>
<th>Industry pit type naming convention</th>
<th>P100</th>
<th>P50</th>
<th>P20 (LIC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Pit</td>
<td>Type 2</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Service Pit or Boundary Pit</td>
<td>Type 5</td>
<td>1</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Local Network Connection Pit &amp;</td>
<td>Type 8</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Distribution Pit (Standard)</td>
<td></td>
<td>3</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Fibre Distribution Hub Pit</td>
<td>Type 9</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>1</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>
## 6 Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BoK</td>
<td>Back of Kerb.</td>
</tr>
<tr>
<td>CAD</td>
<td>Computer Aided Design - a format developed by Autodesk and used by the AutoCAD software application for 2D and 3D design and drafting.</td>
</tr>
<tr>
<td>DN</td>
<td>Distribution Network – the part of the network that connects the FAN to the FDH.</td>
</tr>
<tr>
<td>FAN</td>
<td>Fibre Access Note - a facility that houses the active equipment providing services to a Fibre Serving Area (FSA). Note that Urban FANs may also provide a Point of Interconnection to Access Seekers.</td>
</tr>
<tr>
<td>FDA</td>
<td>Fibre Distribution Area - the area served via a single Fibre Distribution Hub (FDH).</td>
</tr>
<tr>
<td>FDH</td>
<td>Fibre Distribution Hub - the equipment located in a Fibre Distribution Area where Distribution Fibre is split to provide Local Fibre that runs down each street.</td>
</tr>
<tr>
<td>FTTP</td>
<td>Fibre to the Premises - the network design in which the fibre network is deployed to each premises.</td>
</tr>
<tr>
<td>LF</td>
<td>Local Fibre - a connection between the Fibre Distribution Hubs (FDHs) and the individual lots via a series of fibre cables, splice closure, multiports and service drop cables.</td>
</tr>
<tr>
<td>LN</td>
<td>Local Network - the part of the network from the Fibre Distribution Hub (FDH) down each street.</td>
</tr>
<tr>
<td>MDU</td>
<td>Multi Dwelling Unit - a premise that contains more than one dwelling unit. Note this term is interchangeable with MPS – Multi Premise Site.</td>
</tr>
<tr>
<td>MPT</td>
<td>Multiport Terminal.</td>
</tr>
<tr>
<td>New Developments</td>
<td>A new or undeveloped piece of land that represents the growth of the premises market.</td>
</tr>
<tr>
<td>NTD</td>
<td>Network Termination Device - nbn’s termination point for residential fibre services, typically featuring 4 Ethernet and 2 telephone interfaces.</td>
</tr>
<tr>
<td>PCD</td>
<td>Premises Connection Device - a unit to terminate the service drop cable on the side of the premises.</td>
</tr>
<tr>
<td>SDU</td>
<td>Single Dwelling Unit - premises that contains only one dwelling unit.</td>
</tr>
</tbody>
</table>