nbn™ Lead-in Trenching Requirements

Engineering

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Document control

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Revision history

Date	Revision	Details
17/09/15	1.0	Approved
14/07/16	2.0	HFC added to scope, Rural sections removed.

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1 About this document

1.1 Purpose

This document outlines **nbn**'s requirements for lead-in trenching from the **nbn**™ boundary to the building entry point.

1.2 Objective

It is intended to provide guidance to property developers, consultants, builders and customers on how to locate the **nbn**™ property entry point; and the **nbn**™ lead-in requirements for the premises.

1.3 Scope

This documents covers lead-in trenching for the **nbn**™ network

1.3.1 In Scope

Lead-in Trenching for Multi Dwelling Units and Single Dwelling Units

1.3.2 Out of Scope

- Aerial Lead-in
- Lead-in cabling
- New Developments

1.4 Audience

Developers, Builders, Premises Owners, Registered Cablers.

1.5 Related Documents

Document	Owner and Link
[1] AS/ACIF S008: 2013: Requirements for Customer Cabling	Communications Alliance
[2] AS/NZS 4129:2008: Fittings for Polyethylene Pipes for Pressure Applications	Standards Australia
[3] AS/NZS 2032:2006:Installation of PVC Pipe Systems	Standards Australia
[4] ACIF C524: 2013:External Telecommunication Cable Networks	Communications Alliance
[5] AS/ CA S009: 2013:Installation Requirements for Customer Cabling (Wiring Rules)	Communications Alliance

2 Introduction

nbn requires you, the property developer, builder or customer as appropriate, to provide a suitable trench ("the trench") for the installation of **nbn**™ lead-in cabling between the **nbn**™ property entry point and the building entry point.

You are required to ensure that the trench is constructed and reinstated (together with any termite barriers and other building elements) in accordance with all relevant laws and regulations (which may vary between States and Territories).

For new building construction, **nbn** recommends the use of a trench provided for, or to be shared with, another service (e.g. the electrical mains power).

For established premises, you must keep the trench well away from any other existing underground services for safety reasons and to avoid damaging the other services.

2.1 Safety

The trench should be dug by an experienced person who is familiar with underground service arrangements and who is suitably accredited or licensed where required by the relevant authority. Careless excavation work may result in personal injury (e.g. through contact with live underground power cables) or costly damage to underground conduits, pipes and cables. Be aware that **nbn** may seek to recover its entire repair and associated costs in the event that any damage is caused to **nbn**'s assets

In order to avoid personal injury or damage to property, existing underground services should be located and identified by an experienced or suitably accredited or licensed person.

Methods for locating underground services include:

Dial before You Dig (DBYD) "free call service", by telephoning 1100 or by visiting the DBYD website at http://www.1100.com.au

For information about any underground services that may be in the vicinity (note that while plans supplied by DBYD may contain information about underground services on public or adjoining land, you are not required to dig the trench outside the boundary of your premises, e.g. in public footways, roadways or in neighbouring premises).

Review property documentation (e.g. building plans, electrical specifications, and plumbing plan).

Visually inspect the site noting the location of conduits, pipes or cables emerging from the ground at buildings, sheds, swimming pools, fountains, electric barbecues, garden lights, external power outlets, etc.

Visually inspect the footway and verge for the location of any power, water, gas, sanitation, stormwater, drainage or telecommunications facilities (e.g. pedestals, pits, poles, meters, markers, drains, conduits/pipes, cables).

Ascertain the likely path of underground services using the above indicators.

Verify the location of services using a cable locator or similar equipment, if available (note that existing services may not have been installed in a straight line).

Verify the presence or absence of underground services at appropriate points along the chosen trenching route by careful hand digging

Where there is evidence of underground services along the chosen trench route but their position cannot be verified with reasonable accuracy, look for a more suitable route or excavate by careful hand digging where uncertainty exists.

3 Property entry point

3.1 Property Entry Point Description

The Property Entry Point is the point where the **nbn**™ lead-in cabling will enter the private property boundary including any land occupied in common with, or shared with, other occupants, such as land controlled by a body corporate. **nbn** will determine the location of your property entry point based on the location of the nearest and most suitable lead-in cable connection point.

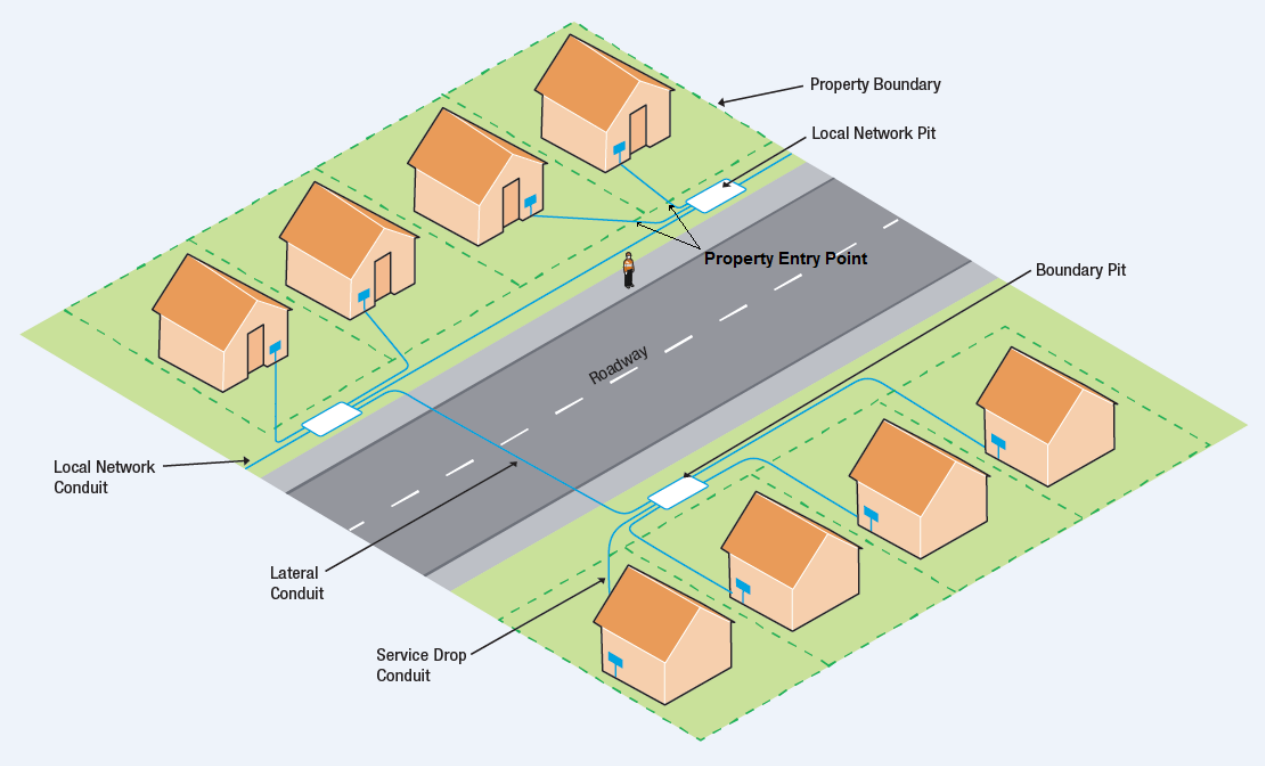

Figure 1. Typical nbn™ Copper Street Distribution

3.2 Urban Residential Areas

In urban residential areas, **nbn**™ underground lead-in cabling is typically fed from a pit or pole in the street or an easement adjacent to the property. In some cases, **nbn**'s property entry point will be evident from the location of the pits and may be confirmed by digging at the property boundary to locate the "starter conduit". In other cases, the location of the **nbn**™ property entry point may not be obvious and **nbn** may need to be consulted

Figure 1 – Shows the typical street distribution of lead-in cable infrastructure to the property boundary point. Note: Starter conduit can be 25m from the pit to the closest boundary.

Starter conduits will usually be provided as shown and be installed at least to the property boundary but they may extend up to one metre into the property. The minimum depth of cover for these conduits is normally 300 mm or 450 mm if the conduit runs parallel with the property boundary for some distance before it enters the property utilities.

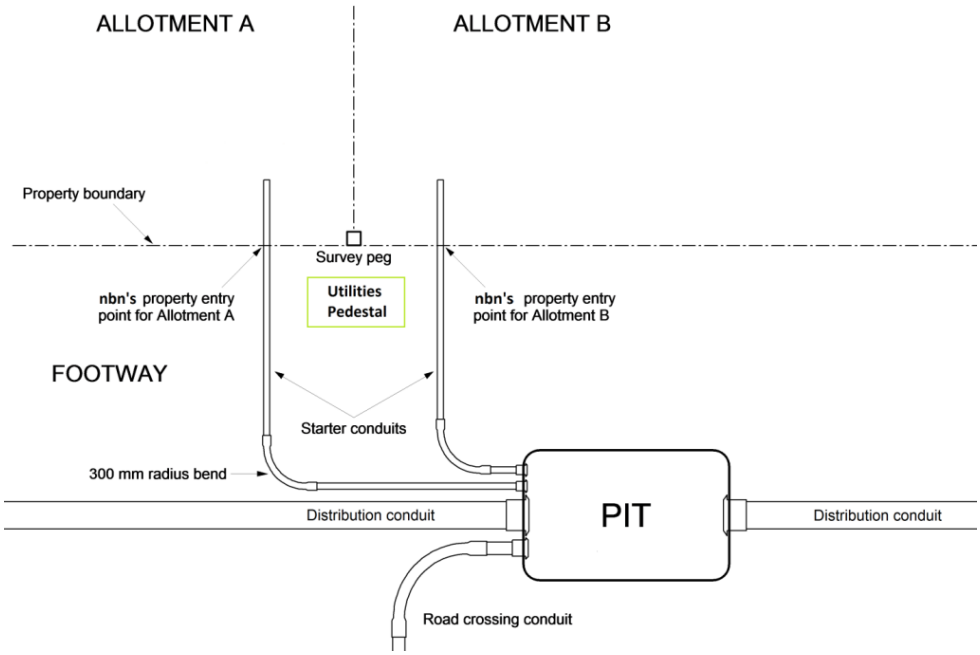

Figure 2. Typical Urban Property Entry Points with Starter Conduits

The lead-in arrangement and distribution for commercial/industrial estates and rural communities may differ from the arrangements shown in figure 1, and are not specifically covered by this document. You are advised to seek advice from **nbn** as to the location of the property entry point in such cases.

4 Trenching

This section details the typical path of the lead-in trench to a single dwelling or small business.

The Trench is required to link the Property Entry point and the Building Entry Point or Network Termination Device (NTD)

You must NOT dig the trench outside the boundary of your premises, e.g. in a public footway, roadway or in neighbouring premises. Trenching outside your premises is subject to land access code requirements and is **nbn**'s responsibility.

The building entry point or NTD is required to be located in the vicinity of the Electricity Switchboard or Meter Panel so Earthing can be facilitated or lightning protection fitted to the NTD as required.

4.1 Typical Trenching to single dwellings or Small business

The trenching route should be as direct as practicable while avoiding sharp changes in direction that may necessitate the use of conduit bends, long sweeping curves that allow the lengths of conduit to be laid in the trench without stress are acceptable.

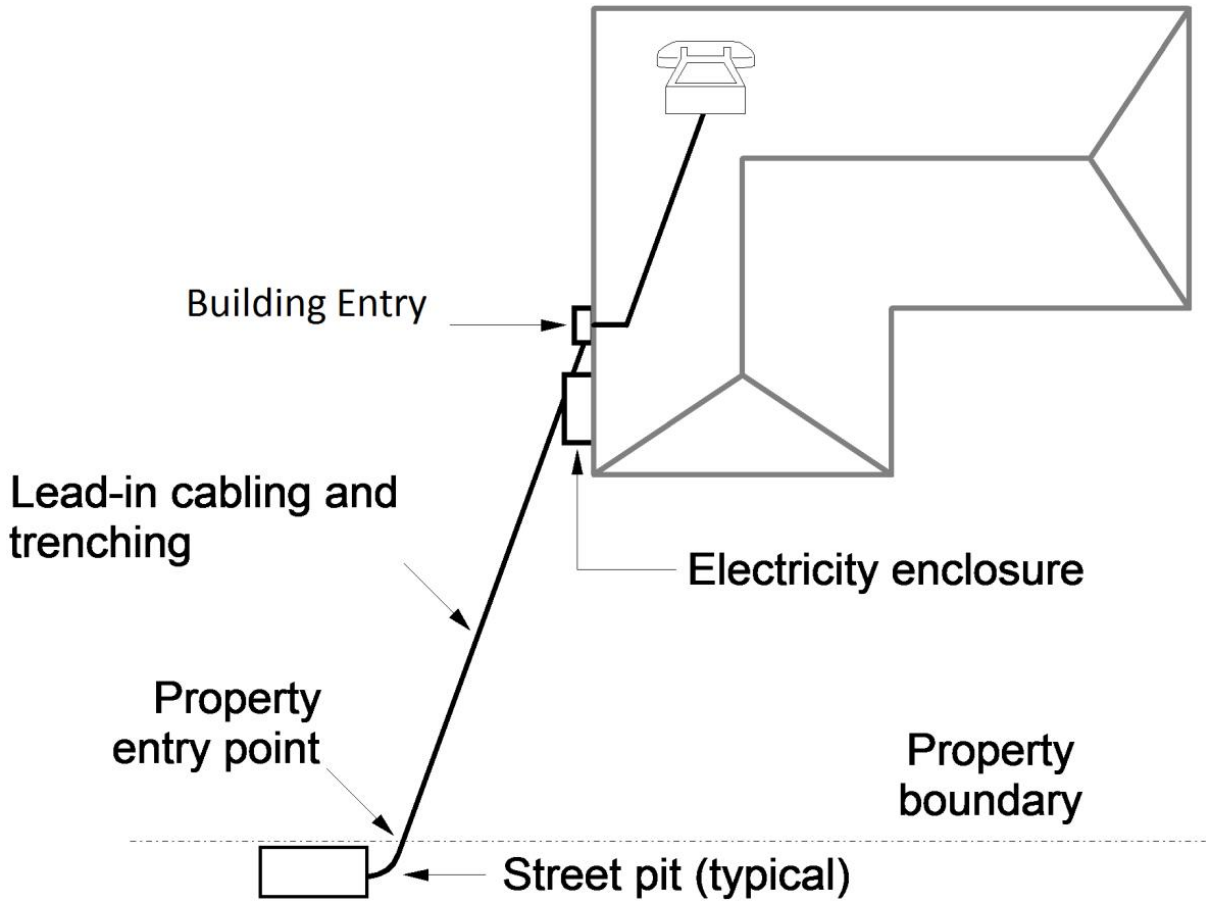

Figure 3. Electricity Enclosure on the Same Side of the Building as the Property Entry Point.

The trenching must be such that there are no sharp bends in the conduit between the property entry point and the building footings. Sweeping curves that will allow the glued lengths of lead-in conduit to be laid in the trench without significant stress are acceptable, as indicated in the figure below

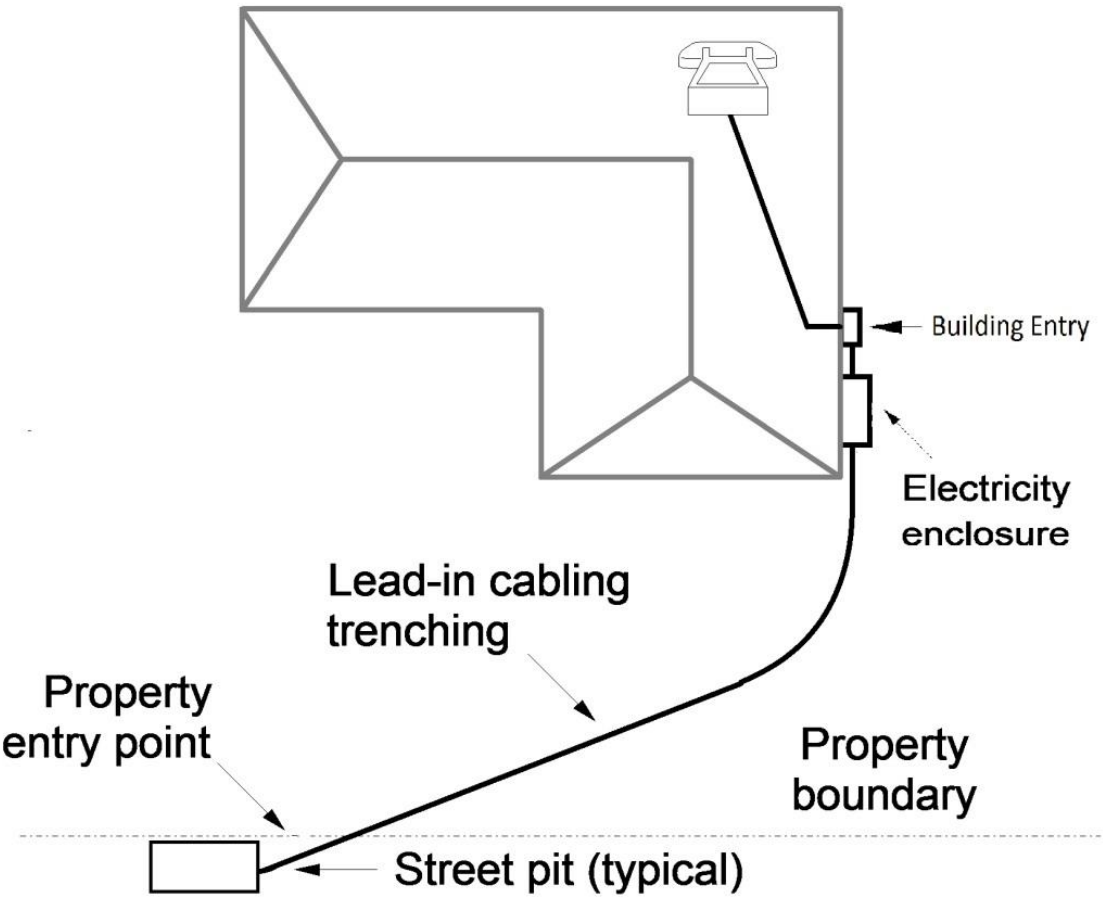

Figure 4. Electricity Enclosure on the Opposite side of the Building to the Property Entry Point.

4.1.1 Outbuilding or a building with a detached electrical Switchboard

Where the **nbn**™ service is required in a separate detached building ("outbuilding"), **nbn** may require lead-in trenching to be provided via the main building or directly to the outbuilding, depending on the circumstances. Similarly, where the electricity enclosure is installed at a separate detached building or structure (e.g. a fence, pole or garage); the trenching for the **nbn**™ lead-in cabling may need to be provided via the building or structure at which the electricity enclosure is located, as shown in Figure 5 and Figure 6. However, take care to avoid any pole carrying a power transformer as shown in Figure 7 and 8. In some cases, it may be possible or desirable to run separate lead-in cabling directly to an outbuilding, as shown in Figure 9.

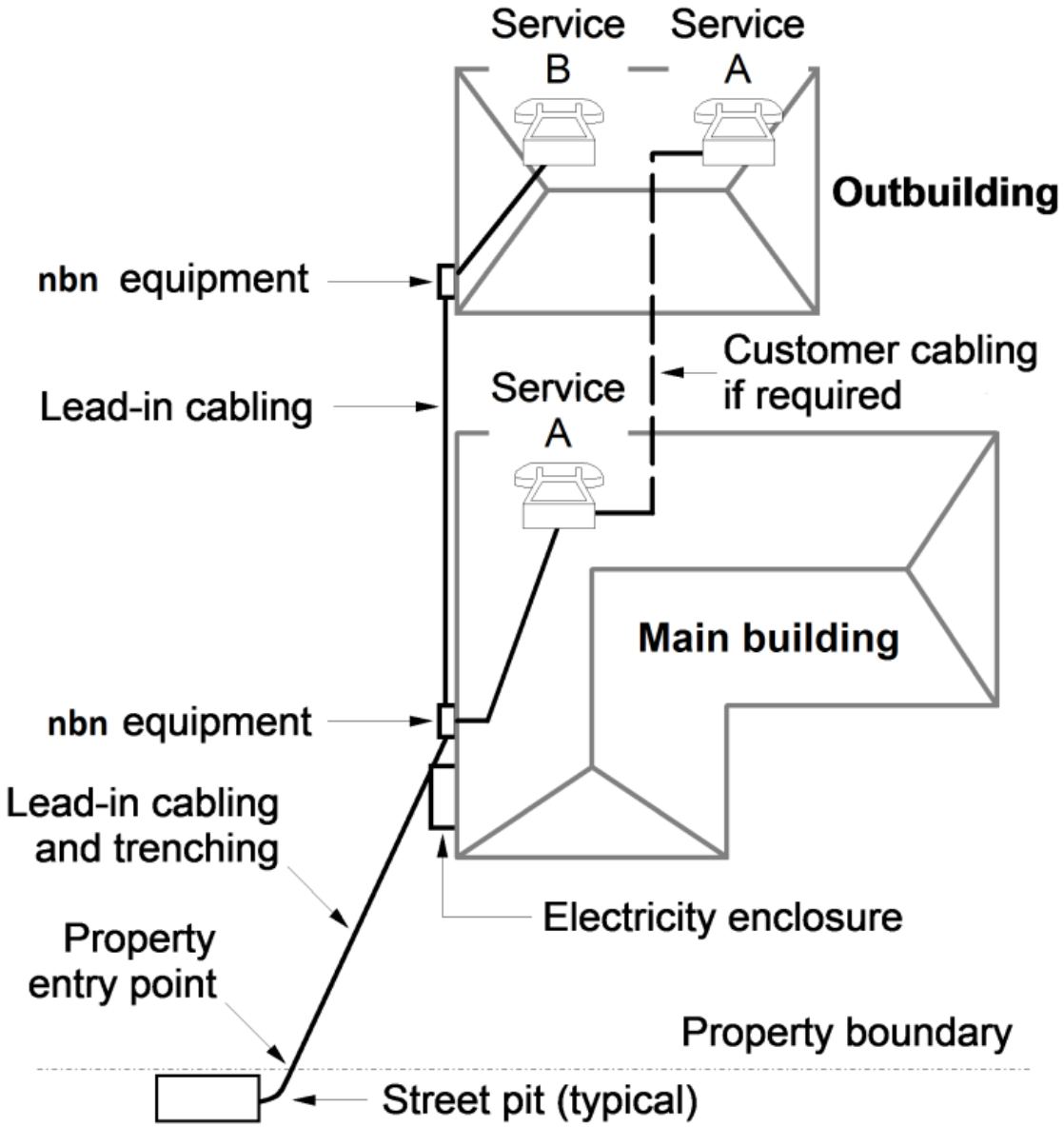

Figure 5. Typical path of the lead-in trench for supply of a separate nbn™ service to an outbuilding

Any customer cabling required between the main building and an outbuilding, e.g. for additional outlets as shown for Service A in Figure 5 must be separate and distinct from the **nbn**™ lead-in cabling, i.e. it must use separate cable and conduit to the **nbn**™ lead-in cable and conduit.

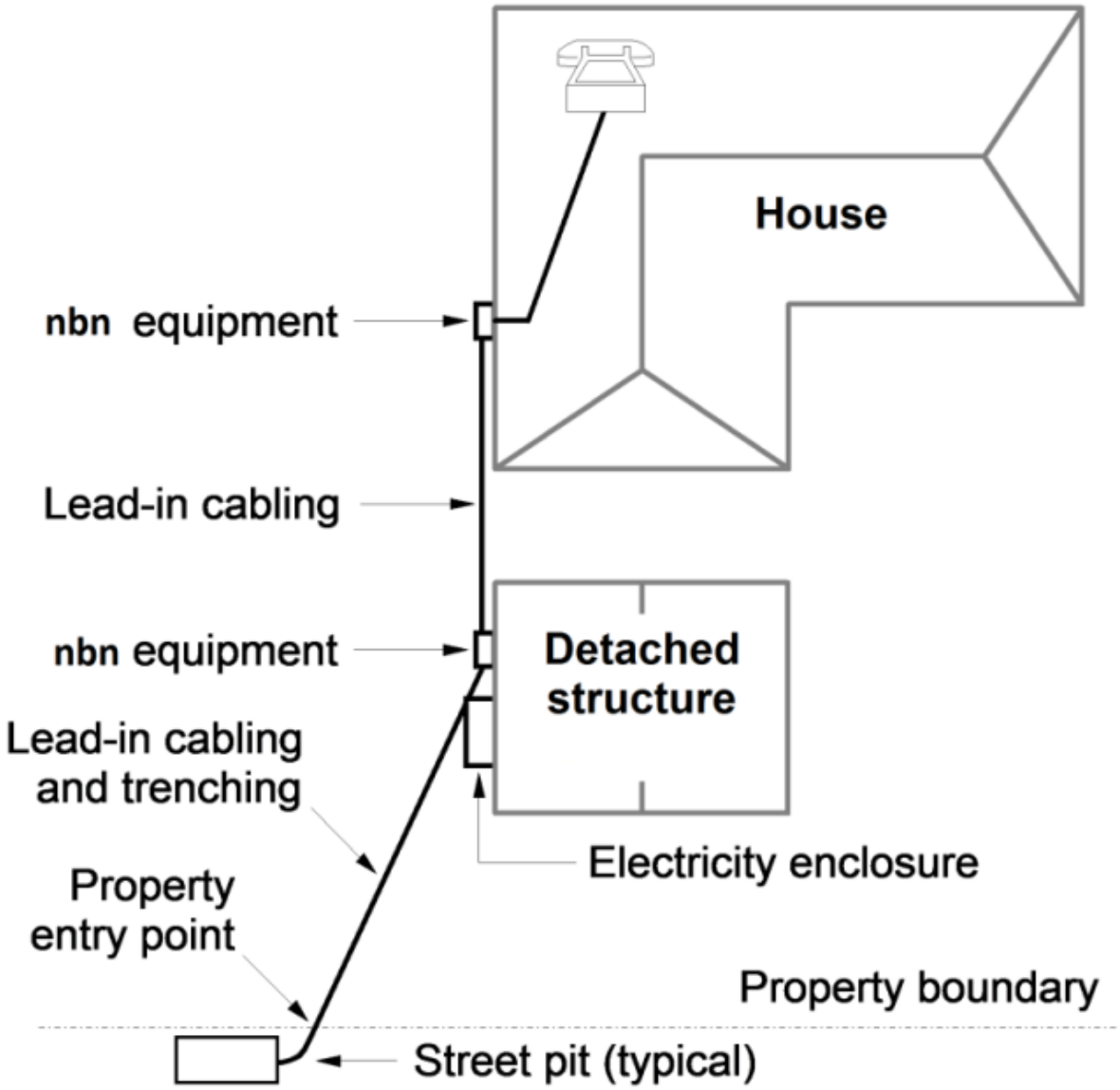

Figure 6. Lead-in cabling via an Outbuilding

The detached structure at which the electricity enclosure is located may be a garage shed, pole or fence.

4.1.2 Lead-ins for buildings with power fed from pole.

Buildings with power supplied aerially either LV or HV (Typically Rural locations) **nbn** may need to install equipment both at the pole and the building

The **nbn**™ equipment should be located externally as close as possible to the electrical switchboard.

nbn™ equipment should be kept at 25 metres away from any pole carrying a SWER (Single Wire Earth Return) Transformer or at least 15 metres away from any other Electricity transformer

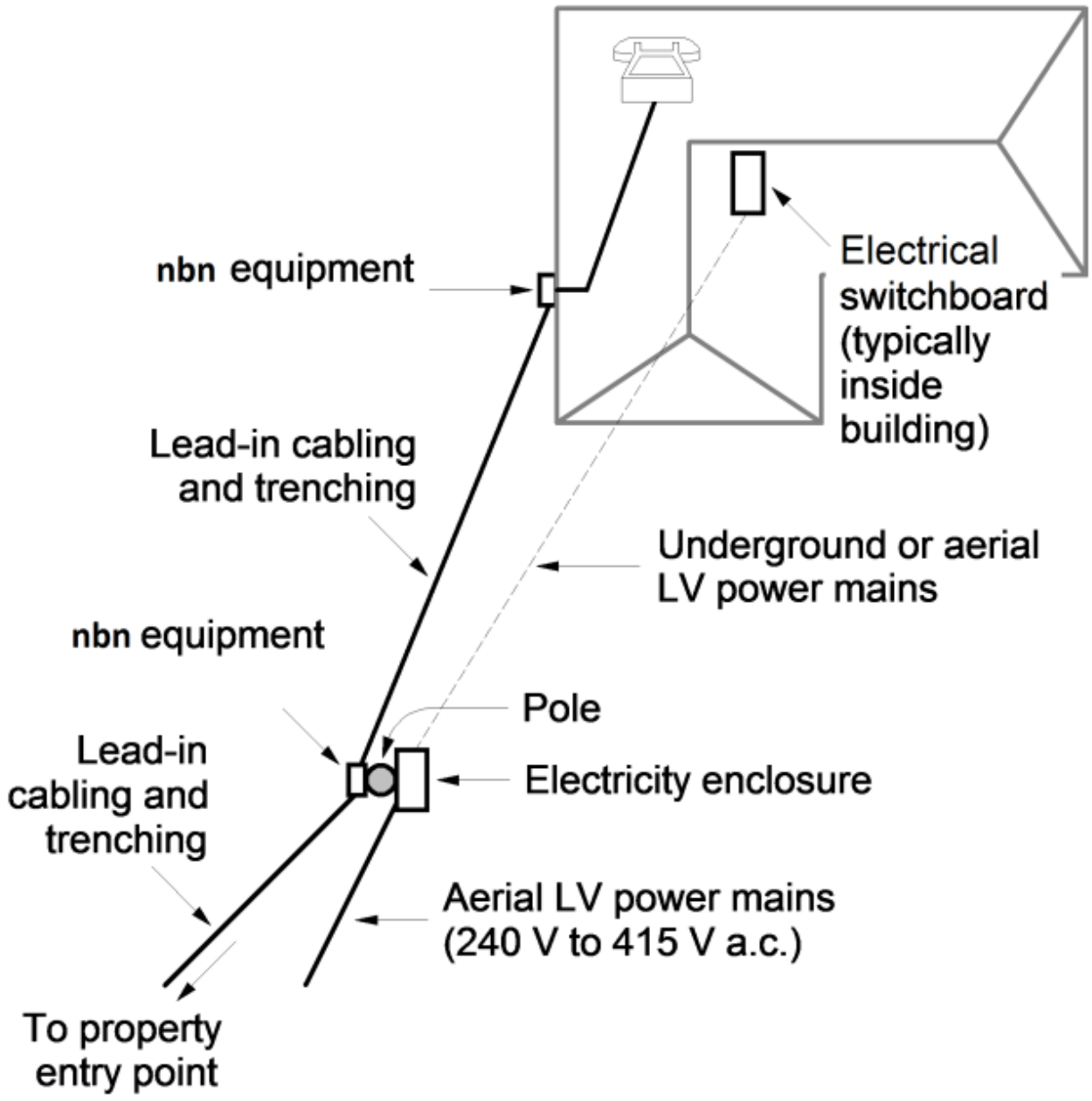

Figure 7. Typical Path of lead-in trench to a building where mains power mains are fed from an LV electricity enclosure transformer located on a pole - Rural Properties

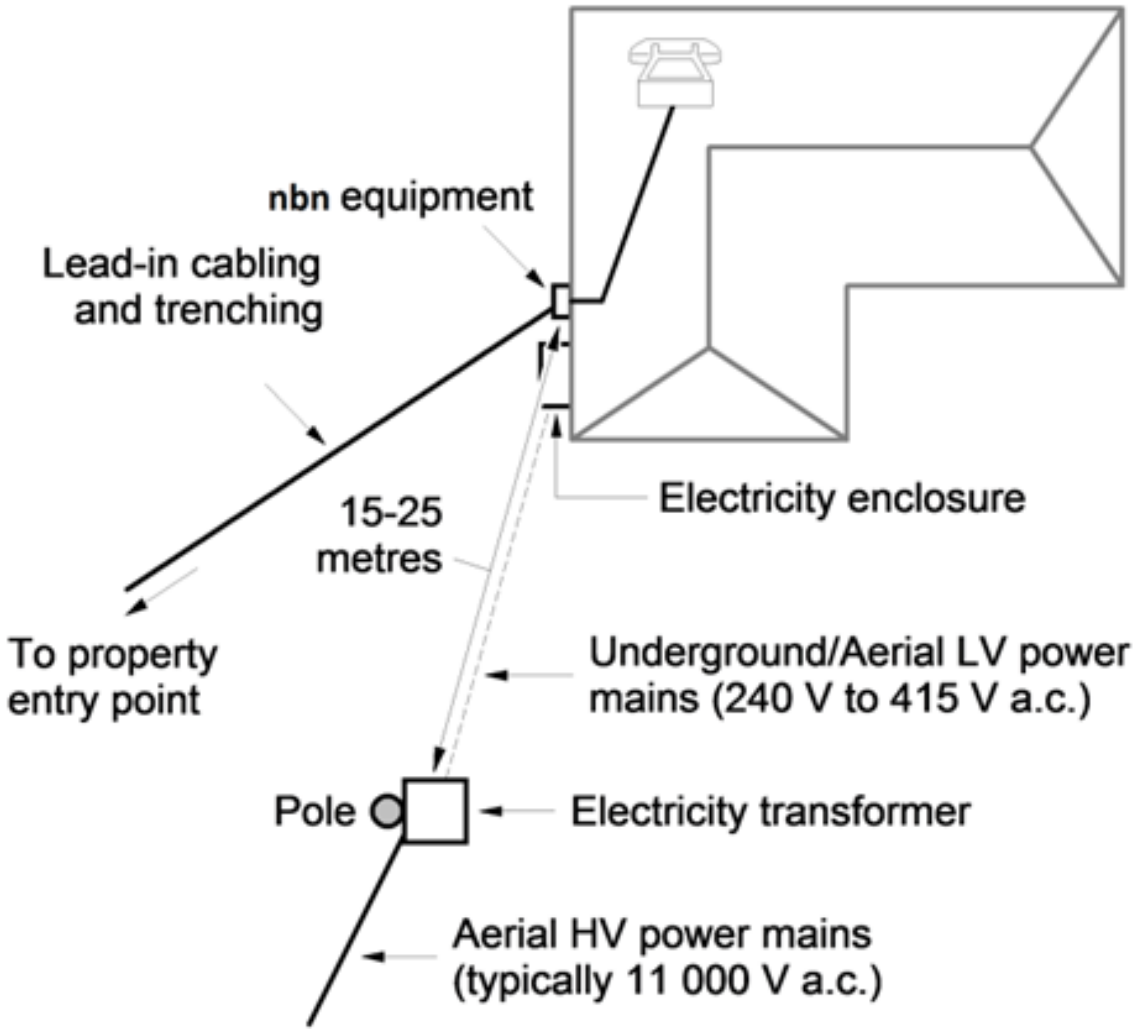

Figure 8. Typical Path of lead-in trench to a building where mains power mains are fed from an HV electricity enclosure transformer located on a pole - Rural Properties

4.1.3 Outbuilding with Separate Lead-ins

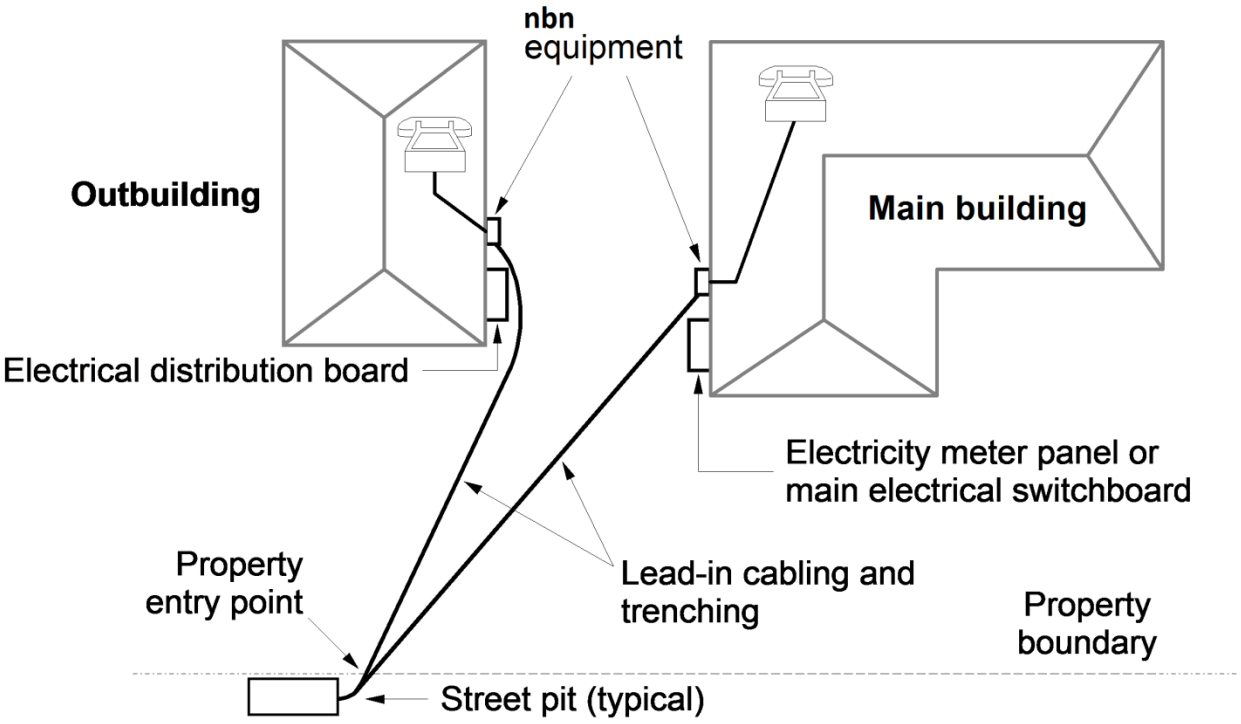

Figure 9. Lead-in cabling/trenching directly to an outbuilding

Outbuildings requiring separate services can be fed by separate lead-ins and may share common conduits using a pit where the lead-in cables branch off.

Any customer cabling required between the buildings must be separate and distinct from **nbn**™ lead-in cabling i.e. using separate cable and conduit to the **nbn**™ lead-in cable and conduit.

4.2 Flow chart for determining lead-in selection

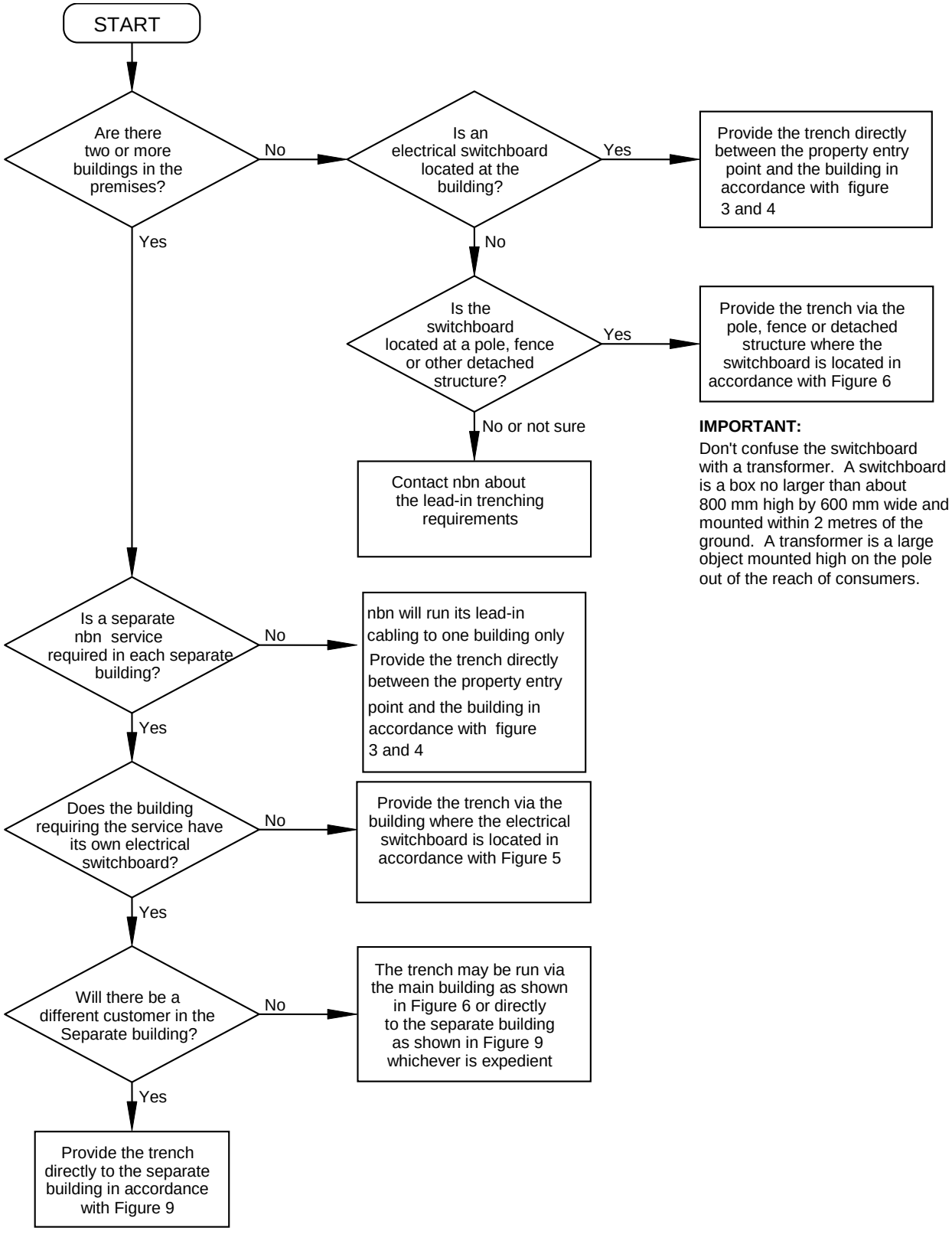

Figure 10. Flow chart determining the appropriate method of cabling/trenching to a particular building

5 Trench Specifications

The conduit shall be installed in a uniform trench depending on the site location and conditions.

Lead-in trenching should be kept at least two metres away from any power poles (including poles used for lighting) to allow for future replacement of the pole without disturbing the **nbn**™ lead-in cabling — except in cases where the electricity enclosure is installed on the pole and it is necessary to run the **nbn**™ lead-in cabling via the electricity enclosure.

5.1 Trench Depths and Access Pits

Table 1. Trench Specifications

Location	Minimum Depth of Cover
Lead-in on Private Property	300 mm
Private Driveways	450 mm
Verge , walkways , footpaths	450 mm
Road	600 mm
Road Crossings	800 mm to 1200 mm (Typically)

5.2 Access Pits

Lead-in trench's exceeding 50m and containing 20mm conduit will require pits at 50m intervals for hauling and access, Access pits at 100m intervals are required when installing 50mm or 100mm.

5.3 Retaining Wall and Embankments

This section details the trenching installation requirements when there is a retaining wall or embankment at the Property Entry Point.

When one side of the wall or embankment is on public property such as a footway, the trenching on that side of the wall/embankment is **nbn**'s responsibility, at properties where the lead is required to or will in future traverse a retaining wall or embankment then the following shall apply.

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.

5.3.1 Wall or Embankment - One Metre or Less

If the vertical height of the retaining wall or embankment does not exceed one metre, the trenching may continue under the wall or embankment at a gradual incline to resume the appropriate depth set out in Table 1 on the high side of the wall/embankment see Figure 12. Alternatively, the technique described in Figure 13 may be applied.

This technique may be applied either before or after the retaining wall is installed or an embankment is created.

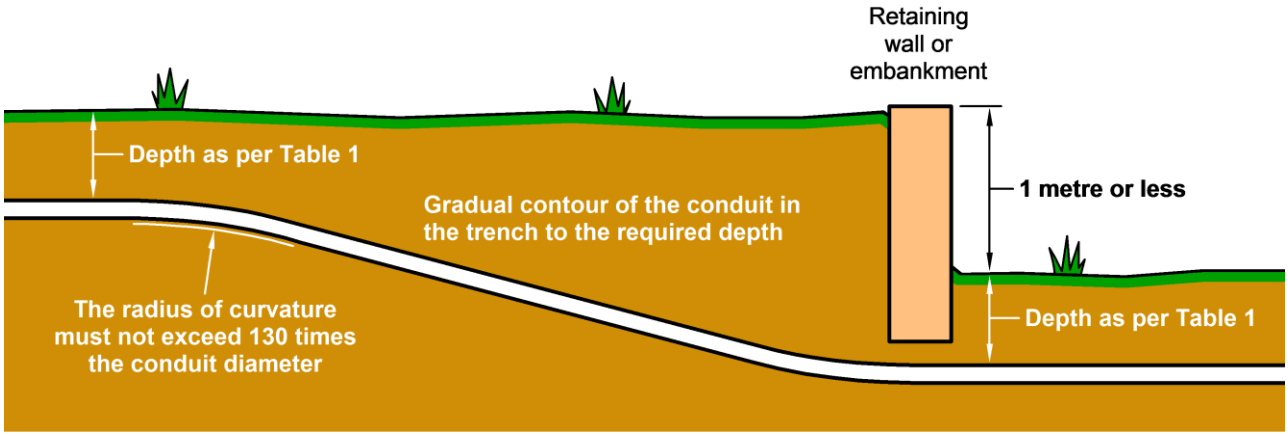

Figure 11. Trenching/Conduit Arrangement with a retaining wall of 1 m or less

5.3.2 Wall or Embankment – Greater in height than One Metre

If the vertical height of the retaining wall or embankment exceeds one metre, the trenching must end at the foot of the retaining wall or embankment and recommence at the high side of the wall/embankment at the depth set out in Table 1.

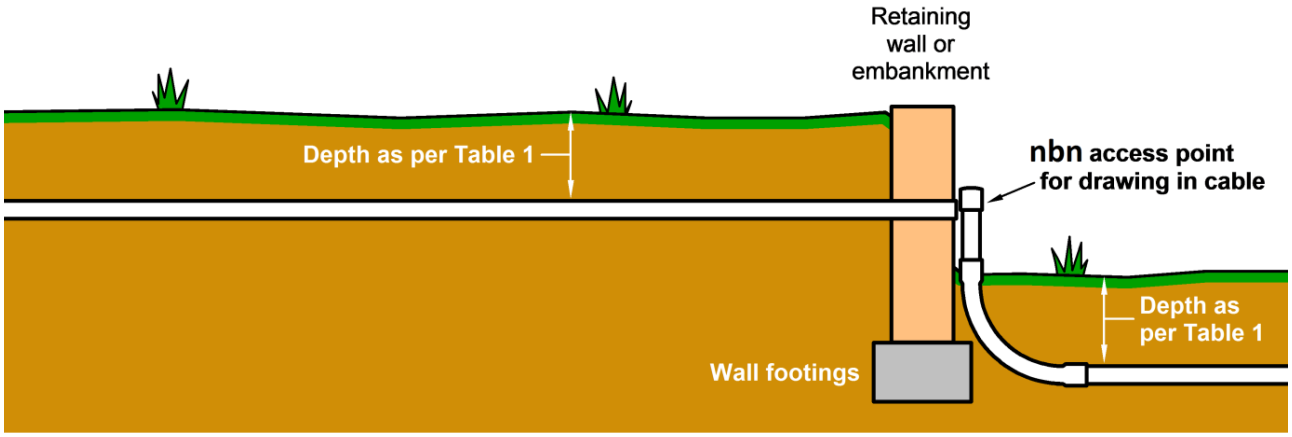

Figure 12. Trenching/Conduit Arrangement with a retaining wall of greater than 1 m

nbn will install conduit on the surface of the retaining wall or embankment as shown. **nbn** may also install a metal cover strip over the conduit as a mower guard.

5.3.3 Wall or Embankment with gradual slope

If the wall or embankment is at a gradual incline to the horizontal, the trenching should follow the incline as close as practicable to the appropriate depth set out in Table 1 and shown in Figure 14.

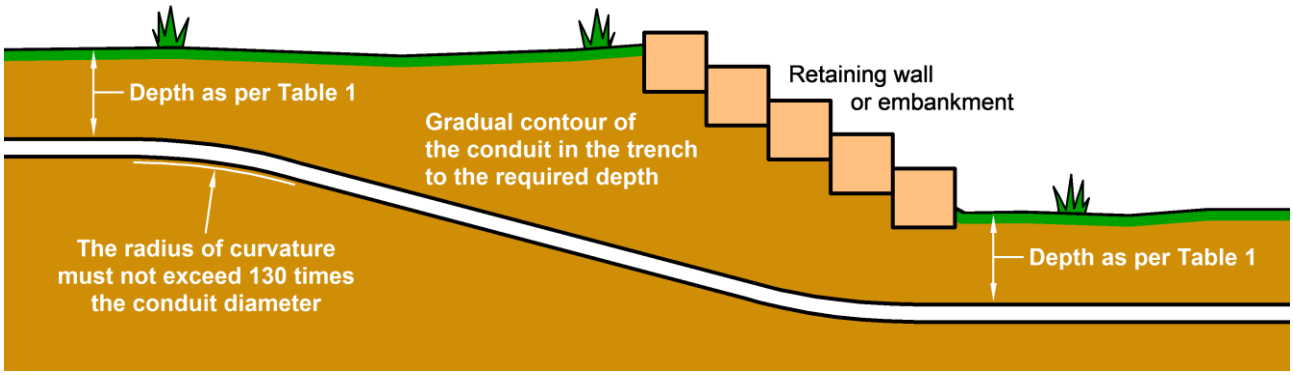

Figure 13. Trenching/Conduit Arrangement with a retaining wall or embankment with a gradual slope

The trenching should follow the contour of the finished ground level within the curvature (flexing) constraints of the conduit to be installed.

For large buildings or multi-tenant developments, **nbn** may require the installation of two or more 100 mm conduits.

5.4 Shared Trench

nbn allows shared trenching with other utility cables or other telecommunication services as required. No Separation is required from conduits or cables of another telecommunications service unless:

- separation is required by the owner of the other telecommunications service; or
- the other telecommunications conduit or cable belongs to another telecommunication carrier then a minimum radial clearance of 100 mm is required.

Notes:

- At least 100 mm separation is required if the electrical cable is installed in orange conduit and the **nbn**™ lead-in cable is directly buried without conduit (e.g. rural areas).
- No separation is required if the **nbn**™ lead-in cable is installed in a white conduit and the power cable is protected and identified with in an orange conduit, orange cover strip or orange warning tape.
- Lead-in cabling may only share a trench with High Voltage power cables (i.e. Exceeding 1000 V), by special arrangement with nbn.
- The lead-in cable shall not be placed above a stormwater drainage pipe.
- The lead-in in conduit must have 100 mm separation to Gas, Stormwater Drainage, Sanitary and Water service pipes.

5.5 Exclusive Trench

Where it is not possible to use a shared trench with another service, the lead-in cabling must be installed in an exclusive trench, the trench separation must adhere to the points listed in section 5.5. and Table 2 for separation from Low Voltage and High Voltage.

Table 2. Exclusive Trench Separation from Power Specifications

	Low Voltage 240 V a c – 4 15 V a c		High Voltage 11000 V a c	
	With protective covering	Without protective covering	With protective covering	Without protective covering (HV Installation should be covered as per AS/NZS 3000)
Minimum separation distance	100 mm	300 mm	300 mm	450 mm

The distances must be measured radially in any direction from the electrical conduit/cable as detailed in the figure 15 below with “D” the minimum separation distance detailed in table 2.

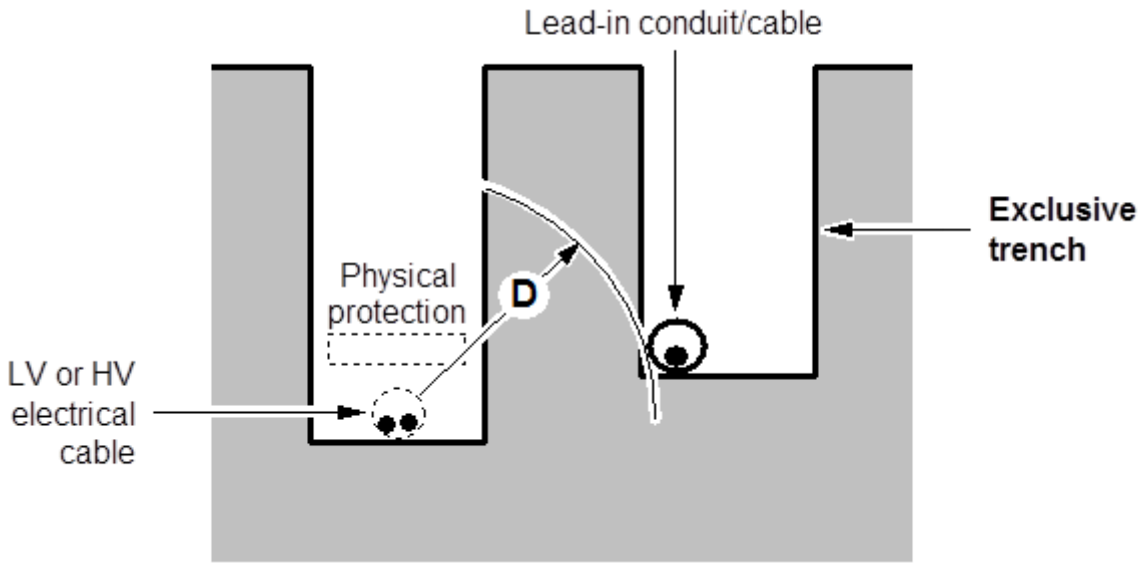

Figure 14. Exclusive Trench Separation from LV – HV Power

5.5.1 Lead-in Cross Over of Utilities Services

When the **nbn**™ lead-in service crosses over another service as shown in Figure 16 separation at the crossover point must be maintained.

The Separation requirements are detailed in Table 3.

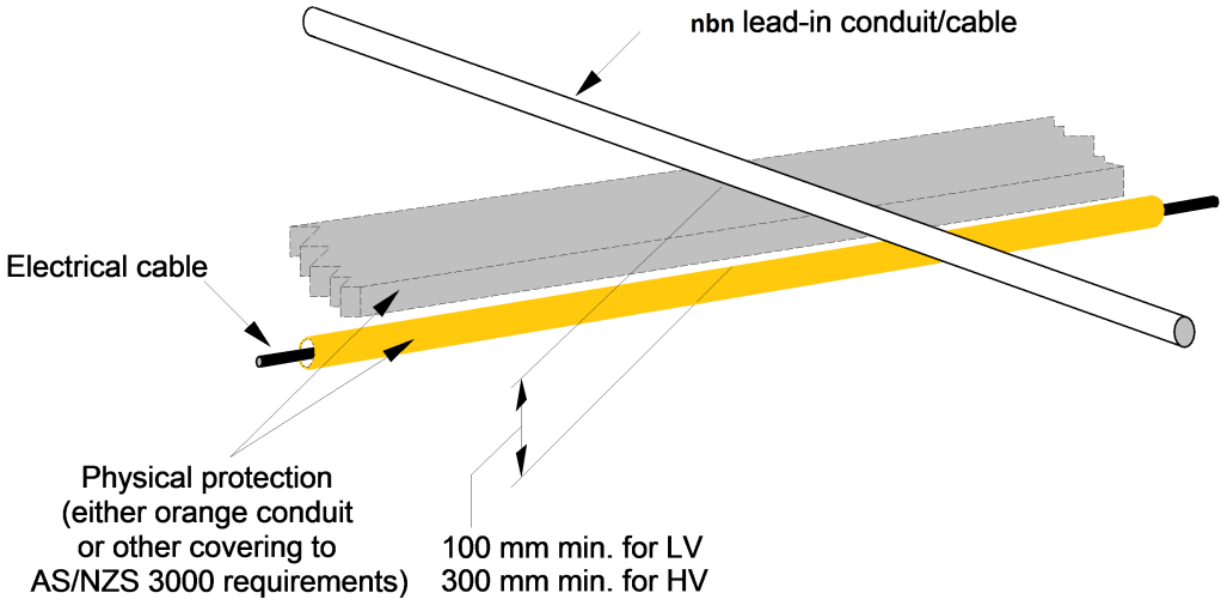

Figure 15. Cross over Separation from LV or HV Power

Table 3. nbn™ Lead-in Separation at Crossover Point specifications

Other Service	Separation Requirements
LV electrical cable with a protective covering	The lead-in cabling must be separated from the electrical cable by at least 100 mm at the crossover, and should cross ABOVE the electrical cable. The lead-in cabling may only cross under the electrical cable if a concrete protective covering is installed above the electrical cable at the crossover and the installation technique
LV electrical cable WITHOUT a protective covering (LV Installation in Trenching without protection is not compliant with AS/NZS3000)	The lead-in cabling must cross at least 300 mm ABOVE the electrical cable unless a protective covering of concrete is provided over the electrical cable 600 mm each side of the crossing in which case a 100 mm separation is allowable. If it is necessary for the **nbn**™ cabling to cross under the electrical cable: • it should only be installed by boring; • a concrete protective covering must be installed above the electrical cable at the crossover; and • a minimum separation distance of 300 mm must be maintained from the electrical cable at the crossover.
HV electrical cable with a protective covering	The lead-in cabling must be separated from the electrical cable by at least 300 mm at the crossover, and should cross ABOVE the electrical cable. The lead-in cabling may only cross under the electrical cable if a concrete protective covering is installed above the electrical cable at the crossover.

Other Service	Separation Requirements
HV electrical cable WITHOUT a protective covering (HV Installation in Trenching without protection is not compliant with AS/NZS3000)	The lead-in cabling must cross at least 450 mm ABOVE the electrical cable unless a protective covering of concrete is provided over the electrical cable 600 mm each side of the crossing, in which case a 300 mm separation is allowable. If it is necessary for the **nbn**™ lead-in cabling to cross under the electrical cable: • it should only be installed by boring; • a concrete protective covering must be installed above the electrical cable at the crossover a minimum separation distance of 300 mm must be maintained from the electrical cable at the crossover.
Water service pipe	The lead-in cabling must cross at least 100 mm BELOW the water pipe at an angle not less than 45°.
Sanitary plumbing/ drainage pipe	The lead-in cabling must cross at least 100 mm ABOVE the pipe at an angle not less than 45°.
Stormwater drainage pipe	The lead-in cabling must cross at least 100 mm BELOW the pipe at an angle not less than 45°.
Gas service pipe	The lead-in cabling must cross at least 100 mm ABOVE the gas pipe and at an angle not less than 45°.
Telecommunications	The lead-in cabling must cross at least 100 mm above or below (whichever is expedient) the other telecommunications conduit or cable.

5.6 Nominal Conduit Descriptions

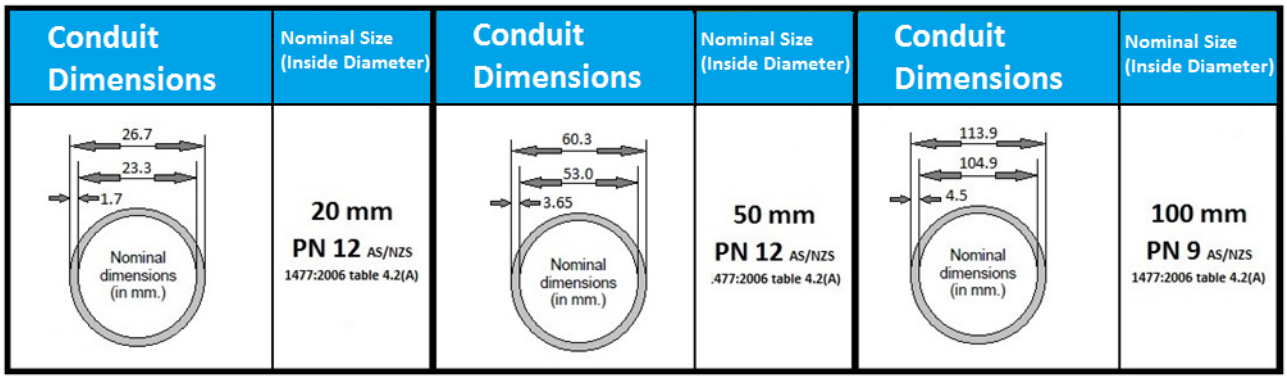

Figure 16. nbn™ approved conduits

nbn requires the following when installing lead-in conduits:

- For Single Dwelling Units (including duplex, triplex and other developments where all premises face the street), one P20 conduit is required per premises.

- For a lot yielding more than three but less than 25 premises that will require an internal pit and conduit network, a P50 conduit is required.
- For a lot yielding 25 or more premises, a P100 conduit is required.
- For a vertical Multi Dwelling Unit (such as an apartment building) of up to 60 internal premises, a P50 conduit is required. More than 60 internal premises in a vertical MDU requires P100 conduit.
- This conduit should meet the minimum requirements of:
    - AS/ACIF S008: 2010 Requirements for Customer Cabling as it applies to customer cabling products.
    - ACIF C524: 2013 External Telecommunication Networks.
- The conduit is labelled as per AS/AC S008: 2010 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 orange draw cord.
- The owner/developer/builder/customer must provide the lead-in conduit from the PEP to the BEP.
- The owner/developer/builder/customer must connect the lead-in conduit to the ‘starter conduit’.

nbn allows 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.

6 Glossary

Term	Description
BoK	Back of Kerb
BJL	Breakout Joint Location
CAD	Computer Aided Design - a format developed by Autodesk and used by the AutoCAD software application for 2D and 3D design and drafting.
DN	Distribution Network – the part of the network that connects the FAN to the FDH.
FDA	Fibre Distribution Area - the area served via a single Fibre Distribution Hub (FDH).
FJL	Flexibility Joint Location - the demarcation point between the DN and LN networks
FTTP	Fibre to the Premises - the network design in which the fibre network is deployed to each premises.
LF	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.
LN	Local Network - the part of the network from the Fibre Distribution Hub (FDH) down each street.
MDU	Multi Dwelling Unit - a premises that contains more than one dwelling unit. Note this term is interchangeable with MPS – Multi Premises Site.
SFM	Small Footprint Multiport
SMP	Splitter Multiport
New Developments	A new or undeveloped piece of land that represents the growth of the premises market.
NTD	Network Termination Device - **nbn**'s termination point for residential fibre services, typically featuring 4 Ethernet and 2 telephone interfaces.
PCD	Premises Connection Device - a unit to terminate the service drop cable on the side of the premises.
SDU	Single Dwelling Unit - premises that contain only one dwelling unit.