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Cabling Requirement
Lead In Conduit**

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| Version | Date Issued | Reason for Update |
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| 0.7a | 27 May 2009 | Updates from AB comments |
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1. Introduction

1.1 Purpose and Effect

The purpose of this Technical Manual (TM) is to record the statement of requirements for the Sanctuary Cove FTTH lead in conduit (LIC) to facilitate FTTH (Fibre To The Home).

1.2 Audience

The audience for this document is:

- UCG Operations
- UCG Management
- Sanctuary Cove Residents, their Builders and Architects
- Sanctuary Cove Management/PBC

1.3 Background

Sanctuary Cove has contracted UCG to provide installation and maintenance services, and separately contracted a Fibre Plant construction contractor for design, and deployment of the required fibre plant for the Sanctuary Cove FTTH network. This document is intended to provide the minimum standard required for home cabling to interwork with the FTTH network and some recommended standards to be adopted that will allow the full potential of the new FTTH network to be realised in terms of home automation and residents lifestyles.

This document and subsequent variations, is subject to agreement between UCG Management, Sanctuary Cove Management.

1.4 Scope

This TM documents the functional and technical requirements for the lead in conduit from a communications pit on the street to the FTTH Network NTD adjacent to the PHD.

1.5 Reference Documents

The documents referenced are as follows:

- UCG technical document, TM00140-1 – Home Cabling Requirement
- AS/ACIF S009:2006 - Installation requirements for customer cabling



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1.6 Glossary

| | |
|-----|--------------------------------|
| LIC | Lead in Conduit |
| NTD | Network Termination Device |
| ONU | Optical Network Unit |
| PBC | Principle Body Corporate |
| PHD | Primary Home Distribution |
| UCG | Universal Communications Group |



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2. Summary

2.1 Objectives

This document for Sanctuary Cove PBC is to define LIC standards to be applied to all new homes to be built in Sanctuary Cove. The LIC requirement is mandatory for all new homes in Sanctuary Cove to be connected to the FTTH network.

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3. Lead-In Conduit Requirements

3.1 Purpose

The LIC provides the link between the communications pit located outside the property boundary and the FTTH Network NTD (Network Termination Device).

The LIC is used to pull in the optical fibre lead-in cable and must be capable of passing a pre-terminated optical fibre connector without damage.

Once the fibre lead-in cable is in place, the LIC protects it from damage and provides separation of the cable from other cables that enter the building.

3.2 Installation

The builder is responsible for supply and installation of this LIC. The LIC must be installed during the construction of the building.

3.3 General Requirements

The following are general requirements, which must be adhered to when installing the conduit:

The LIC is to be white RC20 PVC communications pipe, which has an OD of 27.3mm and ID of 23mm.

The LIC is to be installed to a depth of 450mm below the finished ground level or in accordance to AS/ACIF S009:2006 or its relevant update.

All underground and concealed LIC fittings **MUST** be glued with suitable solvent cement

The LIC bend which takes a change in direction from the horizontal underground alignment to the vertical wall alignment shall be have a minimum bend radius of 300mm

There should be no more than one 100 mm radius bend above ground or within the wall cavity.

All other bends are to be avoided wherever possible to ensure that the lead-in cable can be easily drawn through the LIC.

The vertical section of the LIC is to be positioned so that it is 50mm inside of the right hand edge of the proposed FTTH Network NTD enclosure, with the height above floor level specified in the sections below.

The top of the vertical section of LIC must be capped to prevent ingress of material or animals.

Where the LIC is to be trenched, this must be in accordance to section 18, AS/ACIF S009:2006 or it's relevant update

The LIC shall be roped with 3mm orange polypropylene rope. This rope is to be securely fixed at the existing communications pit located outside the property boundary. The other end of the



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rope is to be securely fastened at the NTD enclosure end of the conduit.

In situations where the FTTH Network NTD is below street level, a drip point will need to be incorporated into the LIC to ensure the free drainage of water, thereby avoiding any water ingress into the FTTH Network NTD.

The LIC must be installed in such a way as to be serviceable yet not provide a passage for the entry of water or termites into the building via the LIC. Termite protection shall be as per current industry approved standards.

3.4 Specific Requirements

The following are specific requirements which must be applied in addition to the general requirements listed above.

3.4.1 FTTH Network NTD located on a solid wall

For cases where the FTTH Network NTD is going to be located on a solid wall, it cannot be recessed, and therefore it will be mounted directly onto the surface of the solid wall.

In this case the LIC will have to be run on the surface of the solid wall. Additional protection such as a steel cable guard may need to be considered if there is a risk of impact damage from vehicles, etc.

The LIC should be run to 100mm below the bottom of the proposed location of the FTTH Network NTD, which will be 1.4m above floor level. The builder is not responsible for installation of the flexible conduit; this will be installed at the same time as the FTTH Network NTD is installed.

The diagram below shows this arrangement.



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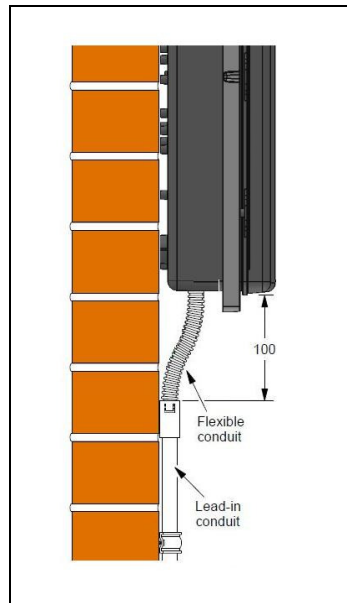


Figure 1: Lead in conduit surface mounted on a solid wall

3.4.2 FTTH Network NTD located in a cavity wall

In the case where the FTTH Network NTD is going to be located in a cavity wall, the LIC must be run inside the cavity wall to a height of 1.7m above floor level. This height is 300mm in excess of the required height; however it makes plenty of allowance for a re-adjustment of the FTTH Network NTD height, should this be required due to a practical constraint.

In this case it may be required to drill or notch the nogging to facilitate the installation of the LIC.

When it is time to install the FTTH Network NTD, the installer will cut back the LIC to the required height and install flexible conduit from the top of the LIC to the FTTH Network NTD.

The builder is not responsible for cutting back the LIC to the required height or installation of the flexible conduit.

It is critical that the builder provides a drawing and notes accurately specifying where the conduit is located within the wall cavity as it will not be visible once the wall sheeting is applied. The drawing can use the Primary Home Distributor (PHD) as a reference point, as the FTTH Network NTD will always be adjacent to this. The drawing and notes must be left inside the PHD

The following diagram shows the FTTH Network NTD in its final position, where it has been mounted into a cavity wall. The LIC is inside the wall cavity and cannot be seen as it is below the FTTH Network NTD.



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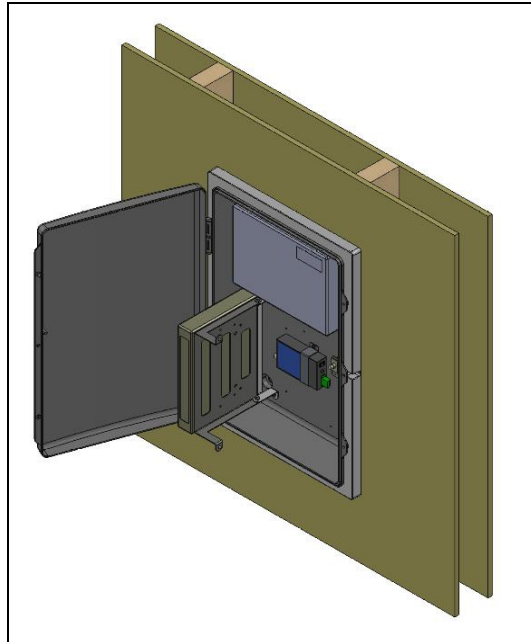


Figure 2: Lead in conduit mounted inside a cavity wall

3.5 Lead in conduit in the building footings

Conduit for underground lead-in cabling should be installed in the building footings before the concrete is poured. A conduit/bend assembly should be located in the building footings in accordance with the following diagram. Unless explicitly approved by Sanctuary Cove in writing the conduit must be installed on the inside wall, preferably within the wall cavity as per 3.4.2.



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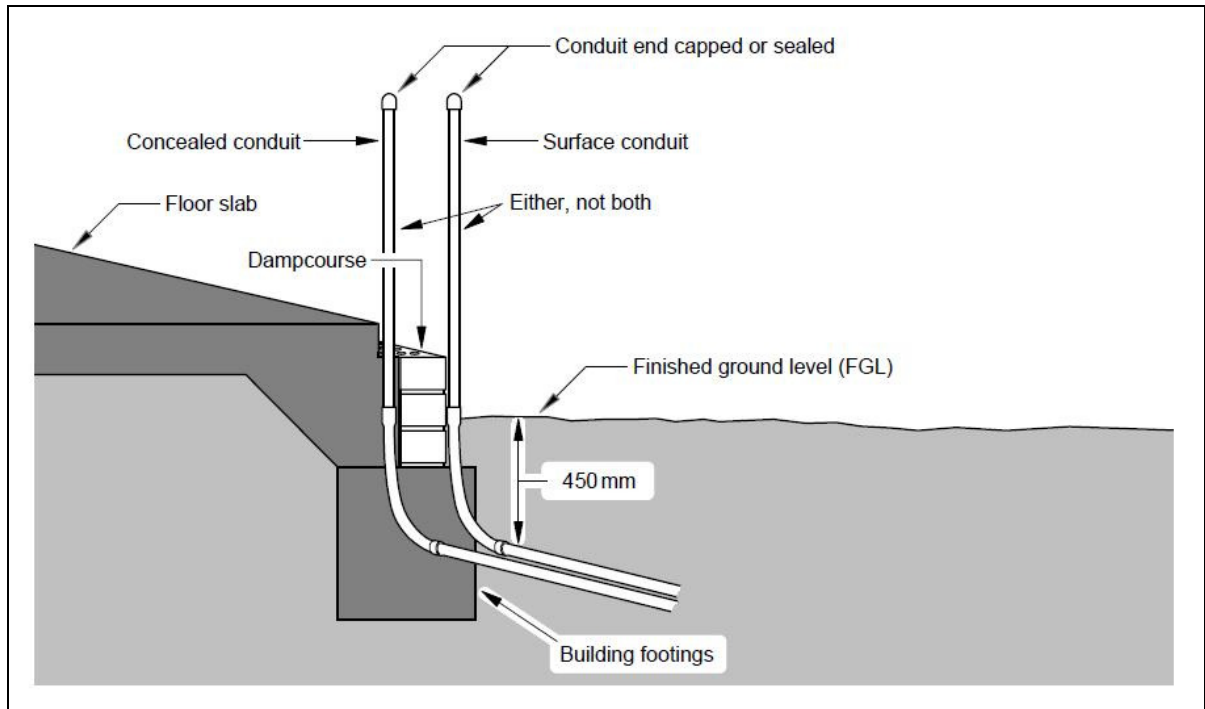


Figure 3: Lead in conduit in the building footings

3.6 Certification

The cabling contractor shall certify that the Lead In Conduit has been installed to this specification.

NOTE: non-conformance will be notified to the home owner, and is the responsibility of the home owner and cabling contractor to attend to any non-conformance notified.

The contractor shall complete form TM00140-2 AT001 – Home Cabling Lead In Conduit Installation Check List and leave a copy in the HD document folder.



4. NTD Earthing

The NDT must be earthed for safety reasons.

Where the electrical earth electrode is near the NTD and is accessible, a 6 mm² green/yellow equipotential bonding conductor may be run between the NTD and the electrode and must be connected to the electrode by a separate earthing clip. The connection must be labelled "Telecommunications Bonding Conductor" in accordance with the requirements of AS/NZS 3000.

Otherwise, the builder's electrician is required to:

- run a 2.5 mm², 4 mm² or 6 mm² green/yellow earthing conductor from the CET to the NTD location.

This arrangement is shown in Figure 4.

The length of the equipotential bonding and earthing conductors is unimportant for the purpose of earthing the NTD, as this earth is provided for electrical safety reasons, not for lightning surge protection purposes.

The earthing conductor need not be installed in conduit within the wall cavity.

The earthing conductor must be tied or taped to either the lead-in conduit or the customer cabling conduit (the earthing conductor may enter either the left hand or the right hand cable entry port, whichever is more convenient).

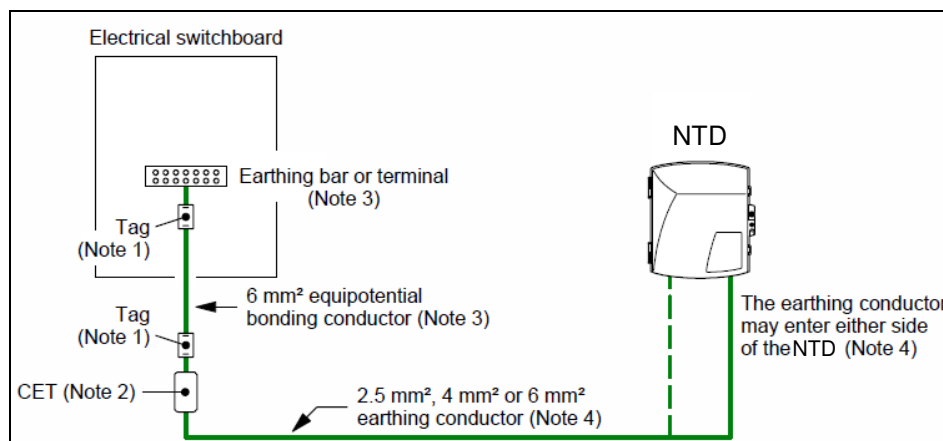


Figure 4: NTD Earthing

Notes:



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1. The bonding conductor must be labelled "Telecommunications Bonding Conductor" at the switchboard end and also at the CET end if the CET is not within sight of the electrical switchboard.
2. The CET should be located in the NTD enclosure or, it may be located in any readily accessible location external to the electrical switchboard – preferably next to the switchboard.
3. A licensed electrician must make the bonding conductor connection inside the electrical switchboard.
4. The earthing conductor will be connected to the NTD by the FTTH installer.



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5. Technical Manual Review

Both Sanctuary Cove and UCG will review this Technical Manual from time to time and any changes must be agreed between both parties.

5.1 Term

This Technical Manual will commence on the day it is signed by ALL parties and continue for as long as the construction contract remains in force or unless terminated by either party in writing.

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