

# Electricity Specification 400E4

Issue 11      February 2023

**Installation, Commissioning and Repair of  
Solid Type Underground Cables Operating  
on the LV and 6.6/11kV Systems, and the  
Restoration of Excavated Areas**



## Amendment Summary

ISSUE NO. DATE	DESCRIPTION
<b>Issue 8</b>  <b>September 2021</b>	New template applied throughout and references updated.  Prepared by: D M Talbot  Approved by: Policy Approval Panel and signed on its behalf by Steve Cox, Engineering and Technical Director
<b>Issue 9</b>  <b>January 2022</b>	Addition of requirement for single point bonding in Section 5.4.4 Cable Voltages added in Table 1 11kV, 400AL cable added in Table 1  Prepared by: P Howell  Approved by: Policy Approval Panel and signed on its behalf by Steve Cox, DSO Director
<b>Issue 10</b>  <b>April 2022</b>	Side/Bottom clearances between duct/cable to trench wall in Appendix B drawings, amended from 40mm to 50mm to follow ENA TS 09-02.  Prepared by: P Howell  Approved by: Policy Approval Panel and signed on its behalf by Steve Cox, DSO Director
<b>Issue 11</b>  <b>February 2023</b>	Reference to handling of cable drums to CP410Ch4 added Appendix A specification references updated Appendix C added for Typical 11kV Joint Bay dimensions  Prepared by: P Howell  Approved by: Policy Approval Panel and signed on its behalf by Steve Cox, DSO Director

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## 1 Foreword

This document has been compiled to enable Electricity North West Limited, hereinafter referred to as Electricity North West to obtain cable installation and repair services from a variety of sources.

## 2 Scope

This document specifies the criteria by which the Works described below will be accepted as complete and fit for service on the 230/400V and 6.6/11kV distribution systems operated by Electricity North West under the auspices of the Electricity Safety, Quality and Continuity Regulations and other relevant legislation, that is to say:

- Newly installed underground cable systems.
- Newly installed cable joints or terminations.
- Newly repaired underground cable systems.
- Newly reinstated areas.

Note that this specification does not cover commissioning or commissioning tests on cables. (For information on commissioning, refer to CP319.)

## 3 Definitions

<b>Approval</b>	Sanction by the Electricity North West Circuits Policy Manager that specified criteria have been satisfied
<b>Authorised Agent</b>	Electricity North West's Engineer to Contract and/or authorised delegated representative to act or give decisions on Electricity North West's behalf.
<b>Contract</b>	The agreement between Electricity North West and the Contractor for the execution of the Works including therein all documents to which reference may properly be made in order to ascertain the rights and obligations of the parties under the said agreement.
<b>Contractor</b>	The person or person's firm or company, including personal representatives, successors and permitted assigns, who's Tender has been accepted by Electricity North West.
<b>Engineer</b>	Electricity North West Circuits Policy Manager or their successor or such person specifically nominated on their behalf.
<b>High Risk</b>	Designated as High Risk in Electricity North West Code of Practice 403 Section 11.
<b>Installer</b>	The person or persons or any company body, corporate or otherwise, carrying out Works for Electricity North West in accordance with this specification.
<b>Manufacturer</b>	The person or persons or any company body corporate or otherwise whose apparatus has been accepted by Electricity North West for incorporation in the Works.
<b>NJUG</b>	National Joint Utilities Group (see <a href="http://www.streetworks.org.uk">www.streetworks.org.uk</a> )

<b>Normal Risk</b>	Designated as Normal Risk in Electricity North West Code of Practice 403 Section 11.
<b>Other Land</b>	Permanent pasture (i.e. land not suitable for ploughing), paths, farm roads, hard standing etc.
<b>Permission</b>	Authority given by an Electricity North West's Authorised Person or Senior Authorised Person as appropriate working in accordance with Electricity North West's Distribution Safety Rules.
<b>Site</b>	The lands and buildings, over, upon, under and in which the work is to take place together with so much of the area surrounding and said land and buildings as the Installer shall with the consent of an Authorised Agent actually use in connection with the Works otherwise than merely for the purpose of access to the said land and buildings.
<b>Solid</b>	A cable with a dielectric of impregnated paper or polymeric compound operating without the assistance of hydraulic or pneumatic pressure.
<b>Specification</b>	The Specifications and schedules (if any) agreed by the parties for the purpose of the Contract.
<b>Street</b>	The whole or any part of the following, irrespective whether they are thoroughfares: <ul style="list-style-type: none"> <li>• Any highway, road, lane, footway, alley or passage.</li> <li>• Any square or court.</li> </ul> Any land laid out as a way whether it is for the time being formed as a way or not.
<b>Sub-Contractor</b>	Any person (other than the Contractor) named in the Contract for any part of the Works or any person to whom any part of the Contract has been sub-let with the consent in writing of the Electricity North West Circuits Policy Manager, and the legal representatives, successors and assigns of such person.
<b>Supplier</b>	Any person or person's firm or company who supplies goods to Electricity North West or to its Contractor.
<b>Tender</b>	An offer in writing to execute work or supply goods at a fixed price.
<b>Tenderer</b>	The person or person's firm or company, including personal representatives, successors and permitted assigns, invited by Electricity North West to submit a Tender.

## 4 General Requirements for Approvals and Testing

### 4.1 General

It is a general requirement that all Works will be carried out strictly in accordance with the provisions of all relevant legislation and standards.

It is a requirement of working for Electricity North West that certain contractors' staff will need to be trained and formally accepted as Authorised Persons in accordance with Electricity North West Code of Practice 605.

All contractors' staff shall abide by the requirements of HS(G)47 for safe excavation techniques.

In order to satisfy regulatory requirements and the expectations of customers, Electricity North West operate the distribution network with a standard of reliability better than 99.9% and is actively seeking to improve on this figure. This is related to assets having anticipated operational lives well in excess of forty years. Whilst no quantitative assessment can be imposed at the time of commissioning which will demonstrate the ability of any new or modified installation to achieve such targets, Installers shall note that the Works will be assessed by Electricity North West Engineers with these qualitative criteria in mind.

All works shall comply with all aspects of the New Roads & Street Works Act, and all associated Codes of Practice and Regulations. In particular, the Signing Lighting & Guarding shall comply with the requirements of the Act. Contractors shall be able to demonstrate their method of complying with the need to monitor excavations to ensure the safety of the public at all times.

The Contractor shall pay all charges for non-compliance with Section 74 of the New Roads & Street Works Act and any other charges relating to street works.

## 4.2 Third Party Certification

Prior to the commencement of the Works, the Installer shall submit certificates from accredited third parties to Electricity North West that confirms that the Works all conform to the relevant standard and will satisfy the requirements of the Specification. (It is anticipated that Installers not currently accredited under ISO 9000 will avail themselves of this facility when obtaining components, materials and assemblies from companies accredited under ISO 9000.)

A minimum requirement for complying with the above paragraph is that Installers shall have current certificates from Lloyds Register confirming that they are accredited for Cable Installation Work. Such certification will be required whether or not any other accreditation is offered.

All Installer's craftsmen engaged in cable jointing shall be and shall pass a trade test, if applicable, before commencing work on Electricity North West's network.

## 4.3 Installers' Own Codes of Practice to be Available

Installers shall submit for inspection prior to the commencement of the Works, evidence in Writing which shows that the Works will be carried out having regard to the following particular requirements:

- Code of Practice for safety, health and welfare of the workforce (which shall comply with the Health and Safety at Work Act and the Control of Substances Hazardous to Health Regulations).
- Code of Practice for ensuring the skill and competency of the workforce.
- Code of Practice for quality assurance of work.
- Code of Practice for ensuring safety of workforce working on or in the vicinity of live electrical conductors and requiring absolute compliance with Electricity North West Distribution Safety Rules and Codes of Practice 605 and 606.

## 4.4 As Constructed Records

Unless otherwise instructed, the Installer shall (during the progress of the Works) record on a set of plans and cross section drawings, such particulars as will allow an accurate record to be made on Electricity North West's mains record. The drawing shall show, amongst other data, the exact position of every cable, cable joint, cable

box, earth electrode, and all connections thereto, and particulars of the route and depth of cables installed, the arrangement of existing and new cables and existing and new joints and the position of all major obstructions and any unidentified apparatus revealed during the course of the Works. In addition, the following cable information shall be included:

- Year and month of cable manufacture.
- Batch number (if provided).

It is imperative that all such drawings are completed in detail whilst the installed equipment and other apparatus is still visible, and before blinding and backfilling takes place.

The "As Constructed Records" shall also include a list of other drawings applicable to the Works and, where applicable, the following information:

- Technical description of the cables.
- Schematic diagram of bonding connections.

Unless otherwise agreed prior to the commencement of the Works, these records shall conform to the requirements of Electricity North West Code of Practice 012.

Unless otherwise specified beforehand, all "As Constructed Records" shall be submitted to the designated premises of Electricity North West within forty-eight hours of the Works being installed in all areas of Electricity North West apart from Lakeland, where seventy-two hours shall be allowed. In all cases, the "As Constructed Records" shall be in the possession of Electricity North West prior to the circuit being made live. (In the case where LV jointing makes new circuitry live, the drawings shall be returned the same working day.)

## 4.5 Confirmation of Conformance

The Tenderer shall complete the conformance declaration sheets in [Appendix D](#). Failure to complete these declaration sheets may result in an unacceptable bid.

# 5 Technical Particulars for Cable Installation Works

## 5.1 Scope

This section refers to the installation of solid type LV and 6.6/11kV cables whether placed underground, in air or in ducts.

## 5.2 General

All cables installed at any Works shall be of a type and installed in such a manner so that the fault level, rated current and voltage regulation (if specified) and operational life are achievable between the designated nodes on the System.

## 5.3 Cables

### 5.3.1 Specification for Cables

All cables shall be of an appropriate type conforming to the Electricity North West Specifications listed in [Appendix A](#) of this Specification. For full technical description/details see ES400C8, ES400C9 or ES400C11.



### 5.3.2 Approved Supplier

Only cables supplied by an Approved Supplier shall be used. For polymeric cables, it is essential that the cables are manufactured at an Approved production facility.

### 5.3.3 Minimum Bending Radii/Maximum Pulling Tensions

All Cable Drums shall be stored and handled on site according to CP410 Chapter 4

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**Table 1: Minimum Bending Radii/Maximum Pulling Tensions**

VOLTAGE LEVEL	CABLE DESCRIPTION	CROSS SECTION & MATERIAL (mm <sup>2</sup> )	MAX. PULLING TENSION (KG)	MIN. BENDING RADII – FIXED*	MIN BENDING RADII – DYNAMIC*
LV	SCNE, Single phase, split concentric, polymeric insulated	4 Cu	24	8D	8D
		25 Cu	150	8D	8D
		35 Al	105	8D	8D
LV	CNE, Single phase, concentric, polymeric insulated	4 Cu	24	8D	8D
		25 Cu	150	8D	8D
		35 Al	105	8D	8D
LV	SCNE, Three phase, split concentric, polymeric insulated	25 Al	225	8D	8D
LV	CNE, Three phase, concentric, polymeric insulated	25 Al	225	8D	8D
LV	Single core, XLPE insulated, XLPE sheathed, Transformer tail, indoor	400 Cu	2000	6D	6D
LV	Single core, XLPE insulated, aluminium armoured, XLPE sheathed	400 Cu	2000	6D	6D
LV	3 core CNE Waveform	95 Al	855	10D	15D
		185 Al	1655	10D	15D
		300 Al	2000	10D	15D
LV	4 core SCNE Waveform	95 Al	1140	10D	15D
		185 Al	2000	10D	15D
		300 Al	2000	10D	15D
6.6/11KV		95 Al	285 per s/c cable	15D	20D

	Single phase, XLPE insulated, 35mm <sup>2</sup> Cu screen, equalising tape, MDPE sheathed, laid-up in triplex formation	185 Al	555 per s/c cable	15D	20D
		300 Al	900 per s/c cable	15D	20D
6.6/11KV	Single phase, XLPE insulated, 35mm <sup>2</sup> Cu screen, equalising tape, MDPE sheathed	400 AL	2000	15D	20D
6.6/11KV	Single phase, XLPE insulated, 35mm <sup>2</sup> Cu screen, equalising tape, MDPE sheathed	400 Cu	2000	15D	20D

\* where D = overall diameter of cable or overall diameter of a single cable within a triplexed group.

## 5.4 Installation Specification

The Works shall satisfy the following criteria:

### 5.4.1 Depth of Newly Installed Cables and Joints

Unless otherwise approved the depth of installation shall be as stated in [Table 2](#) and as illustrated in 'Appendix B' drawings. Note that it is not acceptable to lay, for example, an LV cable with an 11kV cable at the same depth. The tolerance for depth of laying in [Table 2](#) is to allow for minor variations: LV cables shall be laid above higher voltage cables as required in NJUG 7. Separation of cables is specified in [5.4.5](#).

**Table 2 – Depth of Cable Laying**

SYSTEM	ENVIRONMENT	MINIMUM DEPTH (1) & TOLERANCE (2)
LV	Footway	0.45m + 0.3m
LV	Carriageway	0.60m + 0.3m
LV	Good Agricultural Land (3)	0.90m + 0.3m
LV	Other Land (3)	0.45m + 0.3m
6.6/11kV	Footway	0.60m + 0.3m
6.6/11kV	Carriageway	0.75m + 0.3m
6.6/11kV	Good Agricultural Land (3)	0.90m + 0.3m
6.6/11kV	Other Land (3)	0.60m + 0.3m

Notes:

- (1) Depth to be measured to top of the joint of uppermost cable.
- (2) Applies to minor variations in depth of installation deeper than minimum depth.
- (3) Refer to Definitions below

**Definitions:**

Agricultural land: Cables in agricultural land shall be installed in accordance with the requirements of the ENA ER G29 and ENA ER G57 and the reasonable requirements of the land owner and/or occupier of the land. Field drains, fences, walls and gates disturbed or dismantled during the progress of the Works will be promptly reinstated).

Other private land: Cables in private land not specifically referred to in any other clause shall be installed having due regard to the use of the land and the reasonable requirements of the owner and /or occupier. Appropriate measures, including the provision of route marker posts, shall be taken to avoid, as far as reasonably practical, the incidence of danger or damage arising from third party activities during the life of the installation. All features of the landscape disturbed or dismantled during the progress of the Works shall be reinstated to the standard specified by the Engineer.

### 5.4.2 Longitudinal Position

Cables shall be installed, as far as reasonably practical, having regard to the recommendations contained in NJUG 7.

Installations shall comply with these recommendations for at least 90% of the proposed route. Where this is clearly impractical, the details of the proposed route shall be submitted to Electricity North West for Approval.

### 5.4.3 Three Phase Groups of Single Core Cables

The disposition of three phase groups of single core cables shall be such as to minimise the losses due to out of balance and circulating currents, subject to the overriding criteria specified in ENA ER C55. It is recommended that cables are laid in triplexed formation. If laid in trefoil they shall be bound together with cable ties at intervals not exceeding one metre.

### 5.4.4 Earthing of Cable Installations

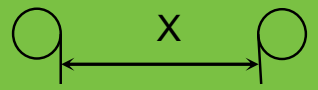
The earthing of cable installations shall have regard to the requirements of ENA ER C55, and to Electricity North West EPD332.

Where three phase groups of single core cables cannot be laid in trefoil formation as described in Section 5.4.3, then single point bonding shall be used on the circuit with the sheath bonded to earth at one end only as described in ENA ER C55. However, consideration must be given for very long circuit lengths to ensure any induced voltage in the cable screens will not exceed 65volts.

### 5.4.5 Spacing Between Cables in Multiple Runs

Unless otherwise specified or approved the spacing between cables in multiple runs shall be as shown in [Table 3.1](#). This applies to both new installations and where additional cables are being installed into an established route. The separation specified below is required in order to exploit maximum circuit rating and also to minimise the possibility of physical damage during any subsequent excavations in the vicinity of the cables.

**Table 3.1 – Spacing Between Cables in Multiple Runs, whether Laid Direct or Laid in Ducts**

SYSTEM		DISTANCE (X)
LV		0.15 m (± 10%)
6.6/11kV		0.23 m (± 10%)

This applies to all 3 and 4 core cables, triplexed cables and single core cables laid in trefoil formation. It does

not apply where three single core cables are laid in other formations, such as flat. In such cases the spacing will be specifically designed to provide the desired circuit rating and for the control of circulating currents.

Where it is not possible to achieve the spacing set out above due to there being insufficient room, reduced spacing can be adopted but a de-rating factor must be applied to both cables as set out in [Table 3.2](#). In such circumstances the actual spacing achieved shall place each cable equidistant from each other and from any other buried object or utilities' equipment. The de-rating is applied based upon spacing and is applied in addition to any other de-rating factor such as installation in ducts.

**Table 3.2 – De-rating Factor to be Applied Where Spacing in Table 3.1 Cannot be Achieved**

SYSTEM		2 CIRCUITS SIDE BY SIDE		4 CIRCUITS PLACED 2 ON 2
LV		10%		15%
6.6/11kV		10%		15%

## 5.5 Installation – Site Works

The Installer shall use the most cost-effective method for installing the cables.

### 5.5.1 Trenchless Methods

In the interests of public relations, productivity and reduced congestion, Installers shall have regard to the benefits of trenchless methods of installation in making their assessment of cost effectiveness.

Installers using this method of installation shall have due regard for all other services in the region of the works and shall carry out a full risk assessment before using this method.

Installers are reminded that the requirements of the Electricity Safety, Quality and Continuity Regulations for marking of cables apply to all installed cables. Cables installed by trenchless methods in a duct which is compliant with ES400E4 (see [5.5.2](#) below) are deemed by Electricity North West to satisfy the requirement of the Electricity Safety, Quality and Continuity Regulations, i.e. the markings at manufacture of the duct satisfy the requirements of the Electricity Safety, Quality and Continuity Regulations as long as the duct installed complies with the requirements of ES400D4.

### 5.5.2 Pulling in Methods

The Installer shall place the cable into position in a manner which complies with the installation criteria specified by the manufacturer, a copy of which shall be available for inspection by Electricity North West. The maximum value of any pulling tension applied mechanically throughout the pulling operation shall not exceed the value recommended by the manufacturer and shall be indicated automatically throughout pulling operations.

### 5.5.3 Installation in Low Temperatures

When working in conditions where the ambient temperature of either the working area or the cable storage area have been below 1°C at any time in the previous 24 hours, the Installer shall pull the cable into position having regard to the recommendations of the manufacturer as to installation in low temperature, a copy of which shall be available for inspection by Electricity North West.

## 5.5.4 Protection and Warning Devices

Protective and warning devices shall be installed not more than 100mm above each cable. These devices shall comply with [Table 4](#). Table 4 – Protection and Warning Devices

SYSTEM	ENVIRONMENT	DEVICE	SPECIFICATION
LV & 6.6/11kV	Trenched	Warning Tape	ES400TC1
LV & 6.6/11kV	Trenchless	Duct	ES400D4

**NOTE:** If cable ducting is laid in open trenches warning tape shall be installed at 100mm above the cable ducting.

## 5.5.5 Cutting and Capping of Cables

At every position where a cable is cut by the Installer, it shall be capped in an Approved manner according to Electricity North West's policy EPD201. This includes capping cable drum ends to prevent moisture ingress.

## 5.5.6 Preparation for Jointing and Terminating Cables

### 5.5.6.1 Specification for Working Areas such as Joint Bays and Terminating Positions

At all positions in which the jointing or terminating of cables is to be carried out, a working area shall be positioned, provided and maintained in such a way as to provide the jointer with an adequate, clean, safe working environment (for example, adequate lighting shall be provided), as far as reasonably practical free from the prospect of flooding. Where the Installer of the cable is not the Installer of the cable joints or terminations, such facilities for the cable jointer shall be agreed between the two parties.

In all cases, special care shall be taken when jointing any cables to keep the jointing area free from any, dirt, contamination, etc.

The minimum dimensions and construction features of joint bays are dictated by the specific requirements of the jointing to be carried out, but for purpose of tendering, the following guidance can be used.

The nominal dimensions shown in [Table 5](#) shall be used, together with the standard nominal laying depths ([Table 2](#)). A sufficient depth shall be dug to allow adequate space below the cable for jointing and shell closure (typically 300mm). Note that work will be requested on the basis of joint bays (i.e. JB1, JB2 etc), and that payment will not be scaled to allow for sizes different to nominal sizes.

**Table 5 – Nominal Dimensions of Joint Bays**

ITEM	SYSTEM VOLTAGE	NOMINAL DIMENSIONS <sup>1</sup>	
		Length (m)	Width (m)
JB1	LV	0.7	0.6
JB2		1.4	0.8
JB3		1.6	0.9
JB11A to JB11C	6.6 / 11 kV	Refer to <a href="#">Appendix C</a>	

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**Notes:**

<sup>1</sup> All joint bays shall accommodate the appropriate joint shells to be used for the works. Sample shells for Electricity North West jointing system (as defined in CP411Pt1(LV) and Pt2(HV)) will be available on request.

Where the joint hole is difficult to access, dig steps or a gradual slope into one face of it to provide a safe means access and exit, and ensure this is only method used.

Where water persists to enter the working area, dig a sump hole in the lowest corner to enable the water to be bailed or pumped out at intervals.

All cables to be jointed shall be positioned substantially straight and level, and adequately supported from the floor of the joint bay to support the weight of the joint.

All cables to be terminated shall be positioned substantially in line with the terminals of the designated apparatus, and supported by fireproof cleats, or a cable guard, or a combination of these methods if necessary.

### 5.5.6.2 Jointing Allowances

At every position where a cable is to be jointed or terminated, the Installer shall install an additional length of undamaged cable measuring beyond the centre line of the proposed joint or extremity of the proposed termination as shown in [Table 6](#).

**Table 6 – Jointing Allowances**

SYSTEM	ADDITIONAL LENGTH
LV & 6.6/11kV	0.5m + 0.075m

Installers should note that for costing purposes this additional length may be included in the cable allocated to the Works, but it will not be included in the measurement of the length installed.

### 5.5.6.3 LV Terminations into LV Fuseboards and Cabinets

Care shall be taken for LV terminations into LV fuseboards and cabinets to allow the future provision of data loggers. The spread of the cores shall be enough for a c.t. from a data logger to be installed on all phases. The minimum distance between cores shall be 25mm at a distance of 100mm from the crutch of the cores.

### 5.5.7 Cables Above Ground

The Installer shall provide all such cables with mechanical protection as specified in [Table 7](#).

**Table 7 – Mechanical Protection for Above-Ground-Cables**

ENVIRONMENT	DEVICE	SPECIFICATION
Inside Electricity North West’s fence	None	N/A
Outside Electricity North West’s fence	Cable guard (1)	ES400G1

A cable guard fitted to an overhead line pole or structure shall extend continuously from a point 0.3m below normal ground line to a point 0.025m above the top of any anti climbing device fitted. A cable guard fitted to any other structure shall extend continuously from a point 0.3m below normal ground line, or from ground line if a made up surface (e.g. concreted or paved), to a point 3m above normal ground line or immediately below any terminating apparatus, whichever is less.

### 5.5.8 Cables in Ducts

All ducts in which cables are to be installed shall be smooth walled and comply with the requirements of ES400D4.

Appropriate allowances shall be made for any cable that is to be installed in a duct or pipe. Where Electricity North West has not specified the installation of the cable in a duct or pipe, the Installer shall demonstrate to the satisfaction of Electricity North West that the designated rated current may be achieved along the length of the duct or pipe run.

### 5.5.9 Multi-Cable Runs – Buildings/Tunnels

Where more than one cable are installed in a building exceeding 5 metres in length; all cables shall be protected from the spread of fire by using propriety fire retardant coating or covering.

## 6 Technical Particulars for Cable Joints and Terminations

### 6.1 Scope

This section refers to the jointing and terminating of Solid type LV and 6.6/11kV cables, whether placed underground, in air or in ducts.

### 6.2 Specification

All joints and terminations shall be of an approved type and installed in such a manner so that the designated fault level, rated current and operational life is achievable between the designated nodes on the System. Approved joints are detailed in CP411Pt1 and CP411Pt2. Cable joints not listed in CP411 shall not be used without written consent of the Engineer.

### 6.3 Type Approval and Installation Procedure

All joints and terminations shall conform to the requirements of the appropriate standards as defined in [Appendix A](#)

All joints and terminations shall be installed in accordance with the procedures detailed in CP411Pt1 (LV) and CP411Pt2 (HV)



All joints and terminations installed shall conform to an appropriate configuration as listed in CP411.

## 7 Technical Particulars for Repairs to Cable Systems

### 7.1 Scope

This section refers to the repair of Electricity North West's cable systems operating at LV and 6.6/11kV, whether placed underground, in air or in ducts.

### 7.2 General

All repairs shall be of a type and installed in such a manner so that the designated fault level, current rating and operational life is achievable between the designated nodes on the System.

All repairs shall be carried out in such a way as to satisfy the requirements of Sections 1 to 6, & 8 of this Specification.

All repairs shall be carried out having regard to the operational procedures and other requirements of Electricity North West Codes of Practice 606, Sections B and G, with the exception that references to Electricity North West Code of Practice 411 shall be deemed to include the Specification for joints and terminations approved under [Section 6.3](#) of this Specification.

### 7.3 Repairs on LV Cable Systems

#### 7.3.1 Specification

##### 7.3.1.1 Repair Work

On receipt of Permission from Electricity North West's Authorised Person to commence work, the cable in question shall be exposed at the point specified, then restored to operational condition in accordance with methods and requirements of [Sections 5 & 6](#) of this Specification.

##### 7.3.1.2 Handover

On completion of the work, the Working Party shall be withdrawn from the working area, and the Electricity North West Authorised Person informed immediately.

### 7.4 Repairs on 6.6/11kV Cable Systems

#### 7.4.1 Specification

##### 7.4.1.1 Repair Work

On receipt of Permission from Electricity North West's Senior Authorised Person to commence work, a Permit To Work shall be received, the cable in question shall be exposed at the point specified, then restored to operational condition in accordance with methods and requirements of [Sections 5 & 6](#) of this Specification.

##### 7.4.1.2 Handover

On completion of the work, the Working Party shall be withdrawn from the working area, the Electricity North West's Senior Authorised Person shall be informed immediately, and the Permit to Work shall be cancelled by the Electricity North West's Senior Authorised Person.



## 8 Technical Particulars for Restoring Excavated Areas

### 8.1 Scope

This section applies to the restoration of any excavated area, wherever it is situated, and for whatever purpose it was excavated.

### 8.2 Compliance with the New Roads and Streetworks Act

Excavations shall meet the full requirements of the New Roads and Streetworks Act, including signing, lighting and guarding.

### 8.3 Materials Surrounding Cables

All such materials shall conform to the requirements of Electricity North West Specification ES400R5.

Unless otherwise approved, cement bound materials including foamed concrete shall not be used as a material for surrounding cables.

No work associated with either excavation or backfilling shall take place in the proximity of a recently made cable joint until any resin comprising part of the joint has cured to the stage where it is solid to the touch. This initial amount of curing is necessary to prevent the moisture seals in the joint from being disrupted by mechanical interference.

On completion of the works no energised cable or cable joint shall be left exposed.

### 8.4 Excavations/Reinstatement in Streets

#### 8.4.1 Specification

All such excavations shall be reinstated in accordance with the requirements of the Code of Practice "Specification for the Reinstatement of Openings in Highways" issued by the Department of Transport.

Surround material as specified in [8.3](#) shall be used above, below and around the cables/ducts prior to backfilling around the cable and other apparatus installed in open trenches. The minimum thickness of surround material above the cable/ducting is specified in [Table 8](#).

**Table 8 – Placing of Surround Material**

SYSTEM	THICKNESS	TOLERANCE
LV	100mm	± 10%
6.6/11kV	100mm	± 10%

#### 8.4.2 Acceptance Tests, Requirements and Default Procedure

As required by the Specification referred to in [8.4.1](#) above.

## 8.5 Excavation Not in Streets

### 8.5.1 Specification

All such excavations shall be reinstated in accordance with the requirements of the Specification agreed between Electricity North West and the land owner or their agent, subject to an overall requirement, unless otherwise agreed, that the standard to be achieved shall not generally exceed that existing prior to excavation.

Surround material as specified in [8.3](#) above shall be used to a thickness as stated in [Table 8](#) above the cable prior to backfilling around the cable and other apparatus installed in open trenches. Where circumstances make it necessary, surround material as specified in [8.3](#) shall be used as bedding for cables.

## 9 Documents Referenced

All references to documents listed below are to the latest versions, unless stated otherwise.

DOCUMENTS REFERENCED	
Health and Safety at Work Etc Act.	
The Electricity Safety, Quality and Continuity Regulations	
Control of Substances Hazardous to Health Regulations 2002	
New Roads and Streetworks Act (including Codes of Practice and Specifications)	
NJUG 7:	Recommended Positioning of Utilities' Mains and Plant for New Works.
BS EN ISO 9000:	Quality management systems.
ENA ER C55	Engineering Recommendation: 'Insulated Sheath Power Cable Systems'
ENA ER C81	Engineering Recommendation.
ENA ER C90	Engineering Recommendation.
ENA TS 12-24:	Plastic Ducts for Buried Electric Cables.
Electricity North West Distribution Safety Rules.	
EPD201:	Redundant Assets.
EPD332:	Customer System Earthing.

<b>CP319:</b>	Applied High Voltage Tests.
<b>CP402</b>	New Roads and Street Works Act
<b>CP404:</b>	Standard Mains Records.
<b>CP410:</b>	Underground Cable Systems.
<b>CP411 Part 1:</b>	Cable Jointing up to and including 1000V.
<b>CP411 Part 2:</b>	6.6/11 kV Cable Jointing.
<b>CP605:</b>	System Operations.
<b>CP606:</b>	Operations Manual (HV).
<b>ES400C8:</b>	LV Service Cables.
<b>ES400C9:</b>	11kV Distribution Cables.
<b>ES400C11:</b>	Low Voltage Mains Cables.
<b>ES400D4:</b>	Specification for Duct.
<b>ES400G1:</b>	Specification for Cable Guard.
<b>ES400J3:</b>	Specification for Low Voltage Cable Joint Shells.
<b>ES400J4</b>	Specification for Low Voltage Cable Joint Connectors
<b>ES400R5:</b>	Specification of Reinstatement Materials.
<b>ES400R10</b>	Specification for Resin Compound used for encapsulation of cable joints up to 33kV

## 10 Keywords

The following keywords (listed in alphabetical order) and keyword combinations appear in this document:

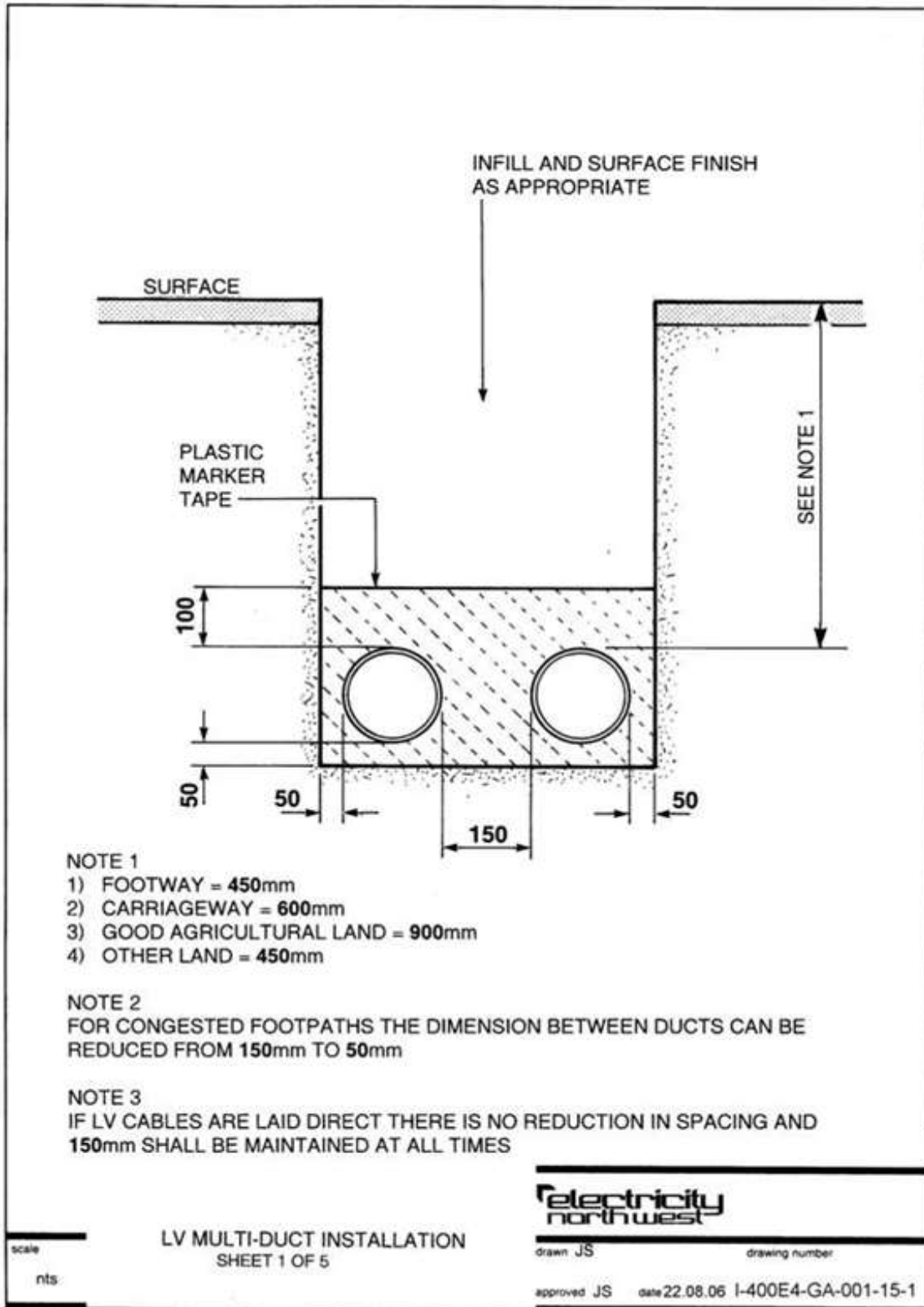
LV: 6.6kV; 11kV; Cable; Jointing; Mains; NRSWA; Termination; Underground.

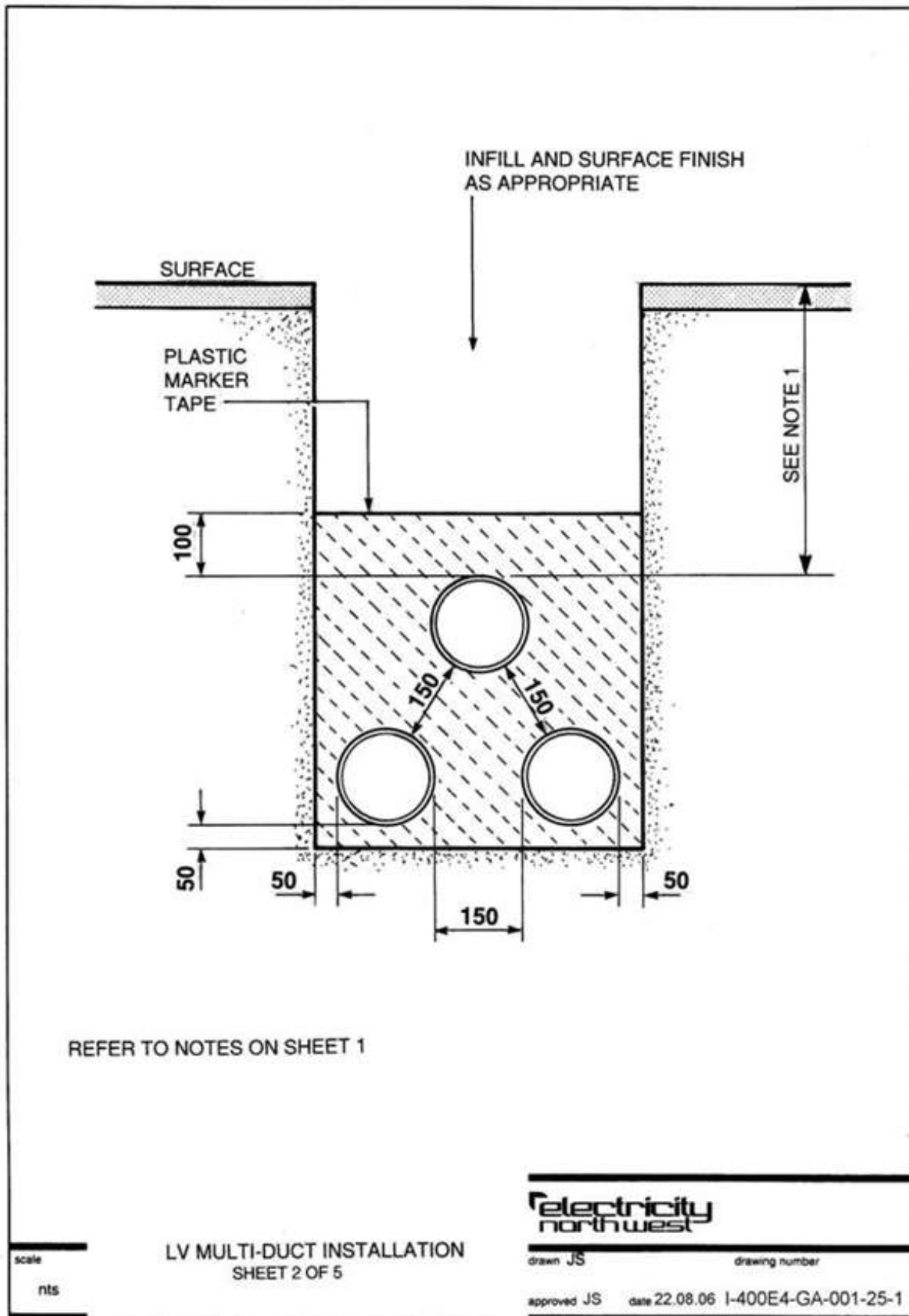
## Appendix A – Specification of Approved Cables and Accessories

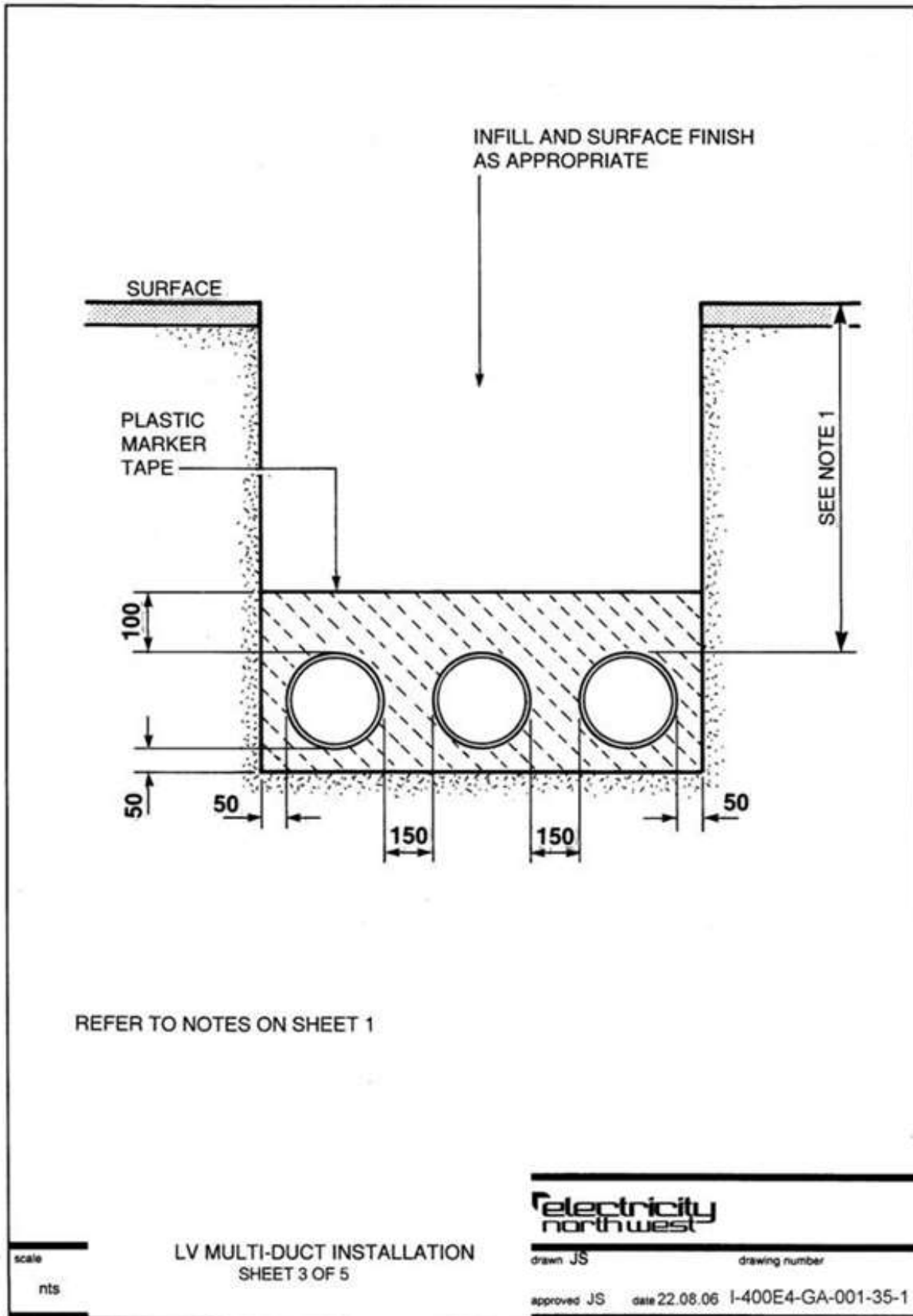
CABLE TYPE	ELECTRICITY NORTH WEST DOCUMENT REF
Low Voltage Service Cables	ES400C8 and CP410
Low Voltage Mains Cables	ES400C11 and CP410
11kV Distribution Cables	ES400C9 and CP410
1kV Cable Joints and Terminations	ES400J3 & ES400J4
11kV Cable Joints & Terminations	ES400J11
Resin Compound for the encapsulation of cable joints	ES400R10

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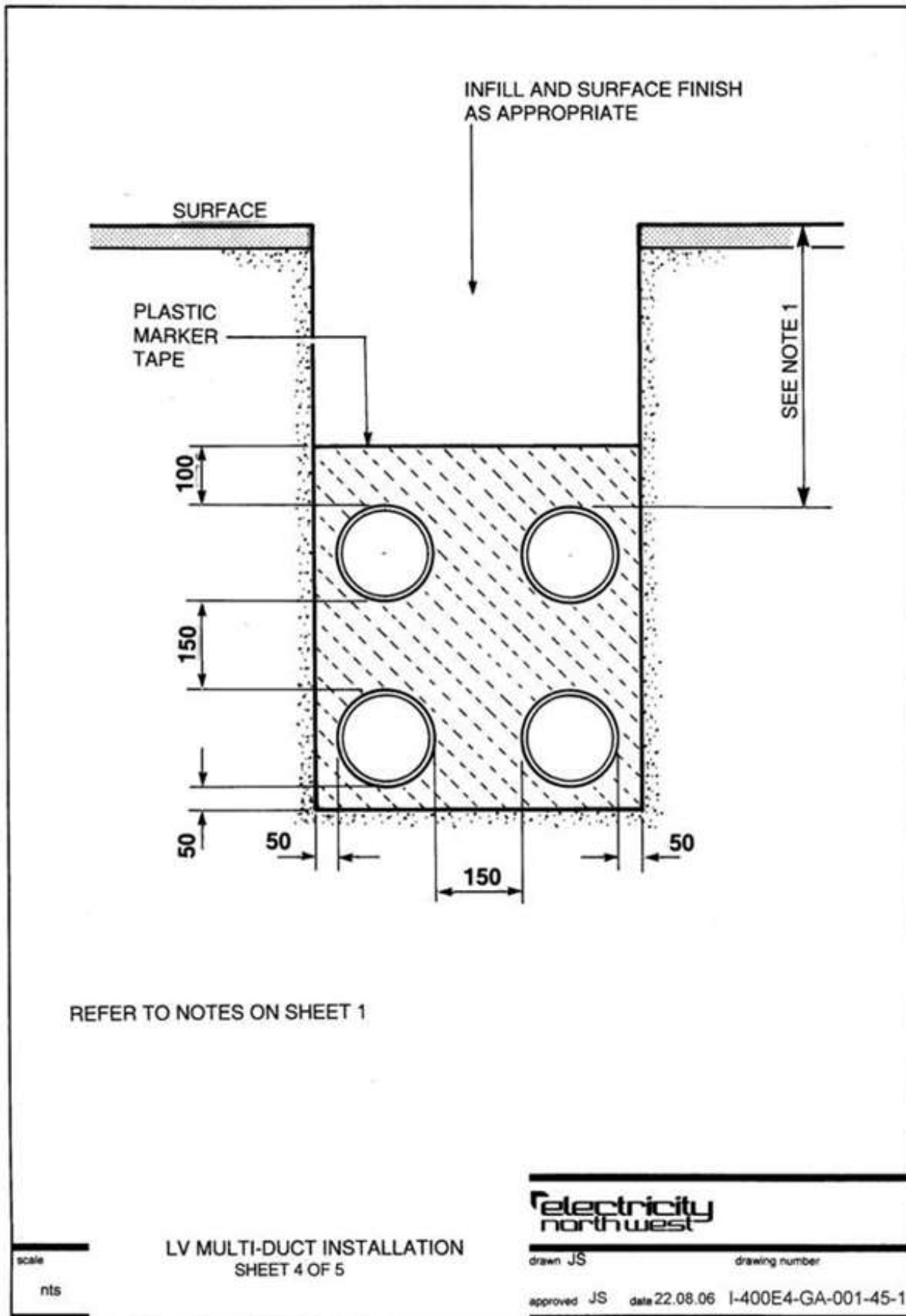
## Appendix B – Depth of Cable Laying Drawings



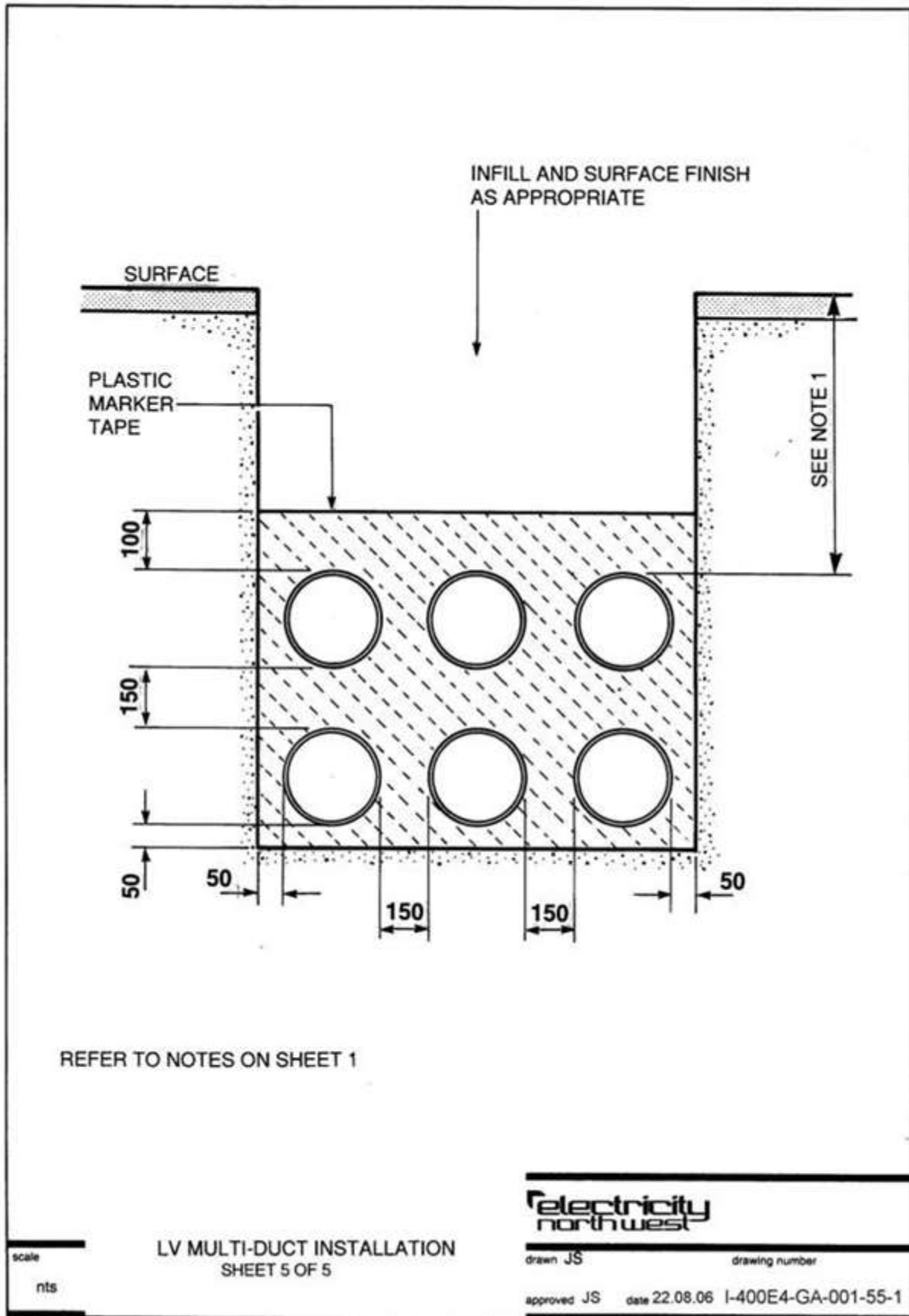












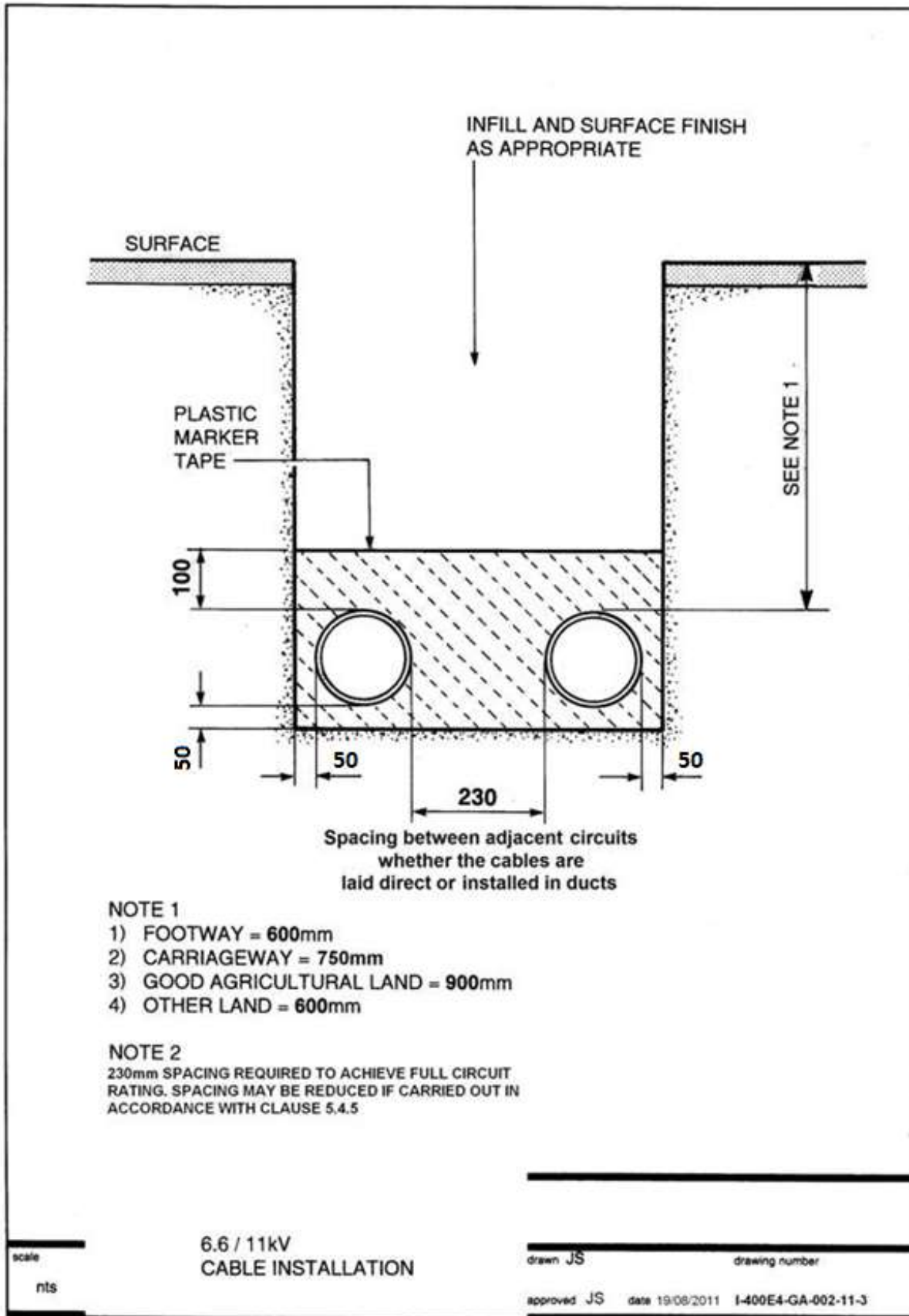
scale  
nts

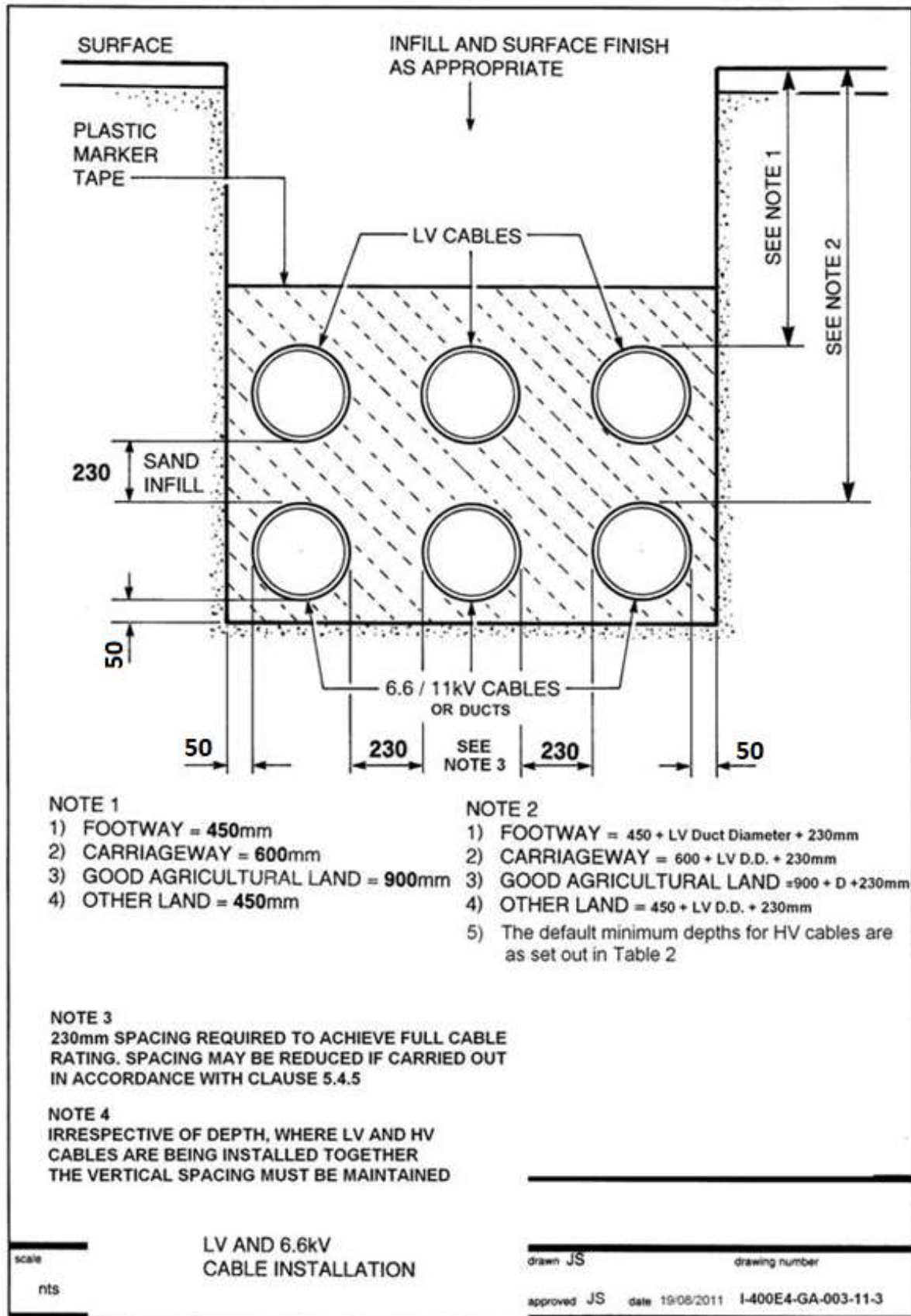
LV MULTI-DUCT INSTALLATION  
SHEET 5 OF 5

**electricity north west**

drawn JS drawing number

approved JS date 22.08.06 I-400E4-GA-001-55-1





## Appendix C – 6.6kV / 11kV Joint Bay Dimensions

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ENWL Commodity Code of Joint Kit	Joint Type	Joint Type	Joint Bay Size	
			Length "A" mm	Width "B" mm
366000	1Core Polymeric Straight	<b>JB11A</b> 1C Poly Straight and Stop End, 1C Branch and Loops	2400	1600
366041				
366001				
366058				
366003				
366004	1Core Polmeric Stop End	<b>JB11B</b> Trifurcating Straight, Branch and Loop / Paper Stop end	3900	1300
366023				
366024				
366032				
366033				
366008	Transition Straight	<b>JB11C</b> Paper Straight and Derated Joints	4200	1400
366005				
366006				
366003				
366004				
366025	3C-1C TTR Branch	Paper Straight and Derated Triff "H" Type	4200	1400
366026				
366027				
366048	3C-1C TTR Loop	Paper Straight and Derated Triff	4200	1400
366032				
366033	3C paper Straight	Paper Straight and Derated Triff	4200	1400
366008				
366056	Derated Triff "H" Type	Paper Straight and Derated Joints	4200	1400
366063	Derated Triff	Paper Straight and Derated Joints	4200	1400

**6.6 / 11kV Cable Joint Bay  
Guidance for minimum dimensions**

## Appendix D – Conformance Declaration

### SECTION-BY-SECTION CONFORMANCE WITH SPECIFICATION

The Tenderer shall declare conformance or otherwise for each product/service or range of products/services, section-by-section, using the following Conformance Declaration Codes.

#### Conformance Declaration Codes:

<b>N/A =</b>	Clause is not applicable/appropriate to the product/service.
<b>C1 =</b>	The product/service conforms fully with the requirements of this clause.
<b>C2 =</b>	The product/service conforms partially with the requirements of this clause.
<b>C3 =</b>	The product/service does not conform to the requirements of this clause.
<b>C4 =</b>	The product/service does not currently conform to the requirements of this clause, but the manufacturer proposes to modify and test the product in order to conform.

**Manufacturer:**

**Product/Service Description:**

**Product/Service Reference:**

**Name:**

**Company:**

**Signature:**



**SECTION-BY-SECTION CONFORMANCE**

Section	Section Topic	Conformance Declaration Code	Remarks * (must be completed if code is not C1)
4.1	General		
4.2	Third Party Certification		
4.3	Installers' own Codes of Practice to be available		
4.4	As Constructed Records		
4.5	Confirmation of Conformance		
5.2	General		
5.3.1	Specification for Cables		
5.3.2	Approved Supplier		
5.3.3	Minimum Bending Radii/Maximum Pulling Tensions		
5.4.1	Depth of Newly Installed Cables and Joints		
5.4.2	Longitudinal Position		
5.4.3	Three Phase Groups of Single Core Cables		
5.4.4	Earthing of Cable Installations		
5.4.5	Spacing between Cables in Multiple Runs		
5.5	Installation – Site Works		
5.5.1	Trenchless Methods		
5.5.2	Pulling in Methods		
5.5.3	Installation in Low Temperatures		
5.5.4	Protection and Warning Devices		
5.5.5	Cutting and Capping of Cables		

5.5.6.1	Specification for Working Areas such as Joint Bays and Terminating Positions		
5.5.6.2	Jointing Allowance		
5.5.6.3	LV Terminations into LV Fuseboards and Cabinets		
5.5.7	Cables above Ground		
5.5.8	Cables in Ducts		
5.5.9	Multi-Cable Runs – Buildings/Tunnels		
6.2	Specification		
6.3	Type Approval and Installation Procedure		
7.2	General		
7.3.1.1	Repair Work		
7.3.1.2	Handover		
7.4.1.1	Repair Work		
7.4.1.2	Handover		
8.2	Compliance with the New Roads and Streetworks Act		
8.3	Materials Surrounding Cables		
8.4.1	Specification		
8.4.2	Acceptance Tests, Requirements and Default Procedure		
8.5.1	Specification		

\* Applicable specifications shall be stated in the Remarks column where alternatives are quoted within a section. The Remarks column shall also be used to indicate cases where the products or services exceed the quoted specifications.

Additional Notes: