

## Underground Construction

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## 1. **SCOPE**

This Work Category Specification (WCS) documents the *Service* requirements for the construction of underground electricity reticulation infrastructure that is to be incorporated into the Energex distribution network for voltages up to 33 kV.

### 1.1 **GENERAL**

- (a) As part of and in conjunction with this WCS, read WCS133 for the general standards and conditions that are relevant to, and are incorporated into this category of work.
- (b) As part of and in conjunction with this WCS, read WCS31 for the requirements to *Commission*, operate and access the network.
- (c) For the avoidance of doubt, a breach of a general standard or condition contained in WCS133, and the requirements and conditions of WCS31 is a breach of WCS2.

### 1.2 **APPLICATION**

The application of *Services* includes, but is not limited to, the following functions:

- (a) The installation and construction of the underground electricity distribution network infrastructure up to 33 kV in both urban and rural locations.
- (b) The installation of underground cables and associated assets up to and including pole terminations and associated cable support and protection equipment.
- (c) Underground cable jointing and terminations.
- (d) Civil works including *Reinstatement*. \*<sup>1</sup>
- (e) The installation of *Conduits*, earth pits\*, pit\* and supply pillars.
- (f) Cable installation (hauling into trenches and Conduits / Pipe).
- (g) Installation of padmount and ground mounted transformer substations and other associated ground mounted plant.
- (h) Testing of pre-*Commissioning* work.

## 2. **AMENDMENT RECORD**

Version	Change
15	<ul style="list-style-type: none"><li>• x.</li><li>• x</li><li>•</li></ul>

\*<sup>1</sup> Construct and install civil work components in accordance with WCS61.

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### 3. AIMS / OBJECTIVES

The aim of this WCS is to ensure:

- (a) The overall aims and objectives detailed in WCS133, Section 3 - Aims and Objectives, are met by the application of procedures herein.
- (b) The additional category of work specific aims and objectives below are met:
  - (i) Underground network and Energex assets are constructed and installed consistent with *Construction Standard* and switching / *Commissioning* methodologies.

### 4. COMPETENCIES, TRAINING AND QUALIFICATIONS

- (a) *Service Providers / Operators / subcontractors* performing *Services* are suitable licensed and trained in accordance with WCS133, Section 4 - Competencies, Training and Qualifications.
- (b) For competencies, training and qualification requirements specific to this category of work refer to the below included references and clauses.

#### 4.1 JOINTING AND TERMINATING UNDERGROUND CABLE

In addition to the core competencies listed in [Table 1](#), *Operators* undertaking cable jointing and termination tasks associated with the *Services* will be required to undertake practical training and assessment that is satisfactory to the electricity supply industry as deemed necessary by Energex.

#### 4.2 ENERGEX COMPETENCIES

[Table 1](#) specifies the Energex Competencies / *Authorisations* (or combination thereof) that are Energex requirements to be held by *Operators*.

**Table 1 - Operator Competencies**

CAMS Code	Competency Description	Operator Requirements
<i>Operators</i> hold the following competencies:		
A CONN	Testing Connections to LV Distribution Network	R
A HVT1	Test HV UG Cable L1	AR
A HVT2	Test HV UG Cable L2	AR
A IWG	Individual Work Group ( <a href="#">Note 2</a> )	R
A LVSO	Low Voltage Switching Operator	MO ( <a href="#">Note 3</a> )
A OILS	Oil Spill Management ( <a href="#">Note 1</a> )	MO
A SOIL	Sediment Control Awareness ( <a href="#">Note 1</a> )	MO
A SR	Switching Recipient	MO
A VIRO	Gen. Environment Awareness ( <a href="#">Note 1</a> )	R
A WEED	Declared Plants Management Awareness ( <a href="#">Note 1</a> )	MO
U EO	Electricity Officer	AR
U GCI	Generic Contractor Induction	R
U OHAW	Overhead Safety Awareness	R
U SSAW	Substation Safety Awareness	R

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U UGAW	Underground Awareness	R
	Authorised Person (as defined in Electricity Safety Regulation 2013)	R
	Excavation Plant ( <a href="#">Note 4</a> )	AR

Legend:

R Required.

AR As required.

MO A minimum of one person on *Worksite* holds this competency.

**Note 1:** *Service Providers* with their own environmental training system equivalent as a minimum to the Energex environmental training system; may train and assess their own *Operators* as competent.

**Note 2:** *Secondary Operators* not undertaking core works, for example plant *Operators* do not require this competency.

**Note 3:** Minimum requirement is one *Operator* with A LVSO *Authorisation* assisted at all times by a competent assistant as defined in Manual 00301.

**Note 4:** *Operators* are to be trained and assessed as competent by a Registered Training Organisation (RTO) with appropriate scope for the plant being operated, and hold a current 'Statement of Attainment' or 'Nationally Recognised Qualification'. Provide *Energex Officer* with a copy of current 'Statement of Attainment' or 'Nationally Recognised Qualification' for all *Operators* of excavation plant.

### 5. VEHICLES AND PLANT

For vehicles and plant requirements, refer to WCS133, Section 5 – Vehicles and Plant.

### 6. MATERIALS, TOOLS AND EQUIPMENT

- (a) For materials, tools, equipment requirements, refer to WCS133, Section 6 – Materials Tools and Equipment.
- (b) For materials, tools, equipment requirements specific to this category of work refer to the below included references and clauses.

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### 6.1 NOMINATED TOOLS AND EQUIPMENT

[Table 2](#) specifies the nominated materials, tools and equipment required when providing Services for this category of work.

**Table 2- Materials, Tools and Equipment**

Description	Supplier
Digital Low Impedance Volt Meters *	Service Provider
Phase Rotation Meters *	Service Provider
Loop Impedance Meters *	Service Provider
Low Voltage Proximity Testers *	Service Provider
Eye Protection	Service Provider
Correct Class of Insulating Gloves	Service Provider
Underground Pillar Spanners and Keys	Service Provider
Service Fuse Extractor	Service Provider
Insulated LV Link Stick	Service Provider
Pit Lid Lifting Key	Service Provider
Motor fuels, lubricants, hacksaw blades, solvents, abrasives, paint etc. as required.	Service Provider

\*Work Practice 1202 Specification.

## 7. SAFETY

For safety requirements, refer to WCS133, Section 7 – Safety.

## 8. ENVIRONMENT

For environmental requirements, refer to WCS133, Section 8 - Environment.

## 9. EXTENT OF WORK

### 9.1 GENERAL

- (a) For the general extent of work requirements, refer to WCS133, Section 9 – Extent of Work.
- (b) For extent of work requirements specific to this category of work refer to the below included references and clauses.
- (c) Provide Services in accordance with (but not limited to):
  - (i) Work Category Specification WCS2 – Underground Construction.
  - (ii) Work Category Specification WCS31 – Commissioning, Operating and Accessing the Network.
  - (iii) Work Category Specification WCS34 – Earthing Systems.
  - (iv) Work Category Specification WCS61 – Underground Civil Construction.

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- (v) Work Category Specification WCS61.1 – Underground Trenchless Technology.
- (vi) Work Category Specification WCS61.2 – Underground Reinforced Concrete Pits.
- (vii) Work Category Specification WCS133 – General Standards and Conditions.
- (viii) Energex Manual 00293 – Commercial and Industrial Substation Manual.
- (ix) Energex Manual 00297 – Network Labelling and Signage Manual.
- (x) Energex Manual 00305 – Underground Distribution Construction Manual.
- (xi) Energex Procedure 00914 – Copper Cable Recovery and Recycling.
- (xii) Energex Standard 00982 – Subdivision Standards Developer Design and Construct Estates.
- (xiii) Energex Form 1485 – Conduit Verification and Certification Sheet.
- (xiv) Energex Form 2121 – Safedig for Improved Power Supply We Upgrade Underground Installations (or *Service Provider* equivalent).
- (xv) Australian Standard AS/NZS 2053.1:2001 - Conduits and fittings for electrical installations - General requirements.
- (xvi) The requirements of the Energex approved *Work Plan* and associated drawings.
- (xvii) Current plans detailing existing underground essential services infrastructure in the immediate area and surrounding the *Worksite*.

### 9.2 CIVIL CONSTRUCTION CERTIFICATION

- (a) Where the civil infrastructure component is not being managed by Energex or certified by a *Service Provider* with a service agreement with Energex, the civil construction is to be certified by the Principal Contractor's or *Developer's* supervising Registered Professional Engineer Queensland (RPEQ) – Civil.
- (b) The RPEQ certifies that all civil construction *Services* have been constructed in strict accordance with:
  - (i) Energex's construction specification.
  - (ii) *Developer's* design drawings for the project.
  - (iii) WCS2.
  - (iv) WCS61.
  - (v) WCS61.1.
  - (vi) WCS61.2.
- (c) Issue the certification to the *Energex Officer* at hand over or before completion of works and *Commissioning* of the network whichever comes first.

### 9.3 PERSONAL PROTECTIVE EQUIPMENT

Ensure as a minimum, safe system of work is consistent with following while performing any live work or working in *Proximity* to exposed live parts of the Energex network:

- (a) Eye protection being worn.
- (b) Metallic framed spectacles not being worn.
- (c) Correct class of insulating gloves being worn when:
  - (i) Performing any live work or in *Proximity* to exposed live parts.
  - (ii) Working on or near any de-energised (dead), not electrically connected situation which may become energised due to error, accident or system failure
  - (iii) Performing any *HV* manual switching work.

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- (iv) Operating ground controlled plant (e.g. GP trucks) when the crane boom is in *Proximity* to exclusion zones.
- (d) Other than the situations outlined above; at all other times the wearing of insulating gloves is to be determined by the *Service Provider's* safe system of work and complied with.

### 9.4 NON-DAYLIGHT HOURS LIGHTING

During non-daylight hours utilising flood lighting; prevent excessive glare from flood lighting impacting on nearby vehicular and marine vessel traffic and or nearby residents and *Premises*.

### 9.5 ENTERING PUBLIC SEALED ROADS

Remove excess dirt, mud and sand from plant and vehicles before leave the *Site* and entering onto public sealed roads. No significant deposits of dirt, mud and sand left are to be left on sealed roadways.

### 9.6 SHORING, TRENCH LINING, BATTERING OR BENCHING EXCAVATIONS

- (a) Shoring, trench lining, battering or benching is to be established to prevent the collapse of excavation walls while providing *Services*. The construction of this infrastructure complies with *Laws* including all Australian Standards and State and Commonwealth Legislation relating to design, construction and installation of shoring, trench lining, battering or benching.
- (b) Shoring and trench lining systems and equipment supplied and utilised are to be designed and certified by a competent person (e.g. structural engineer and or geotechnical engineer).
- (c) Construction and removal of certified shoring, trench lining, battering or benching of excavations is to be undertaken by a minimum of two competent *Operators* who are qualified and trained to carry out this work.
- (d) While any work is progressing at the *Site* with open excavations, a minimum of one competent *Operator* who is qualified and trained to construct and remove shoring, trench lining, battering or benching is on *Site* to:
  - (i) Examine the excavation including batter or bench and installed shoring or trench lining each day, before *Operators* commence work.
  - (ii) Where deficiencies are detected in the excavation, shoring, trench lining, bench or batter, work in the excavation ceases immediately and *Operators* do not enter the excavation until rectification has been carried out.
  - (iii) Regular surveillance of the shoring, trench lining, batter, bench, sides and surrounding surfaces of an excavation is to occur while work is progressing to determine if any change in conditions has occurred. If any changed conditions are detected, the existing control measures to prevent the collapse should be assessed for their adequacy.

### 9.7 INSTALLATION OF CONDUITS AND PIPES

#### 9.7.1 Initial Installation

- (a) Install *Conduits / Pipes* and associated fittings and bends in accordance with AS/NZS 2053.1, and the construction drawings (*Work Plans*).
- (b) Confirmation by the *Energex Officer* or Project Manager / Design Consultant of any changes to the *Conduits / Pipes*:
  - (i) Class.
  - (ii) Alignment.
  - (iii) Configuration (e.g. trefoiled or flat lay).

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- (iv) Vary the length to overcome *Site* difficulties.
- (v) Require adjacent collars to be staggered.
- (vi) Spacers fitted to maintain the design layout.
- (c) *Conduit / Pipe* installed with depth of cover and clearances to sides of the trench in accordance with *Construction Standards* or project specific requirements issued by Energex, for example but not limited to bridge crossings installations.
- (d) The *Service Provider* ensures that during the laying:
  - (i) The *Conduit / Pipe* is grit free at the time of laying.
  - (ii) Measures are taken to prevent later contamination by sealing the ends by an approved method.
- (e) After installation, including trench backfill and compaction, clean and test each *Conduit / Pipe* section with a mandrel (100 mm length and eye spigot each end) sized 6 mm less than the *Conduit / Pipe* bore.
- (f) The *Conduit / Pipe* Installer is to replace or repair any defective *Conduit / Pipe* installations.
- (g) The *Service Provider* is to certify the *Conduits* they have installed have been tested and are suitable for cable installation. Use Form 1485 for this certification.
- (h) Install an Energex approved draw rope in each electrical *Conduit / Pipe* and reseal the ends; except *Conduit / Pipe* entering pit chamber of the pit and duct system.
- (i) The *Energex Officer* is to approve all non-standard *Conduit / Pipe* installations.
- (j) For critical / high risk *Conduit / Pipe* installations (e.g. installations under *Authority* infrastructure such as road and rail corridors) there may be an added requirement to confirm *Conduits / Pipes* suitable for cable installation by *CCTV* system inspection of internal bore that:
  - (i) Has a self-levelling colour camera that clearly identifies any surface deformation of the internal bore of electrical *Conduit / Pipe* installations (e.g. minimum aperture / FOV of F2.0 / 75°; with light sensitivity of 0.5 Lux and image resolution of  $\geq 540$  TVL).
  - (ii) Records video (e.g. AVI Video).
  - (iii) Captures still images (for example JPEG image).
  - (iv) Has zoom capability (to move in on areas of interest for closer inspection and image capture).
  - (v) Has a distance counter and imposed digital representation of distance appearing on all still images and recorded video.
  - (vi) Has a inbuilt sonde for positively locating the camera head.
  - (vii) Profiles the internal bore of *Conduit / Pipe* installations either by mechanical skids (typically 6 mm less in diameter than the internal bore of *Conduit / Pipe* installation) or wave frequency equipment (or equivalent).

### 9.7.2 Roadway Installations

Construct *Conduit / Pipe* installations across and along roadways; to prevent the crushing of installed *Conduits / Pipes* during the *Reinstatement* and compaction of the roadway sub-grade and base course material by ensuring:

- (a) *Conduit / Pipe* of sufficient class that will resist the compressive forces of material compaction (e.g. using 125 mm HD *Conduit* instead of 100 mm LD *Conduit*).
- (b) Bedding material around *Conduits / Pipes* compacted to the same field dry density as the sub-grade material above.
- (c) Use of cable protection cover over *Conduit / Pipe* bank that will distribute the loads applied from above sub-grade material installation and compaction.

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### 9.7.3 Apertures

- (a) Safely access all types of in-situ *Conduit / Pipe* in the existing Energex underground network by establishing an inspection window to determine content of the internal bore of in-situ *Conduit / Pipe* in first instance before any additional construction work, for example but not limited to, the removal of a section of the in-situ *Conduit / Pipe*.
- (b) **Do not use reciprocating and cut off saws under any circumstance to cut into in-situ *Conduit / Pipe* on the existing Energex underground network.**
- (c) When cutting apertures in PVC or polyethylene *Conduit / Pipe*:
  - (i) Only cut aperture (window) edges to sufficient depth to allow final removal of aperture (window) by lightly tapping out.
  - (ii) Fit all cutting devices used to cut an aperture in the wall of *Conduit / Pipe* (inspection window) with a depth control device to regulate the depth of any cut or penetration. The cutting tool or blade is not to penetrate through the internal surface of the *Conduit* wall.
  - (iii) Prior to using any cutting device to form an aperture in the *Conduit / Pipe* (inspection window), *Operators* are to fully expose the *Conduit / Pipe* to determine the location of cable/s in relation to proposed aperture. (Note that cables may have a set in them and may not be laying in bottom of the *Conduit / Pipe* bore).

## 9.8 UNDERGROUND CABLE INSTALLATION

### 9.8.1 Initial Installation

- (a) The *Service Provider* is required to prepare for the installation of cables (unless directed otherwise) by:
  - (i) The placement of granular or fluidised thermal backfill bedding material (compact base layer) in the trench.
  - (ii) The setting up of cable installation plant and equipment.
- (b) The *Service Provider*:
  - (i) Plans the cable installation, and provides the *Energex Officer* with the cable tension pulling calculations for the proposed cable installation between each nominated entry and exit point.
  - (ii) Liaises with *Energex Officer* to ensure supplied cable lengths delivered on cable drums match the section length between joint locations for installation.
  - (iii) Liaises with *Energex Officer / Project Manager* to determine a suitable delivery time for cable drums.
  - (iv) Ensures cables to be installed lubricated, with approved lubricant applied to cable reducing frictional forces between cable and skid plate or *Conduit / Pipe* bore surfaces in accordance with the manufacturer's recommendations.
  - (v) Ensures that cables are installed at the correct depth, alignment and separation from other essential services (unless approved otherwise by the *Energex Officer*).
  - (vi) Utilises a controlled tensioning device during the hauling of cables to prevent damage to cable being installed by limiting actual hauling tension to the maximum allowable for the cable or a lesser tension so that the maximum allowable side-wall pressure (according to the manufacturers recommendations) is not exceeded. The controlled tensioning device is to record the actual hauling tension on the cable for the installation. (Provide the recorded data in a format that can be read by Energex, e.g. a graphical representation plotting time elapsed against hauling tension and cable length installed.)



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- (vii) Ensures *Operators* inspect cable as it comes off drum for signs of factory imperfections or damage and during the cable hauling for possible damage. Stop cable installation when damage is found, for *Energex Officer's* inspection.
- (c) *Operators* monitor cable for signs of cable damage during the cable hauling through contact with displaced cable rollers, snatch blocks, misaligned *Conduits / Pipes* and grit in trenches or *Conduits / Pipes*. Stop cable installation when damage is found, for *Site Supervisor's* inspection and where necessary for repairs to be made or identified for later action.
- (d) When cables are installed, position the ends in an elevated position.
- (e) Seal the cable ends with Energex approved seals, and inspect prior to and after installation of seals to confirm positive seal against contamination entry and where necessary reseal suspect ends.
- (f) Direct lay cable installation is a specialised class of work consisting of excavating and shoring of trenches (when required), hauling of cables into the open trench, backfilling around the cables with special Fluidised Thermal Backfill (FTB) [when required] followed by removal of shoring and general backfilling of trenches. This is followed by *Reinstatement* of the road surface to allow access to the area.
- (g) *Operators*, do not install cables into previously installed *Conduits / Pipe* (by others) until they have confirmed the *Conduits / Pipes* are on the correct alignment at the correct depth below final finished surface level and clear of any obstructions.

### 9.8.2 Setting Of Cables

- (a) Set cables traversing underground foundation areas at substations and up to cable terminations in place, such that there is minimum stress on the cable and the cables can be accessed with as little mechanical disturbance as possible. For substation foundation areas, there is the added consideration of the interrelation of the cables to provide for current and future congestion. Layouts are to consider the use of mechanical aids for the installation of future cables.
- (b) For both cable jointing and cable terminations, the setting of the cables will involve the careful planning of overall cable layout (considering future requirements), and the layout that provides as little mechanical stress on the cables as possible.
- (c) For cable termination on poles, there is the added consideration of possible vehicle impact damage and strain on the termination structure, position cables on pole away from the direction of traffic flow in the first instance. For poles and structures supporting the cable terminations, it is important to consider that the extent of excavation for cable installation does not detrimentally affect the pole or structure foundations.
- (d) For cable termination on poles care is to be taken to ensure that the minimum bending radius for the cable is not exceeded and that the clamps do not apply an excessive pressure to the cable sheath. The minimum cable bending radius will be specified by the manufacturer.

### 9.8.3 Abandoned Cables

Completely remove in-situ underground cables to be abandoned. Where complete removal is not practical, then correctly terminate and label the abandoned cable. Fully detail the abandoned cable on the 'As Constructed' drawings, and the reference is to remain on all network data records until the abandoned cable is removed completely.

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### 9.9 WORKING ON UNDERGROUND CABLES

#### 9.9.1 General

Ensure as a minimum, safe system of work is consistent with following when working on underground cables:

- (a) Isolate underground network in accordance with Manual 00301 and the SAHV - Queensland Electricity Entity Procedures for Safe Access to High Voltage Electrical Apparatus.
- (b) Positively identify target cable(s) prior to any work commencing on underground cables.
- (c) Completed cable jointing and termination and testing to approved Energex / manufacturer's instructions.

#### 9.9.2 Identifying Low Voltage or High Voltage Cables

- (a) Always identify and clearly mark underground cables before any attempt is made to work on identified target cables. Identify Low Voltage (LV) cables at all work positions by electrically tracing the cable using the signal injection method or other Energex approved methods.
- (b) **Only work on CONSAC cables de-energised. "Spike / cut" CONSAC cables** using a remotely activated cutting head to prove de-energised before they are accessed for further work.

#### 9.9.3 Terminating Cables

Install cable terminations to eliminate component failure or external mechanical interference. *Operators* are to ensure when terminating cables the following practices are adhered to:

- (a) Strict adherence to manufacturer's terminating instructions.
- (b) Appropriate tools and techniques used for stripping.
- (c) Working in a clean / dry environment with sufficient work space around the termination provided, so as to exclude contamination of jointing components, for example, heatshrink sleeves and tubes.
- (d) Correct use and selection of tools and equipment.
- (e) High quality and accurate workmanship applied.
- (f) Approved temporary earth continuity bond in place when required.
- (g) Correct heatshrink / coldshrink techniques ensuring lack of air voids and complete shrinkdown of components.
- (h) Correct application of jointing compounds.
- (i) Correct dies are used for crimping to match the conductor size.
- (j) Check phasing prior to connection.
- (k) Earthing of cable sheaths, undertaken in accordance with *Work Plan* and design standards.
- (l) Make plug-in terminations in a clean environment and wipe them down prior to connection to ensure no dust at the plug / socket interface.

Appropriate testing of all cables during preparation and after completion of termination of the cables.

#### 9.9.4 Jointing Cable

Install cable joints to eliminate component failure or external mechanical interference. *Operators*, ensure when jointing cables the following practices are adhered to:

- (a) Strict adherence to manufacturer's jointing instructions.

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- (b) Appropriate tools and techniques used for stripping.
- (c) Working in a clean / dry environment with sufficient work space around the joint provided, so as to exclude contamination of jointing components, for example, heatshrink sleeves and tubes.
- (d) Correct use and selection of jointing tools and equipment.
- (e) High quality and accurate workmanship applied.
- (f) Approved temporary earth continuity bond in place when required.
- (g) Correct heatshrink / coldshrink techniques ensuring lack of air voids and complete shrinkdown of components.
- (h) Correct application of jointing compounds.
- (i) Correct dies are used for crimping to match the conductor size.
- (j) Check phasing prior to connection.
- (k) Earth cable sheaths in accordance with *Work Plan* and design standards.
- (l) Make plug-in terminations in a clean environment and wipe them down prior to connection to ensure no dust at the plug / socket interface.
- (m) Appropriate testing of all cables during preparation and after completion of jointing of the cables.

### 9.9.5 End Cap Utilisation

Ensure heatshrink end caps encapsulate the ends of all cables at all times to prevent the ingress of moisture and other foreign material. (Fit all LV and HV cable ends with a heatshrink cap, which are not jointed or terminated immediately after installation and are left in an open trench or exposed to the elements.)

### 9.10 REMOVING TRANSFORMER FROM SITE

- (a) If a transformer has a PCB contamination level in the oil and or equipment above 50 ppm, the transformer is to be handled and transported in accordance with Australian Dangerous Goods Code.
- (b) Prior to commencement of construction, assess any transformer that will be removed as part of works for PCB contamination.

## 10. RECORDS

For records requirements, refer to WCS133, Section 10 - Records.

## 11. WORK VERIFICATION

- (a) For work verification requirements, refer to WCS133, Section 11 – Work Verification.
- (b) For work verification requirements specific to this category of work refer to the below included references and clauses:

### 11.1 SPECIFIC REQUIREMENTS

Provide Energex with the option of attending *Site* to witness testing of *Conduits / Pipes* and cables.

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### 12. GLOSSARY

- (a) For standard definition of words, acronyms and abbreviations used in this WCS, refer to WCS133, Section 12 - Glossary.
- (b) For addition definition of words, acronyms and abbreviations specific to this category of work, refer below.

Term	Definition
<b>CCTV</b>	Closed Circuit Television – a system that sends television signals to a limited number of screens.
<b>Consac</b>	A brand of low voltage underground cable characterised by an aluminium neutral sheath.
<b>Developer</b>	Any person, organisation or company which enters into an agreement with Energex, for supply of electricity to a subdivision, under the terms and conditions of the agreement.
<b>Reinstatement</b>	The backfilling, compaction and re-surfacing of open cut excavation in order to restore surface and underlying soil structure to enable it to perform its original function.

### 13. REFERENCES

- (a) For reference requirements, refer to WCS133, Section 13 - References.
- (b) For additional reference requirements specific to this category of work refer to Section 13 references and clauses below.

#### 13.1 AVAILABLE DOCUMENTS

Make available (at all times) to Infield *Operators*, the relevant documents / forms listed in [Table 3](#) below for verifying *Service* requirements.

**Table 3 – Available Documents**

Document Reference	Detail / Description
Work Category Specification WCS2	Underground Construction.
Work Category Specification WCS31	Commissioning, Operating and Accessing the Network.
Work Category Specification WCS34	Earthing Systems.
Energex Manual 00293	Commercial and Industrial Substation Manual.
Energex Manual 00297	Network Labelling and Signage Manual.
Energex Manual00305	Underground Distribution Construction Manual.
Energex Form 1485	Conduit Verification and Certification Sheet.
Energex Form 2121	Safedig for Improved Power Supply We Upgrade Underground Installations (or <i>Service Provider</i> equivalent).
	<i>Work Orders</i> detailing the <i>Services</i> to be performed.
	Energex approved <i>Work Plan</i> , construction drawings and associated drawings and instructions. ( <i>Worksite</i> specific and current amendment may be provided as part of the <i>Work Order</i> ).

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	Current plans detailing existing underground essential services infrastructure in the immediate area and surrounding the <i>Worksite</i> .
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### 13.2 RECOMMENDED DOCUMENTS

Refer [Table 4](#) below for the recommended documents that are of relevance.

#### 13.2.1 Energex Documents

**Table 4 – Energex Documents**

Document Reference	Detail / Description
Work Category Specification WCS2A	Assessment – Underground Construction.
Work Category Specification WCS 61	Underground Civil Construction.
Work Category Specification WCS61.1	Underground Trenchless Technology.
Work Category Specification WCS61.2	Underground Reinforced Concrete Pits.
Work Category Specification WCS133	General Standards and Conditions
Energex Manual 00302	Overhead Design Manual.
Energex Manual 00369	Pole Inspection Guidelines.
Energex Manual 00576	Public Lighting – Standard Conditions for Public Lighting Services.
Energex Manual 00796	Public Lighting Construction Manual.
Energex Procedure 00914	Copper Cable Recovery and Recycling.
Energex Standard 00982	Subdivision Standard Developer Design and Construct Estates.

#### 13.2.2 Queensland Acts and Regulations

- For Queensland Acts and Regulation requirements, refer to WCS133, Section 13.2.2 – Queensland Acts and Regulations.

#### 13.2.3 Australian Standards and Other Documents

- Australian Standard AS/NZS 2053.1:2001 - Conduits and fittings for electrical installations - General requirements
- Other relevant Australian Standards.

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