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**Discipline**

**Engineering Standard - NSW**

**Category**

**Electrical**

**Title**

**Cable Route Selection Guide**

**Reference Number**

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**Document Control**

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The technical content of this document has been approved by the relevant ARTC engineering authority and has also been endorsed by the ARTC Safety Committee.

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## **About This Standard**

This publication sets out the requirements for the selection of high voltage ac and 1500 volt dc cable routes.

This publication applies to outdoor and indoor situations, including tunnels and identifies those locations where cables shall not be located due to the unacceptable risk of damage to the cable or the potential to create a hazardous situation.

## Document History

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### List of Amendments –

ISSUE	DATE	CLAUSE	DESCRIPTION
1.1	05/01/2005		Reformatted to ARTC Standard
1.2	11/03/2005	Disclaimer	Minor editorial change

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## 1 Scope and Application

This publication sets out the requirements to be used for the selection of high voltage ac and 1500 volt dc cable routes.

This publication applies to outdoor and indoor situations, including tunnels and identifies those locations where cables shall not be located due to the unacceptable risk of damage to the cable or the potential to create a hazardous situation.

The requirements of this document shall be used for new work and for future relocation of existing cable routes.

## 2 References

C(b)2 1989	ESAA Guide to the Installation of Cables Underground.
PCS 02	Underground Cable Installation Configurations for High Voltage and 1500 Vdc Cables.
PDS 13	Above Ground Cable Installation Systems - Selection Guide.
SAA HB 29:2000	Communications Cabling Manual, Module 2:Communications Cabling Handbook.
SCP 21	Construction of Cable Routes and Associated Civil Works

## 3 Selection of Cable Route

When selecting a cable route priority shall be given to the cable security. The selected cable route shall not expose the cable to unnecessary risks, which could jeopardise the electrical system security and reliability.

The documents PCS 02 - Underground Cable Installation Configurations for High Voltage and 1500Vdc Cables, PDS 13 - Above Ground Cable Installation Systems- Selection Guide and unless otherwise specified the relevant clauses of sections 8, 9 and 19 of SCP 21 - Construction of Cable Routes and Associated Civil Works should be used when determining the cable route configuration.

## 4 Prior Considerations

The most economical route should be selected after considering the following factors:

- The minimum practical route length applicable.
- The location of existing and future supply points.
- Existing duct systems or tunnels.
- The present and future reinstatement costs for any underground section of the route and foreseeable future surface developments.
- Easements, rights of way and other forms of legal access.

- Corrosive situations (see Section 5).
- Electrolysis problems (see Section 6).
- Accessible joint locations (see Section 7).
- The location of known areas of termite infestations.
- The possible “joint use” of trenches by other utilities.
- The impact of the cable route configuration on cable size.
- Minimise the number of new under track crossings in the cable route.

## 5 Cable Corrosion Protection

When armoured or metal sheathed cables are laid directly in the ground it is desirable to avoid laying cables in:

- Made up ground containing ashes, slag, clinker or other corrosive environments.
- Heavily fertilised soils which may contain acidic salts (electrolytes and organic materials that promote bacterial activity).
- Ground moistened by sewage or chemical effluents.
- Peaty soils or decayed wood.

If cables are laid direct in the ground in such locations the cable armouring or metal sheath shall be protected from corrosion by a waterproof sheath or moisture barrier.

## 6 Electrolysis Protection

Care shall be taken to ensure that the proposed cable installation does not cause currents to stray into other underground services in such a manner as to cause corrosion of the other services.

Particular attention must be applied to the design of cable routes where the cables connect other supply authority systems to the ARTC system to avoid stray currents to external infrastructure.

Refer to RailCorp publication EP 12 30 00 01 SP – Electrolysis from Stray DC Current.

## 7 Cable Joint Location

The cable joint bays shall be positioned as to readily accommodate the jointing operation without compromising the cable installation system, the completed joint, the adjacent cable or the safety of the cable jointing personnel.

The joint bays shall not be located:

- Within or in the close proximity of road intersections.

- Beneath other utility services.
- In cable pits unless the cable pit has been purposely designed for the jointing of cables.
- At transitions between in ground and above ground installations.
- On transmission line poles.

## 8 Compliance with Regulations

Proposed cable routes shall be checked for compliance with the requirements of Statutory Authorities and other service utilities such as but not limited to electricity, water, gas, communications, environmental authorities and local government where applicable.

In areas where a number of bodies are concerned with the opening of roads or footpaths, the work should be coordinated.

Before commencing an excavation in a public place for the purpose of the proposed installation of an underground cable, appropriate advance notification should be given to the above listed bodies. Should the proposed route conflict with existing or proposed installations of any of these other bodies the ARTC or its contractors shall confer with those bodies and resolve any objections raised. For excavations in public thoroughfares the relevant traffic and transport authorities shall be contacted to ascertain any conditions or special requirements to prevent or minimise the disruption to traffic flow.

## 9 Situations where Cables must not be Installed

Cables must not be installed in the following situations.

- 1) In applications for which the cable has not been designed or approved by the cable manufacturer.
- 2) In situations where the cable may be easily subjected to mechanical damage by motor vehicles or plant.
- 3) In metallic troughing where :
  - the metallic troughing can cause transferred earth potentials under fault conditions.
  - the metallic troughing does not comply with electrolysis mitigation requirements.
  - an equipotential work area does not exist.

The metallic troughing must not enter the area of substation earth mats.

See PDS 13 "Above Ground Cable Installation Systems – Selection Guide" and SCP 21 – Construction of Cable Routes and Associated Civil Works" for all of the above conditions.

- 4) High voltage cables shall not share a common duct, trough or trench :
  - unless the cables are of the same circuit, or
  - unless the cables of different circuits are electrically and mechanically separated by a continuous rigid barrier.
  - unless the affects on cable rating are checked
- 5) Where the location of other utility services, underground obstructions, boilers or other sources of heat may effect the operation of the cable.
- 6) In locations where it would be necessary to bend the cable to a radius less than the minimum bending radius specified by the cable manufacturer, whether in its installed state or during installation.
- 7) In locations where the cable is likely to be struck by trains due to the operation of catch points and derailling equipment.
- 8) Near existing telecommunications cables containing electrically conductive elements, unless the cables are separated in accordance with the conditions prescribed in SAA HB 29:2000 - Communications Cabling Manual, Module 2: Communications Cabling Handbook.