

NP001.1

Design and Construction of Network Assets - General Requirements

This document is extracted from Network Policy NP 001, Design and Construction of Network Assets.

Other documents in this series include:

- NP001.2 General Specification for Underground Electrical Reticulation
- NP001.3 General Specification for Overhead Electrical Reticulation
- NP001.4 General Specification for Overhead Rural Residential Subdivisions
- NP001.5 General Specification for Overhead Commercial and Industrial Subdivisions
- NP001.6 General Specification for URD Subdivisions
- NP001.7 Reliability Criteria for Distribution Networks
- NP001.8 Handover Documentation
- NP001.9 Electricity Supply to Large Customers
- NP001.10 Documentation Requirements

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Further Information: For additional information or advice regarding this document, please contact the Manager Network Engineering on 1800 245 092

Authorised by	Prepared by:	Issue Date: Oct 2008	Status: Approved
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1. Contents

1.	Contents	2
2.	Introduction	2
3.	Further Information	3
4.	Definitions	3
5.	Customers In Urban Areas	6
6.	Customers In Rural Areas	10
7.	Miscellaneous	12
	Appendices	17

2. Introduction

This document has been prepared to set out the design and construction policy associated with the connection of new customers to the electricity network, including subdivisions. It also sets out the procedures associated with increases to the amount of supply required.

Connection of Serviced Lot

If the calculated maximum demand is such as to be likely to exceed a "basic" supply (see definitions), Power and Water must be contacted to ascertain the method and point of supply, and any charges applicable.

For installations requiring a *basic supply*, the electrical contractor shall lodge a "Notice of Intention to Carry out Installation Work" at the nearest Power and Water office, and obtain a "Point of Entry". The electrical contractor may then proceed with the wiring installation.

On completion of the wiring work, the electrical contractor must complete a "Certificate of Compliance" and submit it to the nearest Power and Water office. The contractor also needs to arrange with the nearest Customer Connection Officer for the service connection to be installed, for the installation of meters, and for the final connection to supply.

Before connection, the customer must complete an "Application for Supply" form, which establishes the customer's account details, and forms a binding contract between the customer and the customer's Retailer. There is usually a fee associated with this.

Connection of Unserviced Lot

For an 'unserved' lot, Power and Water will negotiate with the customer to extend the electricity network to the customer's lot. Refer to the *Distribution System Extension Policy* (Policy No. NP 004).

Increased Supply

Similarly, for a serviced lot where the customer requires an increased supply, Power and Water will negotiate with the customer to increase the capacity of the supply.

Lots with Overriding Statutory Charges

"*Overriding Statutory Charges*" are placed on lots that are serviced by an extension but do not take supply at the time. The OSC is payable prior to supply being connected or on transfer of title of the land. If no OSC amount is stated on the title, the amount is that published in the *Distribution System Extension Policy*.

Technical Requirements

Technical requirements for the provision of supply shall satisfy Power and Water's publications:

- Installation Rules
- Meter Manual
- Service Rules

Registered Electrical Contractors are issued with sets of these publications, which are also available on Power and Water's web site.

Contestability

Where it is a requirement that a developer or customer bear the full cost of any extension to the electricity network, the developer or customer may engage an accredited contractor to carry out the work. Where Power and Water contributes to the cost of the works, the Procurement Guidelines require that it undertakes or manages the works.

Accreditation of Designers and Contractors

It is a requirement that subdivisions and other developments be designed and constructed by accredited designers and contractors. Power and Water will check and approve designs, carry out quality assurance, and do a final inspection at no cost to the developer. Where the quality of workmanship is such as to require excessive checking, Power and Water will charge for the additional work at standard consultancy rates.

Power and Water requires that designers and contractors are competent to design and construct electrical assets that will be handed over to Power and Water. Designers, contractors, and where appropriate project managers, must be accredited by Power and Water. The procedures associated with this are contained in Network Policy NP 009, "Contractor Accreditation Level 1".

Handover

All works carried out by constructors/developers shall be formally handed over to Power and Water in the forms set out in Appendices H or I as appropriate.

Design Certification

The designer shall certify all designs as complying with this Policy in the form set out in Appendix J. The certification shall be attached to the design drawings submitted to Power and Water for approval.

3. Further Information

The following pages provide details of the policy. If further information is required, please contact:

DARWIN

Manager Network Engineering
Power and Water
GPO Box 37471
Winnellie NT 0821
Fax (08) 89245121, Phone (08) 8924 5191

4. Definitions

Capacity means the rated demand applicable to a particular parcel of land or customer, and

refers to an average demand over a 15 minute period. Note that it does not refer to the calculated maximum demand under the SAA Wiring Rules, which is generally higher than the average demand.

Capacity Charge is a non-refundable capital contribution towards the present or future cost of upgrading the distribution network (see Network Policy NP 004).

Capital Contribution is a non-refundable payment towards the cost of constructing a network asset owned by Power and Water (see Network Policy NP 004).

Load Limiting Circuit Breaker is a circuit breaker, complying with Rule 1.8.3.5 of the Wiring Rules and Installation Rule 5.56, that is used to limit the load of an installation to an agreed capacity in accordance with the *Distribution System Extension Policy* (Network Policy NP 004).

Low Voltage (LV) refers to supply at a nominal voltage of 230 volts or 230/460 volts single phase or 230/400 volts two or three phase, in accordance with Australian Standard AS/NZ 60038. In order to accommodate existing 240 volt appliances, Power and Water currently maintains a voltage of 230 volts + 10% - 2%, but eventually AS/NZ 60038 will be amended to require a voltage standard of 230 volts \pm 6%.

Point of Entry (POE) is the point where:

- (1) for an underground service, the service crosses the property boundary [except where the pillar is located on the customer's property – see (f) below]
- (2) for an overhead service, the service terminates (also called the "Point of Attachment" or POA)

Point of Supply is the point where Power and Water makes supply available. For low voltage supply, this is one of the following:

- (a) A point of attachment of an overhead service on to a building or pole on which a metering panel is fitted.
- (b) A point of attachment of an overhead service on to a pole forming part of unmetered aerial consumer's mains.
- (c) A nominated point on a distribution substation located on the customer's lot.
- (d) A point of connection of an underground service in a metering panel, including underground services originating at an overhead line.
- (e) A point of connection of an underground service in a pillar or junction box forming part of unmetered consumer's mains, located on the customer's lot.
- (f) A point on a Power and Water pillar located on the customer's lot.

For high voltage supply, the point of supply will be as agreed between the customer and Power and Water, and will generally be at the terminals of a high voltage metering unit located on the customer's lot.

Project Officer is a person appointed by the Manager Network Engineering to supervise a project. The Project Officer is the only person authorised to approve designs and design changes.

Reticulation is any component of an electricity distribution system including the provision of adequate transformer capacity. An electricity distribution system comprises overhead or underground reticulation (underground cables, aerial conductors, switches, and transformers) up

to 22,000 volts, owned by Power and Water, and generally located on a gazetted public road.

Rural Area refers to an area that is not an urban area (see below) and generally refers to lots predominantly larger than 0.4 hectares that may generally only be developed for residential or farming/rural purposes.

Service refers to the low voltage overhead or underground line running from a pole or pillar owned by Power and Water, which crosses the property boundary of the lot, and runs to the Point of Supply located on the lot. Services use only standard cable; where a customer provides a larger underground service to a pole or distribution pillar, the cable shall be an approved type employing termite protection.

Service and Installation Rules and General Conditions of Supply (the "Service Rules") should be read in conjunction with this Policy. They set out many of the conditions applicable to services and metering.

Serviced means, for all except high voltage customers, that a low voltage supply is available at some point within servicing distance of the property boundary of a lot. For high voltage customers, *serviced* means that a high voltage supply of sufficient capacity is available within one span of the property boundary. Note that *the Distribution System Extension Policy* may use a different basis for definition.

Servicing Distance means:

- (a) for an overhead service, a distance, not exceeding 40 metres, that permits a service to be run without exceeding the design tension, and while maintaining the required ground clearance as defined in the Standards Manual. Refer also to Installation Rule 5.25.
- (b) for an underground service in an underground area, a distance not exceeding 60 metres from the nearest pillar to the Point of Entry (POE).
- (c) For an underground service in an overhead area, a distance not exceeding 60 metres from the nearest pole carrying low voltage mains to the POS. Refer also to Installation Rule 5.26. For services rated in excess of 100A in commercial or industrial areas, such services will normally be terminated in a distribution pillar or metering panel located close to the front property boundary.

Overriding Statutory Charge ("Caveat") is a charge levied under the terms of the Electricity Reform Act on a parcel of land. It refers to an area that has been declared as an "Electricity Supply Distribution Extension Area" under Section 86 of the Act. An area is so declared when an electricity extension under the *Distribution System Extension Policy* results in a power line extension passing parcels of land.

Unserviced means that there is no low voltage supply available within servicing distance of the property boundary of the lot, or in the case of high voltage customers, there is no high voltage supply available within a span of the property boundary.

Urban Area generally refers to lots predominantly of up to 0.4 hectares with services and street lighting that may be developed for residential, industrial or commercial purposes.

5. Customers in Urban Areas

5.1 Basic Supply

This is defined as 10 kVA single phase for single residential customers, or specifically calculated kVA three phase for multiple residential/commercial/industrial customers or known maximum demand of the the lot. Most residential customers and smaller commercial customers fall into this category.

Such customers in existing subdivisions are provided with at least a *basic supply* by the developer.

5.2 Polyphase Supply for Residential Customers

Residential customers requiring a two or three phase supply may apply to have their supply converted to 18 kVA two phase or 25 kVA three phase.

Conversion of a residential supply from single to polyphase requires payment of the standard DSEP fee, replacement of the service, and provision on the customer's switchboard of space for 2 or 3 meters. The customer is required to engage a contractor to carry out this work; the contractor must submit a Notice of Intention before carrying out any work. It should be noted that in some cases polyphase supply is not available, so work must not proceed, or commitments made, until approval by Power and Water is given.

Refer to the *Installation Rules* for particular requirements.

5.3 Larger Customers

These are customers with a demand of more than 25 kVA.

(a) Additional Supply

Existing larger customers who increase their demand are required to pay a capital contribution in accordance with the *Distribution System Extension Policy*. This contribution may include a capacity charge, an additional substation charge, and a cable charge.

(b) Distribution Substations

Where the maximum demand of a particular customer is such that it is not practicable to supply the load from the existing low voltage system, then a distribution substation will be established, either on the customer's lot or in the road reserve.

The procedures associated with establishing a substation on private property are detailed in NP001.9 "Electricity Supply to Large Customers".

The substation type will be the subject of negotiation with Power and Water. However, substations installed within the Darwin CBD shall be of the chamber type.

(c) Multi-metered installations

In major developments involving multi-metered arrangements, the developer of the site will be required to provide sufficient capacity to supply the total load, including the maximum demand of all tenants. This demand will be based on consideration of the diversified load of prospective tenants and will be limited by the use of a fixed setting circuit breaker in accordance with Installation Rule 5.49.

Refer to the next section for details of loading in lots of residential units.

5.4 Residential Subdivisions

Individual residential subdivisions form part of suburbs. Power and Water plans the reticulation

requirements of suburbs based on total future load. Consequently, it is important for developers to confirm cable routes and size, switchgear, cable pits and ducting requirements.

The following applies:-

- (a) The developer shall provide underground internal reticulation within the subdivision to Power and Water's standards and arrange for connection to the existing electricity distribution system. The developer shall provide basic supply of 10 kVA single phase for single residential customers, or specifically calculated kVA three phase for multiple residential customers or known maximum demand of the lot.
- (b) Reticulation systems shall be designed for a diversified demand of 4.5 kVA per lot, except for high-cost subdivisions, where a figure of 7 kVA shall be used. The 4.5 or 7 kVA figure shall be adjusted as follows *only for calculating voltage drop* in radial sections:

Table 1

4.5 kVA/lot		7 kVA/lot	
Number of Lots	Diversified Loading	Number of Lots	Diversified Loading
1 x R1 lot	11 kVA ^α	1 x R1 lot	14 kVA ^α
2 x R1 lots	18 kVA	2 x R1 lots	24 kVA
3 x R1 lots	24 kVA	3 x R1 lots	33 kVA
4 x R1 lots	29 kVA	4 x R1 lots	43 kVA
Additional lots	4.5 kVA	Additional lots	7 kVA

^α This load will be assumed to be at the end of each radial run, and shall be deemed to be single phase. The remaining load shall be considered to be balanced three phase load.

- (c) High-cost subdivisions will generally be those where individual residences are likely to have refrigerated air-conditioning loads exceeding 10 kVA installed capacity.
The maximum permissible voltage drop in any low voltage run with the loads calculated as in Table 1 shall be 4%.
- (d) (i) Where there are existing shared assets from which supply can be made available to each lot with no immediate need for construction, then a capacity charge equivalent to the *basic supply* will be made for each of the new lots (refer to the *Distribution System Extension Policy*).
- (d) (ii) Where specific connection assets are required the additional facilities will be constructed by the developer, or by Power and Water at the developer's cost.
- (e) The electrical system shall be designed and constructed in accordance with NP001.2 or NP001.3 as appropriate.
- (f) No new overhead reticulation is permitted in residential areas in main centres. Power and Water may require underground or ABC (Aerial Bundled Cable) reticulation in other centres or in rural residential subdivisions in particular circumstances. Bare low voltage reticulation is not permitted in new urban residential subdivisions in any centre.
- (g) Lots zoned as R2 shall be designed using a diversified load calculated at 22 VA per m² of land area. Every R2 (and above) lot shall be provided with a three phase service. Where more than three units may be constructed on a lot, a distribution pillar shall be sited on the property frontage.
- (h) Lots zoned as R3 shall be designed for a diversified load of 55 VA/m².

- (i) Lots zoned as R4 shall be designed for a diversified load of 88 VA/m².
- (j) In general, a standard 25mm² service cable shall have only one residential unit per phase. This applies to an air conditioned area of up to 250m². Where the potential air conditioned area exceeds 250m², a two or three phase service shall be provided for each unit.

5.5 Industrial Subdivisions

As for residential subdivisions, the developer should discuss power requirements before committing to the purchase of materials.

- (a) The developer will be required to provide internal reticulation within the subdivision to Power and Water's standards and to arrange for connection to the existing electricity distribution system.
- (b) Industrial subdivisions shall be designed for a diversified demand per lot as follows:
 - (i) minimum capacity per lot 25 kVA
 - (ii) 15 kVA per 1000m², subject to minimums and maximums
 - (iii) maximum capacity per lot 50 kVA, unless specific loading is known
- (c)
 - (i) Where there are existing shared assets from which supply can be made available to each lot with no immediate need for construction, then a capacity charge equivalent to the basic supply will be made for each of the new lots (refer to the *Distribution System Extension Policy*).
 - (ii) Where specific connection assets are required the additional facilities will be constructed by the developer, or by Power and Water at the developer's cost.
- (d) The electrical system shall be designed in accordance with NP001.5.

5.6 Commercial Subdivisions

Generally the rules applying to industrial subdivisions are to be used, except for loading.

Whereas industrial subdivisions have few larger customers, commercial subdivisions tend to have a predominance of larger customers, making estimation of total future load difficult.

Consequently, designers must allow adequate provision for future upgrading of the system, without the need for excavation. This means the provision of conduits, HV cable loops, easements for future substations and/or ring main units, and the like. A basic supply to each allotment may also be required for construction purposes. These requirements must be discussed with Power and Water before commencing design.

5.7 Subdivision or Amalgamation of Serviced Lots

(a) Subdivision

Where a serviced lot is being developed by subdivision, the developer is required to provide power supply to the new lots. Such power supply to the new lots shall be from an adjacent road reserve; under no circumstances will power supplies cross adjoining property boundaries. If the power requirements of one or more of the subdivided lots are unknown at the time of development, Power and Water will assess the likely demand of each lot, and the developer shall provide that capacity. Where it is not possible to make a reasonable calculation (e.g., area is zoned CBD or the like), then Power and Water may require the developer to provide basic infrastructure, such as conduits, easements, etc., and for the individual developers of

each lot to provide specific infrastructure.

Where subdivision results in the formation of battle axe lots, the developer shall provide supply to every point within the axe handle from which two or more lots are serviced. Such line shall be designed to a maximum 4% voltage drop as if it were located on a public road. The developer shall provide an 8m easement (10m for high voltage) covering the full length of reticulation, including all poles serving more than one customer, or poles serving one customer but located on another allotment.

The developer shall also construct an all-weather access road within the axe handle covering the full length of the reticulation. This road will be sealed and suitable for heavy vehicles up to 15 tonnes GVM.

As the owner of the existing serviced lot has paid for a certain capacity, the owner may allocate that capacity to the new lots in any reasonable manner, provided that each lot has a minimum of a *basic supply*. However, if there is a shortfall in capacity to any of the new lots (as reasonably calculated by Power and Water), the developer shall install additional capacity as required.

Where the additional capacity required may, in the opinion of the Power and Water Officer, be supplied from shared assets without need for immediate augmentation, the developer will fulfil any obligations under this section by payment of a capacity charge for the additional capacity required for the new lots.

Any overhead or underground electric lines crossing the new property boundaries are to be removed prior to connection of any new supplies.

(b) Amalgamation

Where serviced lots are to be amalgamated, the developer is to rearrange the power supply to the new lot to provide a single point of supply in accordance with the *Service Rules*.

The new lot retains the capacity allocated to each of the existing lots. The allocated capacity shall be either the basic supply, or the design capacity, whichever is greater. Where additional capacity is required, the developer shall provide this.

(c) Fees

Power and Water will check and approve designs, carry out quality assurance, and do a final inspection at no cost to the developer. Where the quality of workmanship is such as to require excessive checking (e.g., because of the use by the developer of a non-accredited designer or contractor), Power and Water will charge for the additional work at standard consultancy rates.

5.8 High Voltage Customers

Such customers are required to negotiate with Power and Water for the extension of high voltage supply to a point inside the customer's property. Such extension shall generally be in accordance with the *Distribution System Extension Policy*.

Power and Water will install a high voltage metering unit at an agreed location, with high voltage isolation on both the supply and load sides. This unit will be readily accessible during normal working hours. A capital contribution may be applicable for the full cost of the metering installation.

High voltage reticulation beyond the metering point shall be installed by the customer, generally in accordance with the Wiring Rules. Lines constructed to Power and Water's Standards Manual will generally comply. High voltage systems must be operated and maintained in accordance with the Electricity Reform (Safety and Technical) Regulations, and any direction of the Electrical Safety Regulator. The customer will engage accredited contractors to operate and maintain this reticulation. All operations involving high voltage systems shall be carried out in accordance with the "Electrical Safety Manual" (Green Book).

5.9 Customers with a High Maximum Demand

Customers who have an exceptionally large load increment on the electricity distribution system may require major reinforcement of the electricity system. Under such circumstances, the customer's contribution towards the capital costs for augmentation and reinforcement works will be subject to individual negotiation.

Generally, such customers will be Contestable within the meaning of the *Electricity Networks (Third Party Access) Act* and *Code*. Capital contributions, if any, will be negotiated in accordance with the principles set out in the *Code*.

Refer to Network Policy NP 015 "Applications for Supply by Contestable Customers".

6. Customers in Rural Areas

Because of higher costs in rural areas, rural extension are constructed using overhead lines, with poles spaced, where practicable, as far apart as permitted by Standards Manual Volume 1, and the constraints of the terrain and area to be serviced.

Power line extensions to single customers, and to small groups of customers, are covered by the *Distribution System Extension Policy*.

6.1 Basic Supply

This is defined as 10 kVA single phase for rural residential customers (zoned RR1), or 25 kVA three phase for other rural zoned customers.

Such customers in existing subdivisions have been provided with an electricity supply by the developer.

6.2 Augmentation of Basic Supply

Residential customers requiring a two or three phase supply may apply to have their supply converted to 18 kVA two phase or 25 kVA three phase.

Conversion of a residential supply from single to two or three phase requires the replacement of the service, and provision on the customer's switchboard of space for 2 or 3 meters. The customer is required to engage a contractor to carry out this work, who must submit a Notice of Intention before carrying out any work. It should be noted that in some cases polyphase supply is not available, so work must not proceed, or commitments made, until Power and Water approval is given.

(a) Additional Supply

As many rural power systems have very low capacity, Power and Water must assess any significant additional load before it is connected to supply (i.e., load increments of 5kVA or larger).

(b) Distribution Substations

Where the maximum demand of a particular customer is such that the load cannot be supplied from the existing low voltage reticulation, a distribution substation will be required, either on the customer's property or on the road alignment.

6.3 Larger Customers

These are customers with a demand of more than 25 kVA.

(a) Additional Supply

As many rural power systems have very low capacity, Power and Water must assess any significant additional load before it is connected to supply (i.e., load increments of 5kVA or larger).

(b) Distribution Substations

Where the maximum demand of a particular customer is such that the load cannot be supplied from the existing low voltage reticulation, a distribution substation will be required, either on the customer's property or on the road alignment.

Most rural substations will be pole mounted. However, larger substations may be of the ground, package or indoor (chamber) type. The procedures associated with establishing such substations on private property are detailed in the policy NP001.9 "Electricity Supply to Large Customers".

6.4 Groups of Customers

A group of customers in a particular area may approach Power and Water jointly to arrange an extension of supply. Such extensions will be coordinated by Power and Water, and will be carried out under the terms of the *Distribution System Extension Policy*.

Power and Water will assess the load requirements of each customer, and, where the project is contestable (i.e., the customer engages a consultant to design and construct it), will specify the high voltage conductor size to be used.

6.5 Subdivisions

The Development Consent Authority (DCA) determines whether a particular rural subdivision will be provided with electrical reticulation. Where Power and Water believes that a significant number of landowners will require an electricity extension in the short to medium term, Power and Water may recommend that the subdivision be provided with electrical reticulation.

The DCA has advised that the following guidelines apply:-

- (a) any subdivision in Litchfield Shire must be reticulated
- (b) subdivisions less than 8 hectares and intended for rural living or industrial purposes must be reticulated unless they are too remote from the network to be economically connected
- (c) subdivisions larger than 8 hectares and intended for agricultural purposes usually will not be required to be reticulated. However, in cases where, because of the design and/or location of the subdivision, it is believed that there will be a demand for electricity, electricity reticulation will be required

Where it has been determined that reticulation shall be provided, the same rules apply as for residential or industrial subdivisions (as appropriate) in urban areas.

Generally, rural residential lots smaller than 8 hectares are to be given a diversified demand of 6 kVA per lot for design purposes. Rural horticultural lots larger than 8 hectares are to be provided with a supply of 25 kVA three phase.

6 kVA/lot	
Number of Lots	Diversified Loading
1 x R1 lot	13 kVA ^α
2 x R1 lots	20 kVA
3 x R1 lots	27 kVA
4 x R1 lots	33 kVA
Additional lots	6 kVA

For subdivisions including "Battle-Axe" style allotments, the following rules apply:

- (i) Where two or more allotments share a common "axe-handle", the developer shall provide reticulation to the end of the axe-handle.
- (ii) In such cases, the developer shall provide an 8m easement (10m for high voltage) covering the full length of reticulation, including all poles serving more than one customer, or poles serving one customer but located on another allotment.
- (iii) The developer shall also construct a sealed access road within the axe handle covering the full length of the reticulation. This road will be suitable for heavy vehicles up to 15 tonnes GVM.

The electrical system shall be designed and constructed in accordance with NP001.3 and NP001.4 (overhead).

6.6 Subdivision or Amalgamation of Serviced Lots

The same rules that apply for urban areas apply.

6.7 High Voltage Customers

Such customers are required to negotiate with Power and Water for the extension of high voltage supply to a point inside the customer's property. Such extension shall generally be in accordance with the *Distribution System Extension Policy*.

Power and Water will install a high voltage metering unit at an agreed location, with high voltage isolation on both the supply and load sides. This unit will be readily accessible during normal working hours. A capital contribution is applicable for the full cost of the metering installation.

High voltage reticulation beyond the metering point shall be installed by the customer's contractor, generally in accordance with the Standards Manual. The customer will engage accredited contractors to operate and maintain this reticulation. All operations involving high voltage systems shall be carried out in accordance with the "Electrical Safety Manual" (Green Book).

6.8 Customers with a High Maximum Demand

Customers who have an exceptionally large load increment on the electricity distribution system may require major reinforcement of the electricity system. Under such circumstances, the customer's contribution towards the capital costs for augmentation and reinforcement works will be subject to individual negotiation.

Generally, such customers will be Contestable within the meaning of the *Electricity Networks (Third Party Access) Act* and *Code*. Capital contributions, if any, will be negotiated in accordance with the principles set out in the *Code*.

Refer to Network Policy NP 015 "Applications for Supply by Contestable Customers".

7. Miscellaneous

7.1 Application Fee

A Power and Water Application and Account Establishment Fee is a Retail fee defined as such in Power and Water's Schedule of Fees and Charges (the Tariff Schedule).

7.2 Contestability

In cases where the customer is required to bear the full cost of an extension (e.g., high voltage extension on to private property), the design and construction is fully contestable, and the customer has the choice of employing consultants and contractors to carry out the work. In such cases Power and Water will provide a quotation for final connection (where required). Inspection and/or audit fees may be charged if the quality of work is such as to require an excessive amount of checking.

It should be noted that any consultant, project manager or contractor carrying out this work must be accredited by Power and Water to perform the work specified. Refer to Network Policies NP 009 and NP 022.

7.3 Maximum Demand

For the purpose of calculating contributions required by the policy, maximum demands will be determined according to Australian Standard AS 3000 (the Wiring Rules) or Installation Rules 5.30, 5.49 or 5.56 as applicable.

7.4 Low Voltage Lines on Private Property

Power and Water will not own any low voltage pole on private property, except where the line supplies more than one customer, and is located within an easement. In such cases, a low voltage line ceases to be owned by Power and Water when it crosses on to the last property and supplies one customer. The aerial conductors crossing a property boundary and supplying only that property are considered to be a service line. From the property boundary, all poles and conductors, from (and including) the first pole on private property, are treated as aerial consumer's mains.

7.5 High Voltage Lines on Private Property

High voltage line, substations and associated equipment located on private property must be covered by an easement, with appropriate measures to ensure 24 hour access.

7.6 Easements

Easements are required for all power lines located on private property that are owned by Power and Water. For details of conditions applying to easements, refer to the Easement Guidelines (Network Policy NP 021). Such easements are to be surveyed and registered at no cost to Power and Water. The following is a guide to easement sizes:

High voltage overhead line	5 metres each side of centre line
Low voltage overhead line	4 metres each side of centre line
Underground cable	3 metres wide
Package substation	3.5 x 3.5 metres
Kiosk substation	3.0 x 7.0 metres

Low voltage URD pillar	1.0 x 1.0 metres
Low voltage fused pillar	2.0 x 2.0 metres
Ring Main Unit	3.5 x 2.5 metres (typically)

In new subdivisions, Power and Water expects all underground and overhead lines to be located on public roads, except for pillars, ring main units and substations. Lines crossing private property will only be approved for high voltage supply to individual lots, battleaxe blocks, or in circumstances where the cost of alternatives is prohibitive, and then only with the prior approval of Power and Water in each case. Easements are a nuisance to Power and Water and landowners, and require on-going policing to ensure access is maintained.

7.7 Access to Power Lines, Cables and Substations

Power and Water will only accept ownership of power assets if they are fully accessible for inspection and maintenance. Generally, this requires an all-weather access track capable of taking the weight of a crane vehicle. Any gates, etc., across access tracks shall be fitted with a standard Power and Water lock purchased by the customer.

The policy NP001.9 "Electricity Supply to Large Customers" details access provisions for cables and substations supplying large customers.

7.8 Trees

Property owners are responsible for keeping trees located on their property well clear of power lines. A specification for tree clearance is available on request.

Property owners supplied by aerial consumer's mains are responsible for inspection and maintenance of the line, and for ensuring that trees are kept well clear of the line.

7.9 Point of Entry (POE)

The exact location of the POE on a serviced lot should be obtained before carrying out any work on the wiring installation. Details of servicing, including POE's, are discussed in the Service and Installation Rules.

7.10 Battle Axe and Axe Handle Lots

Customers with a serviced 'battle axe' or 'axe handle' lot have a choice of:

- (i) Connection at the street frontage, with an extension of low voltage metered consumer's mains from the street frontage; the line is entirely within the axe handle.
- (ii) Sharing the cost of a low voltage extension where two or more customers share adjacent axe handles.
- (iii) Sharing the cost of a high voltage extension and substation.
- (iv) Where supply is given in accordance with (ii) or (iii) above, easements over the reticulation are to be granted in favour of Power and Water, at no cost to Power and Water.
- (v) In all cases where Power and Water owns a line running along an axe handle, the property owners are responsible for constructing and maintaining an all-weather access road for the full length of the line. This road shall be suitable for heavy vehicles up to 15 tonnes; Power and Water does not accept responsibility for damage to private roads that result from Power and Water vehicles carrying out work on its assets located on private property.

7.11 Metering Points

Meters must be readily accessible for the purpose of reading. For residential customers, meters

must be located so that meter readers do not have to unlock any gate or door, make appointments, place themselves in risk of injury from savage dogs, climb obstacles, or the like. Details of meter location are provided in the *Meter Manual*.

7.12 Multiple Points of Supply

Generally, only one point of supply will be made available to each lot. It is the responsibility of the customer to establish a central metering point to allow present and future needs to be met. Second points of supply will only be permitted where distance and/or load are such as to make a single point of supply impractical (refer *Service Rules*).

7.13 Rezoning of Residential Lots

Sometimes a development may result in a residential lot being rezoned from single residential (e.g., R1) to R2 or similar. In such cases, the developer is required to bear the full cost of any augmentation work required to service the development. This is a similar case to a subdivision, where the purchasers of the new units will pay for the augmentation, not existing Power and water customers. If there is no immediate need for augmentation, the developer is required to contribute a capacity charge for increases in the number of units in accordance with the Diversified Loading in Table 1 of Section 5.4 above. In addition, the developer is required to arrange for upgrading the service.

When rezoning occurs, the capacity charge will relate to the development potential of the lot, not the actual number of units intended to be connected in the short term (refer Section 5.4 above).

In some cases, an area is rezoned by government. This happened, for example, in Larrakeyah. In such cases, each residential lot is entitled only to the *Basic Supply* for an R1 lot. As each development occurs, the developer will be required to pay a *Capacity Charge* for the additional capacity required, subject to the commercial test in the *Capital Contributions Policy*.

7.14 Testing

Transformers

Every transformer connected to the Power and Water system shall be tested to the satisfaction of Power and Water, and fitted with a test tag. Testing of transformers is described in Network Policy NP 006 "Distribution Transformer Testing". Such tests shall be carried out by accredited testers.

Cables

High voltage cables shall be tested to the appropriate Australian Standard for insulation resistance, polarity, high potential and earth continuity. Such tests shall be carried out by accredited testers.

High Voltage Switchgear

Generally, switchgear is factory pre-tested, and does not require field testing. However, testers should take the opportunity when cable testing to also high potential test the associated high voltage switchgear.

7.15 Street Lighting

The responsibility for providing street lighting rests with the road owner. Where a developer is providing street lighting as part of a subdivision or other development, approval of the street lighting design must be sought from the road owner. Approval by Power and Water of a street lighting drawing refers only to the electrical design, not the lighting design.

For subdivisions requiring street lighting to meet requirements of a Development Permit, the

designer shall provide certification that the lighting has been designed in accordance with the relevant standard.

Street lighting systems intended to be handed over to Power and Water for maintenance purposes shall be designed and constructed in accordance with Volume 3 of the Standards Manual, including use of standard components.

Power and Water will not enter into a street lighting agreement for any street light or similar unmetered customer (e.g., bus shelter, telephone booth) unless it is located within a public road reserve. Where the light is located on private property, it shall be treated as any other part of a consumer's electrical installation.

New street lighting systems in the top end shall be controlled using switch wires and electromechanical time switches, strategically located generally in package substations or fused pillars. PE cells are not permitted in new street lighting installations in the Darwin/Katherine areas, except with express written approval of the Manager Network Engineering (e.g., addition of one light to existing system).

Refer also to Network Policy NP 027 Capture of Street Lighting Information.

7.16 Flood Zones in Coastal Areas and River Valleys.

Assets that may be damaged by flood water shall be located above 1:100 year flood zones. In addition, in areas very close to the open ocean, Power and Water may require consideration of wave action in addition to predicted storm surge levels.

APPENDIX A

**Contractor's Certificate of Completion and Handover -
Power Network Assets**

Project Title:

Section/Lot No. Street/Road:

Suburb/Hundred Of:

Description of completed assets being handed over:

Reference Drg. No:

Contract No:

Name of Contractor:

Postal Address:

Contractor's Certification:

I certify that the above works have been completed in accordance with the project specification and Power and Water standards, that they are ready for commissioning, and are hereby handed over to Power and Water.

I further certify that all employees and agents of myself and/or my company, and all plant, materials and equipment, are clear of the works, and that all employees and agents have been instructed by myself to keep clear of the works.

Date of Practical Completion:/...../.....

Signed By:

Name (Please Print):

Authorised by	Prepared by:	Issue Date: Oct 2008	Status: Approved
Bertram Birk General Manager Power Networks	Thanh Tang Manager Distribution Development	File No: F2007/6260	Version: 3

Dated:/...../.....

APPENDIX B

Handover of Works by Developer

Suburb/Hundred ofLot/Section No.

Project Title:

Details of completed assets being handed over:.....

.....

Developer/Constructor:

Postal Address:

.....

Subject to the Developer/Constructor carrying out remedial works by the date specified in the attached list of defects, the power supply to the above lots (or the above work, as the case may be) has been practically completed and is now ready to be taken over by Power and Water for operation and maintenance.

The defects Liability Period will commence on...../...../..... and expire on...../...../.....

As Constructed Drawing/s No.....

.....

Handed over on Date:/...../.....

Survey/Easement Drawing/s No.....

Handed over on Date:/...../.....

.....
Signed by Developer

.....
(Print Name)

Date:/...../.....

.....
Power and Water Contracts Supervisor
or Project Officer

.....
(Print Name)

Date:/...../.....

APPROVED

.....
Manager Network Engineering

Date:/...../.....

APPENDIX C

Certificate of Electrical Design Compliance

Project Title:
.....

Suburb:City/Town/Hundred:

Drawing Title

Drawing Number

.....
.....
.....
.....
.....
.....
.....
.....

I / We certify that:

- The design complies with Network Policy NP001 Design and Construction of Network Assets;
- Voltage drop and pole strength complies – (where applicable - calculations attached);
- The accuracy of the existing network has been checked on site and the design verified;
- All existing services have been identified where practicable.

Signature:

Date: / /

Name of Designer:

Consulting Firm:

Contact Phone:

Fax:

Note that, if incorrect information is provided with a design, and this results in Network Engineering having to make site visits or carry out excessive checking, the design consultant will be required to bear the cost. If there are any queries, please contact the Manager Distribution Development on (08)89245729.

APPENDIX D

Cable Pulling Record

Name of Contractor:

Project:

Cable type: Size: No. Cores:

Drawing No./s

Pull 1: Date:...../...../.....

Start reference: Finish reference:

Direction of pull: Max. tension:kN

Details of dynamometer:

Winch description: Type of rope:

Pull 2: Date:...../...../.....

Start reference: Finish reference:

Direction of pull: Max. tension:kN

Details of dynamometer:

Winch description: Type of rope:

Pull 3: Date:...../...../.....

Start reference: Finish reference:

Direction of pull: Max. tension:kN

Details of dynamometer:

Winch description: Type of rope:

Pull 4: Date:...../...../.....

Start reference: Finish reference:

Direction of pull: Max. tension:kN

Details of dynamometer:

Winch description: Type of rope:

APPENDIX E

Electrical Installation Program

Underground Distribution

Subdivision:

Developer:

Stage: Consultant:

Town: Electrical Contractor:

Civil Contractor:

	Activity Description	Duration (Days)	Start Date	End Date	Inspection Point
1	Trench Excavation				Witnessed
2	HV Cable Laying				Witnessed
3	LV Cable Laying				Witnessed
4	Trench Backfilling				Witnessed
5	Street Light Foundation				Witnessed
6	LV Pillar Installation				Witnessed
7	Street Light Installation				Witnessed
8	Substation Foundation				Witnessed
9	Substation earthing				Witnessed
10	Substation Installation				Witnessed
11	HV Cable Termination				Witnessed
12	LV cable Installation				Witnessed
13	Testing				Witnessed

Anticipated handover date:/...../.....

Signature: Submitted date:/...../.....

Name:

Company name:

APPENDIX F

Electrical Installation Program

Overhead Distribution

Subdivision:

Developer:

Stage: Consultant:

Town: Electrical Contractor:

Civil Contractor:

	Activity Description	Duration (Days)	Start Date	End Date	Inspection Point
1	Site Clearing				Witnessed
2	Pole Pegging				Witnessed
3	Pole Foundations				Witnessed
4	Pole Erection				Witnessed
5	Pole Dressing				Witnessed
6	Conductor Stringing				Witnessed
7	Earthing Installation				Witnessed
8	Substation Installation				Witnessed
9	Street Light Installation				Witnessed
10	Service Installation				Witnessed
11	Site Cleanup				Witnessed

Anticipated handover date:/...../.....

Signature:

Submitted date:/...../.....

Name:

Company name: