

- Gas pipes > 75mm: 300mm minimum to LV or HV cables
- Telstra/Optus cables & conduits: 100mm minimum to LV cables, 300mm minimum to HV cables
- Water Mains \leq DN 375mm: 1000mm minimum horizontal clearance, 225mm vertical clearance
- Water Mains > DN 375mm: advice on clearances is to be sought from relevant water supply organisation.
- Sewer Mains < DN 200mm: 500mm minimum horizontal clearance
- Sewer Mains > DN 200mm: 1000mm minimum horizontal clearance
- Sewer Mains \leq DN 300mm: 225mm minimum vertical clearance
- Sewer Mains > DN 300mm: 300mm minimum vertical clearance
- Earthing should be in accordance with Clause 5.5 of NS116 i.e. the electrodes may be installed either in the footpath cable allocation in accordance with drawing 167433, or in the pole line allocation as per drawing 36377 for pole mounted substations. The pole line allocation is preferred.

3.6 Protection from Vehicles in Off-Street Locations

Kiosks must be protected from damage by vehicles in areas classified as high risk for vehicle impact, such as adjacent to driveways, etc.

3.7 Landscaping for Off-Street Locations

For J, L and K type kiosks, the finished surface of the substation site may be blue metal, lawn grass, pine bark woodchips, pavers or mowing strips.

When selecting the landscaping surface, the customer is responsible to consider the impact the finished surface may have on the adjacent footways either by direct interference or the landscaping material spilling onto it.

Other surface finishes may be permitted, at the discretion of Ausgrid's Regional Planning Officer, provided the customer agrees in writing to bear all costs resulting from any future need to excavate and reinstate around the substation, irrespective of whether or not the excavation is associated with supply to the customer.

Ausgrid cannot accept responsibility for damage to landscaping where excavation for cable works or equipment replacement occurs in the future.

Screening vegetation must not interfere with access to the substation for both personnel and equipment.

Trees, shrubs, or plants, other than lawn grass, are not permitted on the substation site.

Watering systems must not be installed within the substation site or designated personnel access routes.

3.8 Fencing Around Off-Street Locations

Where it is intended to fence around off-street locations, attention must be given to the following issues:

- where segregated earthing systems are employed the likelihood of earth potential rise, under fault conditions, which may be transferred along a metallic fence. This may require wood fence posts in the vicinity of the kiosk, or in some cases the whole section of fence may need to be non-metallic. Each substation should be treated on its own merits with advice sought early in the project design from Ausgrid as required. The major factors which will affect this are: the local soil resistivity; whether the 11kV

4 ACCESS REQUIREMENTS

Kiosk sites must have unimpeded access for Ausgrid personnel and vehicles, directly from a public street, for 24 hours per day, 7 days per week.

A heavy truck with a vehicle-mounted crane is needed to install or remove the kiosk and equipment. Access routes, where required, must be suitable under all weather conditions and constructed to withstand the loading. The access route should be a minimum of 4 metres wide, have a minimum of 4 metres headroom and be continuous from the property boundary to the kiosk site.

For kiosk sites other than footpath, reserve or URD sites, the site owner/customer is responsible for providing and maintaining access routes and surface finishes, to the satisfaction of Ausgrid, as specified in the easement document.

Access from the street to the kiosk site must not be fenced or enclosed, unless approval is given in writing by Ausgrid and the conditions listed in the approval are complied with on an ongoing basis by the site owner/customer.

6 FIRE SEGREGATION REQUIREMENTS

The siting of kiosk substations must comply with the requirements of all relevant authorities (including fire control authorities) in relation to segregation from buildings, structures, etc. Kiosk substations must also be separated from building air intake and exhaust openings and natural ventilation openings by separation distances that meet the requirements of all relevant authorities and Australian Standards.

Apart from any requirements to satisfy other authorities; Ausgrid has a general requirement for kiosk substations to be effectively segregated from neighbouring areas and buildings which are subject to fire risk. Pathways and or fire escape routes shall not encroach upon the kiosk easement and may require greater separation to ensure the route is not impacted in the event of a fire. The following specific additional requirements must also be satisfied.

Ausgrid requires kiosk substation housings to be separated from building ventilation system air intake and exhaust duct openings, by not less than *6 metres. This applies irrespective of whether the building ducted ventilation system is mechanical or natural and irrespective of whether or not fire dampers are installed in the ducts.

(* Measured by shortest string line between housing and duct.)

Note: For the purposes of this Section Ausgrid does not regard openable windows, that provide natural ventilation to one building compartment only, as a building ventilation system opening.

Any portion of a building other than a BCA class 10a structure constructed from non combustible materials, which is not sheltered by a non-ignitable blast-resisting barrier and is within 3 metres in any direction from the housing of a kiosk substation, is required to have a Fire Resistance Level (FRL) of not less than 120/120/120. Openable or fixed windows or glass blockwork or similar, irrespective of their fire rating, are not permitted within 3 metres in any direction from the housing of a kiosk substation, unless they are sheltered by a non-ignitable blast resisting barrier.

Any meter, regulator or exposed pipe work associated with the reticulation of gas which is within 3 metres in any direction from the housing of a kiosk substation and which does not have a Fire Resistance Level of 120/120/120 must be sheltered by a non-ignitable blast-resisting barrier.

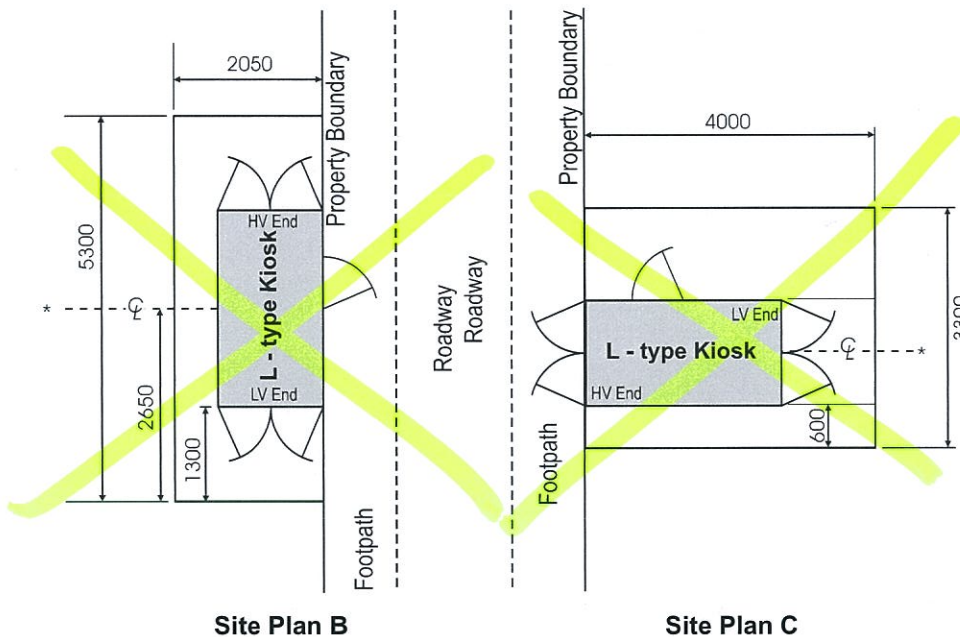
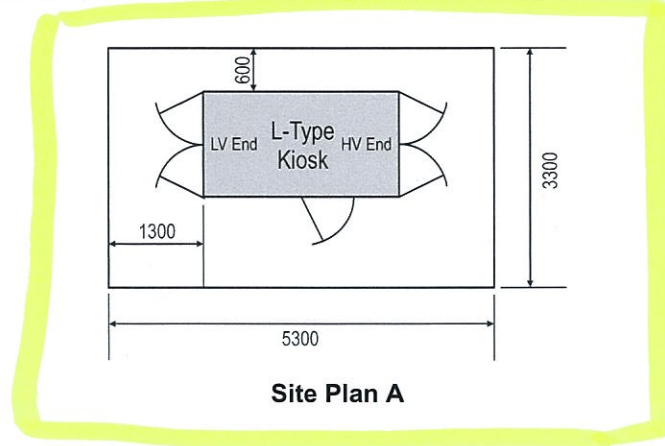
Any portion of an area which may be used for storage of combustible material, which is within 3 metres in any direction from the housing of a kiosk substation, must be sheltered by a non-ignitable blast-resisting barrier.

Blast resisting barriers and their foundations must be external to the overall area required for the substation site and must also comply with the following requirements:

- they must not interfere with personnel or equipment access to the substation or with cabling,
- they must be constructed of non-perishable material such as concrete or brick,
- they must not contain apertures or openings such as doorways or vents even if these have a Fire Resistance Level rating,
- they must provide for concrete encased conduits where required for cable entry to the substation,
- they must not interfere with the kiosk ventilation and the escape of heat from the kiosk,

L Type Kiosk

L type kiosk minimum site requirements are indicated in the following site plans and notes:



(* Property boundary between lots, if kiosk site is located across adjacent residential lots.)

L Type Kiosk - Notes.

Note 1. The L kiosk site plans shown with one edge of the kiosk structure on the street frontage property boundary (Site Plans B and C) are restricted options generally only available for underground residential distribution (URD) sites. Approval for these options in areas other than URD will be at the discretion of Ausgrid, after consideration of all relevant factors.

Note 2. Where the 5300 mm x 3300 mm L kiosk site is set back from the street frontage property boundary (ie Site Plan A with additional set back), it will be necessary for an associated cable easement and a right-of-way for access to be established. (Refer to Clause 3.8.)

Appendix B - Weight of Kiosk Assemblies

Typical Weights of Kiosk Types J, L and K, complete with transformer, switchgear, bases & sundry equipment.

J Type Kiosk		L Type Kiosk		K Type Kiosk	
Item	Weight	Item	Weight	Item	Weight
Kiosk with 160 kVA transformer	3215 kg	Kiosk with 400 kVA transformer	5275 kg	Kiosk with 1500 kVA transformer	6560 kg
Kiosk with 315 kVA transformer	3845 kg	Kiosk with 600 kVA transformer	5875 kg		
Kiosk with 400 kVA transformer	4005 kg	Kiosk with 800 kVA transformer	6475 kg		
		Kiosk with 1000 kVA transformer	7075 kg		
J Type - Maximum Weight (see Note)	4005 kg	L Type - Maximum Weight (see Note)	7075 kg	K Type – Maximum Weight (see Note)	6560 kg

Note: Supporting structures and piers must be suitable for the maximum weight applicable for the kiosk type.

4 ELECTRODES AND EARTHING CONNECTIONS

4.1 Electrode Systems

Earthing systems must consist of vertical electrodes interconnected with earthing cable. (Electrodes are the vertical bare conductors, 5 metres or longer, consisting of joined rods, tube or stranded conductors.)

Electrode systems must be one or more of the following:

- **Driven rod system.** This system utilises 15 mm OD copper clad steel rods in 1800 mm lengths. When driven into ground types other than sand or loam, the start rod must be fitted with hardened steel driving point. Rods must be joined with the approved friction joint couplings. The minimum electrode depth is 5 metres.
- **Bore hole / copper tube system.** This system is constructed by boring a 35 mm (diamond bit) or 50 mm (clay bit) clearance hole into the ground to a suitable depth, then inserting a 14.3 mm OD x 1.63 mm wall copper tube and filling the bore hole with a slurry made from an *approved earthing compound. The earthing compound must be pumped down the tube to fill the hole from the bottom up. The minimum electrode depth is 5 metres.
- **Alternative bore hole systems.** Ausgrid may also approve alternative bore hole type electrode systems utilising copper clad steel rods and/or bare stranded minimum 70 mm² copper cable, where the bore hole is filled after electrode installation with a slurry made from an *approved earthing compound, where satisfactory operational performance can be demonstrated, and where the minimum electrode depth is 5 metres.

(* Ausgrid approved earthing compounds are "Good Earth" or "Lo-Ohm".)

Greater electrode depths or additional electrodes will be required in some areas to achieve the required earthing system resistance. Where the minimum values of earth resistance specified in Section 5 for each type of substation cannot be achieved with the minimum number of 5 metre electrodes, additional or longer electrodes must be installed. In some locations with high resistivity soils, it may be necessary to drill to depths exceeding 10 metres to obtain a suitable resistance value.

The top of each electrode must be not less than 500 mm below ground level. The electrode depth (minimum 5 metres) is to be measured from the top of the electrode and not from ground level.

Copper clad steel rods must comply with Ausgrid's current specification.

4.2 Electrode Groups – Spacing and Cabling

The electrodes within a group are to be interconnected with insulated stranded copper cable with a cross sectional area of at least 70 mm². The cable must be connected to the electrodes with the compression fittings applicable to the type of electrodes used. Welding or brazing must not be used.

Electrode groups must be located so as to minimise the interaction effects between them. For kiosk type substations: electrodes within the substation easement shall be located as shown in drawing no 167433; electrodes outside the substation easement shall be located such that below ground electrodes within an electrode group are separated from electrodes within a different electrode group by a minimum of 3 metres. For chamber type substations, control points and HVCs electrodes within an electrode group must be separated from electrodes within a different electrode group by a minimum of 3 metres. For pole mounted substations and pole mounted HVCs electrodes within an electrode group must be separated from electrodes within a different electrode group by a minimum of 6 metres. Electrodes within an electrode group must also be separated from any street light, low voltage pillar, metallic water mains not bonded to the earthing system in accordance with Section 5.2, or other equipment, by a minimum of 2 metres.

Electrode groups must be connected to the distribution centre earth bar, or control point or HVC earth bar, as applicable, with minimum 0.6 kV black insulated stranded copper cable with a cross sectional area of at least 70 mm². The cable must be connected to the electrodes with the compression fittings applicable to the type of electrodes used. Welding or brazing must not be used.

Insulated cables connecting the electrode groups to the distribution centre, control point or HVC, must be separated by a minimum of 40 mm.

Buried earthing conductors connecting electrodes in a group, or connecting a group of electrodes to the substation earth bar or control point or HVC earth bar, shall be not less than 500 mm below ground level, and shall be covered by cable cover slabs or polymeric cable covers. Where earthing conductors are installed in the footpath cable allocation, the installation depth shall be increased so as to comply where feasible with the buried earth conductor detail shown on drawing 167433 and the note that applies to that detail. This requirement applies for all types of substations and control points.

4.3 Connections to Earth Bars and Neutral Bars

In addition to the specific requirements for each type of distribution centre, as referred to in Section 5, earthing conductor connections must comply with the following general requirements:

- Connections to earth bars and neutral bars must be made with a separate bolted connection for each cable, ie two or more terminations per bolt or stud are not permitted.
- Compression lugs must be of an approved type and must not be of a split or slotted type.
- All bolts, nuts and washers must be 316 grade stainless steel, of minimum diameter 12 mm.
- Before installation of each stainless steel bolt or set-screw, the thread shall be lubricated with specially formulated anti-seize grease containing nickel. (eg Loctite Nickel Anti-Seize or equivalent, Ausgrid stock code 177212.)