



Fw: 2019-016 DA 291/2018 (1) proposed Integrated Development
 admin@griffith.nsw.gov.au to: Maree.Best@griffith.nsw.gov.au
 <Maree.Best@griffith.nsw.gov.au> 24/01/2019 02:55 PM
 Sent by: "Jeanette.Franco@griffith.nsw.gov.au" <Jeanette.Franco

2 Attachments



TransGrid Easement Guidelines - Safety Risks.pdf 161214_TransGrid Fencing Guidelines_Final.pdf

----- Forwarded by Jeanette Franco/Griffith City Council on 24/01/2019 02:55 PM -----

From: "Easements&Development" <Easements&Development@transgrid.com.au>
 To: "admin@griffith.nsw.gov.au" <admin@griffith.nsw.gov.au>
 Date: 24/01/2019 02:52 PM
 Subject: 2019-016 DA 291/2018 (1) proposed Integrated Development

Good Morning,

TransGrid Reference Number: 2019-016

Proposal: DA 291/2018 (1) proposed Integrated Development
 Electricity generation works - construction of a 40MW Solar Farm

Location: Lots 140 & 141 DP 751709 Bob Irvin Road, Morley Road and Irrigation Way, Yoogali

TransGrid: Transmission Line 99J Yanco 1332kV to Griffith 132kV

Thank you for referring the above mentioned Development Application to TransGrid for review.

Please be advised after reviewing the proposed works at **Lots 140 & 141 DP 751709 Bob Irvin Road, Morley Road and Irrigation Way, Yoogali**

TransGrid wishes to comment as follows:

- TransGrid is actively working and supporting the proponent to complete the connection of the 15MW Solar Farm.
- TransGrid has recently executed a project and connection agreement to facilitate the connection and will continue to work with the proponent through the design and construction phases.

Regards

Michael

Michael Platt

Development Assessment and Control Officer | Network Planning and Operations

TransGrid | 200 Old Wallgrove Road, Wallgrove, NSW, 2766

T: (02) 9620 0161 **M:** 0427 529 997

E: Michael.Platt@transgrid.com.au W: www.transgrid.com.au

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(See attached file: *TransGrid Easement Guidelines - Safety Risks.pdf*) (See attached file:
161214_TransGrid Fencing Guidelines_Final.pdf)

1. Background and Context

As a network operator, TransGrid is obliged under the *Australian Standard (AS) 5577 Electricity Network Safety Management Systems* to maintain a network that supports:

- > The safety of the public and people near or working on the network,
- > The protection of property and network assets,
- > Safety aspects arising from the protection of the environment, including protection from ignition of fires by electricity networks, and
- > Safety aspects arising from the loss of electricity supply.

TransGrid is also required, where reasonably practicable to avoid or eliminate the source of risk and where elimination is not reasonably practicable, identify treatments or controls so that the residual risks are reduced As Low As Reasonable Practicable (ALARP). Furthermore, opportunities for further safety improvement must be identified, even if risks have been assessed as being ALARP.

TransGrid acquires transmission line and cable easements to provide adequate clearance along the route of a transmission line for construction, operation / maintenance work and to preserve certain property rights in perpetuity. These easements also ensure no work or other activity is undertaken under or near a transmission line or cable that could create an unsafe situation either for persons or for the security of the transmission line or cable.

TransGrid's paramount concern is the **safety of people and property**. TransGrid is also bound by law to maintain reliability of supply and maintain its infrastructure efficiently and cost effectively. The transmission line and cable easements, along with access to these easement areas, have been designed to facilitate effective operation and maintenance practices in accordance with the applicable standards and good industry practice.

TransGrid also has various statutory powers and rights under the *Electricity Supply Act 1995* which operate independently from the terms of individual cable easements. These guidelines are subject to those powers and rights.

The transmission line or cable easement area / influence zone and its ongoing maintenance are control measures that **cannot be compromised**.

2. Safety Risks

Easements are established to prevent and mitigate against the following safety risks:

Electrical Clearances

Transmission lines are designed for safe electrical clearances from the overhead energised conductors (or wires) to other energized conductors, structures, constructions, plant, vehicles or vessels (watercraft). These safe electrical clearances are generally set out in the Australian Standard AS/NZS 7000:2016 *Overhead Line Design*, however, the responsibility remains with TransGrid to determine the safe electrical clearance to prevent flashover from the energised conductors. These safe electrical clearances apply to the transmission line under

maximum operating conditions, being the maximum expected sag of the conductors and the maximum expected blowout.

As the sag of the transmission line can vary greatly over its operating range, only TransGrid can accurately assess clearances for a development. Site surveys by developers will only give an assessment of the clearance at a point in time and not account for the change in clearance over the transmission line operating range. For this reason, 3D CAD files of a development are required as part of the assessment process.

Conductor Drop/Structure Failure

Conductor drop or structure failure events are associated with asset failure. While TransGrid maintains its assets in accordance with good industry practice, events outside of TransGrid's control such as lightning strikes and high wind events can cause assets to fail. While only a small number of failure events occur each year across TransGrid's network the consequences, particularly at transmission network voltages, are potentially catastrophic.

The catastrophic consequence can occur through the uncontrolled breach of safe electrical clearances and transferred voltages / earth potential rise which occur when a conductor drop or structure failure event occurs. For this reason, TransGrid imposes exclusion zones beneath the area of the conductors for developments which are likely to encourage people to congregate and spend time in the area and requires that external sources of power not be connected on easement unless electrically isolated.

Electrical Induction

Metallic objects in proximity of transmission lines will experience a voltage or current induced on the metallic object, referred to as electrical induction. The larger and/or longer the metallic object, the higher the voltage/current will be. The amount of electrical induction on metallic objects will rapidly reduce with distance from the transmission line.

Small amounts of induction may cause people 'nuisance shocks' when touching metallic objects, whereas larger amounts of induction will become hazardous. For this reason, TransGrid requires that metallic objects within the easement (but outside of exclusion zones) are earthed so that the induced voltage/current is dissipated to the earth. Long metallic objects, such as fences, may also require isolation sections.

Large metallic structures, such as warehouses, or very long metallic objects, such as pipelines, may require earthing and/or isolation even when located outside of but adjacent to the easement.

This risk also applies to underground cables.

Transferred Voltages/Earth Potential Rise

Earth Potential Rise describes an event where electrical current impresses a voltage on a volume of earth. This voltage is a maximum at the point where the electrical current meets the earth and then decreases rapidly from this point. Earth Potential Rise generally occurs during a fault scenario on a transmission line, such as a lightning strike. During a fault scenario, a large amount of fault current will be directed through transmission line structures and into the ground (or earth) where it will cause a voltage on the ground around the transmission line structure.

While precautions are taken, i.e. structure earthing systems, the voltage rise on the ground can still be hazardous to persons (and animals) who are within the Earth Potential Rise zone. Furthermore, metallic objects within the Earth Potential Rise zone increase the hazard to people in the zone, and can also transfer the dangerous voltage from the soil to other persons who are remote from the transmission line. For this reason, TransGrid does not permit metallic objects or swimming pools in proximity to transmission line structures and does not endorse or encourage the loitering or congregation of persons near transmission line structures.

This risk also applies to underground cables, particularly in proximity of joint bays.

Fire/Asset Damage

Damage to TransGrid's assets can create hazardous situations where the integrity of the asset is placed at risk. These hazardous situations could result in any of the events described above occurring and could cause large scale loss of electricity supply. TransGrid imposes requirements such as exclusion zones to protect its assets for damage.

This risk also applies to underground cables.

Access for Maintenance

Clear and free access for maintenance is required along the length of transmission lines and underground cables. This access is required for routine maintenance activities as well as emergency response. For this reason, obstruction which restricts maintenance access or objects/scenarios which place the safety of TransGrid's maintenance personnel at risk are not permitted.

Clear Work Area for Maintenance

TransGrid's maintenance personnel need clear access around transmission line structures so that they can safely perform maintenance activities. Maintenance activities can involve the use of large mobile plant such as elevated work platforms and cranes which require clear work areas. For this reason, TransGrid imposes exclusion zones around the base of transmission line structures.

TransGrid operates and maintains the high voltage electricity network across NSW and the ACT, which includes 99 substations and more than 12,900 kilometres of transmission lines and underground cables. The majority of this infrastructure is located on private land and is accessible by an easement.

An easement provides a 'right of way', allowing access for our staff and contractors to build and maintain electrical infrastructure on private property. If you have an easement registered on your property, there may be some restrictions on the activities performed or structures that can be placed within the easements, including fences.

All fences installed within TransGrid easements should be built with wooden or other non-conductive materials to minimise the risk of injury and/or damage to property. Where this is not possible and metal fences must be installed, certain requirements must be met and are outlined in these guidelines.



As the operator and manager of the high voltage transmission network across NSW and the ACT, TransGrid connects generators, distributors and major end users to the electricity they need, when they need it. At TransGrid, we keep you and your way of life connected. Our core role is to provide safe, reliable and efficient transmission services to NSW, the ACT and the National Electricity Market.

While transmission is a small component of the electricity bill, around 7% for households and businesses, we do not believe that consumers should pay more than necessary for a reliable electricity supply.

Our network comprises 99 bulk supply substations and more than 12,900 kilometres of high voltage transmission lines and cables. Interconnected to QLD and VIC, the network provides a strong electricity system enabling energy trading between Australia's three largest states along the east coast and supporting a competitive wholesale electricity market.

We believe in working with the communities we operate in. We help them learn about energy through our BeSafeKidz primary school education program. Each quarter we partner with different communities to support them grow and develop through our Community Partnership Program. While our easement teams work with landowners to ensure the safety of easements. For more information visit our website www.transgrid.com.au.

Risks posed by metal fences on easements

If a metal fence is installed near a high voltage transmission line, there is a possibility it could act as a conductor of electricity and dangerous currents may be carried along the fence.

These voltages may be an induced voltage from the fence being parallel to a nearby transmission line, or they may be a transferred voltage (or transferred potential), which occurs when a fence is installed too close to the high voltage transmission pole or tower (structure).

The amount of induced or transferred voltage can vary between different transmission lines and structures, and is also affected by the soil beneath the transmission line.

In some cases where a metal fence must be installed, TransGrid may request a detailed earthing assessment and additional measures may be required beyond those outlined in this guideline.

Ensuring the safety of existing metal fences

In some easements, metal fences have been installed by previous owners. It is important these existing fences meet TransGrid's guidelines to minimise the risk of injury or damage to property. This section outlines the guidelines for a fence which is located near or adjacent to a structure, or runs parallel to a transmission line. Despite the location of the fence, you should always follow these simple rules:

- > A metal fence should never touch a transmission line structure
- > A metal fence should always be at least 1m away from an underground earthing system

To find out the location of any underground earthing systems call "Dial before you dig" on 1100.

Fences near a structure

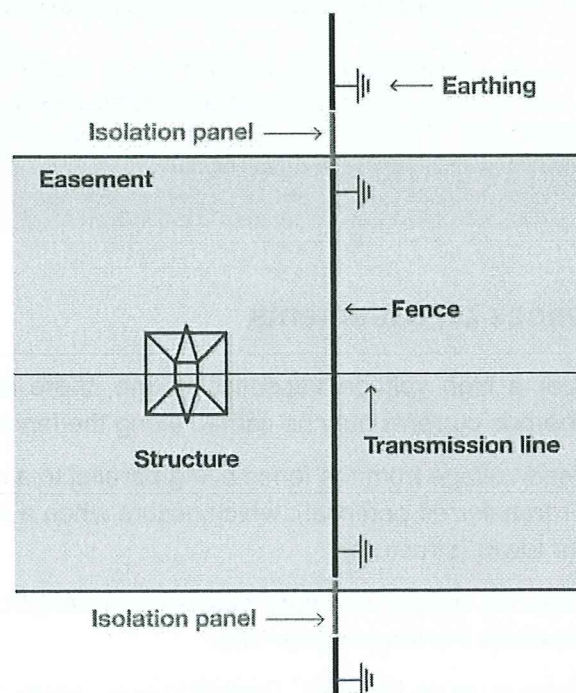
Metal fences that run across an easement, near the base of a transmission line structure, pose specific risks. To manage this risk the following steps must be taken:

- > Install Isolation panels where the fence enters or exits the easement
- > Provide earthing either side of the isolation panels

The diagram below (Diagram 1) shows an example where a fence runs across the easement. It is important the fence has isolation panels installed as it enters and exits the easement, ensuring it is earthed at either side. If the fence stops inside the easement, it will need to be earthed next to the last post.

If the fence is within 1m of the structure, the fence may need to be modified to ensure safety.

Metal fencing running across the easement near a structure

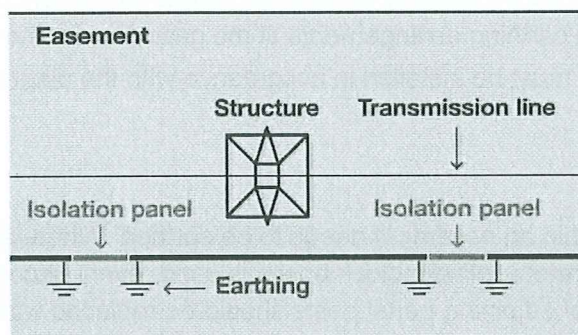


Fences parallel to a transmission line

Metal fences located within an easement and running parallel to a transmission line (see Diagram 2) also pose specific risks. To manage this, adhere to these requirements:

- > Fences that run parallel with a transmission line past a structure should have earthing and isolation panels installed near each the structure
- > An additional earth should be installed around the middle of each span if the fence passes more than one structure
- > In addition to the above, any fence should be earthed at each end.

Metal fencing running parallel to the line in the easement



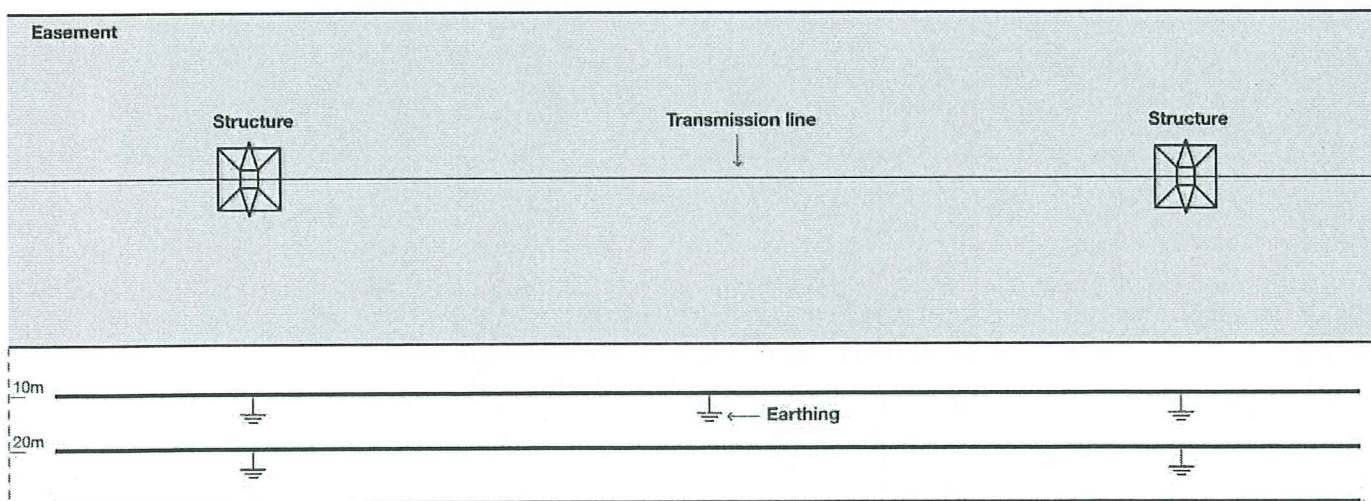
Fences outside the easement

The risk of transferred voltage reduces when the distance between the transmission line and the metal fence is greater. However, to minimise any potential risk of induced voltages, you must follow these requirements:

- > Fences within 10m of the easement should be earthed once in line with each structure and once in the middle of each span
- > Fences within 20m of the transmission line should be earthed once in line with each structure
- > Fences more than 20m from the easement would not generally require earthing

The below diagram (diagram 3) shows the distance of a fence running parallel to an easement and the subsequent level of earthing required.

Metal fencing running parallel to the line on the edge of the easement



Installing a new metal fence in an easement

It is recommended all fencing located within an easement is made from wood or non-conductive materials. However, we understand in some cases metal fencing may be required. In these cases, follow these requirements to reduce the risks:

- > Each separate strand of wire or metal fence panel should be effectively earthed at the edge of the easement, wherever the fence passes in or out of the easement area, and at any end of the fence located within the easement area
- > Metal gates should be earthed by bonding across the hinges to the fence (in the case of a wire or other metal fence), or by suitable earthing arrangements at the gate post for fences of wooden construction
- > All fence and gate earthing must be installed in accordance with the diagrams provided in this guideline.

Temporary fencing

Temporary fencing installed within an easement needs to be earthed. Where a typical chain-wire or weldmesh panel fence supported by concrete or plastic block bases is used, every second panel should be earthed and the pipe clamp between posts of adjoining panel posts should be replaced with a clamp arrangement made of wood or other non-metallic material.

Other types of temporary fencing should be earthed and isolated in accordance with the requirements set out in this guideline.

For more information

For further information please contact TransGrid on 1800 222 537.