Physical Access to Assets - Specification

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1. Introduction

1.1 Purpose

This document sets high level requirements for physically accessing Powerlink's network assets.

1.2 Scope

Powerlink is required to establish and maintain access to its assets to ensure its HV network can be operated safely, reliably, responsibly and efficiently.

Some assets are located in remote areas, away from public road infrastructure. These locations can traverse steep, highly erodible landscapes, placing significant challenges to maintain ground access. This specification provides risk management principles for maintaining access to assets.

1.2.1 Objective

The objective of this framework document is to:

- Align access to asset documentation across the business, including:
  - ASM-FRA-A968358 Land Asset Methodology – Framework.
  - ASM-GDL-A576805 Transmission Line Access Track – Guideline.
  - AM-CL-0567 Substation and Communication Site and Associated Access Track Checklist.
  - Substation Design Manual (V8.04). The Access Roads are covered under Section 7.12.2 (pages 63-65). Section 7.6.6 Helicopter Landing Pad (page 53). Section 7.11.4 Stock Proof Fence & Property Gate (page 62).
  - Substation construction manual (V8.0). Section 2.8 Roadworks (pages 29-31).
  - A3-H-119519-01 Typical Helicopter Landing Pad Plan and Section.
  - ASM- WKI-A580003 Management of Risks Associated with Unexploded Ordnances.
- Review the external environment (e.g. Main Roads standards) to determine expected life of tracks/roads before we can expect life extension work to be undertaken (input into asset life plans).
- Establish data definitions for accessing assets.
- Ensure risk management principles are applied throughout the asset life, including:
  - Planning/Approvals;
  - Design/Construction;
  - Maintenance/Operation;
  - Decommissioning; and
  - Monitoring the external environment for impacts (e.g. compliance and town planning).

1.3 References

Document code	Document title
Public Document	Powerlink's Land Access Protocol (LAP)

1.4 Defined terms

Terms	Definition
Remote locations	>200km or >1.8 hours driving from major depots (e.g. Virginia, Gladstone, Rockhampton, Mackay, Townsville and Cairns), but <600km
Outback locations	>600km from major depots
Substation Sizes	There are three sizes of substations: Small, Medium & Large, which are defined as part of Routine Substation Maintenance (RSM)
Risk Factors for Access Tracks	**Risk Factors to be built up to Built Section Level** Ground Span Characteristics Change in elevation — H/M/L % — High = >40m; Moderate = 20-40m; Low = <20m Slope — H/M/L % — High = >25%; Moderate = 5-25%; Low = <5% Spatial Span Analysis Average annual rainfall — H/M/L % — High = >1600mm; Moderate = 1200-1600; Low = <1200 Soil Types — H/M/L % — High = Sodosols; Moderate = Chromosols, Kurosols, Rudosols, Tenosols, Podosols, Hydosols, Organosols and Calcarosols; Low = Ferrosols, Dermosols and Kandosols Water crossings — H/M/L % — High = >4; Moderates = 3-4; Low = 1-2 Gates — H/M/L % — High = >4; Moderates = 3-4; Low = 1-2 Properties — H/M/L % — High = >4; Moderates = 3-4; Low = 1-2 Measuring Point Results — H/M/L % — High = 3; Moderates = 2; Low = 1-0 Soil disturbance — H/M/L % — High = Yes; Moderates = Unknown or partial; Low = No Construction compliance — H/M/L % — High = No; Moderates = Unknown or partial; Low = Yes Notifications — Outstanding notifications Soil disturbance — H/M/L % — High = Yes; Moderates = Unknown or partial; Low = No Built Section Spatial Analysis Number of Fish passages — H/M/L — High = >25; Moderates = 5-25; Low = <5 4WD access — H/M/L — High = 4WD; Moderate = No data; Low = not 4WD Length of access — H/M/L — High = >250km; Moderate = 100-250km; Low = <100km Constraint complexity — H/M/L — High = >25; Moderates = 5-25; Low = <5

2. Specification

The following diagrams provide an overview for physical access to assets for the following perspectives:

1. Delivery of physical access to assets
2. Decision making for physically accessing assets
3. Evaluating if physical access to assets are fit-for purpose

Figure 2-1 Delivery of Physical Access to Assets

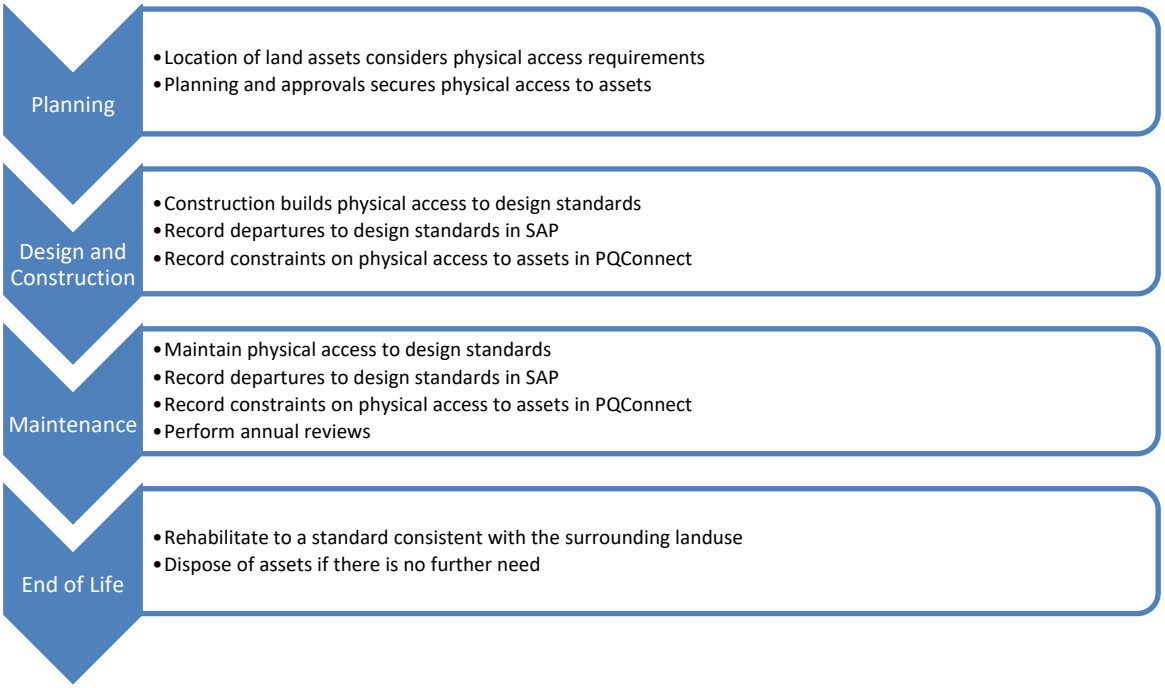


Figure 2-2. Decision Making for Physically Accessing Assets

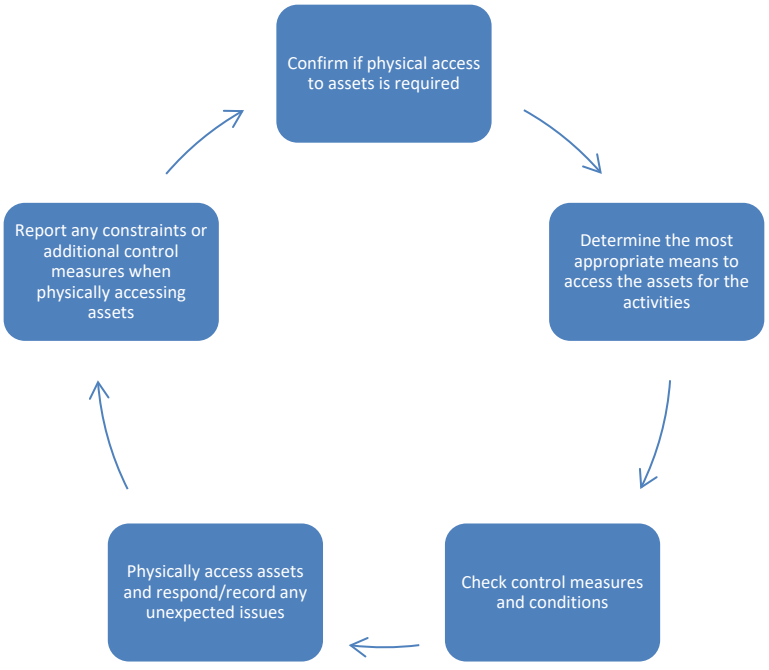
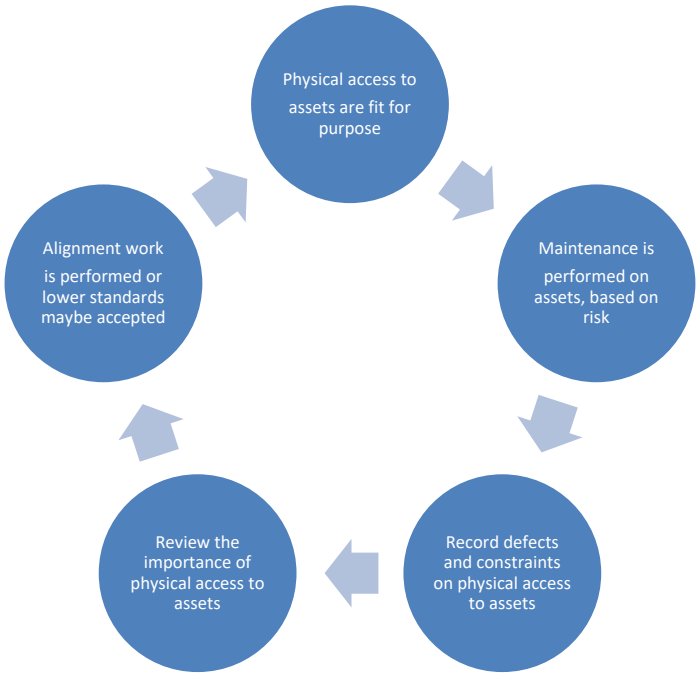


Figure 2-3 Evaluating if Physical Access to Assets are Fit-for Purpose



3. Requirements

Powerlink accepts that not all assets can be physically accessed safely in all weather conditions and applies risk management principles to form the following typical guidelines:

- Lines = dry weather 1 tonne 4WD ground access + some aerial and water access (higher standard maybe necessary for 500kV networks, including securing access easements where tracks depart from the transmission line easement
- Substations = dry weather 2WD ground access where practical/economical to do so, otherwise dry weather 4WD access; emergency landing pads will also be maintained where they exist in remote locations
- Communication sites (PQ owned/controlled) = dry weather 1 tonne 4WD ground access, unless higher standards reduce long term costs (business case required) or commercial agreements are in place
- Non-operational assets = accountability for access is left with the tenants, unless commercial arrangements stipulate access requirements for Powerlink to maintain

Safety, whole of life costs, asset maintenance, project delivery, landholder requirements and environmental impacts all need to be considered as part of establishing and maintaining access to assets. This includes considering the following issues:

- Access types
- Criticality to HV Network
- Uses of access
- Asset life cycle
- Elements of access
- Stakeholders
- Alternatives to Accessing Assets

3.1 Access Types

The following types of access require maintenance and management:

- Ground
    - No access (some assets may have been constructed in a remote location and accessing them is not allowable or feasible unless an emergency or refurbishment project is needed); target <1% of assets
    - Pedestrian access (some assets can only be accessed on foot); target <2% of assets
    - Public access (some assets can be accessed using public roads); dependant on the route acquisition process
    - Restricted access (someone else places restrictions on Powerlink's access to the assets, including washdown requirements and inductions)
    - Private access: Dry weather 4WD (applies to 95% of lines and communication sites; Elevated Work Platform access should be <10%, higher standards maybe expected for 500kV assets)
    - Private access: Dry weather 2WD (target 90% of substations)
    - The following responsibilities apply for transmission line dry weather 4WD access tracks associated with accessing line assets:
        - Powerlink maintained
        - Powerlink shared maintenance

        - Maintained by other organisations
        - Public access
        - Unknown
    - The following categories apply for transmission line dry weather 4WD access tracks associated with accessing line assets:
        - On-easement access
        - Off-easement access
        - Associated properties (access, but no built assets or easements)
- Air
    - Remote substation emergency landing pads; optional, but should meet standards if installed
    - Substation and communication emergency landing directions (i.e. safe entry and departure) to be determined by pilots based on conditions
    - Over canopy landing pads on towers; target <1% of assets
    - Flights paths: CASA + notifying Network Operations & Stakeholder Relations
- Water
    - Boat access to the base of towers or registered signage; target <1% of assets

3.2 Importance to HV Network

In planning, designing, constructing, maintaining and refurbishing access to assets, the importance of the access to the HV Network needs to be considered. In particular, importance will be applied to assist in determining priorities for funding refurbishment projects. Factors that impact the importance of access include:

- Criticality to network security
- Legal security of access
- Ability to use alternative access
- Other users and appropriate cost sharing arrangements

3.3 Uses of Access

Access standards will also vary depending on the use of the access, including:

- Inspections and Audits
- Maintenance
- Refurbishment Works
- Capital Works

Given maintenance for lines is typically designed for 1 tonne 4WD ground access, standards may not suit the needs for capital or refurbishment project delivery where heavy machinery may be needed. Subsequently, projects should have adequate budget allocation to upgrade access to meet required changes. Once completed, the standard of access should meet the requirements for maintenance

During the maintenance phase, annual measuring points will be maintained on the condition of access for spans as outlined in Land Asset Condition Assessment Specification. Annual review programs will consider measuring points, notifications and elements of access outlined in section 3.5 of this report. This review will coincide with the annual review of vegetation management programs.

3.4 Asset Life Cycle

Risk management principles need to be applied throughout the asset life cycle, including:

- Planning/Approvals
    - Written agreements with landholders and registered access easements where needed for off-easement or associated access, recognising joint usage
- Design/Construction
    - Road impact assessments (public and private)
    - Road usage plans (public and private)
    - Access for construction purposes (Powerlink)
- Maintenance
    - Routine and Condition based maintenance
    - Refurbishment
    - Emergency maintenance (e.g. during severe weather events)
- Mothballing, decommissioning or surrendering
- Monitoring the external environment for impacts (e.g. compliance, town planning, development approvals and landuse changes)

3.5 Elements of Access

The following elements need to be considered in all stages of the asset life cycle, applying risk managementprinciples:

- Road/track length associated with Built Sections have been entered into SAP as a Built Section characteristic
- Road/track surface (Objective: provide the lowest long term cost access that manages the associated risks appropriately)
    - Grass
    - Compressed earth
    - Gravel (<15mm)
    - Rock (>15mm)
    - Bitumen
    - Concrete
- Drainage (Objective: drain water off the running surface of roads/tracks/pads to reduce long term costs)
    - Crowned surface
    - Out-slope surface
    - Whoa boys
    - Diversion drains
    - Turn out drains
    - Culverts
    - Camber
    - Cut and fill
- Water crossings (Objective: safely cross waterways, while reducing long term costs)

  - Bed level crossings (refer to self-assessable codes)
  - Culverts (engineering advice required)
  - Bridges (owned and maintained by other authorities)
- Washdowns: see drawings H_154843_001-4 for design details (Objective: install/maintain washdown facilities where they reduce long term costs and meet compliance obligations)
  - Permanent washdown facility
  - Permanent washdown facility (no tank or pump)
  - Temporary washdown site (inspection point)
  - Mothballed

Commercial and agency managed washdowns should be used where possible to reduce the need for Powerlink to invest and maintain washdowns for its own purposes. These facilities also provide broader community benefits for others to meet their biosecurity obligations.

- Landholder requirements as per Powerlink's LAP and PQConnect (Objective: manage landholder requirements in a manner that reduces long term costs)
- Working in wet weather conditions
- Gates & Locks (Objective: install/maintain gates to reduce long term costs of accessing assets and maintaining security)
  - Landholder
  - Powerlink
  - Other
- Fences (Objective: install/maintain fences to reduce long term costs of accessing assets andmaintaining security)
  - Landholder
  - Powerlink
  - Joint
- Emergency landing pads should be positioned approximately 50m from a substation security gate with a graded walking platform. Objective: provision of emergency landing pads near high voltage substations in remote locations as described below:
  - All Small substations or Medium to Large substations located <200km from a major deport, consideration should be made for a possible safe landing area. In most cases, access will be via the road network with dry weather 2WD access. Consideration should be made for a possible safe landing area for these sites with input from Asset Strategies, Network Operations and Operational Support Services.
  - Medium to Large substations in remote locations >200-350km from major depots, drawing A3-H-119519_01 will apply. Access from the emergency landing pad and the substation gate should be kept mown to allow for safe passage and managed in a similar manner to 5m buffer zone around the substation security fence. These landing pads are infrequently used, but provide some business benefits that should be considered in substation site acquisitions and design, but should not be a driver for additional land acquisition and does not require all aspects of the Substation Civil and Structural Design Specification (A5278070) to be considered. Departures are to be considered by Asset Strategies, Network Operations and Operational Support Services.
  - Medium to Large substations in remote locations >350-600km from a major depot, helicopter land pad drawing H_119519-03 should apply, including all design requirements as described in the Substation Civil and Structural Design Specification (A5278070). These landing pads are used more frequently and assist in driving operational efficiency and safety, which may require

additional land acquisition to accommodate the requirements. Departures are to be considered by Asset Strategies, Network Operations and Operational Support Services.

  - Substations in outback locations (>600km from a major depot) are beyond the reach of a helicopter in an emergency without refuelling. For this reason, fixed wing access solutions are preferred in these instances with bespoke operational arrangements to be put in place. Consideration should be made for a possible safe landing area for these sites with input from Asset Strategies, Network Operations and Operational Support Services.
  - CASA flight restrictions
  - Landholder Notification
  - Network Operations
  - Identified safe entry/exit
  - Operational needs of the business
- Safety (Objective: manage safety behaviours, while reducing long term costs of accessing assets)
  - Climbing at heights requirements
  - Signage
  - Speed
  - Entry/exit angles and obstructions/hazards
  - UXOs
- Natural environment (Objective: consider the natural environment, while reducing long term costs of accessing assets)
  - Vegetation
  - Soils
  - Topography
  - Rainfall
- Surrounding landuse (Objective: consider surrounding landuse, while reducing long term costs of accessing assets)
- Customer connection agreements (Objective: comply with customer connection agreements, while reducing long term costs of accessing assets)
- Risk Factors (Objective: consider risk factors, while reducing long term costs of accessing assets) should be considered as part annual land maintenance review
- Risk ownership (Objective: ensure that risk is appropriately managed and owned)
  - Powerlink owned risk
  - Shared risk (document and record in corporate systems)
  - Stakeholder owned risk (contractors and landholders will own risks associated with undertaking their own activities)
- Environmental compliance (Objective: comply with environmental regulatory requirements, while reducing long term costs of accessing assets)
  - Environmental Work Plans

3.6 Stakeholders

Stakeholders should be contacted when accessing our assets has potential to impact on their activities (e.g. mustering stock). Significant interactions and complaints need to be recorded in PQConnect.

For substations sites, stakeholders would generally be restricted to distribution entities that may have sharedaccess (e.g. Energy Queensland), but may include generators and landholders. Referring to the relevant environmental work plan (EWPs) will assist with understanding the requirements.

For communication sites, this may require some planning and contact to landholders and/or owners of the assets to confirm access conditions and restrictions. This should include checking requirements of the relevant EWPs.

For lines and easements, detailed planning is needed to ensure that stakeholder considerations and access conditions have been considered as part of journey planning and work scheduling. This must include checkingrequirements of the relevant EWPs.

3.7 Alternatives to Physically Accessing Assets

Alternatives to physically accessing assets need to be evaluated to assist in minimising long term costs and impacts through reducing the need for physically accessing assets. This includes:

- Laser Surveys (assess asset conditions from data sets from laser surveys)
- Aerial photography (assess asset conditions from data sets from aerial photography)
- Satellite imagery (assess asset conditions from data sets from satellite imagery)
- Digital communications (communicate with landholders and stakeholders using phone calls and emails to determine asset conditions)