Department of Planning, Housing and Infrastructure

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NSW GOVERNMENT

Transmission Guideline

November 2024

Guidance for State significant transmission infrastructure

Acknowledgement of Country

The Department of Planning, Housing and Infrastructure acknowledges that it stands on Aboriginal land. We acknowledge the Traditional Custodians of the land, and we show our respect for Elders past, present and emerging through thoughtful and collaborative approaches to our work, seeking to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.

Published by NSW Department of Planning, Housing and Infrastructure

dphi.nsw.gov.au

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First published: November 2024

Current version: 1.0

Department reference number: DOC24/867372

Contents

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Glossary of terms

Term	Explanation
Authorised network operator	Privately managed network businesses as defined under the NSW *Electricity Network Assets (Authorised Transactions) Act 2015*
Benefit sharing	Approaches and mechanisms that aim to distribute the financial and other benefits of a project between the applicant and the host community
Critical state significant infrastructure	Development that the Minister for Planning has declared to be essential for the State for economic, environmental or social reasons
Determining authority	The authority responsible for granting or refusing consent for a development or modification application
Distribution network	The interconnected system of electrical infrastructure that delivers electricity from the transmission network to end users, such as homes, businesses, and industries
Environmental impact statement	A document prepared by or on behalf of the applicant to accompany a development application that includes a comprehensive assessment of the environmental, social and economic impacts of the project
Landscape	A holistic area comprised of landform, vegetation, buildings, villages, towns, cities and infrastructure
Landscape character	An area or sense of place definable by the quality of its built, natural and cultural elements
Major transmission infrastructure project	Energy transmission projects that are declared as State significant infrastructure or critical State significant infrastructure
Planning Secretary	The Secretary of the Department of Planning, Housing and Infrastructure
Planning Secretary's environmental assessment requirements	Requirements that set out the matters that must be addressed in an environmental impact statement
Proponent	A person seeking approval for an application for a State significant infrastructure project

Term	Explanation
Protected area	Lands reserved or otherwise protected for conserving biodiversity or Aboriginal cultural heritage – this includes lands reserved under the *National Parks and Wildlife Act 1974*, flora reserves under the *Forestry Act 2012*, declared wilderness under the *Wilderness Act 1987*, Indigenous protected areas, world heritage areas and Ramsar wetlands
Renewable energy zone	A designated area to support renewable energy development as declared in the *Electricity Infrastructure Investment Act 2020*
State significant infrastructure	Infrastructure development declared to have state significance due to its size, economic value or potential impacts
Transmission network	The high-voltage network of power lines and associated infrastructure that carries electricity over long distances from power generation facilities to distribution networks
Transport and Infrastructure SEPP	Refers to the State Environmental Planning Policy (Transport and Infrastructure) 2021. Outlines the planning rules for delivering most infrastructure works and facilities across NSW
Viewpoint	A location within the private or public domain with a potential view of a transmission project
Visual magnitude	The apparent size of a transmission infrastructure project in the landscape or when viewed from a given viewpoint

1 Introduction

Australia is undergoing a transformation that will change the way that we generate and use energy. The national energy sector is transitioning from depending on large coal-fired generators to embracing diverse renewable energy generation, storage and transmission.

We need new transmission infrastructure to connect renewable energy sources to the electricity grid and to ensure NSW is supplied with the cleanest and most affordable energy into the future.

This guideline supports major upgrades and expansions to the NSW transmission network and aims to provide communities, industry and regulators with clear and consistent information and guidance on planning and developing this infrastructure.

This guideline is supported by a *Technical Supplement for Landscape and Visual Impact Assessment* that provides detailed guidance and tools for assessing, evaluating and mitigating the visual and landscape impacts of major transmission infrastructure projects.

1.1 Objectives

The objectives of this guideline are to:

- help proponents, the community and transmission industry to understand the NSW planning framework and how it relates to major transmission infrastructure projects
- improve the clarity, certainty and transparency of the assessment and determination of major transmission infrastructure projects in NSW
- provide clear guidance about the route selection process
- explain the typical impacts associated with major transmission infrastructure projects, particularly visual impacts, and how they should be assessed and managed
- support the safe, considered and efficient roll-out of major transmission infrastructure projects.

1.2 Application of the guideline

This guideline applies to the development of major transmission projects that are declared as State significant infrastructure or critical State significant infrastructure. It applies to the development of the high-voltage electricity lines, but it does not apply to the lower-voltage distribution network.

Proponents of major transmission projects must consider the guideline and its supporting technical supplement as referenced in the Planning Secretary's environmental assessment requirements. Proponents must prepare their environmental impact statements according to the technical guidance.

This guideline does not apply to standalone battery energy storage systems or distribution networks.

1.3 Strategic context

Our state's coal-fired power stations, which have been a reliable source of electricity for generations, are aging and scheduled to close in the next 15 years. As they reach the end of their operational life, they become more expensive to maintain. The cheapest form of energy generation with which to replace these stations is renewable energy.

We need to urgently invest in renewable energy infrastructure to transition our energy system and ensure NSW has continued access to cheap, clean and reliable energy. This includes investing in energy storage, the technology to maintain outputs from intermittent power sources and transmission infrastructure. The NSW Government's Electricity Infrastructure Roadmap sets out a 20-year plan to ensure that the transition happens in an orderly way and benefits everyone.

The transmission network is estimated to have a connection capacity of 16 GW in areas with favourable renewable energy resources, which is substantially less than the 125 GW of new grid-scale renewable energy required by 2050.

The existing NSW transmission network, shown in Figure 1**,** is made up of more than 13,000 km of 500 kV, 330 kV, 220 kV and 132 kV transmission lines. These transmission lines were mostly built in the 1950s to 1990s to connect traditional energy sources such as coal-fired power stations to NSW's population centres.

The roadmap, along with the Australian Energy Market Operator's Integrated System Plan 2022, plans for around 10,000 km of new transmission infrastructure across Australia over the next 2 decades to address capacity issues and accommodate new renewable sources of energy generation. Some 4,000 km of this is required in NSW.

Without investment in new infrastructure, the transmission network will quickly reach capacity. New sources of energy generation will not be commercially viable, and NSW will be unlikely to reach its net zero emissions target.

1.3.1 Renewable energy zones

As part of its Electricity Infrastructure Roadmap, the NSW Government has committed to deliver at least 5 renewable energy zones (REZs) that will expand transmission and generation capabilities in strategic areas across NSW (see Figure 1). The planned zones are in the Central-West Orana, New England, South-West, Hunter Central Coast and Illawarra regions of NSW and are all currently at various stages of development and delivery.

REZs are modern-day power stations. They combine renewable energy generation with the required transmission infrastructure in dedicated areas of NSW with high energy resource potential.

Transmission upgrades to and within the REZs will help facilitate the development of renewable energy generation projects at a lower overall cost.

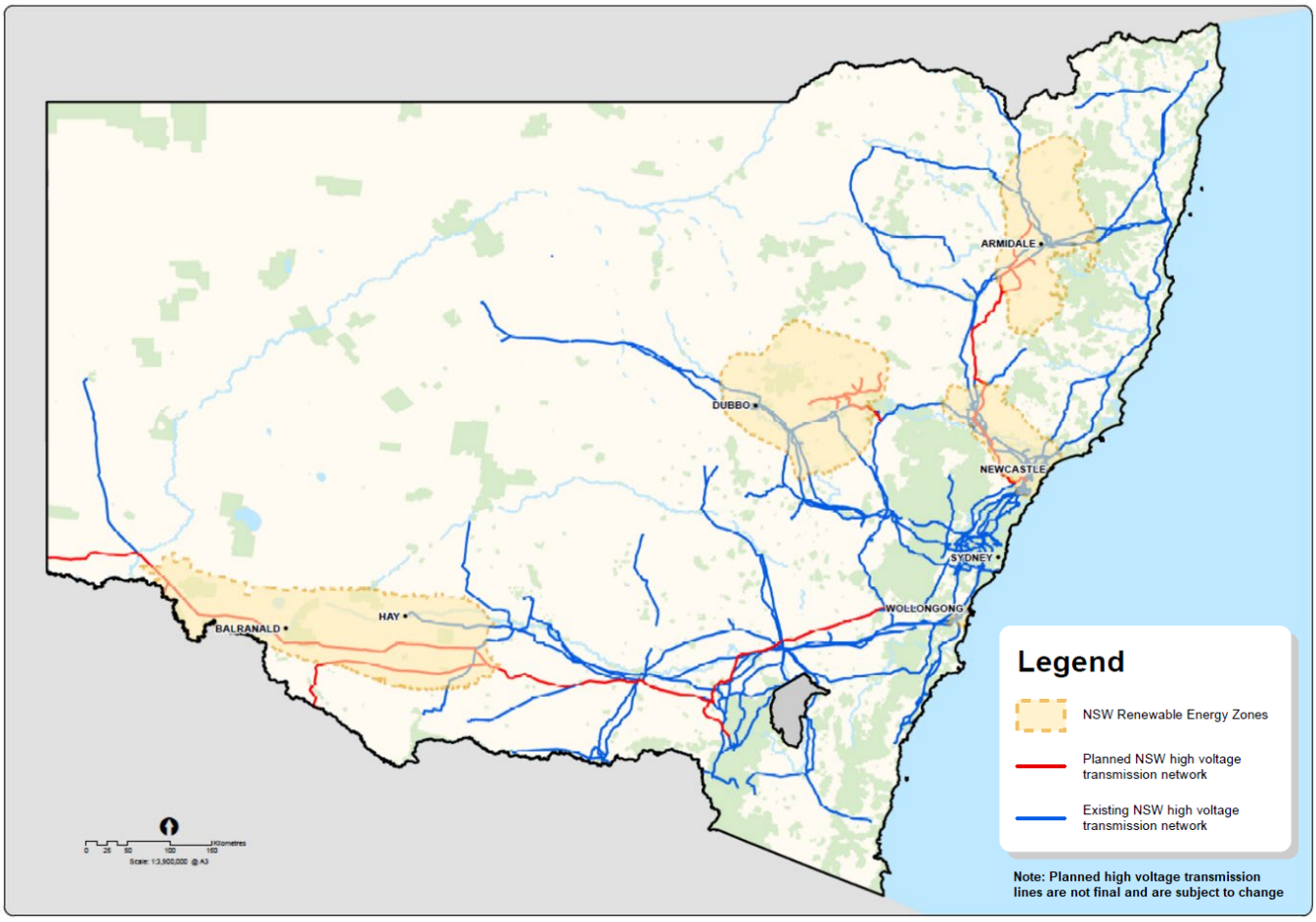


Figure 1. Existing and planned high-voltage transmission infrastructure

1.4 About transmission infrastructure

Transmission infrastructure refers to the network of powerlines and equipment that transports electricity from the point of generation to substations. It can be thought of as a highway system for electricity. In NSW, transmission infrastructure has existed alongside the community for over 70 years. From substations, electricity is distributed to homes, businesses and other places where it is needed via the distribution network. The key elements of transmission infrastructure and distribution are shown in Figure 3.

The most common elements of transmission infrastructure are high-voltage aluminium alloy wires supported by large steel-lattice towers. These wires enable electricity to flow over long distances and span hundreds of kilometres. The size of transmission towers depends on factors such as voltage level, physical and environmental constraints along the selected route and public safety

considerations. They typically range in height from 30 to 60 m and are spaced around 400 to 600 m apart (see Figure 2). Some projects may require specially designed towers up to 80 m high for large land crossings. While less common, transmission infrastructure may also be located underground, as discussed in section 6.2 of this document.

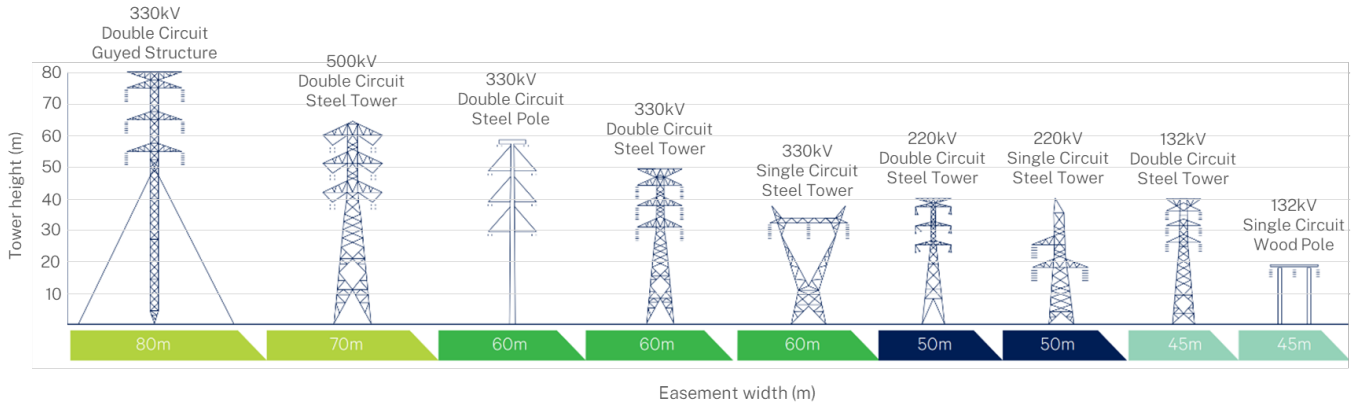
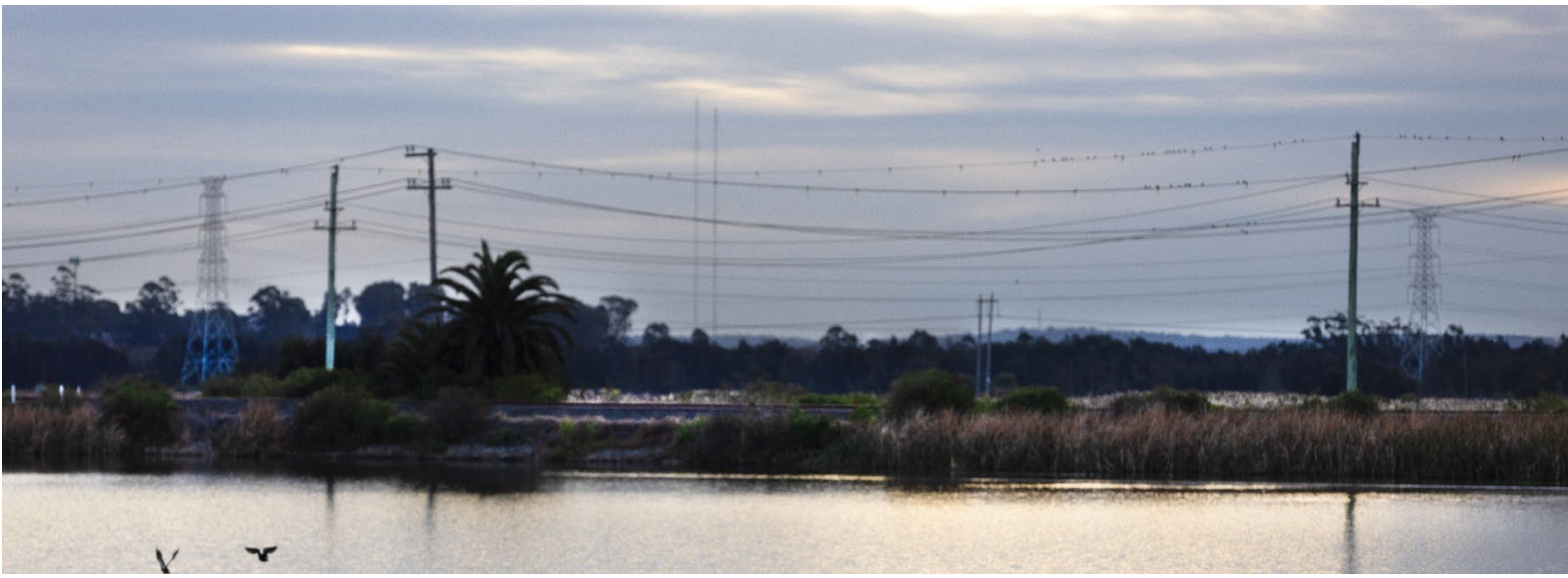


Figure 2. Example transmission tower designs, heights and easement widths (Source: Transgrid's Easement Guidelines)

Transmission lines are typically located within easements that restrict some activities on the land. These easements are designed to reduce safety risks associated with high-voltage electricity and prevent disruption of the network. They also provide a right of way to allow construction, operation and maintenance of the infrastructure, as well as vegetation clearing. Despite the restrictions, a range of activities and land uses can continue in most parts of an easement, including agricultural activities such as cropping, grazing and irrigation, the provision of public open space.

Easements vary in width depending on the voltage and design of the infrastructure. Figure 2 shows examples of transmission tower designs along with heights and easement corridor widths. Easement corridors are generally acquired through negotiations with relevant landowners and are subject to private agreements (see section 6 of this guideline).



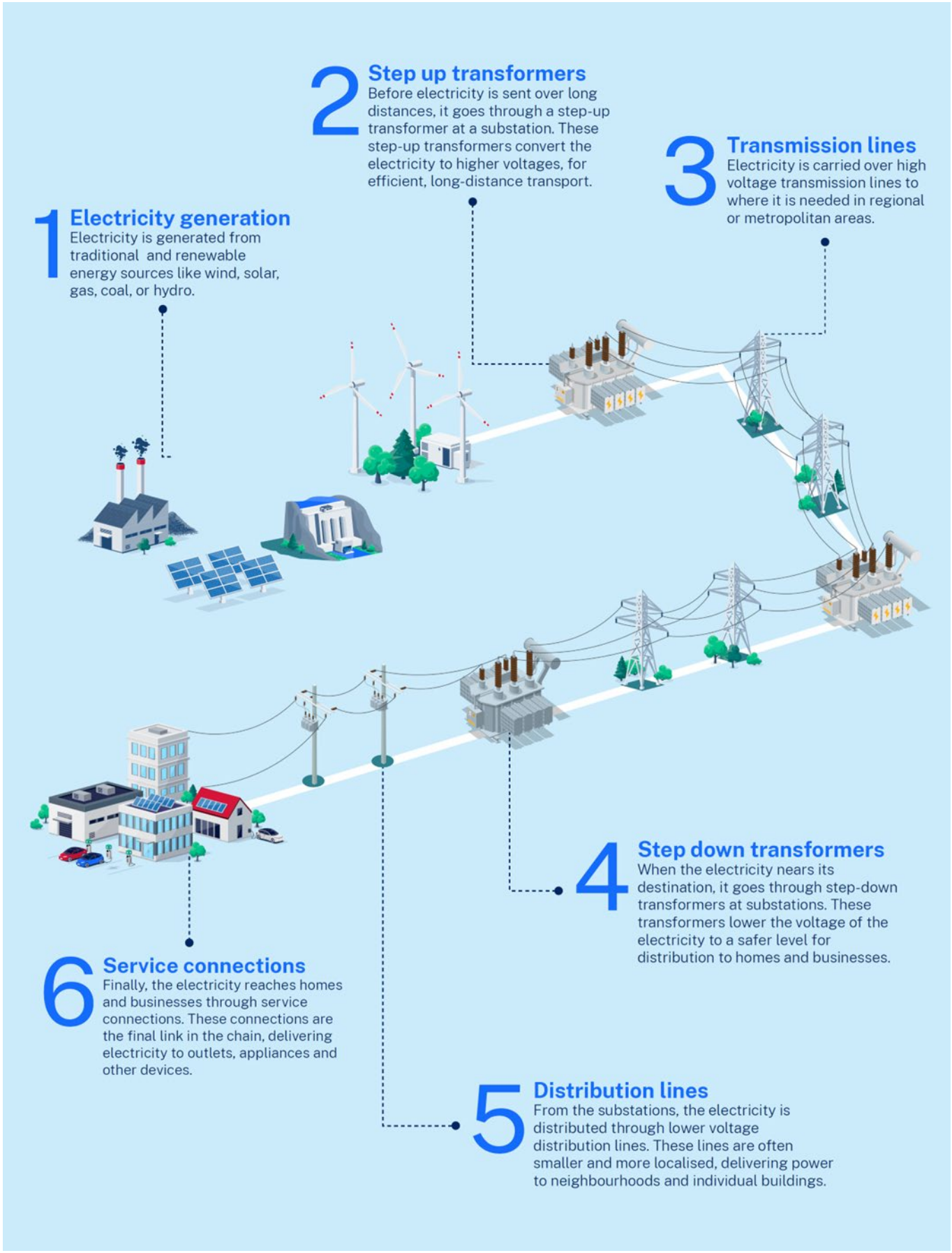


Figure 3. Indicative elements of transmission and distribution infrastructure

1.4.1 Relevant operators and authorities

The energy market in NSW operates under the National Electricity Market, which covers several states and territories in Australia. The National Electricity Market is a wholesale market where electricity is bought and sold between generators, retailers and large consumers. It is overseen by the Australian Energy Market Operator, which manages the market operations and ensures the reliability and security of electricity supply. The Australian Energy Market Operator is responsible for transmission planning as identified in the Integrated System Plan.

The high-voltage transmission network in NSW is owned by the Electricity Transmission Ministerial Holding Corporation, which leases it to Transgrid. Once electricity reaches the distribution stage, it is delegated to one of 3 distribution companies in NSW who are responsible for delivering electricity to consumers. The 3 distribution companies (Ausgrid, Endeavour Energy and Essential Energy) are each responsible for a separate geographic region of NSW.

These network businesses are referred to as 'Authorised Network Operators' in the NSW *Electricity Network Assets (Authorised Transactions) Act 2015.* These network operators, in addition to Transgrid and any future additional network operators identified for the REZs, may also be responsible for developing and operating future transmission networks in NSW.

The Energy Corporation of NSW (EnergyCo) is a statutory authority established under the NSW *Energy and Utilities Administration Act 1987* and is the appointed infrastructure planner for the NSW renewable energy zones. EnergyCo's role includes co-ordinating and planning, designing, constructing and operating network infrastructure in the renewable energy zones on behalf of the authorised network operators.

The Department of Planning, Housing and Infrastructure is responsible for assessing major transmission infrastructure projects according to the provisions for State significant infrastructure or critical State significant infrastructure under the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) (see section 2.1 of this guideline). We provide our recommendation to the Minister for Planning and Public Spaces, who decides whether to approve a project.

1.5 Regulatory approvals

Transmission infrastructure projects undergo a multi-phase test to determine a preferred project option from a range of alternatives.

In general, transmission projects to support renewable energy zones will be considered through the framework established under the NSW *Electricity Infrastructure Investment Act 2020*. This includes priority transmission infrastructure projects, which are critical transmission projects identified by the Australian Energy Market Operator and then by the NSW Minister for Energy for reliability,

efficiency and security of power supply. In particular, these projects are intended as a response to address forecast breaches of the NSW Energy Security Target, which occurs when there is insufficient electricity generation capacity to meet demand. These projects are subject to their own economic assessment process (the Transmission Efficiency Test), however the Australian Energy Regulator still has a role in the revenue determination process.

Most other transmission projects, such as interconnectors, are considered through the Australian Energy Market Commission's national framework for transmission network planning.

1.5.1 The National Framework

The NSW electricity system is part of the National Electricity Market which connects the electricity systems of Queensland, NSW, Victoria, South Australia, and Tasmania. Alongside its primary responsibilities of overseeing the operation and management of the National Electricity Market, the Australian Energy Market Operator also has the role of planning, forecasting, and modelling long-term system needs through network planning. This includes publishing an Integrated System Plan every two years.

The Integrated System Plan is a plan for the efficient development of large transmission, generation, and storage infrastructure across the National Electricity Market to achieve power system needs over the next 30 years.

Transmission projects identified in the Integrated System Plan are categorised as "actionable" projects which are critical to address cost, security, and reliability issues.

Regulation under the national framework is a multi-step process that consists of the Regulatory Investment Test for Transmission (RIT-T) process prescribed under the National Electricity Rules and the Australian Energy Regulator's contingent project application process.

1.5.2 Regulatory Investment Test for Transmission

The RIT-T is a specific form of cost-benefit analysis that transmission providers must apply to proposed transmission investments that exceed a capital cost threshold published by the Australian Energy Regulator (currently set to $7 million).

The RIT-T can be likened to a business case for any project or venture. Its purpose is to identify the investment option that delivers the highest net economic benefit to those who produce, transport and consume electricity in the National Electricity Market. The RIT-T ranks different options, based on scenarios, financial modelling and sensitivity testing, to identify the option with the highest net present value (NPV), termed the "preferred option".

1.5.3 Contingent Project Application Process

After the preferred option has been confirmed through the RIT-T process, the transmission proponent must seek a determination from the Australian Energy Regulator of the costs of delivering the project. This involves preparing a contingent project application that provides an accurate estimate of the costs of the preferred option. Obtaining an estimate typically necessitates the proponent undertaking an engineering, procurement and construction tender process on the global market.

The NSW planning approval process is carried out at the same time as these processes and is described in subsequent sections of this guideline.

2 NSW planning framework

The NSW planning framework consists of the EP&A Act, the NSW Environmental Planning and Assessment Regulation 2021 (EP&A Regulation) and a range of environmental planning instruments, including state environmental planning policies and local environmental plans.

This framework identifies where certain types of development may be carried out – with or without consent – and sets out an assessment process that is proportionate to the scale, importance, risk and impact of that development.

Transmission development is defined under State Environmental Planning Policy (Transport and Infrastructure) 2021 as an 'electricity transmission or distribution network'[1] and includes above- or below-ground:

- electricity transmission or distribution lines and related bridges, cables, conductors, conduits, poles, towers, trenches, tunnels, ventilation and access structures
- electricity kiosks or electricity substations, feeder pillars or transformer housings, substation yards or substation buildings.

Under section 2.44 of the State Environmental Planning Policy (Transport and Infrastructure), 'development for the purpose of an electricity transmission or distribution network, carried out by, or on behalf of, an electricity supply authority or public authority' is permissible without development consent under part 4 of the EP&A Act. However, on land reserved or acquired under the NSW *National Parks and Wildlife Act 1974*, such development can only occur if the development is authorised under that Act.

This means that transmission development does not usually require approval from a consent authority such as the department. It can be self-determined by an electricity supply authority or public authority following an environmental assessment under part 5 of the EP&A Act.

However, if this type of development is of sufficient importance to the state and/or is likely to have a significant impact on the environment, it can become State significant infrastructure or critical State significant infrastructure.

2.1 Transmission as 'State significant infrastructure'

Most major transmission infrastructure development in NSW will be considered State significant infrastructure or critical State significant infrastructure because it is important or essential to the state for economic, environmental or social reasons.

[1] As noted in section 1.4, this guideline only applies to transmission projects and not distribution networks.

2.1.1 State significant infrastructure

Transmission development can be declared State significant infrastructure in 2 ways.

It can be declared State significant infrastructure if it is likely to have a significant impact on the environment. Under Schedule 3 of the State Environmental Planning Policy (Planning Systems) 2021 (the Planning Systems SEPP), transmission development is considered State significant infrastructure if it requires an environmental impact statement and if the proponent is also the determining authority. Under section 5.7 of the EP&A Act, an environmental impact statement is required for transmission development if it is likely to have a significant impact on the environment.

Specified transmission development on specified land can be declared State significant infrastructure by an order of the minister. All developments declared by the minister as State significant infrastructure are listed in Schedule 4 of the Planning Systems SEPP.

The minister is the determining authority for State significant infrastructure, however a senior departmental officer may exercise the minister's approval authority functions where:

- the council of the area within which the project is located has not objected to the project
- less than 50 submitters have objected to the project
- the proponent has not made a reportable political donation.

2.1.2 Critical State significant infrastructure

The minister may also declare development to be critical State significant infrastructure under section 5.13 of the EP&A Act if the infrastructure is considered essential to the state for economic, environmental or social reasons. Our Declaration of SSI and CSSI – State Significant Infrastructure Guide) sets out the general principles and reasons for the minister to declare development as critical State significant infrastructure.

Development declared as critical State significant infrastructure is listed in Schedule 5 of the Planning Systems SEPP. The assessment process for critical State significant infrastructure is fundamentally the same as for State significant infrastructure (see section 2.2 of this guideline). However, the following key provisions apply to critical State significant infrastructure applications:

- The minister is the determining authority for all critical State significant infrastructure decisions and cannot delegate this function (for instance to any senior departmental staff).
- A decision cannot be subject to judicial review (a review of the administrative decisions and conduct) by the Land and Environment Court unless approved by the minister.
- A development control order, for example an order to deal with compliance issues such as a stop work order, cannot be given in relation to critical State significant infrastructure without the approval of the minister.

- Certain directions, orders or notices under other legislation cannot be given to prevent or interfere with approved critical State significant infrastructure.

2.2 Process for assessing major transmission projects

All major State significant and critical State significant infrastructure transmission projects will be subject to a rigorous, merit-based assessment that includes extensive community consultation and a detailed consideration of any environmental, social and economic impacts. The main steps in the assessment process are shown in Figure 4 and summarised below. The process is explained in more detail in our State Significant Development Guidelines.

All State significant infrastructure and critical State significant infrastructure applications must be accompanied by an environmental impact statement. The purpose of the environmental impact statement is to help the community, councils, government agencies and the consent authority understand the impacts of a project so they can make informed submissions or a decision about a project's merits.

Applicants must prepare the environmental impact statement according to the Planning Secretary's environmental assessment requirements. The assessment requirements identify the information the applicant must provide and the community engagement they must carry out.

To enable us to issue the Planning Secretary's environmental assessment requirements, the proponent must submit a scoping report that provides a clear overview of the project and identifies the key environmental assessment issues. The overview should include information such as the project's location, proposed layout and proximity to important features, protected areas and neighbours.

The applicant must outline in the scoping report how they have engaged with the local community and relevant government agencies in the preliminary planning phase and how they intend to undertake meaningful consultation with affected stakeholders during the assessment process (refer to section 4 of this guideline).

The applicant must prepare the scoping report to a high standard and in line with our State Significant Development Guidelines.

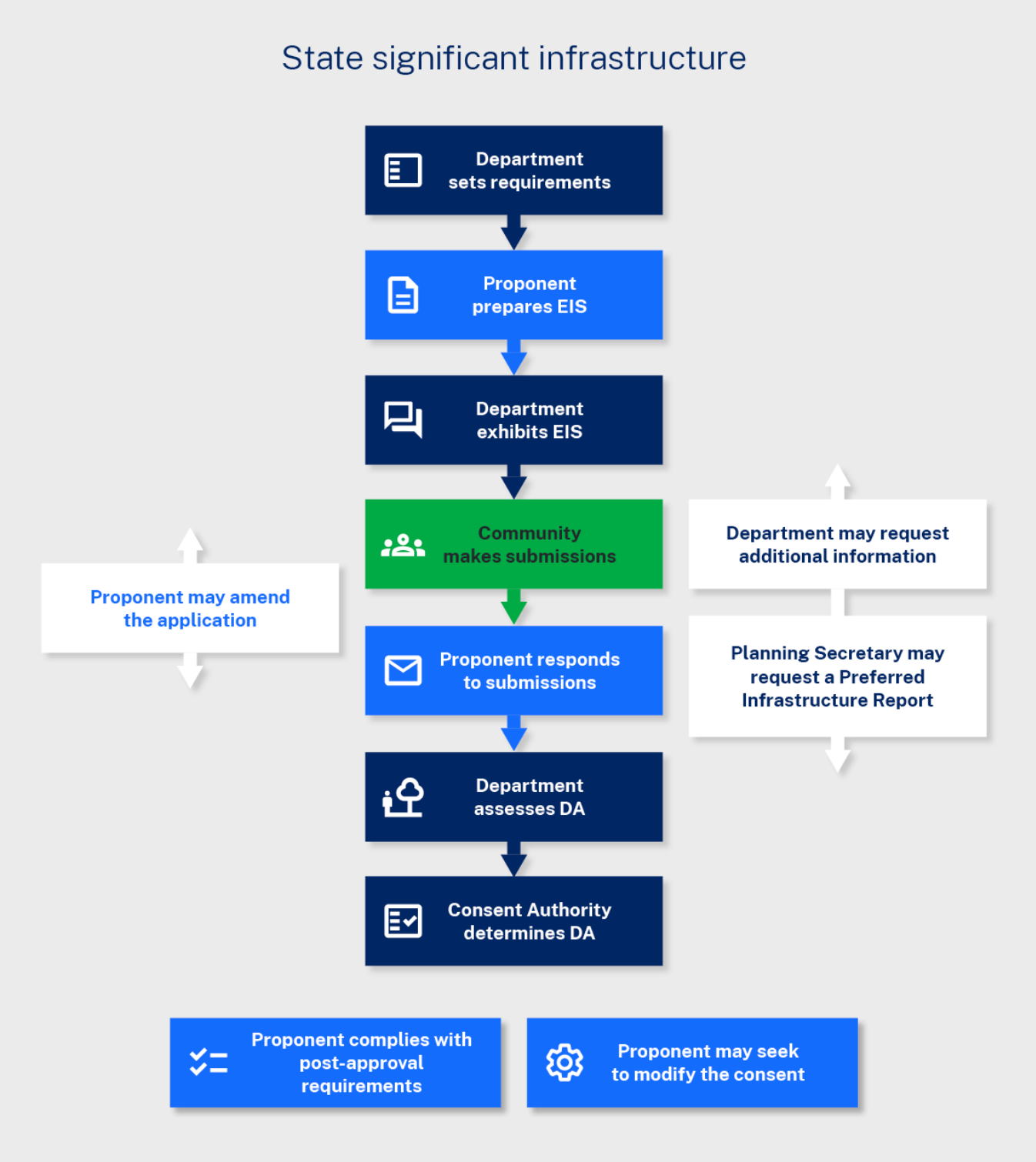


Figure 4. Overview of State significant infrastructure assessment process

While the length of the environmental impact statement will vary depending on the scale and nature of the matters requiring detailed assessment, the main report should be as succinct as possible. The proponent should prepare the environmental impact statement according to the general requirements outlined in the department's State significant infrastructure guidelines – preparing an environmental impact statement.

Once we receive the environmental impact statement, we will exhibit it and the development application for at least 28 days, or longer if the exhibition extends over the Christmas and New Year period[2]. This gives the community an opportunity to have a say on the merits of a project before any final decision is made. Other government agencies may also provide advice during this stage.

After the proponent has responded to submissions from the exhibition, we will assess the proposal. We aim to complete assessments of State significant infrastructure projects within 100 days. In undertaking its assessment, the department may request additional information from the proponent. The time taken to respond to any major requests for information is not counted in the department's assessment timeframes. We are committed to assessing projects within this time frame to ensure the efficient roll-out of infrastructure with economic, environmental and/or social significance for the state.

After we have completed our assessment, the approval authority will determine the State significant infrastructure application.

2.3 Australian Government approval

If a project is likely to have a significant impact on matters of national environmental significance or other protected matters, the Australian Government may need to give approval under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act). This includes, but is not limited to, projects that have impacts on listed threatened species and ecological communities, world heritage properties and Ramsar wetlands.

In such cases, proponents must refer their project to the Australian Department of Climate Change, Energy, the Environment and Water.

The Australian Government's Significant Impact Guidelines will help applicants determine whether they need to refer their project. You can make a referral through the Australian Government's EPBC Act Business Portal.

The NSW assessment process for State significant infrastructure and critical State significant infrastructure under the EP&A Act has been accredited under a bilateral agreement with the Australian Government. The assessment of both state and federal matters can be integrated into a single assessment process to ensure federal and state laws don't duplicate planning processes.

After we determine a project under the EP&A Act, the Australian Government makes its decision under the EPBC Act by reviewing the department's report and issuing any additional conditions of consent as part of its approval.

[2] Schedule 1, Clause 16, *Environmental Planning and Assessment Act 1979*.

3 Route selection

Good route selection can avoid or minimise negative impacts at the outset of a development, allowing the assessment to focus on mitigating and managing unavoidable impacts.

3.1 Foundational principles

The foundational principles outlined in this section should be used to guide the design and development of major transmission projects. Transmission infrastructure should be co-located with existing infrastructure and/or maximise the use of already disturbed land (such as land already cleared of vegetation for other purposes) where possible to help streamline construction and reduce environmental and social impacts.

The scale of major transmission infrastructure projects makes it difficult to select routes that do not present some challenges. Many environmental and land use factors also compete. For example, avoiding agricultural land could lead to impacts on important biodiversity values. It will not be possible to avoid negative impacts entirely.

The route selection process should avoid impacts as far as possible while striking an appropriate balance between competing commercial, technical, environmental and social factors. Priority areas in which to avoid negative impacts include areas of recognised high conservation value such as national parks, world heritage-listed properties and Ramsar wetlands.

The route selection process should also consider the nature and magnitude of the impacts from the project as well as feedback from landowners and the local community.

When applied correctly, the foundational principles will help ensure transmission infrastructure is designed appropriately, minimises environmental and social impacts and provides a cost-effective and value-for-money option. Further information on key assessment issues, including visual and biodiversity impacts, is provided in section 5 of this guideline.

3.1.1 Principle 1 – Efficiency and deliverability

Projects should be efficient from an economic and technical perspective and be deliverable in time to meet the consumer demand and investment need. Given that the cost of transmission lines is passed on to consumers through electricity bills, the cost and affordability of new infrastructure should be strongly weighted in the evaluation of route options.

However, while the most cost-effective option for linear infrastructure projects is to take a straight-line from point to point, this option is not generally feasible due to a range of environmental, social, land use and engineering constraints.

3.1.2 Principle 2 – Environment and land use

Environmental impacts should be avoided, minimised or mitigated and best-practice environmental management incorporated into project design. Impacts on important biodiversity and cultural values should be a key consideration.

Projects should be located on suitable public land where practicable. An exception would be areas protected due to their environmental, cultural, heritage and recreational values (such as national parks). When weighing up the appropriateness of prioritising public land over private land, proponents should carefully consider the inherent characteristics and purposes of different categories of public land and their underlying social, economic, environmental and cultural values.

3.1.3 Principle 3 – People and communities

Projects should avoid and minimise social impacts as much as possible, including those associated with visual amenity. Direct interactions with town centres, residential areas and other sensitive land uses should be minimised.

3.2 Route selection process

Route selection is an iterative process that involves analysing technical, environmental, social and economic factors and making incremental improvements to project design. The process involves identifying and evaluating different project options and selecting a preliminary study area. The proponent then refines the preliminary study area to identify a preliminary project corridor that will be the subject of a detailed environmental assessment, resulting in a final project corridor.

The key steps for each phase are described in sections 3.2.1 and 3.2.2 of this guideline.

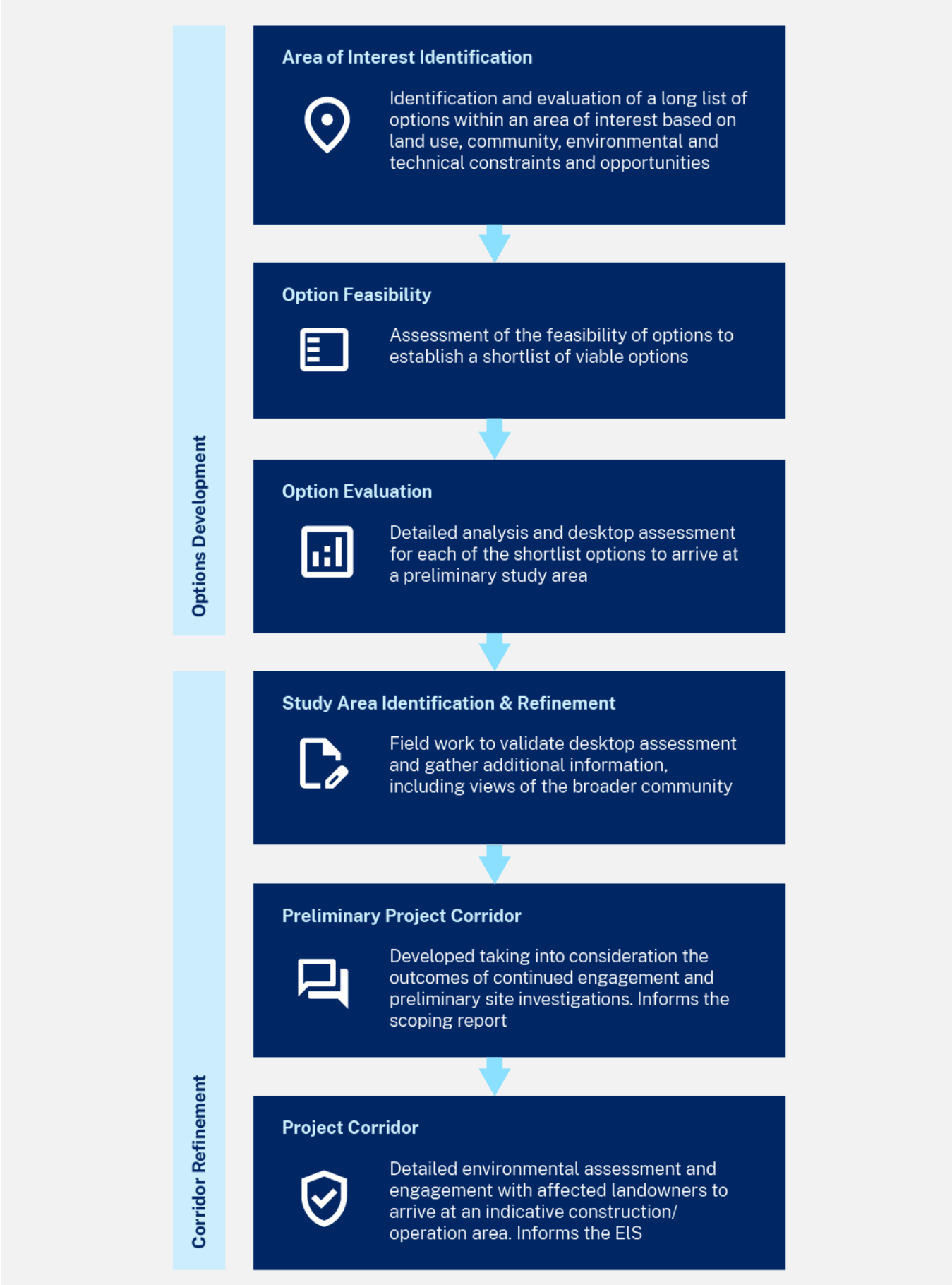


Figure 5. Overview of route selection process

3.2.1 Options development

The options development phase involves identifying a range of reasonable and feasible project options and evaluating them against the foundational principles. This will allow proponents to identify a preliminary study area.

Proponents should begin by identifying a long list of project options within an area of interest. The list should be based on land use planning and the community, environmental and technical opportunities and constraints that apply to the development of a project.

Proponents can then assess the feasibility of the options to establish a shortlist. The types of options explored through this process depend on a wide range of variables, including the:

- start and end points of the transmission infrastructure
- physical and technical characteristics of the infrastructure, including voltage (for example, 330 kV or 500 kV), single or double circuit configuration, overhead or underground
- composition of greenfield versus brownfield works, including the potential for using existing infrastructure corridors and paralleling existing electricity easements
- potential for undergrounding transmission infrastructure
- use of non-network (non-transmission) infrastructure such as grid-connected storage
- staging and sequencing of project delivery.

Proponents can then further evaluate the shortlist of feasible options to identify a preliminary study area. For each shortlisted project option, this may include mapping:

- Aboriginal areas reserved under the National Parks and Wildlife Act, Aboriginal places declared under that Act, sites recorded in NSW Environment and Heritage's Aboriginal Heritage Information Management System and landscapes with a high likelihood of unrecorded sites
- non-Aboriginal heritage items listed on recognised heritage registers and databases
- areas of high environmental value (including threatened species and ecological communities) and protected areas such as national parks, declared wilderness nature reserves, wetlands and conservation areas
- biophysical strategic agricultural land
- major waterbodies, waterway crossings and riparian vegetation.

A high-level summary of the options considered (including the potential for undergrounding) must form part of the scoping report for the project. This summary must include any alternatives to carrying out the project and the opportunities and constraints of each option.

Early engagement considerations

While we encourage stakeholder consultation during the options-development phase (see Figure 5) project options will often remain broad at this stage to allow for further refinement. Consequently, there may be a high level of uncertainty about the final project corridor, its location and the people who will be impacted.

Proponents should carefully consider the need to consult on project options when details are overly conceptual or uncertain. Engagement needs to balance the benefits of providing stakeholders with the opportunity to participate in the options evaluation process, whilst also avoiding unnecessary anxiety for communities that are not ultimately impacted.

It may be appropriate to target engagement to representative bodies and groups which will help the proponent gather feedback whilst avoiding unnecessary anxiety for many individual land holders. These might include Aboriginal community representatives, environmental groups, agricultural groups, business groups and community reference groups.

Proponents should be prepared to engage and respond to community concerns in the early phases of project development. Where questions cannot be immediately addressed, proponents should ensure transparency about the provisional nature of early planning and the steps that will be taken to provide information and consider the preliminary views of the community in the route selection process.

Community engagement is discussed further in section 4 of this guideline.

3.2.2 Corridor refinement

As constraints are identified and opportunities to minimise potential disturbance are confirmed, proponents should identify a preliminary project corridor that provides a higher degree of confidence around the likely project footprint.

The refinement of the project corridor is an iterative process. It typically involves incremental improvements to project design, including the technical and functional specifications, as proponents develop a better understanding of the relevant social and environmental issues (such as interaction with the landscape values and community concerns).

As part of this process, proponents should:

- undertake preliminary studies and field work where appropriate to validate the desktop assessment and gather additional information. This may include initial field surveys to identify key biodiversity values (where land access permits)

- undertake predictive modelling of potential heritage and cultural heritage sites and review any native title claims to determine potential constraints
- continue to consult with the broader community to identify further opportunities and constraints and to build awareness about the project.

Further guidance around how proponents should undertake community and stakeholder engagement is provided in section 4 of this guideline.

The proponent should gather information to determine a preliminary project corridor that will be subject to a detailed environmental assessment. The corridor may be further refined through the planning approval process. Proponents should continue consultation with the representative bodies identified during the options development stage.

Proponents should present the preliminary project corridor in the scoping report along with a description of:

- the route selection methodology
- how the corridor was identified and evaluated against alternative corridors, with reference to the foundational principles
- key opportunities and constraints (including an identified study area for landscape and visual impact assessment – see *Transmission Guideline – Technical Supplement for Landscape and Visual Impact Assessment for more details*)
- how community input informed the selection of the preliminary project corridor.

Proponents should further refine the preliminary project corridor when preparing the environmental impact statement, using local considerations identified through the engagement process.

Direct engagement with landholders should commence when it is reasonably likely they will be affected. Consideration of land uses and site features at an individual property level, in consultation with landowners, should also be a key input to the final project corridor.

Other things proponents must do during the environmental impact statement process that will inform the project corridor include:

- preparing detailed environmental, cultural and social impact assessments, land access negotiations, geotechnical studies and a preliminary engineering design
- engaging with the Aboriginal community, including about any native title claims, to identify any high-level cultural values not recorded in the Aboriginal Heritage Information Management System database and to confirm the location and extent of recorded sites – this consultation may identify specific management and mitigation measures that can be implemented to address identified impacts

- consulting with other stakeholder groups such as conservation bodies, local communities and government agencies to identify specific management and mitigation measures that can be implemented to address identified impacts
- meeting with individual landowners and public land managers to get information about the specific characteristics of their properties or the lands under their management.

The environmental impact statement should report on feedback received from the community and demonstrate how this has influenced the final project corridor.

4

Community and stakeholder engagement

Effective community and stakeholder engagement is essential in the development of major transmission infrastructure and the environmental assessment process. It is important that proponents consider a diverse range of views to achieve positive outcomes.

While proponents must make all reasonable efforts to respond to feedback and address localised impacts where possible, this must be considered alongside the broader benefits that new transmission infrastructure can provide for NSW. Investment in new transmission infrastructure is needed to increase the capacity of the grid, facilitate new sources of energy generation and help NSW reach its net zero emissions target.

There are broader community engagement rules for proponents as part of the Australian Energy Regulator's 'Regulatory investment test for transmission' process for identified Integrated System Plan projects or projects within a renewable energy zone. Further information about these rules can be found on the Australian Energy Market Commission's web pages.

The Energy and Climate Change Ministerial Council has also published *The National Guidelines for Community Engagement and Benefits for Electricity Transmission Projects*. These guidelines have been prepared to elevate and reinforce the importance of building social licence with communities and should be considered by applicants alongside this guideline.

Once a project enters the NSW planning assessment process, we expect proponents to undertake consultation according to our *Undertaking Engagement Guidelines for State Significant Projects*.

These guidelines include requirements for proponents to:

- provide clear and concise information to the community and stakeholders about projects and their impacts
- implement activities that encourage and facilitate public participation
- report back on what was heard and what has or hasn't changed in response to this feedback (that is, closing the loop) and why.

The Planning Secretary's environmental assessment requirements and consent conditions may include additional consultation requirements to make sure that the level of engagement undertaken is proportionate to the scale and likely impacts of the project, and to identify any additional key stakeholders that should be consulted.

The community should be engaged throughout the environmental assessment process to identify potential opportunities and constraints. These could relate to the design of the project, the characterisation of the area and/or management and mitigation measures.

For example, local communities may provide input into characterising scenic quality and landscape sensitivity to inform a landscape and visual impact assessment (see Technical Guideline).

During the environmental impact statement stage, opportunities for input may relate to potential mitigation measures for visual impacts, informed by landholder meetings, or to understand property-specific considerations and constraints.

Proponents must ensure that stakeholders are given the opportunity to participate in the engagement process in a meaningful way. Proponents should clearly outline the details of consultation activities with surrounding residents, community members, relevant authorities and councils in the environmental impact statement. This should include key matters raised and how feedback was integrated into the project.

Proponents must also be mindful of consultation fatigue caused when there are multiple proponents undertaking consultation with a community at the same time. Proponents should be respectful of the time communities invest in engagement activities and be sensitive to engagement requests from other proponents occurring in the community.

Proponents should continue to engage with stakeholders after a projects are approved, including during construction, operation and decommissioning. They should also establish and implement transparent complaints management and dispute resolution mechanisms that ensure community concerns are addressed in a timely manner.

The department also has a role to play in consulting with stakeholders. We are required to:

- consult with relevant government agencies and councils
- exhibit the environmental impact statement for public comment for a minimum of 28 days
- publish documents and submissions relating to the project on the NSW Planning Portal
- ask the proponent to respond to issues raised in submissions and to help the community and stakeholders understand how issues have been addressed and considered
- outline our decision or recommendation about whether planning approval should be given for the project, including how community feedback was considered.

5 Key assessment issues and considerations

5.1 Landscape and visual impacts

Transmission towers are static structures built with a lattice frame, often made of steel. Given their industrial character, they can contrast with the rural and urban areas in which they are built. However, some changes to our rural and natural landscapes will be necessary to facilitate a transition to renewable energy and to support the delivery of important transmission infrastructure.

This guideline and its supporting *Technical Supplement for Landscape and Visual Impact Assessment* (visual impact assessment technical supplement) aim to achieve balanced outcomes that avoid and manage significant landscape and visual impacts while supporting this change.

Visual impacts vary depending on the size of the towers, the distance they are located from public viewpoints or private locations such as residential dwellings (referred to as 'private receivers'), the number of towers visible, where they are being viewed from and the scenic quality of the view. Rural areas are typically more sensitive to the visual impacts of transmission infrastructure than urban areas, where it is a common part of the overall urban fabric.

In some circumstances, transmission towers can be visually dominating despite the scenic quality or importance of the view. For example, a single 80 m tower will generally have a dominant appearance if located within approximately 380 m of a rural dwelling. A tower of this height will be a prominent feature in a rural landscape up to 1.5 km away, after which it will become less noticeable. Beyond this distance, towers can be difficult to see against the backdrop of vegetation and other features of the landscape (see Figure 6).

The visual impact assessment technical supplement outlines thresholds for a range of tower sizes (see section 3.2 of the supplement) in both rural and urban settings. Visual impacts can largely be managed through tower siting and mitigation measures, such as vegetation screening and agreements with affected landowners.

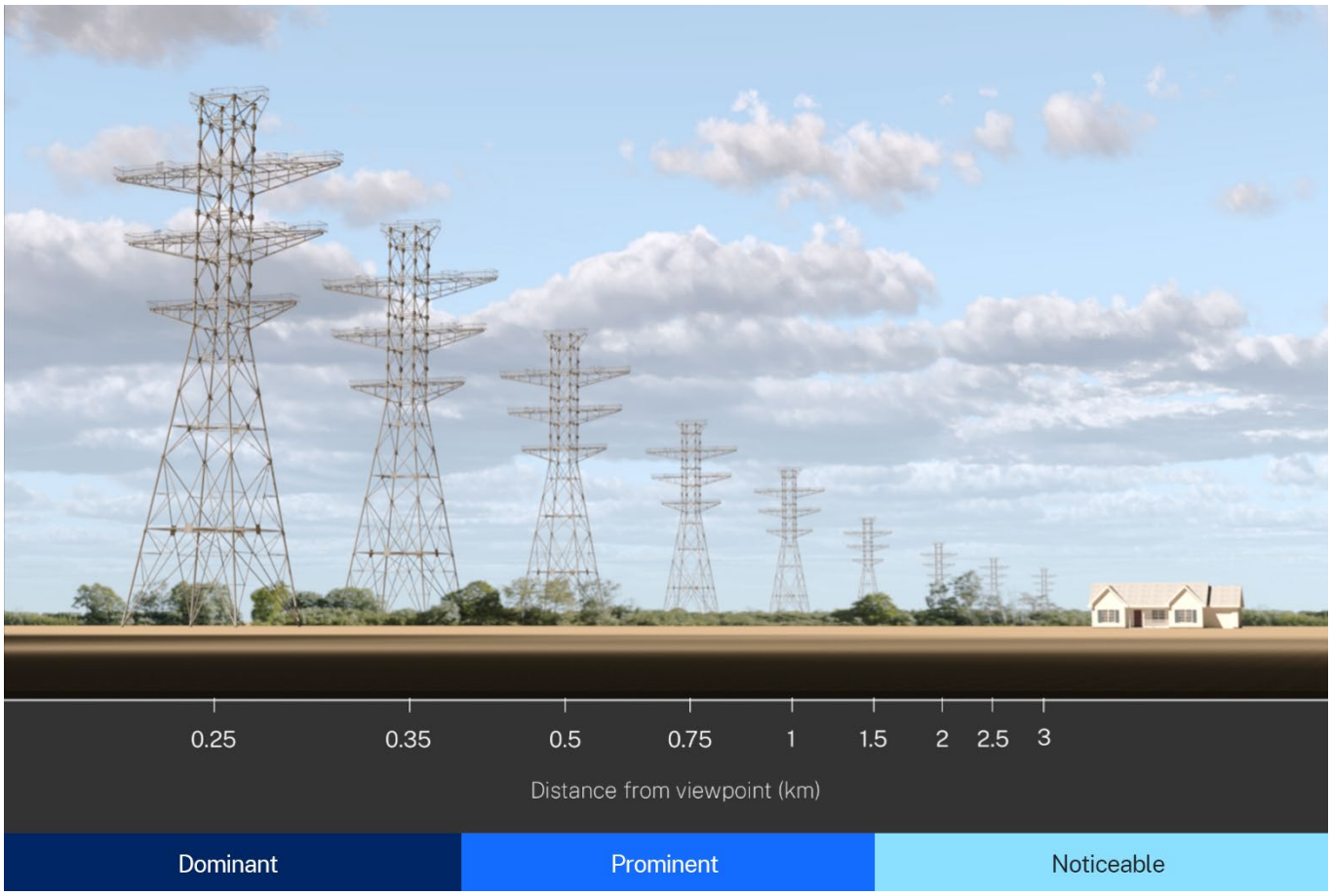


Figure 6. Visual prominence of 80 m transmission towers in rural areas[3].

5.1.1 Landscape and visual impact assessment

The proponent must prepare a landscape and visual impact assessment in accordance with the technical supplement to this guideline. The supplement provides a methodology for assessing, evaluating and mitigating potential impacts on landscape character and individual viewpoints.

The purpose of a landscape character assessment is to understand the sensitivities of the landscape and to determine a project's impact on the character of the area and sense of place.

Proponents must conduct a baseline study as part of their landscape character assessment to establishes an area's existing character and sensitivity. It is important that the study is prepared in consultation with the community (including Indigenous communities), local council and potentially affected landholders early in the EIS preparation process to identify and establish the importance of certain landscape values and characteristics. The impact of the proposal on the landscape should be determined by evaluating the sensitivity of the landscape and the magnitude of the project's effects in that area.

[3] The tower design is indicative only. The dwelling and tree line are approximately 250 m from the viewpoint.

The purpose of a visual impact assessment is to determine any impacts on private receivers and viewpoints in the public domain. The technical supplement includes tools to determine the viewpoints that need to be assessed, the level of assessment required and the extent of the impact. These consider factors such as

- views from some viewpoints are more sensitive than others (for example, a residence is more sensitive than a local road, where views are more intermittent and less frequent).
- a view is more sensitive to change if it has higher scenic qualities and more valued features.
- a view from a rural dwelling is more sensitive than a view from an urban dwelling.

Impacts are assigned a rating from 'very low' to 'high' based on these considerations. Applicants must avoid high impacts (unless they can be justified or the applicant has an agreement with the affected landowner) and provide mitigation (such as vegetation screening) to reduce moderate impacts. Appendix C of the technical supplement provides a range of visual impact examples.

5.2 Biodiversity

Transmission infrastructure can impact biodiversity values through the clearing of native vegetation and management of vegetation within easements. These impacts can be significant given the extensive distances often required for major transmission connections. As with other major linear projects of this scale, it is not feasible to completely avoid any intersections with native vegetation. The best way to minimise the amount of vegetation clearing is to avoid and minimise these intersections during the route selection process by:

- prioritising areas where native vegetation and species habitat are in the poorest condition
- using existing access tracks where possible
- targeting narrow waterway crossing points to minimise clearing of riparian vegetation.

If a project would clear native vegetation, threatened species habitat or ecological communities, the environmental impact statement must include an assessment under the NSW *Biodiversity Conservation Act 2016*, and the proponent must produce a biodiversity development assessment report using Biodiversity Assessment Method 2020.

We expect proponents to demonstrate that they have applied the principles of avoidance, minimisation and mitigation in selecting route options. Unavoidable impacts can be offset by purchasing and/or retiring biodiversity credits or paying the Biodiversity Conservation Fund under the Biodiversity Offset Scheme.

Further detail about this process can be found on the Biodiversity Offsets Scheme web pages.

6 Secondary assessment issues

A range of other assessment issues are discussed in this section. While these are not typically key issues in our assessment of projects, they are commonly raised by communities as issues of concern.

6.1 Agricultural land use

Agricultural land has attributes suitable for transmission infrastructure. It is often flat and accessible. This helps with construction and ongoing maintenance of the infrastructure. Agricultural land is also often cleared of vegetation, which may limit biodiversity impacts.

Agricultural land can continue to support grazing and cropping adjacent to and underneath transmission lines. While there may be some exceptions, the cumulative risks and impacts to agricultural land and productivity due to transmission infrastructure are typically very low. Transgrid has published Easement Guidelines – Living and working with electricity transmission lines, which sets out the requirements for agricultural activities undertaken within Transgrid easements (including around towers).

Assessing the impacts on agricultural land should focus on any operational impacts that may arise, such as temporarily restricted movements during construction and maintenance and disrupting irrigation or aerial agricultural operations. Proponents should consult with affected landowners to explore opportunities for co-existence and reduce the impacts on agricultural activities.

Proponents must also implement erosion and sediment controls during construction. This is to mitigate and manage potential soil impacts and minimise ground disturbance, divert runoff around disturbed areas, implement stockpile management procedures and progressively rehabilitate temporary construction areas. Proponents must also implement biosecurity management protocols during and after construction.

6.2 Undergrounding

It may be possible for transmission projects, or sections of projects[4], to be located underground depending on the type of land, voltage, required capacity and length of the circuit.

Burying high-voltage transmission lines may also be appropriate in certain settings, such as in densely populated urban areas or near airports.

While this can help avoid and mitigate some impacts of a project, particularly visual impacts, the benefits are largely outweighed by other environmental impacts, land use conflicts and costs.

[4] As recommended in the Select Committee Inquiry into the Feasibility of Undergrounding the Transmission Infrastructure for Renewable Energy Projects (report published March 2024)

As noted in the 2023 Parliamentary inquiry into the feasibility of undergrounding transmission infrastructure, the cost and time to install underground transmission infrastructure can vary substantially based upon site-specific conditions, the type of technology used and the method of installation. But it is at least double the cost of above-ground infrastructure and typically takes longer to construct. The cost of installing and maintaining transmission infrastructure is passed on to consumers and is therefore an important factor in route selection and project design.

Another consideration for undergrounding transmission is the surface and subsurface disturbance associated with installation and ongoing operation. The disruption from underground lines can be more severe than that from overhead lines[5]. Trenching, which is the most common and generally lowest-cost method of constructing underground transmission infrastructure, typically requires removal of all above-ground vegetation as well as 1 to 2 m of the ground surface.

The land above underground transmission infrastructure must be kept clear of any deep-rooted vegetation (such as trees and large shrubs) to prevent damage to underground cabling and to allow access in the event of a fault or for maintenance. In addition, locating faults and repairing underground cables can be a complex and time-consuming exercise, requiring highly specialised equipment and expertise.

While underground infrastructure typically requires a smaller easement these easements prevent other productive uses of the land, such as some agricultural and horticultural uses, which would otherwise be possible with above-ground lines.

The potential benefits of undergrounding need to be carefully weighed against the environmental and economic costs. The feasibility of undergrounding will be considered on a project-by-project basis.

6.3 Bushfire risk

When planned and properly maintained, high-voltage overhead transmission lines pose little risk of igniting bushfires. In the Parliamentary inquiry into the feasibility of undergrounding transmission infrastructure, it was reported that bushfires in Australia caused by electricity infrastructure were usually ignited by distribution powerlines or equipment below 66 kV and not those in voltage ranges of 110 kV and above. The inquiry also acknowledged that authorities have put considerable effort into managing the bushfire risk of powerlines, including providing and maintaining adequate clearances from conductors to vegetation.

In the event of a bushfire, transmission lines can be quickly shut down for safety reasons (if deemed necessary by the Rural Fire Service). This greatly reduces the risk of fire spreading and causing

[5] Feasibility of undergrounding the transmission infrastructure for renewable energy projects (Parliament NSW, August 2023)

significant damage to infrastructure. It also allows on-the-ground and aerial firefighting activities to be done with significantly less risk.

To ensure that the risk of bushfire from transmission infrastructure remains low, proponents should do frequent ground and aerial assessments to manage any vegetation in the easement and to assess the condition of towers and transmission lines.

Proponents should also adhere to the following development standards when designing, constructing, operating and maintaining transmission infrastructure:

- Australian Standard AS5577-2013 – Electricity Networks Safety Management Systems
- Australian Standard AS3959-2018 – Construction in Bushfire-prone Areas for the construction of new buildings.

Proponents should minimise the proportion of the route in high-risk bushfire areas, where feasible, as part of the project design and route selection process. They must also prepare and implement an emergency management plan and bushfire risk management plan for the project.

6.4 Electric and magnetic fields

Electric and magnetic fields occur naturally in the environment due to electric currents generated by lightning in the atmosphere and from the Earth's magnetic core. Electric and magnetic fields are also present in homes and the built environment wherever there is electricity. They emanate from common appliances like toasters and from powerlines and transmission infrastructure.

There is a commonly held concern that electric and magnetic fields from transmission infrastructure have the potential to affect human health. The NSW Government and this guideline accept the advice of the World Health Organisation and the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) on this matter. Both advisory bodies note that exposure to low-level electric and magnetic fields, such as the levels found around the home or near powerlines, does not cause adverse health effects[6][7].

Australia has adopted national standards for electric and magnetic fields that draw on the guideline set by the International Commission on Non-Ionizing Radiation Protection as updated in 2020. The guidelines are aimed at preventing the established negative health effects resulting from exposure to extremely low-frequency electric and magnetic fields and are consistent with ARPANSA's advice.

[6] Australian Radiation Protection and Nuclear Safety Agency: Electricity and health web pages and World Health Organisation: Electromagnet fields web pages

[7] EnergyCo: Electric and magnetic fields

The recommended limit of exposure to magnetic fields is 2,000 milligauss (mG)[8]. Magnetic field levels for a 330 kV and 500 kV transmission line range from 10 mG to 50 mG when measured at the edge of the line and from 20 mG to 200 mG when measured directly beneath the line.

The international reference level for general human exposure to electric field levels is 5 kV/m set by commission. Levels above this limit can be expected directly beneath high-voltage transmission lines. However, electric fields reduce quickly with distance from the source, are easily shielded by most materials and structures and cannot pass through objects in the way that magnetic fields can. Consequently, they are not generally an issue for major transmission infrastructure projects.

While the risks are generally low, proponents should carry out an assessment of electric and magnetic field levels as part of the environmental impact statement to ensure all projects meet the exposure guidelines set by the International Commission on Non-Ionizing Radiation Protection and ARPANSA.

The NSW Government will continue to monitor contemporary scientific research outcomes to ensure its position on any health effects is based on robust evidence, including advice released from the World Health Organisation and APRANSA.

6.5 Aviation

Transmission lines can pose a risk to low-flying aircraft (at or below 60 m) as the lines can be difficult to see and may blend into the surroundings and horizon.

Proponents must consider designated air routes and aerial land management activities during route selection (subject to landowner and land manager feedback) and assess any potential impacts on aviation communication and navigation.

We encourage proponents to consult with landholders and land management agencies about installing markers where they consider the infrastructure to be a risk to aerial activities. Overhead transmission lines should be marked in accordance with *Australian Standard AS 3891.1:2021 Air navigation – Cables and their supporting structures – Marking and safety requirements* and in consultation with the transmission network provider.

Proponents should also supply maps of the transmission alignment to firefighting authorities that undertake aerial firefighting activities (including Rural Fire Service and the NSW National Parks and Wildlife Service) before beginning construction.

Towers and ancillary infrastructure may occasionally require minimal safety lighting. Proponents should minimise the off-site lighting impacts of the project. Any external lighting associated with

[8] The strength of magnetic fields is described in one of 2 units, microtesla (μT) or milligauss (mG), where 1 μT = 10 mG. ARPANSA: How close can I live or work near powerlines or other electrical sources?

the development should not shine above the horizontal and should comply with the Australian/New Zealand Standard *AS/NZS 4282:2019 – Control of Obtrusive Effects of Outdoor Lighting*.

6.6 Other assessment issues

Table 1 gives an overview of other matters relevant to transmission developments that require consideration and assessment.

Table 1. Summary of other assessment issues

Issue	Assessment
Aboriginal heritage	An assessment of the likely impacts on Aboriginal cultural heritage must be undertaken and should include consultation with the Aboriginal community according to the Aboriginal cultural heritage consultation requirements for proponents.
Non-aboriginal heritage	An assessment is required of potential non-Aboriginal heritage (cultural and archaeological) impacts.
Social and economic impacts	A social impact assessment is required for all state significant projects and should be undertaken according to the department's Social Impact Assessment Guideline for State Significant Projects. This should consider any increase in demand for community infrastructure and services, such as the need for temporary construction workers accommodation.
Water	An assessment of potential hydrology, flooding and water-quality impacts and mitigation measures to address these impacts is required.
Soil and contamination	An assessment of the impact on soils and land capability of the site and surrounds and the risk of soil contamination from the project is required.
Air quality	An assessment of the air quality impacts of the project is required. This should include consideration of any construction and ongoing operational impacts.
Noise	An assessment of the construction, operational and road noise and vibration impacts of the project is required.
Traffic and transport	An assessment of the transport impacts of the project on the capacity, condition, safety and efficiency of the local and state road network is required. This should consider construction-related impacts as well as ongoing maintenance works required to service the infrastructure.
Waste	A waste management assessment is required. This assessment should identify, quantify and classify the likely waste streams to be generated during the construction and operation of the project, and describe measures to manage, reuse, recycle and safely dispose of any waste.

7 Access arrangements and acquisition agreements

7.1 Access arrangements

The proponent may need consent from some landholders and public land managers to enter properties to carry out field work and environmental surveys. Where proponents and landowners cannot come to an agreement to facilitate access, or other legal right of access cannot be negotiated, proponents may opt to use powers under the NSW *Electricity Supply Act 1995* to enter private land.

7.2 Acquisition agreements

Once the study corridor has been sufficiently narrowed and a detailed route developed, proponents will notify affected landowners that an easement may be required on their property. This will start the negotiation process for easement acquisition.

For private lands, the process is set out in the NSW *Land Acquisition (Just Terms Compensation) Act 1991* and provides a mechanism for compensating landowners through a one-off payment. This payment must include the market value of the land and reasonable costs and expenses. It may also include loss due to severance and disturbance (including potential impacts to the affected property).

If the parties cannot reach an acquisition agreement, a compulsory acquisition process may be initiated, and the NSW Valuer General will determine the amount of compensation. A landowner can appeal the compensation amount through the NSW Land and Environment Court.

Further information for landholders about land and easement acquisition and compensation processes can be found on EnergyCo's web page and at the NSW Centre for Property Acquisition.

The NSW Government also has general principles for engagement. Proponents should consider these when negotiating agreements with landowners. The principles include:

- clearly informing landowners about the purpose of the engagement
- engaging as early as is appropriate and providing timely information
- providing accurate information that is easy to understand and access
- using plain language
- being open and transparent about the terms of the agreement
- ensuring that landholder expectations are properly managed from the outset.

As far as is reasonable, proponents should identify those residences that may be subject to any agreements in the environmental impact statement, noting this may be subject to change as the final project design is refined.

8 Strategic benefit payments

In understanding the payment schemes that apply to transmission infrastructure projects, it is important to distinguish that compensation and community benefits are not the same.

Compensation must be paid to host landholders for the direct economic impacts and changes in land use that occur when land is acquired for transmission infrastructure. This is a legal entitlement and not considered a project benefit.

The NSW Government has separately established a Strategic Benefits Payments Scheme to provide payments to landowners who host major transmission projects that are critical to the energy transition.

Under this scheme, landholders will receive annual payments for hosting high-voltage transmission infrastructure on their land for a period of 20 years. The total payments will be $200,000 per kilometre of transmission hosted (in real 2022 dollars)[9].

These payments will provide affected landholders with financial benefits that complement compensation for easement acquisition.

For further information, including details on eligible projects, see Strategic Benefit Payments Scheme on the EnergyCo website.

[9] Strategic Benefit Payments Scheme (EnergyCo, 2024)