Energy Grid ALLIANCE

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Director – Energy Assessments
Development Assessment
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Submitted online via www.planningportal.nsw.gov.au/major-projects/projects

SUBMISSION IN RESPONSE TO THE ENVIRONMENTAL IMPACT STATEMENT OF THE HUMELINK APPLICATION NO. SSI-36656827

Dear Sir/Madam,

Energy Grid Alliance (EGA) appreciates the opportunity to comment on the HumeLink Environmental Impact Statement (EIS).

This submission outlines the notable deficiencies in the existing proposal, emphasizing a set of questions that ought to have been tackled in the Environmental Impact Statement (EIS) to underscore the proposal's limitations.

Introduction

As indicated in the submission by the National parks Association of NSW, HumeLink's recent reduction in capacity to 2,200 megawatts (MW) limits its ability to transmit electricity from Snowy 2.0 only when the pumping and generation processes are running at maximum capacity. This leaves no room for accommodating new renewable energy generation or interstate transfers. It becomes evident that a second HumeLink will be essential immediately after the commissioning of Snowy 2.0. It is imperative that we consider the comprehensive transmission requirements from southern NSW to Sydney and evaluate the overall environmental impacts in a holistic, single-project approach rather than a piecemeal, project-by-project manner.

The projected cost for HumeLink now stands at a staggering $5 billion, which raises significant concerns about its economic viability. Under the current proposal, the entire cost burden falls on electricity consumers, leading to a more than 50% increase in NSW transmission tariffs. This inequitable distribution of costs places an undue burden on Snowy 2.0 and new generators that are driving the need for HumeLink, essentially resembling an electricity tax.

HumeLink's construction will permanently scar 8,500 hectares of land, with its route cutting through the boundaries of six national parks and nature reserves, a prospect that is deemed unacceptable. The biodiversity offset assessment, previously estimated at $1 billion, reflects the extensive environmental damage that will occur.

It is high time to reconsider the default use of overhead transmission in rural NSW. TransGrid has already embraced underground transmission in urban areas and should extend this practice to non-urban areas with significant environmental, agricultural, scenic, and social value. The adoption of underground cables and long-distance direct current (DC) transmission, consistent with international standards, should be a priority for NSW.

Given the ongoing delays with Snowy 2.0, there exists ample time to redesign HumeLink (One and Two) to create a more comprehensive solution with substantially reduced environmental impact. This revised approach should be one that is acceptable to local communities and primarily funded by the electricity participants who require the transmission capacity.

Significant environmental consequences are anticipated.

HumeLink's environmental impact spans a vast expanse of 360 kilometers, necessitating a cleared easement of at least 70 meters in width (in some instances up to 130m), along with accompanying construction and maintenance access tracks. The project's footprint covers a total of 8,500 hectares, comprising 5,700 hectares of native vegetation, 800 hectares of non-native vegetation, and 2,000 hectares of Category 1 exempt land. The following excerpts from the Environmental Impact Statement (EIS) serve as a testament to the magnitude of environmental degradation:

"Based on several existing spatial datasets and field validation within accessible lands, the project footprint includes about 5,692.96 hectares of native vegetation, about 810.25 hectares of non-native vegetation and about 1,983.48 ha of Category 1 – exempt land."

"Five threatened ecological communities (TECs) listed under the BC Act were recorded within the project footprint during field surveys. Two of these TECs are also listed under the EPBC Act."

"Three candidate threatened flora species were recorded directly within the project footprint during surveys as part of the biodiversity assessment."

"Field surveys carried out for the project recorded 232 native fauna species comprising 13 frog, 136 bird, 45 mammal, 37 reptile and one fish species."

"The project could potentially directly impact about 670.21 hectares of native vegetation based on the indicative disturbance area (excluding Category 1 – exempt land)."

"Of the 58 threatened flora species that have potential to be directly impacted, 11species are listed as critically endangered under the BC Act and/or EPBC Act."

"Of the 47 candidate threatened fauna species, a total of 33 species (12 bird, 11 mammal (including three bat species), three reptile, five amphibian and two insect species) and two endangered fauna populations have the potential to be directly impacted by the project. The impacted threatened fauna species includes 15 species listed only under the BC Act with the remaining 18 species listed under both the BC Act and the EPBC Act."

While undergrounding would also have an environmental impact, it is a much narrower easement, and the disturbed ground can be rehabilitated at least partially.

Considering the extensive environmental consequences at hand and recognising that the transition to renewable energy is primarily driven by emissions reduction goals, EGA seeks to ascertain the complete environmental footprint of HumeLink.

Proximity to National Parks and Nature Reserves

The preservation of a thriving natural environment is paramount to our very existence. However, despite ongoing efforts in recent years, numerous native plant and animal species continue to face threats, leading to a decline in Australia's biodiversity. It is imperative that we halt this decline and work towards ensuring that our natural environment is not only robust but also cherished and actively nurtured. The decline of our biodiversity also impacts the future health, wellbeing and prosperity of all Australian communities.

The construction and operation of transmission lines can affect biodiversity in many ways, including habitat conversion and fragmentation, changes in hydrology, soil compaction and erosion, pesticide use, introduced species, and hunting and harvesting enabled by rights-of-way and construction roads. Species in small, rare, sensitive, and otherwise critical habitats may be especially affected.

The impact on wildlife from transmission line construction and operation include bird electrocutions and collisions, changes in predator-prey relations in and along the edges of rights-of-way, destruction or alteration of wetland and aquatic environments, and increases in hunting and fishing enabled by rights-of-way and construction/maintenance roads.

Transmission planning should consistently prioritise the avoidance of constructing easements through national parks, nature reserves, and crucial wildlife corridors to prevent additional habitat fragmentation.

The siting of transmission facilities must seek to avoid to the maximum extent possible areas of high ecological, cultural, economic, and aesthetic value and sensitivity. The objective is to protect and maintain the natural, aesthetic and scientific values of significant geological and geomorphological features.

Overhead transmission infrastructure should not permanently alter character of significant landscape or national parks and reserves. When the construction of transmission facilities in or near sensitive habitats cannot be avoided, impacts should be minimised using underground cables instead of overhead lines.

Route selection should try to avoid, minimise, or offset impacts on important environmental, social, cultural and landscape values and avoid community and land use conflict by utilising existing rights-of-way and undergrounding as a preferred transmission option.

Planning should help to protect the health of ecological systems and the biodiversity they support (including ecosystems, habitats, species and genetic diversity) and conserve areas with identified environmental and landscape values.

Planning must implement environmental principles for ecologically sustainable development that have been established by international and national agreements. Foremost amongst the national agreements is the Intergovernmental Agreement on the Environment, which sets out key principles for environmental policy in Australia. Other agreements include the National Strategy for Ecologically Sustainable Development, National Greenhouse Strategy, the National Water Quality Management Strategy, the National Strategy for the Conservation of Australia's Biological Diversity, the National Forest Policy Statement and National Environment Protection Measures.

Planning should protect, restore and enhance sites and features of nature conservation, biodiversity, geological or landscape value.

At the very least, a 2km environmental protection buffer from overhead transmission should be applied to all National Parks, reserves and conservation areas.

EGA is perplexed by the acceptance of constructing HumeLink within a mere 200 meters of the borders of six Protected Areas identified in the HumeLink EIS.

Engineering Resilience

Good engineering design will ensure any new transmission infrastructure route does not lead to unsustainable deterioration in grid resilience.

Natural hazard events have significant cost implications for network businesses and the economy more broadly. Maintaining power supply is linked to the ability of communities to absorb and recover from these types of events. Findings from a study commissioned by the Australian Business Round Table for Disaster Resilience and Safer Communities indicate that natural disaster events cost the economy on average $13 billion every year, highlighting the need for proactive resilience measures.

The capacity for electricity networks to prepare, absorb and recover from natural hazard events is referred to as resilience; the ability to continually supply energy during and after an incident.

Investing in reliability does not always deliver resilience, but investing in resilience is demonstrated to deliver significant improvements in both resilience and reliability, resulting in beneficial performance outcomes for customers using cost-effective and efficient network investment approaches.

Increasingly, energy system vulnerabilities to heightened climate impacts, particularly extreme weather, are recognised as material risks to individual assets, the integrated energy system, and society.

Scientists warn that extreme weather will increase in both frequency and severity as climate change accelerates. The Australian Energy Market Operator (AEMO) is acutely aware of this, warning climate change poses "*material risks to individual assets, the integrated energy system, and society*".

The 2019-20 summer was particularly challenging for Australia's physical gas and electricity infrastructure, with notable increases in heat and fire impacts consistent with climate change projections. These impacts highlight the need to integrate resilience measures into the planning, routing, design and assessment of transmission projects and upgrades. The vulnerability of key transmission lines and other major energy infrastructure to fire impacts and extreme weather events needs to be addressed.

Routing critical transmission infrastructure away from bushfire prone areas or underground, would enable our energy networks to better withstand extreme weather events and build increased network resilience.

Increasing frequency of dangerous fire weather poses a threat to most assets, with a particularly high operational risk to transmission lines due to heat and smoke. It is also an important consideration in transmission line route selection and design.

According to AEMO, "*good engineering design will ensure that any new infrastructure does not lead to unsustainable deterioration in grid resilience. Building additional transmission lines along a bushfire prone transmission corridor would be an example of resilience deterioration.*"

Recent bushfires, and subsequent strong winds and heavy rain events across Australia's east coast hit the electricity network hard. Critical infrastructure was affected, including poles and wires, regional substations, and state interconnectors, which led to blackouts for tens of thousands of homes. Rural towns and those living on the edge of the grid were most affected where there is currently a lack of network contingency or back-up supply.

However, lengthy network recovery times, intermittent surges in wholesale power prices and thousands remaining without power weeks later, highlighted a lack of overall system resilience.

During the fires, AEMO acknowledged weaknesses across the National Energy Market (NEM), calling it a '*wake-up call for further investment*' and a clear need for more government support.

Natural disasters impact infrastructure, essential services and communities and can cost billions of dollars. In a paper prepared by Deloitte Access Economics for the Australian Business Round Table for Disaster Resilience and Safer Communities, it was estimated that natural disasters cost Australians over $13 billion every year. As the frequency and intensity of natural disaster event increases, these costs are expected to escalate over the coming years.

Current regulatory arrangements place greater emphasis on managing network resilience through recovery measures, such as via holding insurance or the cost pass through mechanism. These arrangements do not adequately support or incentivise other measures that look at mitigating the impacts of, or absorbing the impacts from, natural hazard events. This is a concern given the increased frequency in which natural hazardous events are occurring and the growing trend for insurance providers to withdraw coverage for natural hazardous events. This trend, if not addressed, is likely to create an over reliance on the pass-through mechanism which in the long-term may not be the most efficient mechanism for mitigating against these types of risks.

Increasing frequency of dangerous fire weather poses a threat to most assets, with a particularly high operational risk to transmission lines due to heat and smoke. Bushfire risk to critical energy assets is an important consideration in transmission line route selection and design. Routing critical transmission infrastructure away from bushfire prone areas or underground, will enable our energy networks to better withstand extreme weather events and build increased network resilience into the energy grid.

Engineering resilience into the grid by adopting the least-regret approach and avoiding bushfire prone areas should realistically achieve a drastic reduction in risk to critical energy infrastructure and pass through costs to energy consumers. Resilience is also an important consideration in transmission line route selection and design.

Considering the long terms economic and social costs, caused by increasing extreme weather events, the risk in building overhead transmission infrastructure through bushfire prone regions is that investments will not be optimally designed for the needs for resilience to bushfires or future climate change. This inherent limitation may not be fully appreciated until the future climate is experienced, by then it will be too late.

While the number of bushfires ignited by overhead transmission lines is low, once started they have the potential to burn large areas. In 2018, a Camp Fire, started by a transmission line fault, devastated a huge swathe of California, claiming 85 lives. Estimation shows that wildfire damages in 2018 totalled $148.5 (126.1–192.9) billion (roughly 1.5% of California's annual gross domestic product), with $27.7 billion (19%) in capital losses, $32.2 billion (22%) in health costs and $88.6 billion (59%) in indirect losses (all values in US$).

The transmission network is more critical than the distribution network – a smaller network of lines supplies a much greater number of customers. An interruption on the transmission network due to bushfire has the potential to impact far more customers than an interruption on a distribution powerline.

It is for this very reason that engineering increased resilience to the impacts of future fire weather is critical.

With this knowledge in mind, EGA seeks to comprehend the rationale behind routing HumeLink through regions with a high risk of bushfires as an overhead solution.

For additional information please refer to '*Engineering Bushfire Resilience – Best Practice Approach to Transmission Line Routing*'

Undergrounding HVDC

The Inquiry into the feasibility of undergrounding the transmission infrastructure for renewable energy projects was established on 22 June 2023 to inquire into and report on the feasibility of undergrounding the transmission infrastructure for renewable energy projects.

However, the inquiry determined that, *"Based on the findings from the report, undergrounding HumeLink would not be consistent with the regulatory rules that require TransGrid to propose the most efficient option for consumers based on the capital cost of the solution, the ongoing operational costs, the market benefits, the expected reliability, and the costs associated with the impact on landowners, the community, and the environment."*

Throughout the Inquiry, EGA consistently emphasized the need for a clear distinction and comparison between underground HVAC and underground HVDC, as the outcomes can significantly vary in terms of environmental impacts, costs, and system resilience. Regrettably, this distinction was not adequately observed, resulting in misrepresentation and the use of outdated information in assessing costs and technical solutions.

Underground HVDC provides a superior transmission solution that minimises degradation of the broader environment by mitigating the likelihood, extent and/or duration of potential effects and increases system resilience to climate and extreme weather events.

To realise the true net benefit of underground HVDC over the life of a project, a Triple Bottom Line (TBL) analysis is required for each transmission project to consider profit, people, and the planet.

Climate change is resulting in rising global temperatures, erratic patterns of precipitation, sea level rise and more frequent or intense extreme weather events. This has significant implications for electricity security. For generation, the impacts of climate change can reduce the efficiency and alter the availability and generation potential of power plants, including both thermal and renewable facilities.

Climate change impacts on transmission and distribution networks can result in higher losses, changes in transfer capacity and particular physical damage. It is also expected to increase electricity demand for cooling in many countries, which will become a driving factor for generation capacity additions.

Studies suggest that the benefits of resilient electricity systems are much greater than the costs in most of the scenarios considering the growing impacts of climate change. It is estimated that for every dollar invested in climate-resilient infrastructure, six dollars can be saved. According to the World Bank, if the actions needed for resilience are delayed by ten years, the cost will almost double.

Underground transmission, which require a higher upfront outlay than above-ground systems, can significantly reduce potential damage from climate impacts and save recovery costs. Transmission lines above ground tend to be more vulnerable to climate hazards such as high-speed winds, wildfires, floods, and landslides, than underground systems.

There are clear gaps in current regulatory framework that prevent prioritisation of resilience. When impacts of extreme weather events interrupt electricity supply and lead to large socio-economic costs, network operators are only expected to bear a fraction of the repair and social costs, with most of the costs often being passed through to energy consumers. Lack of competition and the presence of monopolistic market conditions also discourage network operators from investing in climate resilience measures for enhanced quality of electricity services.

Policy makers need to fulfil a critical role in building resilient electricity systems by adopting effective policy measures that can prevent a potential 'market failure'. Investing in resilience is demonstrated to deliver significant improvements in both resilience and reliability, resulting in beneficial cost and performance outcomes for customers using cost-effective and efficient network investment approaches.

Increasingly, energy system vulnerabilities to heightened climate impacts, particularly extreme weather, are recognised as material risks to individual assets, the integrated energy system, and society. Routing critical transmission lines underground, would enable our energy networks to better withstand such extreme weather events and build increased resilience. Increasingly, utilities in other countries are routing power underground, despite the added expense.

There will always be debate around the cost versus benefit and justifying the additional project cost of undergrounding to improve resilience to future climate effects. Considering the long terms economic and social costs, caused by these extreme weather events, the risk in building overhead transmission infrastructure is that investments will not be optimally designed for the needs for resilience to future climate change. This inherent limitation may not be fully appreciated until the future climate is experienced. And by then it will be too late.

Australia's electricity system is transforming at a rapid rate. We need a reliable and resilient power system that keeps the lights on around the clock, especially during extreme weather events when Australians need it most. Investing in transmission networks that are reliable, resilient, secure, and efficient will support the connection of new wind, solar and hydro generation and smart storage solutions that are waiting to be commissioned.

Where there is a need for new transmission, underground options should be considered, using existing rights-of-way where technically feasible. This will eliminate risks to the infrastructure from extreme weather and bushfire related events and significantly reduce socioeconomic and environmental impact.

Protection of critical infrastructure

Electricity transmission is considered critical infrastructure as it plays a vital role in the functioning of modern societies. Critical infrastructure is defined as the physical and cyber systems and assets that are so essential that their incapacity or destruction would have a debilitating impact on national security, economic security, public health, and safety.

Electricity transmission systems are critical because they provide the backbone of power distribution, enabling homes, businesses, and public services to function. Without electricity transmission, many critical systems, and services, such as hospitals, transportation networks, emergency response systems, and communication networks, would not be able to operate. In addition, electricity is essential for maintaining industrial production and economic activity.

The protection and resilience of the electricity transmission system are critical to safeguard against disruptions caused by natural disasters, cyber-attacks, physical attacks, and other threats.

Avoiding single points of failure in electricity transmission is crucial to ensure a secure reliable and stable power supply. Single points of failure refer to any component or part of an electricity transmission system that, if it fails, can cause the entire system to fail.

For instance, if a power grid has only one transmission line, and it goes down due to any reason, such as equipment failure or severe weather conditions, the entire region served by that line will face a power outage. This situation can lead to significant economic losses, as well as threaten public safety and disrupt critical services such as hospitals, water treatment facilities, and emergency response systems.

By avoiding single points of failure, network planners can minimise the risk of widespread power outages and ensure a continuous, secure, and reliable supply.

Investing in the necessary infrastructure and technology to avoid single points of failure in electricity transmission can be expensive in the short term but can save a significant amount of money and prevent massive disruptions in the long run. It is, therefore, essential for transmission planners to prioritise security, reliability, resilience, and redundancy in their electricity transmission systems.

HumeLink's critical design flaws

The Environmental Impact Statement (EIS) has failed to address critical design flaws in HumeLink, specifically its reliance on 700 single double-circuit transmission towers, each of which represents a single-point of failure.

These towers have the potential to fail, leading to the simultaneous failure of both 500 kV circuits they support. Such failures are not uncommon in the National Electricity Market (NEM) and are expected to occur in HumeLink due to various factors, including severe lightning, destructive winds, wildfires, flooding, and the risk of sabotage. The consequence of such failures could result in a widespread blackout affecting greater Sydney, the Hunter Valley smelters, and a significant portion of NSW.

Proposing an alternative solution, the undergrounding of High Voltage Direct Current (HVDC) transmission along two geographically separated routes, utilizing existing easements, would effectively mitigate these risks. This alternative approach would eliminate the high socio-economic costs associated with the inevitable blackouts that HumeLink, in its current overhead form proposed by TransGrid, would likely cause.

It is essential to consider the financial and social implications of such blackouts when evaluating the 500 kV overhead options for HumeLink and its related projects in comparison to the undergrounding option.

For a more comprehensive understanding of these risks, please refer to the following notes.

Critical Infrastructure Security

The Australian Government established the Critical Infrastructure Centre in January 2017 to safeguard Australia's critical infrastructure from the increasingly complex national security risks of sabotage, espionage, and coercion. Critical infrastructure provides services that are essential for everyday life such as energy, food, water, transport, communications, health and banking and finance. Secure and resilient infrastructure supports productivity and helps to drive the business activity that underpins economic growth. A disruption to critical infrastructure could have serious implications for business, governments, and the community, impacting supply security and service continuity.

Security of Critical Infrastructure Act 2018 (the SOCI Act)

The 2018 Act sought to manage the complex and evolving national security risks of sabotage, espionage and coercion posed by foreign involvement in Australia's critical infrastructure. Two sets of amendments to the SOCI Act received Royal Assent in December 2021 and April 2022 respectively. The regulation of critical infrastructure under the SOCI Act 2018 now places **obligations on specific entities in the electricity**, communications, data storage or processing, financial services and markets, water, health care and medical, higher education and research, food and grocery, transport, space technology, and defence industry.

The SOCI Act Section 10: Meaning of critical electricity asset

(1) An asset is a ***critical electricity asset*** if it is:
  (a) a network, system, or interconnector, for the transmission or distribution of electricity to ultimately service at least 100,000 customers or any other number of customers prescribed by the rules; or
  (b) an electricity generation station that is critical to ensuring the security and reliability of electricity networks or electricity systems in a State or Territory, in accordance with subsection (2).

Note: The rules may prescribe that a specified critical electricity asset is not a critical infrastructure asset (see section 9).

(2) For the purposes of paragraph (1)(b), the rules may prescribe requirements for an electricity generation station to be critical to ensuring the security and reliability of electricity networks or electricity systems in a particular State or Territory.

Security Legislation Amendment (Critical Infrastructure Protection) Act 2022 (SLACIP Act)

The SLACIP Act came into effect on 2 April 2022. SLACIP Act amends the SOCI Act to build upon the existing framework and uplift the security and resilience of Australia's critical infrastructure and introduce the following key measures:

- A new obligation for responsible entities to create and maintain a critical infrastructure risk management program, and
- A new framework for enhanced cyber security obligations required for operators of **systems of national significance** (Australia's most important critical infrastructure assets – SoNS)

The reforms in the SLACIP Act seek to make risk management, preparedness, prevention and resilience, business as usual for the owners and operators of critical infrastructure assets and to improve information exchange between industry and government to build a more comprehensive understanding of threats. These reforms will give Australians reassurance that our essential services are resilient and protected.

Transmission of National Significance

On 12 August 2022, Energy Ministers met in Canberra to agree to new energy market reforms. The Meeting Communique states that Ministers agreed the vision, principles and key initial priority areas for a new National Energy Transformation Partnership. Notably, this partnership will **identify and declare transmission of national significance** (including the actionable projects in the Integrated System Plan - Marinus, VNI West (via Kerang), and **HumeLink** to accelerate the timely delivery of these critical projects and ensure better community consultation.

One would reasonably conclude from this that the declaration of **national significance** was made with respect to the SLACIP Act 2022 and as such, obligations under this Act apply to the transmission projects identified.

AEMC Power System Security

According to the AEMC, increasing the degree of interconnection in the system means that there are **fewer single points of failure**. This is important for both system security, resilience and reliability. A single point of failure (SPOF) is essentially a flaw in the design, configuration, or implementation of a system, circuit, or component that poses a potential risk because it could lead to a situation in which just one malfunction or fault causes the whole system to stop working.

2020 ISP Appendix 8. Resilience and Climate Change (view online)

Page 11: According to AEMO, energy systems are **normally designed to avoid single points of failure due** to location specific hazards – however, this design principle is being challenged with coincident weather patterns now having a greater impact across large amounts of infrastructure (for example, high winds affecting multiple generators). Transmission lines are separated over multiple, diverse corridors using looping or meshed designs. Connection points and generator hub locations are spatially distributed, diversifying both the exposure to hazards, and generation and load profiles – but it is only with sufficient network that the underlying risk exposure to a common fuel source (e.g. wind or sun) can be managed through diversity with resources in other areas.

Final remarks

EGA does not endorse HumeLink in its current form. In the words of the National Parks Association of NSW, let's do HumeLink once and do it right. Whatever is built now will be with us for the rest of this century.

Energy Grid Alliance supports development and implementation of robust, accountable, and beneficial transmission projects and welcome opportunities for further consultation.

I would like to thank you for the opportunity to contribute this EISA process and welcome further discussion should you have any questions regarding this submission.

Sincerely

Darren Edwards
Director