NORTHERN TERRITORY GOVERNMENT
Department of
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Our ref: DEPWS2023/0245

Ms Kylie Fitzpatrick
Department of Environment, Parks and Water Security
PO Box 3675
DARWIN NT 0801

Dear Ms Fitzpatrick

Re: Invitation to comment - Australia-Asia Power Link - Additional information

The Department of Environment, Parks and Water Security (DEPWS) has assessed the information submitted for the above proposal and provides the following comments.

Flora and Fauna Division

The Flora and Fauna Division reviewed the additional information and have provided comment in the attached table.

A review of the additional information identified several matters that have not been fully addressed by the proponent, relating to the potential for indirect impacts on sandsheet heath through effects on surface hydrology; and potential for impacts on local populations on the threatened plants *Cleome insolata*, *Helicteres macrothrix* and *Stylidium ensatum*. In general, these potential impacts may be mitigated by conditions as part of an approval that ensures disturbance to the identified suitable habitat for these species is minimised.

The Flora and Fauna Division considers that the additional information does not adequately demonstrate that there is no potential for significant impacts to Ghost Bat. Rather, there remains significant uncertainty about the level of risk to important maternity colonies near Pine Creek and Katherine from operational noise from the overhead transmission line (OHTL), risk of collision with powerlines, and risk from the static magnetic field and/or static electric field that will be emitted by the OHTL. In relation to the latter risk, the NT EPA may wish to seek additional specialist expert advice, noting that such expertise may not be available due to the lack of relevant studies in this specific field. Given the conservation significance of all known Ghost Bat maternity colonies, and particularly that at Kohinoor adit, a precautionary approach may require a larger separation distance between the OHTL and these sites.

Parks and Wildlife Division

The Parks and Wildlife Division has reviewed the document 'Response to NTEPA Direction to provide additional information' and note the following;

- Page 80 - Figure 21, Locations subject to visual impact assessment, page 81 -Table 23 Summary of visual impact assessment results, these locations are in or very close to Shoal Bay Coastal Reserve, which is a popular waterfowl and pig hunting location, and popular for other recreational users who would be impacted by visual amenity of towers and overhead lines in a natural setting. Table 23 does

not address sensitivity, magnitude of change, overall visual impact or comments, for these two towers as is provided for other view point locations.

- The proponent has not considered and addressed previous Departmental feedback of *The high recreational value for hunters in Shoal Bay needs to be observed.*

Environment Division

The action may require an approval and/or licence under other legislation administered by Environment Division such as the *Water Act 1992* (Water Act) and the *Waste Management and Pollution and Control Act 1998* (WMPC Act).

Should the proponent collect, transport, store, recycle or treat listed wastes on a commercial or fee for service basis as part of the development or operations of the activity, then an Environment Protection Approval or Licence will be required to authorise the activity under the WMPC Act.

If the activity requires the discharge of waste to water or could cause water to be polluted then a waste discharge licence under the Water Act will be required. Please refer to the Guidelines[1].

The proponent should note that all persons are required to comply at all times with the General Environmental Duty under section 12 of the WMPC Act. To help satisfy the General Environmental Duty, the proponent is advised to take notice of the list of environmental considerations below. A non-exhaustive list of environmental issues that should be considered to meet requirements are listed below:

1. **Dust**: The proposed activities have the potential to generate dust, particularly during the dry season. The proponent must ensure that nuisance dust and/or nuisance airborne particles are not discharged or emitted beyond the boundaries of the premises.
2. **Noise**: The proponent is to ensure that the noise levels from the proposed premises comply with the latest version of the NT EPA Northern Territory Noise Management Framework Guideline available online[2].
3. **Erosion and Sediment Control (ESC):** The proponent must ensure that pollution and/or environment harm do not result from soil erosion.

   ESC measures should be employed prior to and throughout the construction stage of the development. Larger projects should plan, install and maintain ESC measures in accordance with the current International Erosion and Sediment Control Association (IECA) Australia guidelines and specifications.

   Where sediment basins are required by the development, the NT EPA recommends the use of at least Type B basins, unless prevented by site specific topography or other physical constraints.

   Basic advice for small development projects is provided by the NT EPA document: Guidelines to Prevent Pollution from Building Sites[3] and Keeping Our Stormwater Clean[4]
4. **Storage:** If an Environment Protection Approval or Environment Protection Licence is not required, the proponent should store liquids only in secure bunded areas in accordance with VIC EPA Publication 1698: Liquid storage and handling guidelines, June 2018, as amended. Where these guidelines are not relevant, the storage should be at least 110% of the total capacity of the largest vessel in the area.

[1] https://ntepa.nt.gov.au/__data/assets/pdf_file/0005/950603/guidelines-waste-discharge-licensing.pdf
[2] https://ntepa.nt.gov.au/__data/assets/pdf_file/0004/566356/noise_management_framework_guideline.pdf
[3] https://ntepa.nt.gov.au/__data/assets/pdf_file/0010/284680/guideline_prevent_pollution_building_sites.pdf
[4] https://ntepa.nt.gov.au/__data/assets/pdf_file/0006/284676/guideline_keeping_stormwater_clean_builders_guide.pdf

Where an Environment Protection Approval or Environment Protection Licence is required, the proponent must only accept, handle or store at the premises listed waste, including asbestos, as defined by the WMPC Act, in accordance with that authorisation.

5. **Site Contamination**: If the proposal relates to a change of land use or if the site is contaminated, including as a result from historical activities such as cyclones, a contaminated land assessment maybe required in accordance with the National Environment Protection (Assessment for Site Contamination) Measure (ASC NEPM). The proponent is encouraged to refer to the information provided on the NT EPA website[5], and the NT Contaminated Land Guidelines[6].
6. **Waste Management - Import and Export of Fill**: The proposed activities have the potential to generate fill and/or involve the importation of fill for use on-site. Untested fill material may already be present on the site. All fill imported or generated and exported as part of the activity must either be certified virgin excavated natural material (VENM) or be sampled and tested in line with the NSW EPA Guidelines[7]

   All imported fill material must be accompanied by details of its nature, origin, volume, testing and transportation details. All records must be retained and made available to authorised officers, upon request. The proponent should also consider the following NT EPA fact sheets: How to avoid the dangers of accepting illegal fill onto your land[8], and Illegal Dumping - What You Need to Know[9].
7. **Odour or Smoke:** The proposed activities may have the potential to create odours and/or smoke. The proponent must ensure that nuisance odours or smoke are not emitted beyond the boundaries of the premises.

Should you have any further queries regarding these comments, please contact the Development Coordination Branch by email DevelopmentAssessment.DEPWS@nt.gov.au or phone (08) 8999 4446.

Yours sincerely

Maria Wauchope
Executive Director Rangelands
11 December 2023

[5] https://ntepa.nt.gov.au/your-environment/contaminated-land
[6] https://ntepa.nt.gov.au/__data/assets/pdf_file/0020/434540/guideline_contaminated_land.pdf
[7] https://www.epa.nsw.gov.au/your-environment/waste/classifying-waste/virgin-excavated-natural-material
[8] https://ntepa.nt.gov.au/__data/assets/pdf_file/0005/285728/factsheet_avoid_danger_accepting_illegal_fill_to_your_land.pdf
[9] https://ntepa.nt.gov.au/__data/assets/pdf_file/0008/285740/factsheet_illegal_dumping_what_you_need_know.pdf

Response to NT EPA Direction to Provide Further Information – AA-Powerlink

Government authority: Department of Environment, Parks and Water Security – Flora and Fauna Division

NT EPA Information Request	Flora and Fauna Division's response to the proponent's address
Extent of the proposed action: There is no succinct summary of the estimated extent of, and/or any limitations to, the proposed action (eg. maximum extent of land clearing for the entire proposed action). 1. Provide a table summarising the maximum extent of each element of the proposed action and the total maximum extent of the whole proposed action. 2. In the case that there is uncertainty about the need for, or aerial extent of key physical elements of the proposal, provide the maximum development envelope and footprint as a worst-case scenario for the maximum likely impact.	The additional information refers only to the proposal providing power to Darwin. It is unclear from the scope identified in Section 1 of the response how power from the proposal would be fed into the greater Darwin region, given that the HVDC is proposed to head to the Darwin converter site at Gunn Point but there is no mention of the infrastructure that would be required to channel power back to the Darwin grid.
Terrestrial Ecosystems – potential impacts to sandsheet heath habitats Section 10 of the *Environment Protection Act 2019* (EP Act) requires consideration of the environmental impacts of the proposed action, including those that are an indirect consequence of the action. The northern overhead transmission line (OHTL) footprint is mapped as crossing habitats that include sandsheet heath, which is known to support highly habitat-specific listed threatened species. These species include:	The proponent has provided additional information to outline the values and significance of the identified patches of sandsheet heath intersecting (or adjacent to) the overhead transmission line (OHTL). Buffers have been applied to identified sandsheet heath patches, in accordance with the *Land Clearing Guidelines*. If the ecological processes driving the sandsheet heath are maintained, these buffers are considered by the Flora and Fauna Division as being generally adequate for the maintenance of the identified values. The proponent has stated: "It is possible to avoid direct impacts to sandsheet heath patches that are intersected by the NTG Utilities Corridor by placing the OHTL towers outside of the patch extent, so that the transmission lines span over or re-route around the patch without any direct ground disturbance". However, in contradiction to this, the proponent has also stated that the entire OHTL alignment needs to be cleared and

• Howard River Toadlet (*Uperolea daviesae*), Vulnerable under the TPWC Act and EPBC Act • *Typhonium taylori* (Vulnerable under the TPWC Act) • *Utricularia dunstaniae* (Endangered under the TPWC and EPBC Acts) The direct impacts on these species have been addressed; however, further information is required on how the proponent will avoid indirect impacts on habitat values. 1. Provide an evidence-based strategy for determining appropriate buffers for sensitive and significant sandsheet heath vegetation. In particular, demonstrate that hydrological characteristics (such as sheet flow) would not be impacted. Consideration should be given to indirect impacts including impacts of tracks and drainage infrastructure on sheet flow. 2. Describe the measures that would be implemented to ensure that the proposed action causes no or minimal impacts on surface hydrology, including the quantity, distribution and movement of surface water in suitable habitat adjacent to the corridor and within the buffer determined by the above. 3. Confirm that measures to avoid and buffer these vegetation communities are in line with the *NT Land Clearing Guidelines*.	that some areas will be 'reinstated', while others will be retained as cleared areas following construction. The proponent's commitment to avoid "direct impacts" should be clarified to ensure this means avoiding or minimising disturbance to (including any clearing of) sandsheet heath. It is also noted that any clearing in sandsheet heath may require offsets to compensate for impacts to threatened species. The proponent has not provided sufficient information to address point 1 (in part) or point 2 (in full) of the EPA's additional information request, as it relates to the potential for indirect impacts on sandsheet heath. This specifically relates to the maintenance of hydrological regimes that support the biodiversity values associated with these patches of sandsheet heath. Point 2 of the EPA information request identifies features of the broader surface water hydrology that should be considered when assessing the potential for indirect impact on sandsheet heath. The proponent's response has not provided specific information to address this request.
Terrestrial Ecosystems - Stylidium 1. Provide the outcome of seasonally appropriate field surveys to identify how many hectares of *Stylidium ensatum* habitat and *Stylidium ensatum* suitable habitat would be cleared in NT Section 572 when access permission is obtained, and quantify the impact of proposed habitat loss on local and	The proponent has not provided the results of surveys within Section 572. This limits the ability to assess the presence and impact to the species. The response by the proponent states: "As explained in the response to Item 4, it is feasible to span the OHTL towers up to 550 m so the vegetation beneath the OHTL can be left uncleared if there are no trees taller than 6 m present. If *Stylidium ensatum* is detected within Section 572, then – depending on the extent of its occurrence and/or

regional populations outside of the proposed action's footprint. 2. Identify the percentage of *Stylidium ensatum* habitat that will be cleared in relation to the local and regional *Stylidium ensatum* habitat and the area of suitable habitat available. 3. Identify a suitable buffer for species records that is suitable to avoid indirect impacts on local hydrology (see Item 4 above). **4.** Propose offsets for any residual significant impacts (for habitat loss and removal of any plants).	whether *Cleome insolata* is also detected (see Section 9) – it may not be feasible to span. In such a scenario, the OHTL could be re-routed outside of the NTG Utilities Corridor, as explained in Section 4.3.5". If sandsheet heath is present within Section 572 and if that sandsheet heath supports *Stylidium ensatum*, it should be excluded from disturbance/clearing and appropriately buffered, as per the commitment discussed in the "sandsheet heath habitat" above.
Terrestrial ecosystems - *Helicteres macrothrix* As identified in the Supplement Direction (Table 2, item 9), DEPWS has mapped highly suitable habitat for *Helicteres macrothrix* (Endangered under the *Territory Parks and Wildlife Conservation Act 1976* (TPWC) and *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Acts) within the OHTL corridor deviation at Adelaide River. Surveys of the deviation have not been conducted, but are required. The Terms of Reference (TOR) required assessment of the significance of residual impacts (Table 5). The significant residual impacts from removing *H. macrothrix* have not been discussed. 1. Provide the outcome of seasonally appropriate field surveys for this species for the OHTL deviation at Adelaide River where it overlaps with DEPWS modelling and Department of Climate Change, Energy the Environment and Water (DCCEEW) species distribution information. 2. Identify: a. the maximum area (hectares) of *Helicteres macrothrix* known and suitable habitat that would be cleared	Despite detectability of the target species at a suitable reference site being established, the surveys for *Helicteres macrothrix* that were undertaken within the proposed disturbance area were conducted soon after a fire event that appears to have consumed a significant proportion of the above-ground biomass in the lower vegetation stratum. It is unclear from the results how this impacted the detection of *H. macrothrix*. The Flora and Fauna Division considers the results of the surveys to be inconclusive because conducting the survey so soon after a fire event is not considered sufficient to demonstrate true absence. Furthermore, the proponent did not provide confirmation of the identity of candidate *H. macrothrix* plants that were encountered during the traverses. Consequently, the NT EPA's request for additional information (1-5) has not been addressed satisfactorily in the additional information.

b. the location of any plants within the area to be cleared. 3. Identify the percentage of *Helicteres macrothrix* habitat that will be cleared in relation to the local and regional *Helicteres macrothrix* habitat and suitable habitat availability. 4. Provide details of the avoidance and mitigation measures for this species such as determining a suitable buffer where plants are identified. 5. Discuss any potential significant residual impacts (e.g. habitat loss and removal of any plants) that cannot be avoided or mitigated and proposed offsets	
Terrestrial ecosystems – Ghost bat The TOR required the proponent to outline measures for avoiding, mitigating, or offsetting impacts including impacts to the Ghost Bat (*Macroderma gigas*). Refer to submission on the Supplement from DEPWS and the submission on the Supplement from DCCEEW. 1. Address DCCEEW comments 9 and 10. 2. Review, analyse and summarise available information on how the OHTL may affect Ghost Bat behaviour. 3. Determine the distance from the cable at which the static magnetic field is likely to be indistinguishable from the background. 4. Subject to the findings of points 2 and 3 above - provide avoidance/ mitigation approaches, including discussion about the effectiveness and confidence in the measures and any residual significant impacts (and proposed offsets). 5. Demonstrate how the precautionary principle has been applied to the assessment of potential significant impacts	**1. Address DCCEEW comments 9 and 10.** DCCEEW comment 9 contains the following components. Whether or not the proponent has addressed the component is indicated below: 1 (1) (relating to barbed wire): Addressed 1 (2) (relating to an exclusion zone): Addressed, although it should be noted that Kohinoor Adit is metres away from a public road, its location is already well-known in the NT community and the site is visited by locals of, and visitors to, Pine Creek. In addition, Kohinoor Adit is just one of numerous adits/shafts in the local hillside that are also known to be used by Ghost Bats, as well as by other bat species. As such, the 'network' of adits/shafts in the hillside should be considered collectively, rather than the focus being on just Kohinoor Adit. While visitation by non-scientific staff to any shafts/adits that contain bats is discouraged, a 'no go' zone for AAPowerLink construction staff to Kohinoor Adit is not a sufficient mitigation strategy for the proposed AAPowerLink development. 1 (3 and 4) (pertaining to noise and the distance at which noise will be below a threshold): The proponent's commentary centres on construction noise, as it may be heard at the entrance of Kohinoor Adit. The proponent references Bat Call WA (2021) for a "best practice threshold of 70 dB", though it should be noted that Bat Call WA (2021) states that this figure is based on results by Bullen and Creese (2014). Bullen

and application of protection measures (Part 2 of the EP Act).	and Creese (2014), as well as Armstrong (2010), explicitly caution that their studies pertained only to exploration drilling and that Ghost Bats may react differently to noise and vibration caused by activities other than drilling (e.g. blasting, pad construction by a bulldozer, nearby construction of road or infrastructure). The proponent does not differentiate whether their modelling for "construction noise" relates to drilling or other types of construction noise. If the model relates to anything other than drilling, the threshold from Bullen and Creese (2014) may not necessarily be relevant to the proposed activities. Bat Call WA (2021) also states that "there is virtually no research on the consequences of bats experiencing high noise levels for brief periods as they emerge from a deep underground roost and transit noisy operational areas." Similarly, Cramer *et al.* (2022) identify that the effect of noise from activities other than drilling is unknown, stating that "we do not know how the indirect disturbances [of noise and vibration caused by activities other than drilling] influence the use of diurnal roost sites and, if a colony abandons a roost site, when they will return." Cramer *et al.* (2022) explicitly identify that "further research and rigorously designed adaptive monitoring on the secondary impacts of disturbance are required. At present, with relatively few local studies on buffer sizes and noise and vibration thresholds, an empirical determination of disturbance thresholds that trigger a significant response remains a substantial challenge." AAPowerLink indicates that, for operational noise, "at the powerlines, the sound pressure will be approximately 50 dB" and claims that, because this is "well below the best-practice threshold of 70 dB", it is acceptable. This operational noise at the powerlines will be permanent for the life of the OHTL; furthermore, presumably there may also be cumulative effects from vibrations, artificial lights and/or vehicle traffic. Given the uncertainty detailed in the studies mentioned above, it is unreasonable for the proponent to be so definitive in their conclusions that there will be no effects of sound and vibration on the Ghost Bat colony at Pine Creek, especially in the context of the permanent presence of a structure that will emit sound at 50 dB at the powerlines, and at 20-~40 dB near the powerlines. Ghost Bats at Kohinoor Adit (and other adits) need to exit each evening in order to forage, and then return in the early morning post-foraging. There is also evidence of animals exiting and re-entering roosts multiple times

	per night. Given the proximity of the proposed OHTL (395m away from Kohinoor Adit), bats would need to fly in an area that will be physically bisected by a structure that permanently emits a noise at a volume that has not been irrefutably shown to be 'safe'. Given the number of Ghost Bats in Kohinoor Adit (and other adits/shafts in the hillside), any impacts leading to a reduction in fitness (eg. reduced foraging distance / time / effectiveness) may constitute a significant impact on the population. AAPowerLink indicates that Kohinoor Adit will be approximately 395 m from the OHTL and 600 m from the nearest tower. The proponent appears to be asserting that these structures are sufficiently far from the roost sites so as to not pose a threat to the population of Ghost Bats within. However, as per information previously provided by the NT Department of Environment, Parks and Water Security (DEPWS), these distances (395 m, 600 m) should not be considered 'large' in the context of documented movement patterns of Ghost Bats. A study by Flora and Fauna Division in Katherine in 2022 identified that, on average, Ghost Bats are flying one-way distances of ~6 km (and up to 23 km) in one night. The OHTL in the currently-proposed alignment at may be regularly traversed by thousands of individual Ghost Bats a minimum of twice per night *en route* to their foraging areas. Aside from the potential impacts from operational noise (see above) and EMF (see below), the proponent has not adequately addressed the risk of collision with powerlines by Ghost Bats. DCCEEW comment 10: DCCEEW states that "the department considers that insufficient information has been provided to enable an assessment of the long-term and cumulative impacts on threatened and migratory species, including EMF-sensitive species such as sawfish, bats and whales, and requests further detailed scientific information…". It is acknowledged that AAPowerLink has provided a literature review of the impacts on marine species from EMF. However, this literature review does not address DCCEEW's request for an assessment on bats and for the proponent to "commit to undertake adaptive management measures to address possible future significant impacts to EPBC Act threatened…species."

	2. Review, analyse and summarise available information on how the OHTL may affect ghost bat behaviour. See commentary above in relation to potential impacts from operational noise and risk of collision, as well as information below in relation to potential impacts from electro-magnetic frequency (EMF). The Flora and Fauna Division agrees with the proponent's conclusion that there may be disorientation and discomfort experienced by individuals traversing the structure. The consequence of this on Ghost Bat behaviour is uncertain and would require the NT EPA to seek additional expert advice. It is possible that such advice is not available either nationally or internationally (due to the difficulties in undertaking such research in a rigorous manner) and a precautionary approach is required to ensure any potential impacts are avoided. **3. Determine the distance from the cable at which the static magnetic field is likely to be indistinguishable from the background.** Magnetoreception is a key element in the sensory repertoire of many organisms, and it has been shown to play a particular role in animal navigation (Schneider *et al.* 2023). Bats use magnetoreception for directional orientation and navigation (Holland *et al.* 2008). The *Submission on the Supplement from DEPWS* details research on the effects of electro-magnetic frequency (EMF) and radiation on foraging bats and the details will not be re-stated here. However, in summary, the *Submission on the Supplement from DEPWS* indicated that "a range of peer-reviewed studies confirm that EMF/radiation poses a risk to bats (Levitt *et al.* 2022). Given the proximity of the OHTL to Kohinoor Adit, it is recommended that a robust assessment of the risks to the colony be provided by the proponent. The assessment needs to demonstrate that the OHTL will not have unacceptable impacts on the globally-important colony of Kohinoor Adit specifically, and on Ghost Bats in the Pine Creek and Katherine regions more generally." Furthermore, DEPWS advised that "it is well-established that Kohinoor Adit, as well as roost sites around Katherine, are permanently occupied year-round." AAPowerLink has retained the plan to site the OHTL within 395 m of Kohinoor Adit, as well as along the railway corridor (mostly) in the vicinity of Katherine. The railway corridor is in relative proximity (in terms of ghost bat foraging distances) to Kintore Caves Conservation Reserve and Cutta Cutta Caves Nature Park (where Ghost Bats are

	known to roost), as well as to areas that are known to be used by Ghost Bats for foraging (DEPWS data 2022). The *Response to NT EPA Direction* provided by AAPowerLink confirms that the OHTL powerlines will emit "low-level static electric and magnetic fields" and that "static magnetic fields…are emitted from DC powerlines." The proponent then claims that "static EMF does not produce any radiation or electromagnetic waves that could impact the Ghost Bat", on the basis that static magnetic fields (SMF) "are not identified as a potential threat to Ghost Bats in either Bat Call WA (2021) or the Conservation Advice for the Ghost Bat (TSSC 2016)." Similarly, the proponent argues that static electric field (SEF) "are not identified as a potential threat to Ghost Bats in either Bat Call WA (2021) or TSSC (2016)." However, at no stage in either of these documents are electromagnetic frequency, static magnetic fields or static electric fields even mentioned or explicitly considered. The effect(s) of EMF/SMF/SEF on Ghost Bats has never been researched, and, as such, the lack of mention of EMF/SMF/SEF does not mean that EMF/SMF/SEF are 'cleared' from being a risk to the species (nor to other fauna). The two documents do not cover all potential, future threats to the Ghost Bat and the threats listed therein are not comprehensive, exclusionary or 'future-proof'. In the absence of species-specific research on effects of EMF/SMF/SEF on Ghost Bats, existing research on the potential impact of EMF/SMF/SEF on fauna and bats must be used. The latter must be placed in the context of the fact that bat navigation is relatively poorly understood compared with that of other animals; this is because, to study bats' navigation, their flight path needs to be tracked in a natural setting but limitations of the available technology make this a labour-intensive process (Holland *et al.* 2006). In terms of static magnetic field (SMF) and navigation, the proponent has not provided evidence that the species does not use magneto-reception and it is precautionary to assume that the species does. Even non-migratory bats – such as the Ghost Bat – are known to possess a polarity-sensitive magnetic compass, which they use for homing tasks. Recent research by Lindecke *et al.* (2021) suggest that magneto-sensory cells located in a bat's body carry single-domain magnetite and that navigation in bats is based on a magnetic sense. Similarly, recent evidence supports a "magnetic map sense" in birds, based on magnetic iron particles that transmit magnetic field information

	through the trigeminal system (e.g. Pakhomov *et al.* 2018). If, as identified by the proponent, static magnetic fields "can still interact with charged particles – such as electrons", these static magnetic fields may impact the Ghost Bat by affecting individuals' ability to use magnetoreception for navigation. In the absence of any species-specific research, the basis for AAPowerLink's assertion of 200 m as the threshold at which there would not be "some degree of disorientation, which could result in a change in foraging behaviour", is unclear. In relation to physiological effects of SMF, the proponent claims that "it is assumed…that because Ghost Bat will – at most – only briefly fly past the powerlines, they will not be close enough for long enough to experience any physiological effects from the SMF of the OHTL". This cannot be validly assumed, because the number of times that an individual Ghost Bat would fly past the powerlines, and its proximity thereto, is unquantified. It is also likely to vary by individual, season and other factors. Given the proposed proximity (395 m) of the OHTL and the fact that individuals could pass the OHTL multiple times per night, there could potentially be a physiological effect to a large number of individuals. Lastly, the proponent discusses static electric fields (SEF) and notes that "they can cause effects on living organisms via changes in the distribution of electric charges on the surface of the body (WHO 2006)." The nature of the potential effect on "biological functioning" is not detailed and this conclusion is based on a literature review conducted by Petri *et al.* (2017), who did not have access to any studies on bats and the studies for which were predominantly on rats, mice and guinea pigs. It should be noted that Petri *et al.* (2017) identified that "many of the animal studies suffered from severe methodological flaws", that a randomised method for the assignment of animals to study groups was not reported in half of the animal studies, and there was "a substantial risk of bias in a large number of studies". Lastly, "in more than half of the animal studies (*n*=22), the static EF strength was not verified through measurements or simulations". The proponent also suggests that this conclusion is supported by the lack of mention of SEF in Bat Call WA (2021) or TSSC (2016). Given the limitations detailed in Petri *et al.* (2017), as well as those previously discussed about the use of Bat Call WA (2021) and TSSC (2016), the Flora and Fauna Division

	notes that there is considerable uncertainty about the potential for adverse health impacts from SEF, EMF or SMF on individual Ghost Bats. **4. Subject to the findings of points 2 and 3 above – provide avoidance/mitigation approaches, including discussion about the effectiveness and confidence in the measures and any residual significant impacts (and proposed offsets).** In summary, the proponent's *Response to NT EPA Direction* does not fully address the information requests in the *Submission to the Supplement from DEPWS* and the *Submission on the Supplement from DCCEEW*. Given the information above, together with that provided in the *Submission to the Supplement from DEPWS* and the *Submission on the Supplement from DCCEEW*, the Flora and Fauna Division considers that there remains a potential significant risk to the Ghost Bat from the following factors and that these have not been appropriately avoided or mitigated: • Operational noise from the OHTL • Risk of collision with powerlines • Risk from the static magnetic field and/or static electric field that will be emitted by the OHTL. Given the global significance of the Pine Creek Ghost Bat colony, and the likely inability to modify the OHTL once it is operational, it is unlikely that these risks could be mitigated through a program of monitoring and adaptive management. It is also difficult to envisage how any significant impact on such a significant maternity colony can be appropriately offset. **5. Demonstrate how the precautionary principle has been applied to the assessment of potential significant impacts and application of protection measures (Part 2 of the EP Act).** The Flora and Fauna Division disagrees with the proponent's assertion that the precautionary principle has been applied and that "it is not considered any additional measures are needed to protect the Ghost Bat". The proponent has not adequately demonstrated that the OHTL alignment will not have unacceptable impacts on the

	globally-important Kohinoor Adit specifically, and on Ghost Bats in both the Pine Creek and Katherine regions more generally. Given the importance of the Kohinoor maternity colony and uncertainty in relation to the risks posed by the OHTL, precautionary approach may involve altering the alignment of the OHTL in the vicinity of Pine Creek so as to substantially increase the distance between the OHTL and known Ghost Bat roosts; or burying the OHTL cable in this portion of the route. A similar precautionary approach should be considered to minimise potential risks to known maternity colonies in the vicinity of Katherine. **References:** Armstrong KN (2010) Assessing the short-term effect of minerals exploration drilling on colonies of bats of conservation significance: a case study near Marble Bar, Western Australia. *Journal of the Royal Society of Western Australia* **93**: 165-174. Bat Call WA (2021) *A review of ghost bat ecology, threats and survey requirements.* Unpublished report available at: https://www.dcceew.gov.au/sites/default/files/documents/review-ghostbat-ecology-threats.pdf Bullen RD, Reiffer S and Trainer J (2023) Satellite tracking Ghost Bats *(Macroderma gigas*) in the Pilbara, Western Australia. *Records of the Western Australian Museum* **38**: 1-10. Bullen RD and Creese S (2014) A note on the impact on Pilbara leaf-nosed and ghost bat activity from cave sound and vibration levels during drilling operations. *The Western Australian Naturalist* **29**, 145-154. Cramer VA *et al.* (2022) Research priorities for the ghost bat (*Macroderma gigas*) in the Pilbara region of Western Australia. *Australian Mammalogy* **45**(1), 1-12. Holland RA, Thorup K, Vonhof MJ, Cochran WW, Wikelski M (2006) Bat orientation using Earth's magnetic field. *Nature* **444**, 702. Holland RA, Kirschvink JL, Doak TG and Wikelski M (2008) Bats use magnetite to detect the Earth's magnetic field. *PLoS ONE*, **3**(2): e1676.

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Terrestrial ecosystems – *Cleome insolata* The TOR required targeted surveys for *Cleome insolata* conducted in the appropriate fruiting/seeding season (i.e. March-April) (Supplement Direction, Table 2, item 5). However, surveys were conducted in the OHTL corridor (excluding NT Section 572, which is private land in Lambell's Lagoon) in September 2021, and surveys of the DCS were conducted in February 2022. Refer to *Submission on the Supplement from DEPWS*. 1. Provide the outcome of seasonally appropriate field surveys to identify how many hectares of *Cleome insolata* known and suitable habitat would be cleared.	Targeted surveys for *Cleome insolata* were not conducted, with the exception of a survey in a "Melaleuca swamp" within the Darwin Converter Station (DCS) footprint. However, for the latter survey, the proponent's response does not provide information on the detectability of the target species at the time of the survey, yet detection at a suitable reference site is required in order to establish the species' presence. The proponent's response also does not provide information on the extent of survey undertaken in the "Melaleuca swamp" nor information on the mix of species characterising the swamp. In assessing the extent of the potentially suitable habitat available for *Cleome insolata*, sandsheet heath patches that occur within or adjacent to the OHTL in the utilities corridor were assumed to represent the extent of potentially suitable habitat. However, *Cleome insolata* is also known to occur in low open woodlands with mixed species, as well as on imperfectly drained sandy soils and at the margins of drainage flats. The proponent's response does not refer to low woodlands, nor to any habitats other than sandsheet heath, when assessing potential habitat suitability and areal

2. Identify the percentage of *Cleome insolata* habitat that will be cleared in relation to the local and regional *Cleome insolata* habitat and the area of suitable habitat available. 3. Identify a suitable buffer for species records. 4. Propose offsets for residual significant impacts (for habitat loss and removal of any plants).	extent for the species. The response also does not consider the area of *Cleome insolata* habitat within a regional context, when discussing the potential proportion of the species' habitat that may be cleared. To avoid indirect impacts to *Cleome insolata*, the proponent outlines a buffer of at least 100 m downstream or 250 m upstream of known occurrences of *Cleome insolata*. This also accords with the buffers proposed for high-quality sandsheet heath patches. The NT EPA request for information for sandsheet heath refers to features of the broader surface water hydrology that should be considered when assessing the potential for indirect impact. This consideration is particularly relevant to *Cleome insolata*, which may inhabit the margins of sandy drainage areas. The proponent's response has not provided specific information to address these attributes and nor has the proponent apparently considered these attributes in assessing the adequacy of the proposed buffers in ensuring "no or minimal impacts" to *Cleome insolata* within or outside of sandsheet heath patches that are assessed as being high quality. Offsets for residual significant impacts have not been proposed.
Matters of National Environmental Significance - migratory species The TOR (item 4.1.1) required that listed marine and/or migratory species need to be addressed. The appropriate guide for the assessment is the Listed Migratory Species criteria of the EPBC Act Significant Impact Guidelines (Significant Impact Guidelines 1.1). The migratory species that are also listed as threatened have not been assessed in line with the Significant Impact Guidelines 1.1 (eg. the Supplement included an assessment for threatened species of migratory shorebirds at Gunn Point but used the Vulnerable and Endangered impact criteria). An assessment against the migratory species criteria has not been provided.	The further information provided by the proponent has addressed this information gap. The further information includes an assessment of migratory species under the EPBC Act.

Provide an assessment of potential impacts on migratory species using the Listed Migratory Species significant impact criteria in the Significant Impact Guidelines 1.1	
Matters of National Environmental Significance - Commonwealth marine areas DCCEEW comments on the EIS and the Supplement Direction required an assessment of avoidance, mitigation and monitoring of potential impacts to Key Ecological Features within and outside of the Oceanic Shoals Marine Park. The assessment has not been provided. 1. Describe the values of the Oceanic Shoals Marine Park, in accordance with the North Marine Parks Network Management Plan 2018, that could potentially be affected by the proposed action. 2. Demonstrate the adequacy of proposed avoidance, mitigation and monitoring measures to reduce impacts to Marine Park values, including Key Ecological Features, to an acceptable level (i.e. not significant).	The proponent has provided details of the values of the Oceanic Shoals Marine Park and how those values could be affected by the proposed action. The proponent has not adequately demonstrated 'avoidance' measures to reduce impacts to the marine park values, including Key Ecological Features. Avoiding these values would involve going around the raised carbonate features altogether. Doing this would avoid most of the turtle habitat and potential biodiversity hotspots that are regularly found on hard substrates at euphotic depths <~60 m.
Marine ecosystems - EMF-sensitive threatened and / or migratory marine fauna The Supplement refers to a review of studies of EMF impacts on marine species produced by the International Cable Protection Committee (ICPC, 2021) (Section 9.5.3.2), and asserts that the review indicates a lack of evidence for positive or negative effects of cable EMF on the species studied, with studies finding no change in biological assemblages along energised cables. The report was not provided and does not appear to be publically available.	The response to further information provides a thorough assessment of the risks from EMF on a diverse range of marine fauna.

1. Provide evidence of the outcomes of studies of EMF exposure/impacts on marine species. 2. Provide a copy of the International Cable Protection Committee (ICPC, 2021) study on EMP impacts on marine species. 3. Demonstrate that EMF in proximity to the subsea cable is not predicted to be above a level which may result in behavioural changes in elasmobranchs (sharks and rays). 4. Provide detail about how the proposed method of installing cables (laid on the seafloor, trenched into the seabed generally to a depth between 0.3 – 1 m or protected with armouring) would mitigate potential EMF impacts on marine fauna, and what post-installation verification is proposed.	