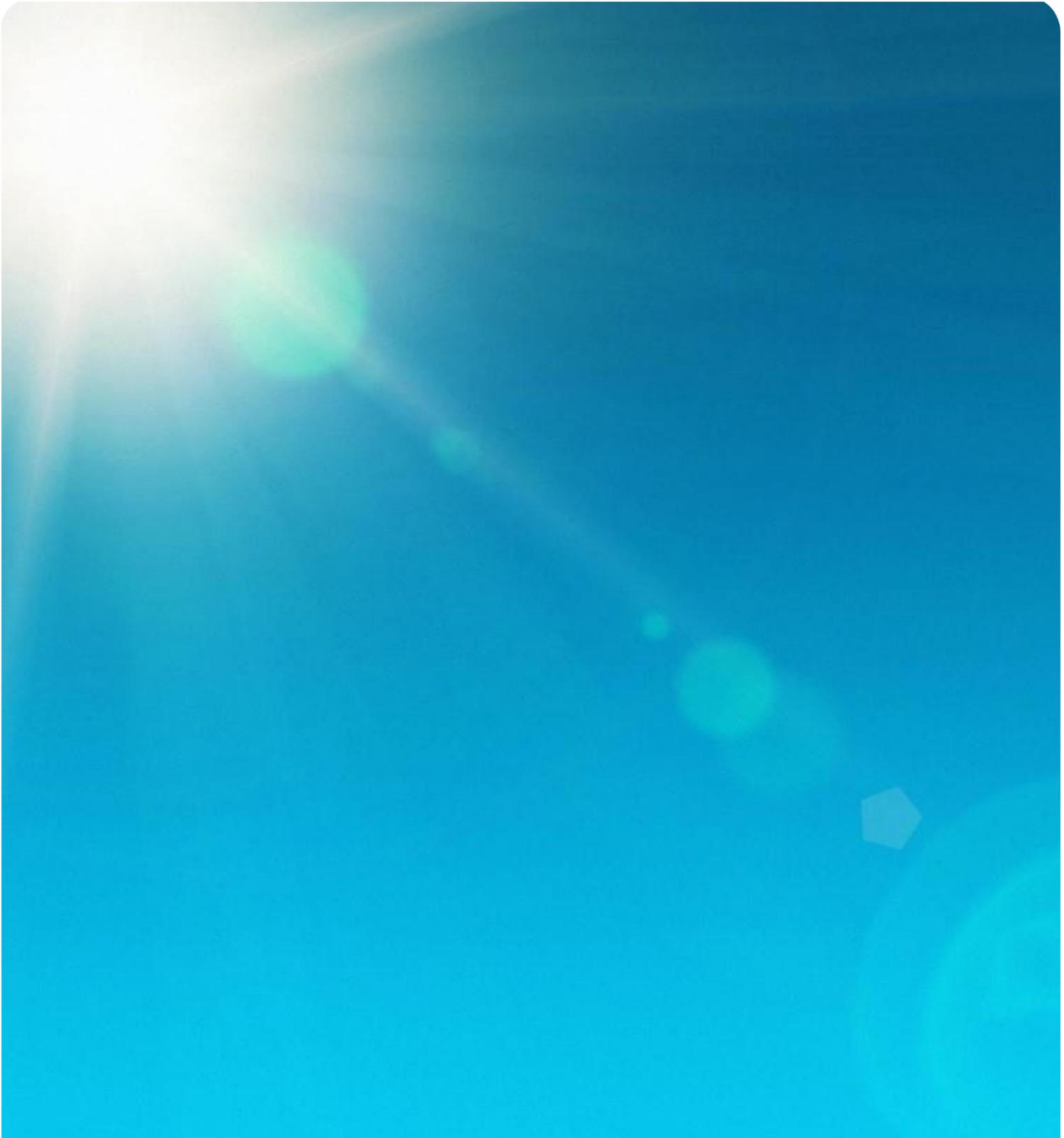


March 2022

Appendix E – Impact Assessment Registers

Australia-Asia PowerLink Environmental Impact Statement



Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Terrestrial environmental quality	Erosion and topsoil migration caused by disturbance of soils	Site selection has chosen flat land, that is mostly above the modelled 1:100 year flood levels	Implementation of site-specific ESCP, which will be commensurate with the risk of erosion in each location.	Likely	Limited	Medium-term	Minor	Medium	High	Minor	Annual post wet season monitoring of rehabilitation success until disturbed areas stabilised. Visual inspections of drainage structures, discharge points and site boundaries following rain events. Post-wet season inspections of footprint and maintenance of emerging erosion issues.	Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions	<p>Likelihood: Likely because erosion hazard and risk is calculated as high to extreme due to large size of footprint and rainfall conditions experience in the area (refer Erosion Risk Assessment EcOz, 2021).</p> <p>Scale: Land clearing and development will be staged. Only portion of the footprint is exposed at any given time.</p> <p>Duration: Construction will take 4 years, after which erosion hazard and risk will reduce to low.</p> <p>Magnitude: Post-wet season inspections will detect and rectify erosion, limiting the magnitude of impact. Limited beneficial use of the land and soils. Unlikely to impact adjacent land uses</p> <p>Values: Limited beneficial use of the land and soils. Not sensitive to impact.</p> <p>Certainty: Erosion hazard assessment and ESCP in accordance with IECA guidelines</p>
Terrestrial environmental quality	Contamination of soils	Solar used as power source, so no requirement for large fuel storages. Dangerous Goods and Hazardous Substances stored and handled in accordance with regulated standards and codes of practice, and manufacturer's directions.	Dangerous Goods and Hazardous Substances stored and handled in accordance with regulated standards and codes of practice, and manufacturer's directions. Spill response procedures and equipment provided at all storage and handling locations. Construction and operations personnel trained in spill response.	Possible	Limited	Short-term	Minor	High	High	Minor	Routine visual inspections around storage locations and work areas.	Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions	<p>Likelihood: Storage and handling of fuels, oils/lubricants/chemicals for use in construction at various locations across footprint. Spills and leaks could occur.</p> <p>Scale: Minor spills/leaks could occur but will be detected and remediated with no offsite impact. Contamination will be limited to small area around site of spill</p> <p>Duration: Spills will occur intermittently. Spills will be detected and remediated immediately.</p> <p>Magnitude: Contaminants will not be detected in soils within or surrounding the site due to small volumes and mitigation measures.</p> <p>Values: Watercourses and groundwater aquifers are sensitive to contamination impacts.</p> <p>Certainty: Australian Standards are established and proven effective for mitigating risk.</p>
Terrestrial environmental quality	Acid sulfate soils disturbance	Nil	Development of an ASSMP if ASS is identified in soil disturbance areas during construction. As per the developed ASSMP treatment of PASS to neutralise acidity and prevent impact on surrounding environment.	Possible	Limited	Short-term	Minor	Medium	High	Minor	Visual inspections and testing of any confirmed ASS in line with National Acid Sulfate Soils Guidance material.	Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions	<p>Likelihood: PASS could occur at specific locations along OHTL. Soil testing to be undertaken.</p> <p>Scale: Area of potential disturbance will be limited to where pole foundations intersect ASS.</p> <p>Duration: ASS would be exposed for a matter of days prior to reburial.</p> <p>Magnitude: Oxidation unlikely to occur during short period of exposure.</p> <p>Values: Watercourses along OHTL would be sensitive to ASS impacts</p> <p>Certainty: Guidelines for identification and management of ASS are established and proven effective</p>
Terrestrial ecosystems	Loss of vegetation and habitat	Site selection has avoided impacts to high value habitats such as watercourses and surveys were undertaken to confirm the absence of Bilby habitat prior to finalising the site boundaries.	Weed hygiene measures and implementation of a Weed Management Plan to contain impacts to within the footprint and avoid impacts to surrounding vegetation and habitats.	Likely	Widespread	Long-term	Minor	Low	High	Minor	Visual inspections during clearing to ensure clearing is within approved boundaries. Results recorded, along with any photographs. Rehabilitation inspections following first wet season post-construction or until vegetation is established and sites are stable.	Records of clearing undertaken. External reporting in accordance with environmental approval conditions	<p>Likelihood: Loss of vegetation and habitat will occur through land clearing.</p> <p>Scale: ~12,000ha will be cleared. Loss of vegetation and habitats will be limited to the footprint.</p> <p>Duration: The majority of cleared area will be developed and so the loss of habitat will be permanent. Remediation back to pastoral land use is proposed at end of life.</p> <p>Magnitude: No core habitat for threatened species. Minor occurrence of riparian vegetation. Limited biodiversity impact.</p> <p>Values: Habitat type is widespread in the area. The habitat is in good condition with little evidence of degradation from land uses, fire or weeds. No significant vegetation communities, threatened species or important habitats were identified by Ecology surveys. Cleared habitats are common and represents 0.43% of the relevant land system. (Refer Solar Precinct Ecology Report EcOz, 2021).</p> <p>Certainty: Ecological surveys undertaken.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Terrestrial ecosystems	Loss or deterioration of significant vegetation	Site selection has avoided impacts to high value habitats such as watercourses and surveys were undertaken to confirm the absence of Bilby habitat prior to finalising the site boundaries.	Weed hygiene measures and implementation of a Weed Management Plan to contain impacts to within the footprint and avoid impacts to surrounding vegetation and habitats.	Possible	Limited	Permanent	Minor	Medium	High	Minor	Visual inspections during clearing to ensure clearing is within approved boundaries. Results recorded, along with any photographs. Rehabilitation inspections following first wet season post-construction or until vegetation is established and sites are stable.	Records of clearing undertaken External reporting in accordance with environmental approval conditions	<p>Likelihood: Access routes cross areas of sparse riparian vegetation.</p> <p>Scale: Access road corridors are approximately 10m wide.</p> <p>Duration: Riparian vegetation in footprint will be removed.</p> <p>Magnitude: Loss of vegetation in corridor will not affect ecosystem more broadly.</p> <p>Values: Riparian vegetation along access roads is locally important.</p> <p>Certainty: Ecological surveys undertaken. Ecology surveys (EcOz, 2021) determined value is absent.</p>
Terrestrial ecosystems	Impacts to threatened species	Micro-siting of transmission towers and access tracks to avoid identified local occurrences (if present). Re-routing the access track to avoid local occurrences (if present).	Clearance only within the boundaries approved in licences obtained to clear native vegetation as per the Planning Act and/or the Pastoral Land Act. Reinstatement of all temporary construction footprints. Post-operations rehabilitation of cleared areas as per the Decommissioning and Rehabilitation Plan.	Possible					High	None	Visual inspections during clearing to ensure clearing is within approved boundaries. Results recorded, along with any photographs. Rehabilitation inspections following first wet season post-construction or until vegetation is established and sites are stable.	Records of clearing undertaken External reporting in accordance with environmental approval conditions	<p><i>Assessment of impacts to listed threatened and migratory species was undertaken with reference to the EPBC Significant Impact Guidelines 1.1 (DEWHA 2013) and EPBC Act Policy Statement 3.21 – Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species (DOE 2015).</i></p>
Terrestrial ecosystems	Degradation of flora and vegetation in surrounding areas			Possible	Limited	Short-term	Minor	Medium	High	Minor			<p>Likelihood: Dust deposition could affect vegetation around footprint.</p> <p>Scale: Deposited dust is modelled to affect an area of approximately 100-380m from footprint (see Chapter 11 Air Quality).</p> <p>Duration: Dust will only be an issue during construction and will be washed off vegetation each wet season.</p> <p>Magnitude: Short-term dust deposition is unlikely to harm vegetation.</p> <p>Values: Riparian vegetation along access roads and watercourses could be sensitive to dust.</p> <p>Certainty: Extent of dust deposition modelled (see Chapter 11 Air Quality). Mitigation measures are routine and proven effective.</p>
Terrestrial ecosystems	Introduction and spread of weeds and pests	Weed hygiene measures will be implemented for construction plant and equipment. Borrow areas will be inspected for weeds and weed contaminated materials will not be brought to site. All project activities will comply with the Weed Management Act which states it is an offence to transport weeds.	A Weed Management Plan will be implemented. Weed inspections and control will be undertaken for the duration of construction and operations to limit the spread of weeds.	Likely	Localised	Permanent	Moderate	Medium	High	Moderate	As per the Weed Management Plan (Appendix Q)	As per the Weed Management Plan (Appendix Q)	<p>Likelihood: Weeds are present in the footprint and likely to be spread on vehicles, plant and equipment, and in imported borrow materials, as commonly occurs on construction projects. Scale: As the site will be developed, any weed infestation likely to be localised to site boundaries and access roads where disturbance occurs during construction but no infrastructure is built. Duration: Experience shows that if weeds are introduced they are very difficult to eradicate and therefore will be permanent and require ongoing control to limit spread and impacts. Magnitude: Because the area currently has limited weeds, any new weeds introduced will represent a change to the weed profile and risk for the area. Values: No weeds were observed in the footprint during Ecology surveys (Refer Solar Precinct Ecology Report EcOz, 2021). The habitats present do not support any significant vegetation or species. Certainty: Potential impacts are well understood from other projects and Weed MP will reduce risk to ALARP.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Terrestrial ecosystems	Changes in fire regimes	Observe fire bans	Develop and implement a Bushfire Management Plan, including first response capability.	Possible	Localised	Short-term	Minor	Medium	High	Minor	Visual monitoring for fires Monitoring NAFI website for proximate fires which may impact proposal. Monitoring conditions for fire risk.	Any fires reported to Bushfires NT or appropriate authority.	<p>Likelihood: Construction activities could start bushfires but individual fire events would not alter fire regimes.</p> <p>Scale: Bushfire response plans will be in place to limit the extent of area burnt.</p> <p>Duration: Impact could occur occasionally during construction.</p> <p>Magnitude: Vegetation is resilient to occasional fire.</p> <p>Values: Sensitive values present in footprint are riparian, sand sheet heath and rainforest, and the Black Jungle Reserve.</p> <p>Certainty: Bushfire risks well understood and bushfire response will reduce risk to ALARP.</p>
Terrestrial ecosystems	Direct fauna mortality	Pre-clearing inspections undertaken to identify and relocate any fauna that are at risk i.e. nests and burrows. Avoiding clearing large hollow-bearing trees where possible. Location of Solar Precinct at a distance from waterbodies.	Clearing will be conducted in a single direction, allowing any fauna to move out of way of clearing activities. If fauna is spotted in immediate clearing area and are in danger, clearing will be stopped until safe to continue. Clearing in a progressive manner to allow wildlife to natural disperse from the area as clearing undertaken. Site inductions will ensure that all personnel are aware of their obligations and know the correct procedures for fauna encounters. Vehicle speed restrictions apply when travelling near uncleared areas or in higher risk conditions.	Possible	Limited	Short-term	Minor	Low	High	Minor	Record any fauna encounters, injuries or death as result of works for the duration of works. Incidental observations of carcasses, including during routine infrastructure inspections	Internal record keeping of incidents of fauna mortality. External reporting in accordance with environmental approval conditions	<p>Likelihood: Individual fauna deaths may occur during land clearing and along access routes.</p> <p>Scale: Deaths will be isolated occurrences. There are no non-mobile fauna populations present that would be at higher risk of large numbers of mortalities. Mobile fauna will avoid construction activities and move into surrounding habitats.</p> <p>Duration: Mortalities will mainly occur when large earthmoving equipment is being operated in the land clearing phase and when there is a high volume of construction traffic movements along access roads, which will occur over 4 years.</p> <p>Magnitude: Isolated occurrences of fauna mortality will not affect the viability of fauna populations.</p> <p>Values: No nesting or roosting habitats identified. No threatened species present.</p> <p>Certainty: Potential impacts are well understood from other projects. Mitigation measures are routine and will reduce risk to ALARP.</p>
Terrestrial ecosystems	Habitat degradation and fragmentation	Nil	Reinstatement of all temporary construction footprints and follow-up weed control post-construction.	Unlikely					High	None	Nil	External reporting in accordance with environmental approval conditions	<p><i>Not assessed. Open sparse vegetation types that are regionally common means fragmentation impacts are unlikely.</i></p> <p>Certainty: Ecologically surveys undertaken</p>
Terrestrial ecosystems	Changes to fauna behaviours due to noise, light and other disturbances	Waste management procedures to avoid attracting fauna to waste disposal areas.		Possible	Limited	Medium-term	Minor	Low	High	Minor			<p>Likelihood: Construction activities will be noisy and lighting will be in place across the site. Fauna are likely to alter their behaviours to avoid noisy construction activities, but could be attracted to light and areas where food wastes are stored.</p> <p>Scale: Impact will not occur across the footprint at once, but will be isolated to where activity is taking place.</p> <p>Duration: Impact will occur over the 4 year construction phase. Fauna will move back in to habitats surrounding the footprint once operational.</p> <p>Magnitude: Change to level of fauna activity may occur but will not affect the viability of fauna populations.</p> <p>Values: No threatened species present, or important populations identified in footprint that would be susceptible to disturbance i.e. no nesting or roosting habitat present.</p> <p>Certainty: Potential impacts are well understood from other projects. Mitigation measures are routine and proven effective</p>
Terrestrial ecosystems	Loss of habitat from erosion			Unlikely					High	None			<p><i>Not assessed. The residual impact associated with erosion was assessed as low (see Chapter 4 Terrestrial Environmental Quality). This level of impact would not cause loss of habitat.</i></p> <p>Certainty: Erosion hazard assessed in accord with accepted guidelines.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Terrestrial ecosystems	Loss of habitat from disturbance of acid sulfate soils			Unlikely					High	None			Not assessed. The residual impact associated with ASS was assessed as low (see Chapter 4 Terrestrial Environmental Quality). This level of impact would not cause loss of habitat. Certainty: ASS risk assessed and managed in accord with accepted guidelines.
Terrestrial ecosystems	Degradation of habitats by contamination and pollution			Unlikely					High	None			Not assessed. The residual impact associated with contamination and pollution was assessed as low (see Chapter 4 Terrestrial Environmental Quality). This level of impact would not cause degradation or loss of habitat. Certainty: Mitigation measures for spill prevention and response are routine and proven effective.
Hydrological processes	Alteration to surface water flows in water courses or wetlands	Solar Precinct and Darwin Converter Site footprints located on flat land above the maximum modelled flood extent (0.1 % AEP/1-in-1000-year flood event) and outside of mapped storm surge zones.Solar Precinct and Darwin Converter Site site selection process included avoidance of major watercourses. Roadside drainage and culverts will be designed and installed in accordance with accepted Austroads standards.Groundwater used as water supply – no surface water extraction.	Drainage, erosion and sediment controls installed and maintained in accordance with Erosion and Sediment Control Plans (ESCP) that align with the Best Practice Erosion and Sediment Control Guidelines (IECA, 2008).Design criteria for engineered stormwater management systems installed at the Solar Precinct and Darwin Converter Site is to discharge water to similar locations and at similar volumes to pre-development conditions.	Possible	Limited	Short-term	Negligible	Medium	High	Minor	During construction, visual inspections of disturbed areas and erosion and sediment controls as per ESCP (after significant rainfall events, at a minimum). Annual post wet season monitoring of revegetation success until disturbed areas are stabilised.Visual inspections of drainage structures, discharge points and site boundaries following rain events. Post-wet season inspections of all project locations and rectification of emerging erosion issues.	Internal records of ESCP inspections, as stipulated in ESCP's. Internal reporting on environmental performance.External reporting in accordance with environmental approval conditions.	Likelihood: Altered flow paths possible in watercourses and alluvial floodplains crossed by access roads. Scale: Altered surface water flow paths limited to direct disturbance footprint at crossings. Duration: Once crossings are installed surface water flows will be unimpeded due to road and drainage design. Magnitude: Watercourses are minor ephemeral drainage lines. Watercourse crossings will not be constructed during periods of flow. Values: Hydrology supports aquatic ecosystems and other beneficial uses of watercourses. Certainty: Roads and crossings will adhere to Austroads, which is proven effective in mitigating impacts to surface water flows. Temporary drainage as per ESCP developed in accordance with IECA guidelines.
Hydrological processes	Changes to ground water levels caused by groundwater extraction	Groundwater extraction sites will be located away from existing groundwater bores in use. Engagement with landowners at Solar Precinct and along OHTL to identify bores that can be used as a water source without affecting other uses.	Bore locations and sustainable yields to be determined subject to investigation and recommendations from a hydrogeologist. Bore work permits and water extraction licences obtained under the Water Act.	Likely	Regional	Medium-term	Minor	Medium	Low	Moderate	Monitoring of standing water levels and water extraction volumes, as required under water extraction licence conditions. Water quality sampling and analysis of springs near Solar Precinct and aquifer targeted for groundwater extraction to ensure there is no connectivity.	Internal records of water usage and water extraction. External reporting of water extraction in accordance with water extraction licence and environmental approval conditions.	Likelihood: Groundwater extraction to supply 1,000 ML/year during construction will result in drawdown around bores. Scale: Drawdown may affect up to kilometres around bores; location and extent currently unknown. Duration: Extraction of large volumes of water only required for construction (up to 5 years). Groundwater levels will take time to recover following extraction. Magnitude: Due to remote location, few existing water users, and distance to springs and GDE's, impact from drawdown expected to be minor. Values: Groundwater in the region support pastoral uses and, in the broader aquifer, many beneficial uses. Certainty: Locations for construction water extraction bores are currently unknown, and so certainty is low about impact to other users.

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Inland water environmental quality	Increased turbidity caused by soil disturbance and erosion	Solar Precinct and Darwin Converter Site footprints located on flat land above the maximum modelled flood extent (1 %AEP/1-in-1000-year flood event) and outside of mapped storm surge zones. Solar Precinct and Darwin Converter Site footprints avoid watercourses. Progressive clearing, construction and reinstatement will be undertaken. Stormwater drainage will be installed to capture and manage runoff. Stormwater captured within facilities will discharge to land, via erosion and sediment controls. Roadside drainage and culverts will be installed in accordance with Austroads standards.	Watercourse crossings along access roads and OHTL will be installed during the dry season when no flow present. Drainage, erosion and sediment controls will be installed and maintained in accordance with Erosion and Sediment Control Plans (ESCP) that align with the Best Practice Erosion and Sediment Control Guidelines (IECA, 2008). Develop and implement a Reinstatement Plan for post-construction reinstatement of works areas to stabilise soils and promote regrowth of native vegetation. Rectification of emerging erosion issues after each wet season.	Possible	Limited	Short-term	Minor	Medium	High	Minor	During construction, visual inspections will be undertaken of disturbed areas and erosion and sediment controls as per ESCP (after significant rainfall events, at a minimum). Annual post wet season monitoring of reinstatement success until disturbed areas are stabilised. Visual inspections of drainage structures, discharge points and site boundaries following rain events. Post-wet season inspections of all project locations and rectification of emerging erosion issues.	Internal records of ESCP inspections, as stipulated in ESCP's. Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions.	<p>Likelihood: Access roads will cross ephemeral watercourses and will disturb bed and banks, which increases erosion risk and potential for increased turbidity.</p> <p>Scale: Water quality may be impacted for several hundred metres downstream of crossings.</p> <p>Duration: Water quality impacts would only occur for days immediately following a rainfall event.</p> <p>Magnitude: Watercourses are naturally turbid, particularly following rainfall and runoff events.</p> <p>Values: Water quality supports values such as aquatic ecosystem health, pastoral, agricultural, cultural, social and amenity.</p> <p>Certainty: Erosion hazard assessment and ESCP in accordance with IECA guidelines.</p>
Inland water environmental quality	Contamination by release of fuels and hazardous substances	During operations, solar power will be used as a power source, hence no requirement for bulk fuel storages. Dangerous Goods and Hazardous Substances will be stored and handled in accordance with regulated standards and codes of practice, and manufacturer's directions. Dangerous Goods and Hazardous Substances will not be stored within 200m of a watercourse or groundwater bore, and mobile refuelling will not occur within 50m of a watercourse or groundwater bore.	Dangerous Goods and Hazardous Substances Registers will be maintained at all storage and handling locations. An Environmental Emergency and Spill Response Plan will be in place and equipment provided at all storage and handling locations. Construction and operations staff will be trained in spill response.	Unlikely	Limited	Short-term	Negligible	High	High	Minor	Routine visual inspections around storage locations and work areas.	Internal records of volumes used and stored in accordance with Workplace Health and Safety Regulations. Internal inspection records and notes. Internal records of water quality monitoring. Incidents of off-site pollution or nuisance reported to the NT EPA within 24 hours	<p>Likelihood: Small volumes of fuels and hazardous substances will be stored and used.</p> <p>Scale: Spills may occur but storage and handling procedures mean a spill will be limited to ground around spill and will not enter a watercourse or groundwater aquifer.</p> <p>Duration: Spills to ground will occur intermittently. Spills will be detected and remediated immediately.</p> <p>Magnitude: No change in water quality as a result of spills.</p> <p>Values: Water quality in watercourses and groundwater is sensitive to contamination and supports numerous beneficial uses.</p> <p>Certainty: Australian Standards are established and proven effective for mitigating risk. No underground storage, or storage within 200 m of a watercourse.</p>
Inland water environmental quality	Contamination from waste storage and disposal areas	Landfill will comply with the Guidelines for Siting, Design and Management of Solid Waste Disposal Sites in the Northern Territory (NT EPA 2003). No waste will be stored within 200m of a watercourse.	Waste management will be in accordance with best practice guidelines (e.g. separation of waste, covering, bunded storage areas), and the requirements of the Waste Management and Pollution Control Act 1998. All listed waste will be disposed of at a licenced waste management facility.	Unlikely	Limited	Long-term	Negligible	Low	High	Minor	Routine visual inspections around landfill, waste storage locations and work areas.	Internal records of inspections. Incident reporting	<p>Likelihood: Inert and putrescible waste will be disposed of onsite at Solar Precinct. All other waste will be temporarily stored and disposed at a licenced facility.</p> <p>Scale: Any contamination from waste storage and disposal will be limited to soil in immediate surrounds.</p> <p>Duration: Waste will be stored at Darwin Converter Site, and stored and disposed at Solar Precinct for construction and operation phases. Short term storage within OHTL.</p> <p>Magnitude: No change in water quality as a result of waste storage and disposal.</p> <p>Values: No watercourses or groundwater proximate to waste storage and disposal areas.</p> <p>Certainty: Compliance with NT guidelines and regulations proven effective for mitigating risk.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Inland water environmental quality	Contamination by sewage from camps and ablutions	Onsite wastewater management systems to be designed and installed by suitably qualified person, in accordance with NT Code of Practice for Onsite Wastewater Management, plus other relevant standards and guidelines. System to be designed for projected wastewater loads, and appropriate for applicable climate.	Any issues identified with wastewater management system to be rectified by suitably licenced person.	Unlikely	Limited	Long-term	Negligible	Medium	High	Minor	Routine inspection and maintenance of wastewater management systems and land application areas, in accordance with the NT Code of Practice for Onsite Wastewater Management.	Internal records of maintenance works undertaken. Relevant notifications/applications and reporting to NT Department of Health, or DIPL.	<p>Likelihood: Onsite wastewater management systems will be established at the Solar Precinct, along the OHTL at fly camps, and at the Darwin Converter Site.</p> <p>Scale: Wastewater will be treated and disposed of to land in a controlled and spatially limited area.</p> <p>Duration: Wastewater management systems will be used for construction and operation phases at Solar Precinct and Darwin Converter Site but will be temporary at OHTL fly camps.</p> <p>Magnitude: No change in water quality as a result of wastewater management.</p> <p>Value: Some watercourses or shallow groundwater may be proximate to Darwin Converter Site and OHTL systems, which support numerous beneficial uses.</p> <p>Certainty: Compliance with NT guidelines and regulations proven effective for mitigating risk.</p>
Aquatic ecosystems	Direct loss of aquatic habitat	Solar Precinct and Darwin Converter Site site selection process included avoidance of major watercourses; neither site has aquatic ecosystems within the direct disturbance footprint. The final route selection process for the Solar Precinct access roads will avoid crossing locations that hold water for extended periods, riparian vegetation and aquatic vegetation, where possible.	Minimise the disturbance footprint within waterways or wetlands to the smallest practicable area. Watercourse crossings along Solar Precinct access roads and OHTL installed in the dry season when no flow is present.	Possible	Limited	Long-term	Negligible	Medium	High	Minor	Monitoring during clearing to ensure clearing remains within approved boundaries, and at approved watercourse crossing locations.	Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions.	<p>Likelihood: No aquatic habitats present in Solar Precinct footprint. Access roads cross watercourses. Scale: Access road crossings may remove a narrow corridor of instream habitat (10m wide) Duration: Habitat will be lost from the corridor indefinitely. Magnitude: No change to aquatic ecosystems predicted outside 10m wide corridor. Value: Watercourses do support aquatic ecosystems during periods of flow and do hold permanent pools. Certainty: Aquatic habitats persist up and downstream of minor road crossings elsewhere in the region.</p>
Aquatic ecosystems	Reduction in aquatic habitat value due to water quality impacts	Solar Precinct and Darwin Converter Site footprints avoid watercourses. Dangerous Goods and Hazardous Substances will be stored and handled in accordance with regulated standards and codes of practice, and manufacturer's directions. Dangerous Goods and Hazardous Substances will not be stored within 200 m of a watercourse or groundwater bore, and mobile refuelling will not occur within 50 m of a watercourse or groundwater bore.	Drainage, erosion and sediment controls installed and maintained in accordance with Erosion and Sediment Control Plans (ESCP) that align with the Best Practice Erosion and Sediment Control Guidelines (IECA, 2008). Develop and implement a Reinstatement Plan for post-construction reinstatement of works areas to stabilise soils and promote regrowth of native vegetation. Rectification of emerging erosion issues after each wet season. Dangerous Goods and Hazardous Substances Registers maintained at all storage and handling locations. An Environmental Emergency and Spill Response Plan will be in place and equipment provided at all storage and handling locations. Construction and operations staff trained in spill response.	Possible	Limited	Short-term	Minor	Medium	High	Minor	Annual post wet season monitoring of rehabilitation success until disturbed areas are stabilised. Visual inspections of drainage structures, discharge points and site boundaries following rain events. Post-wet season inspections of all project locations and rectification of emerging erosion issues.	Internal reporting on environmental performance. Internal records of ESCP inspections, as stipulated in ESCP's. External reporting in accordance with environmental approval conditions. Internal records of water quality monitoring. Internal records of volumes used and stored in accordance with Workplace Health and Safety Regulations. Incidents of off-site pollution or nuisance reported to the NT EPA within 24 hours.	<p>Likelihood: No aquatic habitats in Solar Precinct footprint. Access roads will cross ephemeral watercourses where erosion and sedimentation could occur.</p> <p>Scale: If water quality impacts occur, they will be limited to several hundred metres downstream of crossings.</p> <p>Duration: Water quality impacts would only occur for days immediately following a rainfall event.</p> <p>Magnitude: Watercourses are naturally turbid following rainfall. No permanent pools or sensitive aquatic habitats present.</p> <p>Value: Watercourses do support aquatic ecosystems during periods of flow and do hold permanent pools.</p> <p>Certainty: Water quality impact directly link to erosion hazard, which has been assessed as Low in accordance with IECA (2008)</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Aquatic ecosystems	Reduction in aquatic habitat value due to altered hydrology or groundwater extraction	<p>Solar Precinct and Darwin Converter Site footprints located on flat land above the maximum modelled flood extent (1 %AEP/1-in-1000-year flood event) and outside of mapped storm surge zones.</p> <p>Solar Precinct and Darwin Converter Sites do not have watercourses within direct disturbance footprint. Roadside drainage and culverts will be designed in accordance with accepted AustRoads standards. Groundwater used as water supply – no surface water extraction. Groundwater extraction sites will be located away from springs or GDE's. Engagement with landowners at Solar Precinct and along OHTL to identify bores that can be used as a water source without affecting other uses.</p>	<p>Design criteria for engineered stormwater management systems installed at the Solar Precinct and Darwin Converter Site is to discharge water to similar locations and at similar volumes to pre-development conditions.</p> <p>Implementation of ESCP's which will manage drainage and minimise erosion. Watercourse crossings along Solar Precinct access roads and OHTL installed in the dry season when no flow is present.</p> <p>Bore locations and sustainable yields to be determined subject to investigation and recommendations from a hydrogeologist.</p> <p>Bore permits and water extraction licence obtained under the Water Act 1992.</p>	Unlikely	Limited	Short-term	Negligible	Medium	High	Minor	<p>Monitoring of standing water levels and water extraction volumes, as required under water extraction licence conditions. Water quality sampling and analysis of springs near Solar Precinct and aquifer targeted for groundwater extraction to ensure there is no connectivity.</p>	<p>Internal reporting on environmental performance. Internal records of water usage and water extraction. External reporting of water extraction in accordance with water extraction licence and environmental approval conditions.</p>	<p>Likelihood: No watercourses present in Solar Precinct footprint. Access roads will not be constructed during periods of flow. Groundwater extraction will be located away from springs and GDE's.</p> <p>Scale: Any change in flows will be limited to the immediate vicinity of the crossings.</p> <p>Duration: Once crossings are installed surface water flows will be unimpeded due to road and drainage design.</p> <p>Magnitude: Watercourses are minor ephemeral drainage lines. Watercourse crossings will not be constructed during periods of flow.</p> <p>Value: Watercourses do support aquatic ecosystems during periods of flow and do hold permanent pools.</p> <p>Certainty: Roads and crossings will adhere to Austroads, which is proven effective in mitigating impacts. Groundwater bores and extraction will be regulated under the Water Act.</p>
Aquatic ecosystems	Reduction in aquatic habitat value due to dust	<p>Solar Precinct site, which is largest continuous footprint, is located away from sensitive receptors and aquatic ecosystems</p> <p>Operational footprint will cover soil with infrastructure, hardstand or vegetation to minimise wind erosion and dust</p>	None required	Possible	Limited	Medium-term	Negligible	Low	High	Minor	<p>Visual monitoring for airborne dust around proposal footprints</p>	<p>Internal reporting on environmental performance</p>	<p>Likelihood: Dust deposition could impact watercourses at access road crossings.</p> <p>Scale: Dust modelling indicates impacts up to 244 m from construction footprint (see Chapter 11).</p> <p>Duration: Dust impacts will occur periodically for duration of construction.</p> <p>Magnitude: No aquatic ecosystems within the area of influence.</p> <p>Value: Watercourses do support aquatic ecosystems during periods of flow and do hold permanent pools</p> <p>Certainty: Dust deposition modelling has been undertaken (see Appendix U).</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Air quality	Emissions of PM or NO2 that could affect human health	Whenever possible, plan haul routes to avoid residential areas Efficient staging and layout of construction facilities to minimize haulage, avoid double handling of materials and other excessive equipment operations Use grid or solar power whenever practical over stationary combustion generated power Implement anti-idling policy	NOx emissions will be minimised by using electric vehicles and equipment where practicable, and ensuring all machinery, plant and equipment complies with minimum emissions standards Operate equipment at optimum rated loads as determined by equipment manufacturer and follow routine equipment maintenance procedures Ensure all heavy duty on-road and non-road vehicles are late model and meet all commonwealth and NT emission standards Ensure all equipment brought to site is in good working order accompanied by inspection certificates and not exceeding 10% opacity. Position stationary emission sources such as generators away from sensitive receptors with due regard to safety, security, traffic and other geographic restrictions.	Likely	Localised	Medium-term	Minor	Low	High	Minor	Conduct visual inspections for opacity from vehicle/equipment emissions. Carry out inspections certifying equipment is in good working order prior to shipping to site	Reporting will be carried out per the requirements of the CEMP described in Chapter 17 External reporting in accordance with environmental approval conditions.	<p>Likelihood: Construction activities will produce PM and NO2</p> <p>Scale: Health criteria is predicted to be met within 501m from activities.</p> <p>Duration: Impacts will occur over several years during construction.</p> <p>Magnitude: Emissions are likely to exceed natural variability with no mitigation. Mitigation measures expected to reduce the magnitude of this risk.</p> <p>Value: There are no sensitive receptors present in areas where air quality criteria are predicted to be exceeded.</p> <p>Certainty: Air quality modelling has been undertaken (see Appendix U).</p>
Air quality	Emissions of particulate matter (TSP and deposited dust) that could affect amenity	Locate site access roads, laydown areas and stationary equipment (e.g., generators) as far away as possible from sensitive receivers Limit the amount of time between completion of road base and any paved areas to minimize exposure of unpaved surface	Water carts will be used across the project footprint to minimise dust emissions in areas of high risk at regular intervals. Other dust suppressants will be used if water ineffective. Implement on-site vehicle restrictions (e.g., limit the speed of vehicles travelling on unsealed access roads). Provide tyre wash facilities to minimize tracking of mud or dirt onto sealed roads Cover or dampen any stockpiles where practical. Notify and engage with residences and businesses who could be affected ahead of the construction front, and implement complaints procedure.	Possible	Localised	Medium-term	Minor	Low	High	Minor	Visual observations for fugitive emissions of dust Conduct regular inspections of construction areas and roads to identify potential sources of dust emissions Develop 'watching brief' on 'nuisance' impacts to ensure quick responses to any detriment and emerging issues. Implement complaints procedure	Reporting will be carried out per the requirements of the CEMP described in Chapter 17 External reporting in accordance with environmental approval conditions.	<p>Likelihood: Construction activities will result in dust emissions.</p> <p>Scale: Nuisance criteria is predicted to be met within 244 m from construction activities.</p> <p>Duration: Impacts will occur over several years during construction.</p> <p>Magnitude: Emissions are likely to exceed natural variability with no mitigation. Mitigation measures expected to reduce the magnitude of this risk.</p> <p>Value: There are no sensitive receptors present in areas where air quality criteria are predicted to be exceeded.</p> <p>Certainty: Dust deposition modelling has been undertaken (see Appendix U).</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Atmospheric processes	GHG emissions from combustion of fuel from vessels, plant and equipment for earthworks, air and land travel, logistics and power generation	Continue to identify and engage in opportunities to maximise commercially viable carbon abatement from the AAPowerLink, including: <ul style="list-style-type: none"> • Pursuing power purchase agreements with large fossil fuel power generators in the NT. • Conduct a life-cycle assessment during the design phase to quantify GHG emissions including embodied, direct and indirect emissions and demonstrate that the AAPowerLink is a carbon positive project • Supply AAPowerLink construction and operational power needs via self-generated solar energy where practicable. • Where the use of self-generated solar energy is not possible, source renewable energy via market mechanisms (if available). • Identify and (where practicable) adopt practical zero carbon technology solutions such as electric vehicles, plant and equipment and remote solar energy systems. • Explore practicable opportunities with NT Carbon Capture Utilisation and Storage Project 	Develop and implement a GHG Abatement and Management Plan that aligns with ISO 140001 Environmental Management Systems and ISO 50001 Energy Management Systems. Conduct GHG mitigation workshops every 2 years during design and construction and every five years during operations to assess performance and identify new opportunities for leveraging best practice and emerging technology. Procurement strategies to consider adoption of carbon reduction and energy efficient technologies (where practicable), including but not limited to: <ul style="list-style-type: none"> • Electrification options for civil plant, machinery and equipment. • Energy efficiency in aircraft services selection. • Electrification and alternative fuel options for transportation (e.g., marine vessels, rail) Develop vegetation management strategies that aim to retain vegetation and soil carbon. Conduct studies to identify and select clearing, fire management, vegetation disposal practices and vegetation species to plant or retain. Develop and implement Rehabilitation Plans that aims to reinstate vegetation post-construction and post-decommissioning	Likely	Widespread	Medium-term	Minor	Low	High	Minor	Monitor GHG emissions from activities, as well as energy produced and exported in line with the requirements of NT and Commonwealth law. Data required to calculate GHG emissions will be collected in line with the methods outlined in the National Greenhouse and Energy reporting (Measurement) Determination 2008. Monitor performance against targets set in the GHG Abatement and Management Plan.	Reporting of GHG emissions in line with the requirements of the NGER Act. AAPowerLink will trigger emissions thresholds for reporting during construction and reporting thresholds for energy production during operations. External reporting in accordance with environmental approval conditions under the EP Act.	Likelihood: Equipment requiring fuel combustion will be used where self-generated or renewable energy is not practicable; mainly during construction phase. Scale: Fuel generated GHG from logistics and earthworks from a combined area ~12,900ha. Duration: Impact occurs only during the construction phase. Magnitude: Relevant criteria for environmental protection are met. Value: Most of the footprint is in remote areas. Sensitive receptors are not locally impacted by GHG emissions; project has a net positive GHG impact. Certainty: Acceptable level of certainty pertaining to values and receptors

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Atmospheric processes	GHG emissions from land clearing and land use change	Continue to identify and engage in opportunities to maximise commercially viable carbon abatement from the AAPowerLink, including: <ul style="list-style-type: none"> • Pursuing power purchase agreements with large fossil fuel power generators in the NT. • Conduct a life-cycle assessment during the design phase to quantify GHG emissions including embodied, direct and indirect emissions and demonstrate that the AAPowerLink is a carbon positive project • Supply AAPowerLink construction and operational power needs via self-generated solar energy where practicable. • Where the use of self-generated solar energy is not possible, source renewable energy via market mechanisms (if available). • Identify and (where practicable) adopt practical zero carbon technology solutions such as electric vehicles, plant and equipment and remote solar energy systems. • Explore practicable opportunities with NT Carbon Capture Utilisation and Storage Project 	Develop and implement a GHG Abatement and Management Plan that aligns with ISO 140001 Environmental Management Systems and ISO 50001 Energy Management Systems. Conduct GHG mitigation workshops every 2 years during design and construction and every five years during operations to assess performance and identify new opportunities for leveraging best practice and emerging technology. Procurement strategies to consider adoption of carbon reduction and energy efficient technologies (where practicable), including but not limited to: <ul style="list-style-type: none"> • Electrification options for civil plant, machinery and equipment. • Energy efficiency in aircraft services selection. • Electrification and alternative fuel options for transportation (e.g., marine vessels, rail) Develop vegetation management strategies that aim to retain vegetation and soil carbon Conduct studies to identify and select clearing, fire management, vegetation disposal practices and vegetation species to plant or retain. Develop and implement Rehabilitation Plans that aims to reinstate vegetation post-construction and post-decommissioning	Likely	Widespread	Medium-term	Minor	Low	High	Minor	Monitor GHG emissions from activities, as well as energy produced and exported in line with the requirements of NT and Commonwealth law. Data required to calculate GHG emissions will be collected in line with the methods outlined in the National Greenhouse and Energy reporting (Measurement) Determination 2008 Monitor performance against targets set in the GHG Abatement and Management Plan.	Reporting of GHG emissions in line with the requirements of the NGER Act. AAPowerLink will trigger emissions thresholds for reporting during construction and reporting thresholds for energy production during operations. External reporting in accordance with environmental approval conditions under the EP Act.	<p>Likelihood: Land clearing and land use change is to take place</p> <p>Scale: Land clearing on a combined area ~12,900ha</p> <p>Duration: Impact occurs only during the construction phase</p> <p>Magnitude: Relevant criteria for environmental protection are met</p> <p>Values: Most of the footprint is in remote areas. Sensitive receptors are not locally impacted by GHG emissions; project has a net positive GHG impact.</p> <p>Certainty: Acceptable level of certainty pertaining to values and receptors</p>
Culture and heritage	Direct impact to heritage features	Consult with Traditional Owners and sites custodians through the ILUA and AAPA Authority Certificate processes to identify Sacred Sites and culturally significant landscape features and determine the most appropriate site protection measures. Avoid direct impacts to recorded heritage features where practicable when finalising the locations of AAPowerLink infrastructure and temporary construction works areas.	Prepare Cultural Heritage Management Plan/s (CHMP) in consultation with Traditional Owners and the NT Heritage Branch. Comply with conditions of Authority Certificates and ensure conditions are made available to all authorised personnel. Where impacts to archaeological heritage features are unavoidable, obtain an approval to carry out work on a heritage place or object (work) under the Heritage Act. Mitigation works on heritage features covered by Works Approvals will be undertaken ahead of commencing site preparation activities. Workforce training and inductions will address all aspects of cultural awareness and heritage protection.	Likely	Limited	Permanent	Moderate	High	Low	Moderate	Visual inspection of heritage features identified for protection. Ongoing engagement with Traditional Owners to identify emerging issues or concerns regarding heritage protection.	Internal environmental performance reporting. Reporting of incidents to Traditional Owners/AAPA/NLC and NT Heritage Branch and consultation to determine appropriate response. External reporting in accordance with environmental approval and heritage works approval conditions.	<p>Likelihood: Construction will involve ground disturbance in areas where heritage features have been recorded.</p> <p>Scale: Limited to isolated locations within direct disturbance footprint.</p> <p>Duration: Heritage features disturbed during construction will be permanently impacted.</p> <p>Magnitude: Disturbance will occur across a culturally significant landscape with some direct impact to recorded heritage features. No impact to Sacred Sites.</p> <p>Value: Culturally significant landscape features recorded and many of the recorded archaeological sites have High Aboriginal Significance.</p> <p>Certainty: Heritage surveys undertaken (Appendix V). Sacred Sites clearance are pending. Site-specific mitigation measures to be determined.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Culture and heritage	Indirect impact to heritage features	Restrict unauthorised public access along AAPowerLink access tracks and roads. Design criteria for engineered stormwater management systems and roads to maintain flows similar to pre-development conditions to avoid indirect impacts to heritage features associated with watercourses and swamps. Develop and implement site-specific Erosion and Sediment Control Plans (ESCPs) to minimise erosion and off-site sedimentation that could smother heritage features. Implement dust control measures to minimise dust deposition into surrounds surrounding the proposal footprint where heritage features are present.	Rectify emerging issues associated with unauthorised access, alteration of flows, erosion and sedimentation, water quality and dust, to minimise potential for indirect impacts to heritage features.	Possible	Limited	Permanent	Minor	High	High	Minor	Provision of reporting processes for landholders and community to report unauthorised use of AAPowerLink access tracks. Visual inspections of disturbed areas and erosion and sediment controls as per ESCP (after significant rainfall events, at a minimum). Visual inspection of recorded heritage features adjacent to proposal footprint for signs of disturbance.	Internal reporting on environmental performance. External reporting in accordance with conditions of environmental approvals and permits.	<p>Likelihood: Construction activities could create deposited dust and erosion and sedimentation impacts.</p> <p>Scale: Impacts will be mitigated and therefore limited to within several hundred metres of footprint.</p> <p>Duration: Heritage features disturbed during construction could be permanently impacted.</p> <p>Magnitude: Some loss of site integrity could occur but sites unlikely to be destroyed.</p> <p>Values: Landscape is culturally significant and contains heritage features both inside and outside footprint.</p> <p>Certainty: Sedimentation and dust deposition will affect small areas – see Chapter 5 & 11. Routine mitigation measures are proven effective for minimising offsite impacts.</p>
Culture and heritage	Direct or indirect impact to undetected heritage features	Use archaeological predictive models developed through the HIAs to identify Heritage Risk Areas where clearance survey is required. Undertake clearance surveys in all Heritage Risk Areas to inform final site/route selection and heritage mitigation measures.	CHMPs will provide measures for managing the inadvertent discovery of heritage features. Consultation with NT Heritage Branch to determine appropriate response. Where further impacts to archaeological heritage features are unavoidable, obtain an approval to carry out work on a heritage place or object (work) under the Heritage Act. Workforce training and inductions will address all aspects of cultural awareness and heritage protection.	Possible	Limited	Permanent	Minor	Low	Low	Minor	Monitoring of site protection or mitigation works by a qualified heritage practitioner.	Internal reporting on environmental performance. External reporting in accordance with conditions of environmental approvals and permits. Reporting of incidents and unexpected finds to Traditional Owners/AAPA/NLC and NT Heritage Branch. Reporting outcomes of site protection and mitigation works to Traditional Owners/AAPA/NLC and NT Heritage Branch.	<p>Likelihood: Heritage surveys undertaken by Earth Sea Heritage (2020). Some undetected archaeological features may remain. Scale: Predictive models indicate sites will be limited to along watercourses and on swamp margins. Duration: Heritage features disturbed during construction could be permanently impacted. Magnitude: Undetected sites are generally unlikely to be of high significance due to the level of survey effort undertaken. Loss of low significance sites will not affect heritage value of landscape. Values: Undetected sites are generally unlikely to be of high significance due to the level of survey effort. Medium rating assigned due to potential for burials in dunes crossed by Cable Transition Facilities. Certainty: The heritage surveys and AAPA Authority Certificate process will identify most heritage features present in the footprint, but there remains a risk of undetected or subsurface features.</p>
Human Health	Exposure to EMF	HVAC cables at Solar Precinct and Darwin Converter Site emit low level EMF that does not pose a risk to human health.	Subsea and underground cables design includes lead sheathing and armoured cores which further prevents electric fields from entering the surrounding environment.	Unlikely						None	-	-	Not assessed as impact unlikely to occur. No construction activities predicted to create EMF exposures.

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Human Health	Increase in Biting Insects	<p>Construction camps will be adequately insect screened. Locations for OHTL fly camps will be selected to be as far as possible away from significant mosquito breeding habitats i.e. watercourses and wetlands that retain water during the dry season.</p> <p>Darwin Converter Site workforce will be accommodated in Darwin, not on site.</p> <p>Drains and culverts designed to prevent upstream flooding and be free draining, retaining water for a period of maximum 5 days.</p> <p>Water tanks will be screened to prevent entry of mosquitoes.</p> <p>Landfill will comply with the Guidelines for Siting, Design and Management of Solid Waste Disposal Sites in the Northern Territory 2003.</p> <p>Materials arriving from overseas at Darwin Port are subject to quarantine inspections and treatment.</p>	<p>Workforce education and induction on the use of appropriate PPE, bite prevention and treatment methods.</p> <p>Inspection and removal of any artificial mosquito breeding habitats (see below).</p> <p>Implementation of mosquito control methods, such as residual insecticides and larvicides in accordance with advice from Department of Health.</p> <p>Containers capable of holding water stored undercover and/or emptied on a weekly basis during construction.</p> <p>Post-construction reinstatement activities to remove impediments to surface water drainage such as stockpiles, low points, wheel ruts etc.</p> <p>Stormwater drains, culverts and sediment basins maintained free from sediment build up and vegetation growth.</p> <p>Landfill and wastewater management systems maintained to prevent water ponding and pooling.</p> <p>Inspection of imported materials, equipment and plant for pests on arrival at works areas.</p> <p>Treat any pest species detected in accordance with advice from NT Medical Entomology branch</p>	Possible	Limited	Medium-term	Minor	Low	High	Minor	<p>Visual inspections for the presence of ponding/pooling water and mosquito larvae.</p> <p>Report/complaints from workers.</p> <p>Visual inspections of all infrastructure for ponding/pooling of water.</p> <p>Rectification works if required.</p> <p>Visual inspections for the presence of mosquito larvae and other non-native species.</p>	<p>Incident reporting in the event a worker requires treatment or becomes ill from exposure to biting insect bites or disease.</p> <p>Internal inspection records.</p> <p>Notify NT Medical Entomology branch in the event a pest species is detected.</p>	<p>Likelihood: Construction activities could create biting insect breeding habitat.</p> <p>Scale: Less than 10ha in the immediate proximity of activities.</p> <p>Duration: Impact occurs intermittently during construction.</p> <p>Magnitude: No dry season flows or discharges, which are most typically responsible for creating biting insect breeding habitat.</p> <p>Value: No community receptors within area of influence. On site workers only.</p> <p>Certainty: High level of confidence in assessment and mitigation.</p>
Human Health	Increase in communicable disease	<p>Compliance with all federal (Australian Government Department of Health), state (Northern Territory Government Health), and local requirements set out for COVID 19 health measures, as well as guidelines set out by the World Health Organization (WHO).</p> <p>Practices to minimize the risk of COVID 19 infection while living in camps include washing hands, wearing masks while in common areas where physical distancing is not possible, and avoiding touching one’s eyes, nose, and mouth without properly cleaning hands first.</p> <p>No guests will be allowed in the camps, and all camps will be equipped with readily available PPE, including hand soap, sanitizer, face masks, disinfectant wipes, over the counter medicines, thermometers, and rapid COVID 19 antigen tests.</p> <p>Workers will be required to be fully vaccinated.</p> <p>14 days prior to moving into the</p>	<p>If any worker exhibits cold or flu like symptoms, immediately notify a Construction Supervisor. The individual must, if possible, evacuate the camp to a hotel for a minimum of five days or until symptoms improve, or self-isolate away from other workers.</p>	Possible	Regional	Medium-term	Minor	High	Low	Moderate	-	-	<p>Likelihood: Camp living arrangements and worker interactions with communities could increase communicable disease transmission.</p> <p>Scale: Impacts nearby communities.</p> <p>Duration: Impacts could occur over several years during construction.</p> <p>Magnitude: Minor increase in communicable disease predicted; mitigation measures expected to reduce magnitude of risk.</p> <p>Value: Nearby communities could experience increased communicable disease transmission with could add stress to local health care provision.</p> <p>Certainty: Unpredictable nature of COVID-19 and other communicable diseases.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
		camp, it will be recommended that workers avoid large gatherings, wear masks in public spaces and where physical distancing is not possible, avoid being near people who are sick, and wash their hands.											
Human Health	Exposure to air emissions of particulate matter (PM10, PM2.5) and Nitrogen Oxide (NOx)	Whenever possible, plan haul routes to avoid residential areas. Efficient staging and layout of construction facilities to minimize haulage, avoid double handling of materials and other excessive equipment operations. Use grid or solar power whenever practical over stationary combustion generated power. Prohibit open burning of any materials.	NOx emissions will be minimised by using electric vehicles and equipment where practicable, and ensuring all machinery, plant and equipment complies with minimum emissions standards. Implement anti-idling policy. Operate equipment at optimum rated loads as determined by equipment manufacturer and follow routine equipment maintenance procedures. Ensure all heavy duty on-road and non-road vehicles are late model and meet all commonwealth and NT emission standards. Ensure all equipment brought to site is in good working order accompanied by inspection certificates and not exceeding 10% opacity. Position stationary emission sources such as generators away from sensitive receptors with due regard to safety, security, traffic and other geographic restrictions.	Unlikely					High	None	Conduct visual inspections for opacity from vehicle/equipment emissions.		<i>Not assessed as impact is unlikely to occur. No sensitive receptors are within area of predicted air quality area of influence (~250-500 m from site boundary).</i> Certainty: Atmospheric dispersion modelling undertaken (Appendix U).

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Human Health	Exposure to noise emissions	Whenever possible, schedule work that creates the most noise during the NT EPA prescribed acceptable construction times (Monday to Saturday 7am to 7pm and between 9am and 6pm Sundays or public holidays). However, justification of work outside the NT EPA construction times may be needed if it is not possible to work within these times. Locate site access roads, laydown areas and stationary equipment (e.g., generators) as far away as possible from sensitive receivers; Whenever possible, plan haul routes to avoid residential areas; Maintain access routes to avoid the formation of potholes. Design access roads and laydown areas to minimize reversing of trucks/equipment; Use broadband back-up alarms to extent possible; Do not use engine brakes unless necessary; Maintain equipment as per manufacturer's instructions; Keep engines covers closed; Dampen tailgates to avoid banging; Avoid dropping loads into dump trucks from heights; Limit the use of diesel generators by drawing power from the existing hydro grid.	Where practical, machines shall be operated at low speeds and power and turned off instead of left idling for prolonged periods when not in use; Install temporary noise enclosures in areas of prolonged high noise activities. Notify the local community within the Study Area of the construction activities, especially if overnight construction is required. Notifications should include the location, extent, and duration of construction activities.	Unlikely					High	None			Not assessed as impact is unlikely to occur. No sensitive receptors are within predicted screening distance. Certainty: High confidence in noise screening assessment.

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Terrestrial environmental quality	Erosion and topsoil migration caused by disturbance of soils	Site selection has chosen flat land, that is mostly above the modelled 1:100 year flood levels. OHTL poles will not be placed in watercourses or drainage lines, or in areas where surface drainage could be affected. Roadside drainage and culverts will be installed in accordance with accepted road design standards.	Erosion and Sediment Control Plans implemented. Reinstatement of OHTL corridor footprints post-construction with native vegetation species and erosion controls.	Likely	Limited	Medium-term	Minor	Medium	High	Minor	Annual post wet season monitoring of rehabilitation success until disturbed areas stabilised. Visual inspections of drainage structures, discharge points and site boundaries following rain events. Post-wet season inspections of footprint and maintenance of emerging erosion issues.	Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions	<p>Likelihood: Likely because erosion hazard and risk is calculated as high to extreme due to large size of footprint and rainfall conditions experience in the area (refer Erosion Risk Assessment EcOz, 2021). Construction will disturb soils in 22m wide corridor</p> <p>Scale: Land clearing and development will be staged. Narrow linear corridor. Erosion hazard limited to where there are steep slopes or watercourses.</p> <p>Duration: Construction will take 4 years, after which erosion hazard and risk will reduce to low. Impact occurs intermittently during construction – wet season only.</p> <p>Magnitude: Post-wet season inspections will detect and rectify erosion, limiting the magnitude of impact. Limited beneficial use of the land and soils.</p> <p>Values: Nearby railway and public road infrastructure, and future utilities constructed in the Utilities corridor, are valuable assets that need to be protected from erosion. Land and soils within the Black Jungle and Shoal Bay Coastal Reserve contribute to supporting and maintaining biodiversity conservation values and water quality.</p> <p>Certainty: Erosion hazard assessment and ESCP in accordance with IECA guidelines.</p>
Terrestrial environmental quality	Contamination of soils	Solar used as power source, so no requirement for large fuel storages. Dangerous Goods and Hazardous Substances stored and handled in accordance with regulated standards and codes of practice, and manufacturer's directions.	Dangerous Goods and Hazardous Substances stored and handled in accordance with regulated standards and codes of practice, and manufacturer's directions. Spill response procedures and equipment provided at all storage and handling locations. Construction and operations personnel trained in spill response.	Possible	Limited	Short-term	Minor	High	High	Minor	Routine visual inspections around storage locations and work areas.	Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions	<p>Likelihood: Storage and handling of fuels, oils/lubricants/chemicals for use in construction at various locations across footprint. Spills and leaks could occur.</p> <p>Scale: Minor spills/leaks could occur but will be detected and remediated with no offsite impact.</p> <p>Duration: Spills will occur intermittently. Spills will be detected and remediated immediately.</p> <p>Magnitude: Contaminants will not be detected in soils within or surrounding the site due to small volumes and mitigation measures.</p> <p>Values: No land use or environmental values that are sensitive to soil contamination. No surface watercourses present and groundwater is deep.</p> <p>Certainty: Australian Standards are established and proven effective for mitigating risk.</p>
Terrestrial environmental quality	Acid sulfate soils disturbance	Avoid PASS areas where possible. Implement appropriate PASS management	Development of an ASSMP if ASS is identified in soil disturbance areas during construction. As per the developed ASSMP treatment of PASS to neutralise acidity and prevent impact on surrounding environment.	Possible	Limited	Short-term	Minor	Medium	High	Minor	Visual inspections and testing of any confirmed ASS in line with National Acid Sulfate Soils Guidance material.	Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions	<p>Likelihood: Working in areas of PASS with ground disturbance required. Possible impacts on surrounding soils</p> <p>Scale: Minor disturbance at each power pole structure. Poles will be piled so minimal excavation required</p> <p>Duration: PASS disturbance could occur for a period of days to weeks prior to reburial.</p> <p>Magnitude: Isolated short-term contamination will not affect surrounding land uses or environmental values.</p> <p>Values: Watercourses along OHTL would be sensitive to ASS impacts.</p> <p>Certainty: Guidelines for identification and management of ASS are established and proven effective.</p>
Terrestrial ecosystems	Loss of vegetation and habitat	Site selection has avoided impacts to high value habitats such as watercourses and surveys were undertaken to confirm the absence of Bilby habitat prior to finalising the site boundaries.	Weed hygiene measures and implementation of a Weed Management Plan to contain impacts to within the footprint and avoid impacts to surrounding vegetation and habitats.	Likely	Limited	Medium-term	Minor	Medium	High	Minor	Visual inspections during clearing to ensure clearing is within approved boundaries. Results recorded, along with any photographs. Rehabilitation inspections following first wet season post-construction or until vegetation is established and sites are stable.	Records of clearing undertaken. External reporting in accordance with environmental approval conditions	<p>Likelihood: Vegetation clearing required at pole pads, habitat will be removed.</p> <p>Scale: Impact will occur over a significant portion of the OHTL footprint (a 22 m wide linear corridor) but will not extend beyond the footprint.</p> <p>Duration: Land cleared during construction will be reinstated with native vegetation, excepting for a 6m wide access track.</p> <p>Magnitude: Narrow zone of disturbance. Pole placement will be used to avoid clearing riparian vegetation.</p> <p>Values: Riparian vegetation, sandsheet heath, and monsoon rainforest present in corridor is locally important.</p> <p>Certainty: Ecological surveys undertaken in Utilities Corridor section where key values are present.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Terrestrial ecosystems	Loss or deterioration of significant vegetation	Site selection has avoided impacts to high value habitats such as watercourses and surveys were undertaken to confirm the absence of Bilby habitat prior to finalising the site boundaries.	Weed hygiene measures and implementation of a Weed Management Plan to contain impacts to within the footprint and avoid impacts to surrounding vegetation and habitats.	Possible	Limited	Long-term	Minor	Medium	High	Minor	Visual inspections during clearing to ensure clearing is within approved boundaries. Results recorded, along with any photographs. Rehabilitation inspections following first wet season post-construction or until vegetation is established and sites are stable.	Records of clearing undertaken External reporting in accordance with environmental approval conditions	<p>Likelihood: Areas of significant vegetation are present within the OHTL footprint - may not be able to be avoided</p> <p>Scale: There are only small areas of significant veg, so only a portion of the footprint would be impacted. Commitment made to minimise clearing at major watercourses. Impact limited to minor watercourses.</p> <p>Duration: Any cleared vegetation outside of the access corridor will grow back over time.</p> <p>Magnitude: Impact exceeds natural variability, but due to small clearing areas and proposed rehab environmental values will not be significantly deteriorated.</p> <p>Values: Riparian, sandsheet heath and monsoon rainforest vegetation in corridor is locally important.</p> <p>Certainty: Location and extent of riparian vegetation known. Commitment made to minimise clearing.</p>
Terrestrial ecosystems	Degradation of flora and vegetation in surrounding areas			Possible	Limited	Short-term	Minor	Medium	High	Minor			<p>Likelihood: Dust deposition could affect vegetation around footprint.</p> <p>Scale: Deposited dust is modelled to affect an area of approximately 100-380m from footprint (see Chapter 11 Air Quality).</p> <p>Duration: Dust will only be an issue during construction and will be washed off vegetation each wet season.</p> <p>Magnitude: Short-term dust deposition is unlikely to harm vegetation.</p> <p>Values: Riparian vegetation along access roads and watercourses could be sensitive to dust.</p> <p>Certainty: Extent of dust deposition modelled (see Chapter 11 Air Quality). Mitigation measures are routine and proven effective.</p>
Terrestrial ecosystems	Introduction and spread of weeds and pests	Weed hygiene measures will be implemented for construction plant and equipment. Borrow areas will be inspected for weeds and weed contaminated materials will not be brought to site. All project activities will comply with the Weed Management Act which states it is an offence to transport weeds.	A Weed Management Plan will be implemented. Weed inspections and control will be undertaken for the duration of construction and operations to limit the spread of weeds.	Likely	Localised	Permanent	Moderate	Medium	High	Moderate	As per the Weed Management Plan (Appendix Q)	As per the Weed Management Plan (Appendix Q)	<p>Likelihood: Weeds are present in the footprint and likely to be spread on vehicles, plant and equipment, and in imported borrow materials, as commonly occurs on construction projects.</p> <p>Scale: As the site will be developed, any weed infestation likely to be localised to site boundaries and access roads where disturbance occurs during construction but no infrastructure is built.</p> <p>Duration: Experience shows that if weeds are introduced they are very difficult to eradicate and therefore will be permanent and require ongoing control to limit spread and impacts.</p> <p>Magnitude: Because the area currently has limited weeds, any new weeds introduced will represent a change to the weed profile and risk for the area.</p> <p>Values: No weeds were observed in the footprint during Ecology surveys (Refer Solar Precinct Ecology Report EcOz, 2021). The habitats present do not support any significant vegetation or species.</p> <p>Certainty: Potential impacts are well understood from other projects and Weed MP will reduce risk to ALARP.</p>
Terrestrial ecosystems	Changes in fire regimes	Observe fire bans	Develop and implement a Bushfire Management Plan, including first response capability.	Possible	Localised	Short-term	Minor	Medium	High	Minor	Visual monitoring for fires Monitoring NAFI website for proximate fires which may impact proposal. Monitoring conditions for fire risk.	Any fires reported to Bushfires NT or appropriate authority.	<p>Likelihood: Construction activities could start bushfires but individual fire events would not alter fire regimes.</p> <p>Scale: Bushfire response plans will be in place to limit the extent of area burnt.</p> <p>Duration: Impact could occur occasionally during construction.</p> <p>Magnitude: Vegetation is resilient to occasional fire.</p> <p>Values: Sensitive values present in footprint are riparian, sand sheet heath and rainforest, and the Black Jungle Reserve.</p> <p>Certainty: Bushfire risks well understood and bushfire response will reduce risk to ALARP.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Terrestrial ecosystems	Direct fauna mortality	Pre-clearing inspections undertaken to identify and relocate any fauna that are at risk i.e. nests and burrows. Avoiding clearing large hollow-bearing trees where possible. Use of electrodes removes the need for a top earth wire (which is the wire associated with most birds collision).	Clearing will be conducted in a single direction, allowing any fauna to move out of way of clearing activities. If fauna is spotted in immediate clearing area and are in danger, clearing will be stopped until safe to continue. Clearing in a progressive manner to allow wildlife to natural disperse from the area as clearing undertaken. Site inductions will ensure that all personnel are aware of their obligations and know the correct procedures for fauna encounters. Vehicle speed restrictions apply when travelling near uncleared areas or in higher risk conditions.	Possible	Limited	Short-term	Minor	Low	High	Minor	Record any fauna encounters, injuries or death as result of works for the duration of works. Incidental observations of carcasses, including during routine infrastructure inspections Public reports of carcasses	Internal record keeping of incidents of fauna mortality. External reporting in accordance with environmental approval conditions	<p>Likelihood: Individual fauna deaths may occur during land clearing and along access routes.</p> <p>Scale: Deaths will be isolated occurrences. There are no non-mobile fauna populations present that would be at higher risk of large numbers of mortalities. Mobile fauna will avoid construction activities and move into surrounding habitats.</p> <p>Duration: Mortalities will mainly occur when large earthmoving equipment is being operated in the land clearing phase and when there is a high volume of construction traffic movements along access roads, which will occur over 4 years.</p> <p>Magnitude: Isolated occurrences of fauna mortality will not affect the viability of fauna populations.</p> <p>Values: No nesting or roosting habitats identified. No threatened species present.</p> <p>Certainty: Potential impacts are well understood from other projects. Mitigation measures are routine and will reduce risk to ALARP.</p>
Terrestrial ecosystems	Habitat degradation and fragmentation	The OHTL will fragment habitat; the majority of the OHTL route has been located in the railway corridor where habitat fragmentation has already occurred.	Reinstatement of all temporary construction footprints and follow-up weed control post-construction.	Possible	Limited	Long-term	Moderate	Medium	High	Minor	Nil	External reporting in accordance with environmental approval conditions	<p>Likelihood: OHTL Utilities Corridor will traverse intact habitats</p> <p>Scale: Clearing will only cause habitat fragmentation/degradation along the utilities corridor and a few areas along the OHTL, with the railway corridor being already fragmented.</p> <p>Duration: Vegetation cleared for construction will gradually regrow but fragmentation will persist for an extended period.</p> <p>Magnitude: Narrow unfenced corridor will not limit movement for most species.</p> <p>Values: Sensitive values present in footprint are riparian, sand sheet heath and rainforest, and the Black Jungle Reserve.</p> <p>Certainty: Ecological surveys undertaken.</p>
Terrestrial ecosystems	Changes to fauna behaviours due to noise, light and other disturbances	Waste management procedures to avoid attracting fauna to waste disposal areas.		Possible	Limited	Medium-term	Minor	Low	High	Minor			<p>Likelihood: Possible as construction will results in significant noise, light and other potential disturbance</p> <p>Scale: isolated as impact will only occur in a small portion of the disturbance footprint when machinery is running</p> <p>Duration: Short-term, impacts will only occur during construction, with the work front moving rapidly along the OHTL. Impacts will also only occur while loud machinery or lighting is running</p> <p>Magnitude: Minor as noise and lighting will not cause significant changes to fauna behaviours</p> <p>Values: low as majority of fauna are mobile and will be able to avoid the disturbed areas</p> <p>Certainty: Potential impacts are well understood from other projects. Mitigation measures are routine and proven effective.</p>
Terrestrial ecosystems	Loss of habitat from erosion			Unlikely					High	None			<p><i>Not assessed. The residual impact associated with erosion was assessed as low (see Chapter 4 Terrestrial Environmental Quality). This level of impact would not cause loss of habitat.</i></p> <p>Certainty: Erosion hazard assessed in accord with accepted guidelines.</p>
Terrestrial ecosystems	Loss of habitat from disturbance of acid sulfate soils			Unlikely					High	None			<p><i>Not assessed. The residual impact associated with ASS was assessed as low (see Chapter 4 Terrestrial Environmental Quality). This level of impact would not cause loss of habitat.</i></p> <p>Certainty: ASS risk assessed and managed in accord with accepted guidelines.</p>
Terrestrial ecosystems	Degradation of habitats by contamination and pollution			Unlikely					High	None			<p><i>Not assessed. The residual impact associated with contamination and pollution was assessed as low (see Chapter 4 Terrestrial Environmental Quality). This level of impact would not cause degradation or loss of habitat.</i></p> <p>Certainty: Mitigation measures for spill prevention and response are routine and proven effective.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Hydrological processes	Alteration to surface water flows in water courses or wetlands	OHTL poles will not be placed in watercourses or drainage lines. Only minor drainage lines will be crossed by the OHTL access track. Major drainages will be approached from either side to avoid the need for constructing crossings. Roadside drainage and culverts will be designed and installed in accordance with accepted Austroads standards. Groundwater used as water supply – no surface water extraction.	Watercourse crossings along access roads and OHTL installed during the dry season when no flow present. Drainage, erosion and sediment controls installed and maintained in accordance with Erosion and Sediment Control Plans (ESCP) that align with the Best Practice Erosion and Sediment Control Guidelines (IECA, 2008). Reinstatement of OHTL construction corridor and Cable Transition Facilities footprints post-construction.	Possible	Limited	Short-term	Negligible	Medium	High	Minor	During construction, visual inspections of disturbed areas and erosion and sediment controls as per ESCP (after significant rainfall events, at a minimum). Annual post wet season monitoring of revegetation success until disturbed areas are stabilised. Visual inspections of drainage structures, discharge points and site boundaries following rain events. Post-wet season inspections of all project locations and rectification of emerging erosion issues.	Internal records of ESCP inspections, as stipulated in ESCP's. Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions.	<p>Likelihood: OHTL crosses 154 watercourses. Lower order drainage lines will be crossed by the access track. Pole placement will avoid disturbance to watercourses and wetlands.</p> <p>Scale: Altered surface water flow paths limited to within the direct disturbance footprint.</p> <p>Duration: Minor changes to overland flow paths could occur intermittently during significant rainfall events.</p> <p>Magnitude: No offsite impacts to hydrological regimes in watercourses or wetlands.</p> <p>Values: Hydrology supports aquatic ecosystems and other beneficial uses of watercourses.</p> <p>Certainty: Construction design avoids disturbance of major watercourses. Temporary drainage as per ESCP developed in accordance with IECA guidelines.</p>
Hydrological processes	Changes to ground water levels caused by groundwater extraction	Groundwater extraction sites will be located away from existing groundwater bores in use. Engagement with landowners at Solar Precinct and along OHTL to identify bores that can be used as a water source without affecting other uses.	Bore locations and sustainable yields to be determined subject to investigation and recommendations from a hydrogeologist. Bore work permits and water extraction licences obtained under the Water Act.	Possible	Limited	Short-term	Negligible	High	High	Minor	Monitoring of standing water levels and water extraction volumes, as required under water extraction licence conditions. Water quality sampling and analysis of springs near Solar Precinct and aquifer targeted for groundwater extraction to ensure there is no connectivity.	Internal records of water usage and water extraction. External reporting of water extraction in accordance with water extraction licence and environmental approval conditions.	<p>Likelihood: Extraction of minor volumes (9.2 ML/year spread over the ~800km length) from existing bores.</p> <p>Scale: Drawdown may occur around bore, but will be limited by minor volumes and short duration of use.</p> <p>Duration: OHTL will be constructed as a moving work front, with water use spread across the route.</p> <p>Magnitude: Drawdown unlikely to be detectable or impact other users or GDEs.</p> <p>Values: Groundwater supports numerous other users across the region, and GDE's.</p> <p>Certainty: Water will be extracted from existing bores under agreement with landholders and in accordance with any existing licences.</p>
Inland water environmental quality	Increased turbidity caused by soil disturbance and erosion	Progressive clearing, construction and reinstatement will be undertaken. OHTL poles will not be placed in watercourses or drainage lines. Only minor drainage lines will be crossed by the OHTL access track. Major drainages will be approached from either side to avoid the need for constructing crossings. Stormwater drainage will be installed to capture and manage runoff. Stormwater captured within facilities will discharge to land, via erosion and sediment controls. Roadside drainage and culverts will be installed in accordance with Austroads standards.	Watercourse crossings along access roads and OHTL will be installed during the dry season when no flow present. Drainage, erosion and sediment controls will be installed and maintained in accordance with Erosion and Sediment Control Plans (ESCP) that align with the Best Practice Erosion and Sediment Control Guidelines (IECA, 2008). Develop and implement a Reinstatement Plan for post-construction reinstatement of works areas to stabilise soils and promote regrowth of native vegetation. Rectification of emerging erosion issues after each wet season.	Possible	Limited	Short-term	Minor	Medium	High	Minor	During construction, visual inspections will be undertaken of disturbed areas and erosion and sediment controls as per ESCP (after significant rainfall events, at a minimum). Annual post wet season monitoring of reinstatement success until disturbed areas are stabilised. Visual inspections of drainage structures, discharge points and site boundaries following rain events. Post-wet season inspections of all project locations and rectification of emerging erosion issues.	Internal records of ESCP inspections, as stipulated in ESCP's. Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions.	<p>Likelihood: OHTL crosses 154 water courses. Works will disturb soils, which may erode along the OHTL and increase turbidity in watercourses.</p> <p>Scale: Water quality may be impacted for a several hundred metres downstream of crossings.</p> <p>Duration: Water quality impacts would only occur for days immediately following a rainfall event.</p> <p>Magnitude: Watercourses are naturally turbid, particularly following rainfall and runoff events.</p> <p>Value: Water quality supports values such as aquatic ecosystem health, pastoral, agricultural, cultural, social and amenity.</p> <p>Certainty: Erosion hazard assessment and ESCP in accordance with IECA guidelines.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Inland water environmental quality	Contamination by release of fuels and hazardous substances	During operations, solar power will be used as a power source, hence no requirement for bulk fuel storages. Dangerous Goods and Hazardous Substances will be stored and handled in accordance with regulated standards and codes of practice, and manufacturer's directions. Dangerous Goods and Hazardous Substances will not be stored within 200m of a watercourse or groundwater bore, and mobile refuelling will not occur within 50m of a watercourse or groundwater bore.	Dangerous Goods and Hazardous Substances Registers will be maintained at all storage and handling locations. An Environmental Emergency and Spill Response Plan will be in place and equipment provided at all storage and handling locations. Construction and operations staff will be trained in spill response.	Unlikely	Limited	Short-term	Negligible	High	High	Minor	Routine visual inspections around storage locations and work areas.	Internal records of volumes used and stored in accordance with Workplace Health and Safety Regulations. Internal inspection records and notes. Internal records of water quality monitoring. Incidents of off-site pollution or nuisance reported to the NT EPA within 24 hours	Likelihood: Small volumes of fuels and hazardous substances will be stored and used. Scale: Spills may occur but storage and handling procedures mean a spill will be limited to ground around spill and will not enter a watercourse or groundwater aquifer. Duration: Spills to ground will occur intermittently. Spills will be detected and remediated immediately. Magnitude: No change in water quality as a result of spills. Values: Water quality in watercourses and groundwater is sensitive to contamination and supports numerous beneficial uses. Certainty: Australian Standards are established and proven effective for mitigating risk. No underground storage, or storage within 200 m of a watercourse.
Inland water environmental quality	Contamination from waste storage and disposal areas	Landfill will comply with the Guidelines for Siting, Design and Management of Solid Waste Disposal Sites in the Northern Territory (NT EPA 2003). No waste will be stored within 200m of a watercourse.	Waste management will be in accordance with best practice guidelines (e.g. separation of waste, covering, bunded storage areas), and the requirements of the Waste Management and Pollution Control Act 1998. All listed waste will be disposed of at a licenced waste management facility.	Unlikely	Limited	Long-term	Negligible	Low	High	Minor	Routine visual inspections around landfill, waste storage locations and work areas.	Internal records of inspections. Incident reporting	Likelihood: Inert and putrescible waste will be disposed of onsite at Solar Precinct. All other waste will be temporarily stored and disposed at a licenced facility. Scale: Any contamination from waste storage and disposal will be limited to soil in immediate surrounds. Duration: Waste will be stored at Darwin Converter Site, and stored and disposed at Solar Precinct for construction and operation phases. Short term storage within OHTL. Magnitude: No change in water quality as a result of waste storage and disposal. Values: No watercourses or groundwater proximate to waste storage and disposal areas. Certainty: Compliance with NT guidelines and regulations proven effective for mitigating risk.
Inland water environmental quality	Contamination by sewage from camps and ablutions	Onsite wastewater management systems to be designed and installed by suitably qualified person, in accordance with NT Code of Practice for Onsite Wastewater Management, plus other relevant standards and guidelines. System to be designed for projected wastewater loads, and appropriate for applicable climate.	Any issues identified with wastewater management system to be rectified by suitably licenced person.	Unlikely	Limited	Long-term	Negligible	Medium	High	Minor	Routine inspection and maintenance of wastewater management systems and land application areas, in accordance with the NT Code of Practice for Onsite Wastewater Management.	Internal records of maintenance works undertaken. Relevant notifications/applications and reporting to NT Department of Health, or DIPL.	Likelihood: Onsite wastewater management systems will be established at the Solar Precinct, along the OHTL at fly camps, and at the Darwin Converter Site. Scale: Wastewater will be treated and disposed of to land in a controlled and spatially limited area. Duration: Wastewater management systems will be used for construction and operation phases at Solar Precinct and Darwin Converter Site but will be temporary at OHTL fly camps. Magnitude: No change in water quality as a result of wastewater management. Value: Some watercourses or shallow groundwater may be proximate to Darwin Converter Site and OHTL systems, which support numerous beneficial uses. Certainty: Compliance with NT guidelines and regulations proven effective for mitigating risk.

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Aquatic ecosystems	Direct loss of aquatic habitat	The final route selection process for the Solar Precinct access roads will avoid crossing locations that hold water for extended periods, riparian vegetation and aquatic vegetation, where possible. OHTL pole placement will avoid watercourses or wetlands in accordance with micro-siting criteria provided in Chapter 2 Section 2.5.2.3. Clearing of significant riparian vegetation (e.g. large trees) will be avoided wherever practical by spanning the powerline across riparian zones associated with higher order watercourses. Only minor drainage lines will be crossed by the OHTL access track. Major drainages will be approached from either side to avoid the need for constructing crossings	Minimise the disturbance footprint within waterways or wetlands to the smallest practicable area. Watercourse crossings along Solar Precinct access roads and OHTL installed in the dry season when no flow is present.	Possible	Limited	Long-term	Minor	Medium	High	Minor	Monitoring during clearing to ensure clearing remains within approved boundaries, and at approved watercourse crossing locations.	Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions.	<p>Likelihood: OHTL crosses 154 watercourses. Lower order watercourses and wetlands will be crossed by the access track.</p> <p>Scale: OHTL construction may remove narrow corridor of riparian and instream habitat (max 22 m wide).</p> <p>Duration: OHTL will retain 6 m wide access track through minor seasonal surface water features.</p> <p>Magnitude: No disturbance of aquatic ecosystems in major perennial watercourses.</p> <p>Value: Watercourses and wetlands in OHTL corridor support aquatic ecosystems.</p> <p>Certainty: Construction design avoids disturbance of major watercourses where habitats present.</p>
Aquatic ecosystems	Reduction in aquatic habitat value due to water quality impacts	Clearing will be undertaken progressively. Dangerous Goods and Hazardous Substances will be stored and handled in accordance with regulated standards and codes of practice, and manufacturer's directions. Dangerous Goods and Hazardous Substances will not be stored within 200 m of a watercourse or groundwater bore, and mobile refuelling will not occur within 50 m of a watercourse or groundwater bore.	Watercourse crossings along access roads and OHTL installed during the dry season when no flow present. Drainage, erosion and sediment controls installed and maintained in accordance with Erosion and Sediment Control Plans (ESCP) that align with the Best Practice Erosion and Sediment Control Guidelines (IECA, 2008). Develop and implement a Reinstatement Plan for post-construction reinstatement of works areas to stabilise soils and promote regrowth of native vegetation. Rectification of emerging erosion issues after each wet season. Dangerous Goods and Hazardous Substances Registers maintained at all storage and handling locations. An Environmental Emergency and Spill Response Plan will be in place and equipment provided at all storage and handling locations. Construction and operations staff trained in spill response.	Possible	Limited	Short-term	Minor	Medium	High	Minor	During construction, visual inspections of disturbed areas and erosion and sediment controls as per ESCP (after significant rainfall events, at a minimum). Annual post wet season monitoring of rehabilitation success until disturbed areas are stabilised. Visual inspections of drainage structures, discharge points and site boundaries following rain events. Post-wet season inspections of all project locations and rectification of emerging erosion issues.	Internal reporting on environmental performance. Internal records of ESCP inspections, as stipulated in ESCP's. External reporting in accordance with environmental approval conditions. Internal records of water quality monitoring. Internal records of volumes used and stored in accordance with Workplace Health and Safety Regulations. Incidents of off-site pollution or nuisance reported to the NT EPA within 24 hours.	<p>Likelihood: OHTL crosses 154 water courses. Minor increases in turbidity could occur at crossings.</p> <p>Scale: Water quality may be impacted for a several hundred metres downstream of crossings.</p> <p>Duration: Water quality impacts would only occur for days immediately following a rainfall event.</p> <p>Magnitude: No disturbance of beds, banks or riparian vegetation in major perennial watercourses.</p> <p>Value: Watercourses and wetlands support aquatic ecosystems.</p> <p>Certainty: Water quality impact directly link to erosion hazard, which has been assessed as Low in accordance with IECA (2008)</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Aquatic ecosystems	Reduction in aquatic habitat value due to altered hydrology or groundwater extraction	Roadside drainage and culverts will be designed in accordance with accepted AustRoads standards. Groundwater used as water supply – no surface water extraction. Groundwater extraction sites will be located away from springs or GDE's. Engagement with landowners at Solar Precinct and along OHTL to identify bores that can be used as a water source without affecting other uses.	Implementation of ESCP's which will manage drainage and minimise erosion. Watercourse crossings along Solar Precinct access roads and OHTL installed in the dry season when no flow is present. Bore locations and sustainable yields to be determined subject to investigation and recommendations from a hydrogeologist. Bore permits and water extraction licence obtained under the Water Act 1992.th native vegetation species and erosion controls.	Unlikely	Limited	Short-term	Negligible	Medium	High	Minor	Monitoring of standing water levels and water extraction volumes, as required under water extraction licence conditions.	Internal reporting on environmental performance. Internal records of water usage and water extraction. External reporting of water extraction in accordance with water extraction licence and environmental approval conditions.	Likelihood: OHTL crosses 154 watercourses, but no major disturbance required. Groundwater extraction of minor volumes from existing bores. Scale: Overland flow paths may be altered in direct disturbance footprint (max 22 m wide). Duration: Minor changes to overland flow paths could occur intermittently during significant rainfall events. Magnitude: Minor changes in narrow footprint unlikely to impact aquatic ecosystems. Values: Watercourses and wetlands support aquatic ecosystems. Certainty: Construction design avoids disturbance of major watercourses.
Aquatic ecosystems	Reduction in aquatic habitat value due to dust	Operational footprint will cover soil with infrastructure, hardstand or vegetation to minimise wind erosion and dust		Possible	Limited	Short-term	Negligible	Medium	High	Minor	Visual monitoring for airborne dust around proposal footprints	Internal reporting on environmental performance	Likelihood: Dust deposition could impact watercourses at crossings. Scale: Dust modelling indicates impacts within 105-123 m of the construction footprint (see Chapter 11). Duration: OHTL will be constructed as a rolling work front. Magnitude: Short-term dust deposition is unlikely to impact aquatic ecosystems. Value: Watercourses and wetlands support aquatic ecosystems. Certainty: Dust deposition modelling has been undertaken (see Appendix U).
Air quality	Emissions of PM or NO2 that could affect human health	Whenever possible, plan haul routes to avoid residential areas Efficient staging and layout of construction facilities to minimize haulage, avoid double handling of materials and other excessive equipment operations Use grid or solar power whenever practical over stationary combustion generated power Implement anti-idling policy	NOx emissions will be minimised by using electric vehicles and equipment where practicable, and ensuring all machinery, plant and equipment complies with minimum emissions standards Operate equipment at optimum rated loads as determined by equipment manufacturer and follow routine equipment maintenance procedures Ensure all heavy duty on-road and non-road vehicles are late model and meet all commonwealth and NT emission standards Ensure all equipment brought to site is in good working order accompanied by inspection certificates and not exceeding 10% opacity. Position stationary emission sources such as generators away from sensitive receptors with due regard to safety, security, traffic and other geographic restrictions.	Likely	Localised	Short-term	Minor	Medium	High	Minor	Conduct visual inspections for opacity from vehicle/equipment emissions. Carry out inspections certifying equipment is in good working order prior to shipping to site	Reporting will be carried out per the requirements of the CEMP described in Chapter 17 External reporting in accordance with environmental approval conditions.	Likelihood: Construction activities will produce PM and NO2 Scale: Health criteria is predicted to be met within 63-175m from activities. Duration: Impacts will occur for a few weeks to months at each location along the OHTL. Magnitude: Emissions are likely to exceed natural variability with no mitigation. Mitigation measures expected to reduce the magnitude of this risk. Values: There are residences and buildings present in areas where air quality criteria are predicted to be exceeded. Certainty: Air quality modelling has been undertaken (see Appendix U).

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Air quality	Emissions of particulate matter (TSP and deposited dust) that could affect amenity	Locate site access roads, laydown areas and stationary equipment (e.g., generators) as far away as possible from sensitive receivers Limit the amount of time between completion of road base and any paved areas to minimize exposure of unpaved surface	Water carts will be used across the project footprint to minimise dust emissions in areas of high risk at regular intervals. Other dust suppressants will be used if water ineffective. Implement on-site vehicle restrictions (e.g., limit the speed of vehicles travelling on unsealed access roads). Provide tyre wash facilities to minimize tracking of mud or dirt onto sealed roads Cover or dampen any stockpiles where practical. Notify and engage with residences and businesses who could be affected ahead of the construction front, and implement complaints procedure.	Likely	Localised	Short-term	Minor	Medium	High	Minor	Visual observations for fugitive emissions of dust Conduct regular inspections of construction areas and roads to identify potential sources of dust emissions Develop 'watching brief' on 'nuisance' impacts to ensure quick responses to any detriment and emerging issues. Implement complaints procedure	Reporting will be carried out per the requirements of the CEMP described in Chapter 17 External reporting in accordance with environmental approval conditions.	<p>Likelihood: Construction activities will result in dust emissions.</p> <p>Scale: Nuisance criteria is predicted to be met within 105-123 m from construction activities.</p> <p>Duration: Impacts will occur for a few weeks to months at each location along the OHTL during construction.</p> <p>Magnitude: Emissions are likely to exceed natural variability with no mitigation. Mitigation measures expected to reduce the magnitude of this risk.</p> <p>Values: There are residences and buildings present in areas where air quality criteria are predicted to be exceeded.</p> <p>Certainty: Dust deposition modelling has been undertaken (see Appendix U).</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Atmospheric processes	GHG emissions from combustion of fuel from vessels, plant and equipment for earthworks, air and land travel, logistics and power generation	<p>Continue to identify and engage in opportunities to maximise commercially viable carbon abatement from the AAPowerLink, including:</p> <ul style="list-style-type: none"> • Pursuing power purchase agreements with large fossil fuel power generators in the NT. • Conduct a life-cycle assessment during the design phase to quantify GHG emissions including embodied, direct and indirect emissions and demonstrate that the AAPowerLink is a carbon positive project • Supply AAPowerLink construction and operational power needs via self-generated solar energy where practicable. • Where the use of self-generated solar energy is not possible, source renewable energy via market mechanisms (if available). • Identify and (where practicable) adopt practical zero carbon technology solutions such as electric vehicles, plant and equipment and remote solar energy systems. • Explore practicable opportunities with NT Carbon Capture Utilisation and Storage Project 	<p>Develop and implement a GHG Abatement and Management Plan that aligns with ISO 140001 Environmental Management Systems and ISO 50001 Energy Management Systems. Conduct GHG mitigation workshops every 2 years during design and construction and every five years during operations to assess performance and identify new opportunities for leveraging best practice and emerging technology. Procurement strategies to consider adoption of carbon reduction and energy efficient technologies (where practicable), including but not limited to:</p> <ul style="list-style-type: none"> • Electrification options for civil plant, machinery and equipment. • Energy efficiency in aircraft services selection. • Electrification and alternative fuel options for transportation (e.g., marine vessels, rail) <p>Develop vegetation management strategies that aim to retain vegetation and soil carbon. Conduct studies to identify and select clearing, fire management, vegetation disposal practices and vegetation species to plant or retain.</p> <p>Develop and implement Rehabilitation Plans that aims to reinstate vegetation post-construction and post-decommissioning</p>	Likely	Widespread	Medium-term	Minor	Low	High	Minor	<p>Monitor GHG emissions from activities, as well as energy produced and exported in line with the requirements of NT and Commonwealth law. Data required to calculate GHG emissions will be collected in line with the methods outlined in the National Greenhouse and Energy reporting (Measurement) Determination 2008. Monitor performance against targets set in the GHG Abatement and Management Plan.</p>	<p>Reporting of GHG emissions in line with the requirements of the NGER Act. AAPowerLink will trigger emissions thresholds for reporting during construction and reporting thresholds for energy production during operations. External reporting in accordance with environmental approval conditions under the EP Act.</p>	<p>Likelihood: Equipment requiring fuel combustion will be used where self-generated or renewable energy is not practicable; mainly during construction phase.</p> <p>Scale: Fuel generated GHG from logistics and earthworks from a combined area ~12,900ha</p> <p>Duration: Impact occurs only during the construction phase</p> <p>Magnitude: Relevant criteria for environmental protection are met</p> <p>Value: Most of the footprint is in remote areas. Sensitive receptors are not locally impacted by GHG emissions; project has a net positive GHG impact.</p> <p>Certainty: Acceptable level of certainty pertaining to values and receptors</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Atmospheric processes	GHG emissions from land clearing and land use change	Continue to identify and engage in opportunities to maximise commercially viable carbon abatement from the AAPowerLink, including: <ul style="list-style-type: none"> • Pursuing power purchase agreements with large fossil fuel power generators in the NT. • Conduct a life-cycle assessment during the design phase to quantify GHG emissions including embodied, direct and indirect emissions and demonstrate that the AAPowerLink is a carbon positive project • Supply AAPowerLink construction and operational power needs via self-generated solar energy where practicable. • Where the use of self-generated solar energy is not possible, source renewable energy via market mechanisms (if available). • Identify and (where practicable) adopt practical zero carbon technology solutions such as electric vehicles, plant and equipment and remote solar energy systems. • Explore practicable opportunities with NT Carbon Capture Utilisation and Storage Project 	Develop and implement a GHG Abatement and Management Plan that aligns with ISO 140001 Environmental Management Systems and ISO 50001 Energy Management Systems. Conduct GHG mitigation workshops every 2 years during design and construction and every five years during operations to assess performance and identify new opportunities for leveraging best practice and emerging technology. Procurement strategies to consider adoption of carbon reduction and energy efficient technologies (where practicable), including but not limited to: <ul style="list-style-type: none"> • Electrification options for civil plant, machinery and equipment. • Energy efficiency in aircraft services selection. • Electrification and alternative fuel options for transportation (e.g., marine vessels, rail) Develop vegetation management strategies that aim to retain vegetation and soil carbon. Conduct studies to identify and select clearing, fire management, vegetation disposal practices and vegetation species to plant or retain. Develop and implement Rehabilitation Plans that aims to reinstate vegetation post-construction and post-decommissioning	Likely	Widespread	Medium-term	Minor	Low	High	Minor	Monitor GHG emissions from activities, as well as energy produced and exported in line with the requirements of NT and Commonwealth law. Data required to calculate GHG emissions will be collected in line with the methods outlined in the National Greenhouse and Energy reporting (Measurement) Determination 2008. Monitor performance against targets set in the GHG Abatement and Management Plan.	Reporting of GHG emissions in line with the requirements of the NGER Act. AAPowerLink will trigger emissions thresholds for reporting during construction and reporting thresholds for energy production during operations. External reporting in accordance with environmental approval conditions under the EP Act.	<p>Likelihood: Land clearing and land use change is to take place</p> <p>Scale: Land clearing on a combined area ~12,900ha</p> <p>Duration: Impact occurs only during the construction phase</p> <p>Magnitude: Relevant criteria for environmental protection are met</p> <p>Values: Most of the footprint is in remote areas. Sensitive receptors are not locally impacted by GHG emissions; project has a net positive GHG impact.</p> <p>Certainty: Acceptable level of certainty pertaining to values and receptors</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Culture and heritage	Direct impact to heritage features	Consult with Traditional Owners and sites custodians through the ILUA and AAPA Authority Certificate processes to identify Sacred Sites and culturally significant landscape features and determine the most appropriate site protection measures. Avoid direct impacts to recorded heritage features where practicable when finalising the locations of AAPowerLink infrastructure and temporary construction works areas.	Prepare Cultural Heritage Management Plan/s (CHMP) in consultation with Traditional Owners and the NT Heritage Branch. Comply with conditions of Authority Certificates and ensure conditions are made available to all authorised personnel. Where impacts to archaeological heritage features are unavoidable, obtain an approval to carry out work on a heritage place or object (work) under the Heritage Act. Mitigation works on heritage features covered by Works Approvals will be undertaken ahead of commencing site preparation activities. Workforce training and inductions will address all aspects of cultural awareness and heritage protection.	Likely	Limited	Permanent	Minor	High	Low	Moderate	Visual inspection of heritage features identified for protection. Ongoing engagement with Traditional Owners to identify emerging issues or concerns regarding heritage protection.	Internal environmental performance reporting. Reporting of incidents to Traditional Owners/AAPA/NLC and NT Heritage Branch and consultation to determine appropriate response. External reporting in accordance with environmental approval and heritage works approval conditions.	<p>Likelihood: Construction will involve ground disturbance in areas where heritage features have been recorded.</p> <p>Scale: Limited to within direct disturbance footprint, which is 22m wide.</p> <p>Duration: Heritage features disturbed during construction will be permanently impacted.</p> <p>Magnitude: Direct impacts to heritage features of high significance will be avoided during final route selection and pole placement. Other features will be salvaged.</p> <p>Value: There are declared heritage places and sites of Aboriginal Significance in the OHTL corridor.</p> <p>Certainty: Surveys undertaken in Utilities Corridor section (Appendix W). Railway Corridor section not yet surveyed. Sacred Sites clearances are pending. Site-specific mitigation measures to be determined.</p>
Culture and heritage	Indirect impact to heritage features	Restrict unauthorised public access along AAPowerLink access tracks and roads. Design criteria for engineered stormwater management systems and roads to maintain flows similar to pre-development conditions to avoid indirect impacts to heritage features associated with watercourses and swamps. Develop and implement site-specific Erosion and Sediment Control Plans (ESCPs) to minimise erosion and off-site sedimentation that could smother heritage features. Implement dust control measures to minimise dust deposition into surrounds surrounding the proposal footprint where heritage features are present.	Rectify emerging issues associated with unauthorised access, alteration of flows, erosion and sedimentation, water quality and dust, to minimise potential for indirect impacts to heritage features.	Possible	Limited	Permanent	Moderate	High	High	Minor	Visual inspection of OHTL corridor and access tracks for signs of unauthorised access. Provision of reporting processes for landholders and community to report unauthorised use of AAPowerLink access tracks. Visual inspections of disturbed areas and erosion and sediment controls as per ESCP (after significant rainfall events, at a minimum). Visual inspection of recorded heritage features adjacent to proposal footprint for signs of disturbance.	Internal reporting on environmental performance. External reporting in accordance with conditions of environmental approvals and permits.	<p>Likelihood: Construction activities could create deposited dust and erosion and sedimentation impacts.</p> <p>Scale: Impacts will be mitigated and therefore limited to within several hundred metres of footprint.</p> <p>Duration: Heritage features disturbed during construction could be permanently impacted.</p> <p>Magnitude: Some loss of site integrity could occur but sites unlikely to be destroyed.</p> <p>Values: Landscape is culturally significant and contains heritage features both inside and outside footprint.</p> <p>Certainty: Sedimentation and dust deposition will affect small areas – see Chapter 5 & 11. Routine mitigation measures are proven effective for minimising offsite impacts.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Culture and heritage	Direct or indirect impact to undetected heritage features	Use archaeological predictive models developed through the HIAs to identify Heritage Risk Areas where clearance survey is required. Undertake clearance surveys in all Heritage Risk Areas to inform final site/route selection and heritage mitigation measures.	CHMPs will provide measures for managing the inadvertent discovery of heritage features. Consultation with NT Heritage Branch to determine appropriate response. Where further impacts to archaeological heritage features are unavoidable, obtain an approval to carry out work on a heritage place or object (work) under the Heritage Act. Workforce training and inductions will address all aspects of cultural awareness and heritage protection.	Possible	Limited	Permanent	Moderate	Low	Low	Minor	Monitoring of site protection or mitigation works by a qualified heritage practitioner.	Internal reporting on environmental performance. External reporting in accordance with conditions of environmental approvals and permits. Reporting of incidents and unexpected finds to Traditional Owners/AAPA/NLC and NT Heritage Branch. Reporting outcomes of site protection and mitigation works to Traditional Owners/AAPA/NLC and NT Heritage Branch.	<p>Likelihood: Heritage surveys undertaken by Earth Sea Heritage (2020). Some undetected archaeological features may remain.</p> <p>Scale: Predictive models indicate sites will be limited to along watercourses and on swamp margins.</p> <p>Duration: Heritage features disturbed during construction could be permanently impacted.</p> <p>Magnitude: Undetected sites are generally unlikely to be of high significance due to the level of survey effort undertaken. Loss of low significance sites will not affect heritage value of landscape.</p> <p>Values: Undetected sites are generally unlikely to be of high significance due to the level of survey effort. Medium rating assigned due to potential for burials in dunes crossed by Cable Transition Facilities.</p> <p>Certainty: The heritage surveys and AAPA Authority Certificate process will identify most heritage features present in the footprint, but there remains a risk of undetected or subsurface features.</p>
Human Health	Exposure to EMF	HVAC cables at Solar Precinct and Darwin Converter Site emit low level EMF that does not pose a risk to human health.	No mitigation proposed for OHTL	Unlikely						None	-	-	Not assessed as impact unlikely to occur. No construction activities predicted to create EMF exposures.
Human Health	Increase in Biting Insects	Construction camps will be adequately insect screened. Locations for OHTL fly camps will be selected to be as far as possible away from significant mosquito breeding habitats i.e. watercourses and wetlands that retain water during the dry season. Darwin Converter Site workforce will be accommodated in Darwin, not on site. Drains and culverts designed to prevent upstream flooding and be free draining, retaining water for a period of maximum 5 days. Water tanks will be screened to prevent entry of mosquitoes. Landfill will comply with the Guidelines for Siting, Design and Management of Solid Waste Disposal Sites in the Northern Territory 2003. Materials arriving from overseas at Darwin Port are subject to quarantine inspections and treatment.	Workforce education and induction on the use of appropriate PPE, bite prevention and treatment methods. Inspection and removal of any artificial mosquito breeding habitats (see below). Implementation of mosquito control methods, such as residual insecticides and larvicides in accordance with advice from Department of Health. Containers capable of holding water stored undercover and/or emptied on a weekly basis during construction. Post-construction reinstatement activities to remove impediments to surface water drainage such as stockpiles, low points, wheel ruts etc. Stormwater drains, culverts and sediment basins maintained free from sediment build up and vegetation growth. Landfill and wastewater management systems maintained to prevent water ponding and pooling. Inspection of imported materials, equipment and plant for pests on arrival at works areas. Treat any pest species detected in accordance with advice from NT Medical Entomology branch	Unlikely						None	-	-	Not assessed as impact is unlikely to occur. Construction activities unlikely to create biting insect breeding habitat.

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Human Health	Increase in communicable disease	<p>Compliance with all federal (Australian Government Department of Health), state (Northern Territory Government Health), and local requirements set out for COVID 19 health measures, as well as guidelines set out by the World Health Organization (WHO).</p> <p>Practices to minimize the risk of COVID 19 infection while living in camps include washing hands, wearing masks while in common areas where physical distancing is not possible, and avoiding touching one’s eyes, nose, and mouth without properly cleaning hands first.</p> <p>No guests will be allowed in the camps, and all camps will be equipped with readily available PPE, including hand soap, sanitizer, face masks, disinfectant wipes, over the counter medicines, thermometers, and rapid COVID 19 antigen tests.</p> <p>Workers will be required to be fully vaccinated.</p> <p>14 days prior to moving into the camp, it will be recommended that workers avoid large gatherings, wear masks in public spaces and where physical distancing is not possible, avoid being near people who are sick, and wash their hands.</p>	<p>If any worker exhibits cold or flu like symptoms, immediately notify a Construction Supervisor. The individual must, if possible, evacuate the camp to a hotel for a minimum of five days or until symptoms improve, or self-isolate away from other workers.</p>	Possible	Regional	Medium-term	Minor	High	Low	Moderate	-	-	<p>Likelihood: Camp living arrangements and worker interactions with communities could increase communicable disease transmission.</p> <p>Scale: Impacts nearby communities.</p> <p>Duration: Impacts could occur over several years during construction.</p> <p>Magnitude: Minor increase in communicable disease predicted; mitigation measures expected to reduce magnitude of risk.</p> <p>Value: Nearby communities could experience increased communicable disease transmission with could add stress to local health care provision.</p> <p>Certainty: Unpredictable nature of COVID-19 and other communicable diseases.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Human Health	Exposure to air emissions of particulate matter (PM10, PM2.5) and Nitrogen Oxide (NOx)	Whenever possible, plan haul routes to avoid residential areas. Efficient staging and layout of construction facilities to minimize haulage, avoid double handling of materials and other excessive equipment operations. Use grid or solar power whenever practical over stationary combustion generated power. Prohibit open burning of any materials.	NOx emissions will be minimised by using electric vehicles and equipment where practicable, and ensuring all machinery, plant and equipment complies with minimum emissions standards. Implement anti-idling policy. Operate equipment at optimum rated loads as determined by equipment manufacturer and follow routine equipment maintenance procedures. Ensure all heavy duty on-road and non-road vehicles are late model and meet all commonwealth and NT emission standards. Ensure all equipment brought to site is in good working order accompanied by inspection certificates and not exceeding 10% opacity. Position stationary emission sources such as generators away from sensitive receptors with due regard to safety, security, traffic and other geographic restrictions.	Possible	Localised	Short-term	Minor	Medium	High	Minor	Conduct visual inspections for opacity from vehicle/equipment emissions.		<p>Likelihood: Air emissions likely as a result of land clearing, site preparation, pole installation, and stringing of conductors.</p> <p>Scale: Air quality assessment criteria could be exceeded between 283-468 m from the construction activities.</p> <p>Duration: Impacts will occur for a few weeks to months at each location along the OHTL.</p> <p>Magnitude: Emissions are likely to exceed natural variability with no mitigation. Mitigation measures expected to reduce the magnitude of this risk.</p> <p>Value: There are residences and buildings present in areas where air quality criteria are predicted to be exceeded.</p> <p>Certainty: Atmospheric dispersion modelling undertaken (Appendix U). Understanding of construction activities, and mitigation measures.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Human Health	Exposure to noise emissions	Whenever possible, schedule work that creates the most noise during the NT EPA prescribed acceptable construction times (Monday to Saturday 7am to 7pm and between 9am and 6pm Sundays or public holidays). However, justification of work outside the NT EPA construction times may be needed if it is not possible to work within these times. Locate site access roads, laydown areas and stationary equipment (e.g., generators) as far away as possible from sensitive receivers; Whenever possible, plan haul routes to avoid residential areas; Maintain access routes to avoid the formation of potholes. Design access roads and laydown areas to minimize reversing of trucks/equipment; Use broadband back-up alarms to extent possible; Do not use engine brakes unless necessary; Maintain equipment as per manufacturer's instructions; Keep engines covers closed; Dampen tailgates to avoid banging; Avoid dropping loads into dump trucks from heights; Limit the use of diesel generators by drawing power from the existing hydro grid.	Where practical, machines shall be operated at low speeds and power and turned off instead of left idling for prolonged periods when not in use; Install temporary noise enclosures in areas of prolonged high noise activities. Notify the local community within the Study Area of the construction activities, especially if overnight construction is required. Notifications should include the location, extent, and duration of construction activities.	Likely	Localised	Short-term	Moderate	Medium	High	Moderate			<p>Likelihood: Pole installation activities likely to produce noise emissions experienced by local receptors.</p> <p>Scale: Health criteria predicted to be exceeded within 116-520 m from source activity.</p> <p>Duration: Impacts will occur for a few weeks to months at each location along the OHTL.</p> <p>Magnitude: Emissions will likely exceed natural variability in several locations along OHTL.</p> <p>Value: Sensitive receptors present but have some resilience to change, and impacts will be short-term.</p> <p>Certainty: High confidence in understanding of construction activities contributing to noise.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Terrestrial environmental quality	Erosion and topsoil migration caused by disturbance of soils	Darwin Converter site footprint is located on flat land above the maximum flood extent of 0.05% AEP (i.e. 1-in-2000-year flood event).	Implementation of site-specific ESCP (Appendix X), which will be commensurate with the risk of erosion in each location.	Likely	Limited	Medium-term	Minor	Medium	High	Minor	Annual post wet season monitoring of rehabilitation success until disturbed areas stabilised. Visual inspections of drainage structures, discharge points and site boundaries following rain events. Post-wet season inspections of footprint and maintenance of emerging erosion issues.	Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions	<p>Likelihood: Likely because erosion hazard and risk is calculated as high to extreme due to high seasonal rainfall conditions in the area (refer Erosion Risk Assessment EcOz, 2021).</p> <p>Scale: Erosion could extend beyond the boundaries of the direct disturbance footprint, however, is predicted to be limited because routine inspection and maintenance activities will rectify emerging issues following each wet season.</p> <p>Duration: Impacts will only be felt during construction, with disturbed soils either protected by infrastructure/hardstand or stabilised by reinstatement activities.</p> <p>Magnitude: Isolated erosion is not predicted to affect surrounding land uses or water quality.</p> <p>Values: Soils that could be eroded are common in the region and currently have no beneficial use apart from supporting native vegetation, which will be cleared in developing the site. Seasonal swamp proximate to footprint sensitive to sedimentation caused by erosion.</p> <p>Certainty: Erosion hazard assessment and ESCP in accordance with IECA guidelines</p>
Terrestrial environmental quality	Contamination of soils	Solar used as power source, so no requirement for large fuel storages. Dangerous Goods and Hazardous Substances stored and handled in accordance with regulated standards and codes of practice, and manufacturer's directions.	Dangerous Goods and Hazardous Substances stored and handled in accordance with regulated standards and codes of practice, and manufacturer's directions. Spill response procedures and equipment provided at all storage and handling locations. Construction and operations personnel trained in spill response.	Possible	Limited	Short-term	Minor	High	High	Minor	Routine visual inspections around storage locations and work areas.	Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions	<p>Likelihood: Storage and handling of fuels, oils/lubricants/chemicals for use in construction at various locations across footprint. Spills and leaks could occur.</p> <p>Scale: Minor spills/leaks could occur but will be detected and remediated with no offsite impact.</p> <p>Duration: Soil contamination could occur. Spills will be detected and remediated immediately.</p> <p>Magnitude: Contaminants will not be detected in soils within or surrounding the site due to small volumes and mitigation measures.</p> <p>Values: No land use or environmental values that are sensitive to soil contamination. No surface watercourses present and groundwater is deep.</p> <p>Certainty: Australian Standards are established and proven effective for mitigating risk.</p>
Terrestrial environmental quality	Acid sulfate soils disturbance	Nil	Development of an ASSMP if ASS is identified in soil disturbance areas during construction. As per the developed ASSMP treatment of PASS to neutralise acidity and prevent impact on surrounding environment.	Possible	Limited	Short-term	Minor	Medium	High	Minor	Visual inspections and testing of any confirmed ASS in line with National Acid Sulfate Soils Guidance material.	Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions	<p>Likelihood: PASS could occur at specific locations along OHTL. Soil testing to be undertaken.</p> <p>Scale: Area of potential disturbance will be limited to where pole foundations intersect ASS.</p> <p>Duration: ASS would be exposed for a matter of days prior to reburial.</p> <p>Magnitude: Oxidation unlikely to occur during short period of exposure.</p> <p>Values: Watercourses along OHTL would be sensitive to ASS impacts</p> <p>Certainty: Guidelines for identification and management of ASS are established and proven effective</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Terrestrial ecosystems	Loss of vegetation and habitat	Site selection has avoided impacts to high value habitats such as watercourses and surveys were undertaken to confirm the absence of Bilby habitat prior to finalising the site boundaries.	Weed hygiene measures and implementation of a Weed Management Plan to contain impacts to within the footprint and avoid impacts to surrounding vegetation and habitats.	Likely	Localised	Permanent	Minor	Low	High	Minor	Visual inspections during clearing to ensure clearing is within approved boundaries. Results recorded, along with any photographs. Rehabilitation inspections following first wet season post-construction or until vegetation is established and sites are stable.	Records of clearing undertaken External reporting in accordance with environmental approval conditions	<p>Likelihood: Vegetation clearing required at subset of Darwin Converter Station.</p> <p>Scale: Impact will occur across the direct disturbance footprint (55 ha), with impacts from machinery etc potential extending beyond the boundary of direct footprint.</p> <p>Duration: Infrastructure will remain for an extended period. Future land use unknown.</p> <p>Magnitude: No direct impact to rare or significant vegetation so limited biodiversity impact.</p> <p>Values: Areas being cleared are common within the Gunn Pt peninsula. No threatened species or significant vegetation.</p> <p>Certainty: Ecological surveys undertaken.</p>
Terrestrial ecosystems	Loss or deterioration of significant vegetation	Site selection has avoided impacts to high value habitats such as watercourses and surveys were undertaken to confirm the absence of Bilby habitat prior to finalising the site boundaries.	Weed hygiene measures and implementation of a Weed Management Plan to contain impacts to within the footprint and avoid impacts to surrounding vegetation and habitats.	Unlikely					High	None	Visual inspections during clearing to ensure clearing is within approved boundaries. Results recorded, along with any photographs. Rehabilitation inspections following first wet season post-construction or until vegetation is established and sites are stable.	Records of clearing undertaken External reporting in accordance with environmental approval conditions	<p>Certainty: Ecological surveys undertaken. None identified in site surveys.</p>
Terrestrial ecosystems	Impacts to threatened species	Micro-siting of transmission towers and access tracks to avoid identified local occurrences (if present). Re-routing the access track to avoid local occurrences (if present).	Clearance only within the boundaries approved in licences obtained to clear native vegetation as per the Planning Act and/or the Pastoral Land Act. Reinstatement of all temporary construction footprints. Post-operations rehabilitation of cleared areas as per the Decommissioning and Rehabilitation Plan.	Possible						None	Visual inspections during clearing to ensure clearing is within approved boundaries. Results recorded, along with any photographs. Rehabilitation inspections following first wet season post-construction or until vegetation is established and sites are stable.	Records of clearing undertaken External reporting in accordance with environmental approval conditions	<p>Assessment of impacts to listed threatened and migratory species was undertaken with reference to the EPBC Significant Impact Guidelines 1.1 (DEWHA 2013) and EPBC Act Policy Statement 3.21 – Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species (DOE 2015).</p>
Terrestrial ecosystems	Degradation of flora and vegetation in surrounding areas			Possible	Limited	Short-term	Minor	Medium	High	Minor			<p>Likelihood: Dust deposition could affect vegetation around footprint.</p> <p>Scale: Deposited dust is modelled to affect an area of approximately 100-380m from footprint (see Chapter 11 Air Quality).</p> <p>Duration: Dust will only be an issue during construction and will be washed off vegetation each wet season.</p> <p>Magnitude: Short-term dust deposition is unlikely to harm vegetation.</p> <p>Values: Riparian vegetation along access roads and watercourses could be sensitive to dust.</p> <p>Certainty: Extent of dust deposition modelled (see Chapter 11 Air Quality). Mitigation measures are routine and proven effective.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Terrestrial ecosystems	Introduction and spread of weeds and pests	Weed hygiene measures will be implemented for construction plant and equipment. Borrow areas will be inspected for weeds and weed contaminated materials will not be brought to site. All project activities will comply with the Weed Management Act which states it is an offence to transport weeds.	A Weed Management Plan will be implemented. Weed inspections and control will be undertaken for the duration of construction and operations to limit the spread of weeds.	Likely	Localised	Permanent	Moderate	Medium	High	Moderate	As per the Weed Management Plan (Appendix Q)	As per the Weed Management Plan (Appendix Q)	<p>Likelihood: Weeds are present in the footprint and likely to be spread on vehicles, plant and equipment, and in imported borrow materials, as commonly occurs on construction projects.</p> <p>Scale: As the site will be developed, any weed infestation likely to be localised to site boundaries and access roads where disturbance occurs during construction but no infrastructure is built.</p> <p>Duration: Experience shows that if weeds are introduced they are very difficult to eradicate and therefore will be permanent and require ongoing control to limit spread and impacts.</p> <p>Magnitude: Because the area currently has limited weeds, any new weeds introduced will represent a change to the weed profile and risk for the area.</p> <p>Values: No weeds were observed in the footprint during Ecology surveys (Refer Solar Precinct Ecology Report EcOz, 2021). The habitats present do not support any significant vegetation or species.</p> <p>Certainty: Potential impacts are well understood from other projects and Weed MP will reduce risk to ALARP.</p>
Terrestrial ecosystems	Changes in fire regimes	Observe fire bans	Develop and implement a Bushfire Management Plan, including first response capability.	Possible	Localised	Short-term	Minor	Medium	High	Minor	Visual monitoring for fires Monitoring NAFI website for proximate fires which may impact proposal. Monitoring conditions for fire risk.	Any fires reported to Bushfires NT or appropriate authority.	<p>Likelihood: Construction activities could start bushfires but individual fire events would not alter fire regimes.</p> <p>Scale: Bushfire response plans will be in place to limit the extent of area burnt.</p> <p>Duration: Impact could occur occasionally during construction.</p> <p>Magnitude: Vegetation is resilient to occasional fire.</p> <p>Values: Sensitive values present in footprint are riparian, sand sheet heath and rainforest, and the Black Jungle Reserve.</p> <p>Certainty: Bushfire risks well understood and bushfire response will reduce risk to ALARP.</p>
Terrestrial ecosystems	Direct fauna mortality during land clearing	Pre-clearing inspections undertaken to identify and relocate any fauna that are at risk i.e. nests and burrows. Avoiding clearing large hollow-bearing trees where possible.	Clearing will be conducted in a single direction, allowing any fauna to move out of way of clearing activities. If fauna is spotted in immediate clearing area and are in danger, clearing will be stopped until safe to continue. Clearing in a progressive manner to allow wildlife to natural disperse from the area as clearing undertaken. Site inductions will ensure that all personnel are aware of their obligations and know the correct procedures for fauna encounters. Vehicle speed restrictions apply when travelling near uncleared areas or in higher risk conditions.	Possible	Limited	Short-term	Minor	Low	High	Minor	Record any fauna encounters, injuries or death as result of works for the duration of works. Incidental observations of carcasses, including during routine infrastructure inspections	Internal record keeping of incidents of fauna mortality. External reporting in accordance with environmental approval conditions	<p>Likelihood: Individual fauna deaths may occur during land clearing and along access routes.</p> <p>Scale: Deaths will be isolated occurrences. There are no non-mobile fauna populations present that would be at higher risk of large numbers of mortalities. Mobile fauna will avoid construction activities and move into surrounding habitats.</p> <p>Duration: Mortalities will mainly occur when large earthmoving equipment is being operated in the land clearing phase and when there is a high volume of construction traffic movements along access roads, which will occur over 4 years.</p> <p>Magnitude: Isolated occurrences of fauna mortality will not affect the viability of fauna populations.</p> <p>Values: No nesting or roosting habitats identified. No threatened species present.</p> <p>Certainty: Potential impacts are well understood from other projects. Mitigation measures are routine and will reduce risk to ALARP.</p>
Terrestrial ecosystems	Habitat degradation and fragmentation	The OHTL will fragment habitat; the majority of the OHTL route has been located in the railway corridor where habitat fragmentation has already occurred.	Reinstatement of all temporary construction footprints and follow-up weed control post-construction.	Unlikely					High	None	Nil	External reporting in accordance with environmental approval conditions	<p><i>Not assessed. Small footprint in habitat types that are not susceptible to fragmentation impacts.</i></p> <p>Certainty: Ecologically surveys undertaken</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Terrestrial ecosystems	Changes to fauna behaviours due to noise, light and other disturbances	Waste management procedures to avoid attracting fauna to waste disposal areas.		Possible	Limited	Medium-term	Minor	Low	High	Minor			<p>Likelihood: Construction activities will be noisy and lighting will be in place across the site. Fauna are likely to alter their behaviours to avoid noisy construction activities, but could be attracted to light and areas where food wastes are stored.</p> <p>Scale: Impact will not occur across the footprint at once, but will be isolated to where activity is taking place.</p> <p>Duration: Impact will occur over the 4 year construction phase. Fauna will move back in to habitats surrounding the footprint once operational.</p> <p>Magnitude: Change to level of fauna activity may occur but will not affect the viability of fauna populations.</p> <p>Values: No threatened species present, or important populations identified in footprint that would be susceptible to disturbance i.e. no nesting or roosting habitat present.</p> <p>Certainty: Potential impacts are well understood from other projects. Mitigation measures are routine and proven effective</p>
Terrestrial ecosystems	Loss of habitat from erosion			Unlikely					High	None			<p><i>Not assessed. The residual impact associated with erosion was assessed as low (see Chapter 4 Terrestrial Environmental Quality). This level of impact would not cause loss of habitat.</i></p> <p>Certainty: Erosion hazard assessed in accord with accepted guidelines.</p>
Terrestrial ecosystems	Loss of habitat from disturbance of acid sulfate soils			Unlikely					High	None			<p><i>Not assessed. The residual impact associated with ASS was assessed as low (see Chapter 4 Terrestrial Environmental Quality). This level of impact would not cause loss of habitat.</i></p> <p>Certainty: ASS risk assessed and managed in accord with accepted guidelines.</p>
Terrestrial ecosystems	Degradation of habitats by contamination and pollution			Unlikely					High	None			<p><i>Not assessed. The residual impact associated with contamination and pollution was assessed as low (see Chapter 4 Terrestrial Environmental Quality). This level of impact would not cause degradation or loss of habitat.</i></p> <p>Certainty: Mitigation measures for spill prevention and response are routine and proven effective.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Hydrological processes	Alteration to surface water flows in water courses or wetlands	Solar Precinct and Darwin Converter Site footprints located on flat land above the maximum modelled flood extent (0.1 % AEP/1-in-1000-year flood event) and outside of mapped storm surge zones. Solar Precinct and Darwin Converter Site site selection process included avoidance of major watercourses. Roadside drainage and culverts will be designed and installed in accordance with accepted Austroads standards. Groundwater used as water supply – no surface water extraction.	Drainage, erosion and sediment controls installed and maintained in accordance with Erosion and Sediment Control Plans (ESCP) that align with the Best Practice Erosion and Sediment Control Guidelines (IECA, 2008). Design criteria for engineered stormwater management systems installed at the Solar Precinct and Darwin Converter Site is to discharge water to similar locations and at similar volumes to pre-development conditions.	Possible	Localised	Long-term	Moderate	Medium	Low	Moderate	During construction, visual inspections of disturbed areas and erosion and sediment controls as per ESCP (after significant rainfall events, at a minimum). Annual post wet season monitoring of revegetation success until disturbed areas are stabilised. Visual inspections of drainage structures, discharge points and site boundaries following rain events. Post-wet season inspections of all project locations and rectification of emerging erosion issues.	Internal records of ESCP inspections, as stipulated in ESCP's. Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions.	<p>Likelihood: Overland flows progressively altered within direct disturbance footprint (~55ha) over construction period.</p> <p>Scale: No watercourses present in footprint but seasonal swamp present 150 m south-west.</p> <p>Duration: Hydrology will be altered for the construction and operational phases.</p> <p>Magnitude: No watercourses present in footprint but seasonal swamp present immediately south-west.</p> <p>Values: Hydrology supports aquatic ecosystem in seasonal swamp.</p> <p>Certainty: Stormwater management plan yet to be developed and could result in increased or decreased flows to the swamp.</p>
Hydrological processes	Changes to ground water levels caused by groundwater extraction	Groundwater extraction sites will be located away from existing groundwater bores in use. Engagement with landowners at Solar Precinct and along OHTL to identify bores that can be used as a water source without affecting other uses. Solar Precinct and Darwin Converter Site footprints are not located in identified groundwater recharge zones for the underlying productive aquifers. Ground under the solar fields will not be compacted, allowing rainfall to infiltrate soils. Design criteria for engineered stormwater management systems installed at the Solar Precinct and Darwin Converter Site is to discharge water to similar locations and at similar volumes to pre-development conditions.	Bore locations and sustainable yields to be determined subject to investigation and recommendations from a hydrogeologist. Bore work permits and water extraction licences obtained under the Water Act.	Possible	Limited	Medium-term	Minor	Low	High	Minor	Monitoring of standing water levels and water extraction volumes, as required under water extraction licence conditions. Water quality sampling and analysis of springs near Solar Precinct and aquifer targeted for groundwater extraction to ensure there is no connectivity.	Internal records of water usage and water extraction. External reporting of water extraction in accordance with water extraction licence and environmental approval conditions.	<p>Likelihood: Groundwater extraction to supply 33 ML/year during construction could result in drawdown around bores.</p> <p>Scale: Drawdown may occur around bore, but impacts limited by lack of other users.</p> <p>Duration: Extraction for construction may occur for 5 years. Groundwater levels may take years to recover.</p> <p>Magnitude: Drawdown may be measurable but unlikely to impact other users or the environment.</p> <p>Values: No existing consumptive users within 4 km or GDE's fed by Koolpinyah aquifer.</p> <p>Certainty: Extraction of proposed volumes at Darwin Converter Site unlikely to impact other users or GDE's as none are present within area of influence.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Inland water environmental quality	Increased turbidity caused by soil disturbance and erosion	Solar Precinct and Darwin Converter Site footprints located on flat land above the maximum modelled flood extent (1 %AEP/1-in-1000-year flood event) and outside of mapped storm surge zones. Solar Precinct and Darwin Converter Site footprints avoid watercourses. Progressive clearing, construction and reinstatement will be undertaken. Stormwater drainage will be installed to capture and manage runoff. Stormwater captured within facilities will discharge to land, via erosion and sediment controls. Roadside drainage and culverts will be installed in accordance with Austroads standards.	Watercourse crossings along access roads and OHTL will be installed during the dry season when no flow present. Drainage, erosion and sediment controls will be installed and maintained in accordance with Erosion and Sediment Control Plans (ESCP) that align with the Best Practice Erosion and Sediment Control Guidelines (IECA, 2008). Develop and implement a Reinstatement Plan for post-construction reinstatement of works areas to stabilise soils and promote regrowth of native vegetation. Rectification of emerging erosion issues after each wet season.	Possible	Localised	Short-term	Moderate	Medium	Low	Moderate	During construction, visual inspections will be undertaken of disturbed areas and erosion and sediment controls as per ESCP (after significant rainfall events, at a minimum). Annual post wet season monitoring of reinstatement success until disturbed areas are stabilised. Visual inspections of drainage structures, discharge points and site boundaries following rain events. Visual inspections of seasonal swamp at Darwin Converter Site for evidence of sedimentation; implement water quality monitoring if required. Post-wet season inspections of all project locations and rectification of emerging erosion issues.	Internal records of ESCP inspections, as stipulated in ESCP's. Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions.	<p>Likelihood: Construction works will disturb soils in an area of high seasonal rainfall, which could erode and result in turbid runoff into the swamp.</p> <p>Scale: Water quality impacts may occur in the swamp, but not further downstream.</p> <p>Duration: Water quality impacts could occur following rainfall, and last for days to weeks.</p> <p>Magnitude: Turbidity is naturally low in similar swamps and lagoons, except when water levels are low as it dries up.</p> <p>Value: Water quality in swamp supports aquatic ecosystem health.</p> <p>Certainty: Erosion hazard assessment and ESCP in accordance with IECA guidelines. However, swamps proximity to the proposal footprint and location in a high erosion risk area mean impact could still occur.</p>
Inland water environmental quality	Contamination by release of fuels and hazardous substances	During operations, solar power will be used as a power source, hence no requirement for bulk fuel storages. Dangerous Goods and Hazardous Substances will be stored and handled in accordance with regulated standards and codes of practice, and manufacturer's directions. Dangerous Goods and Hazardous Substances will not be stored within 200m of a watercourse or groundwater bore, and mobile refuelling will not occur within 50m of a watercourse or groundwater bore.	Dangerous Goods and Hazardous Substances Registers will be maintained at all storage and handling locations. An Environmental Emergency and Spill Response Plan will be in place and equipment provided at all storage and handling locations. Construction and operations staff will be trained in spill response.	Unlikely	Limited	Short-term	Negligible	High	High	Minor	Routine visual inspections around storage locations and work areas.	Internal records of volumes used and stored in accordance with Workplace Health and Safety Regulations. Internal inspection records and notes. Internal records of water quality monitoring. Incidents of off-site pollution or nuisance reported to the NT EPA within 24 hours	<p>Likelihood: Small volumes of fuels and hazardous substances will be stored and used.</p> <p>Scale: Spills may occur but storage and handling procedures mean a spill will be limited to ground around spill and will not enter a watercourse or groundwater aquifer.</p> <p>Duration: Spills to ground will occur intermittently. Spills will be detected and remediated immediately.</p> <p>Magnitude: No change in water quality as a result of spills.</p> <p>Values: Water quality in watercourses and groundwater is sensitive to contamination and supports numerous beneficial uses.</p> <p>Certainty: Australian Standards are established and proven effective for mitigating risk. No underground storage, or storage within 200 m of a watercourse.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Inland water environmental quality	Contamination from waste storage and disposal areas	Landfill will comply with the Guidelines for Siting, Design and Management of Solid Waste Disposal Sites in the Northern Territory (NT EPA 2003). No waste will be stored within 200m of a watercourse.	Waste management will be in accordance with best practice guidelines (e.g. separation of waste, covering, bunded storage areas), and the requirements of the Waste Management and Pollution Control Act 1998. All listed waste will be disposed of at a licenced waste management facility.	Unlikely	Limited	Long-term	Negligible	Low	High	Minor	Routine visual inspections around landfill, waste storage locations and work areas.	Internal records of inspections. Incident reporting	<p>Likelihood: Inert and putrescible waste will be disposed of onsite at Solar Precinct. All other waste will be temporarily stored and disposed at a licenced facility.</p> <p>Scale: Any contamination from waste storage and disposal will be limited to soil in immediate surrounds.</p> <p>Duration: Waste will be stored at Darwin Converter Site, and stored and disposed at Solar Precinct for construction and operation phases. Short term storage within OHTL.</p> <p>Magnitude: No change in water quality as a result of waste storage and disposal.</p> <p>Values: No watercourses or groundwater proximate to waste storage and disposal areas.</p> <p>Certainty: Compliance with NT guidelines and regulations proven effective for mitigating risk.</p>
Inland water environmental quality	Contamination by sewage from camps and ablutions	Onsite wastewater management systems to be designed and installed by suitably qualified person, in accordance with NT Code of Practice for Onsite Wastewater Management, plus other relevant standards and guidelines. System to be designed for projected wastewater loads, and appropriate for applicable climate.	Any issues identified with wastewater management system to be rectified by suitably licenced person.	Unlikely	Limited	Long-term	Negligible	Medium	High	Minor	Routine inspection and maintenance of wastewater management systems and land application areas, in accordance with the NT Code of Practice for Onsite Wastewater Management.	Internal records of maintenance works undertaken. Relevant notifications/applications and reporting to NT Department of Health, or DIPL.	<p>Likelihood: Onsite wastewater management systems will be established at the Solar Precinct, along the OHTL at fly camps, and at the Darwin Converter Site. Scale: Wastewater will be treated and disposed of to land in a controlled and spatially limited area. Duration: Wastewater management systems will be used for construction and operation phases at Solar Precinct and Darwin Converter Site but will be temporary at OHTL fly camps. Magnitude: No change in water quality as a result of wastewater management. Value: Some watercourses or shallow groundwater may be proximate to Darwin Converter Site and OHTL systems, which support numerous beneficial uses. Certainty: Compliance with NT guidelines and regulations proven effective for mitigating risk.</p>
Aquatic ecosystems	Direct loss of aquatic habitat	Solar Precinct and Darwin Converter Site site selection process included avoidance of major watercourses; neither site has aquatic ecosystems within the direct disturbance footprint.	Minimise the disturbance footprint within waterways or wetlands to the smallest practicable area.	Unlikely					High	None	Monitoring during clearing to ensure clearing remains within approved boundaries, and at approved watercourse crossing locations.	Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions.	<p><i>Not assessed as impact is inherently unlikely to occur.</i></p> <p>Certainty: No watercourses or aquatic ecosystems present in direct disturbance footprint.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Aquatic ecosystems	Reduction in aquatic habitat value due to water quality impacts	Solar Precinct and Darwin Converter Site footprints avoid watercourses. Clearing will be undertaken progressively. Dangerous Goods and Hazardous Substances will be stored and handled in accordance with regulated standards and codes of practice, and manufacturer's directions. Dangerous Goods and Hazardous Substances will not be stored within 200 m of a watercourse or groundwater bore, and mobile refuelling will not occur within 50 m of a watercourse or groundwater bore.	Drainage, erosion and sediment controls installed and maintained in accordance with Erosion and Sediment Control Plans (ESCP) that align with the Best Practice Erosion and Sediment Control Guidelines (IECA, 2008). Develop and implement a Reinstatement Plan for post-construction reinstatement of works areas to stabilise soils and promote regrowth of native vegetation. Rectification of emerging erosion issues after each wet season. Dangerous Goods and Hazardous Substances Registers maintained at all storage and handling locations. An Environmental Emergency and Spill Response Plan will be in place and equipment provided at all storage and handling locations. Construction and operations staff trained in spill response.	Possible	Localised	Short-term	Moderate	Medium	Low	Moderate	During construction, visual inspections of disturbed areas and erosion and sediment controls as per ESCP (after significant rainfall events, at a minimum). Annual post wet season monitoring of rehabilitation success until disturbed areas are stabilised. Visual inspections of drainage structures, discharge points and site boundaries following rain events. Post-wet season inspections of all project locations and rectification of emerging erosion issues. Visual inspections of seasonal swamp at Darwin Converter Site for evidence of sedimentation; implement water quality monitoring if required.	Internal reporting on environmental performance. Internal records of ESCP inspections, as stipulated in ESCP's. External reporting in accordance with environmental approval conditions. Internal records of water quality monitoring. Internal records of volumes used and stored in accordance with Workplace Health and Safety Regulations. Incidents of off-site pollution or nuisance reported to the NT EPA within 24 hours.	<p>Likelihood: Construction works will disturb soils in an area of high seasonal rainfall, which could result in turbid runoff.</p> <p>Scale: Water quality impacts may occur in the proximate seasonal swamp, but not further downstream.</p> <p>Duration: Water quality impacts could occur following rainfall, and last for days to weeks.</p> <p>Magnitude: Turbidity will alter natural conditions as turbidity is naturally low in similar swamps and lagoons.</p> <p>Value: Seasonal swamp supports aquatic ecosystem and is a culturally important resource area.</p> <p>Certainty: Sensitivity of the swamp to altered water quality is uncertain.</p>
Aquatic ecosystems	Reduction in aquatic habitat value due to water quality impacts	Solar Precinct and Darwin Converter Site footprints located on flat land above the maximum modelled flood extent (1 %AEP/1-in-1000-year flood event) and outside of mapped storm surge zones. Solar Precinct and Darwin Converter Sites do not have watercourses within direct disturbance footprint. Roadside drainage and culverts will be designed in accordance with accepted AustRoads standards. Groundwater used as water supply – no surface water extraction. Groundwater extraction sites will be located away from springs or GDE's. Engagement with landowners at Solar Precinct and along OHTL to identify bores that can be used as a water source without affecting other uses.	Design criteria for engineered stormwater management systems installed at the Solar Precinct and Darwin Converter Site is to discharge water to similar locations and at similar volumes to pre-development conditions. Implementation of ESCP's which will manage drainage and minimise erosion. Bore locations and sustainable yields to be determined subject to investigation and recommendations from a hydrogeologist. Bore permits and water extraction licence obtained under the Water Act 1992.	Possible	Localised	Long-term	Moderate	Medium	Low	Moderate	Visual inspection of discharge points and monitoring of water levels in seasonal swamp at Darwin Converter Site - monthly during the wet season. Monitoring of standing water levels and water extraction volumes, as required under water extraction licence conditions. Water quality sampling and analysis of springs near Solar Precinct and aquifer targeted for groundwater extraction to ensure there is no connectivity.	Internal reporting on environmental performance. Internal records of water usage and water extraction. External reporting of water extraction in accordance with water extraction licence and environmental approval conditions.	<p>Likelihood: Overland flows progressively altered within direct disturbance footprint. Ground water extraction of minor volumes.</p> <p>Scale: No watercourses present in footprint but seasonal swamp present 150 m south-west, not fed by productive aquifer.</p> <p>Duration: Surface flows to swamp may be indefinitely altered by development in the catchment.</p> <p>Magnitude: Hydrology could be altered by swamp filling faster or slower, or having reduced flows.</p> <p>Value: Seasonal swamp supports aquatic ecosystem and is a culturally important resource area.</p> <p>Certainty: Extent to which discharges will be altered and sensitivity of the swamp to changes is uncertain.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Aquatic ecosystems	Reduction in aquatic habitat value due to dust	Operational footprint will cover soil with infrastructure, hardstand or vegetation to minimise wind erosion and dust	Dust suppression (e.g. water carts and sprinklers) used during earthworks and dust generating construction activities Progressive clearing and construction/reinstatement of proposal footprints	Possible	Localised	Medium-term	Moderate	Medium	High	Minor	Visual monitoring for airborne dust around proposal footprints Visual inspections of seasonal swamp for deposited dust on vegetation in swamp	Internal reporting on environmental performance	<p>Likelihood: Depositional dust will impact areas within the Darwin Converter Site and immediate surrounds.</p> <p>Scale: Dust modelling indicates impacts up to 380m from footprint, which includes seasonal swamp (see Chapter 11).</p> <p>Duration: Dust impacts will occur for duration of construction.</p> <p>Magnitude: Depositional dust concentrations at the seasonal swamp will exceed assessment criteria. Potential minor impact to water quality.</p> <p>Value: Seasonal swamp supports aquatic ecosystem and is a culturally important resource area.</p> <p>Certainty: Dust deposition modelling has been undertaken (see Appendix U). Dust chemical composition will reflect natural background conditions.</p>
Air quality	Emissions of PM or NO2 that could affect human health	Whenever possible, plan haul routes to avoid residential areas Efficient staging and layout of construction facilities to minimize haulage, avoid double handling of materials and other excessive equipment operations Use grid or solar power whenever practical over stationary combustion generated power Implement anti-idling policy	NOx emissions will be minimised by using electric vehicles and equipment where practicable, and ensuring all machinery, plant and equipment complies with minimum emissions standards Operate equipment at optimum rated loads as determined by equipment manufacturer and follow routine equipment maintenance procedures Ensure all heavy duty on-road and non-road vehicles are late model and meet all commonwealth and NT emission standards Ensure all equipment brought to site is in good working order accompanied by inspection certificates and not exceeding 10% opacity. Position stationary emission sources such as generators away from sensitive receptors with due regard to safety, security, traffic and other geographic restrictions.	Likely	Localised	Medium-term	Minor	Medium	High	Minor	Conduct visual inspections for opacity from vehicle/equipment emissions. Carry out inspections certifying equipment is in good working order prior to shipping to site	Reporting will be carried out per the requirements of the CEMP described in Chapter 17 External reporting in accordance with environmental approval conditions.	<p>Likelihood: Construction activities will produce PM and NO2</p> <p>Scale: Health criteria predicted to be exceeded ~ 170-950m from site boundary.</p> <p>Duration: Impacts will occur over several years during construction.</p> <p>Magnitude: Emissions are likely to exceed natural variability with no mitigation. Mitigation measures expected to reduce the magnitude of this risk.</p> <p>Values: People frequent areas where air quality criteria are predicted to be exceeded.</p> <p>Certainty: Air quality modelling has been undertaken (see Appendix U).</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Air quality	Emissions of particulate matter (TSP and deposited dust) that could affect amenity	Locate site access roads, laydown areas and stationary equipment (e.g., generators) as far away as possible from sensitive receivers Limit the amount of time between completion of road base and any paved areas to minimize exposure of unpaved surface	Water carts will be used across the project footprint to minimise dust emissions in areas of high risk at regular intervals. Other dust suppressants will be used if water ineffective. Implement on-site vehicle restrictions (e.g., limit the speed of vehicles travelling on unsealed access roads). Provide tyre wash facilities to minimize tracking of mud or dirt onto sealed roads Cover or dampen any stockpiles where practical. Notify and engage with residences and businesses who could be affected ahead of the construction front, and implement complaints procedure.	Likely	Localised	Medium-term	Minor	Medium	High	Minor	Visual observations for fugitive emissions of dust Conduct regular inspections of construction areas and roads to identify potential sources of dust emissions Develop 'watching brief' on 'nuisance' impacts to ensure quick responses to any detriment and emerging issues. Implement complaints procedure	Reporting will be carried out per the requirements of the CEMP described in Chapter 17 External reporting in accordance with environmental approval conditions.	<p>Likelihood: Construction activities will result in dust emissions.</p> <p>Scale: Nuisance criteria predicted to be exceeded ~ 380 m from site boundary.</p> <p>Duration: Impacts will occur over several years during construction.</p> <p>Magnitude: Emissions are likely to exceed natural variability with no mitigation. Mitigation measures expected to reduce the magnitude of this risk.</p> <p>Values: People frequent areas where air quality criteria are predicted to be exceeded.</p> <p>Certainty: Dust deposition modelling has been undertaken (see Appendix U).</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Atmospheric processes	GHG emissions from combustion of fuel from vessels, plant and equipment for earthworks, air and land travel, logistics and power generation	<p>Continue to identify and engage in opportunities to maximise commercially viable carbon abatement from the AAPowerLink, including:</p> <ul style="list-style-type: none"> • Pursuing power purchase agreements with large fossil fuel power generators in the NT. • Conduct a life-cycle assessment during the design phase to quantify GHG emissions including embodied, direct and indirect emissions and demonstrate that the AAPowerLink is a carbon positive project • Supply AAPowerLink construction and operational power needs via self-generated solar energy where practicable. • Where the use of self-generated solar energy is not possible, source renewable energy via market mechanisms (if available). • Identify and (where practicable) adopt practical zero carbon technology solutions such as electric vehicles, plant and equipment and remote solar energy systems. • Explore practicable opportunities with NT Carbon Capture Utilisation and Storage Project 	<p>Develop and implement a GHG Abatement and Management Plan that aligns with ISO 140001 Environmental Management Systems and ISO 50001 Energy Management Systems.</p> <p>Conduct GHG mitigation workshops every 2 years during design and construction and every five years during operations to assess performance and identify new opportunities for leveraging best practice and emerging technology.</p> <p>Procurement strategies to consider adoption of carbon reduction and energy efficient technologies (where practicable), including but not limited to:</p> <ul style="list-style-type: none"> • Electrification options for civil plant, machinery and equipment. • Energy efficiency in aircraft services selection. • Electrification and alternative fuel options for transportation (e.g., marine vessels, rail) <p>Develop vegetation management strategies that aim to retain vegetation and soil carbon</p> <p>Conduct studies to identify and select clearing, fire management, vegetation disposal practices and vegetation species to plant or retain.</p> <p>Develop and implement Rehabilitation Plans that aims to reinstate vegetation post-construction and post-decommissioning</p>	Likely	Widespread	Medium-term	Minor	Low	High	Minor	<p>Monitor GHG emissions from activities, as well as energy produced and exported in line with the requirements of NT and Commonwealth law.</p> <p>Data required to calculate GHG emissions will be collected in line with the methods outlined in the National Greenhouse and Energy reporting (Measurement) Determination 2008</p> <p>Monitor performance against targets set in the GHG Abatement and Management Plan.</p>	<p>Reporting of GHG emissions in line with the requirements of the NGER Act. AAPowerLink will trigger emissions thresholds for reporting during construction and reporting thresholds for energy production during operations.</p> <p>External reporting in accordance with environmental approval conditions under the EP Act.</p>	<p>Likelihood: Equipment requiring fuel combustion will be used where self-generated or renewable energy is not practicable; mainly during construction phase.</p> <p>Scale: Fuel generated GHG from logistics and earthworks from a combined area ~12,900ha</p> <p>Duration: Impact occurs only during the construction phase</p> <p>Magnitude: Relevant criteria for environmental protection are met</p> <p>Value: Most of the footprint is in remote areas. Sensitive receptors are not locally impacted by GHG emissions; project has a net positive GHG impact.</p> <p>Certainty: Acceptable level of certainty pertaining to values and receptors</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Atmospheric processes	GHG emissions from land clearing and land use change	<p>Continue to identify and engage in opportunities to maximise commercially viable carbon abatement from the AAPowerLink, including:</p> <ul style="list-style-type: none"> • Pursuing power purchase agreements with large fossil fuel power generators in the NT. • Conduct a life-cycle assessment during the design phase to quantify GHG emissions including embodied, direct and indirect emissions and demonstrate that the AAPowerLink is a carbon positive project • Supply AAPowerLink construction and operational power needs via self-generated solar energy where practicable. • Where the use of self-generated solar energy is not possible, source renewable energy via market mechanisms (if available). • Identify and (where practicable) adopt practical zero carbon technology solutions such as electric vehicles, plant and equipment and remote solar energy systems. • Explore practicable opportunities with NT Carbon Capture Utilisation and Storage Project 	<p>Develop and implement a GHG Abatement and Management Plan that aligns with ISO 140001 Environmental Management Systems and ISO 50001 Energy Management Systems. Conduct GHG mitigation workshops every 2 years during design and construction and every five years during operations to assess performance and identify new opportunities for leveraging best practice and emerging technology. Procurement strategies to consider adoption of carbon reduction and energy efficient technologies (where practicable), including but not limited to:</p> <ul style="list-style-type: none"> • Electrification options for civil plant, machinery and equipment. • Energy efficiency in aircraft services selection. • Electrification and alternative fuel options for transportation (e.g., marine vessels, rail) <p>Develop vegetation management strategies that aim to retain vegetation and soil carbon. Conduct studies to identify and select clearing, fire management, vegetation disposal practices and vegetation species to plant or retain. Develop and implement Rehabilitation Plans that aims to reinstate vegetation post-construction and post-decommissioning</p>	Likely	Widespread	Medium-term	Minor	Low	High	Minor	<p>Monitor GHG emissions from activities, as well as energy produced and exported in line with the requirements of NT and Commonwealth law. Data required to calculate GHG emissions will be collected in line with the methods outlined in the National Greenhouse and Energy reporting (Measurement) Determination 2008. Monitor performance against targets set in the GHG Abatement and Management Plan.</p>	<p>Reporting of GHG emissions in line with the requirements of the NGER Act. AAPowerLink will trigger emissions thresholds for reporting during construction and reporting thresholds for energy production during operations. External reporting in accordance with environmental approval conditions under the EP Act.</p>	<p>Likelihood: Land clearing and land use change is to take place Scale: Land clearing on a combined area ~12,900ha Duration: Impact occurs only during the construction phase Magnitude: Relevant criteria for environmental protection are met Values: Most of the footprint is in remote areas. Sensitive receptors are not locally impacted by GHG emissions; project has a net positive GHG impact. Certainty: Acceptable level of certainty pertaining to values and receptors</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Culture and heritage	Direct impact to heritage features	Consult with Traditional Owners and sites custodians through the ILUA and AAPA Authority Certificate processes to identify Sacred Sites and culturally significant landscape features and determine the most appropriate site protection measures. Avoid direct impacts to recorded heritage features where practicable when finalising the locations of AAPowerLink infrastructure and temporary construction works areas.	Prepare Cultural Heritage Management Plan/s (CHMP) in consultation with Traditional Owners and the NT Heritage Branch. Comply with conditions of Authority Certificates and ensure conditions are made available to all authorised personnel. Where impacts to archaeological heritage features are unavoidable, obtain an approval to carry out work on a heritage place or object (work) under the Heritage Act. Mitigation works on heritage features covered by Works Approvals will be undertaken ahead of commencing site preparation activities. Workforce training and inductions will address all aspects of cultural awareness and heritage protection.	Unlikely					High	None	Visual inspection of OHTL corridor and access tracks for signs of unauthorised access. Provision of reporting processes for landholders and community to report unauthorised use of AAPowerLink access tracks. Visual inspections of disturbed areas and erosion and sediment controls as per ESCP (after significant rainfall events, at a minimum). Visual inspection of recorded heritage features adjacent to proposal footprint for signs of disturbance.	Internal reporting on environmental performance. External reporting in accordance with conditions of environmental approvals and permits.	<i>Not assessed as no heritage features recorded in direct disturbance footprint – no direct impact.</i> Certainty: Heritage surveys undertaken (Appendix W)
Culture and heritage	Indirect impact to heritage features	Restrict unauthorised public access along AAPowerLink access tracks and roads. Design criteria for engineered stormwater management systems and roads to maintain flows similar to pre-development conditions to avoid indirect impacts to heritage features associated with watercourses and swamps. Develop and implement site-specific Erosion and Sediment Control Plans (ESCPs) to minimise erosion and off-site sedimentation that could smother heritage features. Implement dust control measures to minimise dust deposition into surrounds surrounding the proposal footprint where heritage features are present.	Rectify emerging issues associated with unauthorised access, alteration of flows, erosion and sedimentation, water quality and dust, to minimise potential for indirect impacts to heritage features.	Possible	Limited	Permanent	Minor	High	High	Minor	Provision of reporting processes for landholders and community to report unauthorised use of AAPowerLink access tracks. Visual inspection of discharge points and monitoring of water levels and water quality in seasonal swamp at Darwin Converter Site monthly during the wet season. Visual inspections of disturbed areas and erosion and sediment controls as per ESCP (after significant rainfall events, at a minimum). Visual inspection of recorded heritage features adjacent to proposal footprint for signs of disturbance.	Internal reporting on environmental performance. External reporting in accordance with conditions of environmental approvals and permits.	Likelihood: Construction activities could create deposited dust and erosion and sedimentation impacts. Scale: Impacts will be mitigated and therefore limited to within several hundred metres of footprint. Duration: Heritage features disturbed during construction could be permanently impacted. Magnitude: Some loss of site integrity could occur but sites unlikely to be destroyed. Values: Landscape is culturally significant and contains heritage features both inside and outside footprint. Certainty: Sedimentation and dust deposition will affect small areas – see Chapter 5 & 11. Routine mitigation measures are proven effective for minimising offsite impacts.

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Culture and heritage	Direct or indirect impact to undetected heritage features	Use archaeological predictive models developed through the HIAs to identify Heritage Risk Areas where clearance survey is required. Undertake clearance surveys in all Heritage Risk Areas to inform final site/route selection and heritage mitigation measures.	CHMPs will provide measures for managing the inadvertent discovery of heritage features. Consultation with NT Heritage Branch to determine appropriate response. Where further impacts to archaeological heritage features are unavoidable, obtain an approval to carry out work on a heritage place or object (work) under the Heritage Act. Workforce training and inductions will address all aspects of cultural awareness and heritage protection.	Possible	Limited	Permanent	Minor	Low	Low	Minor	Monitoring of site protection or mitigation works by a qualified heritage practitioner.	Internal reporting on environmental performance. External reporting in accordance with conditions of environmental approvals and permits. Reporting of incidents and unexpected finds to Traditional Owners/AAPA/NLC and NT Heritage Branch. Reporting outcomes of site protection and mitigation works to Traditional Owners/AAPA/NLC and NT Heritage Branch.	<p>Likelihood: Heritage surveys undertaken by Earth Sea Heritage (2020). Some undetected archaeological features may remain.</p> <p>Scale: Predictive models indicate sites will be limited to along watercourses and on swamp margins.</p> <p>Duration: Heritage features disturbed during construction could be permanently impacted.</p> <p>Magnitude: Undetected sites are generally unlikely to be of high significance due to the level of survey effort undertaken. Loss of low significance sites will not affect heritage value of landscape.</p> <p>Values: Undetected sites are generally unlikely to be of high significance due to the level of survey effort. Medium rating assigned due to potential for burials in dunes crossed by Cable Transition Facilities.</p> <p>Certainty: The heritage surveys and AAPA Authority Certificate process will identify most heritage features present in the footprint, but there remains a risk of undetected or subsurface features.</p>
Human Health	Exposure to EMF	HVAC cables at Solar Precinct and Darwin Converter Site emit low level EMF that does not pose a risk to human health.	Subsea and underground cables design includes lead sheathing and armoured cores which further prevents electric fields from entering the surrounding environment.	Unlikely						None	-	-	<i>Not assessed as impact unlikely to occur. No construction activities predicted to create EMF exposures.</i>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Human Health	Increase in Biting Insects	<p>Construction camps will be adequately insect screened. Locations for OHTL fly camps will be selected to be as far as possible away from significant mosquito breeding habitats i.e. watercourses and wetlands that retain water during the dry season.</p> <p>Darwin Converter Site workforce will be accommodated in Darwin, not on site.</p> <p>Drains and culverts designed to prevent upstream flooding and be free draining, retaining water for a period of maximum 5 days. Water tanks will be screened to prevent entry of mosquitoes. Landfill will comply with the Guidelines for Siting, Design and Management of Solid Waste Disposal Sites in the Northern Territory 2003.</p> <p>Materials arriving from overseas at Darwin Port are subject to quarantine inspections and treatment.</p>	<p>Workforce education and induction on the use of appropriate PPE, bite prevention and treatment methods. Inspection and removal of any artificial mosquito breeding habitats (see below). Implementation of mosquito control methods, such as residual insecticides and larvicides in accordance with advice from Department of Health.</p> <p>Containers capable of holding water stored undercover and/or emptied on a weekly basis during construction.</p> <p>Post-construction reinstatement activities to remove impediments to surface water drainage such as stockpiles, low points, wheel ruts etc.</p> <p>Stormwater drains, culverts and sediment basins maintained free from sediment build up and vegetation growth.</p> <p>Landfill and wastewater management systems maintained to prevent water ponding and pooling.</p> <p>Inspection of imported materials, equipment and plant for pests on arrival at works areas.</p> <p>Treat any pest species detected in accordance with advice from NT Medical Entomology branch</p>	Possible	Limited	Medium-term	Minor	Low	High	Minor	<p>Visual inspections for the presence of ponding/pooling water and mosquito larvae. Report/complaints from workers.</p> <p>Visual inspections of all infrastructure for ponding/pooling of water. Rectification works if required.</p> <p>Visual inspections for the presence of mosquito larvae and other non-native species.</p>	<p>Incident reporting in the event a worker requires treatment or becomes ill from exposure to biting insect bites or disease. Internal inspection records.</p> <p>Notify NT Medical Entomology branch in the event a pest species is detected.</p>	<p>Likelihood: Construction activities could create biting insect breeding habitat.</p> <p>Scale: Less than 10ha in the immediate proximity of activities.</p> <p>Duration: Impact occurs intermittently during construction.</p> <p>Magnitude: No dry season flows or discharges, which are most typically responsible for creating biting insect breeding habitat.</p> <p>Value: No community receptors within area of influence. On site workers only.</p> <p>Certainty: High level of confidence in assessment and mitigation.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Human Health	Increase in communicable disease	<p>Compliance with all federal (Australian Government Department of Health), state (Northern Territory Government Health), and local requirements set out for COVID 19 health measures, as well as guidelines set out by the World Health Organization (WHO).</p> <p>Practices to minimize the risk of COVID 19 infection while living in camps include washing hands, wearing masks while in common areas where physical distancing is not possible, and avoiding touching one's eyes, nose, and mouth without properly cleaning hands first.</p> <p>No guests will be allowed in the camps, and all camps will be equipped with readily available PPE, including hand soap, sanitizer, face masks, disinfectant wipes, over the counter medicines, thermometers, and rapid COVID 19 antigen tests.</p> <p>Workers will be required to be fully vaccinated.</p> <p>14 days prior to moving into the camp, it will be recommended that workers avoid large gatherings, wear masks in public spaces and where physical distancing is not possible, avoid being near people who are sick, and wash their hands.</p>	<p>If any worker exhibits cold or flu like symptoms, immediately notify a Construction Supervisor. The individual must, if possible, evacuate the camp to a hotel for a minimum of five days or until symptoms improve, or self-isolate away from other workers.</p>	Possible	Regional	Medium-term	Minor	High	Low	Moderate	-	-	<p>Likelihood: Camp living arrangements and worker interactions with communities could increase communicable disease transmission.</p> <p>Scale: Impacts nearby communities.</p> <p>Duration: Impacts could occur over several years during construction.</p> <p>Magnitude: Minor increase in communicable disease predicted; mitigation measures expected to reduce magnitude of risk.</p> <p>Value: Nearby communities could experience increased communicable disease transmission with could add stress to local health care provision.</p> <p>Certainty: Unpredictable nature of COVID-19 and other communicable diseases.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Human Health	Exposure to air emissions of particulate matter (PM10, PM2.5) and Nitrogen Oxide (NOx)	Whenever possible, plan haul routes to avoid residential areas. Efficient staging and layout of construction facilities to minimize haulage, avoid double handling of materials and other excessive equipment operations. Use grid or solar power whenever practical over stationary combustion generated power. Prohibit open burning of any materials.	NOx emissions will be minimised by using electric vehicles and equipment where practicable, and ensuring all machinery, plant and equipment complies with minimum emissions standards. Implement anti-idling policy. Operate equipment at optimum rated loads as determined by equipment manufacturer and follow routine equipment maintenance procedures. Ensure all heavy duty on-road and non-road vehicles are late model and meet all commonwealth and NT emission standards. Ensure all equipment brought to site is in good working order accompanied by inspection certificates and not exceeding 10% opacity. Position stationary emission sources such as generators away from sensitive receptors with due regard to safety, security, traffic and other geographic restrictions.	Possible	Localised	Medium-term	Minor	Medium	High	Minor	Conduct visual inspections for opacity from vehicle/equipment emissions.		<p>Likelihood: PM2.5 and NO2 pollutants decrease rapidly outside construction site boundary and are unlikely to be at levels that cause health effects outside of the site. Scale: PM10 could exceed criteria up to 2km (annual) and 3.5km (daily) from site boundary. Duration: Impacts will occur over several years during construction. Magnitude: Emissions are likely to exceed natural variability with no mitigation. Mitigation measures expected to reduce the magnitude of this risk. Value: People frequent areas where air quality criteria are predicted to be exceeded. Certainty: Atmospheric dispersion modelling undertaken (Appendix U). Understanding of construction activities, and mitigation measures.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Human Health	Exposure to noise emissions	<p>Whenever possible, schedule work that creates the most noise during the NT EPA prescribed acceptable construction times (Monday to Saturday 7am to 7pm and between 9am and 6pm Sundays or public holidays). However, justification of work outside the NT EPA construction times may be needed if it is not possible to work within these times.</p> <p>Locate site access roads, laydown areas and stationary equipment (e.g., generators) as far away as possible from sensitive receivers;</p> <p>Whenever possible, plan haul routes to avoid residential areas;</p> <p>Maintain access routes to avoid the formation of potholes.</p> <p>Design access roads and laydown areas to minimize reversing of trucks/equipment;</p> <p>Use broadband back-up alarms to extent possible;</p> <p>Do not use engine brakes unless necessary;</p> <p>Maintain equipment as per manufacturer's instructions;</p> <p>Keep engines covers closed;</p> <p>Dampen tailgates to avoid banging;</p> <p>Avoid dropping loads into dump trucks from heights;</p> <p>Limit the use of diesel generators by drawing power from the existing hydro grid.</p>	<p>Where practical, machines shall be operated at low speeds and power and turned off instead of left idling for prolonged periods when not in use;</p> <p>Install temporary noise enclosures in areas of prolonged high noise activities.</p> <p>Notify the local community within the Study Area of the construction activities, especially if overnight construction is required. Notifications should include the location, extent, and duration of construction activities.</p>	Unlikely					High	None			<p><i>Not assessed as impact is unlikely to occur. No sensitive receptors are within predicted screening distance.</i></p> <p>Certainty: High confidence in noise screening assessment.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Terrestrial environmental quality	Erosion and topsoil migration caused by disturbance of soils	Site placed away from watercourses.	Implementation of site-specific ESCP (Appendix X), which will be commensurate with the risk of erosion in each location. Reinstatement of Cable Transition Facilities footprints post-construction with native vegetation species and erosion controls.	Likely	Limited	Medium-term	Minor	High	High	Minor	Annual post wet season monitoring of rehabilitation success until disturbed areas stabilised. Visual inspections of drainage structures, discharge points and site boundaries following rain events. Post-wet season inspections of footprint and maintenance of emerging erosion issues.	Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions	<p>Likelihood: Construction works will involve trenching and soil disturbance across the footprint, in an area with very high seasonal rainfall.</p> <p>Scale: Erosion could extend beyond the boundaries of the direct disturbance footprint. However, is predicted to be limited because routine inspection and maintenance activities will rectify emerging issues following each wet season.</p> <p>Duration: Impacts will mainly occur during construction within wet-season but may also occur for a period of time after construction until vegetation re-establishes, and the soils stabilise.</p> <p>Magnitude: Localised erosion is not predicted to have any long-term impact on surrounding land uses or water quality.</p> <p>Values: Land and soils contribute to supporting biodiversity values (shorebirds) and recreational access and use of Gunn Point Beach.</p> <p>Certainty: Erosion hazard assessment and ESCP in accordance with IECA guidelines.</p>
Terrestrial environmental quality	Contamination of soils	Solar used as power source, so no requirement for large fuel storages. Dangerous Goods and Hazardous Substances stored and handled in accordance with regulated standards and codes of practice, and manufacturer's directions.	Dangerous Goods and Hazardous Substances stored and handled in accordance with regulated standards and codes of practice, and manufacturer's directions. Spill response procedures and equipment provided at all storage and handling locations. Construction and operations personnel trained in spill response.	Possible	Limited	Short-term	Minor	High	High	Minor	Routine visual inspections around storage locations and work areas.	Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions	<p>Likelihood: Storage and handling of fuels, oils/lubricants/chemicals for use in construction at various locations across footprint. Spills and leaks could occur.</p> <p>Scale: Minor spills/leaks could occur but will be detected and remediated with no offsite impact. Contamination will be limited to small area around site of spill.</p> <p>Duration: Spills will occur intermittently. Spills will be detected and remediated immediately.</p> <p>Magnitude: Contaminants will not be detected in soils within or surrounding the site due to small volumes and mitigation measures.</p> <p>Values: No land use or environmental values that are sensitive to soil contamination. No surface watercourses present and groundwater is deep.</p> <p>Certainty: Australian Standards are established and proven effective for mitigating risk.</p>
Terrestrial environmental quality	Acid sulfate soils disturbance	Nil	Development and implementation of an ASSMP if ASS is present on site. ASS managed in line with guidelines.	Possible	Limited	Short-term	Minor	Medium	High	Minor	Visual inspections and testing of any confirmed ASS in line with National Acid Sulfate Soils Guidance material.	Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions	<p>Likelihood: High probability PASS is present within disturbance footprint, may be encountered.</p> <p>Scale: PASS may occur across the CTF footprint, but impacts will not spread to the surrounding environment</p> <p>Duration: PASS disturbance could occur for a period of days to weeks</p> <p>Magnitude: Limited short-term contamination will not affect surrounding land uses or environmental values.</p> <p>Values: No land use or environmental values that are sensitive to soil contamination, and soils are common to the Gunn Point region</p> <p>Certainty: Guidelines for identification and management of ASS are established and proven effective</p>
Terrestrial ecosystems	Loss of vegetation and habitat	Site selection has avoided impacts to high value habitats such as watercourses and surveys were undertaken to confirm the absence of Bilby habitat prior to finalising the site boundaries.	Weed hygiene measures and implementation of a Weed Management Plan to contain impacts to within the footprint and avoid impacts to surrounding vegetation and habitats.	Likely	Localised	Medium-term	Minor	Low	High	Minor	Visual inspections during clearing to ensure clearing is within approved boundaries. Results recorded, along with any photographs. Rehabilitation inspections following first wet season post-construction or until vegetation is established and sites are stable.	Records of clearing undertaken. External reporting in accordance with environmental approval conditions	<p>Likelihood: Vegetation clearing required at subset of Darwin Converter Station</p> <p>Scale: Impact will occur across the direct disturbance footprint, with impacts from machinery etc potential extending beyond the boundary of direct footprint</p> <p>Duration: Clearing will be maintained for the entire construction period, with some areas remaining cleared for the 70 year design life of the proposal</p> <p>Magnitude: Impact exceed natural variability, but due to small clearing areas and proposed rehab env values will not be significantly deteriorated.</p> <p>Values: Areas being cleared are common within the Gunn Pt peninsula</p> <p>Certainty: Ecological surveys undertaken in Utilities Corridor section where key values are present.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Terrestrial ecosystems	Loss or deterioration of significant vegetation	Site selection has avoided impacts to high value habitats such as watercourses and surveys were undertaken to confirm the absence of Bilby habitat prior to finalising the site boundaries.	Weed hygiene measures and implementation of a Weed Management Plan to contain impacts to within the footprint and avoid impacts to surrounding vegetation and habitats.	Unlikely					High	None	Visual inspections during clearing to ensure clearing is within approved boundaries. Results recorded, along with any photographs. Rehabilitation inspections following first wet season post-construction or until vegetation is established and sites are stable.	Records of clearing undertaken External reporting in accordance with environmental approval conditions	<i>Not assessed as no significant vegetation in footprint.</i> Certainty: Ecological surveys undertaken. None identified in site surveys.
Terrestrial ecosystems	Impacts to threatened species			Possible						None			<i>Assessment of impacts to listed threatened and migratory species was undertaken with reference to the EPBC Significant Impact Guidelines 1.1 (DEWHA 2013) and EPBC Act Policy Statement 3.21 – Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species (DOE 2015).</i>
Terrestrial ecosystems	Impacts to migratory shorebirds			Possible						None			<i>Assessment of impacts to listed threatened and migratory species was undertaken with reference to the EPBC Significant Impact Guidelines 1.1 (DEWHA 2013) and EPBC Act Policy Statement 3.21 – Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species (DOE 2015).</i>
Terrestrial ecosystems	Degradation of flora and vegetation in surrounding areas			Possible	Limited	Short-term	Minor	Medium	High	Minor			Likelihood: Dust deposition could affect vegetation around footprint. Scale: Deposited dust is modelled to affect an area of approximately 100-380m from footprint (see Chapter 11 Air Quality). Duration: Dust will only be an issue during construction and will be washed off vegetation each wet season. Magnitude: Short-term dust deposition is unlikely to harm vegetation. Values: Riparian vegetation along access roads and watercourses could be sensitive to dust. Certainty: Extent of dust deposition modelled (see Chapter 11 Air Quality). Mitigation measures are routine and proven effective.
Terrestrial ecosystems	Introduction and spread of weeds and pests	Weed hygiene measures will be implemented for construction plant and equipment. Borrow areas will be inspected for weeds and weed contaminated materials will not be brought to site. All project activities will comply with the Weed Management Act which states it is an offence to transport weeds.	A Weed Management Plan will be implemented. Weed inspections and control will be undertaken for the duration of construction and operations to limit the spread of weeds.	Likely	Localised	Permanent	Moderate	Medium	High	Moderate	As per the Weed Management Plan (Appendix Q)	As per the Weed Management Plan (Appendix Q)	Likelihood: Weeds are present in the footprint and likely to be spread on vehicles, plant and equipment, and in imported borrow materials, as commonly occurs on construction projects. Scale: As the site will be developed, any weed infestation likely to be localised to site boundaries and access roads where disturbance occurs during construction but no infrastructure is built. Duration: Experience shows that if weeds are introduced they are very difficult to eradicate and therefore will be permanent and require ongoing control to limit spread and impacts. Magnitude: Because the area currently has limited weeds, any new weeds introduced will represent a change to the weed profile and risk for the area. Values: No weeds were observed in the footprint during Ecology surveys (Refer Solar Precinct Ecology Report EcOz, 2021). The habitats present do not support any significant vegetation or species. Certainty: Potential impacts are well understood from other projects and Weed MP will reduce risk to ALARP.
Terrestrial ecosystems	Changes in fire regimes	Observe fire bans	Develop and implement a Bushfire Management Plan, including first response capability.	Possible	Localised	Short-term	Minor	Medium	High	Minor	Visual monitoring for fires Monitoring NAFI website for proximate fires which may impact proposal. Monitoring conditions for fire risk.	Any fires reported to Bushfires NT or appropriate authority.	Likelihood: Construction activities could start bushfires but individual fire events would not alter fire regimes. Scale: Bushfire response plans will be in place to limit the extent of area burnt. Duration: Impact could occur occasionally during construction. Magnitude: Vegetation is resilient to occasional fire. Values: Sensitive values present in footprint are riparian, sand sheet heath and rainforest, and the Black Jungle Reserve.

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
													Certainty: Bushfire risks well understood and bushfire response will reduce risk to ALARP.
Terrestrial ecosystems	Direct fauna mortality during land clearing and trenching	Pre-clearing inspections undertaken to identify and relocate any fauna that are at risk i.e. nests and burrows. Avoiding clearing large hollow-bearing trees where possible.	Clearing will be conducted in a single direction, allowing any fauna to move out of way of clearing activities. If fauna is spotted in immediate clearing area and are in danger, clearing will be stopped until safe to continue. Clearing in a progressive manner to allow wildlife to natural disperse from the area as clearing undertaken. Site inductions will ensure that all personnel are aware of their obligations and know the correct procedures for fauna encounters. Vehicle speed restrictions apply when travelling near uncleared areas or in higher risk conditions.	Possible	Limited	Short-term	Minor	Low	High	Minor	Record any fauna encounters, injuries or death as result of works for the duration of works. Incidental observations of carcasses, including during routine infrastructure inspections	Internal record keeping of incidents of fauna mortality. External reporting in accordance with environmental approval conditions	Likelihood: Individual fauna deaths may occur during land clearing and along access routes. Scale: Deaths will be isolated occurrences. There are no non-mobile fauna populations present that would be at higher risk of large numbers of mortalities. Mobile fauna will avoid construction activities and move into surrounding habitats. Duration: Mortalities will mainly occur when large earthmoving equipment is being operated in the land clearing phase and when there is a high volume of construction traffic movements along access roads, which will occur over 4 years. Magnitude: Isolated occurrences of fauna mortality will not affect the viability of fauna populations. Values: No nesting or roosting habitats identified. No threatened species present. Certainty: Potential impacts are well understood from other projects. Mitigation measures are routine and will reduce risk to ALARP.
Terrestrial ecosystems	Habitat degradation and fragmentation	The OHTL will fragment habitat; the majority of the OHTL route has been located in the railway corridor where habitat fragmentation has already occurred.	Reinstatement of all temporary construction footprints and follow-up weed control post-construction.	Unlikely					High	None	Nil	External reporting in accordance with environmental approval conditions	Certainty: Ecological surveys undertaken
Terrestrial ecosystems	Changes to fauna behaviours due to noise, light and other disturbances	Waste management procedures to avoid attracting fauna to waste disposal areas.		Possible	Limited	Medium-term	Minor	Low	High	Minor			Likelihood: Construction activities will be noisy and lighting will be in place across the site. Fauna are likely to alter their behaviours to avoid noisy construction activities, but could be attracted to light and areas where food wastes are stored. Scale: Impact will not occur across the footprint at once, but will be isolated to where activity is taking place. Duration: Impact will occur over the 4 year construction phase. Fauna will move back in to habitats surrounding the footprint once operational. Magnitude: Change to level of fauna activity may occur but will not affect the viability of fauna populations. Values: No threatened species present, or important populations identified in footprint that would be susceptible to disturbance i.e. no nesting or roosting habitat present. Certainty: Potential impacts are well understood from other projects. Mitigation measures are routine and proven effective
Terrestrial ecosystems	Loss of habitat from erosion			Unlikely					High	None			<i>Not assessed. The residual impact associated with erosion was assessed as low (see Chapter 4 Terrestrial Environmental Quality). This level of impact would not cause loss of habitat.</i> Certainty: Erosion hazard assessed in accord with accepted guidelines.
Terrestrial ecosystems	Loss of habitat from disturbance of acid sulfate soils			Unlikely					High	None			<i>Not assessed. The residual impact associated with ASS was assessed as low (see Chapter 4 Terrestrial Environmental Quality). This level of impact would not cause loss of habitat.</i> Certainty: ASS risk assessed and managed in accord with accepted guidelines.
Terrestrial ecosystems	Degradation of habitats by contamination and pollution			Unlikely					High	None			<i>Not assessed. The residual impact associated with contamination and pollution was assessed as low (see Chapter 4 Terrestrial Environmental Quality). This level of impact would not cause degradation or loss of habitat.</i>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
													Certainty: Mitigation measures for spill prevention and response are routine and proven effective.
Hydrological processes	Alteration to surface water flows in water courses or wetlands	Roadside drainage and culverts will be designed and installed in accordance with accepted Austroads standards. Groundwater used as water supply – no surface water extraction.	Watercourse crossings along access roads and OHTL installed during the dry season when no flow present. Drainage, erosion and sediment controls installed and maintained in accordance with Erosion and Sediment Control Plans (ESCP) that align with the Best Practice Erosion and Sediment Control Guidelines (IECA, 2008). Reinstatement of OHTL construction corridor and Cable Transition Facilities footprints post-construction.	Unlikely	Limited	Short-term	Negligible	Low	High	Minor	During construction, visual inspections of disturbed areas and erosion and sediment controls as per ESCP (after significant rainfall events, at a minimum). Annual post wet season monitoring of revegetation success until disturbed areas are stabilised. Visual inspections of drainage structures, discharge points and site boundaries following rain events. Post-wet season inspections of all project locations and rectification of emerging erosion issues.	Internal records of ESCP inspections, as stipulated in ESCP's. Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions.	Likelihood: Footprint is small; there are no watercourses present and the area is outside of storm surge zone. Scale: Flows may be altered in direct disturbance footprint. Duration: Construction activities will take place over a single dry season and footprint will be reinstated. Magnitude: No alteration of flows in watercourses as none present. Values: No watercourses supported by flows from Cable Transition Facilities Certainty: -
Hydrological processes	Changes to ground water levels caused by groundwater extraction	Groundwater extraction sites will be located away from existing groundwater bores in use.	Bore locations and sustainable yields to be determined subject to investigation and recommendations from a hydrogeologist. Bore work permits and water extraction licences obtained under the Water Act.	Unlikely					High	None	Monitoring of standing water levels and water extraction volumes, as required under water extraction licence conditions. Water quality sampling and analysis of springs near Solar Precinct and aquifer targeted for groundwater extraction to ensure there is no connectivity.	Internal records of water usage and water extraction. External reporting of water extraction in accordance with water extraction licence and environmental approval conditions.	<i>Not assessed</i> Certainty: Construction water to be supplied from bore at Darwin Converter Site. No groundwater extraction directly associated with Cable Transition Facilities.
Inland water environmental quality	Increased turbidity caused by soil disturbance and erosion	Progressive clearing, construction and reinstatement will be undertaken. OHTL poles will not be placed in watercourses or drainage lines. Only minor drainage lines will be crossed by the OHTL access track. Major drainages will be approached from either side to avoid the need for constructing crossings. Stormwater drainage will be installed to capture and manage runoff. Stormwater captured within facilities will discharge to land, via erosion and sediment controls. Roadside drainage and culverts	Watercourse crossings along access roads and OHTL will be installed during the dry season when no flow present. Drainage, erosion and sediment controls will be installed and maintained in accordance with Erosion and Sediment Control Plans (ESCP) that align with the Best Practice Erosion and Sediment Control Guidelines (IECA, 2008). Develop and implement a Reinstatement Plan for post-construction reinstatement of works areas to stabilise soils and promote regrowth of native vegetation.	Unlikely	Limited	Short-term	Negligible	Low	High	Minor	During construction, visual inspections will be undertaken of disturbed areas and erosion and sediment controls as per ESCP (after significant rainfall events, at a minimum). Annual post wet season monitoring of reinstatement success until disturbed areas are stabilised. Visual inspections of drainage structures, discharge points and site boundaries following rain events.	Internal records of ESCP inspections, as stipulated in ESCP's. Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions.	Likelihood: Footprint is small, there are no watercourses present and the area is outside of storm surge zone. Scale: Any runoff from the footprint could be turbid but would be discharged to vegetated area in immediate surrounds. Duration: Construction activities will take place over a single dry season. Magnitude: Lack of watercourses mean water quality impacts are negligible. Value: No watercourses or surface water features within area of influence. Certainty: Works will be undertaken over a single dry season, footprint will be reinstated, and controls as per ESCP in accordance with IECA guidelines.

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
		will be installed in accordance with Austroads standards.	Rectification of emerging erosion issues after each wet season.								Post-wet season inspections of all project locations and rectification of emerging erosion issues.		
Inland water environmental quality	Contamination by release of fuels and chemicals	During operations, solar power will be used as a power source, hence no requirement for bulk fuel storages. Dangerous Goods and Hazardous Substances will be stored and handled in accordance with regulated standards and codes of practice, and manufacturer's directions. Dangerous Goods and Hazardous Substances will not be stored within 200m of a watercourse or groundwater bore, and mobile refuelling will not occur within 50m of a watercourse or groundwater bore.	Dangerous Goods and Hazardous Substances Registers will be maintained at all storage and handling locations. An Environmental Emergency and Spill Response Plan will be in place and equipment provided at all storage and handling locations. Construction and operations staff will be trained in spill response.	Unlikely	Limited	Short-term	Negligible	High	High	Minor	Routine visual inspections around storage locations and work areas.	Internal records of volumes used and stored in accordance with Workplace Health and Safety Regulations. Internal inspection records and notes. Internal records of water quality monitoring. Incidents of off-site pollution or nuisance reported to the NT EPA within 24 hours	Likelihood: Small volumes of fuels and hazardous substances will be stored and used. Scale: Spills may occur but storage and handling procedures mean a spill will be limited to ground around spill and will not enter a watercourse or groundwater aquifer. Duration: Spills to ground will occur intermittently. Spills will be detected and remediated immediately. Magnitude: No change in water quality as a result of spills. Values: Water quality in watercourses and groundwater is sensitive to contamination and supports numerous beneficial uses. Certainty: Australian Standards are established and proven effective for mitigating risk. No underground storage, or storage within 200 m of a watercourse.
Inland water environmental quality	Contamination from waste storage and disposal areas	Landfill will comply with the Guidelines for Siting, Design and Management of Solid Waste Disposal Sites in the Northern Territory (NT EPA 2003). No waste will be stored within 200m of a watercourse.	Waste management will be in accordance with best practice guidelines (e.g. separation of waste, covering, bunded storage areas), and the requirements of the Waste Management and Pollution Control Act 1998. All listed waste will be disposed of at a licenced waste management facility.	Unlikely	Limited	Long-term	Negligible	Low	High	Minor	Routine visual inspections around landfill, waste storage locations and work areas.	Internal records of inspections. Incident reporting	Likelihood: Inert and putrescible waste will be disposed of onsite at Solar Precinct. All other waste will be temporarily stored and disposed at a licenced facility. Scale: Any contamination from waste storage and disposal will be limited to soil in immediate surrounds. Duration: Waste will be stored at Darwin Converter Site, and stored and disposed at Solar Precinct for construction and operation phases. Short term storage within OHTL. Magnitude: No change in water quality as a result of waste storage and disposal. Values: No watercourses or groundwater proximate to waste storage and disposal areas. Certainty: Compliance with NT guidelines and regulations proven effective for mitigating risk.
Inland water environmental quality	Contamination by sewage from camps and ablutions	Onsite wastewater management systems to be designed and installed by suitably qualified person, in accordance with NT Code of Practice for Onsite Wastewater Management, plus other relevant standards and guidelines. System to be designed for projected wastewater loads, and appropriate for applicable climate.	Any issues identified with wastewater management system to be rectified by suitably licenced person.	Unlikely	Limited	Long-term	Negligible	Medium	High	Minor	Routine inspection and maintenance of wastewater management systems and land application areas, in accordance with the NT Code of Practice for Onsite Wastewater Management.	Internal records of maintenance works undertaken. Relevant notifications/applications and reporting to NT Department of Health, or DIPL.	Likelihood: Onsite wastewater management systems will be established at the Solar Precinct, along the OHTL at fly camps, and at the Darwin Converter Site. Scale: Wastewater will be treated and disposed of to land in a controlled and spatially limited area. Duration: Wastewater management systems will be used for construction and operation phases at Solar Precinct and Darwin Converter Site but will be temporary at OHTL fly camps. Magnitude: No change in water quality as a result of wastewater management. Value: Some watercourses or shallow groundwater may be proximate to Darwin Converter Site and OHTL systems, which support numerous beneficial uses. Certainty: Compliance with NT guidelines and regulations proven effective for mitigating risk.
Aquatic ecosystems	Direct loss of aquatic habitat	None required	None required	Unlikely					High	None	Monitoring during clearing to ensure clearing remains within approved boundaries, and at approved watercourse crossing locations.	Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions.	<i>Not assessed as impact is inherently unlikely to occur.</i> Certainty: No watercourses or aquatic ecosystems present in direct disturbance footprint.

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Aquatic ecosystems	Reduction in aquatic habitat value due to water quality impacts	None required	None required	Unlikely					High	None	None required	None required	<i>Not assessed as impact is inherently unlikely to occur.</i> Certainty: No aquatic habitats present in zone of influence
Aquatic ecosystems	Reduction in aquatic habitat value due to altered hydrology or groundwater extraction	None required	None required	Unlikely					High	None	None required	Internal reporting on environmental performance. Internal records of water usage and water extraction. External reporting of water extraction in accordance with water extraction licence and environmental approval conditions.	<i>Not assessed as impact is inherently unlikely to occur.</i> Certainty: No aquatic habitats present in zone of influence
Aquatic ecosystems	Reduction in aquatic habitat value due to dust	None required	None required	Unlikely					High	None	None required	Internal reporting on environmental performance	<i>Not assessed as impact is inherently unlikely to occur.</i> Certainty: No aquatic habitats present in zone of influence
Marine environmental quality	Sediment mobilisation from Shore Crossing Site impacting water quality	Construction of the Shore Crossing Site will avoid periods of monsoonal conditions, to minimise erosion risk.	Erosion and sediment controls will be installed and maintained in accordance with a site-specific Erosion and Sediment Control Plans (ESCP) that aligns with the Best Practice Erosion and Sediment Control Guidelines (IECA, 2008). Develop and implement a Reinstatement Plan for post-construction reinstatement of works areas to promote recolonisation of shore and benthic habitats.	Likely	Localised	Short-term	Moderate	Medium	High	Minor	During construction and post construction, visual inspections will be undertaken of the works area and surrounding marine waters until all areas are reinstated.	Internal records of inspections.	Likelihood: Shore crossing will include trenching and disturbance of sediments in intertidal area. Scale: SSC may be elevated in intertidal area and may spread along the coastline for several hundred metres. Duration: Mobilisation of sediment may occur intermittently over short construction phase (one month). Magnitude: Water quality objective exceeded for short periods but unlikely to affect marine habitats or biota adapted to high turbidity conditions. Value: Water quality supports marine ecosystems, including seagrass, seaweed and hard coral, and beneficial uses. Certainty: Footprint is small and will be reinstated post construction. Disturbance will occur for a short period of time.
Marine environmental quality	Spills of hazardous substances impacting water quality	Besides marine fuel oil, no HAZMAT materials will be used on vessels during construction. Any HAZMAT stored at Land Sea Joint Station will be >300 m from beach and on bunded storages.	Compliance with MARPOL requirements regarding refuelling and spill prevention. Fuels and hazardous chemicals will be stored and handled in accordance with Australian standards and guidelines An Environmental Emergency and Spill Response Plan will be in place and equipment provided at all storage and handling locations. Construction and operations staff will be trained in spill response.	Possible	Limited	Short-term	Negligible	Low	High	Minor	Visual inspections of land-based storages and during refuelling activities for early spill detection. In the event of a significant spill, water quality monitoring.	Internal records of volumes used and stored in accordance with Workplace Health and Safety Regulations. Internal inspection records Internal incident reporting.	Likelihood: Temporary storages of fuel and other substances will be located at the Land Sea Joint Station. Scale: Spills may occur but storage and handling procedures mean a spill will be limited to ground around spill and will not enter marine water. Duration: Spills to ground will occur intermittently. Spills will be detected and remediated immediately. Magnitude: No impact to marine water quality. Value: Land Sea Joint Station is >300 m from beach and no marine environments within the footprint. Certainty: Australian Standards for storage and handling are established and proven effective for mitigating risk.

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Marine environmental quality	Disturbance of Potential Acid Sulfate Soils at Shore Crossing Site	Sampling and assessment prior to construction to delineate PASS area.	Development and implementation of an Acid Sulfate Soils Management Plan (if required). Management of PASS in accordance with National Acid Sulfate Soils Guidance.	Possible	Limited	Short-term	Minor	Medium	High	Minor	Visual inspections during excavation to assess for PASS in disturbed soils. Sampling and assessment of treated ASS in accordance with National Acid Sulfate Soils Guidance.	Internal records of PASS testing and management actions.	<p>Likelihood: Ground disturbance for the shore crossing may disturb PASS.</p> <p>Scale: Footprint is small and period of exposure for PASS would be limited to weeks. Significant acid generation unlikely in that time, and impacts limited to immediate vicinity.</p> <p>Duration: Construction will occur over one month with water quality returning to baseline post construction.</p> <p>Magnitude: Any acidity impacts to water would be minor and rapidly diluted.</p> <p>Value: Water quality supports marine ecosystems, including seagrass, seaweed and hard coral, and beneficial uses.</p> <p>Certainty: Testing and management of PASS in accordance with guidelines is proven effective in mitigating risk of water quality impacts.</p>
Marine ecosystems	Marine habitat and fauna impact due spills of fuels or hazardous chemicals	Any HAZMAT stored at Land Sea Joint Station will be >300 m from beach and on bunded storages.	Compliance with MARPOL requirements regarding refuelling and spill prevention. Fuels and hazardous chemicals will be stored and handled in accordance with Australian standards and guidelines. An Environmental Emergency and Spill Response Plan will be in place and equipment provided at all storage and handling locations. Construction and operations staff will be trained in spill response.	Possible	Limited	Short-term	Minor	Medium	High	Minor	Visual inspections of land-based storages and during refuelling activities for early spill detection. In the event of a significant spill, water quality monitoring.	Internal records of volumes used and stored in accordance with Workplace Health and Safety Regulations. Internal inspection records. Internal incident reporting. Incidents of off-site pollution or nuisance reported to the NT EPA within 24 hours.	<p>Likelihood: Ships and barges are powered by marine fuel oil. Temporary storages of fuel and hazardous chemicals located at the Land Sea Joint Station.</p> <p>Scale: Spills may occur but extent would be limited due to small volumes and spill response measures.</p> <p>Duration: Spill response measures will ensure spills are detected, contained and cleaned up within hours.</p> <p>Magnitude: No detectable change in water quality beyond the direct spill location.</p> <p>Value: Patches of locally important benthic habitats present in footprint and surrounding areas.</p> <p>Certainty: Adherence to Australian Standards and MARPOL are proven effective in mitigating risk of spills to marine environment.</p>
Marine ecosystems	Loss of mangrove vegetation	Impact avoidance measures as per to minimise habitat loss, degradation and direct fauna mortality and spills.	Mitigations as per above to minimise habitat loss, degradation and direct fauna mortality and spills.	Unlikely					High	None	Nil	Nil	<p><i>Identified as a potential impact in the EIS TOR, this was not assessed as there are no mangroves within the proposal footprint, and mangroves located adjacent to the proposal area are unlikely to be impact by proposal activities.</i></p> <p>Certainty: Surveys of footprint have not identified any mangrove vegetation</p>
Air quality	Emissions of PM or NO2 that could affect human health	Whenever possible, plan haul routes to avoid residential areas. Efficient staging and layout of construction facilities to minimize haulage, avoid double handling of materials and other excessive equipment operations. Use grid or solar power whenever practical over stationary combustion generated power. Implement anti-idling policy.	NOx emissions will be minimised by using electric vehicles and equipment where practicable, and ensuring all machinery, plant and equipment complies with minimum emissions standards. Operate equipment at optimum rated loads as determined by equipment manufacturer and follow routine equipment maintenance procedures. Ensure all heavy duty on-road and non-road vehicles are late model and meet all commonwealth and NT emission standards. Ensure all equipment brought to site is in good working order accompanied by inspection certificates and not exceeding 10% opacity. Position stationary emission sources such as generators away from sensitive receptors with due regard to safety, security, traffic	Likely	Localised	Medium-term	Minor	Medium	High	Minor	Conduct visual inspections for opacity from vehicle/equipment emissions. Carry out inspections certifying equipment is in good working order prior to shipping to site.	Reporting will be carried out per the requirements of the CEMP described in Chapter 17. External reporting in accordance with environmental approval conditions.	<p>Likelihood: Construction activities will produce PM and NO2.</p> <p>Scale: Health criteria is predicted to be met within ~370m from activities.</p> <p>Duration: Impacts will occur over months during construction.</p> <p>Magnitude: Emissions are likely to exceed natural variability with no mitigation. Mitigation measures expected to reduce the magnitude of this risk.</p> <p>Values: People frequent areas where air quality criteria are predicted to be exceeded.</p> <p>Certainty: Air quality modelling has been undertaken (see Appendix U).</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
			and other geographic restrictions.										
Air quality	Emissions of particulate matter (TSP and deposited dust) that could affect amenity	Locate site access roads, laydown areas and stationary equipment (e.g., generators) as far away as possible from sensitive receivers Limit the amount of time between completion of road base and any paved areas to minimize exposure of unpaved surface	Water carts will be used across the project footprint to minimise dust emissions in areas of high risk at regular intervals. Other dust suppressants will be used if water ineffective. Implement on-site vehicle restrictions (e.g., limit the speed of vehicles travelling on unsealed access roads). Provide tyre wash facilities to minimize tracking of mud or dirt onto sealed roads Cover or dampen any stockpiles where practical. Notify and engage with residences and businesses who could be affected ahead of the construction front, and implement complaints procedure.	Likely	Localised	Medium-term	Minor	Medium	High	Minor	Visual observations for fugitive emissions of dust Conduct regular inspections of construction areas and roads to identify potential sources of dust emissions Develop 'watching brief' on 'nuisance' impacts to ensure quick responses to any detriment and emerging issues. Implement complaints procedure	Reporting will be carried out per the requirements of the CEMP described in Chapter 17 External reporting in accordance with environmental approval conditions.	Likelihood: Construction activities will result in dust emissions. Scale: Nuisance criteria predicted to be met within 123 m from activities. Duration: Impacts will occur over months during construction phase. Magnitude: Emissions are likely to exceed natural variability with no mitigation. Mitigation measures expected to reduce the magnitude of this risk. Values: People frequent areas where air quality criteria are predicted to be exceeded. Certainty: Dust deposition modelling has been undertaken (see Appendix U).
Air quality	GHG emissions from combustion of fuel from vessels, plant and equipment for earthworks, air and land travel, logistics and power generation	Continue to identify and engage in opportunities to maximise commercially viable carbon abatement from the AAPowerLink, including: • Pursuing power purchase agreements with large fossil fuel power generators in the NT. • Conduct a life-cycle assessment during the design phase to quantify GHG emissions including embodied, direct and indirect emissions and demonstrate that the AAPowerLink is a carbon positive project • Supply AAPowerLink construction and operational power needs via self-generated solar energy where practicable. • Where the use of self-generated solar energy is not possible, source renewable energy via market mechanisms (if available). • Identify and (where practicable) adopt practical zero carbon technology solutions such as electric vehicles, plant and equipment and remote solar energy systems. • Explore practicable opportunities with NT Carbon Capture Utilisation and Storage Project	Develop and implement a GHG Abatement and Management Plan that aligns with ISO 140001 Environmental Management Systems and ISO 50001 Energy Management Systems. Conduct GHG mitigation workshops every 2 years during design and construction and every five years during operations to assess performance and identify new opportunities for leveraging best practice and emerging technology. Procurement strategies to consider adoption of carbon reduction and energy efficient technologies (where practicable), including but not limited to: • Electrification options for civil plant, machinery and equipment. • Energy efficiency in aircraft services selection. • Electrification and alternative fuel options for transportation (e.g., marine vessels, rail) Develop vegetation management strategies that aim to retain vegetation and soil carbon Conduct studies to identify and select clearing, fire management, vegetation disposal practices and vegetation species to plant or retain. Develop and implement	Likely	Widespread	Medium-term	Minor	Low	High	Minor	Monitor GHG emissions from activities, as well as energy produced and exported in line with the requirements of NT and Commonwealth law. Data required to calculate GHG emissions will be collected in line with the methods outlined in the National Greenhouse and Energy reporting (Measurement) Determination 2008 Monitor performance against targets set in the GHG Abatement and Management Plan.	Reporting of GHG emissions in line with the requirements of the NGER Act. AAPowerLink will trigger emissions thresholds for reporting during construction and reporting thresholds for energy production during operations. External reporting in accordance with environmental approval conditions under the EP Act.	Likelihood: Equipment requiring fuel combustion will be used where self-generated or renewable energy is not practicable; mainly during construction phase. Scale: Fuel generated GHG from logistics and earthworks from a combined area ~12,900ha Duration: Impact occurs only during the construction phase Magnitude: Relevant criteria for environmental protection are met Value: Most of the footprint is in remote areas. Sensitive receptors are not locally impacted by GHG emissions; project has a net positive GHG impact. Certainty: Acceptable level of certainty pertaining to values and receptors

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
			Rehabilitation Plans that aims to reinstate vegetation post-construction and post-decommissioning										
Atmospheric processes	GHG emissions from land clearing and land use change	Continue to identify and engage in opportunities to maximise commercially viable carbon abatement from the AAPowerLink, including: <ul style="list-style-type: none"> • Pursuing power purchase agreements with large fossil fuel power generators in the NT. • Conduct a life-cycle assessment during the design phase to quantify GHG emissions including embodied, direct and indirect emissions and demonstrate that the AAPowerLink is a carbon positive project • Supply AAPowerLink construction and operational power needs via self-generated solar energy where practicable. • Where the use of self-generated solar energy is not possible, source renewable energy via market mechanisms (if available). • Identify and (where practicable) adopt practical zero carbon technology solutions such as electric vehicles, plant and equipment and remote solar energy systems. • Explore practicable opportunities with NT Carbon Capture Utilisation and Storage Project 	Develop and implement a GHG Abatement and Management Plan that aligns with ISO 140001 Environmental Management Systems and ISO 50001 Energy Management Systems. Conduct GHG mitigation workshops every 2 years during design and construction and every five years during operations to assess performance and identify new opportunities for leveraging best practice and emerging technology. Procurement strategies to consider adoption of carbon reduction and energy efficient technologies (where practicable), including but not limited to: <ul style="list-style-type: none"> • Electrification options for civil plant, machinery and equipment. • Energy efficiency in aircraft services selection. • Electrification and alternative fuel options for transportation (e.g., marine vessels, rail) Develop vegetation management strategies that aim to retain vegetation and soil carbon. Conduct studies to identify and select clearing, fire management, vegetation disposal practices and vegetation species to plant or retain. Develop and implement Rehabilitation Plans that aims to reinstate vegetation post-construction and post-decommissioning	Likely	Widespread	Medium-term	Minor	Low	High	Minor	Monitor GHG emissions from activities, as well as energy produced and exported in line with the requirements of NT and Commonwealth law. Data required to calculate GHG emissions will be collected in line with the methods outlined in the National Greenhouse and Energy reporting (Measurement) Determination 2008. Monitor performance against targets set in the GHG Abatement and Management Plan.	Reporting of GHG emissions in line with the requirements of the NGER Act. AAPowerLink will trigger emissions thresholds for reporting during construction and reporting thresholds for energy production during operations. External reporting in accordance with environmental approval conditions under the EP Act.	<p>Likelihood: Land clearing and land use change is to take place</p> <p>Scale: Land clearing on a combined area ~12,900ha</p> <p>Duration: Impact occurs only during the construction phase</p> <p>Magnitude: Relevant criteria for environmental protection are met</p> <p>Values: Most of the footprint is in remote areas. Sensitive receptors are not locally impacted by GHG emissions; project has a net positive GHG impact.</p> <p>Certainty: Acceptable level of certainty pertaining to values and receptors</p>
Culture and heritage	Direct impact to heritage features	Consult with Traditional Owners and sites custodians through the ILUA and AAPA Authority Certificate processes to identify Sacred Sites and culturally significant landscape features and determine the most appropriate site protection measures. Avoid direct impacts to recorded heritage features where practicable when finalising the locations of AAPowerLink infrastructure and temporary construction works areas.	Prepare Cultural Heritage Management Plan/s (CHMP) in consultation with Traditional Owners and the NT Heritage Branch. Comply with conditions of Authority Certificates and ensure conditions are made available to all authorised personnel. Where impacts to archaeological heritage features are unavoidable, obtain an approval to carry out work on a heritage place or object (work) under the Heritage Act. Mitigation works on heritage features	Likely	Limited	Permanent	Minor	High	Low	Moderate			<p>Likelihood: Construction will involve ground disturbance in areas where heritage features have been recorded.</p> <p>Scale: Limited to within direct disturbance footprint, which is a 70m wide corridor.</p> <p>Duration: Heritage features disturbed during construction will be permanently impacted.</p> <p>Magnitude: Direct impacts to heritage features of high significance will be avoided during final route selection and pole placement. Other features will be salvaged.</p> <p>Value: There are archaeological sites and sites of Aboriginal Significance recorded in the footprint.</p> <p>Certainty: Heritage surveys undertaken (Appendix W). Site-specific mitigation measures to be determined.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
			covered by Works Approvals will be undertaken ahead of commencing site preparation activities. Workforce training and inductions will address all aspects of cultural awareness and heritage protection.										
Culture and heritage	Indirect impact to heritage features	Restrict unauthorised public access along AAPowerLink access tracks and roads. Design criteria for engineered stormwater management systems and roads to maintain flows similar to pre-development conditions to avoid indirect impacts to heritage features associated with watercourses and swamps. Develop and implement site-specific Erosion and Sediment Control Plans (ESCPs) to minimise erosion and off-site sedimentation that could smother heritage features. Implement dust control measures to minimise dust deposition into surrounds surrounding the proposal footprint where heritage features are present.	Rectify emerging issues associated with unauthorised access, alteration of flows, erosion and sedimentation, water quality and dust, to minimise potential for indirect impacts to heritage features.	Possible	Limited	Permanent	Minor	High	High	Minor			<p>Likelihood: Construction activities could create deposited dust and erosion and sedimentation impacts.</p> <p>Scale: Impacts will be mitigated and therefore limited to within several hundred metres of footprint.</p> <p>Duration: Heritage features disturbed during construction could be permanently impacted.</p> <p>Magnitude: Some loss of site integrity could occur but sites unlikely to be destroyed.</p> <p>Values: Landscape is culturally significant and contains heritage features both inside and outside footprint.</p> <p>Certainty: Sedimentation and dust deposition will affect small areas – see Chapter 5 & 11. Routine mitigation measures are proven effective for minimising offsite impacts.</p>
Culture and heritage	Direct or indirect impact to undetected heritage features	Use archaeological predictive models developed through the HIAs to identify Heritage Risk Areas where clearance survey is required. Undertake clearance surveys in all Heritage Risk Areas to inform final site/route selection and heritage mitigation measures.	CHMPs will provide measures for managing the inadvertent discovery of heritage features. Consultation with NT Heritage Branch to determine appropriate response. Where further impacts to archaeological heritage features are unavoidable, obtain an approval to carry out work on a heritage place or object (work) under the Heritage Act. Workforce training and inductions will address all aspects of cultural awareness and heritage protection.	Possible	Limited	Permanent	Minor	Low	Low	Minor			<p>Likelihood: Heritage surveys undertaken by Earth Sea Heritage (2020). Some undetected archaeological features may remain.</p> <p>Scale: Predictive models indicate sites will be limited to along watercourses and on swamp margins.</p> <p>Duration: Heritage features disturbed during construction could be permanently impacted.</p> <p>Magnitude: Undetected sites are generally unlikely to be of high significance due to the level of survey effort undertaken. Loss of low significance sites will not affect heritage value of landscape.</p> <p>Values: Undetected sites are generally unlikely to be of high significance due to the level of survey effort. Medium rating assigned due to potential for burials in dunes crossed by Cable Transition Facilities.</p> <p>Certainty: The heritage surveys and AAPA Authority Certificate process will identify most heritage features present in the footprint, but there remains a risk of undetected or subsurface features.</p>
Human Health	Exposure to EMF	HVAC cables at Solar Precinct and Darwin Converter Site emit low level EMF that does not pose a risk to human health.	Subsea and underground cables design includes lead sheathing and armoured cores which further prevents electric fields from entering the surrounding environment.	Unlikely						None			Not assessed as impact unlikely to occur. No construction activities predicted to create EMF exposures.
Human Health	Increase in Biting Insects			Unlikely						None			Not assessed as impact is unlikely to occur. Construction activities unlikely to create biting insect breeding habitat.

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Human Health	Increase in communicable disease	<p>Compliance with all federal (Australian Government Department of Health), state (Northern Territory Government Health), and local requirements set out for COVID 19 health measures, as well as guidelines set out by the World Health Organization (WHO).</p> <p>Practices to minimize the risk of COVID 19 infection while living in camps include washing hands, wearing masks while in common areas where physical distancing is not possible, and avoiding touching one's eyes, nose, and mouth without properly cleaning hands first.</p> <p>No guests will be allowed in the camps, and all camps will be equipped with readily available PPE, including hand soap, sanitizer, face masks, disinfectant wipes, over the counter medicines, thermometers, and rapid COVID 19 antigen tests.</p> <p>Workers will be required to be fully vaccinated.</p> <p>14 days prior to moving into the camp, it will be recommended that workers avoid large gatherings, wear masks in public spaces and where physical distancing is not possible, avoid being near people who are sick, and wash their hands.</p>	<p>If any worker exhibits cold or flu like symptoms, immediately notify a Construction Supervisor. The individual must, if possible, evacuate the camp to a hotel for a minimum of five days or until symptoms improve, or self-isolate away from other workers.</p>	Possible	Regional	Medium-term	Minor	High	Low	Moderate	-	-	<p>Likelihood: Camp living arrangements and worker interactions with communities could increase communicable disease transmission.</p> <p>Scale: Impacts nearby communities.</p> <p>Duration: Impacts could occur over several years during construction.</p> <p>Magnitude: Minor increase in communicable disease predicted; mitigation measures expected to reduce magnitude of risk.</p> <p>Value: Nearby communities could experience increased communicable disease transmission with could add stress to local health care provision.</p> <p>Certainty: Unpredictable nature of COVID-19 and other communicable diseases.</p>
Human Health	Exposure to air emissions of particulate matter (PM10, PM2.5) and Nitrogen Oxide (NOx)	<p>Whenever possible, plan haul routes to avoid residential areas. Efficient staging and layout of construction facilities to minimize haulage, avoid double handling of materials and other excessive equipment operations. Use grid or solar power whenever practical over stationary combustion generated power. Prohibit open burning of any materials.</p>	<p>NOx emissions will be minimised by using electric vehicles and equipment where practicable, and ensuring all machinery, plant and equipment complies with minimum emissions standards. Implement anti-idling policy. Operate equipment at optimum rated loads as determined by equipment manufacturer and follow routine equipment maintenance procedures.</p> <p>Ensure all heavy duty on-road and non-road vehicles are late model and meet all commonwealth and NT emission standards.</p> <p>Ensure all equipment brought to site is in good working order accompanied by inspection certificates and not exceeding</p>	Possible	Localised	Medium-term	Minor	Medium	High	Minor	Conduct visual inspections for opacity from vehicle/equipment emissions.		<p>Likelihood: Air emissions likely as a result of land clearing, trenching, and cable burial activities.</p> <p>Scale: Air quality assessment criteria could be exceeded between 48-370 m from the construction activities.</p> <p>Duration: Impacts will occur over months during construction.</p> <p>Magnitude: Emissions are likely to exceed natural variability with no mitigation. Mitigation measures expected to reduce the magnitude of this risk.</p> <p>Value: People frequent areas where air quality criteria are predicted to be exceeded.</p> <p>Certainty: Atmospheric dispersion modelling undertaken (Appendix U). Understanding of construction activities, and mitigation measures.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
			<p>10% opacity.</p> <p>Position stationary emission sources such as generators away from sensitive receptors with due regard to safety, security, traffic and other geographic restrictions.</p>										
Human Health	Exposure to noise emissions	<p>Whenever possible, schedule work that creates the most noise during the NT EPA prescribed acceptable construction times (Monday to Saturday 7am to 7pm and between 9am and 6pm Sundays or public holidays). However, justification of work outside the NT EPA construction times may be needed if it is not possible to work within these times.</p> <p>Locate site access roads, laydown areas and stationary equipment (e.g., generators) as far away as possible from sensitive receivers;</p> <p>Whenever possible, plan haul routes to avoid residential areas;</p> <p>Maintain access routes to avoid the formation of potholes.</p> <p>Design access roads and laydown areas to minimize reversing of trucks/equipment;</p> <p>Use broadband back-up alarms to extent possible;</p> <p>Do not use engine brakes unless necessary;</p> <p>Maintain equipment as per manufacturer’s instructions;</p> <p>Keep engines covers closed;</p> <p>Dampen tailgates to avoid banging;</p> <p>Avoid dropping loads into dump trucks from heights;</p> <p>Limit the use of diesel generators by drawing power from the existing hydro grid.</p>	<p>Where practical, machines shall be operated at low speeds and power and turned off instead of left idling for prolonged periods when not in use;</p> <p>Install temporary noise enclosures in areas of prolonged high noise activities.</p> <p>Notify the local community within the Study Area of the construction activities, especially if overnight construction is required. Notifications should include the location, extent, and duration of construction activities.</p>	Likely	Localised	Medium-term	Moderate	Low	High	Minor			<p>Likelihood: Cable installation and backfilling activities likely to produce noise emissions experienced by local receptors.</p> <p>Scale: Health criteria predicted to be exceeded within 92 m from source activity.</p> <p>Duration: Impacts will occur over months during construction.</p> <p>Magnitude: Emissions will likely exceed natural variability at Gunn Point Beach.</p> <p>Value: NT EPA noise guideline (NTEPA 2018) does not identify recreational beaches (Gunn Point Beach) as a noise sensitive land use.</p> <p>Certainty: High confidence in understanding of construction activities contributing to noise, and effective mitigation.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Marine environmental quality	Increased turbidity in marine waters caused by cable burial activities - nearshore	Corridor selection avoids areas of significant marine habitat as much as possible. Cable burial methods will be selected to suit the local seabed conditions.	Nil	Likely	Widespread	Short-term	Moderate	Medium	High	Moderate	Turbidity monitoring in impact zone and baseline/reference site during cable installation in high-risk area (shallow waters <20m depth).	External reporting in accordance with environmental approval conditions	<p>Likelihood: Cable burial will result in disturbance of sediments and increased suspended sediment concentrations (SSC) in the water column.</p> <p>Scale: Sediment transport modelling indicates elevated SSC could occur over a wide area of shallow waters (up to 26 km x 11 km).</p> <p>Duration: Elevated SSC will be experienced for periods of days to weeks as the cable burial activities occur in the shallow waters of Shoal Bay.</p> <p>Magnitude: Water quality objective exceeded for short periods but unlikely to affect marine habitats or biota adapted to high turbidity conditions.</p> <p>Value: Water quality supports marine ecosystems, including seagrass, seaweed and hard coral, and beneficial uses.</p> <p>Certainty: Marine modelling undertaken (see Appendix R). Model assumptions are conservative.</p>
Marine environmental quality	Increased turbidity in marine waters caused by cable burial activities - offshore	Corridor selection avoids areas of significant marine habitat as much as possible. Cable burial methods will be selected to suit the local seabed conditions.	Nil	Possible	Limited	Short-term	Negligible	Medium	High	Minor	Turbidity monitoring in impact zone and baseline/reference site during cable installation in high-risk area (shallow waters <20m depth).	External reporting in accordance with environmental approval conditions	<p>Likelihood: Cable burial will occur in offshore environment.</p> <p>Scale: Modelling indicates elevated SSC concentrations around cable and bottom layer of the water only.</p> <p>Duration: Elevated SSC will occur for hours to days following trenching.</p> <p>Magnitude: Maximum modelled SSC <4 mg/L near seabed; no increase near surface.</p> <p>Value: Water quality supports marine ecosystems and beneficial uses.</p> <p>Certainty: Marine modelling undertaken (see Appendix R). Model assumptions are conservative.</p>
Marine environmental quality	Spills of hazardous substances impacting water quality	Besides marine fuel oil, no HAZMAT materials will be used on vessels during construction.	Compliance with MARPOL requirements regarding refuelling and spill prevention. Fuels and hazardous chemicals will be stored and handled in accordance with Australian standards and guidelines. An Environmental Emergency and Spill Response Plan will be in place and equipment provided at all storage and handling locations. Construction and operations staff will be trained in spill response.	Possible	Limited	Short-term	Minor	Medium	High	Minor	Visual inspections of land-based storages and during refuelling activities for early spill detection. In the event of a significant spill, water quality monitoring.	Internal records of volumes used and stored in accordance with Workplace Health and Safety Regulations. Internal inspection records. Internal incident reporting. Incidents of off-site pollution or nuisance reported to the NT EPA within 24 hours.	<p>Likelihood: Ships and barges will be used in the marine environment which are powered by marine fuel oil. No other hazardous materials will be used for cable installation.</p> <p>Scale: Spill would be small in volume and would weather, disperse and dilute.</p> <p>Duration: Spills will be detected and remediated immediately.</p> <p>Magnitude: No detectable change in water quality beyond the direct spill location.</p> <p>Values: Water quality supports marine ecosystems, including seagrass, seaweed and hard coral, and beneficial uses.</p> <p>Certainty: Adherence to regulations and MARPOL are proven effective in mitigating risk to marine environment.</p>
Marine ecosystems	Direct disturbance or loss of benthic habitat	Route design, where possible, has avoided topographical areas along the sea floor which are associated with areas of higher habitat value	Design, install and operate Subsea Cable System in accordance with the Guidelines on Best Environmental Practices in Cable Installation and Operation (OSPAR 2012)	Likely	Limited	Medium-term	Minor	Medium	Low	Minor		Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions.	<p>Likelihood: Benthic habitat will be directly impacted by cable laying and burial activities</p> <p>Scale: A 12m wide corridor of habitat will be disturbed for each of 6 cables. The cumulative area disturbed is large but habitat disturbance associated with a narrow corridor is limited.</p> <p>Duration: Benthic habitats predicted to recover over time. Recovery is likely to occur quickly in soft sediment habitats but will take longer for hard substrates.</p> <p>Magnitude: Narrow corridor of habitat disturbance is unlikely to impact marine biota or beneficial uses.</p> <p>Value: Most of the habitat in the footprint is bare substrate. Some small patches of locally important benthic habitat potentially present – seagrass, seaweed and hard coral.</p> <p>Certainty: Nearshore cable route has not been surveyed. Benthic habitat occurrence assessed based on publicly available mapping data.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Marine ecosystems	Habitat degradation due to elevated turbidity in marine waters	Route design, where possible, has avoided topographical areas along the sea floor which are associated with areas of higher habitat value	Design, install and operate Subsea Cable System in accordance with the Guidelines on Best Environmental Practices in Cable Installation and Operation (OSPAR 2012)	Possible	Localised	Short-term	Minor	Medium	High	Minor	Turbidity monitoring in impact zone and baseline/reference site during cable installation in high-risk area (shallow, <10m depth).	Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions.	<p>Likelihood: Sediment transport and timeseries modelling indicates turbidity will be elevated for short periods during cable burial activities.</p> <p>Scale: Elevated turbidity could be widespread; however, any impact to benthic habitats would be localised as only small patches of sensitive habitats occur in the area of influence.</p> <p>Duration: Turbidity elevated for short-periods (days to hours) over one month during the cable burial. Benthic habitats are resilient to short periods of increased turbidity and will recovery rapidly.</p> <p>Magnitude: Darwin Harbour Water Quality Objective for turbidity exceeded, but over such a short timeframe that there is no measurable impact to benthic habitats.</p> <p>Value: Most of the habitat in the footprint is bare substrate. Some small patches of locally important benthic habitat potentially present – seagrass, seaweed and hard coral.</p> <p>Certainty: Sediment transport and time series modelling used to predict area of impact and influence (Appendix R).</p>
Marine ecosystems	Changes to fauna behaviours due to noise or light	Route selection avoids important turtle breeding beaches. Cable laying activities move up to 500m per hour which limits the duration of noise emissions in any given area.	Nil	Likely	Localised	Short-term	Minor	Low	High	Minor	Nil	Nil	<p>Likelihood: Artificial light and noise will be produced by cable laying vessels and equipment and could alter behaviour of marine fauna.</p> <p>Scale: Noise emissions are predicted to have a localised deterrent effect causing fauna to avoid the cable installation activities. Artificial light could attract certain species, such as turtles, but the impact is localised due to there being no proximate nesting beaches.</p> <p>Duration: Noise and light impacts in any one area will occur intermittently for days in any given area as the cable laying and burial activities can progress at a rate of 500 m per hour and will take place 24 hours/day.</p> <p>Magnitude: Noise and light could deter or attract marine fauna moving through the area; however, there is unlikely to be a measurable change in any population due to the low level and short duration of noise and light impacts.</p> <p>Value: No important habitat for noise or light sensitive species (i.e. marine mammals and turtles) proximate to the proposal footprint.</p> <p>Certainty: Literature indicates cable laying has minimal noise impacts. Good information is available in relation to noise and light sensitive marine species, and there are no important habitat areas proximate to the proposal footprint.</p>
Marine ecosystems	Marine habitat and fauna impact due spills of fuels or hazardous chemicals	Besides marine fuel oil, no HAZMAT materials will be used on vessels during construction.	Compliance with MARPOL requirements regarding refuelling and spill prevention. Fuels and hazardous chemicals will be stored and handled in accordance with Australian standards and guidelines. An Environmental Emergency and Spill Response Plan will be in place and equipment provided at all storage and handling locations. Construction and operations staff will be trained in spill response.	Possible	Limited	Short-term	Minor	Medium	High	Minor	Visual inspections of land-based storages and during refuelling activities for early spill detection. In the event of a significant spill, water quality monitoring.	Internal records of volumes used and stored in accordance with Workplace Health and Safety Regulations. Internal inspection records. Internal incident reporting. Incidents of off-site pollution or nuisance reported to the NT EPA within 24 hours.	<p>Likelihood: Ships and barges are powered by marine fuel oil. Temporary storages of fuel and hazardous chemicals located at the Land Sea Joint Station.</p> <p>Scale: Spills may occur but extent would be limited due to small volumes and spill response measures.</p> <p>Duration: Spill response measures will ensure spills are detected, contained and cleaned up within hours.</p> <p>Magnitude: No detectable change in water quality beyond the direct spill location.</p> <p>Value: Patches of locally important benthic habitats present in footprint and surrounding areas.</p> <p>Certainty: Adherence to Australian Standards and MARPOL are proven effective in mitigating risk of spills to marine environment.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Marine ecosystems	Introduction of marine pests	Manage vessels in accordance with National Biofouling Guidelines to avoid establishment of marine pests on vessels.	Marine Environment Management Plan to provide controls for ensuring vessels comply with the appropriate marine pest management guidelines/requirements.	Unlikely					High	Minor	Monitoring in accordance with the Marine Environment Management Plan	External reporting of any marine pest incursion.	<i>Not assessed because the impact is unlikely. All vessels used in the Subsea Cable System installation will comply with marine pest regulations and guidelines. Marine pest incursions are unlikely to occur.</i> Certainty: Marine pest regulations and guidelines are proven effective in mitigating the risk of marine pest incursions.
	GHG emissions from combustion of fuel from vessels, plant and equipment for earthworks, air and land travel, logistics and power generation	Continue to identify and engage in opportunities to maximise commercially viable carbon abatement from the AAPowerLink, including: <ul style="list-style-type: none"> Pursuing power purchase agreements with large fossil fuel power generators in the NT. Conduct a life-cycle assessment during the design phase to quantify GHG emissions including embodied, direct and indirect emissions and demonstrate that the AAPowerLink is a carbon positive project Supply AAPowerLink construction and operational power needs via self-generated solar energy where practicable. Where the use of self-generated solar energy is not possible, source renewable energy via market mechanisms (if available). Identify and (where practicable) adopt practical zero carbon technology solutions such as electric vehicles, plant and equipment and remote solar energy systems. Explore practicable opportunities with NT Carbon Capture Utilisation and Storage Project 	Develop and implement a GHG Abatement and Management Plan that aligns with ISO 140001 Environmental Management Systems and ISO 50001 Energy Management Systems. Conduct GHG mitigation workshops every 2 years during design and construction and every five years during operations to assess performance and identify new opportunities for leveraging best practice and emerging technology. Procurement strategies to consider adoption of carbon reduction and energy efficient technologies (where practicable), including but not limited to: <ul style="list-style-type: none"> Electrification options for civil plant, machinery and equipment. Energy efficiency in aircraft services selection. Electrification and alternative fuel options for transportation (e.g., marine vessels, rail) Develop vegetation management strategies that aim to retain vegetation and soil carbon Conduct studies to identify and select clearing, fire management, vegetation disposal practices and vegetation species to plant or retain. Develop and implement Rehabilitation Plans that aims to reinstate vegetation post-construction and post-decommissioning	Likely	Widespread	Medium-term	Minor	Low	High	Minor	Monitor GHG emissions from activities, as well as energy produced and exported in line with the requirements of NT and Commonwealth law. Data required to calculate GHG emissions will be collected in line with the methods outlined in the National Greenhouse and Energy reporting (Measurement) Determination 2008 Monitor performance against targets set in the GHG Abatement and Management Plan.	Reporting of GHG emissions in line with the requirements of the NGER Act. AAPowerLink will trigger emissions thresholds for reporting during construction and reporting thresholds for energy production during operations. External reporting in accordance with environmental approval conditions under the EP Act.	Likelihood: Equipment requiring fuel combustion will be used where self-generated or renewable energy is not practicable; mainly during construction phase. Scale: Fuel generated GHG from logistics and earthworks from a combined area ~12,900ha Duration: Impact occurs only during the construction phase Magnitude: Relevant criteria for environmental protection are met Value: Most of the footprint is in remote areas. Sensitive receptors are not locally impacted by GHG emissions; project has a net positive GHG impact. Certainty: Acceptable level of certainty pertaining to values and receptors

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Atmospheric processes	GHG emissions from land clearing and land use change	<p>Continue to identify and engage in opportunities to maximise commercially viable carbon abatement from the AAPowerLink, including:</p> <ul style="list-style-type: none"> Pursuing power purchase agreements with large fossil fuel power generators in the NT. Conduct a life-cycle assessment during the design phase to quantify GHG emissions including embodied, direct and indirect emissions and demonstrate that the AAPowerLink is a carbon positive project Supply AAPowerLink construction and operational power needs via self-generated solar energy where practicable. Where the use of self-generated solar energy is not possible, source renewable energy via market mechanisms (if available). Identify and (where practicable) adopt practical zero carbon technology solutions such as electric vehicles, plant and equipment and remote solar energy systems. Explore practicable opportunities with NT Carbon Capture Utilisation and Storage Project 	<p>Develop and implement a GHG Abatement and Management Plan that aligns with ISO 140001 Environmental Management Systems and ISO 50001 Energy Management Systems.</p> <p>Conduct GHG mitigation workshops every 2 years during design and construction and every five years during operations to assess performance and identify new opportunities for leveraging best practice and emerging technology.</p> <p>Procurement strategies to consider adoption of carbon reduction and energy efficient technologies (where practicable), including but not limited to:</p> <ul style="list-style-type: none"> Electrification options for civil plant, machinery and equipment. Energy efficiency in aircraft services selection. Electrification and alternative fuel options for transportation (e.g., marine vessels, rail) <p>Develop vegetation management strategies that aim to retain vegetation and soil carbon</p> <p>Conduct studies to identify and select clearing, fire management, vegetation disposal practices and vegetation species to plant or retain.</p> <p>Develop and implement Rehabilitation Plans that aims to reinstate vegetation post-construction and post-decommissioning</p>	Likely	Widespread	Medium-term	Minor	Low	High	Minor	<p>Monitor GHG emissions from activities, as well as energy produced and exported in line with the requirements of NT and Commonwealth law.</p> <p>Data required to calculate GHG emissions will be collected in line with the methods outlined in the National Greenhouse and Energy reporting (Measurement) Determination 2008</p> <p>Monitor performance against targets set in the GHG Abatement and Management Plan.</p>	<p>Reporting of GHG emissions in line with the requirements of the NGER Act. AAPowerLink will trigger emissions thresholds for reporting during construction and reporting thresholds for energy production during operations.</p> <p>External reporting in accordance with environmental approval conditions under the EP Act.</p>	<p>Likelihood: Land clearing and land use change is to take place</p> <p>Scale: Land clearing on a combined area ~12,900ha</p> <p>Duration: Impact occurs only during the construction phase</p> <p>Magnitude: Relevant criteria for environmental protection are met</p> <p>Values: Most of the footprint is in remote areas. Sensitive receptors are not locally impacted by GHG emissions; project has a net positive GHG impact.</p> <p>Certainty: Acceptable level of certainty pertaining to values and receptors</p>
Marine ecosystems	Direct fauna mortality/collisions with vessels	Nil	<p>Marine Environment Management Plan to the following controls:</p> <p>Cable-laying vessels will move slowly (up to 600m/hr).</p> <p>Support vessels will adhere to low speeds, particularly in high-risk areas (shallow waters and migration and foraging zones).</p> <p>If marine fauna is spotted, vessels will reduce speeds to below 6 knots until fauna has passed.</p> <p>No marine fauna will actively be approached by vessels.</p>	Possible	Limited	Short-term	Negligible	Medium	High	Minor	<p>Visual observation for marine fauna activity in accordance with the Marine Environment Management Plan</p>	<p>Internal incident reporting.</p> <p>Fauna strikes recorded and reported to the Marine Wildwatch Hotline 1800 453 941</p>	<p>Likelihood: Vessels will be moving through areas where fauna are known to occur</p> <p>Scale: Impacts will be limited to the area directly proximate to vessels</p> <p>Duration: Impacts in any one area will be for days only as the cable laying and burial activities can progress at a rate of 500 m per hour and will take place 24.</p> <p>Magnitude: Due to low speeds collisions that cause death are unlikely to occur.</p> <p>Value: Locally important fauna such as marine mammals and turtles are known to inhabit the area.</p> <p>Certainty: Speed is known to be the key factor associated with fauna strikes, as low speeds will be adopted there is high certainty around the impacts.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Culture and heritage	Direct impact to heritage features	Consult with Traditional Owners and sites custodians through the ILUA and AAPA Authority Certificate processes to identify Sacred Sites and culturally significant landscape features and determine the most appropriate site protection measures. Avoid direct impacts to recorded heritage features where practicable when finalising the locations of AAPowerLink infrastructure and temporary construction works areas.	Prepare Cultural Heritage Management Plan/s (CHMP) in consultation with Traditional Owners and the NT Heritage Branch. Comply with conditions of Authority Certificates and ensure conditions are made available to all authorised personnel. Where impacts to archaeological heritage features are unavoidable, obtain an approval to carry out work on a heritage place or object (work) under the Heritage Act. Mitigation works on heritage features covered by Works Approvals will be undertaken ahead of commencing site preparation activities. Workforce training and inductions will address all aspects of cultural awareness and heritage protection.	Unlikely					High	None	Visual inspection of heritage features identified for protection. Ongoing engagement with Traditional Owners to identify emerging issues or concerns regarding heritage protection.	Internal environmental performance reporting. Reporting of incidents to Traditional Owners/AAPA/NLC and NT Heritage Branch and consultation to determine appropriate response. External reporting in accordance with environmental approval and heritage works approval conditions.	Not assessed as desktop heritage assessment (Appendix X) indicates low risk of maritime heritage features. Cable route will be surveyed to confirm and Sacred Sites clearances will also be undertaken. Direct impacts to significant maritime archaeological sites or Sacred Sites will be avoided. Certainty: There is flexibility in the final route selection to avoid direct impact to heritage features.
Culture and heritage	Indirect impact to heritage features	Restrict unauthorised public access along AAPowerLink access tracks and roads. Design criteria for engineered stormwater management systems and roads to maintain flows similar to pre-development conditions to avoid indirect impacts to heritage features associated with watercourses and swamps. Develop and implement site-specific Erosion and Sediment Control Plans (ESCPs) to minimise erosion and off-site sedimentation that could smother heritage features. Implement dust control measures to minimise dust deposition into surrounds surrounding the proposal footprint where heritage features are present.	Rectify emerging issues associated with unauthorised access, alteration of flows, erosion and sedimentation, water quality and dust, to minimise potential for indirect impacts to heritage features.	Unlikely					High	None	Provision of reporting processes for landholders and community to report unauthorised use of AAPowerLink access tracks. Visual inspections of disturbed areas and erosion and sediment controls as per ESCP (after significant rainfall events, at a minimum). Visual inspection of recorded heritage features adjacent to proposal footprint for signs of disturbance.	Internal reporting on environmental performance. External reporting in accordance with conditions of environmental approvals and permits.	Not assessed as sediment transport modelling indicates sediment mobilised during cable installation will disperse over wide area. Deposition onto heritage features is unlikely to occur. Certainty: Sediment transport modelling used to assess area of impact (Appendix R).

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Culture and heritage	Direct or indirect impact to undetected heritage features	Use archaeological predictive models developed through the HIAs to identify Heritage Risk Areas where clearance survey is required. Undertake clearance surveys in all Heritage Risk Areas to inform final site/route selection and heritage mitigation measures.	CHMPs will provide measures for managing the inadvertent discovery of heritage features. Consultation with NT Heritage Branch to determine appropriate response. Where further impacts to archaeological heritage features are unavoidable, obtain an approval to carry out work on a heritage place or object (work) under the Heritage Act. Workforce training and inductions will address all aspects of cultural awareness and heritage protection.	Unlikely					High	None	Monitoring of site protection or mitigation works by a qualified heritage practitioner.	Internal reporting on environmental performance. External reporting in accordance with conditions of environmental approvals and permits. Reporting of incidents and unexpected finds to Traditional Owners/AAPA/NLC and NT Heritage Branch. Reporting outcomes of site protection and mitigation works to Traditional Owners/AAPA/NLC and NT Heritage Branch.	Not assessed as desktop heritage assessment (Appendix X) indicates low risk of maritime heritage features. Cable route will be surveyed to confirm, and Sacred Sites clearances will also be undertaken. Certainty: There is flexibility in the final route selection to avoid direct impact to heritage features.

Factor	Potential Impact	Avoidance	Mitigation.	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Terrestrial environmental quality	Erosion and topsoil migration caused by disturbance of soils		Implementation of site-specific ESCP, which will be commensurate with the risk of erosion in each location.	Possible	Limited	Medium-term	Minor	Medium	High	Minor	Annual post wet season monitoring of rehabilitation success until disturbed areas stabilised. Visual inspections of drainage structures, discharge points and site boundaries following rain events. Post-wet season inspections of footprint and maintenance of emerging erosion issues.	Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions	<p>Likelihood: Significant rainfall events can cause erosions.</p> <p>Scale: Erosion will affect isolated areas where runoff is concentrated.</p> <p>Duration: Impact occurs intermittently – wet season only.</p> <p>Magnitude: Good drainage design and reinstatement of the footprint will minimise erosion severity.</p> <p>Value: Railway and road infrastructure, and seasonal swamp at Darwin Converter Site and Gunn Point Beach could be affected by erosion.</p> <p>Certainty: Erosion hazard assessment and ESCP in accordance with IECA guidelines.</p>
Terrestrial environmental quality	Contamination of soils	Solar used as power source, so no requirement for large fuel storages. Dangerous Goods and Hazardous Substances stored and handled in accordance with regulated standards and codes of practice, and manufacturer's directions.	Dangerous Goods and Hazardous Substances stored and handled in accordance with regulated standards and codes of practice, and manufacturer's directions. Spill response procedures and equipment provided at all storage and handling locations. Construction and operations personnel trained in spill response.	Possible	Limited	Short-term	Minor	High	High	Minor	Routine visual inspections around storage locations and work areas.	Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions	<p>Likelihood: Operations will require the storage and handling of fuels and hazardous chemicals which have the potential to come in contact with soils if spills or leaks occur.</p> <p>Scale: The volumes stored and handled are small and therefore spills and leaks are predicted to affect isolated areas.</p> <p>Duration: Impact is only felt briefly before being cleaned up, or the contaminated material removed.</p> <p>Magnitude: Contaminants will not be detected in soils within or surrounding the site.</p> <p>Value: There are no land uses or environmental values located near to the Solar Precinct or Darwin Converter Site that would be sensitive to isolated short-term contaminating events.</p> <p>Certainty: Only aviation fuel stored in significant quantities. Australian Standards established and proven effective for mitigating risk.</p>
Terrestrial environmental quality	Acid sulfate soils disturbance	Nil	Development of an ASSMP if ASS is identified in soil disturbance areas during construction. As per the developed ASSMP treatment of PASS to neutralise acidity and prevent impact on surrounding environment.	Possible	Limited	Short-term	Minor	Medium	High	Minor	Visual inspections and testing of any confirmed ASS in line with National Acid Sulfate Soils Guidance material.	Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions	<p>Likelihood: PASS could occur at specific locations along OHTL. Soil testing to be undertaken.</p> <p>Scale: Area of potential disturbance will be limited to repair work requiring excavation where ASS present.</p> <p>Duration: ASS would be exposed for a matter of days prior to reburial.</p> <p>Magnitude: Oxidation unlikely to occur during short period of exposure.</p> <p>Value: Watercourses along OHTL would be sensitive to ASS impacts.</p> <p>Certainty: Guidelines for identification and management of ASS are established and proven effective.</p>
Terrestrial ecosystems	Degradation of flora and vegetation in surrounding areas			Unlikely						None			Certainty: Potential impacts are well understood from other projects.
Terrestrial ecosystems	Introduction and spread of weeds and pests	All project activities will comply with the Weed Management Act which states it is an offence to transport weeds.	A Weed Management Plan will be implemented. Weed inspections and control will be undertaken for the duration of construction and operations to limit the spread of weeds.	Likely	Localised	Permanent	Moderate	Medium	High	Moderate	As per the Weed Management Plan (Appendix Q)	As per the Weed Management Plan (Appendix Q)	<p>Likelihood: Maintenance activities and/or inadequate weed control post-construction could spread weeds.</p> <p>Scale: Weed infestations are likely to occur at some locations in the disturb footprint, but unlikely to extend far into surrounds.</p> <p>Duration: Once weeds are introduced they are very difficult to eradicate.</p> <p>Magnitude: Implementation of Weed MP will limit impact to ecological function and integrity.</p> <p>Values: Sensitive values present in footprint are riparian, sand sheet heath and rainforest, and the Black Jungle Reserve.</p> <p>Certainty: Potential impacts are well understood from other projects and Weed MP will reduce risk to ALARP.</p>

Factor	Potential Impact	Avoidance	Mitigation.	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Terrestrial ecosystems	Direct fauna mortality	Pre-clearing inspections undertaken to identify and relocate any fauna that are at risk i.e. nests and burrows. Avoiding clearing large hollow-bearing trees where possible. Location of Solar Precinct at a distance from waterbodies. Bird Collisions with panels: Location of Solar Precinct at a distance from waterbodies.	Clearing will be conducted in a single direction, allowing any fauna to move out of way of clearing activities. If fauna is spotted in immediate clearing area and are in danger, clearing will be stopped until safe to continue. Clearing in a progressive manner to allow wildlife to natural disperse from the area as clearing undertaken. Site inductions will ensure that all personnel are aware of their obligations and know the correct procedures for fauna encounters. Vehicle speed restrictions apply when travelling near uncleared areas or in higher risk conditions. Bird collisions with panels: Nil	Possible	Limited	Medium-term	Moderate	Medium	Low	Minor	Record any fauna encounters, injuries or death as result of works for the duration of works. Incidental observations of carcasses, including during routine infrastructure inspections Bird collisions with panels: Incidental observations of carcasses, including during routine infrastructure inspections	Internal record keeping of incidents of fauna mortality. External reporting in accordance with environmental approval conditions Bird collisions with panels: Internal incident reporting. External reporting in accordance with environmental approval conditions	Likelihood: Some recent studies suggest that birds may collide with solar panels for unknown reasons. Scale: The impact of bird deaths will be limited to isolated locations within the proposal footprint. Duration: Impact could occur intermittently over the life of the Solar Precinct. Magnitude: Intermittent bird deaths would not be expected to affect biodiversity or ecological function/integrity. Values: Species most likely to be affected are those most abundant, but less common species could also be affected. Certainty: There has been limited study of this impact around the world and no assessment relevant to the proposed location.
Terrestrial ecosystems	Changes to fauna behaviours due to noise, light and other disturbances	Waste management procedures to avoid attracting fauna to waste disposal areas.		Possible	Limited	Medium-term	Minor	Low	High	Minor			Likelihood: Fauna could either be attracted or deterred by operational activities. Scale: Affects expected to be limited to within close proximity to activities. Duration: Impact will occur intermittently during operations. Magnitude: Localised behavioural change will not affect biodiversity or ecosystem function/integrity. Values: There are no proximate ecological receptors that are sensitive to these disturbances. Certainty: Potential impacts are well understood from other projects. Mitigation measures are routine and proven effective.
Hydrological processes	Alteration of surface water flows caused by development	Roadside drainage and culverts will be designed and installed in accordance with accepted Austroads standards. Groundwater used as water supply – no surface water extraction.	Drainage, erosion and sediment controls installed and maintained in accordance with Erosion and Sediment Control Plans (ESCP) that align with the Best Practice Erosion and Sediment Control Guidelines (IECA, 2008). Design criteria for engineered stormwater management systems installed at the Solar Precinct and Darwin Converter Site is to discharge water to similar locations and at similar volumes to pre-development conditions.	Possible	Limited	Long-term	Negligible	High	High	Minor	During construction, visual inspections of disturbed areas and erosion and sediment controls as per ESCP (after significant rainfall events, at a minimum). Annual post wet season monitoring of revegetation success until disturbed areas are stabilised. Visual inspections of drainage structures, discharge points and site boundaries following rain events. Post-wet season inspections of all project locations and rectification of emerging erosion issues.	Internal records of ESCP inspections, as stipulated in ESCP's. Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions.	Likelihood: The Solar Precinct will alter overland flow paths across ~12,000 ha Scale: No watercourses within Solar Precinct and Lake Woods >10 km away. Duration: Overland flow paths will be altered for the duration of operations. Magnitude: Alteration of overland flow paths within Solar Precinct will have negligible impact on hydrological regime of Lake Woods. Values: Lake Woods is a nationally important wetland which provides numerous ecosystem values, particularly during times of flood. Certainty: Hydrological modelling has been undertaken: see Appendix N.

Factor	Potential Impact	Avoidance	Mitigation.	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Hydrological processes	Changes to groundwater levels caused by water extraction from bores	Groundwater extraction sites will be located away from existing groundwater bores in use.	Bore locations and sustainable yields to be determined subject to investigation and recommendations from a hydrogeologist. Bore work permits and water extraction licences obtained under the Water Act.	Unlikely	Limited	Long-term	Negligible	Medium	High	Minor	Monitoring of standing water levels and water extraction volumes, as required under water extraction licence conditions. Water quality sampling and analysis of springs near Solar Precinct and aquifer targeted for groundwater extraction to ensure there is no connectivity.	Internal records of water usage and water extraction. External reporting of water extraction in accordance with water extraction licence and environmental approval conditions.	<p>Likelihood: Groundwater extraction to supply 10 ML/year.</p> <p>Scale: Drawdown may occur immediately surrounding the bore.</p> <p>Duration: Extraction will occur for duration of operations.</p> <p>Magnitude: Remote location, few other users, no proximate GDE's.</p> <p>Values: Groundwater in the region supports pastoral uses and, in the broader aquifer, many beneficial uses.</p> <p>Certainty: Although extraction locations not known, volumes are low and aquifer is a regional aquifer with significant supply.</p>
Hydrological processes	Changes to groundwater levels caused by reduced recharge	Solar Precinct and Darwin Converter Site footprints are not located in identified groundwater recharge zones for the underlying productive aquifers. Ground under the solar fields will not be compacted, allowing rainfall to infiltrate soils. Design criteria for engineered stormwater management systems installed at the Solar Precinct and Darwin Converter Site is to discharge water to similar locations and at similar volumes to pre-development conditions.	None required	Unlikely	Limited	Long-term	Negligible	Medium	High	Minor	None required	None required	<p>Likelihood: Reduced recharge to the regional aquifer at Solar Precinct unlikely to impact groundwater levels.</p> <p>Scale: Reduced recharge within direct disturbance footprint only.</p> <p>Duration: Reduced recharge will occur for duration of operations.</p> <p>Magnitude: Site is not located in identified groundwater recharge area. Aquifer is a broad, regional scale aquifer.</p> <p>Values: Groundwater in the region supports pastoral uses and, in the broader aquifer, many beneficial uses.</p> <p>Certainty: A localised decrease in infiltration is unlikely to affect recharge. Flows to Lake Woods (which is a recharge area) will be unimpacted.</p>
Inland water environmental quality	Increased turbidity caused by soil disturbance and erosion	Solar Precinct and Darwin Converter Site footprints located on flat land above the maximum modelled flood extent (1 %AEP/1-in-1000-year flood event) and outside of mapped storm surge zones. Solar Precinct and Darwin Converter Site footprints avoid watercourses. Progressive clearing, construction and reinstatement will be undertaken. Stormwater drainage will be installed to capture and manage runoff. Stormwater captured within facilities will discharge to land, via erosion and sediment controls. Roadside drainage and culverts will be installed in accordance with Austroads standards.	Watercourse crossings along access roads and OHTL will be installed during the dry season when no flow present. Drainage, erosion and sediment controls will be installed and maintained in accordance with Erosion and Sediment Control Plans (ESCP) that align with the Best Practice Erosion and Sediment Control Guidelines (IECA, 2008). Develop and implement a Reinstatement Plan for post-construction reinstatement of works areas to stabilise soils and promote regrowth of native vegetation. Rectification of emerging erosion issues after each wet season.	Possible	Limited	Short-term	Minor	Medium	High	Minor	During construction, visual inspections will be undertaken of disturbed areas and erosion and sediment controls as per ESCP (after significant rainfall events, at a minimum). Annual post wet season monitoring of reinstatement success until disturbed areas are stabilised. Visual inspections of drainage structures, discharge points and site boundaries following rain events. Post-wet season inspections of all project locations and rectification of emerging erosion issues.	Internal records of ESCP inspections, as stipulated in ESCP's. Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions.	<p>Likelihood: Minor occurrences of erosion at Solar Precinct access road watercourse crossings could increase turbidity in watercourses.</p> <p>Scale: Water quality may be impacted for a several hundred metres downstream of crossings.</p> <p>Duration: Erosion will be identified and rectified, and water quality impacts would only occur for days immediately following a rainfall event.</p> <p>Magnitude: Watercourses are naturally turbid, particularly following rainfall and runoff events.</p> <p>Value: Water quality supports values such as aquatic ecosystem health, pastoral, agricultural, cultural, social and amenity.</p> <p>Certainty: ESCP in accordance with IECA guidelines, and ongoing monitoring and maintenance.</p>

Factor	Potential Impact	Avoidance	Mitigation.	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Inland water environmental quality	Contamination by release of fuels and chemicals	During operations, solar power will be used as a power source, hence no requirement for bulk fuel storages. Dangerous Goods and Hazardous Substances will be stored and handled in accordance with regulated standards and codes of practice, and manufacturer's directions. Dangerous Goods and Hazardous Substances will not be stored within 200m of a watercourse or groundwater bore, and mobile refuelling will not occur within 50m of a watercourse or groundwater bore.	Dangerous Goods and Hazardous Substances Registers will be maintained at all storage and handling locations. An Environmental Emergency and Spill Response Plan will be in place and equipment provided at all storage and handling locations. Construction and operations staff will be trained in spill response.	Unlikely	Limited	Short-term	Negligible	High	High	Minor	Routine visual inspections around storage locations and work areas.	Internal records of volumes used and stored in accordance with Workplace Health and Safety Regulations. Internal inspection records and notes. Internal records of water quality monitoring. Incidents of off-site pollution or nuisance reported to the NT EPA within 24 hours	<p>Likelihood: Generally minor volumes of fuels and hazardous substances will be stored and used. A large above-ground storage will in place at the Solar Precinct airfield.</p> <p>Scale: Spills may occur but storage and handling procedures mean a spill will be limited to ground around spill and will not enter a watercourse or groundwater aquifer.</p> <p>Duration: Spills to ground will occur intermittently. Spills will be detected and remediated immediately.</p> <p>Magnitude: No change in water quality as a result of spills.</p> <p>Value: Water quality in watercourses and groundwater is sensitive to contamination and supports numerous beneficial uses.</p> <p>Certainty: Australian Standards are established and proven effective for mitigating risk. No underground storage, or storage within 200 m of a watercourse.</p>
Inland water environmental quality	Contamination from waste storage and disposal areas	Landfill will comply with the Guidelines for Siting, Design and Management of Solid Waste Disposal Sites in the Northern Territory (NT EPA 2003). No waste will be stored within 200m of a watercourse.	Waste management will be in accordance with best practice guidelines (e.g. separation of waste, covering, banded storage areas), and the requirements of the Waste Management and Pollution Control Act 1998. All listed waste will be disposed of at a licenced waste management facility.	Unlikely	Limited	Long-term	Negligible	Low	High	Minor	Routine visual inspections around landfill, waste storage locations and work areas.	Internal records of inspections. Incident reporting	<p>Likelihood: Inert and putrescible waste will be disposed of onsite at Solar Precinct. All other waste will be temporarily stored and disposed at a licenced facility.</p> <p>Scale: Any contamination from waste storage and disposal will be limited to soil in immediate surrounds.</p> <p>Duration: Waste will be stored at Darwin Converter Site, and stored and disposed at Solar Precinct for construction and operation phases. Short term storage within OHTL.</p> <p>Magnitude: No change in water quality as a result of waste storage and disposal.</p> <p>Value: No watercourses or groundwater proximate to waste storage and disposal areas.</p> <p>Certainty: Compliance with NT guidelines and regulations proven effective for mitigating risk.</p>
Inland water environmental quality	Contamination by wastewater from camps and ablutions	Onsite wastewater management systems to be designed and installed by suitably qualified person, in accordance with NT Code of Practice for Onsite Wastewater Management, plus other relevant standards and guidelines. System to be designed for projected wastewater loads, and appropriate for applicable climate.	Any issues identified with wastewater management system to be rectified by suitably licenced person.	Unlikely	Limited	Long-term	Negligible	Medium	High	Minor	Routine inspection and maintenance of wastewater management systems and land application areas, in accordance with the NT Code of Practice for Onsite Wastewater Management.	Internal records of maintenance works undertaken. Relevant notifications/applications and reporting to NT Department of Health, or DIPL.	<p>Likelihood: Onsite wastewater management systems will be established at the Solar Precinct and at the Darwin Converter Site.</p> <p>Scale: Wastewater will be treated and disposed of to land in a controlled and spatially limited area.</p> <p>Duration: Wastewater management systems will be used for operation phase (70 years).</p> <p>Magnitude: No change in water quality as a result of wastewater management.</p> <p>Value: The seasonal swamp and shallow groundwater are proximate to Darwin Converter Site system, which support numerous beneficial uses.</p> <p>Certainty: Compliance with NT guidelines and regulations proven effective for mitigating risk.</p>
Aquatic ecosystems	Direct loss of aquatic habitat	Solar Precinct and Darwin Converter Site site selection process included avoidance of major watercourses; neither site has aquatic ecosystems within the direct disturbance footprint. The final route selection process for the Solar Precinct access roads will avoid crossing locations that hold water for extended periods, riparian vegetation and aquatic vegetation, where possible. Clearing of significant riparian vegetation (e.g. large	Minimise the disturbance footprint within waterways or wetlands to the smallest practicable area. Watercourse crossings along Solar Precinct access roads and OHTL installed in the dry season when no flow is present.	Unlikely					High	None	None required	Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions.	<p><i>Not assessed because impact is inherently unlikely to occur.</i> Certainty: No further disturbance of aquatic ecosystems beyond disturbance that occurred during construction.</p>

Factor	Potential Impact	Avoidance	Mitigation.	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
		trees) will be avoided wherever practical by spanning the powerline across riparian zones associated with higher order watercourses.											
Aquatic ecosystems	Reduction in aquatic habitat value due to water quality impacts	Solar Precinct and Darwin Converter Site footprints avoid watercourses. Clearing will be undertaken progressively. Dangerous Goods and Hazardous Substances will be stored and handled in accordance with regulated standards and codes of practice, and manufacturer's directions. Dangerous Goods and Hazardous Substances will not be stored within 200 m of a watercourse or groundwater bore, and mobile refuelling will not occur within 50 m of a watercourse or groundwater bore.	Drainage, erosion and sediment controls installed and maintained in accordance with Erosion and Sediment Control Plans (ESCP) that align with the Best Practice Erosion and Sediment Control Guidelines (IECA, 2008). Develop and implement a Reinstatement Plan for post-construction reinstatement of works areas to stabilise soils and promote regrowth of native vegetation. Rectification of emerging erosion issues after each wet season. Dangerous Goods and Hazardous Substances Registers maintained at all storage and handling locations. An Environmental Emergency and Spill Response Plan will be in place and equipment provided at all storage and handling locations. Construction and operations staff trained in spill response	Possible	Limited	Short-term	Negligible	Medium	High	Minor	Annual post wet season monitoring of rehabilitation success until disturbed areas are stabilised. Visual inspections of drainage structures, discharge points and site boundaries following rain events. Post-wet season inspections of all project locations and rectification of emerging erosion issues.	Internal reporting on environmental performance. Internal records of ESCP inspections, as stipulated in ESCP's. External reporting in accordance with environmental approval conditions. Internal records of water quality monitoring. Internal records of volumes used and stored in accordance with Workplace Health and Safety Regulations. Incidents of off-site pollution or nuisance reported to the NT EPA within 24 hours.	<p>Likelihood: Minor erosion and increased turbidity could occur at access road crossings. Chemical contamination unlikely.</p> <p>Scale: Water quality may be impacted immediately downstream of crossings.</p> <p>Duration: Erosion will be identified and rectified regularly. Water quality impacts would be short-term following rain.</p> <p>Magnitude: Watercourses are naturally turbid, particularly following rainfall and runoff events. Short-term elevated turbidity will not affect ecosystem.</p> <p>Value: Watercourses do support aquatic ecosystems during periods of flow and do hold permanent pools.</p> <p>Certainty: Aust Roads design standards and IECA (2008) Guidelines proven effective for minimising erosion and water quality impacts.</p>
Aquatic ecosystems	Reduction in aquatic habitat value due to altered hydrology or groundwater extraction	Solar Precinct and Darwin Converter Site footprints located on flat land above the maximum modelled flood extent (1 %AEP/1-in-1000-year flood event) and outside of mapped storm surge zones. Solar Precinct and Darwin Converter Sites do not have watercourses within direct disturbance footprint. Roadside drainage and culverts will be designed in accordance with accepted AustRoads standards. Groundwater used as water supply – no surface water extraction. Groundwater extraction sites will be located away from springs or GDE's. Engagement with landowners at Solar Precinct and along OHTL to identify bores that can be used as a water source without affecting other uses.	Design criteria for engineered stormwater management systems installed at the Solar Precinct and Darwin Converter Site is to discharge water to similar locations and at similar volumes to pre-development conditions. Implementation of ESCP's which will manage drainage and minimise erosion. Watercourse crossings along Solar Precinct access roads and OHTL installed in the dry season when no flow is present. Bore locations and sustainable yields to be determined subject to investigation and recommendations from a hydrogeologist. Bore permits and water extraction licence obtained under the Water Act 1992.	Unlikely	Limited	Long-term	Negligible	Medium	High	Minor	Monitoring of standing water levels and water extraction volumes, as required under water extraction licence conditions. Water quality sampling and analysis of springs near Solar Precinct and aquifer targeted for groundwater extraction to ensure there is no connectivity.	Internal reporting on environmental performance. Internal records of water usage and water extraction. External reporting of water extraction in accordance with water extraction licence and environmental approval conditions.	<p>Likelihood: Access road crossings only location where aquatic habitat present - unlikely to have ongoing impact. Groundwater extraction will be minor (10 ML/year).</p> <p>Scale: Overland flows altered within direct disturbance footprint. Groundwater drawdown may occur in the direct vicinity of the bore.</p> <p>Duration: Impacts will occur for duration of operations.</p> <p>Magnitude: No discernible impact to aquatic ecosystems.</p> <p>Value: Watercourses do support aquatic ecosystems during periods of flow and do hold permanent pools.</p> <p>Certainty: Hydrological modelling demonstrates no catchment changes see Appendix N. Austroads design standards proven effective in mitigating impacts to water flows, fish passage etc.</p>

Factor	Potential Impact	Avoidance	Mitigation.	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Aquatic ecosystems	Reduction in aquatic habitat value due to dust	Operational footprint will cover soil with infrastructure, hardstand or vegetation to minimise wind erosion and dust	None required	Unlikely					High	Minor	Visual monitoring for airborne dust around proposal footprints Visual inspections of seasonal swamp for deposited dust on vegetation in swamp	Internal reporting on environmental performance	<i>Not assessed as the impact is inherently unlikely to occur.</i> Certainty: The majority of construction footprints will be covered by infrastructure, hardstand or vegetation, or reinstated.
Aquatic ecosystems	Heat island effect on Lake Woods	Solar Precinct site selection process involved selecting remote area away from sensitive receptors and >10 km from Lake Woods	None required	Unlikely					High	None	None required	None required	<i>Not assessed as the impact is inherently unlikely to occur.</i> Certainty: Localised heating will occur at Solar Farm may occur but will not impact Lake Woods. Studies of other Solar Farms indicate localised heating around the solar panels, within 300 m. No impact on aquatic ecosystems or Lake Woods, which is >10 km north.
Air quality	Emissions of NO ₂ from diesel exhaust	Whenever possible, plan haul routes to avoid residential areas Efficient staging and layout of construction facilities to minimize haulage, avoid double handling of materials and other excessive equipment operations Use grid or solar power whenever practical over stationary combustion generated power Implement anti-idling policy	NOx emissions will be minimised by using electric vehicles and equipment where practicable, and ensuring all machinery, plant and equipment complies with minimum emissions standards Operate equipment at optimum rated loads as determined by equipment manufacturer and follow routine equipment maintenance procedures Ensure all heavy duty on-road and non-road vehicles are late model and meet all commonwealth and NT emission standards Ensure all equipment brought to site is in good working order accompanied by inspection certificates and not exceeding 10% opacity. Position stationary emission sources such as generators away from sensitive receptors with due regard to safety, security, traffic and other geographic restrictions.	Possible	Limited	Short-term	Negligible	Medium	High	Minor	Conduct visual inspections for opacity from vehicle/equipment emissions. Carry out inspections certifying equipment is in good working order prior to shipping to site	Reporting will be carried out per the requirements of the CEMP described in Chapter 17 External reporting in accordance with environmental approval conditions.	Likelihood: Operational activities will use vehicles and maintenance equipment. Scale: Diesel emissions from operational activities will affect a small area around activities. Vehicle numbers required during operations are limited. Duration: Emissions could cause elevated concentrations of NO ₂ for short periods of time as vehicles drive by or during maintenance activities. Magnitude: Health criteria are unlikely to be exceeded. Value: There are no sensitive receptors in areas where air emissions will occur i.e. they are limited to within operational areas. Certainty: The only sources of NO ₂ during operations will be some vehicles and maintenance equipment.
Air quality	Emissions of particulate matter (dust)	Locate site access roads, laydown areas and stationary equipment (e.g., generators) as far away as possible from sensitive receivers Limit the amount of time between completion of road base and any paved areas to minimize exposure of unpaved surface	Water carts will be used across the project footprint to minimise dust emissions in areas of high risk at regular intervals. Other dust suppressants will be used if water ineffective. Implement on-site vehicle restrictions (e.g., limit the speed of vehicles travelling on unsealed access roads). Provide tyre wash facilities to minimize tracking of mud or dirt onto sealed roads Cover or dampen any stockpiles where practical. Notify and engage with residences and businesses who could be affected ahead of the construction front, and	Possible	Limited	Short-term	Negligible	Medium	High	Minor	Visual observations for fugitive emissions of dust Conduct regular inspections of construction areas and roads to identify potential sources of dust emissions Develop 'watching brief' on 'nuisance' impacts to ensure quick responses to any detriment and emerging issues. Implement complaints procedure	Reporting will be carried out per the requirements of the CEMP described in Chapter 17 External reporting in accordance with environmental approval conditions.	Likelihood: Operational activities include vehicle movement and possibly minor ground disturbance. Scale: Dust emissions from operational activities will affect a small area around activities. Most of the footprint will be under infrastructure and vegetation management will be used to control dust at the Solar Precinct. Duration: Emissions could cause elevated concentrations of TSP for short periods of time as vehicles drive by or during maintenance activities that require ground disturbance. Magnitude: Health or nuisance criteria are unlikely to be exceeded. Value: There are no sensitive receptors in areas where air emissions will occur i.e. they are limited to within operational areas. Certainty: Operational activities will not involve major ground disturbance works. Most ground surfaces will be covered.

Factor	Potential Impact	Avoidance	Mitigation.	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
			implement complaints procedure.										
Atmospheric processes	GHG emissions from the decomposition of organic debris and loss of soil carbon during operation	Continue to identify and engage in opportunities to maximise commercially viable carbon abatement from the AAPowerLink, including: <ul style="list-style-type: none"> • Pursuing power purchase agreements with large fossil fuel power generators in the NT. • Conduct a life-cycle assessment during the design phase to quantify GHG emissions including embodied, direct and indirect emissions and demonstrate that the AAPowerLink is a carbon positive project • Supply AAPowerLink construction and operational power needs via self-generated solar energy where practicable. • Where the use of self-generated solar energy is not possible, source renewable energy via market mechanisms (if available). • Identify and (where practicable) adopt practical zero carbon technology solutions such as electric vehicles, plant and equipment and remote solar energy systems. • Explore practicable opportunities with NT Carbon Capture Utilisation and Storage Project 	Develop and implement a GHG Abatement and Management Plan that aligns with ISO 140001 Environmental Management Systems and ISO 50001 Energy Management Systems. Conduct GHG mitigation workshops every 2 years during design and construction and every five years during operations to assess performance and identify new opportunities for leveraging best practice and emerging technology. Procurement strategies to consider adoption of carbon reduction and energy efficient technologies (where practicable), including but not limited to: <ul style="list-style-type: none"> • Electrification options for civil plant, machinery and equipment. • Energy efficiency in aircraft services selection. • Electrification and alternative fuel options for transportation (e.g., marine vessels, rail) Develop vegetation management strategies that aim to retain vegetation and soil carbon Conduct studies to identify and select clearing, fire management, vegetation disposal practices and vegetation species to plant or retain. Develop and implement Rehabilitation Plans that aims to reinstate vegetation post-construction and post-decommissioning	Likely	Widespread	Long-term	Minor	Low	High	Minor	Monitor GHG emissions from activities, as well as energy produced and exported in line with the requirements of NT and Commonwealth law. Data required to calculate GHG emissions will be collected in line with the methods outlined in the National Greenhouse and Energy reporting (Measurement) Determination 2008 Monitor performance against targets set in the GHG Abatement and Management Plan.	Reporting of GHG emissions in line with the requirements of the NGER Act. AAPowerLink will trigger emissions thresholds for reporting during construction and reporting thresholds for energy production during operations. External reporting in accordance with environmental approval conditions under the EP Act.	<p>Likelihood: Organic matter from land clearing will decompose.</p> <p>Scale: Organic matter and debris from a combined area of ~12,900ha.</p> <p>Duration: Impacts will occur over the operational phase.</p> <p>Magnitude: Relevant criteria for environmental protection are met.</p> <p>Value: Local sensitive receptors are not impacted by GHG emissions; project has a net positive GHG impact.</p> <p>Certainty: Acceptable level of certainty pertaining to values and receptors.</p>
Atmospheric processes	Positive Impact Overall reduction in GHG emissions from generation of renewable energy	Nil	Utilising energy produced by the Solar Precinct wherever possible	Likely	Widespread	Long-term	Major	High	High	Major	Monitor GHG emissions from activities, as well as energy produced and exported in line with the requirements of NT and Commonwealth law. Data required to calculate GHG emissions will be collected in line with the methods outlined in the National Greenhouse and Energy reporting (Measurement) Determination 2008 Monitor performance against targets set in the	Reporting of GHG emissions in line with the requirements of the NGER Act. AAPowerLink will trigger emissions thresholds for reporting during construction and reporting thresholds for energy production during operations. External reporting in accordance with environmental approval conditions under the EP Act.	<p>Likelihood: This is the intent of the Project.</p> <p>Scale: Intended benefits are regional and global.</p> <p>Duration: Impact will occur over the construction and operational phase.</p> <p>Magnitude: The degree of the change will contribute to the protection of environmental values, ecological function and sensitive receptors.</p> <p>Value: Important at regional, national and international scale.</p> <p>Certainty: Overall project objective.</p>

Factor	Potential Impact	Avoidance	Mitigation.	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
											GHG Abatement and Management Plan.		
Culture and heritage	Direct or indirect impact to heritage features associated with operations and maintenance activities	Consult with Traditional Owners and sites custodians through the ILUA and AAPA Authority Certificate processes to identify Sacred Sites and culturally significant landscape features and determine the most appropriate site protection measures.	Prepare Cultural Heritage Management Plan/s (CHMP) in consultation with Traditional Owners and the NT Heritage Branch. Comply with conditions of Authority Certificates and ensure conditions are made available to all authorised personnel. Where impacts to archaeological heritage features are unavoidable, obtain an approval to carry out work on a heritage place or object (work) under the Heritage Act. Mitigation works on heritage features covered by Works Approvals will be undertaken ahead of commencing site preparation activities. Workforce training and inductions will address all aspects of cultural awareness and heritage protection.	Unlikely					High	None	Visual inspection of heritage features identified for protection. Ongoing engagement with Traditional Owners to identify emerging issues or concerns regarding heritage protection.	Internal environmental performance reporting. Reporting of incidents to Traditional Owners/AAPA/NLC and NT Heritage Branch and consultation to determine appropriate response. External reporting in accordance with environmental approval and heritage works approval conditions.	<i>Not assessed as no additional disturbance proposed during operations. Sites in footprint will be removed prior to construction so heritage value rating is low.</i> Certainty: No disturbance proposed.
Human Health	Exposure to EMF	HVAC cables at Solar Precinct and Darwin Converter Site emit low level EMF that does not pose a risk to human health.	Subsea and underground cables design includes lead sheathing and armoured cores which further prevents electric fields from entering the surrounding environment.	Unlikely	Limited	Long-term	Negligible	Medium	High	None	-	-	Likelihood: Exposure to low frequency fields unlikely. Scale: Very short distance from emissions source. Duration: Continuous during operations. Magnitude: Negligible risk associated with low frequency fields; below ICNIRP occupational exposure criteria. Value: There are no sensitive receptors in areas where EMF exposure could occur; no public access near and under facilities. Certainty: Acceptable level of confidence in EMF research to date.

Factor	Potential Impact	Avoidance	Mitigation.	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Human Health	Increase in Biting Insects	Construction camps will be adequately insect screened. Locations for OHTL fly camps will be selected to be as far as possible away from significant mosquito breeding habitats i.e. watercourses and wetlands that retain water during the dry season. Darwin Converter Site workforce will be accommodated in Darwin, not on site. Drains and culverts designed to prevent upstream flooding and be free draining, retaining water for a period of maximum 5 days. Water tanks will be screened to prevent entry of mosquitoes. Landfill will comply with the Guidelines for Siting, Design and Management of Solid Waste Disposal Sites in the Northern Territory 2003. Materials arriving from overseas at Darwin Port are subject to quarantine inspections and treatment.	Workforce education and induction on the use of appropriate PPE, bite prevention and treatment methods. Inspection and removal of any artificial mosquito breeding habitats (see below). Implementation of mosquito control methods, such as residual insecticides and larvicides in accordance with advice from Department of Health. Containers capable of holding water stored undercover and/or emptied on a weekly basis during construction. Post-construction reinstatement activities to remove impediments to surface water drainage such as stockpiles, low points, wheel ruts etc. Stormwater drains, culverts and sediment basins maintained free from sediment build up and vegetation growth. Landfill and wastewater management systems maintained to prevent water ponding and pooling. Inspection of imported materials, equipment and plant for pests on arrival at works areas. Treat any pest species detected in accordance with advice from NT Medical Entomology branch	Unlikely						None	Visual inspections for the presence of ponding/pooling water and mosquito larvae. Report/complaints from workers. Visual inspections of all infrastructure for ponding/pooling of water. Rectification works if required. Visual inspections for the presence of mosquito larvae and other non-native species.	Incident reporting in the event a worker requires treatment or becomes ill from exposure to biting insect bites or disease. Internal inspection records. Notify NT Medical Entomology branch in the event a pest species is detected.	<i>Not assessed as impact is unlikely to occur. Operational footprints will be managed to avoid creation of biting insect breeding habitat.</i>
Human Health	Increase in communicable disease	Compliance with all federal (Australian Government Department of Health), state (Northern Territory Government Health), and local requirements set out for COVID 19 health measures, as well as guidelines set out by the World Health Organization (WHO). Practices to minimize the risk of COVID 19 infection while living in camps include washing hands, wearing masks while in common areas where physical distancing is not possible, and avoiding touching one's eyes, nose, and mouth without properly cleaning hands first. No guests will be allowed in the camps, and all camps will be equipped with readily available PPE, including hand soap, sanitizer, face masks,	If any worker exhibits cold or flu like symptoms, immediately notify a Construction Supervisor. The individual must, if possible, evacuate the camp to a hotel for a minimum of five days or until symptoms improve, or self-isolate away from other workers.	Unlikely						None	-	-	<i>Not assessed as impact is unlikely to occur. Size of operations workforce and lack of camp living accommodations reduces risk of increase in communicable disease to unlikely during operations phase.</i>

Factor	Potential Impact	Avoidance	Mitigation.	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
		<p>disinfectant wipes, over the counter medicines, thermometers, and rapid COVID 19 antigen tests. Workers will be required to be fully vaccinated. 14 days prior to moving into the camp, it will be recommended that workers avoid large gatherings, wear masks in public spaces and where physical distancing is not possible, avoid being near people who are sick, and wash their hands.</p>											
Human Health	Exposure to air emissions of particulate matter (PM10, PM2.5) and Nitrogen Oxide (NOx)	<p>Whenever possible, plan haul routes to avoid residential areas. Efficient staging and layout of construction facilities to minimize haulage, avoid double handling of materials and other excessive equipment operations. Use grid or solar power whenever practical over stationary combustion generated power. Prohibit open burning of any materials.</p>	<p>NOx emissions will be minimised by using electric vehicles and equipment where practicable, and ensuring all machinery, plant and equipment complies with minimum emissions standards. Implement anti-idling policy. Operate equipment at optimum rated loads as determined by equipment manufacturer and follow routine equipment maintenance procedures. Ensure all heavy duty on-road and non-road vehicles are late model and meet all commonwealth and NT emission standards. Ensure all equipment brought to site is in good working order accompanied by inspection certificates and not exceeding 10% opacity.</p> <p>Position stationary emission sources such as generators away from sensitive receptors with due regard to safety, security, traffic and other geographic restrictions.</p>	Possible	Limited	Short-term	Negligible	Medium	High	Minor	Conduct visual inspections for opacity from vehicle/equipment emissions.		<p>Likelihood: Diesel emissions from vehicles and dust emissions from operational activities could potentially expose human receptors to air emissions. Scale: Diesel emissions from operational activities will affect a small area around activities. Vehicle numbers required during operations are limited. Dust emissions from operational activities will affect a small area around activities. Most of the footprint will be under infrastructure and vegetation management will be used to control dust at the Solar Precinct. Duration: Emissions could cause elevated concentrations of NO2 or TSP for short periods of time as vehicles drive by or during maintenance activities, or ground disturbance. Magnitude: Health criteria are unlikely to be exceeded. Value: There are no sensitive receptors in areas where air emissions will occur i.e. they are limited to within operational areas. Certainty: The only sources of NO2 during operations will be some vehicles and maintenance equipment. Operational activities will not involve major ground disturbance works. Most ground surfaces will be covered.</p>

Factor	Potential Impact	Avoidance	Mitigation.	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Human Health	Exposure to noise emissions	Whenever possible, schedule work that creates the most noise during the NT EPA prescribed acceptable construction times (Monday to Saturday 7am to 7pm and between 9am and 6pm Sundays or public holidays). However, justification of work outside the NT EPA construction times may be needed if it is not possible to work within these times. Locate site access roads, laydown areas and stationary equipment (e.g., generators) as far away as possible from sensitive receivers; Whenever possible, plan haul routes to avoid residential areas; Maintain access routes to avoid the formation of potholes. Design access roads and laydown areas to minimize reversing of trucks/equipment; Use broadband back-up alarms to extent possible; Do not use engine brakes unless necessary; Maintain equipment as per manufacturer's instructions; Keep engines covers closed; Dampen tailgates to avoid banging; Avoid dropping loads into dump trucks from heights; Limit the use of diesel generators by drawing power from the existing hydro grid.	Where practical, machines shall be operated at low speeds and power and turned off instead of left idling for prolonged periods when not in use; Install temporary noise enclosures in areas of prolonged high noise activities. Notify the local community within the Study Area of the construction activities, especially if overnight construction is required. Notifications should include the location, extent, and duration of construction activities.	Unlikely					High	None			Not assessed as impact is unlikely to occur. No sensitive receptors are within predicted screening distance. Certainty: High confidence in noise screening assessment.

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Terrestrial environmental quality	Erosion and topsoil migration caused by disturbance of soils		Erosion and Sediment Control Plans implemented. Reinstatement of OHTL corridor footprints post-construction with native vegetation species and erosion controls.	Possible	Limited	Medium-term	Minor	Medium	High	Minor	Annual post wet season monitoring of rehabilitation success until disturbed areas stabilised. Visual inspections of drainage structures, discharge points and site boundaries following rain events. Post-wet season inspections of footprint and maintenance of emerging erosion issues.	Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions	Likelihood: Significant rainfall events can cause erosions. Scale: Erosion will affect isolated areas where runoff is concentrated. Duration: Impact occurs intermittently – wet season only. Magnitude: Good drainage design and reinstatement of the footprint will minimise erosion severity. Value: Railway and road infrastructure, and seasonal swamp at Darwin Converter Site and Gunn Point Beach could be affected by erosion. Certainty: Erosion hazard assessment and ESCP in accordance with IECA guidelines.
Terrestrial environmental quality	Contamination of soils	Solar used as power source, so no requirement for large fuel storages. Dangerous Goods and Hazardous Substances stored and handled in accordance with regulated standards and codes of practice, and manufacturer's directions.	Dangerous Goods and Hazardous Substances stored and handled in accordance with regulated standards and codes of practice, and manufacturer's directions. Spill response procedures and equipment provided at all storage and handling locations. Construction and operations personnel trained in spill response.	Possible	Limited	Short-term	Minor	High	High	Minor	Routine visual inspections around storage locations and work areas.	Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions	Likelihood: Operations will require the storage and handling of fuels and hazardous chemicals which have the potential to come in contact with soils if spills or leaks occur. Scale: The volumes stored and handled are small and therefore spills and leaks are predicted to affect isolated areas. Duration: Impact is only felt briefly before being cleaned up, or the contaminated material removed. Magnitude: Contaminants will not be detected in soils within or surrounding the site. Value: There are no land uses or environmental values located near to the Solar Precinct or Darwin Converter Site that would be sensitive to isolated short-term contaminating events. Certainty: Only aviation fuel stored in significant quantities. Australian Standards established and proven effective for mitigating risk.
Terrestrial environmental quality	Acid sulfate soils disturbance		Development of an ASSMP if ASS is identified in soil disturbance areas during construction. As per the developed ASSMP treatment of PASS to neutralise acidity and prevent impact on surrounding environment.	Possible	Limited	Short-term	Minor	Medium	High	Minor	Visual inspections and testing of any confirmed ASS in line with National Acid Sulfate Soils Guidance material.	Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions	Likelihood: PASS could occur at specific locations along OHTL. Soil testing to be undertaken. Scale: Area of potential disturbance will be limited to repair work requiring excavation where ASS present. Duration: ASS would be exposed for a matter of days prior to reburial. Magnitude: Oxidation unlikely to occur during short period of exposure. Value: Watercourses along OHTL would be sensitive to ASS impacts. Certainty: Guidelines for identification and management of ASS are established and proven effective.
Terrestrial ecosystems	Degradation of flora and vegetation in surrounding areas			Unlikely					High	None			Certainty: Potential impacts are well understood from other projects.
Terrestrial ecosystems	Introduction and spread of weeds and pests	All project activities will comply with the Weed Management Act which states it is an offence to transport weeds.	A Weed Management Plan will be implemented. Weed inspections and control will be undertaken for the duration of construction and operations to limit the spread of weeds.	Likely	Localised	Permanent	Moderate	Medium	High	Moderate	As per the Weed Management Plan (Appendix Q)	As per the Weed Management Plan (Appendix Q)	Likelihood: Maintenance activities and/or inadequate weed control post-construction could spread weeds. Scale: Weed infestations are likely to occur at some locations in the disturb footprint, but unlikely to extend far into surrounds. Duration: Once weeds are introduced they are very difficult to eradicate. Magnitude: Implementation of Weed MP will limit impact to ecological function and integrity. Values: Sensitive values present in footprint are riparian, sand sheet heath and rainforest, and the Black Jungle Reserve. Certainty: Potential impacts are well understood from other projects and Weed MP will reduce risk to ALARP.

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Terrestrial ecosystems	Direct fauna mortality	Bird collisions with transmission wires: Use of electrodes removes the need for a top earth wire (which is the wire associated with most birds collision).	Site inductions will ensure that all personnel are aware of their obligations and know the correct procedures for fauna encounters. Vehicle speed restrictions apply when travelling near uncleared areas or in higher risk conditions. Bird collisions with transmission wires: Marking transmission powerlines with diverting devices at major river crossings and where they transect important wetland areas on Gunn Point peninsula. Installing diverting devices in response to any collision hotspots identified during operations.	Possible	Limited	Medium-term	Negligible	Low	High	Minor	Incidental observations of carcasses, including during routine infrastructure inspections Public reports of carcasses	Internal record keeping of incidents of fauna mortality. External reporting in accordance with environmental approval conditions	Likelihood: The large diameter of the powerlines makes them conspicuous and avoidable but strikes by birds are possible. Scale: The impact of bird deaths will be limited to isolated locations within the proposal footprint. Duration: Impact could occur intermittently over the life of the Solar Precinct. Magnitude: The number of birds deaths will be low and will not affect biodiversity or ecological function/integrity. Values: Species most likely to be affected are larger birds. There are no threatened large bird species that are likely to be affected. Certainty: Potential impacts are well understood from other projects. Proven mitigation measures (visibility markers) are available to implement if issues arise.
Terrestrial ecosystems	Changes to fauna behaviours due to noise, light and other disturbances	Waste management procedures to avoid attracting fauna to waste disposal areas.		Unlikely					High	None			Certainty: Potential impacts are well understood from other projects.
Hydrological processes	Alteration of flows in surface watercourses or wetlands	Roadside drainage and culverts will be designed and installed in accordance with accepted Austroads standards. Groundwater used as water supply – no surface water extraction.	Drainage, erosion and sediment controls installed and maintained in accordance with Erosion and Sediment Control Plans (ESCP) that align with the Best Practice Erosion and Sediment Control Guidelines (IECA, 2008). Reinstatement of OHTL construction corridor and Cable Transition Facilities footprints post-construction. Design criteria for engineered stormwater management systems installed at the Solar Precinct and Darwin Converter Site is to discharge water to similar locations and at similar volumes to pre-development conditions.	Unlikely	Limited	Short-term	Negligible	Medium	High	Minor	During construction, visual inspections of disturbed areas and erosion and sediment controls as per ESCP (after significant rainfall events, at a minimum). Annual post wet season monitoring of revegetation success until disturbed areas are stabilised. Visual inspections of drainage structures, discharge points and site boundaries following rain events. Post-wet season inspections of all project locations and rectification of emerging erosion issues.	Internal records of ESCP inspections, as stipulated in ESCP's. Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions.	Likelihood: Majority of OHTL will be reinstated following construction with drainage as required to manage overland flows and maintain hydrological regime. Scale: Overland flows may be altered in limited areas due to erosion. Duration: Erosion would be identified and rectified. Magnitude: No impacts to flows in watercourses or wetlands. Values: OHTL does cross watercourses and wetland which support numerous beneficial uses. Certainty: OHTL will be reinstated, and drainage as per an ESCP developed in accordance with IECA guidelines.
Hydrological processes	Changes to groundwater levels caused by water extraction from bores	Groundwater extraction sites will be located away from existing groundwater bores in use.	Bore locations and sustainable yields to be determined subject to investigation and recommendations from a hydrogeologist. Bore work permits and water extraction licences obtained under the Water Act.	Unlikely	Limited	Short-term	Negligible	Medium	High	Minor	Monitoring of standing water levels and water extraction volumes, as required under water extraction licence conditions. Water quality sampling and analysis of springs near Solar Precinct and aquifer targeted for groundwater extraction to	Internal records of water usage and water extraction. External reporting of water extraction in accordance with water extraction licence and environmental approval conditions.	Likelihood: Very limited groundwater may be required for maintenance. Scale: Drawdown may occur immediately surrounding the bore. Duration: Groundwater extraction would only occur for short maintenance works. Magnitude: Short term use of minor volume unlikely to impact levels or other users. Values: Groundwater supports numerous other users across the region, and GDE's. Certainty: If required, water will be extracted from existing bores under agreement with landholders and in accordance with any existing licences.

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
											ensure there is no connectivity.		
Hydrological processes	Changes to groundwater levels caused by reduced recharge			Unlikely					High	None			<i>Not assessed</i> Certainty: No impervious surface created, so no impact on recharge.
Inland water environmental quality	Increased turbidity caused by soil disturbance and erosion	Progressive clearing, construction and reinstatement will be undertaken. OHTL poles will not be placed in watercourses or drainage lines. Only minor drainage lines will be crossed by the OHTL access track. Major drainages will be approached from either side to avoid the need for constructing crossings. Stormwater drainage will be installed to capture and manage runoff. Stormwater captured within facilities will discharge to land, via erosion and sediment controls. Roadside drainage and culverts will be installed in accordance with Austroroads standards.	Watercourse crossings along access roads and OHTL will be installed during the dry season when no flow present. Drainage, erosion and sediment controls will be installed and maintained in accordance with Erosion and Sediment Control Plans (ESCP) that align with the Best Practice Erosion and Sediment Control Guidelines (IECA, 2008). Develop and implement a Reinstatement Plan for post-construction reinstatement of works areas to stabilise soils and promote regrowth of native vegetation. Rectification of emerging erosion issues after each wet season.	Possible	Limited	Short-term	Minor	Medium	High	Minor	During construction, visual inspections will be undertaken of disturbed areas and erosion and sediment controls as per ESCP (after significant rainfall events, at a minimum). Annual post wet season monitoring of reinstatement success until disturbed areas are stabilised. Visual inspections of drainage structures, discharge points and site boundaries following rain events. Post-wet season inspections of all project locations and rectification of emerging erosion issues.	Internal records of ESCP inspections, as stipulated in ESCP's. Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions.	Likelihood: OHTL crosses 154 water courses. Maintenance of a cleared 6 m wide access along a long linear footprint could result in erosion and turbidity in watercourses. Scale: Water quality may be impacted for a several hundred metres downstream of crossings. Duration: Erosion will be identified and rectified, and water quality impacts would only occur for days immediately following a rainfall event. Magnitude: Watercourses are naturally turbid, particularly following rainfall and runoff events. Value: Water quality supports values such as aquatic ecosystem health, pastoral, agricultural, cultural, social and amenity. Certainty: ESCP in accordance with IECA guidelines, and ongoing monitoring and maintenance.
Inland water environmental quality	Contamination by release of fuels and chemicals	During operations, solar power will be used as a power source, hence no requirement for bulk fuel storages. Dangerous Goods and Hazardous Substances will be stored and handled in accordance with regulated standards and codes of practice, and manufacturer's directions. Dangerous Goods and Hazardous Substances will not be stored within 200m of a watercourse or groundwater bore, and mobile refuelling will not occur within 50m of a watercourse or groundwater bore.	Dangerous Goods and Hazardous Substances Registers will be maintained at all storage and handling locations. An Environmental Emergency and Spill Response Plan will be in place and equipment provided at all storage and handling locations. Construction and operations staff will be trained in spill response.	Unlikely	Limited	Short-term	Negligible	High	High	Minor	Routine visual inspections around storage locations and work areas.	Internal records of volumes used and stored in accordance with Workplace Health and Safety Regulations. Internal inspection records and notes. Internal records of water quality monitoring. Incidents of off-site pollution or nuisance reported to the NT EPA within 24 hours	Likelihood: Generally minor volumes of fuels and hazardous substances will be stored and used. A large above-ground storage will in place at the Solar Precinct airfield. Scale: Spills may occur but storage and handling procedures mean a spill will be limited to ground around spill and will not enter a watercourse or groundwater aquifer. Duration: Spills to ground will occur intermittently. Spills will be detected and remediated immediately. Magnitude: No change in water quality as a result of spills. Value: Water quality in watercourses and groundwater is sensitive to contamination and supports numerous beneficial uses. Certainty: Australian Standards are established and proven effective for mitigating risk. No underground storage, or storage within 200 m of a watercourse.

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Inland water environmental quality	Contamination from waste storage and disposal areas	Landfill will comply with the Guidelines for Siting, Design and Management of Solid Waste Disposal Sites in the Northern Territory (NT EPA 2003). No waste will be stored within 200m of a watercourse.	Waste management will be in accordance with best practice guidelines (e.g. separation of waste, covering, bunded storage areas), and the requirements of the Waste Management and Pollution Control Act 1998. All listed waste will be disposed of at a licenced waste management facility.	Unlikely	Limited	Long-term	Negligible	Low	High	Minor	Routine visual inspections around landfill, waste storage locations and work areas.	Internal records of inspections. Incident reporting	Likelihood: Inert and putrescible waste will be disposed of onsite at Solar Precinct. All other waste will be temporarily stored and disposed at a licenced facility. Scale: Any contamination from waste storage and disposal will be limited to soil in immediate surrounds. Duration: Waste will be stored at Darwin Converter Site, and stored and disposed at Solar Precinct for construction and operation phases. Short term storage within OHTL. Magnitude: No change in water quality as a result of waste storage and disposal. Value: No watercourses or groundwater proximate to waste storage and disposal areas. Certainty: Compliance with NT guidelines and regulations proven effective for mitigating risk.
Inland water environmental quality	Contamination by sewage from accommodation camp			Unlikely					High	None			Certainty: No wastewater systems will be installed within this area
Aquatic ecosystems	Direct loss of aquatic habitat	OHTL pole placement will avoid watercourses or wetlands in accordance with micro-siting criteria provided in Chapter 2 Section 2.5.2.3. Clearing of significant riparian vegetation (e.g. large trees) will be avoided wherever practical by spanning the powerline across riparian zones associated with higher order watercourses. Only minor drainage lines will be crossed by the OHTL access track. Major drainages will be approached from either side to avoid the need for constructing crossings.	Watercourse crossings along Solar Precinct access roads and OHTL installed in the dry season when no flow is present.	Unlikely					High	None	None required	Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions.	<i>Not assessed because impact is inherently unlikely to occur.</i> Certainty: No further disturbance of aquatic ecosystems beyond disturbance that occurred during construction.
Aquatic ecosystems	Reduction in aquatic habitat value due to water quality impacts	Clearing will be undertaken progressively. Dangerous Goods and Hazardous Substances will be stored and handled in accordance with regulated standards and codes of practice, and manufacturer's directions. Dangerous Goods and Hazardous Substances will not be stored within 200 m of a watercourse or groundwater bore, and mobile refuelling will not occur within 50 m of a watercourse or groundwater bore.	Watercourse crossings along access roads and OHTL installed during the dry season when no flow present. Drainage, erosion and sediment controls installed and maintained in accordance with Erosion and Sediment Control Plans (ESCP) that align with the Best Practice Erosion and Sediment Control Guidelines (IECA, 2008). Develop and implement a Reinstatement Plan for post-construction reinstatement of works areas to stabilise soils and promote regrowth of native vegetation. Rectification of emerging erosion issues after each wet season. Dangerous Goods and Hazardous	Possible	Limited	Short-term	Negligible	Medium	High	Minor	Annual post wet season monitoring of rehabilitation success until disturbed areas are stabilised. Visual inspections of drainage structures, discharge points and site boundaries following rain events. Post-wet season inspections of all project locations and rectification of emerging erosion issues.	Internal reporting on environmental performance. Internal records of ESCP inspections, as stipulated in ESCP's. External reporting in accordance with environmental approval conditions. Internal records of water quality monitoring. Internal records of volumes used and stored in accordance with Workplace Health and Safety Regulations. Incidents of off-site pollution or nuisance	Likelihood: Minor erosion and increased turbidity could occur at access road crossings. Chemical contamination unlikely. Scale: Isolated occurrences of scour and erosion at watercourse crossings with water quality impacts immediately downstream. Duration: Erosion will be identified and rectified regularly. Water quality impacts would be short-term following rain. Magnitude: Watercourses are naturally turbid, particularly following rainfall and runoff events. Short-term elevated turbidity will not affect ecosystem. Value: Watercourses and wetlands support aquatic ecosystems. Certainty: IECA (2008) Guidelines proven effective for minimising erosion and water quality impacts.

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
			Substances Registers maintained at all storage and handling locations. An Environmental Emergency and Spill Response Plan will be in place and equipment provided at all storage and handling locations. Construction and operations staff trained in spill response.									reported to the NT EPA within 24 hours.	
Aquatic ecosystems	Reduction in aquatic habitat value due to altered hydrology or groundwater extraction	Roadside drainage and culverts will be designed in accordance with accepted AustRoads standards. Groundwater used as water supply – no surface water extraction. Groundwater extraction sites will be located away from springs or GDE's.	None required	Unlikely					High	None	Monitoring of standing water levels and water extraction volumes, as required under water extraction licence conditions.	Internal reporting on environmental performance. Internal records of water usage and water extraction. External reporting of water extraction in accordance with water extraction licence and environmental approval conditions.	<i>Not assessed as impact inherently unlikely to occur.</i> Certainty: Access track across minor watercourse will not alter stream flows.
Aquatic ecosystems	Reduction in aquatic habitat value due to dust	Operational footprint will cover soil with infrastructure, hardstand or vegetation to minimise wind erosion and dust	None required	Unlikely					High	Minor	None required	Internal reporting on environmental performance	<i>Not assessed as the impact is inherently unlikely to occur.</i> Certainty: The majority of construction footprints will be covered by infrastructure, hardstand or vegetation, or reinstated.
Air quality	Emissions of NO ₂ from diesel exhaust	Whenever possible, plan haul routes to avoid residential areas Efficient staging and layout of construction facilities to minimize haulage, avoid double handling of materials and other excessive equipment operations Use grid or solar power whenever practical over stationary combustion generated power Implement anti-idling policy	NOx emissions will be minimised by using electric vehicles and equipment where practicable, and ensuring all machinery, plant and equipment complies with minimum emissions standards Operate equipment at optimum rated loads as determined by equipment manufacturer and follow routine equipment maintenance procedures Ensure all heavy duty on-road and non-road vehicles are late model and meet all commonwealth and NT emission standards Ensure all equipment brought to site is in good working order accompanied by inspection certificates and not exceeding 10% opacity. Position stationary emission sources such as generators away from sensitive receptors with due regard to safety, security, traffic and other geographic restrictions.	Possible	Limited	Short-term	Negligible	Medium	High	Minor	Conduct visual inspections for opacity from vehicle/equipment emissions. Carry out inspections certifying equipment is in good working order prior to shipping to site	Reporting will be carried out per the requirements of the CEMP described in Chapter 17 External reporting in accordance with environmental approval conditions.	Likelihood: Operational activities will use vehicles and maintenance equipment. Scale: Diesel emissions from operational activities will affect a small area around activities. Vehicle numbers required during operations are limited. Duration: Emissions could cause elevated concentrations of NO ₂ for short periods of time as vehicles drive by or during maintenance activities. Magnitude: Health criteria are unlikely to be exceeded. Value: There are no sensitive receptors in areas where air emissions will occur i.e. they are limited to within operational areas. Certainty: The only sources of NO ₂ during operations will be some vehicles and maintenance equipment.

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Air quality	Emissions of particulate matter (dust)	Locate site access roads, laydown areas and stationary equipment (e.g., generators) as far away as possible from sensitive receivers Limit the amount of time between completion of road base and any paved areas to minimize exposure of unpaved surface	Water carts will be used across the project footprint to minimise dust emissions in areas of high risk at regular intervals. Other dust suppressants will be used if water ineffective. Implement on-site vehicle restrictions (e.g., limit the speed of vehicles travelling on unsealed access roads). Provide tyre wash facilities to minimize tracking of mud or dirt onto sealed roads Cover or dampen any stockpiles where practical. Notify and engage with residences and businesses who could be affected ahead of the construction front, and implement complaints procedure.	Possible	Limited	Short-term	Negligible	Medium	High	Minor	Visual observations for fugitive emissions of dust Conduct regular inspections of construction areas and roads to identify potential sources of dust emissions Develop 'watching brief' on 'nuisance' impacts to ensure quick responses to any detriment and emerging issues. Implement complaints procedure	Reporting will be carried out per the requirements of the CEMP described in Chapter 17 External reporting in accordance with environmental approval conditions.	<p>Likelihood: Operational activities include vehicle movement and possibly minor ground disturbance.</p> <p>Scale: Dust emissions from operational activities will affect a small area around activities. Most of the footprint will be under infrastructure and vegetation management will be used to control dust at the Solar Precinct.</p> <p>Duration: Emissions could cause elevated concentrations of TSP for short periods of time as vehicles drive by or during maintenance activities that require ground disturbance.</p> <p>Magnitude: Health or nuisance criteria are unlikely to be exceeded.</p> <p>Value: There are no sensitive receptors in areas where air emissions will occur i.e. they are limited to within operational areas.</p> <p>Certainty: Operational activities will not involve major ground disturbance works. Most ground surfaces will be covered.</p>
Atmospheric processes	GHG emissions from the decomposition of organic debris and loss of soil carbon during operation	Continue to identify and engage in opportunities to maximise commercially viable carbon abatement from the AAPowerLink, including: <ul style="list-style-type: none"> Pursuing power purchase agreements with large fossil fuel power generators in the NT. Conduct a life-cycle assessment during the design phase to quantify GHG emissions including embodied, direct and indirect emissions and demonstrate that the AAPowerLink is a carbon positive project Supply AAPowerLink construction and operational power needs via self-generated solar energy where practicable. Where the use of self-generated solar energy is not possible, source renewable energy via market mechanisms (if available). Identify and (where practicable) adopt practical zero carbon technology solutions such as electric vehicles, plant and equipment and remote solar energy systems. Explore practicable opportunities with NT Carbon Capture Utilisation and Storage Project 	Develop and implement a GHG Abatement and Management Plan that aligns with ISO 140001 Environmental Management Systems and ISO 50001 Energy Management Systems. Conduct GHG mitigation workshops every 2 years during design and construction and every five years during operations to assess performance and identify new opportunities for leveraging best practice and emerging technology. Procurement strategies to consider adoption of carbon reduction and energy efficient technologies (where practicable), including but not limited to: <ul style="list-style-type: none"> Electrification options for civil plant, machinery and equipment. Energy efficiency in aircraft services selection. Electrification and alternative fuel options for transportation (e.g., marine vessels, rail) Develop vegetation management strategies that aim to retain vegetation and soil carbon Conduct studies to identify and select clearing, fire management, vegetation disposal practices and vegetation species to plant or retain. Develop and implement Rehabilitation Plans that aim to reinstate vegetation post-	Likely	Widespread	Long-term	Minor	Low	High	Minor	Monitor GHG emissions from activities, as well as energy produced and exported in line with the requirements of NT and Commonwealth law. Data required to calculate GHG emissions will be collected in line with the methods outlined in the National Greenhouse and Energy reporting (Measurement) Determination 2008 Monitor performance against targets set in the GHG Abatement and Management Plan.	Reporting of GHG emissions in line with the requirements of the NGER Act. AAPowerLink will trigger emissions thresholds for reporting during construction and reporting thresholds for energy production during operations. External reporting in accordance with environmental approval conditions under the EP Act.	<p>Likelihood: Organic matter from land clearing will decompose.</p> <p>Scale: Organic matter and debris from a combined area of ~12,900ha.</p> <p>Duration: Impacts will occur over the operational phase.</p> <p>Magnitude: Relevant criteria for environmental protection are met.</p> <p>Value: Local sensitive receptors are not impacted by GHG emissions; project has a net positive GHG impact.</p> <p>Certainty: Acceptable level of certainty pertaining to values and receptors.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
			construction and post-decommissioning										
Atmospheric processes	Positive Impact Overall reduction in GHG emissions from generation of renewable energy	Nil	Utilising energy produced by the Solar Precinct wherever possible	Likely	Widespread	Long-term	Major	High	High	Major	Monitor GHG emissions from activities, as well as energy produced and exported in line with the requirements of NT and Commonwealth law. Data required to calculate GHG emissions will be collected in line with the methods outlined in the National Greenhouse and Energy reporting (Measurement) Determination 2008. Monitor performance against targets set in the GHG Abatement and Management Plan.	Reporting of GHG emissions in line with the requirements of the NGER Act. AAPowerLink will trigger emissions thresholds for reporting during construction and reporting thresholds during operations. External reporting in accordance with environmental approval conditions under the EP Act.	Likelihood: This is the intent of the Project. Scale: Intended benefits are regional and global. Duration: Impact will occur over the construction and operational phase. Magnitude: The degree of the change will contribute to the protection of environmental values, ecological function and sensitive receptors. Value: Important at regional, national and international scale. Certainty: Overall project objective.
Culture and heritage	Direct or indirect impact to heritage features associated with operations and maintenance activities	Consult with Traditional Owners and sites custodians through the ILUA and AAPA Authority Certificate processes to identify Sacred Sites and culturally significant landscape features and determine the most appropriate site protection measures.	Prepare Cultural Heritage Management Plan/s (CHMP) in consultation with Traditional Owners and the NT Heritage Branch. Comply with conditions of Authority Certificates and ensure conditions are made available to all authorised personnel. Where impacts to archaeological heritage features are unavoidable, obtain an approval to carry out work on a heritage place or object (work) under the Heritage Act. Mitigation works on heritage features covered by Works Approvals will be undertaken ahead of commencing site preparation activities. Workforce training and inductions will address all aspects of cultural awareness and heritage protection.	Possible	Limited	Short-term	Minor	Low	High	Minor	Visual inspection of heritage features identified for protection. Ongoing engagement with Traditional Owners to identify emerging issues or concerns regarding heritage protection.	Internal environmental performance reporting. Reporting of incidents to Traditional Owners/AAPA/NLC and NT Heritage Branch and consultation to determine appropriate response. External reporting in accordance with environmental approval and heritage works approval conditions.	Likelihood: Some public access could occur along OHTL corridor. Scale: Public access impacts would be limited to within OHTL and immediate surrounds. Duration: Public access could occur intermittently over the operations phase. Magnitude: Public access unlikely to significantly impact sites as locations not made public. Value: Sites within direct disturbance footprint removed during construction. Certainty: Public access along OHTL corridor will be managed.
Human Health	Exposure to EMF	HVAC cables at Solar Precinct and Darwin Converter Site emit low level EMF that does not pose a risk to human health.	Subsea and underground cables design includes lead sheathing and armoured cores which further prevents electric fields from entering the surrounding environment.	Unlikely	Limited	Long-term	Negligible	Medium	High	None	-	-	Likelihood: Exposure static electricity and magnetic fields unlikely to cause health effects. Scale: Very short distance from emissions source. Duration: Continuous during operations. Magnitude: Research to date shows no detrimental health effect from exposure to low-level static electric and magnetic fields. Value: There are no sensitive receptors in areas where EMF exposure could occur; no public access near and under facilities. Certainty: Acceptable level of confidence in EMF research to date.

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Human Health	Increase in Biting Insects	<p>Construction camps will be adequately insect screened. Locations for OHTL fly camps will be selected to be as far as possible away from significant mosquito breeding habitats i.e. watercourses and wetlands that retain water during the dry season.</p> <p>Darwin Converter Site workforce will be accommodated in Darwin, not on site.</p> <p>Drains and culverts designed to prevent upstream flooding and be free draining, retaining water for a period of maximum 5 days.</p> <p>Water tanks will be screened to prevent entry of mosquitoes. Landfill will comply with the Guidelines for Siting, Design and Management of Solid Waste Disposal Sites in the Northern Territory 2003. Materials arriving from overseas at Darwin Port are subject to quarantine inspections and treatment.</p>	<p>Workforce education and induction on the use of appropriate PPE, bite prevention and treatment methods. Inspection and removal of any artificial mosquito breeding habitats (see below). Implementation of mosquito control methods, such as residual insecticides and larvicides in accordance with advice from Department of Health. Containers capable of holding water stored undercover and/or emptied on a weekly basis during construction.</p> <p>Post-construction reinstatement activities to remove impediments to surface water drainage such as stockpiles, low points, wheel ruts etc.</p> <p>Stormwater drains, culverts and sediment basins maintained free from sediment build up and vegetation growth. Landfill and wastewater management systems maintained to prevent water ponding and pooling. Inspection of imported materials, equipment and plant for pests on arrival at works areas. Treat any pest species detected in accordance with advice from NT Medical Entomology branch</p>	Unlikely						None	<p>Visual inspections for the presence of ponding/pooling water and mosquito larvae. Report/complaints from workers. Visual inspections of all infrastructure for ponding/pooling of water. Rectification works if required. Visual inspections for the presence of mosquito larvae and other non-native species.</p>	<p>Incident reporting in the event a worker requires treatment or becomes ill from exposure to biting insect bites or disease. Internal inspection records. Notify NT Medical Entomology branch in the event a pest species is detected.</p>	<p><i>Not assessed as impact is unlikely to occur. Operational footprints will be managed to avoid creation of biting insect breeding habitat.</i></p>
Human Health	Increase in communicable disease	<p>Compliance with all federal (Australian Government Department of Health), state (Northern Territory Government Health), and local requirements set out for COVID 19 health measures, as well as guidelines set out by the World Health Organization (WHO). Practices to minimize the risk of COVID 19 infection while living in camps include washing hands, wearing masks while in common areas where physical distancing is not possible, and avoiding touching one's eyes, nose, and mouth without properly cleaning hands first. No guests will be allowed in the camps, and all camps will be equipped with readily available PPE, including hand soap, sanitizer, face masks,</p>	<p>If any worker exhibits cold or flu like symptoms, immediately notify a Construction Supervisor. The individual must, if possible, evacuate the camp to a hotel for a minimum of five days or until symptoms improve, or self-isolate away from other workers.</p>	Unlikely						None	-	-	<p><i>Not assessed as impact is unlikely to occur. Size of operations workforce and lack of camp living accommodations reduces risk of increase in communicable disease to unlikely during operations phase.</i></p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
		<p>disinfectant wipes, over the counter medicines, thermometers, and rapid COVID 19 antigen tests. Workers will be required to be fully vaccinated. 14 days prior to moving into the camp, it will be recommended that workers avoid large gatherings, wear masks in public spaces and where physical distancing is not possible, avoid being near people who are sick, and wash their hands.</p>											
Human Health	Exposure to air emissions of particulate matter (PM10, PM2.5) and Nitrogen Oxide (NOx)	<p>Whenever possible, plan haul routes to avoid residential areas. Efficient staging and layout of construction facilities to minimize haulage, avoid double handling of materials and other excessive equipment operations. Use grid or solar power whenever practical over stationary combustion generated power. Prohibit open burning of any materials.</p>	<p>NOx emissions will be minimised by using electric vehicles and equipment where practicable, and ensuring all machinery, plant and equipment complies with minimum emissions standards. Implement anti-idling policy. Operate equipment at optimum rated loads as determined by equipment manufacturer and follow routine equipment maintenance procedures. Ensure all heavy duty on-road and non-road vehicles are late model and meet all commonwealth and NT emission standards. Ensure all equipment brought to site is in good working order accompanied by inspection certificates and not exceeding 10% opacity.</p> <p>Position stationary emission sources such as generators away from sensitive receptors with due regard to safety, security, traffic and other geographic restrictions.</p>	Possible	Limited	Short-term	Negligible	Medium	High	Minor	Conduct visual inspections for opacity from vehicle/equipment emissions.		<p>Likelihood: Diesel emissions from vehicles and dust emissions from operational activities could potentially expose human receptors to air emissions. Scale: Diesel emissions from operational activities will affect a small area around activities. Vehicle numbers required during operations are limited. Dust emissions from operational activities will affect a small area around activities. Most of the footprint will be under infrastructure and vegetation management will be used to control dust at the Solar Precinct. Duration: Emissions could cause elevated concentrations of NO2 or TSP for short periods of time as vehicles drive by or during maintenance activities, or ground disturbance. Magnitude: Health criteria are unlikely to be exceeded. Value: There are no sensitive receptors in areas where air emissions will occur i.e. they are limited to within operational areas. Certainty: The only sources of NO2 during operations will be some vehicles and maintenance equipment. Operational activities will not involve major ground disturbance works. Most ground surfaces will be covered.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Human Health	Exposure to noise emissions	Whenever possible, schedule work that creates the most noise during the NT EPA prescribed acceptable construction times (Monday to Saturday 7am to 7pm and between 9am and 6pm Sundays or public holidays). However, justification of work outside the NT EPA construction times may be needed if it is not possible to work within these times. Locate site access roads, laydown areas and stationary equipment (e.g., generators) as far away as possible from sensitive receivers; Whenever possible, plan haul routes to avoid residential areas; Maintain access routes to avoid the formation of potholes. Design access roads and laydown areas to minimize reversing of trucks/equipment; Use broadband back-up alarms to extent possible; Do not use engine brakes unless necessary; Maintain equipment as per manufacturer's instructions; Keep engines covers closed; Dampen tailgates to avoid banging; Avoid dropping loads into dump trucks from heights; Limit the use of diesel generators by drawing power from the existing hydro grid.	Where practical, machines shall be operated at low speeds and power and turned off instead of left idling for prolonged periods when not in use; Install temporary noise enclosures in areas of prolonged high noise activities. Notify the local community within the Study Area of the construction activities, especially if overnight construction is required. Notifications should include the location, extent, and duration of construction activities.	Possible	Localised	Long-term	Moderate	Medium	High	Moderate			<p>Likelihood: OHTL operation will produce continuous noise.</p> <p>Scale: Health criteria predicted to be exceeded within 100-300 m from source activity.</p> <p>Duration: Impact to occur continuously during operations.</p> <p>Magnitude: Noise will likely exceed health criteria at sensitive receptors in several locations along OHTL.</p> <p>Value: Some sensitive receptors within area of influence.</p> <p>Certainty: High confidence in noise screening assessment, understanding of operations activities.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Terrestrial environmental quality	Erosion and topsoil migration caused by disturbance of soils	Nil	Implementation of site-specific ESCP (Appendix X), which will be commensurate with the risk of erosion in each location.	Possible	Limited	Medium-term	Minor	Medium	High	Minor	Annual post wet season monitoring of rehabilitation success until disturbed areas stabilised. Visual inspections of drainage structures, discharge points and site boundaries following rain events. Post-wet season inspections of footprint and maintenance of emerging erosion issues.	Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions	<p>Likelihood: Significant rainfall events can cause erosions.</p> <p>Scale: Erosion will affect isolated areas where runoff is concentrated.</p> <p>Duration: Impact occurs intermittently – wet season only.</p> <p>Magnitude: Good drainage design and reinstatement of the footprint will minimise erosion severity.</p> <p>Value: Railway and road infrastructure, and seasonal swamp at Darwin Converter Site and Gunn Point Beach could be affected by erosion.</p> <p>Certainty: Erosion hazard assessment and ESCP in accordance with IECA guidelines.</p>
Terrestrial environmental quality	Contamination of soils	Solar used as power source, so no requirement for large fuel storages. Dangerous Goods and Hazardous Substances stored and handled in accordance with regulated standards and codes of practice, and manufacturer’s directions.	Dangerous Goods and Hazardous Substances stored and handled in accordance with regulated standards and codes of practice, and manufacturer’s directions. Spill response procedures and equipment provided at all storage and handling locations. Construction and operations personnel trained in spill response.	Possible	Limited	Short-term	Minor	High	High	Minor	Routine visual inspections around storage locations and work areas.	Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions	<p>Likelihood: Operations will require the storage and handling of fuels and hazardous chemicals which have the potential to come in contact with soils if spills or leaks occur.</p> <p>Scale: The volumes stored and handled are small and therefore spills and leaks are predicted to affect isolated areas.</p> <p>Duration: Impact is only felt briefly before being cleaned up, or the contaminated material removed.</p> <p>Magnitude: Contaminants will not be detected in soils within or surrounding the site.</p> <p>Value: There are no land uses or environmental values located near to the Solar Precinct or Darwin Converter Site that would be sensitive to isolated short-term contaminating events.</p>
Terrestrial environmental quality	Acid sulfate soils disturbance	Nil	Development of an ASSMP if ASS is identified in soil disturbance areas during construction. As per the developed ASSMP treatment of PASS to neutralise acidity and prevent impact on surrounding environment.	Possible	Limited	Short-term	Minor	Medium	High	Minor	Visual inspections and testing of any confirmed ASS in line with National Acid Sulfate Soils Guidance material.	Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions	<p>Likelihood: PASS could occur at specific locations along OHTL. Soil testing to be undertaken.</p> <p>Scale: Area of potential disturbance will be limited to repair work requiring excavation where ASS present.</p> <p>Duration: ASS would be exposed for a matter of days prior to reburial.</p> <p>Magnitude: Oxidation unlikely to occur during short period of exposure.</p> <p>Value: Watercourses along OHTL would be sensitive to ASS impacts.</p> <p>Certainty: Guidelines for identification and management of ASS are established and proven effective.</p>
Terrestrial ecosystems	Degradation of flora and vegetation in surrounding areas			Unlikely					High	None			<p>Certainty: Potential impacts are well understood from other projects.</p>
Terrestrial ecosystems	Introduction and spread of weeds and pests	All project activities will comply with the Weed Management Act which states it is an offence to transport weeds.	A Weed Management Plan will be implemented. Weed inspections and control will be undertaken for the duration of construction and operations to limit the spread of weeds.	Likely	Localised	Permanent	Moderate	Medium	High	Moderate	As per the Weed Management Plan (Appendix Q)	As per the Weed Management Plan (Appendix Q)	<p>Likelihood: Maintenance activities and/or inadequate weed control post-construction could spread weeds.</p> <p>Scale: Weed infestations are likely to occur at some locations in the disturb footprint, but unlikely to extend far into surrounds.</p> <p>Duration: Once weeds are introduced they are very difficult to eradicate.</p> <p>Magnitude: Implementation of Weed MP will limit impact to ecological function and integrity.</p> <p>Values: Sensitive values present in footprint are riparian, sand sheet heath and rainforest, and the Black Jungle Reserve.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
													Certainty: Potential impacts are well understood from other projects and Weed MP will reduce risk to ALARP.
Terrestrial ecosystems	Direct fauna mortality	Pre-clearing inspections undertaken to identify and relocate any fauna that are at risk i.e. nests and burrows. Avoiding clearing large hollow-bearing trees where possible.	Clearing will be conducted in a single direction, allowing any fauna to move out of way of clearing activities. If fauna is spotted in immediate clearing area and are in danger, clearing will be stopped until safe to continue. Clearing in a progressive manner to allow wildlife to natural disperse from the area as clearing undertaken. Site inductions will ensure that all personnel are aware of their obligations and know the correct procedures for fauna encounters. Vehicle speed restrictions apply when travelling near uncleared areas or in higher risk conditions.	Unlikely					High	None	Record any fauna encounters, injuries or death as result of works for the duration of works. Incidental observations of carcasses, including during routine infrastructure inspections	Internal record keeping of incidents of fauna mortality. External reporting in accordance with environmental approval conditions	Certainty: Potential impacts are well understood from other projects.
Terrestrial ecosystems	Changes to fauna behaviours due to noise, light and other disturbances	Waste management procedures to avoid attracting fauna to waste disposal areas.		Possible	Limited	Medium-term	Minor	Low	High	Minor			Likelihood: Fauna could either be attracted or deterred by operational activities. Scale: Affects expected to be limited to within close proximity to activities. Duration: Impact will occur intermittently during operations. Magnitude: Localised behavioural change will not affect biodiversity or ecosystem function/integrity. Values: There are no proximate ecological receptors that are sensitive to these disturbances. Certainty: Potential impacts are well understood from other projects. Mitigation measures are routine and proven effective.
Hydrological processes	Alteration of flows in surface watercourses or wetlands	Roadside drainage and culverts will be designed and installed in accordance with accepted Austroads standards. Groundwater used as water supply – no surface water extraction.	Drainage, erosion and sediment controls installed and maintained in accordance with Erosion and Sediment Control Plans (ESCP) that align with the Best Practice Erosion and Sediment Control Guidelines (IECA, 2008). Design criteria for engineered stormwater management systems installed at the Solar Precinct and Darwin Converter Site is to discharge water to similar locations and at similar volumes to pre-development conditions.	Possible	Localised	Long-term	Moderate	Medium	Low	Moderate	During construction, visual inspections of disturbed areas and erosion and sediment controls as per ESCP (after significant rainfall events, at a minimum). Annual post wet season monitoring of revegetation success until disturbed areas are stabilised. Visual inspections of drainage structures, discharge points and site boundaries following rain events. Post-wet season inspections of all project locations and rectification of emerging erosion issues.	Internal records of ESCP inspections, as stipulated in ESCP's. Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions.	Likelihood: Overland flows altered within direct disturbance footprint ~55ha. Scale: Potential for increase or decrease in discharges to seasonal swamp located 150 m south-west. Duration: Overland flow paths will be altered for the duration of operations. Magnitude: Potential for increase or decrease in swamp levels. Values: Hydrology supports aquatic ecosystem in seasonal swamp. Certainty: Stormwater management plan yet to be developed and could result in increased or decreased flows to the swamp.

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Hydrological processes	Changes to groundwater levels caused by water extraction from bores	Groundwater extraction sites will be located away from existing groundwater bores in use.	Bore locations and sustainable yields to be determined subject to investigation and recommendations from a hydrogeologist. Bore work permits and water extraction licences obtained under the Water Act.	Unlikely	Limited	Long-term	Negligible	Low	High	Minor	Monitoring of standing water levels and water extraction volumes, as required under water extraction licence conditions. Water quality sampling and analysis of springs near Solar Precinct and aquifer targeted for groundwater extraction to ensure there is no connectivity.	Internal records of water usage and water extraction. External reporting of water extraction in accordance with water extraction licence and environmental approval conditions.	<p>Likelihood: Groundwater extraction to supply 0.05 ML/year</p> <p>Scale: Drawdown may occur immediately surrounding the bore.</p> <p>Duration: Extraction will occur for duration of operations.</p> <p>Magnitude: Low volumes, few other users, no GDE's.</p> <p>Values: No existing consumptive users within 4 km or GDE's fed by Koolpinyah aquifer.</p> <p>Certainty: Extraction of proposed volumes at Darwin Converter Site unlikely to impact other users or GDE's as none are present within area of influence.</p>
Hydrological processes	Changes to groundwater levels caused by reduced recharge	Solar Precinct and Darwin Converter Site footprints are not located in identified groundwater recharge zones for the underlying productive aquifers. Ground under the solar fields will not be compacted, allowing rainfall to infiltrate soils. Design criteria for engineered stormwater management systems installed at the Solar Precinct and Darwin Converter Site is to discharge water to similar locations and at similar volumes to pre-development conditions.	None required	Unlikely	Limited	Long-term	Negligible	Low	High	Minor	None required	None required	<p>Likelihood: No change in recharge to deep productive aquifer. Recharge to shallow aquifer may be reduced by hardstand areas, but unlikely to impact shallow aquifer levels.</p> <p>Scale: Reduced recharge within direct disturbance footprint only.</p> <p>Duration: Reduced recharge will occur for duration of operations</p> <p>Magnitude: Productive aquifer is confined under the Darwin Converter Site. Site is not located in identified recharge area.</p> <p>Values: No known GDE's which would be impacted by reduced recharge to shallow aquifer in operational footprint.</p> <p>Certainty: -</p>
Inland water environmental quality	Increased turbidity caused by soil disturbance and erosion	Solar Precinct and Darwin Converter Site footprints located on flat land above the maximum modelled flood extent (1 %AEP/1-in-1000-year flood event) and outside of mapped storm surge zones. Solar Precinct and Darwin Converter Site footprints avoid watercourses. Progressive clearing, construction and reinstatement will be undertaken. Stormwater drainage will be installed to capture and manage runoff. Stormwater captured within facilities will discharge to land, via erosion and sediment controls. Roadside drainage and culverts will be installed in accordance with Austroads standards.	Watercourse crossings along access roads and OHTL will be installed during the dry season when no flow present. Drainage, erosion and sediment controls will be installed and maintained in accordance with Erosion and Sediment Control Plans (ESCP) that align with the Best Practice Erosion and Sediment Control Guidelines (IECA, 2008). Develop and implement a Reinstatement Plan for post-construction reinstatement of works areas to stabilise soils and promote regrowth of native vegetation. Rectification of emerging erosion issues after each wet season.	Possible	Localised	Short-term	Moderate	Medium	Low	Moderate	During construction, visual inspections will be undertaken of disturbed areas and erosion and sediment controls as per ESCP (after significant rainfall events, at a minimum). Annual post wet season monitoring of reinstatement success until disturbed areas are stabilised. Visual inspections of drainage structures, discharge points and site boundaries following rain events. Visual inspections of seasonal swamp at Darwin Converter Site for evidence of sedimentation; implement water quality monitoring if required. Post-wet season	Internal records of ESCP inspections, as stipulated in ESCP's. Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions.	<p>Likelihood: Erosion at the Darwin Converter Site could result in increased turbidity and sedimentation of the seasonal swamp.</p> <p>Scale: Water quality impacts may occur in the swamp, but not further downstream.</p> <p>Duration: Erosion will be identified and rectified. Water quality impacts could occur following rainfall, and last for days to weeks.</p> <p>Magnitude: Turbidity is naturally low in similar swamps and lagoons, except when water levels are low as it dries up.</p> <p>Value: Water quality in swamp supports aquatic ecosystem health.</p> <p>Certainty: ESCP in accordance with IECA guidelines and ongoing monitoring and maintenance. However, the swamps proximity to the proposal footprint and location in a high erosion risk area mean impact could still occur.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
											inspections of all project locations and rectification of emerging erosion issues.		
Inland water environmental quality	Contamination by release of fuels and chemicals	During operations, solar power will be used as a power source, hence no requirement for bulk fuel storages. Dangerous Goods and Hazardous Substances will be stored and handled in accordance with regulated standards and codes of practice, and manufacturer's directions. Dangerous Goods and Hazardous Substances will not be stored within 200m of a watercourse or groundwater bore, and mobile refuelling will not occur within 50m of a watercourse or groundwater bore.	Dangerous Goods and Hazardous Substances Registers will be maintained at all storage and handling locations. An Environmental Emergency and Spill Response Plan will be in place and equipment provided at all storage and handling locations. Construction and operations staff will be trained in spill response.	Unlikely	Limited	Short-term	Negligible	High	High	Minor	Routine visual inspections around storage locations and work areas.	Internal records of volumes used and stored in accordance with Workplace Health and Safety Regulations. Internal inspection records and notes. Internal records of water quality monitoring. Incidents of off-site pollution or nuisance reported to the NT EPA within 24 hours	<p>Likelihood: Generally minor volumes of fuels and hazardous substances will be stored and used. A large above-ground storage will in place at the Solar Precinct airfield.</p> <p>Scale: Spills may occur but storage and handling procedures mean a spill will be limited to ground around spill and will not enter a watercourse or groundwater aquifer.</p> <p>Duration: Spills to ground will occur intermittently. Spills will be detected and remediated immediately.</p> <p>Magnitude: No change in water quality as a result of spills.</p> <p>Value: Water quality in watercourses and groundwater is sensitive to contamination and supports numerous beneficial uses.</p> <p>Certainty: Australian Standards are established and proven effective for mitigating risk. No underground storage, or storage within 200 m of a watercourse.</p>
Inland water environmental quality	Contamination from waste storage and disposal areas	Landfill will comply with the Guidelines for Siting, Design and Management of Solid Waste Disposal Sites in the Northern Territory (NT EPA 2003). No waste will be stored within 200m of a watercourse.	Waste management will be in accordance with best practice guidelines (e.g. separation of waste, covering, bunded storage areas), and the requirements of the Waste Management and Pollution Control Act 1998. All listed waste will be disposed of at a licenced waste management facility.	Unlikely	Limited	Long-term	Negligible	Low	High	Minor	Routine visual inspections around landfill, waste storage locations and work areas.	Internal records of inspections. Incident reporting	<p>Likelihood: Inert and putrescible waste will be disposed of onsite at Solar Precinct. All other waste will be temporarily stored and disposed at a licenced facility.</p> <p>Scale: Any contamination from waste storage and disposal will be limited to soil in immediate surrounds.</p> <p>Duration: Waste will be stored at Darwin Converter Site, and stored and disposed at Solar Precinct for construction and operation phases. Short term storage within OHTL.</p> <p>Magnitude: No change in water quality as a result of waste storage and disposal.</p> <p>Value: No watercourses or groundwater proximate to waste storage and disposal areas.</p> <p>Certainty: Compliance with NT guidelines and regulations proven effective for mitigating risk.</p>
Inland water environmental quality	Contamination by sewage from accommodation camp	Onsite wastewater management systems to be designed and installed by suitably qualified person, in accordance with NT Code of Practice for Onsite Wastewater Management, plus other relevant standards and guidelines. System to be designed for projected wastewater loads, and appropriate for applicable climate.	Any issues identified with wastewater management system to be rectified by suitably licenced person.	Unlikely	Limited	Long-term	Negligible	Medium	High	Minor	Routine inspection and maintenance of wastewater management systems and land application areas, in accordance with the NT Code of Practice for Onsite Wastewater Management.	Internal records of maintenance works undertaken. Relevant notifications/applications and reporting to NT Department of Health, or DIPL.	<p>Likelihood: Onsite wastewater management systems will be established at the Solar Precinct and at the Darwin Converter Site.</p> <p>Scale: Wastewater will be treated and disposed of to land in a controlled and spatially limited area.</p> <p>Duration: Wastewater management systems will be used for operation phase (70 years).</p> <p>Magnitude: No change in water quality as a result of wastewater management.</p> <p>Value: The seasonal swamp and shallow groundwater are proximate to Darwin Converter Site system, which support numerous beneficial uses.</p> <p>Certainty: Compliance with NT guidelines and regulations proven effective for mitigating risk.</p>
Aquatic ecosystems	Direct loss of aquatic habitat	Solar Precinct and Darwin Converter Site site selection process included avoidance of major watercourses; neither site has aquatic ecosystems within the direct disturbance footprint. Clearing of significant riparian vegetation (e.g. large trees) will be avoided wherever practical by spanning the powerline across	Minimise the disturbance footprint within waterways or wetlands to the smallest practicable area.	Unlikely					High	None	None required	Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions.	<p><i>Not assessed because impact is inherently unlikely to occur.</i></p> <p>Certainty: No aquatic habitats present in zone of influence.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
		riparian zones associated with higher order watercourses.											
Aquatic ecosystems	Reduction in aquatic habitat value due to water quality impacts	Solar Precinct and Darwin Converter Site footprints avoid watercourses. Clearing will be undertaken progressively. Dangerous Goods and Hazardous Substances will be stored and handled in accordance with regulated standards and codes of practice, and manufacturer's directions. Dangerous Goods and Hazardous Substances will not be stored within 200 m of a watercourse or groundwater bore, and mobile refuelling will not occur within 50 m of a watercourse or groundwater bore.	Drainage, erosion and sediment controls installed and maintained in accordance with Erosion and Sediment Control Plans (ESCP) that align with the Best Practice Erosion and Sediment Control Guidelines (IECA, 2008). Develop and implement a Reinstatement Plan for post-construction reinstatement of works areas to stabilise soils and promote regrowth of native vegetation. Rectification of emerging erosion issues after each wet season. Dangerous Goods and Hazardous Substances Registers maintained at all storage and handling locations. An Environmental Emergency and Spill Response Plan will be in place and equipment provided at all storage and handling locations. Construction and operations staff trained in spill response.	Possible	Limited	Short-term	Minor	Medium	High	Minor	Annual post wet season monitoring of rehabilitation success until disturbed areas are stabilised. Visual inspections of drainage structures, discharge points and site boundaries following rain events. Post-wet season inspections of all project locations and rectification of emerging erosion issues. Visual inspections of seasonal swamp at Darwin Converter Site for evidence of sedimentation; implement water quality monitoring if required.	Internal reporting on environmental performance. Internal records of ESCP inspections, as stipulated in ESCP's. External reporting in accordance with environmental approval conditions. Internal records of water quality monitoring. Internal records of volumes used and stored in accordance with Workplace Health and Safety Regulations. Incidents of off-site pollution or nuisance reported to the NT EPA within 24 hours.	<p>Likelihood: Erosion at the Darwin Converter Site could result in increased turbidity in seasonal swamp. Contamination of water quality with fuels or chemicals is unlikely.</p> <p>Scale: Water quality impacts may occur in the swamp, but not further downstream.</p> <p>Duration: Erosion will be identified and rectified regularly. Water quality impacts would be short-term following rain.</p> <p>Magnitude: Minor erosion events could increase turbidity, which is naturally low except when water levels are low as it dries up.</p> <p>Value: Seasonal swamp supports aquatic ecosystems.</p> <p>Certainty: IECA (2008) Guidelines proven effective for minimising erosion and water quality impacts.</p>
Aquatic ecosystems	Reduction in aquatic habitat value due to altered hydrology or groundwater extraction	Solar Precinct and Darwin Converter Site footprints located on flat land above the maximum modelled flood extent (1 %AEP/1-in-1000-year flood event) and outside of mapped storm surge zones. Solar Precinct and Darwin Converter Sites do not have watercourses within direct disturbance footprint. Roadside drainage and culverts will be designed in accordance with accepted AustRoads standards. Groundwater used as water supply – no surface water extraction. Groundwater extraction sites will be located away from springs or GDE's.	Design criteria for engineered stormwater management systems installed at the Solar Precinct and Darwin Converter Site is to discharge water to similar locations and at similar volumes to pre-development conditions. Implementation of ESCP's which will manage drainage and minimise erosion. Bore locations and sustainable yields to be determined subject to investigation and recommendations from a hydrogeologist. Bore permits and water extraction licence obtained under the Water Act 1992.	Possible	Limited	Long-term	Moderate	Medium	Low	Moderate	Visual inspection of discharge points and monitoring of water levels in seasonal swamp at Darwin Converter Site - monthly during the wet season. Monitoring of standing water levels and water extraction volumes, as required under water extraction licence conditions.	Internal reporting on environmental performance. Internal records of water usage and water extraction. External reporting of water extraction in accordance with water extraction licence and environmental approval conditions.	<p>Likelihood: Development could alter discharges to seasonal swamp. Minor groundwater extraction – no impact.</p> <p>Scale: Potential for increase or decrease in stormwater discharges to seasonal swamp located 150 m south-west.</p> <p>Duration: Overland flow paths will be altered for the duration of operations.</p> <p>Magnitude: Potential for increase or decrease in swamp levels.</p> <p>Value: Seasonal swamp supports aquatic ecosystem and is a culturally important resource area.</p> <p>Certainty: Extent to which discharges will be altered and sensitivity of the swamp to changes is uncertain.</p>
Aquatic ecosystems	Reduction in aquatic habitat value due to dust	Operational footprint will cover soil with infrastructure, hardstand or vegetation to minimise wind erosion and dust	None required	Unlikely					High	Minor	None required	None required	<p><i>Not assessed as the impact is inherently unlikely to occur.</i></p> <p>Certainty: The majority of construction footprints will be covered by infrastructure, hardstand or vegetation, or reinstated.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Air quality	Emissions of NO ₂ from diesel exhaust	Whenever possible, plan haul routes to avoid residential areas Efficient staging and layout of construction facilities to minimize haulage, avoid double handling of materials and other excessive equipment operations Use grid or solar power whenever practical over stationary combustion generated power Implement anti-idling policy	NOx emissions will be minimised by using electric vehicles and equipment where practicable, and ensuring all machinery, plant and equipment complies with minimum emissions standards Operate equipment at optimum rated loads as determined by equipment manufacturer and follow routine equipment maintenance procedures Ensure all heavy duty on-road and non-road vehicles are late model and meet all commonwealth and NT emission standards Ensure all equipment brought to site is in good working order accompanied by inspection certificates and not exceeding 10% opacity. Position stationary emission sources such as generators away from sensitive receptors with due regard to safety, security, traffic and other geographic restrictions.	Possible	Limited	Short-term	Negligible	Medium	High	Minor	Conduct visual inspections for opacity from vehicle/equipment emissions. Carry out inspections certifying equipment is in good working order prior to shipping to site	Reporting will be carried out per the requirements of the CEMP described in Chapter 17 External reporting in accordance with environmental approval conditions.	Likelihood: Operational activities will use vehicles and maintenance equipment. Scale: Diesel emissions from operational activities will affect a small area around activities. Vehicle numbers required during operations are limited. Duration: Emissions could cause elevated concentrations of NO ₂ for short periods of time as vehicles drive by or during maintenance activities. Magnitude: Health criteria are unlikely to be exceeded. Value: There are no sensitive receptors in areas where air emissions will occur i.e. they are limited to within operational areas. Certainty: The only sources of NO ₂ during operations will be some vehicles and maintenance equipment.
Air quality	Emissions of particulate matter (dust)	Locate site access roads, laydown areas and stationary equipment (e.g., generators) as far away as possible from sensitive receivers Limit the amount of time between completion of road base and any paved areas to minimize exposure of unpaved surface	Water carts will be used across the project footprint to minimise dust emissions in areas of high risk at regular intervals. Other dust suppressants will be used if water ineffective. Implement on-site vehicle restrictions (e.g., limit the speed of vehicles travelling on unsealed access roads). Provide tyre wash facilities to minimize tracking of mud or dirt onto sealed roads Cover or dampen any stockpiles where practical. Notify and engage with residences and businesses who could be affect ahead of the construction front, and implement complaints procedure.	Possible	Limited	Short-term	Negligible	Medium	High	Minor	Visual observations for fugitive emissions of dust Conduct regular inspections of construction areas and roads to identify potential sources of dust emissions Develop 'watching brief' on 'nuisance' impacts to ensure quick responses to any detriment and emerging issues. Implement complaints procedure	Reporting will be carried out per the requirements of the CEMP described in Chapter 17 External reporting in accordance with environmental approval conditions.	Likelihood: Operational activities include vehicle movement and possibly minor ground disturbance. Scale: Dust emissions from operational activities will affect a small area around activities. Most of the footprint will be under infrastructure and vegetation management will be used to control dust at the Solar Precinct. Duration: Emissions could cause elevated concentrations of TSP for short periods of time as vehicles drive by or during maintenance activities that require ground disturbance. Magnitude: Health or nuisance criteria are unlikely to be exceeded. Value: There are no sensitive receptors in areas where air emissions will occur i.e. they are limited to within operational areas. Certainty: Operational activities will not involve major ground disturbance works. Most ground surfaces will be covered.

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Atmospheric processes	GHG emissions from the decomposition of organic debris and loss of soil carbon during operation	Continue to identify and engage in opportunities to maximise commercially viable carbon abatement from the AAPowerLink, including: <ul style="list-style-type: none"> Pursuing power purchase agreements with large fossil fuel power generators in the NT. Conduct a life-cycle assessment during the design phase to quantify GHG emissions including embodied, direct and indirect emissions and demonstrate that the AAPowerLink is a carbon positive project Supply AAPowerLink construction and operational power needs via self-generated solar energy where practicable. Where the use of self-generated solar energy is not possible, source renewable energy via market mechanisms (if available). Identify and (where practicable) adopt practical zero carbon technology solutions such as electric vehicles, plant and equipment and remote solar energy systems. Explore practicable opportunities with NT Carbon Capture Utilisation and Storage Project 	Develop and implement a GHG Abatement and Management Plan that aligns with ISO 140001 Environmental Management Systems and ISO 50001 Energy Management Systems. Conduct GHG mitigation workshops every 2 years during design and construction and every five years during operations to assess performance and identify new opportunities for leveraging best practice and emerging technology. Procurement strategies to consider adoption of carbon reduction and energy efficient technologies (where practicable), including but not limited to: <ul style="list-style-type: none"> Electrification options for civil plant, machinery and equipment. Energy efficiency in aircraft services selection. Electrification and alternative fuel options for transportation (e.g., marine vessels, rail) Develop vegetation management strategies that aim to retain vegetation and soil carbon Conduct studies to identify and select clearing, fire management, vegetation disposal practices and vegetation species to plant or retain. Develop and implement Rehabilitation Plans that aims to reinstate vegetation post-construction and post-decommissioning 	Likely	Widespread	Long-term	Minor	Low	High	Minor	Monitor GHG emissions from activities, as well as energy produced and exported in line with the requirements of NT and Commonwealth law. Data required to calculate GHG emissions will be collected in line with the methods outlined in the National Greenhouse and Energy reporting (Measurement) Determination 2008. Monitor performance against targets set in the GHG Abatement and Management Plan.	Reporting of GHG emissions in line with the requirements of the NGER Act. AAPowerLink will trigger emissions thresholds for reporting during construction and reporting thresholds for energy production during operations. External reporting in accordance with environmental approval conditions under the EP Act.	<p>Likelihood: Organic matter from land clearing will decompose. Scale: Organic matter and debris from a combined area of ~12,900ha. Duration: Impacts will occur over the operational phase. Magnitude: Relevant criteria for environmental protection are met. Value: Local sensitive receptors are not impacted by GHG emissions; project has a net positive GHG impact. Certainty: Acceptable level of certainty pertaining to values and receptors.</p>
Atmospheric processes	Positive Impact Overall reduction in GHG emissions from generation of renewable energy	Nil	Utilising energy produced by the Solar Precinct wherever possible	Likely	Widespread	Long-term	Major	High	High	Major	Monitor GHG emissions from activities, as well as energy produced and exported in line with the requirements of NT and Commonwealth law. Data required to calculate GHG emissions will be collected in line with the methods outlined in the National Greenhouse and Energy reporting (Measurement) Determination 2008. Monitor performance against targets set in the GHG Abatement and Management Plan.	Reporting of GHG emissions in line with the requirements of the NGER Act. AAPowerLink will trigger emissions thresholds for reporting during construction and reporting thresholds for energy production during operations. External reporting in accordance with environmental approval conditions under the EP Act.	<p>Likelihood: This is the intent of the Project. Scale: Intended benefits are regional and global. Duration: Impact will occur over the construction and operational phase. Magnitude: The degree of the change will contribute to the protection of environmental values, ecological function and sensitive receptors. Value: Important at regional, national and international scale. Certainty: Overall project objective.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Culture and heritage	Direct or indirect impact to heritage features associated with operations and maintenance activities	Consult with Traditional Owners and sites custodians through the ILUA and AAPA Authority Certificate processes to identify Sacred Sites and culturally significant landscape features and determine the most appropriate site protection measures.	Prepare Cultural Heritage Management Plan/s (CHMP) in consultation with Traditional Owners and the NT Heritage Branch. Comply with conditions of Authority Certificates and ensure conditions are made available to all authorised personnel. Where impacts to archaeological heritage features are unavoidable, obtain an approval to carry out work on a heritage place or object (work) under the Heritage Act. Mitigation works on heritage features covered by Works Approvals will be undertaken ahead of commencing site preparation activities. Workforce training and inductions will address all aspects of cultural awareness and heritage protection.	Possible	Limited	Permanent	Minor	Medium	Low	Moderate	Visual inspection of heritage features identified for protection. Ongoing engagement with Traditional Owners to identify emerging issues or concerns regarding heritage protection.	Internal environmental performance reporting. Reporting of incidents to Traditional Owners/AAPA/NLC and NT Heritage Branch and consultation to determine appropriate response. External reporting in accordance with environmental approval and heritage works approval conditions.	Likelihood: Cultural resource use in seasonal swamp could be affected by access and changes to hydrological regimes or water quality. Scale: Impacts to would be limited to the seasonal swamp. Duration: Cultural resource use could be permanently altered. Magnitude: Swamp is expected to persist, but there could be some change to the aquatic ecosystem (refer Chapter 8). Value: Seasonal swamp assessed as having High Aboriginal significance but is not a known Sacred Site. Certainty: Types of resource use not recorded and therefore potential for impact is uncertain.
Human Health	Exposure to EMF	HVAC cables at Solar Precinct and Darwin Converter Site emit low level EMF that does not pose a risk to human health.	Subsea and underground cables design includes lead sheathing and armoured cores which further prevents electric fields from entering the surrounding environment.	Unlikely	Limited	Long-term	Negligible	Medium	High	None	-	-	Likelihood: Exposure to low frequency fields unlikely. Scale: Very short distance from emissions source. Duration: Continuous during operations. Magnitude: Negligible risk associated with low frequency fields; below ICNIRP occupational exposure criteria. Value: There are no sensitive receptors in areas where EMF exposure could occur; no public access near and under facilities. Certainty: Acceptable level of confidence in EMF research to date.
Human Health	Increase in Biting Insects	Construction camps will be adequately insect screened. Locations for OHTL fly camps will be selected to be as far as possible away from significant mosquito breeding habitats i.e. watercourses and wetlands that retain water during the dry season. Darwin Converter Site workforce will be accommodated in Darwin, not on site. Drains and culverts designed to prevent upstream flooding and be free draining, retaining water for a period of maximum 5 days. Water tanks will be screened to prevent entry of mosquitoes. Landfill will comply with the Guidelines for Siting, Design and Management of Solid Waste Disposal Sites in the Northern Territory 2003. Materials arriving from overseas	Workforce education and induction on the use of appropriate PPE, bite prevention and treatment methods. Inspection and removal of any artificial mosquito breeding habitats (see below). Implementation of mosquito control methods, such as residual insecticides and larvicides in accordance with advice from Department of Health. Containers capable of holding water stored undercover and/or emptied on a weekly basis during construction. Post-construction reinstatement activities to remove impediments to surface water drainage such as stockpiles, low points, wheel ruts etc. Stormwater drains, culverts and sediment basins maintained free from sediment build up and	Unlikely						None	Visual inspections for the presence of ponding/pooling water and mosquito larvae. Report/complaints from workers. Visual inspections of all infrastructure for ponding/pooling of water. Rectification works if required. Visual inspections for the presence of mosquito larvae and other non-native species.	Incident reporting in the event a worker requires treatment or becomes ill from exposure to biting insect bites or disease. Internal inspection records. Notify NT Medical Entomology branch in the event a pest species is detected.	<i>Not assessed as impact is unlikely to occur. Operational footprints will be managed to avoid creation of biting insect breeding habitat.</i>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
		at Darwin Port are subject to quarantine inspections and treatment.	vegetation growth. Landfill and wastewater management systems maintained to prevent water ponding and pooling. Inspection of imported materials, equipment and plant for pests on arrival at works areas. Treat any pest species detected in accordance with advice from NT Medical Entomology branch										
Human Health	Increase in communicable disease	Compliance with all federal (Australian Government Department of Health), state (Northern Territory Government Health), and local requirements set out for COVID 19 health measures, as well as guidelines set out by the World Health Organization (WHO). Practices to minimize the risk of COVID 19 infection while living in camps include washing hands, wearing masks while in common areas where physical distancing is not possible, and avoiding touching one's eyes, nose, and mouth without properly cleaning hands first. No guests will be allowed in the camps, and all camps will be equipped with readily available PPE, including hand soap, sanitizer, face masks, disinfectant wipes, over the counter medicines, thermometers, and rapid COVID 19 antigen tests. Workers will be required to be fully vaccinated. 14 days prior to moving into the camp, it will be recommended that workers avoid large gatherings, wear masks in public spaces and where physical distancing is not possible, avoid being near people who are sick, and wash their hands.	If any worker exhibits cold or flu like symptoms, immediately notify a Construction Supervisor. The individual must, if possible, evacuate the camp to a hotel for a minimum of five days or until symptoms improve, or self-isolate away from other workers.	Unlikely						None	-	-	Not assessed as impact is unlikely to occur. Size of operations workforce and lack of camp living accommodations reduces risk of increase in communicable disease to unlikely during operations phase.

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Human Health	Exposure to air emissions of particulate matter (PM10, PM2.5) and Nitrogen Oxide (NOx)	Whenever possible, plan haul routes to avoid residential areas. Efficient staging and layout of construction facilities to minimize haulage, avoid double handling of materials and other excessive equipment operations. Use grid or solar power whenever practical over stationary combustion generated power. Prohibit open burning of any materials.	NOx emissions will be minimised by using electric vehicles and equipment where practicable, and ensuring all machinery, plant and equipment complies with minimum emissions standards. Implement anti-idling policy. Operate equipment at optimum rated loads as determined by equipment manufacturer and follow routine equipment maintenance procedures. Ensure all heavy duty on-road and non-road vehicles are late model and meet all commonwealth and NT emission standards. Ensure all equipment brought to site is in good working order accompanied by inspection certificates and not exceeding 10% opacity. Position stationary emission sources such as generators away from sensitive receptors with due regard to safety, security, traffic and other geographic restrictions.	Possible	Limited	Short-term	Negligible	Medium	High	Minor	Conduct visual inspections for opacity from vehicle/equipment emissions.		<p>Likelihood: Diesel emissions from vehicles and dust emissions from operational activities could potentially expose human receptors to air emissions.</p> <p>Scale: Diesel emissions from operational activities will affect a small area around activities. Vehicle numbers required during operations are limited. Dust emissions from operational activities will affect a small area around activities. Most of the footprint will be under infrastructure and vegetation management will be used to control dust at the Solar Precinct.</p> <p>Duration: Emissions could cause elevated concentrations of NO2 or TSP for short periods of time as vehicles drive by or during maintenance activities, or ground disturbance.</p> <p>Magnitude: Health criteria are unlikely to be exceeded.</p> <p>Value: There are no sensitive receptors in areas where air emissions will occur i.e. they are limited to within operational areas.</p> <p>Certainty: The only sources of NO2 during operations will be some vehicles and maintenance equipment. Operational activities will not involve major ground disturbance works. Most ground surfaces will be covered.</p>
Human Health	Exposure to noise emissions	Whenever possible, schedule work that creates the most noise during the NT EPA prescribed acceptable construction times (Monday to Saturday 7am to 7pm and between 9am and 6pm Sundays or public holidays). However, justification of work outside the NT EPA construction times may be needed if it is not possible to work within these times. Locate site access roads, laydown areas and stationary equipment (e.g., generators) as far away as possible from sensitive receivers; Whenever possible, plan haul routes to avoid residential areas; Maintain access routes to avoid the formation of potholes. Design access roads and laydown areas to minimize reversing of trucks/equipment; Use broadband back-up alarms to extent possible; Do not use engine brakes unless necessary; Maintain equipment	Where practical, machines shall be operated at low speeds and power and turned off instead of left idling for prolonged periods when not in use; Install temporary noise enclosures in areas of prolonged high noise activities. Notify the local community within the Study Area of the construction activities, especially if overnight construction is required. Notifications should include the location, extent, and duration of construction activities.	Unlikely	Localised	Long-term	Minor	Low	High	Minor			<p>Likelihood: Transformer operation will produce noise.</p> <p>Scale: Health criteria predicted to be exceeded within 92 m from source activity.</p> <p>Duration: Impact to occur continuously during operations.</p> <p>Magnitude: Noise will likely exceed health criteria in immediate surrounds of footprint. Mitigation expected to be effective.</p> <p>Value: No sensitive receptors within area of influence.</p> <p>Certainty: High confidence in noise screening assessment, understanding of operations activities, and effective mitigation.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Terrestrial environmental quality	Erosion and topsoil migration caused by disturbance of soils	Nil	Implementation of site-specific ESCP (Appendix X), which will be commensurate with the risk of erosion in each location. Reinstatement of Cable Transition Facilities footprints post-construction with native vegetation species and erosion controls.	Possible	Limited	Medium-term	Minor	Medium	High	Minor	Annual post wet season monitoring of rehabilitation success until disturbed areas stabilised. Visual inspections of drainage structures, discharge points and site boundaries following rain events. Post-wet season inspections of footprint and maintenance of emerging erosion issues.	Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions	<p>Likelihood: Significant rainfall events can cause erosions.</p> <p>Scale: Erosion will affect isolated areas where runoff is concentrated.</p> <p>Duration: Impact occurs intermittently – wet season only.</p> <p>Magnitude: Good drainage design and reinstatement of the footprint will minimise erosion severity.</p> <p>Value: Railway and road infrastructure, and seasonal swamp at Darwin Converter Site and Gunn Point Beach could be affected by erosion.</p> <p>Certainty: Erosion hazard assessment and ESCP in accordance with IECA guidelines.</p>
Terrestrial environmental quality	Contamination of soils	Solar used as power source, so no requirement for large fuel storages. Dangerous Goods and Hazardous Substances stored and handled in accordance with regulated standards and codes of practice, and manufacturer's directions.	Dangerous Goods and Hazardous Substances stored and handled in accordance with regulated standards and codes of practice, and manufacturer's directions. Spill response procedures and equipment provided at all storage and handling locations. Construction and operations personnel trained in spill response.	Possible	Limited	Short-term	Minor	High	High	Minor	Routine visual inspections around storage locations and work areas.	Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions	<p>Likelihood: Possible Operations will require the storage and handling of fuels and hazardous chemicals which have the potential to come in contact with soils if spills or leaks occur.</p> <p>Scale: Isolated The volumes stored and handled are small and therefore spills and leaks are predicted to affect isolated areas.</p> <p>Duration: Short-term Impact is only felt briefly before being cleaned up, or the contaminated material removed.</p> <p>Magnitude: Low Contaminants will not be detected in soils within or surrounding the site.</p> <p>Value: Low There are no land uses or environmental values located near to the Solar Precinct or Darwin Converter Site that would be sensitive to isolated short-term contaminating events.</p>
Terrestrial environmental quality	Acid sulfate soils disturbance	Nil	Development and implementation of an ASSMP if ASS is present on site. ASS managed in line with guidelines.	Possible	Limited	Short-term	Minor	Medium	High	Minor	Visual inspections and testing of any confirmed ASS in line with National Acid Sulfate Soils Guidance material.	Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions	<p>Likelihood: PASS could occur at specific locations along OHTL. Soil testing to be undertaken.</p> <p>Scale: Area of potential disturbance will be limited to repair work requiring excavation where ASS present.</p> <p>Duration: ASS would be exposed for a matter of days prior to reburial.</p> <p>Magnitude: Oxidation unlikely to occur during short period of exposure.</p> <p>Value: Watercourses along OHTL would be sensitive to ASS impacts.</p> <p>Certainty: Guidelines for identification and management of ASS are established and proven effective.</p>
Terrestrial ecosystems	Degradation of flora and vegetation in surrounding areas			Unlikely					High	None			Certainty: Potential impacts are well understood from other projects.
Terrestrial ecosystems	Introduction and spread of weeds and pests	All project activities will comply with the Weed Management Act which states it is an offence to transport weeds.	A Weed Management Plan will be implemented. Weed inspections and control will be undertaken for the duration of construction and operations to limit the spread of weeds.	Likely	Localised	Permanent	Moderate	Medium	High	Moderate	As per the Weed Management Plan (Appendix Q)	As per the Weed Management Plan (Appendix Q)	<p>Likelihood: Maintenance activities and/or inadequate weed control post-construction could spread weeds.</p> <p>Scale: Weed infestations are likely to occur at some locations in the disturb footprint, but unlikely to extend far into surrounds.</p> <p>Duration: Once weeds are introduced they are very difficult to eradicate.</p> <p>Magnitude: Implementation of Weed MP will limit impact to ecological function and integrity.</p> <p>Values: Sensitive values present in footprint are riparian, sand sheet heath and rainforest, and the Black Jungle Reserve.</p> <p>Certainty: Potential impacts are well understood from other projects and Weed MP will reduce risk to ALARP.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Terrestrial ecosystems	Direct fauna mortality	Pre-clearing inspections undertaken to identify and realocate any fauna that are at risk i.e. nests and burrows. Avoiding clearing large hollow-bearing trees where possible.	Clearing will be conducted in a single direction, allowing any fauna to move out of way of clearing activities. If fauna is spotted in immediate clearing area and are in danger, clearing will be stopped until safe to continue. Clearing in a progressive manner to allow wildlife to natural disperse from the area as clearing undertaken. Site inductions will ensure that all personnel are aware of their obligations and know the correct procedures for fauna encounters. Vehicle speed restrictions apply when travelling near uncleared areas or in higher risk conditions.	Unlikely					High	None	Record any fauna encounters, injuries or death as result of works for the duration of works. Incidental observations of carcasses, including during routine infrastructure inspections	Internal record keeping of incidents of fauna mortality. External reporting in accordance with environmental approval conditions	Certainty: Potential impacts are well understood from other projects.
Terrestrial ecosystems	Changes to fauna behaviours due to noise, light and other disturbances	Waste management procedures to avoid attracting fauna to waste disposal areas.		Possible	Limited	Medium-term	Minor	Low	High	Minor			Likelihood: Fauna could either be attracted or deterred by operational activities. Scale: Affects expected to be limited to within close proximity to activities. Duration: Impact will occur intermittently during operations. Magnitude: Localised behavioural change will not affect biodiversity or ecosystem function/integrity. Values: There are no proximate ecological receptors that are sensitive to these disturbances. Certainty: Potential impacts are well understood from other projects. Mitigation measures are routine and proven effective.
Hydrological processes	Alteration of flows in surface watercourses or wetlands	Roadside drainage and culverts will be designed and installed in accordance with accepted Austroads standards. Groundwater used as water supply – no surface water extraction.	Drainage, erosion and sediment controls installed and maintained in accordance with Erosion and Sediment Control Plans (ESCP) that align with the Best Practice Erosion and Sediment Control Guidelines (IECA, 2008). Reinstatement of OHTL construction corridor and Cable Transition Facilities footprints post-construction. Design criteria for engineered stormwater management systems installed at the Solar Precinct and Darwin Converter Site is to discharge water to similar locations and at similar volumes to pre-development conditions.	Unlikely	Limited	Short-term	Negligible	Low	High	Minor	During construction, visual inspections of disturbed areas and erosion and sediment controls as per ESCP (after significant rainfall events, at a minimum). Annual post wet season monitoring of revegetation success until disturbed areas are stabilised. Visual inspections of drainage structures, discharge points and site boundaries following rain events. Post-wet season inspections of all project locations and rectification of emerging erosion issues.	Internal records of ESCP inspections, as stipulated in ESCP's. Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions.	Likelihood: Footprint will be reinstated following construction. Scale: Some isolated erosion may occur, with no impacts to hydrology in surrounding watercourses. Duration: Any erosion would be identified and rectified. Magnitude: No impact to watercourses from altered hydrology. Values: No watercourses present in footprint. Certainty: Footprint will be reinstated. ESCP developed in accordance with IECA guidelines.

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Hydrological processes	Changes to groundwater levels caused by water extraction from bores <i>Not assessed</i>	Groundwater extraction sites will be located away from existing groundwater bores in use.	Bore locations and sustainable yields to be determined subject to investigation and recommendations from a hydrogeologist. Bore work permits and water extraction licences obtained under the Water Act.	Unlikely					High	None	Monitoring of standing water levels and water extraction volumes, as required under water extraction licence conditions. Water quality sampling and analysis of springs near Solar Precinct and aquifer targeted for groundwater extraction to ensure there is no connectivity.	Internal records of water usage and water extraction. External reporting of water extraction in accordance with water extraction licence and environmental approval conditions.	Certainty: No water use as part of routine operations. Any water requirements for maintenance activities would be met by extraction from bores at Darwin Converter Site.
Hydrological processes	Changes to groundwater levels caused by reduced recharge <i>Not assessed</i>			Unlikely					High	None			Certainty: No impervious surface created, so no impact on recharge.
Inland water environmental quality	Increased turbidity caused by soil disturbance and erosion	Progressive clearing, construction and reinstatement will be undertaken. Stormwater drainage will be installed to capture and manage runoff. Stormwater captured within facilities will discharge to land, via erosion and sediment controls. Roadside drainage and culverts will be installed in accordance with Austroads standards.	Watercourse crossings along access roads and OHTL will be installed during the dry season when no flow present. Drainage, erosion and sediment controls will be installed and maintained in accordance with Erosion and Sediment Control Plans (ESCP) that align with the Best Practice Erosion and Sediment Control Guidelines (IECA, 2008). Develop and implement a Reinstatement Plan for post-construction reinstatement of works areas to stabilise soils and promote regrowth of native vegetation. Rectification of emerging erosion issues after each wet season.	Unlikely	Limited	Short-term	Negligible	Low	High	Minor	During construction, visual inspections will be undertaken of disturbed areas and erosion and sediment controls as per ESCP (after significant rainfall events, at a minimum). Annual post wet season monitoring of reinstatement success until disturbed areas are stabilised. Visual inspections of drainage structures, discharge points and site boundaries following rain events. Post-wet season inspections of all project locations and rectification of emerging erosion issues.	Internal records of ESCP inspections, as stipulated in ESCP's. Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions.	Likelihood: No operational activities in footprint. Some minor erosion could occur in reinstated footprint. Scale: Any runoff from the footprint could be turbid but would report to vegetated areas. Duration: Any erosion will be identified and rectified. Magnitude: Lack of watercourses mean water quality impacts are negligible. Value: No watercourses or surface water features within area of influence. Certainty: ESCP in accordance with IECA guidelines, and ongoing monitoring and maintenance.
Inland water environmental quality	Contamination by release of fuels and chemicals	During operations, solar power will be used as a power source, hence no requirement for bulk fuel storages. Dangerous Goods and Hazardous Substances will be stored and handled in accordance with regulated standards and codes of practice, and manufacturer's directions. Dangerous Goods and Hazardous Substances will not be stored within 200m of a watercourse or groundwater bore, and mobile refuelling will not occur within	Dangerous Goods and Hazardous Substances Registers will be maintained at all storage and handling locations. An Environmental Emergency and Spill Response Plan will be in place and equipment provided at all storage and handling locations. Construction and operations staff will be trained in spill response.	Unlikely	Limited	Short-term	Negligible	High	High	Minor	Routine visual inspections around storage locations and work areas.	Internal records of volumes used and stored in accordance with Workplace Health and Safety Regulations. Internal inspection records and notes. Internal records of water quality monitoring. Incidents of off-site pollution or nuisance reported to the NT EPA within 24 hours	Likelihood: Generally minor volumes of fuels and hazardous substances will be stored and used. A large above-ground storage will in place at the Solar Precinct airfield. Scale: Spills may occur but storage and handling procedures mean a spill will be limited to ground around spill and will not enter a watercourse or groundwater aquifer. Duration: Spills to ground will occur intermittently. Spills will be detected and remediated immediately. Magnitude: No change in water quality as a result of spills. Value: Water quality in watercourses and groundwater is sensitive to contamination and supports numerous beneficial uses. Certainty: Australian Standards are established and proven effective for mitigating risk. No underground storage, or storage within 200 m of a watercourse.

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
		50m of a watercourse or groundwater bore.											
Inland water environmental quality	Contamination from waste storage and disposal areas	Landfill will comply with the Guidelines for Siting, Design and Management of Solid Waste Disposal Sites in the Northern Territory (NT EPA 2003). No waste will be stored within 200m of a watercourse.	Waste management will be in accordance with best practice guidelines (e.g. separation of waste, covering, banded storage areas), and the requirements of the Waste Management and Pollution Control Act 1998. All listed waste will be disposed of at a licenced waste management facility.	Unlikely	Limited	Long-term	Negligible	Low	High	Minor	Routine visual inspections around landfill, waste storage locations and work areas.	Internal records of inspections. Incident reporting	<p>Likelihood: Inert and putrescible waste will be disposed of onsite at Solar Precinct. All other waste will be temporarily stored and disposed at a licenced facility.</p> <p>Scale: Any contamination from waste storage and disposal will be limited to soil in immediate surrounds.</p> <p>Duration: Waste will be stored at Darwin Converter Site, and stored and disposed at Solar Precinct for construction and operation phases. Short term storage within OHTL.</p> <p>Magnitude: No change in water quality as a result of waste storage and disposal.</p> <p>Value: No watercourses or groundwater proximate to waste storage and disposal areas.</p> <p>Certainty: Compliance with NT guidelines and regulations proven effective for mitigating risk.</p>
Inland water environmental quality	Contamination by sewage from accommodation camp			Unlikely					High	None			<p>Certainty: No wastewater systems will be installed within this area</p>
Aquatic ecosystems	Direct loss of aquatic habitat	None required	None required	Unlikely					High	Minor	None required	Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions.	<p><i>Not assessed because impact is inherently unlikely to occur.</i></p> <p>Certainty: No aquatic habitats present in zone of influence.</p>
Aquatic ecosystems	Reduction in aquatic habitat value due to water quality impacts	None required	None required	Unlikely					High	None	Annual post wet season monitoring of rehabilitation success until disturbed areas are stabilised. Visual inspections of drainage structures, discharge points and site boundaries following rain events. Post-wet season inspections of all project locations and rectification of emerging erosion issues.	Internal reporting on environmental performance. Internal records of ESCP inspections, as stipulated in ESCP's. External reporting in accordance with environmental approval conditions. Internal records of water quality monitoring. Internal records of volumes used and stored in accordance with Workplace Health and Safety Regulations. Incidents of off-site pollution or nuisance reported to the NT EPA within 24 hours.	<p><i>Not assessed as impact is inherently unlikely to occur.</i></p> <p>Certainty: No aquatic habitats present in zone of influence.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Aquatic ecosystems	Reduction in aquatic habitat value due to altered hydrology or groundwater extraction	Roadside drainage and culverts will be designed in accordance with accepted AustRoads standards. Groundwater used as water supply – no surface water extraction. Groundwater extraction sites will be located away from springs or GDE's.	Implementation of ESCP's which will manage drainage and minimise erosion. Bore locations and sustainable yields to be determined subject to investigation and recommendations from a hydrogeologist. Bore permits and water extraction licence obtained under the Water Act 1992.	Unlikely					High	None	Monitoring of standing water levels and water extraction volumes, as required under water extraction licence conditions. Water quality sampling and analysis of springs near Solar Precinct and aquifer targeted for groundwater extraction to ensure there is no connectivity.	Internal reporting on environmental performance. Internal records of water usage and water extraction. External reporting of water extraction in accordance with water extraction licence and environmental approval conditions.	<i>Not assessed as impact inherently unlikely to occur.</i> Certainty: Access track across minor watercourse will not alter stream flows.
Aquatic ecosystems	Reduction in aquatic habitat value due to dust	Operational footprint will cover soil with infrastructure, hardstand or vegetation to minimise wind erosion and dust	None required	Unlikely					High	Minor	None required	Internal reporting on environmental performance	<i>Not assessed as the impact is inherently unlikely to occur.</i> Certainty: The majority of construction footprints will be covered by infrastructure, hardstand or vegetation, or reinstated.
Air quality	Emissions of NO ₂ from diesel exhaust	Whenever possible, plan haul routes to avoid residential areas Efficient staging and layout of construction facilities to minimize haulage, avoid double handling of materials and other excessive equipment operations Use grid or solar power whenever practical over stationary combustion generated power Implement anti-idling policy	NOx emissions will be minimised by using electric vehicles and equipment where practicable, and ensuring all machinery, plant and equipment complies with minimum emissions standards Operate equipment at optimum rated loads as determined by equipment manufacturer and follow routine equipment maintenance procedures Ensure all heavy duty on-road and non-road vehicles are late model and meet all commonwealth and NT emission standards Ensure all equipment brought to site is in good working order accompanied by inspection certificates and not exceeding 10% opacity. Position stationary emission sources such as generators away from sensitive receptors with due regard to safety, security, traffic and other geographic restrictions.	Possible	Limited	Short-term	Negligible	Medium	High	Minor	Conduct visual inspections for opacity from vehicle/equipment emissions. Carry out inspections certifying equipment is in good working order prior to shipping to site	Reporting will be carried out per the requirements of the CEMP described in Chapter 17 External reporting in accordance with environmental approval conditions.	Likelihood: Operational activities will use vehicles and maintenance equipment. Scale: Diesel emissions from operational activities will affect a small area around activities. Vehicle numbers required during operations are limited. Duration: Emissions could cause elevated concentrations of NO ₂ for short periods of time as vehicles drive by or during maintenance activities. Magnitude: Health criteria are unlikely to be exceeded. Value: There are no sensitive receptors in areas where air emissions will occur i.e. they are limited to within operational areas. Certainty: The only sources of NO ₂ during operations will be some vehicles and maintenance equipment.

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Air quality	Emissions of particulate matter (dust)	Locate site access roads, laydown areas and stationary equipment (e.g., generators) as far away as possible from sensitive receivers Limit the amount of time between completion of road base and any paved areas to minimize exposure of unpaved surface	Water carts will be used across the project footprint to minimise dust emissions in areas of high risk at regular intervals. Other dust suppressants will be used if water ineffective. Implement on-site vehicle restrictions (e.g., limit the speed of vehicles travelling on unsealed access roads). Provide tyre wash facilities to minimize tracking of mud or dirt onto sealed roads Cover or dampen any stockpiles where practical. Notify and engage with residences and businesses who could be affected ahead of the construction front, and implement complaints procedure.	Possible	Limited	Short-term	Negligible	Medium	High	Minor	Visual observations for fugitive emissions of dust Conduct regular inspections of construction areas and roads to identify potential sources of dust emissions Develop 'watching brief' on 'nuisance' impacts to ensure quick responses to any detriment and emerging issues. Implement complaints procedure	Reporting will be carried out per the requirements of the CEMP described in Chapter 17 External reporting in accordance with environmental approval conditions.	Likelihood: Operational activities include vehicle movement and possibly minor ground disturbance. Scale: Dust emissions from operational activities will affect a small area around activities. Most of the footprint will be under infrastructure and vegetation management will be used to control dust at the Solar Precinct. Duration: Emissions could cause elevated concentrations of TSP for short periods of time as vehicles drive by or during maintenance activities that require ground disturbance. Magnitude: Health or nuisance criteria are unlikely to be exceeded. Value: There are no sensitive receptors in areas where air emissions will occur i.e. they are limited to within operational areas. Certainty: Operational activities will not involve major ground disturbance works. Most ground surfaces will be covered.
Atmospheric processes	GHG emissions from the decomposition of organic debris and loss of soil carbon during operation	Continue to identify and engage in opportunities to maximise commercially viable carbon abatement from the AAPowerLink, including: • Pursuing power purchase agreements with large fossil fuel power generators in the NT. • Conduct a life-cycle assessment during the design phase to quantify GHG emissions including embodied, direct and indirect emissions and demonstrate that the AAPowerLink is a carbon positive project • Supply AAPowerLink construction and operational power needs via self-generated solar energy where practicable. • Where the use of self-generated solar energy is not possible, source renewable energy via market mechanisms (if available). • Identify and (where practicable) adopt practical zero carbon technology solutions such as electric vehicles, plant and equipment and remote solar energy systems. • Explore practicable opportunities with NT Carbon Capture Utilisation and Storage Project	Develop and implement a GHG Abatement and Management Plan that aligns with ISO 140001 Environmental Management Systems and ISO 50001 Energy Management Systems. Conduct GHG mitigation workshops every 2 years during design and construction and every five years during operations to assess performance and identify new opportunities for leveraging best practice and emerging technology. Procurement strategies to consider adoption of carbon reduction and energy efficient technologies (where practicable), including but not limited to: • Electrification options for civil plant, machinery and equipment. • Energy efficiency in aircraft services selection. • Electrification and alternative fuel options for transportation (e.g., marine vessels, rail) Develop vegetation management strategies that aim to retain vegetation and soil carbon Conduct studies to identify and select clearing, fire management, vegetation disposal practices and vegetation species to plant or retain. Develop and implement Rehabilitation Plans that aims to	Likely	Widespread	Long-term	Minor	Low	High	Minor	Monitor GHG emissions from activities, as well as energy produced and exported in line with the requirements of NT and Commonwealth law. Data required to calculate GHG emissions will be collected in line with the methods outlined in the National Greenhouse and Energy reporting (Measurement) Determination 2008 Monitor performance against targets set in the GHG Abatement and Management Plan.	Reporting of GHG emissions in line with the requirements of the NGER Act. AAPowerLink will trigger emissions thresholds for reporting during construction and reporting thresholds for energy production during operations. External reporting in accordance with environmental approval conditions under the EP Act.	Likelihood: Organic matter from land clearing will decompose. Scale: Organic matter and debris from a combined area of ~12,900ha. Duration: Impacts will occur over the operational phase. Magnitude: Relevant criteria for environmental protection are met. Value: Local sensitive receptors are not impacted by GHG emissions; project has a net positive GHG impact. Certainty: Acceptable level of certainty pertaining to values and receptors.

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
			reinstate vegetation post-construction and post-decommissioning										
Atmospheric processes	Positive Impact Overall reduction in GHG emissions from generation of renewable energy	Nil	Utilising energy produced by the Solar Precinct wherever possible	Likely	Widespread	Long-term	Major	High	High	Major	Monitor GHG emissions from activities, as well as energy produced and exported in line with the requirements of NT and Commonwealth law. Data required to calculate GHG emissions will be collected in line with the methods outlined in the National Greenhouse and Energy reporting (Measurement) Determination 2008. Monitor performance against targets set in the GHG Abatement and Management Plan.	Reporting of GHG emissions in line with the requirements of the NGER Act. AAPowerLink will trigger emissions thresholds for reporting during construction and reporting thresholds for energy production during operations. External reporting in accordance with environmental approval conditions under the EP Act.	<p>Likelihood: This is the intent of the Project.</p> <p>Scale: Intended benefits are regional and global.</p> <p>Duration: Impact will occur over the construction and operational phase.</p> <p>Magnitude: The degree of the change will contribute to the protection of environmental values, ecological function and sensitive receptors.</p> <p>Value: Important at regional, national and international scale.</p> <p>Certainty: Overall project objective.</p>
Culture and heritage	Direct or indirect impact to heritage features associated with operations and maintenance activities	Consult with Traditional Owners and sites custodians through the ILUA and AAPA Authority Certificate processes to identify Sacred Sites and culturally significant landscape features and determine the most appropriate site protection measures.	Prepare Cultural Heritage Management Plan/s (CHMP) in consultation with Traditional Owners and the NT Heritage Branch. Comply with conditions of Authority Certificates and ensure conditions are made available to all authorised personnel. Where impacts to archaeological heritage features are unavoidable, obtain an approval to carry out work on a heritage place or object (work) under the Heritage Act. Mitigation works on heritage features covered by Works Approvals will be undertaken ahead of commencing site preparation activities. Workforce training and inductions will address all aspects of cultural awareness and heritage protection.	Unlikely					High	None	Visual inspection of heritage features identified for protection. Ongoing engagement with Traditional Owners to identify emerging issues or concerns regarding heritage protection.	Internal environmental performance reporting. Reporting of incidents to Traditional Owners/AAPA/NLC and NT Heritage Branch and consultation to determine appropriate response. External reporting in accordance with environmental approval and heritage works approval conditions.	<p><i>Not assessed as no additional disturbance proposed during operations. Sites in footprint will be removed prior to construction so residual heritage value rating is low.</i></p> <p>Certainty: No disturbance proposed</p>
Human Health	Exposure to EMF	HVAC cables at Solar Precinct and Darwin Converter Site emit low level EMF that does not pose a risk to human health.	Subsea and underground cables design includes lead sheathing and armoured cores which further prevents electric fields from entering the surrounding environment.	Unlikely	Limited	Long-term	Negligible	Medium	High	None	-	-	<p>Likelihood: Exposure static electricity and magnetic fields unlikely to cause health effects.</p> <p>Scale: Very short distance from emissions source.</p> <p>Duration: Continuous during operations.</p> <p>Magnitude: Research to date shows no detrimental health effect from exposure to low-level static electric and magnetic fields. Mitigation measures expected to reduce the magnitude of this risk.</p> <p>Value: There are no sensitive receptors in areas where EMF exposure could occur; no public access near and under facilities.</p> <p>Certainty: Acceptable level of confidence in EMF research to date, and high level of confidence in mitigation.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Human Health	Increase in Biting Insects	<p>Construction camps will be adequately insect screened. Locations for OHTL fly camps will be selected to be as far as possible away from significant mosquito breeding habitats i.e. watercourses and wetlands that retain water during the dry season.</p> <p>Darwin Converter Site workforce will be accommodated in Darwin, not on site.</p> <p>Drains and culverts designed to prevent upstream flooding and be free draining, retaining water for a period of maximum 5 days. Water tanks will be screened to prevent entry of mosquitoes. Landfill will comply with the Guidelines for Siting, Design and Management of Solid Waste Disposal Sites in the Northern Territory 2003.</p> <p>Materials arriving from overseas at Darwin Port are subject to quarantine inspections and treatment.</p>	<p>Workforce education and induction on the use of appropriate PPE, bite prevention and treatment methods. Inspection and removal of any artificial mosquito breeding habitats (see below).</p> <p>Implementation of mosquito control methods, such as residual insecticides and larvicides in accordance with advice from Department of Health.</p> <p>Containers capable of holding water stored undercover and/or emptied on a weekly basis during construction.</p> <p>Post-construction reinstatement activities to remove impediments to surface water drainage such as stockpiles, low points, wheel ruts etc.</p> <p>Stormwater drains, culverts and sediment basins maintained free from sediment build up and vegetation growth.</p> <p>Landfill and wastewater management systems maintained to prevent water ponding and pooling.</p> <p>Inspection of imported materials, equipment and plant for pests on arrival at works areas.</p> <p>Treat any pest species detected in accordance with advice from NT Medical Entomology branch</p>	Unlikely						None	<p>Visual inspections for the presence of ponding/pooling water and mosquito larvae. Report/complaints from workers.</p> <p>Visual inspections of all infrastructure for ponding/pooling of water. Rectification works if required.</p> <p>Visual inspections for the presence of mosquito larvae and other non-native species.</p>	<p>Incident reporting in the event a worker requires treatment or becomes ill from exposure to biting insect bites or disease. Internal inspection records.</p> <p>Notify NT Medical Entomology branch in the event a pest species is detected.</p>	<p><i>Not assessed as impact is unlikely to occur. Operational footprints will be managed to avoid creation of biting insect breeding habitat.</i></p>
Human Health	Increase in communicable disease	<p>Compliance with all federal (Australian Government Department of Health), state (Northern Territory Government Health), and local requirements set out for COVID 19 health measures, as well as guidelines set out by the World Health Organization (WHO). Practices to minimize the risk of COVID 19 infection while living in camps include washing hands, wearing masks while in common areas where physical distancing is not possible, and avoiding touching one's eyes, nose, and mouth without properly cleaning hands first. No guests will be allowed in the camps, and all camps will be equipped with readily available PPE, including hand soap, sanitizer, face masks,</p>	<p>If any worker exhibits cold or flu like symptoms, immediately notify a Construction Supervisor. The individual must, if possible, evacuate the camp to a hotel for a minimum of five days or until symptoms improve, or self-isolate away from other workers.</p>	Unlikely						None	-	-	<p><i>Not assessed as impact is unlikely to occur. Size of operations workforce and lack of camp living accommodations reduces risk of increase in communicable disease to unlikely during operations phase.</i></p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
		disinfectant wipes, over the counter medicines, thermometers, and rapid COVID 19 antigen tests. Workers will be required to be fully vaccinated. 14 days prior to moving into the camp, it will be recommended that workers avoid large gatherings, wear masks in public spaces and where physical distancing is not possible, avoid being near people who are sick, and wash their hands.											
Human Health	Exposure to air emissions of particulate matter (PM10, PM2.5) and Nitrogen Oxide (NOx)	Whenever possible, plan haul routes to avoid residential areas. Efficient staging and layout of construction facilities to minimize haulage, avoid double handling of materials and other excessive equipment operations. Use grid or solar power whenever practical over stationary combustion generated power. Prohibit open burning of any materials.	NOx emissions will be minimised by using electric vehicles and equipment where practicable, and ensuring all machinery, plant and equipment complies with minimum emissions standards. Implement anti-idling policy. Operate equipment at optimum rated loads as determined by equipment manufacturer and follow routine equipment maintenance procedures. Ensure all heavy duty on-road and non-road vehicles are late model and meet all commonwealth and NT emission standards. Ensure all equipment brought to site is in good working order accompanied by inspection certificates and not exceeding 10% opacity. Position stationary emission sources such as generators away from sensitive receptors with due regard to safety, security, traffic and other geographic restrictions.	Possible	Limited	Short-term	Negligible	Medium	High	Minor	Conduct visual inspections for opacity from vehicle/equipment emissions.		<p>Likelihood: Diesel emissions from vehicles and dust emissions from operational activities could potentially expose human receptors to air emissions.</p> <p>Scale: Diesel emissions from operational activities will affect a small area around activities. Vehicle numbers required during operations are limited. Dust emissions from operational activities will affect a small area around activities. Most of the footprint will be under infrastructure and vegetation management will be used to control dust at the Solar Precinct.</p> <p>Duration: Emissions could cause elevated concentrations of NO2 or TSP for short periods of time as vehicles drive by or during maintenance activities, or ground disturbance.</p> <p>Magnitude: Health criteria are unlikely to be exceeded.</p> <p>Value: There are no sensitive receptors in areas where air emissions will occur i.e. they are limited to within operational areas.</p> <p>Certainty: The only sources of NO2 during operations will be some vehicles and maintenance equipment. Operational activities will not involve major ground disturbance works. Most ground surfaces will be covered.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Human Health	Exposure to noise emissions	<p>Whenever possible, schedule work that creates the most noise during the NT EPA prescribed acceptable construction times (Monday to Saturday 7am to 7pm and between 9am and 6pm Sundays or public holidays). However, justification of work outside the NT EPA construction times may be needed if it is not possible to work within these times.</p> <p>Locate site access roads, laydown areas and stationary equipment (e.g., generators) as far away as possible from sensitive receivers;</p> <p>Whenever possible, plan haul routes to avoid residential areas;</p> <p>Maintain access routes to avoid the formation of potholes.</p> <p>Design access roads and laydown areas to minimize reversing of trucks/equipment;</p> <p>Use broadband back-up alarms to extent possible;</p> <p>Do not use engine brakes unless necessary;</p> <p>Maintain equipment as per manufacturer's instructions;</p> <p>Keep engines covers closed;</p> <p>Dampen tailgates to avoid banging;</p> <p>Avoid dropping loads into dump trucks from heights;</p> <p>Limit the use of diesel generators by drawing power from the existing hydro grid.</p>	<p>Where practical, machines shall be operated at low speeds and power and turned off instead of left idling for prolonged periods when not in use;</p> <p>Install temporary noise enclosures in areas of prolonged high noise activities.</p> <p>Notify the local community within the Study Area of the construction activities, especially if overnight construction is required. Notifications should include the location, extent, and duration of construction activities.</p>	Unlikely					High	None			<p><i>No operational noise is anticipated for the Cable Transition Facilities as the cabling will be buried underground. No sensitive receptors.</i></p> <p>Certainty: High confidence in noise screening assessment.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Marine environmental quality	Increased turbidity in marine waters caused by cable maintenance activities	Minimise disturbance footprint by undertaking targeted repairs as required.	Nil	Possible	Limited	Short-term	Minor	Medium	High	Minor	Nil	Nil	<p>Likelihood: Repairs may require cables to be uncovered or additional cable to be laid. Potential for water quality impacts due to increased suspended sediment concentrations.</p> <p>Scale: Repairs would only be required due to damage, in a small section of the Subsea Cable System.</p> <p>Duration: Water quality impacts could occur over days during repairs.</p> <p>Magnitude: Spatially restricted and over a short time frame.</p> <p>Value: Water quality supports marine ecosystems, including seagrass, seaweed and hard coral, and beneficial uses.</p> <p>Certainty: Repairs would only be required if damage occurred, in a small footprint, and over a short period of time.</p>
Marine environmental quality	Localised temperature increase	Use of HVDC cables which emit less heat than other cables (e.g. AC).	Nil	Likely	Limited	Long-term	Minor	Medium	High	Minor	Nil	Nil	<p>Likelihood: Operation of the HVDC cables will generate heat.</p> <p>Scale: Heat emissions will be restricted to the immediate vicinity of the cable, including sediment within ~ 1 m of cable.</p> <p>Duration: Heating will occur for duration of operations.</p> <p>Magnitude: Heating within immediate vicinity of cable only. Unlikely to impact habitat value.</p> <p>Value: Water and sediment quality support marine ecosystems and beneficial uses.</p> <p>Certainty: Peer reviewed studies of other similar cables have informed impact assessment.</p>
Marine ecosystems	Habitat loss and degradation	Route design, where possible, has avoided topographical areas along the sea floor which are associated with areas of higher habitat value.	Design, install and operate Subsea Cable System in accordance with the Guidelines on Best Environmental Practices in Cable Installation and Operation (OSPAR 2012)	Possible	Limited	Long-term	Minor	Medium	High	Minor	Turbidity monitoring in impact zone and baseline/reference site during cable installation in high-risk area (shallow, <10m depth).	Internal reporting on environmental performance. External reporting in accordance with environmental approval conditions.	<p>Likelihood: Cable repair (if required) will disturb benthic habitat.</p> <p>Scale: Only a small area of benthic habitat would be disturbed during repairs</p> <p>Duration: Benthic habitat will recover following construction, and habitat disturbed during repairs should also recover. Recovery of habitat occurring over months or years, depending on the type of benthic habitat.</p> <p>Magnitude: Habitat loss will occur but unlikely to impact on surrounding environment or other uses</p> <p>Value: Patches of locally important benthic habitats present in footprint and surrounding areas.</p> <p>Certainty: Habitat mapping provides certainty that habitats are present and marine modelling identifies potential impacts</p>
Marine ecosystems	Changes to fauna behaviours due to EMF	Route selection avoids important turtle breeding beaches.	nil	Likely	Limited	Long-term	Minor	Medium	High	Minor	Nil	Nil	<p>Likelihood: Operation of the HVDC cables will generate heat and EMF that could deter or attract fauna.</p> <p>Scale: EMF and heat emissions from the cables will be minor and restricted to the sediment directly around the cable.</p> <p>Duration: Impacts will occur for the duration of operations.</p> <p>Magnitude: The behaviour of some species will be impacted, and not in a way that significantly alters local biodiversity.</p> <p>Value: Locally important marine habitats and fauna are present in proposal footprint</p> <p>Certainty: Peer reviewed studies of other similar cables have informed impact assessment.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Atmospheric processes	GHG emissions from the decomposition of organic debris and loss of soil carbon during operation	Continue to identify and engage in opportunities to maximise commercially viable carbon abatement from the AAPowerLink, including: <ul style="list-style-type: none"> • Pursuing power purchase agreements with large fossil fuel power generators in the NT. • Conduct a life-cycle assessment during the design phase to quantify GHG emissions including embodied, direct and indirect emissions and demonstrate that the AAPowerLink is a carbon positive project • Supply AAPowerLink construction and operational power needs via self-generated solar energy where practicable. • Where the use of self-generated solar energy is not possible, source renewable energy via market mechanisms (if available). • Identify and (where practicable) adopt practical zero carbon technology solutions such as electric vehicles, plant and equipment and remote solar energy systems. • Explore practicable opportunities with NT Carbon Capture Utilisation and Storage Project 	Develop and implement a GHG Abatement and Management Plan that aligns with ISO 140001 Environmental Management Systems and ISO 50001 Energy Management Systems. Conduct GHG mitigation workshops every 2 years during design and construction and every five years during operations to assess performance and identify new opportunities for leveraging best practice and emerging technology. Procurement strategies to consider adoption of carbon reduction and energy efficient technologies (where practicable), including but not limited to: <ul style="list-style-type: none"> • Electrification options for civil plant, machinery and equipment. • Energy efficiency in aircraft services selection. • Electrification and alternative fuel options for transportation (e.g., marine vessels, rail) Develop vegetation management strategies that aim to retain vegetation and soil carbon. Conduct studies to identify and select clearing, fire management, vegetation disposal practices and vegetation species to plant or retain. Develop and implement Rehabilitation Plans that aims to reinstate vegetation post-construction and post-decommissioning	Likely	Widespread	Long-term	Minor	Low	High	Minor	Monitor GHG emissions from activities, as well as energy produced and exported in line with the requirements of NT and Commonwealth law. Data required to calculate GHG emissions will be collected in line with the methods outlined in the National Greenhouse and Energy reporting (Measurement) Determination 2008. Monitor performance against targets set in the GHG Abatement and Management Plan.	Reporting of GHG emissions in line with the requirements of the NGER Act. AAPowerLink will trigger emissions thresholds for reporting during construction and reporting thresholds for energy production during operations. External reporting in accordance with environmental approval conditions under the EP Act.	<p>Likelihood: Organic matter from land clearing will decompose.</p> <p>Scale: Organic matter and debris from a combined area of ~12,900ha.</p> <p>Duration: Impacts will occur over the operational phase.</p> <p>Magnitude: Relevant criteria for environmental protection are met.</p> <p>Value: Local sensitive receptors are not impacted by GHG emissions; project has a net positive GHG impact.</p> <p>Certainty: Acceptable level of certainty pertaining to values and receptors.</p>
Atmospheric processes	Positive Impact Overall reduction in GHG emissions from generation of renewable energy	Nil	Utilising energy produced by the Solar Precinct wherever possible	Likely	Widespread	Long-term	Major	High	High	Major	Monitor GHG emissions from activities, as well as energy produced and exported in line with the requirements of NT and Commonwealth law. Data required to calculate GHG emissions will be collected in line with the methods outlined in the National Greenhouse and Energy reporting (Measurement) Determination 2008. Monitor performance against targets set in the	Reporting of GHG emissions in line with the requirements of the NGER Act. AAPowerLink will trigger emissions thresholds for reporting during construction and reporting thresholds for energy production during operations. External reporting in accordance with environmental approval conditions under the EP Act.	<p>Likelihood: This is the intent of the Project.</p> <p>Scale: Intended benefits are regional and global.</p> <p>Duration: Impact will occur over the construction and operational phase.</p> <p>Magnitude: The degree of the change will contribute to the protection of environmental values, ecological function and sensitive receptors.</p> <p>Value: Important at regional, national and international scale.</p> <p>Certainty: Overall project objective.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
											GHG Abatement and Management Plan.		
Culture and heritage	Direct or indirect impact to heritage features associated with operations and maintenance activities	Consult with Traditional Owners and sites custodians through the ILUA and AAPA Authority Certificate processes to identify Sacred Sites and culturally significant landscape features and determine the most appropriate site protection measures.	Prepare Cultural Heritage Management Plan/s (CHMP) in consultation with Traditional Owners and the NT Heritage Branch. Comply with conditions of Authority Certificates and ensure conditions are made available to all authorised personnel. Where impacts to archaeological heritage features are unavoidable, obtain an approval to carry out work on a heritage place or object (work) under the Heritage Act. Mitigation works on heritage features covered by Works Approvals will be undertaken ahead of commencing site preparation activities. Workforce training and inductions will address all aspects of cultural awareness and heritage protection.	Unlikely					High	None	Visual inspection of heritage features identified for protection. Ongoing engagement with Traditional Owners to identify emerging issues or concerns regarding heritage protection.	Internal environmental performance reporting. Reporting of incidents to Traditional Owners/AAPA/NLC and NT Heritage Branch and consultation to determine appropriate response. External reporting in accordance with environmental approval and heritage works approval conditions.	<i>Not assessed as impact is u</i>
Human Health	Exposure to EMF	HVAC cables at Solar Precinct and Darwin Converter Site emit low level EMF that does not pose a risk to human health.	Subsea and underground cables design includes lead sheathing and armoured cores which further prevents electric fields from entering the surrounding environment.	Unlikely	Limited	Long-term	Negligible	Medium	High	None	-	-	<p>Likelihood: Exposure static electricity and magnetic fields unlikely to cause health effects.</p> <p>Scale: Very short distance from emissions source.</p> <p>Duration: Continuous during operations.</p> <p>Magnitude: Research to date shows no detrimental health effect from exposure to low-level static electric and magnetic fields. Mitigation measures expected to reduce the magnitude of this risk.</p> <p>Value: There are no sensitive receptors in areas where EMF exposure could occur; no public access near and under facilities.</p> <p>Certainty: Acceptable level of confidence in EMF research to date, and high level of confidence in mitigation.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Human Health	Increase in Biting Insects	Construction camps will be adequately insect screened. Locations for OHTL fly camps will be selected to be as far as possible away from significant mosquito breeding habitats i.e. watercourses and wetlands that retain water during the dry season. Darwin Converter Site workforce will be accommodated in Darwin, not on site. Drains and culverts designed to prevent upstream flooding and be free draining, retaining water for a period of maximum 5 days. Water tanks will be screened to prevent entry of mosquitoes. Landfill will comply with the Guidelines for Siting, Design and Management of Solid Waste Disposal Sites in the Northern Territory 2003. Materials arriving from overseas at Darwin Port are subject to quarantine inspections and treatment.	Workforce education and induction on the use of appropriate PPE, bite prevention and treatment methods. Inspection and removal of any artificial mosquito breeding habitats (see below). Implementation of mosquito control methods, such as residual insecticides and larvicides in accordance with advice from Department of Health. Containers capable of holding water stored undercover and/or emptied on a weekly basis during construction. Post-construction reinstatement activities to remove impediments to surface water drainage such as stockpiles, low points, wheel ruts etc. Stormwater drains, culverts and sediment basins maintained free from sediment build up and vegetation growth. Landfill and wastewater management systems maintained to prevent water ponding and pooling. Inspection of imported materials, equipment and plant for pests on arrival at works areas. Treat any pest species detected in accordance with advice from NT Medical Entomology branch	Unlikely						None	Visual inspections for the presence of ponding/pooling water and mosquito larvae. Report/complaints from workers. Visual inspections of all infrastructure for ponding/pooling of water. Rectification works if required. Visual inspections for the presence of mosquito larvae and other non-native species.	Incident reporting in the event a worker requires treatment or becomes ill from exposure to biting insect bites or disease. Internal inspection records. Notify NT Medical Entomology branch in the event a pest species is detected.	<i>Not assessed as impact is unlikely to occur. Operational footprints will be managed to avoid creation of biting insect breeding habitat.</i>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Human Health	Increase in communicable disease	<p>Compliance with all federal (Australian Government Department of Health), state (Northern Territory Government Health), and local requirements set out for COVID 19 health measures, as well as guidelines set out by the World Health Organization (WHO).</p> <p>Practices to minimize the risk of COVID 19 infection while living in camps include washing hands, wearing masks while in common areas where physical distancing is not possible, and avoiding touching one’s eyes, nose, and mouth without properly cleaning hands first.</p> <p>No guests will be allowed in the camps, and all camps will be equipped with readily available PPE, including hand soap, sanitizer, face masks, disinfectant wipes, over the counter medicines, thermometers, and rapid COVID 19 antigen tests.</p> <p>Workers will be required to be fully vaccinated.</p> <p>14 days prior to moving into the camp, it will be recommended that workers avoid large gatherings, wear masks in public spaces and where physical distancing is not possible, avoid being near people who are sick, and wash their hands.</p>	<p>If any worker exhibits cold or flu like symptoms, immediately notify a Construction Supervisor. The individual must, if possible, evacuate the camp to a hotel for a minimum of five days or until symptoms improve, or self-isolate away from other workers.</p>	Unlikely						None	-	-	<p><i>Not assessed as impact is unlikely to occur. Size of operations workforce and lack of camp living accommodations reduces risk of increase in communicable disease to unlikely during operations phase.</i></p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Human Health	Exposure to air emissions of particulate matter (PM10, PM2.5) and Nitrogen Oxide (NOx)	Whenever possible, plan haul routes to avoid residential areas. Efficient staging and layout of construction facilities to minimize haulage, avoid double handling of materials and other excessive equipment operations. Use grid or solar power whenever practical over stationary combustion generated power. Prohibit open burning of any materials.	<p>NOx emissions will be minimised by using electric vehicles and equipment where practicable, and ensuring all machinery, plant and equipment complies with minimum emissions standards. Implement anti-idling policy. Operate equipment at optimum rated loads as determined by equipment manufacturer and follow routine equipment maintenance procedures. Ensure all heavy duty on-road and non-road vehicles are late model and meet all commonwealth and NT emission standards. Ensure all equipment brought to site is in good working order accompanied by inspection certificates and not exceeding 10% opacity.</p> <p>Position stationary emission sources such as generators away from sensitive receptors with due regard to safety, security, traffic and other geographic restrictions.</p>	Possible	Limited	Short-term	Negligible	Medium	High	Minor	Conduct visual inspections for opacity from vehicle/equipment emissions.		<p>Likelihood: Diesel emissions from vehicles and dust emissions from operational activities could potentially expose human receptors to air emissions.</p> <p>Scale: Diesel emissions from operational activities will affect a small area around activities. Vehicle numbers required during operations are limited. Dust emissions from operational activities will affect a small area around activities. Most of the footprint will be under infrastructure and vegetation management will be used to control dust at the Solar Precinct.</p> <p>Duration: Emissions could cause elevated concentrations of NO2 or TSP for short periods of time as vehicles drive by or during maintenance activities, or ground disturbance.</p> <p>Magnitude: Health criteria are unlikely to be exceeded.</p> <p>Value: There are no sensitive receptors in areas where air emissions will occur i.e. they are limited to within operational areas.</p> <p>Certainty: The only sources of NO2 during operations will be some vehicles and maintenance equipment. Operational activities will not involve major ground disturbance works. Most ground surfaces will be covered.</p>

Factor	Potential Impact	Avoidance	Mitigation	Likelihood	Scale	Duration	Magnitude	Value	Certainty	Residual Impact	Monitoring	Reporting	Assumptions
Human Health	Exposure to noise emissions	<p>Whenever possible, schedule work that creates the most noise during the NT EPA prescribed acceptable construction times (Monday to Saturday 7am to 7pm and between 9am and 6pm Sundays or public holidays). However, justification of work outside the NT EPA construction times may be needed if it is not possible to work within these times.</p> <p>Locate site access roads, laydown areas and stationary equipment (e.g., generators) as far away as possible from sensitive receivers;</p> <p>Whenever possible, plan haul routes to avoid residential areas;</p> <p>Maintain access routes to avoid the formation of potholes.</p> <p>Design access roads and laydown areas to minimize reversing of trucks/equipment;</p> <p>Use broadband back-up alarms to extent possible;</p> <p>Do not use engine brakes unless necessary;</p> <p>Maintain equipment as per manufacturer’s instructions;</p> <p>Keep engines covers closed;</p> <p>Dampen tailgates to avoid banging;</p> <p>Avoid dropping loads into dump trucks from heights;</p> <p>Limit the use of diesel generators by drawing power from the existing hydro grid.</p>	<p>Where practical, machines shall be operated at low speeds and power and turned off instead of left idling for prolonged periods when not in use;</p> <p>Install temporary noise enclosures in areas of prolonged high noise activities.</p> <p>Notify the local community within the Study Area of the construction activities, especially if overnight construction is required. Notifications should include the location, extent, and duration of construction activities.</p>	Unlikely					High	None			<p><i>No operational noise is anticipated for the Cable Transition Facilities as the cabling will be buried underground. No sensitive receptors.</i></p> <p>Certainty: High confidence in noise screening assessment.</p>