EPBC Act referral

Australian Government

Department of the Environment and Energy

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

Title of proposal	2019/8594 - Davis Aerodrome Project

Section 1

Summary of your proposed action

1.1 Project industry type Commonwealth Development

1.2 Provide a detailed description of the proposed action, including all proposed activities

Details of the proposed action are provided in the Extended Referral Submission (Attachment 01, Section 1.2); a summary is provided below.

The Australian Government's 2016 Australian Antarctic Strategy and 20 Year Action Plan committed to various activities to support Australia's national Antarctic interests and enhance Australia's Antarctic science capability and standing in the Antarctic science community, including investigating year-round air access between Australia and Antarctica. In May 2018 , the Australian Government announced its intention to construct a paved runway near Davis research station, subject to environmental and other Government approvals.

The proposed action (the Davis Aerodrome Project) is the construction and operation of a 2.7km paved runway, 4.5km access road, and associated aerodrome and station infrastructure. Davis aerodrome would enable year-round flights between Australia and Antarctica.

Aviation is crucial to the Australian Antarctic Program's activities in Antarctica. Australia's Antarctic aviation system currently consists of a summer-only link from Hobart to the Wilkins Aerodrome ice runway (approx 70km from Casey), with interconnecting intracontinental flights to other stations and field sites using aircraft such as DHC-6 Twin Otters, Basler BT-67 and helicopters. Intercontinental flights to Wilkins occur between Oct and Mar, with an approx 6-week closure in late Dec and Jan when warmer temperatures weaken the ice surface. Stations are inaccessible by air or ship in winter.

Year-round access for scientists and equipment to Antarctica would provide significant science benefits, including the ability to monitor and understand change, improve accuracy of forecast models, sea level rise predictions and climate change impacts. Year-round access provides opportunities to study wildlife across the annual lifecycle of key species including krill, penguins, seals and seabirds, and allow scientists to investigate processes through the full cycle of changes including through winter.

The Davis Aerodrome Project includes:

-A 2,700m paved Code 4E runway suitable for aircraft capable of return flights from Australia without refuelling at the aerodrome (e.g. Boeing 787, Airbus A330), and the Royal Australian Air Force operated Boeing C-17A Globemaster III

-Aviation infrastructure (taxiway, apron, runway lighting, intracontinental aircraft hangars, terminal facility, storage building, fuel storage, and combined Aerodrome Rescue and Fire Fighting Services station and air traffic services centre)

-An access road to the aerodrome

-Supporting infrastructure at Davis research station to enable construction of the aerodrome

The population capacity of Davis research station would expand to approx 250 people during the construction period, consisting of a construction workforce of approx 150 plus station operations personnel. This expansion would require new accommodation and supporting infrastructure, as outlined below.

CONSTRUCTION (See Map 2)

Shipping and logistics: A range of items required for construction would be transported by icebreakers and ice-strengthened cargo vessels to a new wharf at Davis research station, with up to 9 ship voyages per year for up to 10 years. Ships would arrive in Oct for 'over ice' cargo transfer, in Jan and Feb for over water transfer, and in Apr for personnel retrieval at the end of the season. Ships would anchor at the existing Davis anchorage.

A new wharf, adjacent to the existing wharf, would be required with an indicative reclamation area of 2,300 m2 using material sourced from within the project footprint.

Access road: This would be constructed from rock material sourced from within the project footprint.

Runway earthworks: Approx 3 million cubic metres of earthworks would be required for aerodrome construction. This involves removing elevated areas and filling depressions to create a level area for runway construction. Earthworks would predominantly be drilling and blasting as most material at the site is rock. Most blasted rock would be placed as coarse rock fill without processing; approx. 15% would be crushed and screened for use in pavement sublayers.

Explosives storage: A facility would be constructed to store explosives used in earthworks, it would include a hardstand area, storage facility and generator.

Pavement: The runway would be constructed from pre-cast concrete pavers, made in Australia and assembled on site. Approximately 11,500 pavers are required for the apron, taxiway and runway. Each paver weighs approx 10t. Pavers would be transported by barge from the cargo ships, and towed to the aerodrome site on trailers over winter, then craned and grouted into place.

Runway infrastructure: Runway infrastructure such as lighting, communication, navigation systems, and weather stations would be required for completion of the runway. Runway approach lights, extending 420m from each end of the runway, would require construction of access tracks, excavation for footings, erection of lighting masts and gantries, and installation of power cables.

Aerodrome buildings: Construction of the aerodrome buildings would rely on prefabricated and modular design where

practical to minimise construction on site.

Aerodrome fuel farm: A fuel farm would be constructed at the aerodrome, consisting of around seven 110kL bunded tanks.

Davis enabling infrastructure: This infrastructure would include accommodation facilities; water treatment and storage tanks; wastewater storage, treatment and disposal; power generation and distribution; fuel storage; waste storage for return to Australia; and workshop, storage and hardstand areas. Siting studies are underway for this infrastructure; consequently, specific locations have not yet been determined. The AAD's policy is to site infrastructure in previously disturbed sites, where practical, to manage potential increases in the disturbed footprint associated with its activities. Attachment 01 provides more information on footprint and location for this infrastructure.

OPERATION

Flying operations: Once operational, Davis aerodrome would become Australia's primary Antarctic aviation hub, with Wilkins Aerodrome remaining an important link to Casey research station. The indicative operational tempo is approx 3 intercontinental flights per month between Australia and Davis from Oct to Apr, and approx monthly flights from May to Sep to support winter operations. The aerodrome would be used for intercontinental flights from Australia conducted by aircraft chartered by the AAD or by the Australian government. More frequent intracontinental flights would be conducted, including to support other nations' activities in Antarctica.

Flight paths are being developed for intercontinental and intracontinental aircraft taking into consideration environmental constraints, Antarctic guidelines, and legislative, technical and operational requirements. The flight paths will be used to assess environmental impacts, with the flight paths to be finalised and validated by Airservices Australia and CASA, closer to operations commencing.

Ground operations: Key ground activities would include clearing snow and grit from the runway, processing passengers and cargo, and refuelling. Ground operations could include emergency de-icing and emergency response (rescue and firefighting), but these are expected to be a rare occurrence.

1.3 What is the extent and location of your proposed action?

See Appendix B

1.5 Provide a brief physical description of the property on which the proposed action will take place and the location of the proposed action (e.g. proximity to major towns, or for off-shore actions, shortest distance to mainland)

The project is located in the Vestfold Hills, East Antarctica, a roughly 410km2 triangular area of rocky hills that are predominantly ice-free.

The Vestfold Hills are bounded by the Sørsdal Glacier (south), Antarctic ice sheet (east) and by the Southern Ocean (west and north); they lie 4,800km south-west of Hobart, 1,400km from Casey research station (and Wilkins Aerodrome) and 600km from Mawson research station. There are many offshore islands, including Hawker Island Antarctic Specially Protected Area (ASPA) approx 6km south-west of Davis research station. Marine Plain ASPA is located approx 8km south-east of the Davis aerodrome.

Davis research station is approx 120km northeast of the Larsemann Hills where the Zhongshan (People's Republic of China), Progress (Russia) and Bharati (India) research stations are located. Australia also has a summer-only field site at Law Base in the Larsemann Hills. There are no other year-round facilities within 250km of the project.

1.6 What is the size of the proposed action area development footprint (or work area) including disturbance footprint and avoidance footprint (if relevant)?

Approximately 220ha for the project

The project includes infrastructure and activities in the following locations:

- Davis aerodrome, located approximately 4.5 km north-east of Davis research station
- Access road, following an alignment between Davis research station and the aerodrome that crosses Adams Flat
- A new wharf, anticipated to be located adjacent to the existing wharf
- The existing anchorage and offshore areas, which would be used for shipping and logistics activities
- An explosives storage facility, which could potentially be located near Heidemann Valley, although further investigation is required to confirm a location
- Davis research station, where enabling infrastructure would be located, and
- Airspace of the proposed runway.

1.7 Proposed action location

Other - Davis research station is located in the Vestfold Hills, East Antarctica.

1.8 Primary jurisdiction	Australian Antarctic Territory

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1.9 Has the person proposing to take the action received any Australian Government grant funding to undertake this project?

☐ Yes ☑ No

1.10 Is the proposed action subject to local government planning approval?

☐ Yes ☑ No

1.11 Provide an estimated start and estimated end date for the proposed action	Start Date	01/12/2023
	End Date	31/12/2069

1.12 Provide details of the context, planning framework and state and/or local Government requirements

A range of Commonwealth Government legislation and requirements would apply to the Davis Aerodrome Project. The key legislative requirements are outlined below.

Antarctic Treaty (Environment Protection) Act 1980 (ATEP Act)

The Protocol on Environmental Protection to the Antarctic Treaty (the Environment Protocol) establishes Antarctica as a 'natural reserve, devoted to peace and science,' prohibits mining, establishes environmental principles for the conduct of activities, and requires all proposed activities to undergo prior assessment of their environmental impacts.

Australia's obligations under the Environment Protocol are implemented through the ATEP Act. The ATEP Act sets out the process to determine the environmental impact of an activity and circumstances under which an activity may be authorised. The ATEP Act also stipulates those activities that are offences, and in what circumstances, if any, an activity can be permitted. For an activity to be approved that would otherwise be an offence under the ATEP Act, the activity must be authorised and permitted.

As such, to undertake the Davis Aerodrome Project, an environmental impact assessment (EIA) must be undertaken and authorisation obtained under the ATEP Act. Under the ATEP Act the first stage of the EIA process is the development and submission of a Preliminary Assessment (PA). The AAD submitted a PA for the Project on 14 October 2019. On 28 November 2019 the AAD received a determination under section 12E of the ATEP Act that the proposed activity is likely to have more than a minor or transitory impact on the environment. Accordingly, the AAD is required to follow the requirements under section 12K of the ATEP Act for the preparation and submission of a Draft and Final comprehensive environmental evaluation (CEE) for the Project. Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

The EPBC Act establishes an EIA regime for the protection of matters of national environmental significance (MNES), and other measures for the conservation of biodiversity. The EPBC Act applies in the location of the proposed activity, which is a Commonwealth area for the purposes of the EPBC Act (section 525 of the EPBC Act).

Under the EPBC Act, a person must refer an action that they think will, or is likely to have significant impact on a MNES to the Minister for Environment to determine whether it will, or is likely to, have such impacts and is subject to the EIA regime. The MNES include the environment broadly where an action is proposed to be taken on or to impact a Commonwealth area, or an action carried out by a Commonwealth agency.

The AAD has received advice that an authorisation is not required from Airservices Australia (or the Civil Aviation Safety Authority) for the design or implementation of new instrument flight rule procedures at the Davis aerodrome; consequently, section 160 of the EPBC Act, as it relates to "the adoption or implementation of a plan for aviation airspace management involving aircraft operations that have, will have or are likely to have a significant impact on the environment", does not apply. Accordingly, this Referral has been submitted under section 68 of the Act to commence the environmental assessment and approval process, and considers the construction and operation of the proposed Davis aerodrome, including new instrument flight rule procedures.

Antarctic Marine Living Resources Conservation Act 1981 (AMLRC Act)

The AMLRC Act, and subordinate Regulations, gives effect to the Convention on the Conservation of Antarctic Marine Living Resources, which entered into force in 1982. The Act applies to the Antarctic marine living resources of the area south of 60° south latitude and to the Antarctic marine living resources of the area between that latitude and the Antarctic Convergence which form part of the Antarctic marine ecosystem (Article 1.1).

The Act generally prohibits the harvesting of any marine organisms without a permit (section 8). As such, the AMLRC Act regulates the taking of seawater from the Antarctic, as it contains microorganisms that are covered under the Act. Seawater may be used as part of construction activities for the Davis aerodrome (e.g. as a source of reverse osmosis water), and permits would be required under the Act.

Other applicable legislation includes Protection of the Sea legislation, Biosecurity Act 2015, Civil Aviation Act 1988, Airspace Act 2007, and Aviation Transport Security Act 2004.

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1.13 Describe any public consultation that has been, is being or will be undertaken, including with Indigenous stakeholders

Following the release of the Australian Antarctic Strategy and 20 Year Action Plan in 2016, the AAD has consulted with internal and external stakeholders through several forums and working groups. Consultation with these and other stakeholders would be ongoing during design development, planning and construction phases of the project.

A communication strategy, stakeholder management plan, and stakeholder register are being prepared as part of an ongoing process to identify and engage with stakeholders of the project to ensure that key stakeholders are identified and that strategies are put in place to engage with them and respond to any issues or opportunities raised.

Key stakeholders for this project include the following:

- The Australian public
- Commonwealth Government departments, agencies and authorities, from a policy and regulatory perspective (including the Civil Aviation Safety Authority and Airservices Australia)
- Tasmanian Government entities
- Commercial stakeholders, such as airports and air charter operators
- Scientific institutions' councils, academies and advisory bodies (including but not limited to those participating in the AAP)
- Antarctic Treaty parties and nations active in Antarctica and their stakeholders, and
- Domestic and international environmental non-government organisations.

As noted in Section 1.12 of this Referral, it has been determined that the Project is subject to the CEE provisions of the ATEP Act. Accordingly, the AAD will prepare a Draft CEE for submission to the Minister. The Draft CEE will then be made available for public comment in Australia, to all Parties to the Environment Protocol, and to the Committee for Environmental Protection (CEP). Each Party will also make the Draft CEE available for public comment. The CEP will consider the Draft CEE and provide advice to the Antarctic Treaty Consultative Meeting (ATCM). The AAD will need to prepare and submit to the Minister a Final CEE, addressing all comments on the Draft CEE provided by other Parties, the ATCM and members of the public. The Minister will then decide whether or not to authorise the carrying on of the activity as proposed or with certain modifications.

While there is no Indigenous heritage in Antarctica, Indigenous stakeholder consultation would be undertaken, as appropriate, as part of the environmental assessment and broader project development process. Indigenous Australians have participated in past and present Australian National Antarctic Research Expeditions (ANARE) expeditions and will continue to be an important part of the Australian Antarctic Program into the future.

1.14 Describe any environmental impact assessments that have been or will be carried out under Commonwealth, State or Territory legislation including relevant impacts of the project

ENVIRONMENTAL IMPACT ASSESSMENT UNDER THE ATEP ACT

As noted in Section 1.12 of this Referral, to undertake the Project an environmental impact assessment (EIA) must be undertaken and authorisation obtained under the ATEP Act. On the basis of a Preliminary Assessment submitted on 14 October 2019, it was determined on 28 November 2019 that the Project is required to follow the requirements under section 12K of the ATEP Act for the preparation and submission a Draft and Final CEE. Section 1.13 of this Referral outlines the process that will be followed for public and international comment on the Draft CEE, and the preparation of a Final CEE.

STATE LEGISLATION

State impact assessment does not apply to the proposed activities.

1.15 Is this action part of a staged development (or a component of a larger project)?

☐ Yes ☑ No

1.16 Is the proposed action related to other actions or proposals in the region?

☑ Yes ☐ No

1.16.1 Identify the nature/scope and location of the related action (Including under the relevant legislation)

The AAD is planning a variety of modernisation projects to support Australia's national interests in Antarctica & enhance Australia's Antarctic science.

The AAD is planning works at Davis research station prior to Davis Aerodrome Project (the Davis Stabilisation Project), to address identified capacity & condition concerns with existing infrastructure. As part of the Project, station capacity would increase to 120 personnel by upgrading & repurposing existing infrastructure. Separate environmental approvals will be gained for the Stabilisation Project.

The AAD is also planning the long-term redevelopment of Davis research station. The redevelopment would replace existing aging infrastructure with a modern, master planned station. It would be staged, with separate environmental approvals gained as required.

This Davis Stabilisation Project & long-term redevelopment are needed regardless of the Davis Aerodrome Project, & are not part of the proposed action in this Referral.

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Section 2

Matters of national environmental significance

2.1 Is the proposed action likely to have any direct or indirect impact on the values of any World Heritage properties?

☐ Yes ☑ No

2.2 Is the proposed action likely to have any direct or indirect impact on the values of any National Heritage places?

☐ Yes ☑ No

2.3 Is the proposed action likely to have any direct or indirect impact on the ecological character of a Ramsar wetland?

☐ Yes ☑ No

2.4 Is the proposed action likely to have any direct or indirect impact on the members of any listed species or any threatened ecological community, or their habitat?

☑ Yes ☐ No

Species or threatened ecological community

Southern Giant Petrel (Macronectes giganteus)

Impact

There are potential impacts from construction and ground operations.

1. Loss of foraging habitat: It is not anticipated that the construction or ground operations of the aerodrome would have a significant impact on foraging habitat for the Southern Giant Petrel, given its broad range of foraging habitat

2. Loss of breeding habitat: Construction is not anticipated to disturb breeding habitat for the Southern Giant Petrel, as the nearest breeding colony is located at Hawker Island over 6 km south-west of Davis research station.

3. Potential impacts on birds from waste, such as ingestion, generated by construction and operation are not considered to be significant.

Further information is provided in Attachment 01 (Section 2.4.1).

Species or threatened ecological community

Southern Giant Petrel (Macronectes giganteus)

Impact

Potential noise impacts from aircraft operations may cause disturbance to birds, which has the potential to affect behaviour:

1. Flights are not planned to pass directly over Hawker Island, in accordance with the Management Plan for ASPA No 167 Hawker Island.

2. There is the potential for the colony at Hawker Island to be affected by noise from aircraft, and further analysis is required to determine if this would be significant.

3. It is not anticipated that the aircraft operations would have a significant impact on foraging habitat for the Southern Giant Petrel, given its broad range of foraging habitat.

4. Potential indirect impacts of noise disturbance require further investigation during the detailed assessment.

A precautionary approach has been applied in this Referral. The need for further detailed assessment has been recognised, and potential impacts and appropriate mitigation will be considered through the environmental assessment processes triggered under the ATEP Act and through this Referral.

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Species or threatened ecological community

There are no records report in the area of the other four species on the Department of Environment and Energy Protected Matters Search Tool (PMST) (White-bellied Storm Petrel (Tasman Sea) (Fregetta grallaria grallaria), Fairy Prion (southern) (Pachyptila turtur subantarctica), Antarctic Tern (Indian Ocean) (Sterna vittata vittata), and Black-browed Albatross (Thalassarche melanophris))

Impact

Given there are no records of the other four species in the area (White-bellied Storm Petrel [Tasman Sea], Fairy Prion [Southern Ocean], Antarctic Tern [Indian Ocean] and Black-browed Albatross), no impacts are anticipated.

Species or threatened ecological community

The PMST Report identified five cetaceans listed as both threatened and migratory under the EPBC Act. These are Sei Whale (Balaenoptera borealis), Blue Whale (Balaenoptera musculus), Fin Whale (Balaenoptera physalus), Southern Right Whale (Eubalaena australis), and Humpback Whale (Megaptera novaeangliae).

Impact

There are potential impacts from construction and ground operations.

1. The potential impact of ship strike on whales associated with the increased shipping is not considered to be significant.

1.a. The AAP currently undertakes 3 voyages to Davis anchorage each year using the RSV Aurora Australis, and other nations' vessels also occasionally use the anchorage; there have been no recorded vessel strikes on marine mammals from AAP vessels in the last ten years. The number of vessels would increase, with up to 9 annual ship voyages (including the current resupply voyages), with the potential for short periods of two ships present in the area at one time.

1.b. Knowledge of whale occurrence in the nearshore environment is scant, however Orcas and Minke whales are known to inhabit inshore waters and have been sighted close to Davis Station. While there would also be an increase in the number of ship-to-shore loading and unloading movements, these nearshore movements would typically be slow with a relatively low risk of striking a cetacean. Controls, such as speed restrictions and the use of wildlife spotters, would be investigated.

2. Disturbance from underwater noise (construction works): The new wharf on the coast at the Davis research station would require physical works to be undertaken. These works would generate underwater noise (e.g. during piling), which has the potential to disturb marine mammals.

3. Disturbance from underwater noise (vessel movement): While it is not considered to present a significant impact at a species level, localised and transitory noise from vessel operations (bulk cargo carriers, barges and tug boats) has the potential to cause disturbance to individual cetaceans that might be in the area near the loading and unloading operations. Further analysis would be undertaken through the detailed environmental assessment for the project.

4. Potential impacts on cetaceans from waste, such as ingestion, generated by construction and operation would be mitigated and managed through the implementation of the AAD's environmental management practices (refer Section 4.0), and are not considered to be significant.

The potential impacts on the listed cetacean species are not considered to be significant at the species level; nevertheless, the extent of potential impacts would be assessed through the detailed environmental assessment for the project.

Species or threatened ecological community

The PMST Report identified five cetaceans listed as both threatened and migratory under the EPBC Act. These are Sei Whale (Balaenoptera borealis), Blue Whale (Balaenoptera musculus), Fin Whale (Balaenoptera physalus), Southern Right Whale (Eubalaena australis) and Humpback Whale (Megaptera novaeangliae).

Impact

Potential noise impacts (disturbance) on the listed cetacean species from aircraft overflights are not considered to be significant at a species level, given there are planned to be approximately three intercontinental flights per month, and the existing regular use of the Davis area for intracontinental and scientific flights. Aircraft noise is considered to be localised and transitory. Potential indirect impacts of noise disturbance require further investigation during the detailed assessment.

Species or threatened ecological community

Southern Elephant Seal (Mirounga leonina)

Impact

Potential impacts from construction and ground operations to Southern Elephant Seals, which moult at wallows at Davis research station (Station Beach), Old Wallow and other wallows between Davis research station and Law Cairn:

1. Disturbance from movement of people, cargo and equipment in proximity to haul out areas: Further analysis is required to

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understand the potential impacts and identify mitigation for construction activities related to station infrastructure, cargo unloading and transport near the Southern Elephant Seal haul out areas, and would be undertaken for the detailed environmental assessment for the project. A precautionary approach has been applied in this Referral. There is the potential for the increased vehicle movements and construction activity to disturb this population of seals during the summer moult. Further analysis is required to determine if this would be significant, as many moulting locations are currently exposed to the physical presence of people, machinery, infrequent intracontinental overflights, and helicopter operations. Potential impacts and appropriate mitigation will be considered through the detailed environmental assessment for the project.

2. Potential impacts on Southern Elephant Seals from waste, such as ingestion, generated by construction and operation would be mitigated and managed through the implementation of the AAD's environmental management practices, and are not considered to be significant.

Species or threatened ecological community

Southern Elephant Seal (Mirounga leonina)

Impact

Disturbance from aircraft noise: Further analysis is required to understand the potential impacts and identify mitigation of changes to aircraft noise during aircraft operation on the Southern Elephant Seal haul out areas, as many moulting locations in the area are currently exposed to the physical presence of people, machinery, infrequent intracontinental overflights, and helicopter operations. This analysis would be undertaken for the detailed environmental assessment for the project. Potential indirect impacts of noise require further investigation during the detailed assessment.

Species or threatened ecological community

There are no listed flora or threatened ecological communities near the project site.

Impact

N/A

2.4.2 Do you consider this impact to be significant?

☑ Yes ☐ No

2.5 Is the proposed action likely to have any direct or indirect impact on the members of any listed migratory species or their habitat?

☑ Yes ☐ No

Migratory species

Southern Giant Petrel (Macronectes giganteus)

Impact

There are potential impacts from construction and ground operations.

1. Loss of foraging habitat: It is not anticipated that the construction or ground operations of the aerodrome would have a significant impact on foraging habitat for the Southern Giant Petrel, given its broad range of foraging habitat.

2. Loss of breeding habitat: Construction is not anticipated to disturb breeding habitat for the Southern Giant Petrel, as the nearest breeding colony is located at Hawker Island over 6 km south-west of Davis research station.

3. Potential impacts on birds from waste generated by construction and operation are not considered to be significant.

Further information is provided in Attachment 01 (Section 2.4.1).

Migratory species

Southern Giant Petrel (Macronectes giganteus)

Impact

Potential noise impacts from aircraft operations may cause disturbance to birds, which has the potential to affect behaviour:

1. Flights are not planned to pass directly over Hawker Island, in accordance with the Management Plan for ASPA No 167 Hawker Island.

2. There is the potential for the colony at Hawker Island to be affected by noise from aircraft, and further analysis is required to determine if this would be significant.

3. It is not anticipated that the aircraft operations would have a significant impact on foraging habitat for the Southern Giant Petrel, given its broad range of foraging habitat.

4. Potential indirect impacts of noise disturbance require further investigation during the detailed assessment.

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A precautionary approach has been applied in this Referral. The need for further detailed assessment has been recognised, and potential impacts and appropriate mitigation will be considered through the environmental assessment processes triggered under the ATEP Act and through this Referral.

Migratory species

There are no records of the other species identified in the PMST Report, Black-browed Albatross (Thalassarche melanophris), in the area.

Impact

Given there are no records of Black-browed Albatross in the area, no impacts are anticipated.

Migratory species

Wilson's Storm Petrel (Oceanites oceanicus)

Impact

Preliminary surveys in 2017-18 and 2018-19 demonstrated that Wilson's Storm Petrels nest within the project site. Additional surveys are being undertaken as part of the 2019-20 field season, which will contribute to the understanding of the population estimate for the project site and surrounding areas. Construction would affect individual Wilson's Storm Petrels nests within the site and would reduce available habitat for this species; however, this is not anticipated to present a significant impact on the overall population of this relatively abundant species. Wilson's Storm Petrels have the potential to be affected by the change to aircraft operations at Davis aerodrome, and further analysis is required to determine if this would be significant. A precautionary approach has been applied in this Referral. The need for further detailed assessment has been recognised, and potential impacts and appropriate mitigation will be considered through the detailed environmental assessment for the project.

Migratory species

South Polar Skua (Catharacta maccormicki).

Impact

South Polar Skuas have the potential to be affected by the change to aircraft operations at Davis aerodrome, and further analysis is required to determine if this would be significant. A precautionary approach has been applied in this Referral. The need for further detailed assessment has been recognised, and potential impacts and appropriate mitigation will be considered through the detailed environmental assessment for the project.

Migratory species

The PMST Report identified eight cetaceans listed as migratory under the EPBC Act. These are Sei Whale (Balaenoptera borealis), Blue Whale (Balaenoptera musculus), Fin Whale (Balaenoptera physalus), Southern Right Whale (Eubalaena australis), Humpback Whale (Megaptera novaeangliae), Killer Whale (Orcinus orca), Antarctic Minke Whale (Balaenoptera bonaerensis) and Sperm Whale (Physeter macrocephalus)

Impact

There are potential impacts from construction and ground operations.

1. The potential impact of ship strike on whales associated with the increased shipping is not considered to be significant.

1.a. The AAP currently undertakes 3 voyages to Davis anchorage each year using the RSV Aurora Australis, and other nations' vessels also occasionally use the anchorage; there have been no recorded vessel strikes on marine mammals from AAP vessels in the last ten years. The number of vessels would increase, with up to 9 annual ship voyages (including the current resupply voyages), with the potential for short periods of two ships present in the area at one time.

1.b. Knowledge of whale occurrence in the nearshore environment is scant, however Orcas and Minke whales are known to inhabit inshore waters and have been sighted close to Davis Station. While there would also be an increase in the number of ship-to-shore loading and unloading movements, these nearshore movements would typically be slow with a relatively low risk of striking a cetacean. Controls, such as speed restrictions and the use of wildlife spotters, would be investigated.

2. Disturbance from underwater noise (construction works): The new wharf on the coast at the Davis research station would require physical works to be undertaken. These works would generate underwater noise (e.g. during piling), which has the potential to disturb marine mammals.

3. Disturbance from underwater noise (vessel movement): While it is not considered to present a significant impact at a species level, localised and transitory noise from vessel operations (bulk cargo carriers, barges and tug boats) has the potential to cause disturbance to individual cetaceans that might be in the area near the loading and unloading operations.

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Further analysis would be undertaken through the detailed environmental assessment for the project.

4. Potential impacts on cetaceans from waste generated by construction and operation would be mitigated and managed through the implementation of the AAD's environmental management practices (refer Section 4.0), and are not considered to be significant.

The potential impacts on the listed cetacean species are not considered to be significant at the species level; nevertheless, the extent of potential impacts would be assessed through the detailed environmental assessment for the project.

Migratory species

The PMST Report identified eight cetaceans listed as migratory under the EPBC Act. These are Sei Whale (Balaenoptera borealis), Blue Whale (Balaenoptera musculus), Fin Whale (Balaenoptera physalus), Southern Right Whale (Eubalaena australis), Humpback Whale (Megaptera novaeangliae), Killer Whale (Orcinus orca), Antarctic Minke Whale (Balaenoptera bonaerensis) and Sperm Whale (Physeter macrocephalus)

Impact

The potential impacts on the listed cetacean species from aircraft overflights are not considered to be significant at a species level, given there are planned to be approximately three intercontinental flights per month, and the existing regular use of the Davis area for intracontinental and scientific flights. Aircraft noise is considered to be localised and transitory. Potential indirect impacts of noise disturbance require further investigation during the detailed assessment.

2.5.2 Do you consider this impact to be significant?

☑ Yes ☐ No

2.6 Is the proposed action to be undertaken in a marine environment (outside Commonwealth marine areas)?

☑ Yes ☐ No

2.6.1 Is the proposed action likely to have any direct or indirect impact on the Commonwealth marine environment?

☑ Yes ☐ No

2.6.2 Describe the nature and extent of the likely impact on the whole of the environment

The activities that would occur in the marine environment relate to shipping from Australia where it occurs outside Commonwealth marine areas. Potential, but negligible, impacts would be associated with possible ship strike of cetaceans and birds, and bilge water and wastewater disposal to the ocean; these activities would be managed in accordance with international conventions as standard practice. The potential impacts associated with this activity are considered to be negligible, as there would be only 18 vessel movements per season in the Southern Ocean, which already experiences considerable shipping activity.

The project does not include activities within an existing or proposed Commonwealth Marine Reserve or Antarctic Marine Protected Area.

Activities within Commonwealth marine areas are described in Section 2.13.

2.6.3 Do you consider this impact to be significant?

☐ Yes ☑ No

2.7 Is the proposed action likely to be taken on or near Commonwealth land?

☑ Yes ☐ No

2.7.1 Is the proposed action likely to have any direct or indirect impact on the Commonwealth land?

☑ Yes ☐ No

2.7.2 Describe the nature and extent of the likely impact on the whole of the environment

Impacts to the whole of environment were considered in accordance with Significant Impact Guidelines 1.2; a precautionary approach was taken in this Referral. Further analysis to understand the significance of potential impacts would be undertaken as part of a detailed environmental assessment. Preliminary mitigation measures are in Section 4.

LANDSCAPES & SOILS

The project would require earthworks. Cut and fill would be balanced, so that import or disposal of material would not be needed. Studies are underway to determine the location of enabling infrastructure and specific locations have not yet been determined. Nevertheless, major earthworks are not anticipated. The AAD's policy is to site infrastructure in previously disturbed sites where practical. Key infrastructure locations are described in Attachment 01.

COASTAL PROCESSES

The new wharf would require land reclamation, which would have the potential to locally affect coastal processes.

OCEAN FORMS, OCEAN PROCESSES & OCEAN LIFE

Project activities that would occur in the marine environment are shipping, and the transport of materials from ship to shore. Potential impacts associated with the anchorage, marine mammals, wastewater and pollution are discussed in Attachment 01 Section 2.7.2.3 and below.

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

GROUNDWATER

Groundwater is present in areas where sediment overlays rock, including Camp Lake Valley. The alignment for the access road across Adams Flat has been developed to reduce potential impacts on groundwater.

SURFACE WATER

The area is arid, with annual precipitation of approx 70mm snowfall. Construction of the runway requires earthworks to remove high points and fill low points, including Halfway Lake (approx 6,300sq.m in area and 1m deep) and a 250m long section of Camp Lake Valley. Minor drainage paths may be truncated by earthworks. It is anticipated that the project would reduce water flow in Camp Lake Valley, and alter drainage patterns in the immediate area.

POLLUTANTS, CHEMICALS, TOXIC SUBSTANCES

Aeolian transport of sediment occurs as a result of natural processes; the project would generate additional localised sources of dust from earthworks and vehicles. Construction activities require the transport, storage and use of fuel, oils etc on land and in marine areas. In the unlikely event of an accidental release, these materials have the potential to result in pollution of soil and water and represent a toxicity risk to biota. During operation, fuel storage would be required for Special Antarctic blend diesel and JetA1. Minor fuel spills have the potential to occur when refuelling. With the implementation of handling procedures and emergency response, the potential for pollution and contamination is not anticipated to present a significant risk to the environment.

PLANTS

The ice-free areas of Antarctica support sparse vegetation. Earthworks would involve the removal of terrestrial algae and lichens within the construction footprint. It is anticipated that the project would generate localised additional dust, and there is the potential for associated impacts on plants, such as wind scour and reduced ability of vegetation to photosynthesise.

ANIMALS

Fauna relevant to the project is described in Section 3.1. Construction would affect individual Wilson's Storm Petrels nests within the site and would remove some available habitat for this species; this is not anticipated to result in a significant impact to the overall population of this relatively abundant species. Dust emissions have the potential to reduce the quality of individual sea bird nesting cavities close to construction activities, but are not anticipated to significantly impact species more broadly.

Construction noise may result in wildlife disturbance; further analysis is required to understand the significance of construction noise on fauna. Animals in nearshore marine areas may be affected by disturbance associated with ship to shore transfer, including potential ship strike and noise disturbance.

Aircraft noise emissions during operation would be dependent on a range of factors including engine type, flight stage, aircraft height and meteorological conditions. The impact from existing intracontinental aviation operations already occurring around Davis and the wider Vestfold Hills, including fjords, was assessed in the Initial Environmental Evaluation for Australia's Antarctic Air Transport System 2015-2020; it was considered to have the potential to cause only minor disturbance to colonies of birds or seals. There would be changes to the type of aircraft, location, frequency and intensity of aircraft noise in the area; further analysis is required to understand the significance of potential aircraft noise impacts on fauna

PEOPLE & COMMUNITIES: the project is not anticipated to have a significant impact on people and communities.

HERITAGE: the project is not anticipated to have a significant impact on heritage.

Further detail is provided in Attachment 01.

2.7.3 Do you consider this impact to be significant?

☑ Yes ☐ No

2.8 Is the proposed action taking place in the Great Barrier Reef Marine Park?

☐ Yes ☑ No

2.9 Is the proposed action likely to have any direct or indirect impact on a water resource from coal seam gas or large coal mining development?

☐ Yes ☑ No

2.10 Is the proposed action a nuclear action?

☐ Yes ☑ No

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

2.11 Is the proposed action to be taken by a Commonwealth agency?

☑ Yes ☐ No

2.11.1 Describe the nature and extent of the likely impact on the whole of the environment

Impacts to the whole of environment were considered in accordance with Significant Impact Guidelines 1.2; a precautionary approach was taken in this Referral. Further analysis to understand the significance of potential impacts would be undertaken as part of a detailed environmental assessment. Preliminary mitigation measures are in Section 4.

LANDSCAPES & SOILS

The project would require earthworks. Cut and fill would be balanced, so that import or disposal of material would not be needed. Studies are underway to determine the location of enabling infrastructure and specific locations have not yet been determined. Nevertheless, major earthworks are not anticipated. The AAD's policy is to site infrastructure in previously disturbed sites where practical. Key infrastructure locations are described in Attachment 01.

COASTAL PROCESSES

The new wharf would require land reclamation, which would have the potential to locally affect coastal processes.

OCEAN FORMS, OCEAN PROCESSES & OCEAN LIFE

Project activities that would occur in the marine environment are shipping, and the transport of materials from ship to shore. Potential impacts associated with the anchorage, marine mammals, wastewater and pollution are discussed in Attachment 01 Section 2.7.2.3 and below.

GROUNDWATER

Groundwater is present in areas where sediment overlays rock, including Camp Lake Valley. The alignment for the access road across Adams Flat has been developed to reduce potential impacts on groundwater.

SURFACE WATER

The area is arid, with annual precipitation of approx 70mm snowfall. Construction of the runway requires earthworks to remove high points and fill low points, including Halfway Lake (approx 6,300sq.m in area and 1m deep) and a 250m long section of Camp Lake Valley. Minor drainage paths may be truncated by earthworks. It is anticipated that the project would reduce water flow in Camp Lake Valley, and alter drainage patterns in the immediate area.

POLLUTANTS, CHEMICALS, TOXIC SUBSTANCES

Aeolian transport of sediment occurs as a result of natural processes; the project would generate additional localised sources of dust from earthworks and vehicles. Construction activities require the transport, storage and use of fuel, oils etc on land and in marine areas. In the unlikely event of an accidental release, these materials have the potential to result in pollution of soil and water and represent a toxicity risk to biota. During operation, fuel storage would be required for Special Antarctic blend diesel and JetA1. Minor fuel spills have the potential to occur when refuelling. With the implementation of handling procedures and emergency response, the potential for pollution and contamination is not anticipated to present a significant risk to the environment.

PLANTS

The ice-free areas of Antarctica support sparse vegetation. Earthworks would involve the removal of terrestrial algae and lichens within the construction footprint. It is anticipated that the project would generate localised additional dust, and there is the potential for associated impacts on plants, such as wind scour and reduced ability of vegetation to photosynthesise.

ANIMALS

Fauna relevant to the project is described in Section 3.1. Construction would affect individual Wilson's Storm Petrels nests within the site and would remove some available habitat for this species; this is not anticipated to result in a significant impact to the overall population of this relatively abundant species. Dust emissions have the potential to reduce the quality of individual sea bird nesting cavities close to construction activities, but are not anticipated to significantly impact species more broadly.

Construction noise may result in wildlife disturbance; further analysis is required to understand the significance of construction noise on fauna. Animals in nearshore marine areas may be affected by disturbance associated with ship to shore transfer, including potential ship strike and noise disturbance.

Aircraft noise emissions during operation would be dependent on a range of factors including engine type, flight stage, aircraft height and meteorological conditions. The impact from existing intracontinental aviation operations already occurring around Davis and the wider Vestfold Hills, including fjords, was assessed in the Initial Environmental Evaluation for Australia's Antarctic Air Transport System 2015-2020; it was considered to have the potential to cause only minor disturbance to colonies of birds or seals. There would be changes to the type of aircraft, location, frequency and intensity of aircraft noise in the area; further analysis is required to understand the significance of potential aircraft noise impacts on fauna

PEOPLE & COMMUNITIES: the project is not anticipated to have a significant impact on people and communities.

HERITAGE: the project is not anticipated to have a significant impact on heritage.

Further detail is provided in Attachment 01.

2.11.2 Do you consider this impact to be significant?

☑ Yes ☐ No

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

2.12 Is the proposed action to be undertaken in a Commonwealth Heritage place overseas?

☐ Yes ☑ No

2.13 Is the proposed action likely to have any direct or indirect impact on any part of the environment in the Commonwealth marine area?

☑ Yes ☐ No

2.13.1 Describe the nature and extent of the likely impact on the whole of the environment

Activities in the Commonwealth Marine Area would involve the construction of a new wharf, transport of construction materials, equipment, and personnel during the construction period, carried on bulk cargo vessels as they traverse between Australia and the anchorage point located approximately 1 nm off-shore from Davis research station. These vessels would use existing shipping routes to reach this location. Once at the anchorage point, as described in Section 1.2, ship-to-shore operations using barges and tug boats would be undertaken to transport cargo and personnel between the ships and the new wharf at Davis research station.

The Commonwealth Marine Area also has the potential to be affected by changed hydrology at the project site.

The potential impacts on the marine environment are summarised below.

Impacts to the whole of environment were considered in accordance with Significant Impact Guidelines 1.2; a precautionary approach was taken in this Referral. Further analysis to understand the significance of potential impacts would be undertaken as part of a detailed environmental assessment. Preliminary mitigation measures are provided in Section 4.

COASTAL PROCESSES

The new wharf would require land reclamation, which would have the potential to locally affect coastal processes.

OCEAN FORMS, OCEAN PROCESSES & OCEAN LIFE

Project activities that would occur in the marine environment are shipping, and the transport of materials from ship to shore. Potential impacts associated with the anchorage, marine mammals, wastewater and pollution are discussed below.

SURFACE WATER

Construction of the runway requires earthworks, including filling a 250m long section of Camp Lake Valley, which flows into West Bay. It is anticipated that the project would reduce water flow in Camp Lake Valley, which has the potential to affect sediment and nutrient transport into West Bay.

POLLUTANTS, CHEMICALS, TOXIC SUBSTANCES

Construction activities require the transport and use of fuel, oils etc in marine areas. In the unlikely event of an accidental release, these materials have the potential to result in pollution of soil and water and represent a toxicity risk to biota. With the implementation of handling procedures and emergency response, the potential for pollution and contamination is not anticipated to present a significant risk to the environment.

ANIMALS

Fauna relevant to the project is described in Section 3.1.

Animals in nearshore marine areas may be affected by disturbance associated with ship to shore transfer, including potential ship strike and noise disturbance. Further analysis is required to understand the significance of this disturbance.

Aircraft noise emissions during operation would be dependent on a range of factors including engine type, flight stage, aircraft height and meteorological conditions. The impact from existing intracontinental aviation operations already occurring around Davis and the wider Vestfold Hills, including fjords, was assessed in the Initial Environmental Evaluation for Australia's Antarctic Air Transport System 2015-2020; it was considered to have the potential to cause only minor disturbance to colonies of birds or seals, including those in marine areas. There would be changes to the type of aircraft, location, frequency and intensity of aircraft noise in the area; further analysis is required to understand the significance of potential aircraft noise impacts on fauna

A more detailed description is provided in the Extended Referral Submission (Attachment 01 Section 2.7).

2.13.2 Do you consider this impact to be significant?

☑ Yes ☐ No

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

Section 3

Description of the project area

3.1 Describe the flora and fauna relevant to the project area

Antarctic terrestrial ecosystems are isolated, with less complex floral and faunal communities than at lower latitudes. Visible life is predominately confined to lower altitude areas in coastal regions (Klekociuk & Wienecke, 2017) and more than 99 per cent of Antarctica's biodiversity is concentrated in areas that are permanently ice-free. The following sections provide a summary of flora and fauna, and a more detailed description is provided in the Extended Referral Submission (Attachment 01 Section 3.1).

Birds that use ice-free areas in East Antarctica for nesting include Adélie Penguins and flying seabirds such as Cape Petrels, Southern Giant Petrels, Snow Petrels, Wilson's Storm Petrels, Antarctic Petrels and South Polar Skuas. Adélie Penguins breed along the coast of the Vestfold Hills region and on offshore islands, while Emperor Penguins have only ever been observed transiting through the hills using occasional moulting sites. Wilson's Storm Petrel nest within the aerodrome site and adjacent to the coast at Adams Flat. Snow Petrels and South Polar Skuas may possibly nest within the area surrounding the aerodrome site. The sea bird breeding season typically occurs from October to March for most species, but can extend into April for some

The PMST Report identified five cetaceans listed as both threatened and migratory under the EPBC Act (Sei, Blue, Fin, Southern Right, and Humpback Whales) (refer Section 2.4). Three additional cetaceans, which are not threatened, are also listed as migratory species (Killer, Antarctic Minke, and Sperm Whales). Southern Bottlenose Whales, which are not listed as threatened or migratory, may also be present. Knowledge of whale occurrence in the nearshore environment is scant, however Orcas and Minke whales are known to inhabit inshore waters and have been sighted close to Davis Station.

Under the EPBC Act all seals and sea lions occurring within Australian waters are listed as marine species. Four seal species are found in the Vestfold Hills area: Southern Elephant Seals (a summer visitor with moulting wallows at sandy beaches along the coast of the Vestfold Hills and some offshore islands), Weddell Seals (which breed in Tryne and Long Fjords), Crabeater Seals and Leopard Seals (both observed in the area during summer, but do not breed there).

Terrestrial Invertebrates and Microbial Communities: Studies have found that many of the terrestrial invertebrates found in Antarctica are endemic, and in some cases endemic to particular ice-free regions. Although the species richness of insects is low in Antarctica, invertebrates are relatively well represented. Abundance of invertebrates in the Vestfold Hills has been found to be lower when compared to sites sampled in the Windmill Islands (near Casey research station). Microbial communities include cyanobacteria, bacteria, and protozoa. Similar to invertebrates, species identified in the Vestfold Hills have lower taxonomic richness than the Windmill Island sites.

Marine benthos: Benthic marine ecology in the broader Vestfold Hills area is diverse and several surveys have been carried out since 1982. A variety of benthic marine communities exist at the Davis anchorage and in the broader marine environment offshore of the Vestfold Hills. A description of the benthic environment at West Bay, Davis research station, anchorage, Long and Ellis Fjords is provided in the Extended Referral Submission (Attachment 01 Section 3.1).

Terrestrial flora: The ice-free areas of Antarctica support sparse vegetation, as vegetation must contend with temperatures below zero for months, low availability of water, poor nutrient status of such soils as exist, sand and ice abrasion and a saline environment. Vegetation at the site is limited to algae and lichens. The PMST Report did not identify any threatened flora or threatened ecological communities within the area of interest. No vegetation identified at the site is listed under the EPBC Act (or other act) as threatened.

Lake ecology: The Vestfold Hills is biologically unique because of its freshwater and hyper-saline lakes, which support microscopic invertebrates (AAD, 2011b). The biota of the lakes studied consists of bacteria (including abundant cyanobacteria in benthic microbial mats), archaea, algae (particularly diatoms), ciliates and metazoa (nematodes, tardigrades, mites and rotifers). The bacteria, archaea, plants and animals occur in two distinct habitats within the lakes: the water column and the microbial mats that cover the base of the lakes. Many of the organisms appear to be marine species that have been able to survive in saline lakes.

3.2 Describe the hydrology relevant to the project area (including water flows)

SURFACE WATER

The Vestfold Hills is a lake-rich area of Antarctica, characterised by the presence of hundreds of lakes, ranging in salinity from amongst the most saline to the freshest in the world. These lakes range in size from small, shallow pools that freeze entirely in winter, to large, deep lakes that remain largely unfrozen. Other, unmapped, waterbodies are likely to appear in depressions during wetter periods.

Lake formation in the Vestfold Hills reflects the combination of ice retreat from a low-lying area, which was then partially flooded by the sea (Ferris, 1984). The altitude of the lakes ranges from 50 m below sea level (the lowest lake in Antarctica, Deep Lake) to over 40 m AMSL. A 2018 investigation found that, given the historic sea levels, it is likely that most of the lakes with surface below 10 m AMSL were invaded by seawater in the mid-Holocene. Consequently, lower lying lakes are usually saline, with the relative concentration of major ions up to eight times that of seawater. Higher lakes, above the marine high stand (10 m AMSL), are less likely to be saline, and the ion concentrations markedly different to seawater.

Less saline lakes are ice covered for most of the year, with the most saline lakes typically remaining ice-free (Ferris, 1984).

Lakes of interest in the project area include Camp Lake, immediately east of the proposed runway, and several small

unnamed lakes; there are also a number of low-lying temporal lakes present on Adams Flat. Camp Lake has a relatively small catchment that is fed by snow melt that accumulates on the leeward side of Camp Knoll and other geographical features.

The Vestfold Hills has limited precipitation, averaging 70 mm/y (BOM, 2019), which falls entirely as snow. Snow in the area is a blend of snow blown off the ice sheet and falling locally. In the Vestfold Hills, snow accumulates on the leeward side of hills and other elevated areas, and in summer snow melt can flow along valleys for a period of approximately four to six weeks in summer. The runway alignment is crossed by several small drainage lines and two larger valleys, including those locally referred to as Camp Lake Valley and East Valley.

Snow melt accumulates in Camp Lake Valley, which in summer flows north-west into the marine environment. It also occasionally receives overflow from Camp Lake, although this is not an annual event. East Valley is unlikely to receive significant snow accumulation, as it is generally aligned with the prevailing wind direction; therefore, the amount of snow melt in summer is likely to be small in volume.

Adams Flat is undulating terrain consisting of glacial deposits, rock outcrops, melt-lakes and major melt-water drainage channels. Snow-drifts that accumulate during the winter along these slopes, and along the hills and gullies over the high ground to the east, melt during the summer, with the melt-waters draining down over the lower lying areas and coastal regions. This forms broad melt-water streams and shallow melt-ponds. Some melt-ponds remain during the whole summer and start freezing by the end of February.

GROUNDWATER

Groundwater in the Vestfold Hills has not been well studied before consideration of this project, and as such there is a paucity of data in the project area. The local groundwater assessment has therefore been based on field programs undertaken in 2012-13, 2016-17, and 2018-19.

Initial findings from the 2018-19 field season indicate that melt water flows along Camp Lake Valley as a combination of groundwater and surface water. It is likely that soil warming, combined with seasonal snow melt, could allow groundwater flow (at less than 1 m deep) and discharge to sea. Similar groundwater flows may also occur in the smaller drainage lines in the project area.

Field observations indicate groundwater recharge and flow are limited in Adams Flat and Heidemann Valley. There is limited groundwater movement and groundwater is unable to be flushed by fresh surface water recharge. This has resulted in hypersaline groundwater underlying the area, including depressions and lakes.

The depth of thaw on the moraine has been measured between 0.3 m and 1.3 m below the surface. The moraine is thought to start thawing in late November, with parts of its surface refreezing in February. The salt content of groundwater samples ranges from 0.3 to 11.3% (average 5.8%), whereas ground ice can have a much lower salt content of 0.013 to 0.17%.

Permafrost in the soil is present at Adams Flat, with frozen solid ground typically intercepted between 0.8 and 2.0 m. The active layer above these depths typically experiences seasonal freeze-thaw action that is affected by salinity; where there is hypersalinity a solid state may not be present.

3.3 Describe the soil and vegetation characteristics relevant to the project area

SOILS AND GEOLOGY

The aerodrome site is an area of exposed rock outcrop with a thin substrate of gravel and pebbles, approximately 4.5 km northeast of Davis research station. The area is underlain by basement rock typically composed of Archean granulite-grade orthogneisses with an east-west foliation, dipping to the north. The site itself consists of an outcropping mass of weak-moderately foliated tonalite (referred to as ‘meta-tonalite’) that is considered to be part of the Crooked Lake Group ~2475 Ma. This rock varies from mafic to felsic composition. The gneisses have been intruded by Proterozoic basaltic dykes of varying width (from a few centimetres up to 20 m), with dominant trends of north-south or northeast-southwest.

Surface conditions on the aerodrome site consist of outcropping basement rock on slopes and hilltops, with poorly sorted boulder fields and lesser amounts of consolidated sediments in valleys and low-lying areas.

Outcropping meta-tonalite bedrock is variably covered by unconsolidated sand, gravel and poorly sorted boulders, which are inferred to represent aeolian and glacial deposits. The depth of this cover was interpreted to be typically less than 5 m except for Camp Lake Valley, where the sediments are thicker. Ground conditions vary from frozen ground to soft mud depending on the freeze/thaw state over the season. Permafrost was only intersected within and to the north of Camp Lake Valley during the 2017-18 field season.

The four main mapped units occur in repeated, narrow east-west-aligned bands that extend across the area. Mafic dyke swarms, which were probably emplaced during separate events in the late Archaean and Proterozoic, are obvious features of the landscape (AAD, 2018b). Davis research station is built on frozen moraine deposits and sand (AAD, 2011a) that lie upon the Archean Mossel Gneiss bedrock.

Adams Flat is an area of undulating terrain consisting of glacial deposits, rock outcrops, melt-lakes and major melt-water drainage channels. Most of the rock outcrops are part of the ridge which bounds the lower lying coastal area. This ridge, which in most areas rises sharply to about 15 metres forms part of the belt of high, hilly ground. In the northern part of Adams Flat the distance between this ridge and the sea is approximately 100 metres.

The subsurface materials in this area consist of gravelly sand, overlying a material generally grading with depth from a gravelly, silty sand to a gravelly, silty clay-sand mixture. Intermixed with this underlying material are occasional small lenses

of sand and silty clay, and bands of gravel. Cobbles and small boulders are scattered throughout these soils. The presence of an occasional larger boulder is also likely.

Adams Flat forms part of the Death Valley system. Glaciation has eroded valleys along lines of weakness developed in the landscape, including the Death Valley system. This valley system passes through Deep Lake, Lake Stinear and Lake Dingle where it splits and meets the ocean at Adams Flat and Heidemann Valley. This valley system preserves the history of the evolution of the Vestfold Hills and the geological and climatic evolution for Eastern Antarctica. Parallel valley systems are now partially flooded and form Long, Ellis and Crooked Fjords.

Permafrost is present in the soils, and is discussed under groundwater in the section below on hydrology.

VEGETATION

A description of the vegetation in the Vestfold Hills and project area is provided in Section 3.1.

3.4 Describe any outstanding natural features and/or any other important or unique values relevant to the project area

AESTHETIC AND WILDERNESS VALUES

Antarctica is characterised by a range of wilderness and aesthetic values, defined under the 'Guidance for assessing an area for a potential Antarctic Specially Managed Area designation' (ATS, 2017):

- Wilderness values apply to an area that contains characteristics that are particularly unique or representative components of the Antarctic environment (e.g. remoteness, few or no people, an absence of human-made objects, untraveled or infrequently visited terrain).
- Aesthetic values apply to an area that contains attributes that contribute to people's appreciation and sense or perception of an area (e.g. beauty, pleasantness, inspirational qualities, scenic attraction).

The Vestfold Hills, including the aerodrome site, has a range of physical attributes that contribute to senses of beauty (aesthetic), solitude, remoteness, discovery and scale (wilderness), including the (AAD, 2018b):

- number, patterning and diversity of shapes and intensity of colouring of its lakes
- presence and contrast of the plateau
- formation and retreat of sea ice
- clarity of the near-shore water and the Hills' intersecting fjords
- patterns of dark stripes and criss-crossing of black dolerite against a paler brown base
- abundance of iconic species of wildlife
- variety, texture and colour of individual rocks, and
- qualities of the Vestfold Hills environment, in totality, are not reproduced elsewhere (AAD, 2018b).

ANTARCTIC SPECIALLY PROTECTED AREAS

There are two ASPAs within the Vestfold Hills area (shown on map 3):

Hawker Island (ASPA 167): located 12km south from the aerodrome site. It was designated as an ASPA in 2006 following a proposal by Australia, primarily to protect the southernmost breeding colony of Southern Giant Petrels (ATS, 2016). Hawker Island also supports breeding colonies of Adélie Penguins, South Polar Skuas and Cape Petrels. Southern Elephant Seals occasionally haul out on the southern beaches. The Management Plan for Hawker Island prohibits overflights of the island except where essential for scientific or management purposes and authorised by a permit (ATS, 2016). During the Southern Giant Petrel breeding season additional permit requirements apply.

Marine Plain (ASPA 143): located 8km south-east of the aerodrome site. It was designated as an ASPA in 2003 following a proposal by Australia. It is "representative of a major Antarctic terrestrial ice-free ecosystem" and is primarily designated to protect outstanding fossil fauna and rare geological features. It is of exceptional scientific interest because of its relevance to the palaeoecological and palaeoclimatic record of Antarctica" (ATS, 2013). The Management Plan for Marine Plan stipulates that overflights of lakes should be kept to the minimum necessary to achieve specific research or management requirements.

ICE-FREE AREAS

The Vestfold Hills are a roughly triangular 410 km2 area of rounded rocky hills that are predominantly ice-free. The total area of the Antarctic landmass is 14 million km2 (compared to that of Australia at 7.6 million km2), of which the ice-free area is estimated between 21,745 km2 (Burton-Johnson, et al., 2016) and 54,274 km2 (Brooks, et al., 2019). The Vestfold Hills is the largest coastal ice-free area in East Antarctica (Seppelt & Broady, 1988). Other ice-free areas in East Antarctica include the Larsemann Hills (40 km2) (ATS, 2015) and Bunger Hills (952 km2) (Wisniewski, 1983). The largest ice-free area in Antarctica are the McMurdo Dry valleys, approximately 4,800 km2. Ice-free areas typically have higher diversity and numbers of wildlife compared to the ice-covered parts of the continent.

SEA ICE

Fast ice begins to form offshore from Davis research station in early to mid-March and surrounds the area during the winter months. Fast ice forms as a continuous band of stationary sea ice, fixed to the land by grounded icebergs or in sheltered embayments. The extent and quality of sea ice varies from year to year.

FJORDS

Fjords are uncommon in Antarctica and mainly found on the Antarctic Peninsula, but the Vestfold Hills have a unique concentration of fjords (AAD, 2018b). Long Fjord and Tryne Fjord are located approximately 1.2 km north-east of the proposed aerodrome. Meltwater from the Antarctic plateau drains into these fjords.

A 1999 bathymetric survey recorded a minimum depth of 3 m, and a maximum depth of 222 m in the middle basin of Long Fjord (Lake & Heil, 1999), and reported that the far basins of both tidal fjords are well mixed.

The fjords of the Vestfold Hills remain ice covered for longer than the coastal waters off Davis research station. Weddell Seals breed in the fjords of the Vestfold Hills (ATS, 2016).

3.5 Describe the status of native vegetation relevant to the project area

Terrestrial flora (algae, lichens, mosses and fungi) are described previously in Section 3.1. The ice-free areas of Antarctica support only sparse vegetation, as vegetation must contend with temperatures below zero for months, low availability of water, poor nutrient status of such soils as exist, sand and ice abrasion and large concentrations of salt. Terrestrial flora in the Vestfold Hills is generally representative of other regions of continental Antarctica and was not considered to be unique by earlier studies (Seppelt & Broady, 1988). However, recent surveys (2018-19 field season) have revealed hitherto unrecorded species of lichens and mosses from the area, suggesting that further surveys are required to adequately characterise the flora of the region.

3.6 Describe the gradient (or depth range if action is to be taken in a marine area) relevant to the project area

The proposed runway would be located on an elevated rock outcrop in the Vestfold Hills. The gently undulating to steep exposed hills that form the landform predominately are oriented north-east to south-west, and are truncated by minor valleys that grade from the south-east to north-west to the ocean.

Key topographical features within the project footprint are:

- Camp Knoll, the highest point within the project footprint, with a maximum elevation of approximately 80 m AMSL, and
- Camp Lake Valley, adjacent to Camp Knoll and the lowest point within the project footprint, with an elevation of approximately 20 m AMSL.
- Adams Flat, which would be crossed by the access road, which is a low-lying area with elevations less than 20 m AMSL and below 5 m AMSL in places.

Within the Vestfold Hills more broadly, elevations range from various peaks with elevations up to approximately 160 m AMSL, and a number of lakes that are below sea level, for example Deep Lake at approximately -50 m below MSL. The islands along the coast of the Vestfold Hills reach elevations of up to 60 m AMSL, although peaks of approximately 40 m are more common.

The bathymetry near Davis research station is shallow (less than 10 m) out to approximately half a kilometre from shore. Beyond this, the seabed drops to approximately 25 m at Davis anchorage approximately 1.5 km from shore. The wharf would require reclamation to achieve sufficient water depth for the pontoons and tugs required to transfer materials from ship to shore (Section 1.2).

3.7 Describe the current condition of the environment relevant to the project area

The current condition of the environment in the Vestfold Hills is associated with the location of existing human activities, which are described in Section 3.11. Human presence, and associated impacts, is focussed at Davis research station where most buildings and infrastructure are located. The area encompassed within the Davis research station limits is approximately 110 ha and includes buildings, infrastructure, roads, modified and unmodified landscape.

The areas outside the Davis research station limits that are proposed for the activity are generally undisturbed by human activity beyond foot traffic, vehicle traverse and helicopter operations. There are no obvious signs of human activity in many of these areas. The preliminary site selected for the proposed explosives storage facility was chosen to use the existing Dingle Road where possible to lessen the disturbance footprint; nevertheless, an extension to the road is likely to be required.

3.8 Describe any Commonwealth Heritage places or other places recognised as having heritage values relevant to the project

There are no places on the World Heritage List or National Heritage List in the Vestfold Hills.

Two sites in the Vestfold Hills are listed as indicative places on the Commonwealth Heritage List- Davis Station Group, Davis Station, Australia (Place ID 105269)

- Mikkelsen Cairn, Davis Station, Australia (Place ID 105217). Mikkelsen Cairn is also included in the list of Antarctic Historic Sites and Monuments (HSM), which are protected under the Environment Protocol (Annex V, Article 8).

An indicative listing means that no formal nomination has been made; however, information has been provided to or obtained by the Australian Department of Environment and Energy (DoEE) Heritage Branch and has been entered into the heritage database.

DAVIS STATION GROUP

Davis research station was established in 1957 and is the second oldest Australian Antarctic station after Mawson research station. A Heritage Assessment of Buildings and Other Structures and Sites in The Davis Area was undertaken in 1996 (Rando & Davies, 1996). This study assessed the cultural significance of 48 buildings, structures, sites and objects in the Davis area which, with one exception, predate the commencement of the 1978 rebuilding program. Of these 48 buildings, structures, sites and objects assessed, 32 are included within the indicative Davis Station Group listing on the Commonwealth Heritage List. Eighteen of the buildings within station limits have been removed, and several other buildings have been repurposed. The remaining buildings include the paint store (now ‘post office’), old balloon hut (now ‘old met

building'), remote transmitter hut, electrical and scientific stores (now 'hobby hut'), magnetometer hut, biology laboratory (now unoccupied), and emergency powerhouse.

Three field refuges and three cairns, located outside station limits, are included in the indicative listing and remain in place:

1) Mikkelsen Cairn (also indicative listing #105217 and HSM #72) (approximately 25 km north-east of the aerodrome site)
2) Walkabout Rocks (also HSM #6) (approximately 22 km north-east of the aerodrome site)
3) Law Cairn (approximately 220 m west of the proposed access road)
4) Platcha Hut (approximately 17 km east of the aerodrome site)
5) Brookes Hut (approximately 4 km east of the aerodrome site)
6) Watts Hut (approximately 9 km south-east of the aerodrome site).

OTHER HERITAGE FEATURES

Several artefacts were discovered at Camp Lake in the 2017-18 field season, which are likely to be evidence of the second visit to the Vestfold Hills by the Australian National Antarctic Research Expedition (ANARE) in January 1955. Artefacts discovered include wooden pallet lids, soap and wire, the impression of a tent site, vehicle tracks, and a rock cairn. In accordance with the Guidelines for handling pre-1958 historic remains whose existence or present location is not known (Resolution 5 (2001)), Australia notified the Committee for Environmental Protection (CEP) of the discovery of these artefacts at the 2019 Antarctic Treaty Consultative Meeting. Separate to this project, these artefacts are being assessed for heritage significance. These artefacts are given interim protection until the assessment has determined significance and appropriate management practices. The closest artefact is located approximately 150 m from the earthworks footprint.

3.9 Describe any Indigenous heritage values relevant to the project area

There are no indigenous heritage values relevant to the project area. Human presence commenced with early exploration, with first landings in the early 19th century.

3.10 Describe the tenure of the action area (e.g. freehold, leasehold) relevant to the project area

The project area is Commonwealth land under the EPBC Act (section 525 of the EPBC Act).

3.11 Describe any existing or any proposed uses relevant to the project area

Scientific research is the main activity on the Antarctic Continent. The purpose of Davis research station and associated infrastructure is to conduct and support the conduct of scientific investigations.

There are currently 85 single bed rooms plus a surge to 93 beds total for expeditioners over summer, and about 18 over winter, that can be accommodated at Davis research station (AAD, 2011a). These expeditioners carry out a broad range of physical and biological scientific programs. Many of these programs have been conducted over a number of field seasons.

In addition to Australia's Antarctic activities, other nations have established stations and field camps within East Antarctica. Princess Elizabeth Land is an area of particular scientific interest, and there are multiple stations and nations active in this area, including India, Russia and China. China is also proposing to develop a new ice runway to support their Zhongshan station in the Larsemann hills, approximately 120 km south-west of Davis. There are also various emergency shelters, tracks, masts, traverses and helicopter landing areas across the Vestfold Hills.

Aviation is currently used extensively to support Davis research station operations and scientific activities. The total number of aircraft movements in the Davis area is typically between 500 and 700 aircraft movements per annum including both fixed-wing and rotary aircraft. In terms of operational ice runways, there is an existing sea ice ski landing area offshore from Davis research station located north-east of O'Gorman Rocks. This operates between October and early December each year, when the sea ice is of adequate strength. Another snow airstrip operates at Davis plateau ski landing area, located approximately 35 km inland and north-east from Davis research station. Casey and Davis are approximately 1,400 km apart, and are within different climatic zones; consequently, it is common for flights between Casey and Davis to be delayed by poor weather.

Smaller fixed wing propeller aircraft (Basler BT-67 and DHC-6 Twin Otter) are used regularly to support personnel transfer between the stations and to support field activities. A Basler is usually based at the plateau ski landing area from December to February each year. In 2017-18, there were 56 fixed wing propeller flight movements associated with Davis research station, with destinations including Casey research station, Mawson research station, the plateau ski landing area, and for science purposes. In 2018-19, there were 30 fixed wing movements.

Helicopters are used for transporting passengers, cargo and fuel between Davis research station and the plateau ski landing area approximately 35 km inland from the station. Given the distance between the station and landing area, it is common for two aircraft to travel together to meet operational and safety requirements. Helicopters also operate regularly from the station in support of scientific work, transporting personnel and equipment to field sites. There were between 500 and 600 helicopter movements in 2017-18 and 2018-19, to and from the plateau ski landing area and to support science and operational activities. A number of helicopter landing areas are distributed across the Vestfold Hills.

More broadly, the AAP operates an ice runway at Wilkins Aerodrome, near Casey research station, during the months between October to March, which is currently the intercontinental hub for Australia's aviation operations in Antarctica.

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

Section 4

Measures to avoid or reduce impacts

4.1 Describe the measures you will undertake to avoid or reduce impact from your proposed action

In preparing the environmental impact assessment, more details would be developed for the project scope, construction methodology and operational activities; alternatives (e.g. materials or methodologies) for particular elements would be considered with the intention of reducing potential environmental impacts associated with the delivery and ongoing operation of the project.

This project would develop a comprehensive set of environmental mitigation and monitoring measures to reduce, mitigate and offset impacts as required and appropriate under the EPBC Act and ATEP Act. These measures would be applied to the planning, construction and operational phases of the project. A long-term environmental monitoring program would be required to assess the effectiveness of implemented mitigation measures, with an adaptive management framework to allow for adjustments as the understanding of the environment, and its interaction with the project, increases.

It is expected that completion of a detailed impact assessment would enhance the existing knowledge of the local environment and the project implications and enable mitigation measures to be reviewed and refined over the course of the project and into operation. Preliminary mitigation measures that have been identified at this early stage are summarised below for key environmental aspects, and a more detailed list is provided in the Extended Referral Submission (Attachment 01 Section 4).

Existing practices and policies: The AAD has established a variety of procedures and management plans to reduce the potential environmental impacts of its operations in Antarctica, addressing matters such as fuel handling, biosecurity and quarantine, waste management, activities near wildlife, and aviation and shipping operations. AAD procedures are regularly reviewed and would be updated as required to ensure suitability for the project to mitigate and manage potential environmental risks associated with construction and operation.

Landforms and hydrology: Reducing engineering risks associated with ground conditions was an important consideration during the site selection process (see Section 8 Proposed Alternatives), and the proposed alignment balances this with other factors such as geological stability, avoidance of the Hawker Island ASPA and operational requirements to minimise crosswinds on take-off and landing.

Flora and Fauna: Mitigation measures may include:

- Physical disturbance: Limiting the disturbance footprint to the extent practicable; barricading work areas to prevent access by wildlife; locating stockpile areas to reduce wildlife disturbance; and rehabilitating terrestrial flora if appropriate.
- Air quality, dust and light emissions: reducing the release of dust and particulates through containment, entrapment and/or wetting if appropriate; restricting certain activities during high winds; maintaining machinery in good condition and compliant with relevant emission standards; complying with ICAO aircraft engine emissions standards, where applicable; designing, using and maintaining the access road in a manner that reduces dust generation; reducing visible light from anchored ships to reduce bird strike; and construction of noise attenuating earth berms during construction.
- Noise Emissions: minimising noisy construction activities near wildlife populations or during sensitive periods to the extent practicable; appropriately maintaining vessels to reduce noise output; design of preliminary flight paths with lateral and vertical separation between aircraft and wildlife concentrations maximised to the largest extent possible, while also considering aviation safety rules and navigation criteria.
- Pollution and Contamination: Reviewing and updating existing procedures; bunding refuelling areas; providing appropriate spill kits and training, maintaining vehicles, plant and equipment; consideration of the use of electric vehicles for aspects of the construction and operations; and implementing project-specific waste management plans.
- Introduction of Non-native Species: The AAD has established biosecurity procedures and management plans to reduce the potential environmental impacts of its operations in Antarctica. Additional measures to restrict the introduction of non-native species and diseases are outlined in Article 4 of Annex II to the Environment Protocol and supported by the Non-Native Species Manual (CEP, 2017). The introduction of invasive marine species through ballast water is avoided through the implementation of The Practical Guidelines for Ballast Water Exchange in the Antarctic Treaty Area.

Social and Economic Environment: implementing thorough selection processes for construction personnel to ensure suitability of employees; designating Law Cairn and artefacts identified at Camp Lake as a ‘no go area’; and heritage inductions for construction personnel.

4.2 For matters protected by the EPBC Act that may be affected by the proposed action, describe the proposed environmental outcomes to be achieved

To date, the project has sought, where possible, to avoid and reduce impacts to MNES and other environmental values through the selection of the preferred location for the Davis aerodrome. The project will seek to achieve an environmental outcome where residual impacts to MNES are reduced to an acceptable level.

The process of further reducing impacts would remain a key driver for the project. To achieve this, the project would go through further, more detailed, design and environmental assessment processes (under the EPBC and ATEP Acts), delivering more detail regarding baseline data (on which to base environmental assessment, proposed mitigation and ultimately environmental outcomes).

Key aspects to be addressed include:

- Confirmation of the location and likelihood of occurrence of MNES and other environmental values in and around the project area.
- Further analysis of the potential indirect impacts on birds and marine mammals.
- Determination of species presence and significance of populations, through targeted ecological investigations, in accordance with relevant Commonwealth survey guidance in the context of access and logistics in Antarctica
- Further definition of habitat, vegetation and aesthetic impacts, through iterative design and environmental assessment.
- Design development to avoid, reduce or manage impacts to identified environmental values
- Understanding the need for and scope of potential environmental offsets in the Antarctic context if residual impacts are identified for MNES and other environmental values.

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

Section 5

Conclusion on the likelihood of significant impacts

5.1 You indicated the below ticked items to be of significant impact and therefore you consider the action to be a controlled action

- ☐ World Heritage properties
- ☐ National Heritage places
- ☐ Wetlands of international importance (declared Ramsar wetlands)
- ☑ Listed threatened species or any threatened ecological community
- ☑ Listed migratory species
- ☐ Marine environment outside Commonwealth marine areas
- ☑ Protection of the environment from actions involving Commonwealth land
- ☐ Great Barrier Reef Marine Park
- ☐ A water resource, in relation to coal seam gas development and large coal mining development
- ☐ Protection of the environment from nuclear actions
- ☑ Protection of the environment from Commonwealth actions
- ☐ Commonwealth Heritage places overseas
- ☑ Commonwealth marine areas

5.2 If no significant matters are identified, provide the key reasons why you think the proposed action is not likely to have a significant impact on a matter protected under the EPBC Act and therefore not a controlled action

N/A

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

Section 6

Environmental record of the person proposing to take the action

6.1 Does the person taking the action have a satisfactory record of responsible environmental management? Explain in further detail

Yes. The AAD, as part of the Australian Government, is committed to the comprehensive protection of the Antarctic environment in accordance with Australia's international obligations and the ATEP Act. The AAD is guided by the AAD's Environmental Policy 2018 – 2022 (See Attachment 01, Appendix B).

The AAD maintains an Environmental Management System (EMS) which is consistent with the Australian/New Zealand Standard AS/NZS ISO 14001:2016. The AAD's EMS is a systematic means of managing interaction with the environment and implementing the AAD's environmental management policy and processes.

The EMS identifies and addresses all environmental aspects and impacts associated with the Australian Antarctic Program's activities.

6.2 Provide details of any past or present proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against either (a) the person proposing to take the action or, (b) if a permit has been applied for in relation to the action – the person making the application

The AAD has no past or present proceedings against them.

6.3 If it is a corporation undertaking the action will the action be taken in accordance with the corporation's environmental policy and framework?

☐ Yes ☑ No

6.4 Has the person taking the action previously referred an action under the EPBC Act, or been responsible for undertaking an action referred under the EPBC Act?

☑ Yes ☐ No

6.4.1 EPBC Act No and/or Name of Proposal

2018/8306 Macquarie Island Research Station Modernisation Project, Tas
2010/5657 Mawson's Huts Historic Site - Transit Hut Conservation 2010 - 2013 29/09/2010
2006/2890 Repair and conservation of Biscoe Hut 23/06/2006
2004/1330 Removal of Old Donga Line Buildings
2002/904 Thala Valley Tip
2002/802 Mawson's Huts Expedition 2002
2002/801 Antarctic Air Transport System

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

Section 7

Information sources

Reference source

In the preparation of this Referral, findings of the 2018-19 field season have been incorporated into the description of the existing environment where appropriate; however, the full reports of these studies have not been published and are referred to as (AAD, unpublished data).

Reliability

The reports of these studies have not been finalised.

Uncertainties

The outcomes of the 2018-19 field season (and other seasons) will be reported as part of the detailed environmental assessments for the project.

Reference source

AAD, 2011a. Location of Davis station. [Online]
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Available at: Microscopic organisms
[Accessed 18 09 2018].
AAD, 2018a. Antarctic krill. [Online]
Available at: http://www.antarctica.gov.au/about-antarctica/wildlife/animals/krill
[Accessed 18 09 2018].

Reliability

Considered reliable.

Uncertainties

Unknown

Reference source

AAD, 2018b. Initial Environmental Evaluation Year Round Aviation Access Project 2018-19 Field Activities AAS Project 5097, Hobart: Department of the Environment and Energy.

Reliability

Considered reliable.

Uncertainties

Unknown

Reference source

AADC, 2018. Taxon Profile: Aptenodytes forsteri. [Online]
Available at: https://data.aad.gov.au/aadc/biodiversity/taxon_profile.cfm?taxon_id=100000
[Accessed 19 09 2018].

Reliability

Published reference, considered reliable.

Uncertainties

Unknown

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

Reference source

Adamson, D. A. et al., 1986. Antarctic Oasis Terrestrial environments and history of the Vestfold Hills. North Ryde: Academic Press.

Reliability

Published reference, considered reliable.

Uncertainties

None known.

Reference source

Antarctic Division, 2006. Initial Environmental Evaluation Quarry Operations in the Australian Antarctic Territory at Casey and Davis Stations, s.l.: Australian Government.

Reliability

Considered reliable.

Uncertainties

Unknown

Reference source

ATS, 2013. Management Plan for Antarctic Specially Protected Area No. 143, s.l.: Secretariat of the Antarctic Treaty.

Reliability

Considered reliable.

Uncertainties

None known.

Reference source

ATS, 2015. Larsemann Hills, East Antarctica Antarctic Specially Managed Area Management Plan. Brasilia, Brazil, Secretariat of the Antarctic Treaty.

Reliability

Considered reliable.

Uncertainties

None known.

Reference source

ATS, 2016. Management Plan for Antarctic Specially Protected Area No. 167, s.l.: Secretariat of the Antarctic Treaty.

Reliability

Considered reliable.

Uncertainties

None known.

Reference source

ATS, 2017. Resolution 1 (2017) Annex A: Guidance for assessing an area for a potential Antarctic Specially Managed Area designation. s.l., Secretariat of the Antarctic Treaty.

Reliability

Considered reliable.

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

Uncertainties

None known.

Reference source

BirdLife International, 2018a. Species factsheet: Aptenodytes forsteri. [Online]
Available at: http://datazone.birdlife.org/species/factsheet/emperor-penguin-aptenodytes-forsteri/distribution
[Accessed 19 09 2018].
BirdLife International, 2018b. Species factsheet: Catharacta maccormicki.. [Online]
Available at: http://datazone.birdlife.org/species/factsheet/south-polar-skua-catharacta-maccormicki/details
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BirdLife International, 2018c. Species factsheet: Fulmarus glacialoides. [Online]
Available at: http://datazone.birdlife.org/species/factsheet/southern-fulmar-fulmarus-glacialoides/text
[Accessed 18 09 2018].
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[Accessed 18 09 2018].
BirdLife International, 2019. Macronectes giganteus. [Online]
Available at: http://datazone.birdlife.org/species/factsheet/Southern-Giant-Petrel
[Accessed 22 08 2019].

Reliability

Considered reliable

Uncertainties

Global information, uncertainty in applicability to Vestfold Hills.

Reference source

BOM, 2019. Climate statistics for Australian locations: Davis. [Online]
Available at: http://www.bom.gov.au/climate/averages/tables/cw_300000.shtml
[Accessed 07 March 2019].

Reliability

Considered reliable.

Uncertainties

None known.

Reference source

Branch, T. A., 2007. Abundance of Antarctic blue whales south of 60oS from three complete circumpolar sets of surveys. Journal of Cetacean research and management, Issue 9, pp. 253-262.

Reliability

Published reference, considered reliable.

Uncertainties

Unknown

Reference source

Brooke, M. D., 2004. Albatrosses and Petrels Across the World. Oxford: Oxford University Press.

Reliability

Published reference, considered reliable.

Uncertainties

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

Global information, uncertainty in applicability to Vestfold Hills.

Reference source

Burton-Johnson, A., Black, M., Fretwell, P. T. & Kaluza-Gilbert, J., 2016. An automated methodology for differentiating rock from snow, clouds and sea in Antarctica from Landsat 8 imagery: a new rock outcrop map and area estimation for the entire Antarctic continent. The Cryosphere, Volume 10, pp. 1665-1677.

Reliability

Published reference, considered reliable.

Uncertainties

Unknown

Reference source

CEP, 2017. Non-Native Species Manual, Buenos Aires: Committee for Environmental Protection.

Reliability

Considered reliable

Uncertainties

Uncertainties identified within specific sections of this Referral.

Reference source

Chittleborough, R. G., 1965. Dynamics of two populations of the humpback whale, Megaptera novaeangliae (Borowski). Marine and Freshwater Research, Issue 16, pp. 33-128.

Reliability

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Uncertainties

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Reference source

DoEE, 2018a. Balaenoptera bonaerensis — Antarctic Minke Whale, Dark-shoulder Minke Whale. [Online]
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Available at: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=36
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DoEE, 2018e. Hyperoodon planifrons — Southern Bottlenose Whale. [Online]
Available at: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=71
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Reliability

Considered reliable

Uncertainties

Australian focused information, uncertainty in applicability to Vestfold Hills.

Reference source

DoEE, 2018f. Megaptera novaeangliae — Humpback Whale. [Online]
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Available at: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=1034
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Reliability

Considered reliable

Uncertainties

Australian focused information, uncertainty in applicability to Vestfold Hills.

Reference source

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Reliability

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Uncertainties

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Reference source

Ferris, J., 1984. Preface. In: J. M. Ferris, H. R. Burton, G. W. Johnstone & I. A. Bayly, eds. Biology of the Vestfold Hills. The Netherlands: Kluwer Academic Publishers.

Reliability

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Uncertainties

None known

Reference source

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Reliability

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Reliability

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Uncertainties

Unknown

Reference source

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Reliability

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Uncertainties

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Reference source

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Reliability

Considered reliable.

Uncertainties

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Reference source

Hedley, S. L., Bannister, J. L. & Dunlop, R. A., 2011. Abundance estimates of southern hemisphere Breeding Stock ‘D’ humpback whales from aerial and land-based surveys off Shark Bay, Western Australia, 2008. Journal of Cetacean Research and Management (Special Issue), 3, pp. 209-221.

Reliability

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Uncertainties

Unknown

Reference source

Hofmeyr, G. J., 2015. Mirounga leonina. [Online]
Available at: http://www.iucnredlist.org/details/13583/0
[Accessed 19 09 2018].

Reliability

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Uncertainties

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Reference source

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Available at: http://www.iucnredlist.org/details/11696/0
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Reliability

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Uncertainties

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Reference source

IWC, 2019. International Whaling Commission: Whale Population Estimates. [Online] Available at: https://iwc.int/estimate [Accessed 22 08 2019].

Reliability

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Uncertainties

Unknown

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Ji, M. et al., 2017. Atmospheric trace gases support primary production in Antarctic desert surface soil. Nature, pp. 400-403.

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Uncertainties

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Reliability

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Uncertainties

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Klekociuk, A. & Wienecke, B., 2017. Australia state of the environment 2016: Antarctic environment, Canberra: Department of the Environment and Energy.

Reliability

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Uncertainties

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Reliability

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Uncertainties

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Reliability

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Uncertainties

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Reference source

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Reliability

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Uncertainties

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Uncertainties

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Reference source

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Reliability

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Uncertainties

None known

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

Reference source

Rando, S. & Davies, M., 1996. Heritage Assessment of Buildings and Other Structures and Sites in the Davis Area, Hobart: Australian Antarctic Division.

Reliability

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Uncertainties

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Reference source

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Reliability

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Uncertainties

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Uncertainties

None known

Reference source

Southwell, C. et al., 2017. Large-scale population assessment informs conservation management for seabirds in Antarctica and the Southern Ocean: A case study of Adélie penguins. Global Ecology and Conservation, 9, pp. 104-115.

Reliability

Published reference, considered reliable.

Uncertainties

Unknown

Reference source

TSSC, 2016. Conservation Advice Mirounga leonina, Canberra: Department of the Environment.

Reliability

Considered reliable.

Uncertainties

Australian information, uncertainty in applicability to Vestfold Hills.

Reference source

Wisniewski, E., 1983. Bunger Oasis: the largest ice-free area in the Antarctic. Terra, Volume 95, pp. 178-187.
Zhang, E. & Ferrari, B. C., 2018. Microbial Profile of The Ridge Soil Communities, Sydney: School of Biotechnology & Biomolecular Sciences, UNSW.

Reliability

Published reference, considered reliable.

Uncertainties

None known

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

Section 8

Proposed alternatives

Do you have any feasible alternatives to taking the proposed action?

☑ Yes ☐ No

8.0 Provide a description of the feasible alternative

Alternatives to the project that were considered are described below.

AERODROME LOCATION

The Australian Government's 2016 Australian Antarctic Strategy and 20 Year Action Plan committed to various activities to advance Australia's national interests in Antarctica and enhance Australia's Antarctic science, including investigating year-round air access between Australia & Antarctica. In May 2018, the Australian Government announced its intention to construct a paved runway near Davis research station, subject to environmental and other Government approvals.

Possible sites near Davis research station have been considered for a future runway since at least 1983. In addition to the ridge site (the location of the proposed action), two alternative locations for a runway were considered near Davis research station at Heidemann Valley and a coastal site near Adams Flat.

The Heidemann Valley and coastal sites were not feasible, primarily because of the significant engineering risks associated with constructing a runway in an area of extensive potential frost heave. The ridge site's more favourable geotechnical conditions make it the only feasible option; it also has an associated reduced construction risk and environmental impact compared to the other options.

RUNWAY LENGTH

Several runway lengths were considered for the Davis aerodrome. A 2,700 m paved runway is the only feasible option that meets the operational requirements for year-round aviation access.

RUNWAY MATERIAL

Alternative pavement options to concrete pavers, including asphalt and concrete poured in situ were considered, but not considered feasible. The transport of bitumen products to Antarctica by ship is prohibited under MARPOL requirements (the International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978).

A semi-prepared surface (gravel) was considered but would not be suitable for intercontinental aircraft to fly directly between Australia and Davis.

Therefore, a paved runway using pre-cast concrete pavement was considered the only feasible option that meets the operational requirements for year-round aviation access.

WHARF

Several wharf options were considered including: upgrade the existing lift-on lift-off wharf; mobile crawler crane operating on a self-elevating platform; fixed ramp for roll-on and roll-off using landing craft; floating roll-on and roll-off wharf, and lift-on and lift-off wharf with floating berthing structure.

With consideration of bathymetry, impact on existing resupply operations, difficulty of operation, and extensive maintenance requirements, it was determined that only a floating roll-on and roll-off wharf, or a lift-on and lift-off wharf with floating berthing structure were feasible. Both options have similar land and reclamation footprints, and require similar rotary piling effort. Both options remain under consideration for the project.

NOT CARRYING OUT THE ACTIVITY

This alternative involves sustaining Wilkins Aerodrome only and presents no change in current capability to access Antarctica (i.e. only in summer). It is anticipated that over time, the effects of climate change would increase the period of the summer shutdown of the Wilkins runway (noting that the likely timing and extent of that impact is unknown), which would reduce aviation access to Australian facilities in Antarctica.

This option does not meet the operational requirements for year-round aviation access.

8.1 Select the relevant alternatives related to your proposed action

☐ Timeframes
☐ Locations
☐ Activities

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

8.25 Do you have another alternative?

☐ Yes ☑ No

Australian Government
Department of the Environment and Energy

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

Section 9

Person proposing the action

9.1.1 Is the person proposing the action a member of an organisation?

☑ Yes ☐ No

Organisation

Organisation name	DEPARTMENT OF THE ENVIRONMENT AND ENERGY
Business name	
ABN	34190894983
ACN	
Business address	203 Channel Highway, Antarctic Division Headquarters, Kingston, 7050, TAS, Australia
Postal address	
Main Phone number	03 6232 3209
Fax	
Primary email address	DavisAerodromeProject@aad.gov.au
Secondary email address	

9.1.2 I qualify for exemption from fees under section 520(4C)(e)(v) of the EPBC Act because I am:

☐ Small business
☑ Not applicable

9.1.2.2 I would like to apply for a waiver of full or partial fees under Schedule 1, 5.21A of the EPBC Regulations *

☐ Yes ☑ No

9.1.3 Contact

First name	Kim
Last name	Ellis
Job title	Director
Phone	03 6232 3209
Mobile	
Fax	
Email	DavisAerodromeProject@aad.gov.au
Primary address	203 Channel Highway, Antarctic Division Headquarters, Kingston, 7050, TAS, Australia
Address	

Declaration: Person proposing the action

I, KIMBERLEY CHRISTOPHER ELLIS, declare that to the best of my knowledge the information I have given on, or attached to the EPBC Act Referral is complete, current and correct. I understand that giving false or misleading information is a serious offence. I declare that I am not taking the action on behalf or for the benefit of any other person or entity.

Signature: ..... Date: 16 December 2019.

I, _____, the person proposing the action, consent to the designation of _____ as the proponent for the purposes of the action described in this EPBC Act Referral.

Signature:.....Date: .....

Australian Government
Department of the Environment and Energy

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

Proposed designated proponent

9.2.1 Is the proposed designated proponent a member of an organisation?

☑ Yes ☐ No

Organisation

Organisation name	DEPARTMENT OF THE ENVIRONMENT AND ENERGY
Business name	
ABN	34190894983
ACN	
Business address	203 Channel Highway, Antarctic Division Headquarters, Kingston, 7050, TAS, Australia
Postal address	
Main Phone number	03 6232 3209
Fax	
Primary email address	DavisAerodromeProject@aad.gov.au
Secondary email address	

9.2.2 Contact

First name	Kim
Last name	Ellis
Job title	Director
Phone	03 6232 3209
Mobile	
Fax	
Email	DavisAerodromeProject@aad.gov.au
Primary address	203 Channel Highway, Antarctic Division Headquarters, Kingston, 7050, TAS, Australia
Address	

Declaration: Proposed Designated Proponent

I, KIMBER CHATHAM ELLIS **,the proposed designated proponent, consent to the designation of myself as the proponent for the purposes of the action described in this EPBC Act Referral.**

Signature: ..... **Date:** 16 December 2019.

Australian Government
Department of the Environment and Energy

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

Referring party (person preparing the information)

9.3.1 Is the referring party (person preparing the information) a member of an organisation?

☑ Yes ☐ No

Organisation

Organisation name	DEPARTMENT OF THE ENVIRONMENT AND ENERGY
Business name	
ABN	34190894983
ACN	
Business address	203 Channel Highway, Antarctic Division Headquarters, Kingston, 7050, TAS, Australia
Postal address	
Main Phone number	03 6232 3209
Fax	
Primary email address	DavisAerodromeProject@aad.gov.au
Secondary email address	

9.3.2 Contact

First name	Andrew
Last name	Sharman
Job title	Environmental Manager, Australian Antarctic Division
Phone	03 6232 3209
Mobile	
Fax	
Email	DavisAerodromeProject@aad.gov.au
Primary address	203 Channel Highway, Antarctic Division Headquarters, Kingston, 7050, TAS, Australia
Address	

Declaration: Referring party (person preparing the information)

I, ANDREW SHARMAN **, declare that to the best of my knowledge the information I have given on, or attached to this EPBC Act Referral is complete, current and correct. I understand that giving false or misleading information is a serious offence.**

Signature: ..... **Date:** 16 DEC 2019

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

Appendix A

Attachment

Document Type	File Name
supporting_tech_reports	Protected matters search tool report.pdf
supporting_tech_reports	Attachment 01 - Extended Referral Submission.pdf
supporting_tech_reports	Attachment 01-Extended Referral Submission.pdf

Appendix B

Coordinates

Area 1
-68.572561190901,77.899575206658
-68.56459163124,77.916943893043
-68.570790140977,77.94683357116
-68.519821545964,78.103955237867
-68.542439378109,78.122937524432
-68.579348089364,78.09143426709
-68.589082184545,77.993686817327
-68.588934301561,77.994091956617
-68.588934301561,77.994091956617
-68.572561190901,77.899575206658