

Sunshine Coast Airport Expansion project

**Coordinator-General's evaluation report
on the environmental impact statement**

May 2016

The Department of State Development

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Copies of this publication are available on our website at www.statedevelopment.qld.gov.au and further copies are available upon request to:

Department of State Development
PO Box 15009 City East, Queensland 4002.
100 George Street Brisbane Qld 4000 (Australia)

Phone: 13QGOV (137468)
Fax: 07 3220 6465
Email: info@dsd.qld.gov.au
Web: www.statedevelopment.qld.gov.au

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Synopsis

This report evaluates the potential impacts of the Sunshine Coast Airport Expansion project (the project). It has been prepared pursuant to section 35 of the *State Development and Public Works Organisation Act 1971*¹ (Qld) (SDPWO Act).

The proponent, Sunshine Coast Regional Council (SCRC), proposes to construct and operate the east-west runway and associated infrastructure at the existing Sunshine Coast Airport (SCA) site at Marcoola, located 5 km north of the regional centre of Maroochydore. The site is located within the SCRC Local Government Area.

In 1958, the Queensland Government set aside 300 acres of Crown Land for the development of the airport. Operations commenced in 1961 and the airport has been operating for 55 years. Planning commenced in 1982 for a new east–west runway in order to align the runway more appropriately with the prevailing south-easterly winds to increase the operational performance of the airport and move flight paths over less populated areas and the ocean.

The project seeks to address longstanding operational constraints, open up additional domestic and international destinations, and provide opportunities for the region to benefit from increasing demand in emerging tourism markets.

The project would require capital expenditure of \$347 million and is expected to create a workforce of 86 people during the construction phase and an operational workforce of 1,538 direct employees by 2040.

Aircraft traffic is forecast to increase to 38,270 jet and turboprop aircraft movements per annum at commencement in 2020, an increase of 20 per cent from 2012 aircraft movements.

Air traffic is then expected to increase by 30 per cent to 53,840 jet and turboprop aircraft movements by 2040. This would result in over 2 million extra passenger movements.

In undertaking my evaluation, I have considered the environmental impact statement (EIS) documentation, issues raised in submissions during the public consultation periods, the additional information on the EIS (AEIS), further documents provided by the proponent and the community, and advice I have received from relevant Commonwealth, state and local government agencies.

The following provides an overview of the main issues arising from my evaluation.

Airport operation

Aircraft noise impacts

The proposed east–west runway and predicted noise contours have been published in the Maroochy Plan 2000, the Airport Master Plan 2007, and the Sunshine Coast

¹ Pursuant to section 197 of the SDPWO Act, the version of the act in force prior to 1 October 2014 applies for the evaluation of the project.

Council Planning Scheme 2014 involving considerable public consultation during the finalisation of these documents. Since 1999, the SCRC has also applied government property notes to the real property descriptions for all lots west of David Low Way and adjacent to the airport, advising that the properties are subject to aircraft noise. These documents have informed the public of potential impacts of noise and were based on projected growth in annual aircraft movements for the year 2025. The EIS conducted the aircraft noise assessment by comparing predicted aircraft noise from the proposed east-west runway with the existing north-south runway at 2020 and 2040 using a number of noise measures including the Australian Noise Exposure Concept (ANEC) and N70 event contours. N70 contours identify the number of noise events that exceed 70 decibels (dB(A)) over a day (7am to 6pm) or evening (6pm to 10pm) period and are used to explain the potential noise impact. ANEC contours indicate aircraft noise exposure around an airport, averaged over a 12 month period. ANEC contours are used to assess the potential impacts of aircraft noise.

The predicted aircraft noise is based on projected growth in annual aircraft movements—an increase of 20 per cent from 2012 to 2020 and an additional 30 per cent from 2020 to 2040.

The EIS assessment concludes that in 2040, the proposed east-west runway would result in a net reduction of 70 per cent or approximately 4,946 dwellings exposed to five or more N70 events when compared with the existing north-south runway. ANEC contours were the second noise measure used to assess the potential impacts of the proposed east-west runway. The contours are also used to inform future decisions on development through the Queensland State Planning Policy 2014 (SPP) and the Sunshine Coast Planning Scheme 2014. The ANEC contours will be reviewed by the Department of Transport and Main Roads (DTMR) and Airservices Australia (ASA) following detailed design for the proposed east-west runway and associated flight paths.

ASA would then review the contours for the purposes of technical accuracy and to ensure that modelling inputs include appropriate selection of aircraft types, appropriate runway use, flight path data and aircraft movement forecasts.

The EIS concluded that the proposed east-west runway would result in a reduction in dwellings located within ANEC 20 or more (considered a threshold) when compared with the existing north-south runway. At the commencement of the proposed east-west runway in 2020, the project would result in a net reduction of 25 per cent or approximately 392 dwellings located in ANEC 20 or more. In 2040, the proposed east-west runway would result in a net reduction of 26 per cent or approximately 540 dwellings located in ANEC 20 or more. The noise reduction would occur as a result of aircraft flying over the ocean to the east and less populated suburbs to the west of the proposed east-west runway and the proposed relocation of existing helicopter operations from the southern general aviation area at the SCA to the western general aviation area.

Whilst there are significant reductions predicted in dwellings affected, the EIS identified a potential increase in aircraft noise at some dwellings in Yandina Creek, Mudjimba and the southern part of Marcoola. Due to east-west flight paths and flight operations,

modelling indicated approximately 154 dwellings in 2020 and approximately 716 dwellings in 2040 could be located in a higher ANEC contour. Although the ANEC noise measure presents averaged noise over a 12 month period, the majority of scheduled flights would occur during the weekday period (72 per cent), from 7am to 6 pm. Furthermore, the EIS noise modelling indicated a worst-case scenario. This means that the project is likely to result in less noise impacts than predicted, especially for the ANEC measure and particularly if additional mitigation measures are put in place.

The EIS reports that the most effective noise mitigation measure is the project design. The east–west orientation of the proposed runway requires planes to fly over less populated suburbs and the ocean. Together with ASA and CASA, the proponent has undertaken a detailed flight path development process for the proposed east-west runway. The EIS reports that minimising noise impacts was an integral design objective for the development of the proposed flight paths. This process involved analysis of existing and planned developments at the Sunshine Coast. In addition, the proponent is committed to continue operations in line with the Commonwealth National Airports Safeguarding Framework 2012. This includes noise reduction measures detailed in the fly neighbourly policy, noise abatement procedures, required navigation performance procedures, and runway modes of operation. These will be updated as follows:

- revising the fly neighbourly policy to reflect the proposed east-west runway and maintain existing measures to reduce noise impact associated with helicopters, jets and turboprop movements
- revising and enhance the noise abatement procedures to prioritise the mode of operation which results in less noise to suburbs of Mudjimba and Marcoola
- revising the required navigation performance procedures to implement the continuous descent approach resulting in less engine thrust, maintaining higher altitudes for a greater proportion of the approach and therefore less noise.

Further, relocation of helicopter operations from the southern to the western general aviation (GA) area is proposed by 2027. The effect of the relocation is that no dwellings will be in ANEC 30 or higher from 2027, as is reflected in the ANEC predictions at 2040. Accordingly, I recommended the proponent implement these measures as detailed in Appendix 3 of this report.

The Commonwealth Department of Infrastructure and Regional Development (DIRD) has advised that the conclusions and management measures outlined above are consistent with the principles of the Commonwealth National Airports Safeguarding Framework 2012. Commonwealth agencies DIRD, the Civil Aviation Safety Authority (CASA) and ASA would also assess airspace and safety approvals for the project. Further, advice received from the Aircraft Noise Ombudsman (ANO) confirms that the proponent has a history of constructive community engagement and a responsive approach to managing noise complaints.

While I accept the proponent's conclusions and proposed measures to manage aircraft noise, I acknowledge that some residences living near the SCA in some locations may experience increased noise impacts at certain times. Therefore, I recommend the following additional measures to further reduce potential aircraft noise impacts:

- engage directly with all affected sensitive receptors (dwellings and community facilities) that may potentially experience an increase in noise due to the project in order to determine suitable noise management measures
- implement additional measures to manage aircraft noise from the noise source and/or at the noise sensitive receptor (dwellings and community facilities) beyond the measures specified in the EIS. The additional measures should focus on noise sensitive receptors (dwellings and community facilities) predicted to potentially experience an increase in noise
- report progress on all measures to manage aircraft noise to the SCA Community Aviation Forum and publish a report on the proponent's website detailing progress to further manage aircraft noise
- to reduce helicopter noise impacts, work with helicopter operators to relocate helicopter operations from the southern to the western GA area earlier than the 2027 date as proposed in the EIS by the proponent.

I also recommend that the proponent implement the following recommendations to further enhance community engagement, provide detailed information for the public, and inform land-use planning:

- update the ANEF and Australian Noise Exposure Index (ANEI) contours every five to ten years and publish them on the proponent's website to inform the community of the predicted and actual aircraft noise contours
- cooperate with ASA to implement the WebTrak (or similar) online portal and the Noise and Flight Path Monitoring System to provide real-time information to inform the community of property specific flight paths and associated noise levels
- provide ASA with noise complaints made directly to the proponent so that all noise complaints about the SCA are captured in the ASA quarterly online noise reports
- provide the necessary data to enable the Sunshine Coast Planning Scheme 2014 to be updated to reflect the changes to Sunshine Coast Airport operations resulting from the project's development, including the Airservices endorsed ANEF contours for the expanded Sunshine Coast Airport and reflect the principles relating to noise in the National Airports Safeguarding Framework 2012
- seek to establish a memorandum of understanding with the Real Estate Institute of Queensland to promote real estate agents' use of the WebTrak online portal and the Noise and Flight Path Monitoring System. This would provide flight path information and aircraft noise levels to prospective property buyers and ensure they are fully informed of potential aircraft noise impacts.

I conclude that, on balance, the proponent's proposed east-west runway could substantially reduce net potential noise impacts overall on noise sensitive receptors.

I note that noise management measures outlined in the EIS are consistent with the principles of the Commonwealth National Airports Safeguarding Framework 2012 as advised by the DIRD. Further, the ANO supports the proponent's constructive approach to community engagement. Accordingly, I require the proponent's proposed management measures to be fully implemented and enhanced, where reasonable and possible.

I acknowledge the potential increase in aircraft noise at some dwellings in Yandina Creek, Mudjimba and the southern part of Marcoola. Consequently, I require the proponent to enhance community engagement, provide detailed information for the public, and inform land use planning. I also require the proponent to engage with affected community members to identify further measures to manage potential aircraft noise, particularly relocating helicopter operations sooner than 2027.

For the reasons outlined above, I consider that potential aircraft noise impacts on the community can be effectively managed.

Social impacts

To inform the social impact assessment, the proponent undertook an extensive and broad-scale stakeholder consultation and community engagement. While several submitters raised issues about the community engagement process, I consider that SCRC has taken all reasonable steps to inform the community about the airport expansion, prior to and during the EIS process.

The SCRC has committed to expand the stakeholder consultation group to include representatives from newly affected areas. I consider this is an appropriate mechanism to gauge community response to the proposed new airport operations and I encourage the SCRC to work with the community aviation forum to address noise impacts as effectively as possible.

Economic impacts

The expansion of the SCA is identified as key transport infrastructure under SCRC's Regional Economic Development Strategy 2013–2033.

The benefit cost analysis in the EIS concluded the proposed east-west runway would provide a net economic benefit for the Sunshine Coast, producing a benefit cost ratio of 2.45. The AEIS reported that capital expenditure is expected to provide a direct benefit to the Sunshine Coast economy of approximately \$145 million in additional Gross Value Added (GVA) activity, mostly within the construction, manufacturing and professional services sectors.

Growth of the airport is expected to attract 450,000 additional visitors per year to the region by 2040. The AEIS stated that the direct benefit to the Sunshine Coast economy associated with these additional visitors and increased expenditure on airport operations is expected to provide approximately \$310 million in additional GVA activity by 2040, with most of the growth occurring within: the retail trade; accommodation and food services; and transport, postal and warehousing sectors.

Although I note there is risk and uncertainty involved in forecasting demand and economic benefits, I conclude that there are potentially significant economic benefits as a result of the project. These include the estimated 86 jobs during the construction phase and 1538 direct operational jobs by 2040.

Further, it should also be noted that the commercial viability of an expanded airport, along with any funding arrangements to progress the project, is beyond the scope of my evaluation.

Natural hazards

Flooding impacts

The EIS has identified the potential flooding impacts of the project. I have been advised by the Department of Science, Information Technology and Innovation (DSITI) that the flood modelling undertaken for the EIS is consistent with industry practice and appropriate to identify the potential impacts of the project. I have imposed conditions to ensure potential flow impacts or damage to properties or infrastructure are mitigated or managed. I consider the airport drainage described in the EIS is appropriate to manage possible floodwaters that may cross the project site.

Coastal processes

I accept the pipeline alignment and pump-out locations proposed in the EIS are appropriate for the project. I have stated conditions to address erosion and sediment control, rehabilitation of the dune system and the management of material deposited during the construction phase of the project. The proponent must also develop the Dredge Management Plan as outlined in the EIS to ensure the potential impacts of sand pumping operations are identified, monitored and corrective actions implemented as required.

Airport construction

Water quality

Hydraulic sand delivery and runway construction

The EIS has identified the potential impacts of sand delivery and runway construction and the management measures proposed to adequately mitigate impacts to surrounding water resources, the Mount Coolum National Park and the Wallum Heath Management Area (WHMA).

I have stated conditions for inclusion in the environmental authority. The conditions require the proponent to:

- install lining on the base and sides of the reclamation area and control structures on drains to prevent groundwater drawdown and contamination of waters
- construct a permanent low-permeability cut-off wall from the ground surface down to the confining coffee rock layer, adjacent to the northern perimeter drain, to manage tailwater discharge and protect the Mount Coolum National Park from groundwater drawdown.

To prevent lowering the water table below potential acid sulfate soils in the western section of the project site, I have stated conditions requiring installation of a second cut-off wall west of the western perimeter drain. The proponent must also install control structures, such as weirs, on drains traversing the Mount Coolum National Park to prevent groundwater drawdown and contaminant ingress into the national park.

Tailwater discharge

I am satisfied that the potential impacts on water quality and hydrological processes were adequately identified in the EIS and the mitigation measures proposed by the proponent are appropriate to manage the impacts.

I have stated conditions for inclusion in the environmental authority that require the proponent to install a tidal flap on Marcoola drain at the Finland Road crossing culvert to minimise salt water ingress upstream to the Mount Coolum National Park. The tidal flap must allow for conveyance of floodwaters and not submerge mangrove roots for extended durations.

I have made recommendations for the proponent to provide further information on background water quality and the monitoring program, in support of an application for an environmental authority.

Dredging

I am satisfied the EIS has identified the potential impacts of dredging operations and the proposed management framework can adequately protect water quality values. To ensure this, I have stated conditions for inclusion in the environmental authority requiring the proponent to develop a Dredge Management Plan including a monitoring program and management actions to be implemented if water quality objectives are exceeded. The conditions apply to dredging in Moreton Bay and unloading of dredge materials offshore of Marcoola Beach and would ensure the project does not result in erosion or damage to the banks adjacent to dredging activities, impacts to riparian vegetation, or environmental harm to receiving waters.

Transport

I accept the EIS finding that overall the project would have a minimal impact on the surrounding road network. I consider that the capacity of the existing road network could accommodate additional construction and operational traffic generated by the project. I have included conditions in this report to ensure that all safety, road and traffic operational issues are effectively addressed prior to construction.

Matters of national environmental significance

The project is a controlled action and the relevant controlling provisions under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) are:

- wetlands of international importance (sections 16 and 17B)
- listed threatened species and communities (sections 18 and 18A)
- listed migratory species (sections 20 and 20A).

The potential impacts on matters of national environmental significance (MNES) have been assessed in accordance with the bilateral agreement between the Queensland and Australian governments, and I conclude that the proponent has adequately identified impacts of the project on threatened species and ecological communities, migratory species and the ecological character of the Moreton Bay Ramsar wetland, listed under the EPBC Act.

Mount Emu she-oak

I require the proponent to manage impacts to the Mount Emu she-oak through the conditions in this report. In addition, I have stated conditions under the environmental authority for dredging and reclamation works to protect surface and groundwater quality, the remaining she-oak population 1 (AEP1) to the south; the she-oak population 2 (AEP2) and the translocation site to the north from water quality impacts during reclamation activities.

The proposal could potentially result in a residual impact of 4.4ha or 550 plants. This residual impact is significant as all populations of this species are considered important to its survival. To offset this residual impact, the proponent has proposed to translocate the entire 4.4ha of impacted vegetation to a suitable site which is located in close proximity to the AEP2 population.

Wallum sedgefrog

I have stated conditions for the environmental authority for dredging and reclamation works to protect surface and groundwater quality, the wallum sedgefrog habitat within the WHMA and potential habitat in Mount Coolum National Park. The proposed action is expected to result in a residual impact of 1.67ha on wallum sedgefrog breeding habitat. To offset this loss, the proponent has proposed to augment 2.28ha of existing habitat within the northern section of the WHMA. This would include the creation of purpose-built breeding ponds and appropriate sedge plantings to form a mosaic of wet and dry heath habitats which would be expected to support breeding activities.

Moreton Bay Ramsar site

I am satisfied the proponent has adequately identified the potential impacts of the proposal on the ecological character of the Moreton Bay Ramsar site. I have stated conditions that require the proponent to implement measures, including limiting the area of dredging disturbance, managing water quality being released from the project site (stormwater runoff), tailwater discharge and dredging, establishing buffer zones for marine mega-fauna observed near dredge vessels and operations, and managing marine vessel activities to avoid/limit striking marine mega-fauna.

Matters of state environmental significance

Potential impacts on matters of state environmental significance have been assessed in the EIS, and I conclude that the proponent has adequately identified the potential impacts of the project on regulated vegetation, connectivity areas, protected wildlife habitat (protected plants and animals), protected areas (Mount Coolum National Park and Moreton Bay Marine Park) and fish habitat area (FHA) (Maroochy River Fish Habitat Area) listed under the *Environmental Offsets Act 2014*.

Connectivity

The construction of the proposed east-west runway could result in the loss of connectivity between the northern and southern sections of Mount Coolum National Park and subsequently reduce connectivity in the wider region between Lake Weyba and the Maroochy River. To manage this impact, the proponent has proposed to

revegetate a 2.5km long, 25ha corridor of native vegetation around the western extent of the proposed east-west runway to create an ecological corridor between the northern and southern sections of Mount Coolum National Park. The corridor would include vegetation of sufficient density to allow passage by cover-dependent species considering the operational safety requirements of the airport (limiting vegetation height and avoiding flowering species). As a result, the project is not expected to result in adverse impacts on the connectivity between the northern and southern sections of Mount Coolum National Park.

Ground parrot

The project could result in a residual impact of 7.88ha on essential habitat, once avoidance and mitigation measures are taken into account. To offset the loss, 31.52ha of ground parrot habitat would be required. I consider that the project is unlikely to have an adverse impact on the ground parrot, provided that the proponent adheres to the proposed mitigation measures and commitments described in the EIS. I have recommended conditions to ensure this outcome. The proponent is required to finalise an environmental offsets strategy for my approval that provides either direct offsets, a direct benefit management plan or a financial settlement to the Department of Environment and Heritage Protection (either alone or in combination) to ensure no net loss of ground parrot habitat.

Wallum rocket frog and wallum froglet

The project could have a residual impact of 60.63ha on wallum froglet habitat; and 21.85ha of wallum rocket frog habitat (which is found entirely within wallum froglet habitat). This includes likely breeding habitat and adjoining habitat used by non-breeding animals for foraging, shelter and/or dispersal between areas of breeding habitat. I require the proponent to manage impacts through the proposed mitigation measures. I have stated conditions under the environmental authority to protect surface and groundwater quality, the wallum rocket frog, wallum froglet habitat and potential habitat within the WHMA and Mount Coolum National Park. To offset the loss of habitat the proponent has proposed to:

- augment 2.28ha of existing habitat within the northern section of the WHMA to create breeding habitat
- improve 5.84ha of habitat adjacent to the northern perimeter drain through regular vegetation slashing activities
- provide an additional 63.15ha of offset areas at the Lower Mooloolah River Environmental Reserve, located south of the project area at Palmview which includes 9.8ha of breeding ponds.

To ensure the offset areas achieve a conservation outcome for both species, I have required the proponent to finalise a biodiversity offset strategy consistent with the commitments provided in EIS documentation.

Protected areas—Mount Coolum National Park

Two sections of the Mount Coolum National Park are situated to the north and south of the proposed runway. I am satisfied that the sand delivery and runway construction management measures proposed can adequately mitigate impacts on surrounding surface and groundwater on the Mount Coolum National Park. I have stated conditions requiring the proponent to install lining on the base and sides of the reclamation area and control structures on drains to prevent groundwater drawdown and contamination of waters. I also require the proponent to construct a permanent low-permeability cut-off wall from the ground surface down to the confining coffee rock layer, adjacent to the northern perimeter drain, to manage tailwater discharge and protect the Mount Coolum National Park from groundwater drawdown. The proponent must also install control structures, such as weirs, on drains traversing the Mount Coolum National Park to prevent groundwater drawdown and contaminant ingress into the national park.

Fish habitat area

The Maroochy River Fish Habitat Area (FHA-008) is located downstream of the proposed tailwater discharge. Based on water quality assessment, impacts on water quality are not expected to extend beyond the Marcoola drain and are therefore unlikely to impact on the Maroochy River Fish Habitat Area, provided the proponent adheres to the proposed mitigation measures and commitments described in the EIS. To protect surface water quality I have stated conditions for the environmental authority requiring the proponent to establish water quality limits for surface water and develop a monitoring program.

Moreton Bay Marine Park

The Spitfire Realignment Channel which is located within northern Moreton Bay, near the southern end of Bribie Island, is within the General Use Zone of the Moreton Bay Marine Park. The General Use Zone allows for activities such as shipping, maintenance of shipping channels and sand extraction under the State approvals process. The EIS has identified the potential impacts of dredging operations and shows that the proposed management framework can adequately protect water quality in the marine park.

I have stated conditions for inclusion in the environmental authority requiring the proponent to develop a Dredge Management Plan including a monitoring program and management actions to be implemented if water quality objectives are exceeded. The conditions apply to dredging in Moreton Bay and unloading of dredge materials offshore of Marcoola Beach and they would ensure the project does not result in erosion or damage to the banks adjacent to dredging activities, impacts on riparian vegetation, or environmental harm to receiving waters.

Coordinator-General's conclusion

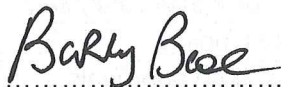
I consider that the environmental impact assessment requirements of the SDPWO Act for the Sunshine Coast Airport Expansion project have been met and that sufficient information has been provided to enable a thorough evaluation of the potential impacts of the project.

I conclude that there are significant local, regional and state benefits to be derived from the development, and that any adverse environmental impacts can be acceptably avoided, minimised, mitigated or offset through the implementation of the measures and proponent commitments outlined in the EIS documentation. The conditions I have specified in this report have been formulated in order to further manage the potential impacts associated with the project.

Accordingly, I recommend that the project proceeds subject to the conditions and in accordance with the recommendations set out in the appendices of this report. In addition, I require the proponent's commitments to be fully implemented.

My report will be provided to the Commonwealth Minister for the Environment pursuant to section 36(2) of the SDPWO Regulation. My report will inform the assessment decision by the Minister on the controlled actions for the project pursuant to section 133 of the EPBC Act. The project will also be assessed by agencies in the Commonwealth Government as part of their responsibility to manage aviation airspace, for example the CASA and ASA.

A copy of this report will be provided to the proponent and relevant state government agencies, and will also be made publicly available at www.statedevelopment.qld.gov.au/scaexpansion



Barry Broe
Coordinator-General

18 May 2016

1. Introduction

This report has been prepared pursuant to section 35 of the *State Development and Public Works Organisation Act 1971*² (Qld) (SDPWO Act) and provides an evaluation of the environmental impact statement (EIS) for the Sunshine Coast Airport Expansion project (the project).

It is not intended to record all the matters that were identified and subsequently settled. Rather, it concentrates on the substantive issues identified during the EIS process and is by nature a summary report. For example, extensive detailed analysis has been undertaken on the submissions and correspondence about the project. This report:

- summarises the key issues associated with the potential impacts of the project on the physical, social and economic environments at the local, regional state and national levels
- presents the findings of my evaluation of the project, based on information contained in the EIS, additional information to the EIS (AEIS), submissions made on the EIS during public consultation periods and information and advice from advisory agencies and other parties
- states and imposes conditions and makes recommendations under which the project may proceed
- documents proponent commitments.

2. About the project

2.1 Project description

2.1.1 Project location

The project site is located within the Sunshine Coast Regional Council (SCRC) Local Government Area, approximately 5km north of the regional centre of Maroochydore on relatively flat, low-lying land. Covering approximately 430ha, the site is owned by SCRC and surrounded by a wide range of land uses including residential, national parks, farming and industry. The project site location is shown in Figure 2.1.

The Spitfire Realignment Channel, located in Moreton Bay east of Woorim at the southern end of Bribie Island, was identified as the preferred sand extraction area in the EIS and is shown in Figure 2.2.

² Pursuant to section 197 of the SDPWO Act, the version of the act in force prior to 1 October 2014 applies for the evaluation of the project.

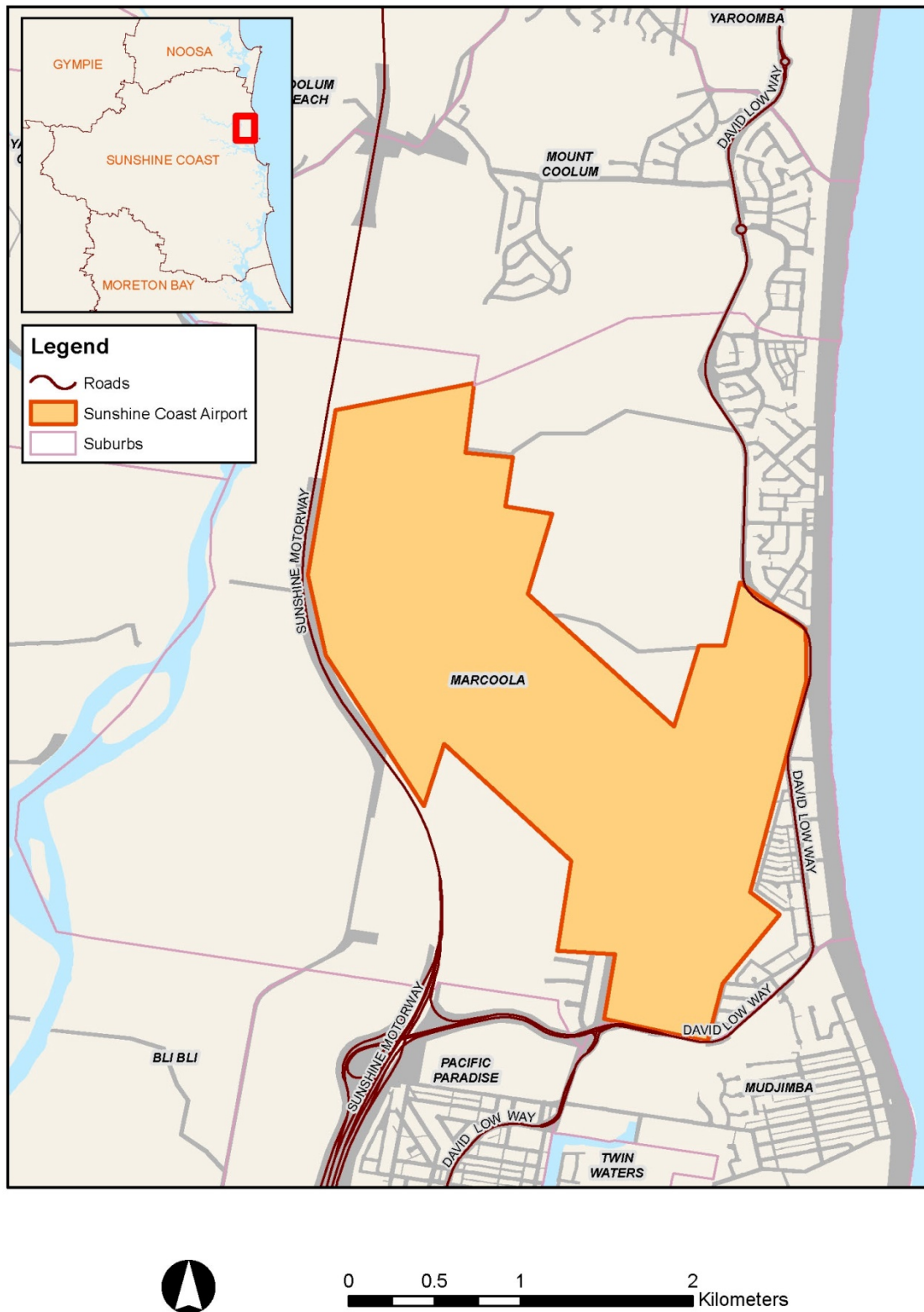


Figure 2.1 Project location

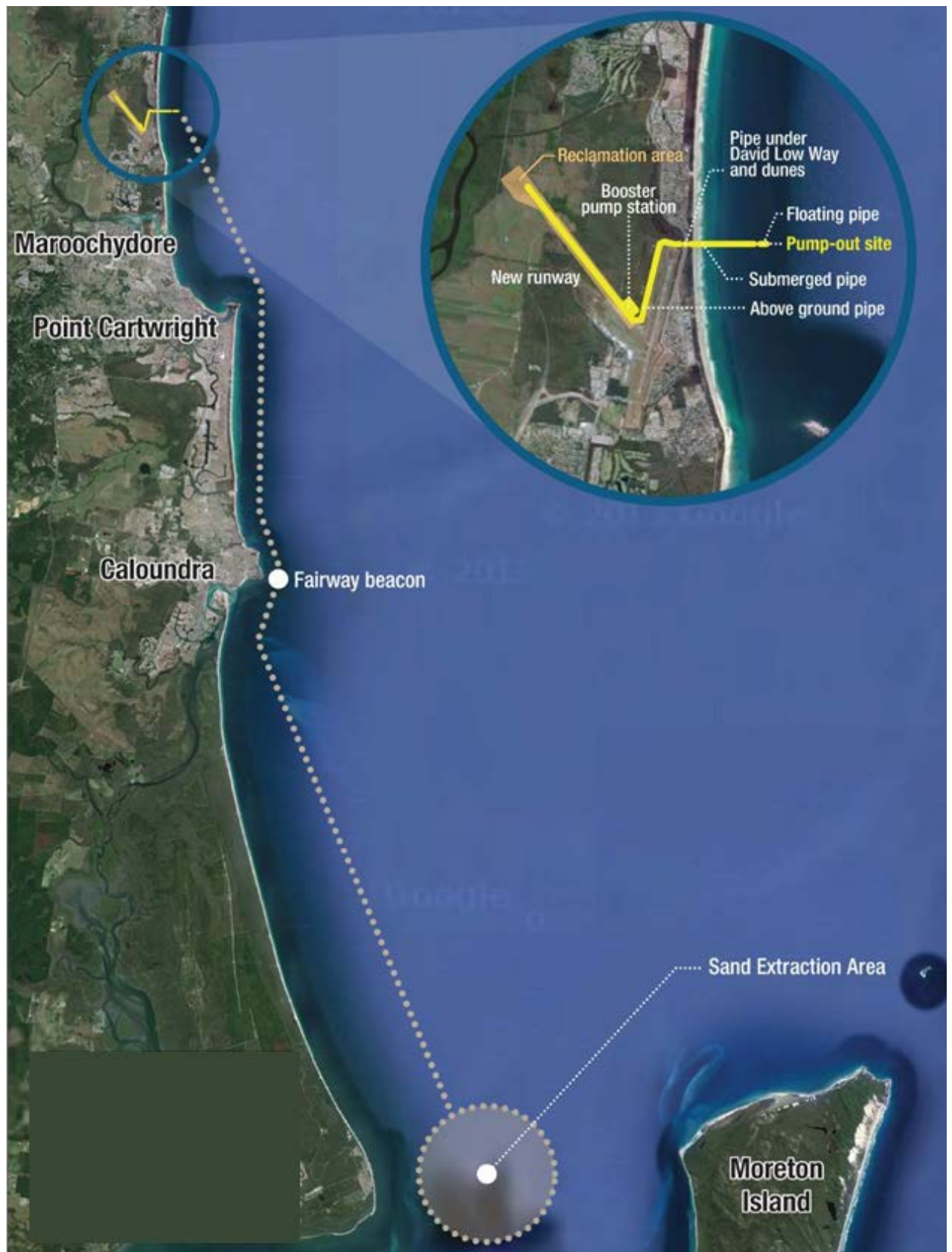


Figure 2.2 Sand extraction area

2.2 The proponent

The proponent for the project is the SCRC, which has jurisdiction over 2,291km² and supports a population of approximately 285,000 people.

The EIS process was managed by the Sunshine Coast Airport, a business unit of SCRC responsible for the operation, maintenance, commercial development and strategic planning functions of the airport. Sunshine Coast Airport manages the terminal building, car parking, internal roads and aviation infrastructure, including the current north–south runway and cross-runway.

The airport was opened on 12 August 1961 and handles approximately 90,000 aircraft movements per annum and has a terminal with a capacity of over one million passengers per annum. The existing north–south runway is 1,797m long and 30m wide, limiting airport operations to narrow-body aircraft. The existing cross-runway, 695m long and 18m wide, is used only for smaller aircraft.

2.2.1 Project components

Key components of the expansion project include:

- closure of the existing cross runway and construction of a new 2,450-metre-long and 45-metre-wide, east–west oriented runway
- construction of two taxiway loops
- dredging up to 1.1 million m³ of sand fill from Spitfire Realignment Channel in Moreton Bay
- transporting and mooring of a dredge to a pump-out location off Marcoola Beach for sand pumping to the site
- temporary construction operations for the dredge pipeline
- temporary tailwater release through Marcoola drain to the Maroochy River for a 12 to 33 week dredge program
- expansion of the existing terminal and apron
- extension of Airport Drive, the main entry to the airport
- co-location of an Air Traffic Control (ATC) tower and Aviation Rescue and Fire Fighting Services (ARFFS) Station
- changes to airspace and flight paths
- implementation of revised aircraft management and procedures for the new runway and aerodrome configuration
- new drainage channels north and west of the proposed runway
- a new perimeter road.

The project would also require some existing services to be relocated and the installation of new trunk services including water, sewerage, power and communications infrastructure.

East-west runway, taxi loops and aprons

The proposed east-west runway would be capable of servicing Code 4E aircraft such as the Airbus 330 (A330), Boeing 787 (B787) and Boeing 777 (B777) and would be serviced by two end taxiway loops. The alignment was selected to avoid topographical constraints and cater for the runway dimensions required by Code E aircraft. The existing north-south runway would be retained as an operational runway for general aviation purposes.

Two taxiway loops would provide additional runway capacity by allowing aircraft to exit the runway quickly, decreasing the time between consecutive aircraft movements.

The existing apron at the airport terminal would be upgraded to accommodate Code 4E aircraft by expanding the paved area and strengthening the pavement to support the increased aircraft weight.

ATC tower and ARFFS station

Previous assessments undertaken for the airport found the ATC tower would need to be located south of the proposed east-west runway midway along its length and be built approximately 55m high. The EIS adopted the current ASA philosophy of co-locating the ATC tower with the ARFFS Station.

Dredging and reclamation

Dredging of fill material would be required to provide a base for the runway and taxiway. The airport site has a gentle slope from the south-east to north-west from 3.95m Australian Height Datum (AHD) to 0.8m AHD. Preliminary designs for the runway are 4.65m AHD which would require varying depths of dredge material, from 0.8m at the south-eastern end, up to 4.0m at the north-western end. The material would be dredged from the Spitfire Realignment Channel in Moreton Bay and transported to a pump-out location off Marcoola Beach before being pumped through to the reclamation area on the project site, refer to Figure 2.2.

Airport drainage

Chapter B5 of the EIS shows the major drainage proposed in the EIS. A 3km northern perimeter drain would be constructed parallel to the proposed east-west runway to direct stormwater from the runway into the Marcoola drain. The northern perimeter drain would be 1.5m deep with a base width of 10m and 22m wide at the top.

A western perimeter drain would be constructed to assist the conveyance of floodwaters past the runway. The western perimeter drain would also be 1.5m deep and 10m wide at the base and connect the northern perimeter drain to the existing southern perimeter drain. The southern perimeter drain would receive stormwater run-off from the western perimeter drain, runway, taxiway loops and developed areas of the site before conveying it west to the Maroochy River.

The EIS proposed the construction of a permanent low-permeability cut-off wall, parallel to the northern perimeter drain on the northern side of the drain to prevent groundwater drawdown in the Mount Coolum National Park.

2.2.2 Development stages

The EIS described a staged construction approach that is anticipated to commence upon receipt of relevant approvals, and be completed over four to five years. The construction works would be divided into the following four packages:

- (1) civil works
- (2) dredging and reclamation
- (3) runway, taxiway and apron construction
- (4) building works.

The civil works package establishes the construction compound and upgrade of Finland Road, preliminary works, construction of the major drainage, dredge bunds and polishing pond. Preliminary works include fencing, internal access roads, clearing and establishing acid sulfate soils (ASS) treatment pads.

The dredging and reclamation package includes mobilising and establishing the sand delivery pipeline and dredge pump-out point, conducting bathymetric surveys of the dredge footprint, selecting the dredge vessel and delivering sand to the reclamation area.

Pavement construction and connection of the proposed east-west runway and the existing north-south runway from the third package of works, will occur following profiling of the sand fill, installation of culverts beneath the taxiway loops and installation of electrical and lighting systems.

The building works package will involve upgrading the terminal, extending Airport Drive and constructing the ATC and ARFFS.

2.3 Dependencies and relationships to other projects

The Spitfire Realignment Channel is an area utilised for dredging by the Port of Brisbane Pty Ltd (PBPL) and for the construction of Brisbane Airport's New Parallel Runway. Dredging the Spitfire Realignment Channel removes sharp bends from the existing shipping channels, resulting in a channel that will ultimately be 500m wide and a depth of -16.5m Chart Datum (CD).

The proponent has consulted with PBPL to identify opportunities for a combined sand extraction area at the Spitfire Realignment Channel for the project and PBPL's approved allocation. PBPL has indicated a preference for a shared dredging footprint that would be extended deeper than PBPL's approved dredging footprint, rather than wider.

PBPL has an allocation of 15 million m³ for use as fill and reclamation. Should PBPL dredge this allocation completely, a combined extraction of 16.1 million m³ (i.e. PBPL's 15 million m³ allocation and 1.1 million m³ for the project) would extend the base of the alignment to approximately -17.05m CD.

2.4 Project objectives

The existing north-south runway is 30m wide and was previously subject to a number of operational conditions for narrow runways, as determined by the CASA. SCA had operated under an exemption granted by CASA, allowing the operation of Code 4C aircraft, such as the Boeing 737-800 (B737-800) and Airbus 320 (A320). Without such an exemption, a minimum runway width of 45m is required to operate Code 4C aircraft.

On 13 November 2014, changes to CASA regulations for narrow runways changed the responsibility of aircraft operations from airports to airlines. The change did not affect the need for the project as the 30m wide runway poses an operational constraint by limiting the types of aircraft that can use the airport, the distances that can be flown and the capacity to carry passengers and cargo. Further, the current airport is limited in its ability to attract new carriers servicing new destinations, restricting regional economic development potential.

The proposed east-west runway provides a more favourable orientation (south-easterly winds) for aircraft operation. Approximately 2 per cent of flights affected by bad weather have previously been diverted from the Sunshine Coast to Brisbane. The new alignment is expected to increase the operational performance of aircraft and reduce potential diversions. The existing runway would provide additional support up to 10 per cent of the time (at capacity) in poor weather conditions.

The airport expansion forms a key part of the SCRC Regional Economic Development Strategy 2013-2033 by providing a domestic and international gateway to the region and direct access to a global tourist market. It also provides a platform for an aviation and aerospace industry hub. Growth opportunities associated with the project include passenger services, helicopter engineering, advanced pilot training, aircraft engineering training, maintenance repair and overhaul, and knowledge-based aviation technology.

2.5 Project alternatives

The EIS considered a number of alternatives regarding future operational requirements of the airport and runway, and options for sourcing the fill material for runway construction.

2.5.1 Airport and runway options

With respect to the airport site and runway requirements, the EIS described the alternatives considered including: a 'do nothing option', a 'do minimum option', and a refinement to the design for the proposed east-west runway.

Do nothing option

Under the 'do nothing' scenario, the 30-metre-wide existing north-south runway would remain as an operational constraint, limiting the type of aircraft that can be flown, the distances travelled and the passenger and cargo capacity of the airport.

Under this option, it is assumed by the proponent that the change in regulation that transfers responsibility for narrow runway operations from the airport to airlines poses a risk that Code 4C aircraft could potentially no longer be operated from the airport.

Do minimum option

The 'do minimum' option considered in the EIS describes the upgrades required to the existing north-south runway to remove the requirements for the exemption from CASA for narrow runway operations in place at the time of the assessment. The upgrades involved widening the runway from 30m to 45m, extending the runway strip 60m beyond the ends of the runway and increasing the Runway End Safety Area. This option would maintain access to existing markets but the runway length would not allow for new domestic and international markets due to continuing operational constraints for larger aircraft.

Proposed east-west runway refinement

The proposed east-west runway design presented in the Initial Advice Statement was consistent with the SCA Master Plan 2007. Investigations undertaken for the EIS identified a number of constraints associated with the design including poor ground conditions at the north-west end of the site and potential flood impacts.

The proponent subsequently refined the project by moving the runway footprint 310m south-east, while maintaining the east-west alignment. This move avoided an area underlain by a thick layer of soft material and reduced the amount of fill material required to address these ground conditions. This design change was included in the EIS and is discussed in more detail in section 5.7 of this report.

Taxiway loops and airport terminal

Regarding the taxiway loops, the option presented in the EIS was selected in preference to a full-length parallel taxiway as it significantly reduced the amount of fill material required while having a minimal impact on runway performance.

In addition, options to build a new terminal or upgrade the existing terminal were considered. Upgrading the existing terminal was identified as the preferred option as it could provide sufficient capacity for airport operations beyond 2040; and would result in a reduced surface disturbance and significantly less fill.

2.5.2 Fill source options

The proposed east-west runway requires up to 1.1 million m³ of fill material to construct a safe, low-maintenance pavement that meets flood immunity requirements. To prevent deformation in aircraft movement areas, the fill material must be homogenous to prevent differentiation in the settlement of the runway platform and of high strength to minimise the thickness of the pavement required.

Terrestrial fill

The EIS considered a number of terrestrial sources to supply the fill material required for the project. These options identified included local quarries and Key Resource Areas (KRAs).

Six potential quarry sites were identified based on proximity to the airport and suitability of the material available at each quarry. Moy Pocket quarry was considered to have the most suitable fill material and is located approximately 65km from the project site. Transporting the required amount of material from this site would result in 350 truck movements to transfer 7,000 tonnes each day. The haul route would pass through a number of small towns and result in noise, vibration and dust impacts for approximately 12 months.

One of the KRAs considered was the Meridan Plains Extractive Resource Area, which is not currently operating as a quarry source (an approval to extract material from the site has been issued).

The second KRA, KRA 150, is located on low-lying land south-west of the airport between the Sunshine Motorway and the Maroochy River. Extraction at the site would require a dredge as groundwater at the site is near to the surface and would result in the creation of a lake once the dredging is completed. This option would require SCRC taking on the ongoing maintenance of the lake and would potentially attract birds to airport flight paths. SCRC has placed a moratorium on the creation of 'fill lakes' due to a history of poor environmental performance of similar lakes on the Sunshine Coast. In addition, this option would result in a higher environmental risk to the Maroochy River due to the poor quality of the tailwater.

Marine fill

The options considered in the EIS for sources of marine fill were a nearshore coastal source, the Maroochy River and two locations in Moreton Bay. A viable nearshore source has not been identified.

The Maroochy River fill material would likely contain layers of silts and clays that would result in higher levels of turbidity in tailwater discharged from the site and could cause differential patterns in settlement of the runway platform. It also poses a higher risk of disturbing potential or actual ASS.

The Moreton Bay locations considered in the EIS were Middle Banks and the Spitfire Realignment Channel, both of which were identified in the Moreton Bay Sand Extraction Study (MBSES) undertaken by the Queensland Government from 2002 to 2005. The Spitfire Realignment Channel was selected as its closer proximity would result in a shorter dredge operation and the opportunity to dredge in the same footprint approved for PBPL. In addition, Middle Bank supports higher environmental values and dredging the Spitfire Realignment Channel provides a secondary benefit to maritime navigation.

3. Environmental impact statement assessment process

In undertaking this evaluation, I have considered the following:

- initial advice statement (IAS)
- the EIS
- issues raised in submissions on the EIS
- other correspondence received after the submission period of the EIS
- the AEIS
- issues raised in submissions on the AEIS
- other correspondence received after the submission period of the AEIS
- technical reports
- advice from the proponent
- advice from the following Australian Government agencies:
 - the Department of the Environment (DE)
 - ASA
 - CASA
 - Department of Infrastructure and Regional Development (DIRD)
- advice from the independent Aircraft Noise Ombudsman (ANO)
- state agency advice from:
 - Department of Aboriginal and Torres Strait Islander Partnership
 - Department of Agriculture and Fisheries (DAF)
 - Department of Education and Training (DET)
 - Department of Energy and Water Supply (DEWS)
 - Department of Environment and Heritage Protection (EHP)
 - Department of National Parks, Sport and Racing (DNPSR)
 - Department of Natural Resources and Mines (DNRM)
 - Department of State Development (DSD)– Regional Services
 - Department of Infrastructure, Local Government and Planning (DILGP)
 - Department of Transport and Main Roads (DTMR)
 - Department of Science, Information, Technology and Innovation (DSITI)
 - Public Safety Business Agency (PSBA)
 - Queensland Ambulance Service (QAS)
 - Queensland Health (QH).

The steps taken in the project's EIS assessment process are documented on the project's webpage at **www.statedevelopment.qld.gov.au/scaexpansion**

3.1 State environmental impact assessment process

3.1.1 Coordinated project declaration

On 24 October 2011, the then Coordinator-General declared this project to be a 'coordinated project' under section 26(1)(a) of the SDPWO Act. This declaration initiated the statutory environmental impact evaluation procedure of part 4 of the SDPWO Act, which required the proponent to prepare an EIS for the project.

3.1.2 Terms of reference

The draft terms of reference (TOR) for the EIS were released for public and advisory agency comment from 18 February 2012 to 2 April 2012. Comments were received from 14 submitters, comprising nine from advisory agencies, four from non-government organisations and one from the proponent.

A final TOR was prepared having regard to submissions received and was issued to the proponent on 9 May 2012.

3.1.3 Review of the EIS

The EIS, prepared by the proponent, was released for public and agency comment from 29 September 2014 to 13 November 2014.

A total of 987 submissions were received, copies of which were forwarded to the proponent and to DE. The submissions comprised 880 public submissions, 87 submissions from organisations and 20 submissions from state and Commonwealth agencies. Key issues raised in the submissions are listed in Table 3.1.

3.1.4 Additional information to the EIS

On 18 February 2015, I requested that SCRC submit additional information regarding:

- an offsets strategy in accordance with applicable state and Commonwealth requirements
- more information on the number of dwellings included in the ANEF 20–25 contour for suburbs outside of Mudjimba
- more detail on flooding impacts, including impacts on transport infrastructure
- more detail on potential salinity impacts on groundwater, the Marcoola drain and the Maroochy River fish habitat area (FHA)
- potential increases in salinity impacts on matter of national environmental significance (MNES)
- a draft acid sulfate soils management plan (ASSMP)
- more detail on potentially contaminated land present on the project site
- an updated air quality assessment, including an assessment of likely emission rates of xylenes and more detail on dust deposition during construction

- more information about the impacts on protected flora and fauna, and mitigation measures
- an updated proponent commitment register.

On 7 April 2015, I asked SCRC to provide more detailed responses to public submissions in relation to economic issues, aircraft noise matters and MNES.

On 8 October 2015, the proponent submitted the AEIS to respond to issues raised in submissions on the EIS. The AEIS was released for public and agency comment from 2–30 November 2015. A total of 1,240 submissions were received, comprising 1,187 private submissions, 31 from organisations and 22 from state and Commonwealth agencies. Copies of submissions were forwarded to the proponent and DE. Further submissions were received following the conclusion of the public comment period and I have considered these submissions in my evaluation of the project. Further, on 23 November 2015, I requested that SCRC provide further information on aircraft noise. On 23 December 2015, the SCRC provided N70 noise contours based on fixed wing (jets) and helicopter noise emissions.

The provisions of the SDPWO Act dealing with the evaluation of an EIS for a coordinated project were amended by the *State Development Infrastructure and Planning (Red Tape Reduction) and Other Legislation Amendment Act 2014*, which for the most part commenced on 1 October 2014. As public notification of the EIS was carried out prior to the commencement of the amended provisions, Part 4 of the SDPWO Act in force prior to 1 October 2014, continues to apply to the project.

The version of the SDPWO Act in force prior to 1 October 2014 provides for submissions on supplementary information to the EIS to be treated as if they were EIS submissions and requires the Coordinator-General to consider all properly made submissions and other submissions accepted by the Coordinator-General about the EIS.

3.2 Commonwealth assessment

3.2.1 Matters of national environmental significance

The Commonwealth has accredited the State of Queensland's SDPWO Act EIS process under a bilateral agreement between the Commonwealth and the Queensland Government. Under the agreement (made under section 45 of the EPBC Act), if a controlled action is a 'coordinated project for which an EIS is required' under the SDPWO Act, certain types of projects do not require assessment under Part 8 of the EPBC Act. The agreement enables the EIS to meet the impact assessment requirements of both Commonwealth and Queensland legislation.

Under Part 4 of the SDPWO Act and section 36 of the *State Development and Public Works Organisation Regulation 2010* (SDPWO Regulation), the Coordinator-General must ensure the assessment report evaluates all relevant impacts that the action has, will have, or is likely to have, and provide enough information about the action and its

relevant impacts to allow the minister to make an informed decision whether or not to approve the action under the EPBC Act.

The evaluation report will be provided to the Commonwealth Minister for the Environment pursuant to section 36(2) of the SDPWO Regulation. The evaluation report will inform the assessment decision by the Minister on the controlled actions for the project pursuant to section 133 of the EPBC Act. The controlled action may be considered for approval under section 133 of the EPBC Act, once the minister has received the Coordinator-General's EIS evaluation report.

On 7 October 2011, the then Commonwealth Minister for Sustainability, Environment, Water, Population and Communities (Commonwealth Environment Minister) determined that the project is a 'controlled action' under the EPBC Act. The relevant controlling provisions under the EPBC Act are:

- wetlands of international importance (sections 16 and 17B)
- listed threatened species and communities (sections 18 and 18A)
- listed migratory species (sections 20 and 20A).

Section 6 (Matters of national environmental significance) of this report lists each controlling provision under the EPBC Act and explains the extent to which the Queensland Government EIS process addresses the actual or likely impacts of the project on the matters covered by each provision.

The Commonwealth Minister for the Environment will use the information in section 6 of this report to make an informed decision whether or not to approve the controlled action under the EPBC Act, and if so, apply conditions to the approval necessary to protect MNES.

3.2.2 Aviation airspace management

Changes to the use of existing airspace brought about by the operation of the new runway would require an airspace change approval under the Commonwealth *Airspace Act 2007*. Approval for this airspace change is required prior to the operation of the new runway. An approval to change the use of airspace is reliant upon detailed construction specifications of the runway, and would occur closer to the completion of the construction of the runway. This is discussed further in section 4.1.2 of this report.

3.3 Key issues raised in submissions

Key issues raised in the submissions on the EIS and AEIS have been summarised in Table 3.1. I have considered each of the submissions and how the information provided by the proponent addressed submitter issues in my evaluation of the project.

Table 3.1 Key issues raised in public and agency submissions

Topic	Issue summary
Operational aircraft noise	<ul style="list-style-type: none">• noise impacts associated with aircraft arriving to and departing from the airport during the day time and night time• increase in noise associated with the move in the proposed east-west runway footprint• the need for compensation for newly affected dwellings and dwellings that would experience an increase in noise• inadequate noise mitigation measures• aircraft noise impacts on community facilities
Land use planning	<ul style="list-style-type: none">• change in ANEF contours throughout planning documents• move in the proposed east-west runway footprint and consequent noise impacts on surrounding residents• potential impacts on residential dwellings and associated community safety in new Public Safety Areas• potential impacts on road safety from aircraft landing and taking-off over major roads
Social impacts	<ul style="list-style-type: none">• health impacts• poor community consultation about the proposed east west runway• lack of information about the project for people purchasing property in the vicinity of the airport and impacts on property values• potential overdevelopment of the Sunshine Coast• potential impacts on Pacific Paradise State School
Economic impacts	<ul style="list-style-type: none">• methodology of the economic impact assessment—comparisons between the preferred and non-preferred project options• assumptions and data used in the economic impact assessment—for example, flight predictions, change in CASA regulation• lack of risk analysis to underpin methodology• devaluation of property in close proximity to the airport and under flight paths• flow-on economic development is not supported by the submitters
Natural hazards	<ul style="list-style-type: none">• flood impacts on property• reduced capacity of the floodplain from runway fill• adequacy of the flood modelling• flood impacts exacerbated by sea level rise• increased risk of extreme weather events
Water quality	<ul style="list-style-type: none">• tailwater discharge from the reclamation area• water quality impacts in the Maroochy River and Marcoola Drain• runoff from ASS• groundwater impacts and monitoring• management of the sand delivery pipeline

Topic	Issue summary
Geology and soils	<ul style="list-style-type: none"> • management of acid ASS, in particular runoff from sand placement into surface water • potential impacts of ASS on groundwater and bore water • likelihood of whether calcareous material will buffer soil acidity of sand deposits in a terrestrial environment • the need for a more detailed ASS environmental management framework • contamination of shallow groundwater by hydrocarbons • management of contaminated land in the proposed construction compound
Matters of state environmental significance	<ul style="list-style-type: none"> • effectiveness of the proposed connectivity corridor in supporting ecosystem functions due to aircraft noise impacts and restrictions on airport safety requirements and edge effects on the corridor • appropriateness and likelihood of the proposed translocation of Mount Emu she-oak being successful and contingency measures • suitability of the 'Palmview' site in providing a conservation gain for the acid frogs and the Mount Emu she-oak (as a contingency) • potential for the construction of the dredge pipeline to impact on the wallum orchid • requirement for pre-clearing flora surveys, species management plans and compliance with the Nature Conservation (Wildlife Management) Regulation 2006 • the effectiveness of a linear strip beside a runway being maintained as ground parrot and acid frog habitat • potential salinity impacts from tailwater discharge on acid frogs in the east drain which is connected to the Marcoola drain • potential impacts on water mouse habitat in the Maroochy River associated with tailwater discharge to Marcoola drain and sediment runoff/land disturbance • impacts of aircraft noise on fauna, particularly impacts on wedge-tailed shearwaters that nest on Mudjimba Island, and increased risk of bird strike with the new flight path • lighting impacts on nesting turtles/hatchlings on Marcoola Beach during airport operation; and from subsequent airport-related development • timing of sand pumping works to avoid impacts on nesting turtles and hatchlings and dredging impacts on turtles including transit of the dredge vessel. • reinstatement of the dune following the cessation of sand delivery
Air quality	<ul style="list-style-type: none"> • location of air quality monitoring stations • impact of dust from increased use of unsealed roads during construction • accuracy of the air pollution model (TAPM) used for the project assessment • emissions resulting from increased air traffic and consequent air quality impacts
Greenhouse gas emissions	<ul style="list-style-type: none"> • environmental impacts of greenhouse gas emissions from increased air traffic at the SCA

Topic	Issue summary
Construction noise	<ul style="list-style-type: none"> noise impacts from the dredge booster pump, and mitigation and monitoring measures for the pump
Traffic and transport	<ul style="list-style-type: none"> increased motor vehicle traffic in the vicinity of airport the signalised upgrade of the Finland Road/David Low Way intersection, including the potential layout and proposed upgrades how traffic will be managed during construction, particularly in the road-use management plan
Cultural heritage	<ul style="list-style-type: none"> impacts on cultural heritage related to consultation with traditional owners impacts on heritage values
Other issues	<ul style="list-style-type: none"> project justification and alternatives to the project the need for a fourth international airport in south-east Queensland length of the EIS process

4. Project approvals

Following the release of this evaluation report, the proponent would be required to obtain statutory approvals from Australian, state and local government agencies before the project can proceed. Table 4.1 provides an indication of the approvals likely to be required for each component of the project.

Table 4.1 Approvals required for the project to proceed

Project component	Relevant approvals	Legislation	Authority
Whole of project			
Whole of project	EPBC approval	<i>Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)</i>	Commonwealth Department of the Environment (DE)
Airspace			
Aviation airspace management plan	Advice from the Commonwealth Minister on environmental effects of aircraft operations to CASA and ASA	EPBC Act	DE
Changes to airspace architecture and modes of operation	Airspace change approval	<i>Airspace Act 2007</i>	Civil Aviation Safety Authority (CASA)
Regulation of international aircraft navigation within Australian Airspace	Designation of an aerodrome as an international airport	<i>Air Navigation Act 1920</i>	Australian Department of Infrastructure and Regional Development (DIRD)
Aviation security	Transport security program	<i>Aviation Transport Security Act 2004</i>	DIRD

Project component	Relevant approvals	Legislation	Authority
Changes to airspace architecture, relocation of navigational aids and design of runway, taxiways and aprons	Various airspace and safety approvals	<i>Air Services Act 1995</i> <i>Civil Aviation Act 1988</i>	Airservices Australia (ASA) CASA
Airport including runway, taxiway and aprons			
Airport	Aerodrome certification	<i>Civil Aviation Safety Regulations 1998</i>	CASA
Removal and disposal of contaminated soil	Disposal permit	<i>Environmental Protection Act 1994</i> (EP Act)	Department of Environment and Heritage Protection (DEHP)
ERA 6(1)—Asphalt manufacturing	EA	EP Act	DEHP
ERA 6(1)—Asphalt manufacturing	Material change of use (MCU)	<i>Sustainable Planning Act 2009</i> (SPA)	State Assessment Referral Agency (SARA)
ERA 16(3)(a)—Extractive and screening activities	EA MCU	EP Act SPA	DEHP SARA
ERA 50(1)(a)—Bulk material handling (loading/unloading)	EA MCU	EP Act SPA	DEHP SARA
ERA 50(1)(b)—Bulk material handling (stockpiling)	EA MCU	EP Act SPA	DEHP SARA
Clearing of Mount Emu she-oak and other vegetation within 100m	Clearing permit for protected plants	<i>Nature Conservation Act 1992</i> (NC Act)	DEHP
Construction activities	Rehabilitation permit for fauna catchers	NC Act	DEHP
Possible damage to protected wildlife habitat and/or interfering with breeding places	Species management program	NC Act	DEHP
Possible injury or harm to protected animals	Approval to take a protected animal	NC Act	DEHP
Ancillary works and encroachment on a state-controlled road (SCR)	Road corridor permit	<i>Transport Infrastructure Act 1994</i> (TI Act)	Department of Transport and Main Roads (DTMR)
Road works or interference with the Sunshine Motorway (SCR)	Approval from DTMR Chief Executive	TI Act	DTMR
Interference to traffic flow	Traffic control permit	TI Act	DTMR
Tidal works (construction of runway, taxiway and aprons)	Development permit for operational work—tidal works	SPA <i>Coastal Protection and Management Act 1995</i> (CPM Act)	SARA

Project component	Relevant approvals	Legislation	Authority
Marcoola drain tidal flap	Development permit for waterway barrier works	<i>Fisheries Act 1994</i>	Either SARA or self-assessable code depending on duration
Taking or interfering with the flow of water	Water licence	<i>Water Act 2000</i>	DNRM
Indigenous cultural heritage (ICH)	Cultural Heritage Management Plan (CHMP)	<i>Aboriginal Cultural Heritage Act 2003</i> (ACH Act)	Department of Aboriginal and Torres Strait Islander and Multicultural Affairs (DATSIMA)
Potential transportation of declared pests	Environmental management plan	<i>Land Protection (Pest and Stock Route Management) Act 2002</i>	DAF
Dredge mooring			
Installation of mooring	Development permit for operational work—tidal works	SPA CPM Act	SARA
Possible removal, destruction or damage of marine plants	Development permit for operational work	SPA <i>Fisheries Act 1994</i>	SARA
Dredge pipeline and sand delivery pipeline			
Installation of sand delivery pipeline below high water mark	Development permit for operational work—tidal works	SPA CPM Act	SARA
Installation of sand delivery pipeline via excavation and directional drilling through sand dunes on state coastal land	Development permit for operational work—interfering with quarry materials on state coastal land above the high water mark and within a coastal management district	SPA CPM Act	SARA
Installation of sand delivery pipeline via excavation and directional drilling through sand dunes on freehold/ leasehold land within an erosion prone area	Development permit for operational work	SPA CPM Act	DEHP

Project component	Relevant approvals	Legislation	Authority
Disturbance to 1500m ² of vegetated dune through assembly/installation of pipelines	Protected plant surveys as per the DEHP 'high risk area' trigger maps	NC Act	DEHP
Ancillary works and encroachment on David Low Way through installation of the sand delivery pipeline	Road corridor permit	TI Act	DTMR
Temporary or permanent closure of roads	Approval to close a road	<i>Land Act 1994</i> Transport Operations (Road Use Management Plan) 2004	DTMR
Installation of sand delivery pipeline at Marcoola beach	Permit to occupy unallocated state land, a reserve or road	<i>Land Act 1994</i>	DNRM
Possible removal, destruction or damage of marine plants	Development permit for operational work	SPA <i>Fisheries Act 1994</i>	SARA
Dredging activities in Moreton Bay			
Dredging activities	Allocation and removal of quarry material in tidal waters	CPM Act	DEHP
Dredging works in tidal water, construction of a shipping channel	Development permit for operational work	SPA CPM Act	DEHP
ERA16(1)—Dredging	EA MCU	EP Act SPA	DEHP SARA
Carrying out ERA 16(1)	Registration as a suitable operator	EP Act	DEHP
Possible removal, destruction or damage of marine plants from dredging	Development permit for operational work	SPA Fisheries Act	SARA

The proponent acknowledges that further information will be required to support the lodgement of applications for subsequent approvals with the relevant assessment managers.

4.1 Australian Government approvals

4.1.1 Whole of project

The EIS process has been undertaken in accordance with the requirements of the bilateral agreement between the Queensland and Australian governments relating to environmental assessment, as discussed in section 3.2 of this report.

The Commonwealth Minister for the Environment will use the information in section 6 of this report to make a decision whether or not to approve the controlled action under the EPBC Act, and if so, apply any conditions to the approval necessary to manage the impacts on MNES. I have included recommended conditions to be applied to this approval in Appendix 3.

4.1.2 Airport and airspace

A separate referral under section 160 of the EPBC Act (EPBC2011/6104) has been made by CASA and ASA for the implementation of an aviation airspace management plan. Whilst this referral is not part of my assessment, the Commonwealth Minister for the Environment will use the EIS documentation and submissions described in this report to assess and determine whether aircraft operations have, will have, or are likely to have a significant impact on the environment. The Minister will then provide advice to CASA and ASA. Should there be an approval of the management plan and finalisation of runway specifications, an airspace change approval would be obtained prior to the operation of the runway from CASA, Office of Airspace Regulation (OAR).

CASA and ASA have provided an 'agreement in principle' that the projected flight path corridors and predicted airspace changes, as described and assessed in the EIS, are:

- consistent with CASA and ASA planning requirements
- appropriate for use in the preparation of the EIS and public consultation of the EIS.

Further approvals relating to airspace, security and safety are required to be obtained from CASA, ASA and DIRD under Commonwealth legislation. See Table 4.1 for further information.

On 30 June 2011, the Commonwealth Minister for the Environment approved, subject to conditions, a separate referral under the EPBC Act to transfer the ownership of 41.8 ha of Commonwealth land within the airport boundary from ASA to the proponent (referral EPBC 2009/4899). As part of these conditions, the Commonwealth Minister included a requirement for a Conservation Agreement to be established over the Wallum Heath Management Area (WHMA). I have included conditions in Appendix 3 to inform the management of this site.

4.2 State government approvals

4.2.1 Environmental Protection Act 1994

Under the *Environmental Protection Act 1994* (EP Act), an environmental authority is required to carry out an Environmentally Relevant Activity (ERA). Relevant ERAs for the runway, taxiway and aprons include:

- ERA 6(1)—asphalt manufacturing
- ERA 16(3)(a)—extractive and screening activities
- ERA 50(1)(a)—bulk material handling.

For offshore dredging and placement of sand on shore, I have stated conditions in Appendix 1 for inclusion in an environmental authority for ERA 16 (dredging, extractive industry and screening). The dredging operator will also be required to comply with the requirements of the *Transport Operations (Marine Safety) Act 1994*, *Transport Operations (Marine Pollution) Act 1995* and *Maritime Safety Queensland Act 2002*.

4.2.2 State Development and Public Works Organisation Act 1971

Under Division 8 of Part 4 of the SDPWO Act, I have the power to impose conditions for matters where conditions cannot be applied through approvals under other specified legislation. Imposed conditions are provided in Appendix 3 of this report and relate to flooding and environmental offset matters.

4.2.3 Coastal Protection and Management Act 1995

State coastal land is protected under the *Coastal Protection and Management Act 1995* (CPM Act). The project is likely to trigger requirements to obtain development approvals for operational works within the defined coastal management district. This applies to the installation of the dredging mooring, establishment of pipelines, dredging and any other activities. I have stated conditions in Appendix 1 which must be adopted by SARA when applications are made by the proponent under the Integrated Development Assessment System (IDAS).

4.2.4 Nature Conservation Act 1992

The *Nature Conservation Act 1992* (NC Act) provides for the identification, protection and management of flora and fauna in Queensland. Activities related to the construction of the new runway are located within the high-risk area for the Mount Emu she-oak, listed under the Nature Conservation (Protected Plants) Conservation Plan 2000. As such, the proponent will require a permit for clearing these protected plants and any other vegetation within 100m.

4.2.5 Transport Infrastructure Act 1994

The installation of the sand delivery pipeline would require a road corridor permit under the *Transport Infrastructure Act 1994* (TI Act) due to encroachment on the state-controlled David Low Way. I have included recommended conditions regarding the road corridor permit in Appendix 3 which must be administered by DTMR.

4.3 Local government approvals

The majority of the airport land is designated as a Community Facilities Zone for 'Air Services' in the Sunshine Coast Planning Scheme 2014. Under the planning scheme, development in a Community Facilities Zone, owned or controlled by SCRC, is exempt from MCU approvals and would not require approval under SPA. This includes operational works for filling, excavation and vegetation clearing.

Notwithstanding this, the proponent must comply with the airport environs overlay code as per Part 5 of the planning scheme in order to maintain and enhance the safety and operations of the airport and associated facilities. Chapter A6 (Section 6.5.3 Local planning framework) of the EIS provides an overview of the airport environs overlay mapping.

Project activities outside of the Community Facilities Zone are assessable development under the planning scheme and would require development approval under SPA. These activities include some ancillary airport development, the assembly of the dredge pipeline and installation of the sand delivery pipeline.

Further, under the *Local Government Act 2009*, the proponent must comply with any relevant local laws and subordinate local laws. This is particularly relevant to road impacts and parking, and is discussed in section 5.12 of this report.

5. Evaluation of environmental impacts

5.1 Operational aircraft noise

5.1.1 Introduction

The SCA is located on Council owned land and is operated by the proponent. The location of the airport was decided in 1958, when the Queensland Government set aside 300 acres of Crown Land for the development of the airport. Operations commenced in 1961 through use of the existing north–south runway and existing cross runway. Planning for a new east–west runway aligning more closely with the prevailing south easterly winds commenced in 1982. In 1985, the Maroochy Shire Strategic Plan designated the airport site as 'special purpose', allowing for the proposed east-west runway. Subsequently, the Sunshine Coast Highway was realigned to accommodate the airport land.

As part of the EIS process, the proponent carried out further planning and design of the proposed east-west runway. This involved comprehensive aircraft noise modelling through the Integrated Noise Model (INM). The INM is a standard international aircraft noise tool used for assessment of aircraft noise impacts. The INM modelled noise emissions associated with the following operational scenarios:

- existing north-south runway in 2020
- existing north-south runway in 2040, which included a gradual increase in aircraft movements over a 20 year period
- proposed east-west runway at the start of operations in 2020
- proposed east-west runway at full operational capacity in 2040.

To describe how the project could change the potential aircraft noise impacts experienced at noise sensitive receptors³, this section compares:

- the existing north-south runway to the proposed east-west runway at the start of operations in 2020
- the existing north-south runway to the proposed east-west runway at full operational capacity in 2040.

The comparison in 2020 and 2040 is discussed using each of the following aircraft noise measures:

- N70 event contours for the day and evening periods
- N60 event contours for the night period
- ANEC contours - an average noise measure over 12 months.

The section evaluates noise generated by jets, turboprops and helicopters while flying, landing and taking-off from the airport. For assessment of construction noise impacts refer to section 5.11 of this report.

5.1.2 Regulation of aircraft noise

Aircraft noise at Commonwealth owned or leased airports is regulated through the Commonwealth *Airports Act 1996* and associated National Airports Safeguarding Framework 2012 (NASF). The SCA is Council owned and therefore the *Airports Act 1996* does not apply. However, the proponent voluntarily adopts noise management measures set out in the NASF. These include the fly neighbourly policy, noise abatement procedures (NAPs), required navigation performance (RNP) procedures and community engagement and noise complaints handling (refer to section 5.1.6 for further detail).

The key noise management measure of the NASF is strategic land use planning, which is implemented through the Queensland State Planning Policy 2014 (SPP) and the Sunshine Coast Planning Scheme 2014 (the planning scheme) to control new development around the airport.

³ The EIS and AEIS define noise sensitive receptors as community facilities, dwellings and commercial accommodation providers.

Commonwealth agencies such as ASA and CASA regulate the safety of civil air operations including navigation. ASA provides air traffic control, aviation rescue and firefighting as well as other related services to the aviation industry. ASA also manages noise complaints through a dedicated Noise Complaints Information System (NCIS). Through the OAR, CASA has responsibility for assessment of any changes to the aviation industry's use of Australian airspace.

As discussed in section 4.1 (Australian Government approvals) of this report, ASA and CASA have made a separate referral under section 160 of the EPBC Act (EPBC2011/6104) for the implementation of an aviation airspace management plan. The Commonwealth Minister for the Environment will use the EIS documentation and submissions described in this report to assess and determine whether aircraft operations have, will have, or are likely to have a significant impact on the environment. The Minister will then provide advice to CASA and ASA. Should there be an approval of the management plan and finalisation of runway specifications, an airspace change approval from the OAR may be required prior to the operation of the runway.

5.1.3 Aircraft noise measures

The Australian Noise Exposure Concept (ANEC) contours and N70 and N60 event contours are the aircraft noise measures used nationally to describe levels of aircraft noise and were both used to compare the change between the existing north-south runway and the proposed east-west runway. ANEC contours indicate aircraft noise exposure around an airport, averaged over a 12 month period (refer to Appendix 5 for further detail). These contours are used for strategic land use planning and are a decision making tool for local governments (refer to Appendix 5 for further detail). Once the final detailed design of the project is completed, the ANEC contours would be reviewed and endorsed by ASA for technical accuracy. The ANEC contours would then be referred to as Australian Noise Exposure Forecasts (ANEF) and included in the planning scheme.

N70 contours identify the number of noise events that exceed 70 decibels (dB(A)) over a day (7am to 6pm) or evening (6pm to 10pm) period. A noise level of 70 dB(A) is generally equivalent to operating a vacuum cleaner and is identified as a level at which conversation would be disturbed⁴. N60 events are used to describe the number of noise events that exceed 60 dB(A) during a night time period (10pm to 7am). In a room where a person is sleeping, a 50 dB(A) maximum noise level (allowing for noise reduction from walls or roofs) is considered to be close to a point at which noise may cause sleep disturbance.

5.1.4 Submissions received

The key issues regarding aircraft noise raised in submissions on the EIS and AEIS included the following:

⁴ Commonwealth Department of the Environment and Heritage, Aviation and Airports Policy Division, Department of Transport and Regional Services. 2003. Guidance material for selecting and providing aircraft noise information. Accessed on 18 April 2016 from https://infrastructure.gov.au/aviation/environmental/transparent_noise/guidance/index.aspx

- noise impacts associated with aircraft arriving to and departing from the airport during day time and night time
- the need for compensation for newly affected dwellings and dwellings that would experience an increase in noise
- inadequate noise mitigation measures
- increase in noise associated with or resulting from the move in the proposed east-west runway footprint
- effects of noise on community health and wellbeing (assessed in section 5.3.4 [Social impacts])
- changes in noise contours throughout planning documents (assessed in section 5.2.4 [Land use planning])
- effects of aircraft noise on property values (assessed in section 5.4 [Economic impacts]).

I have considered each submission and the responses provided by the proponent in my evaluation of the potential impacts of the project on the community and my assessment is provided in relevant sections below. Furthermore, I have also considered advice received from Australian Government agencies, including the Department of Infrastructure and Regional Development (DIRD), ASA, CASA and the independent ANO.

5.1.5 Potential aircraft noise impacts

As described in section 5.1.1, the following sections present the predicted changes in the noise environment by comparing the existing north-south runway with the proposed east-west runway in 2020 (commencement of operations) and in 2040 (full capacity). The changes in the noise environment are described using the N70 (day and evening periods) and N60 events (night period), and ANEC contours.

Both N70 and N60 noise measures are used to explain the change in noise expected to occur, while the ANEC contours are used to assess potential aircraft noise impacts and to inform future land use development around the SCA (refer to section 5.1.3 for further detail). Due to the different measures and the size and shape of the ANEC, N70 and N60 contours, noise sensitive receptors would be captured differently. Consequently, impacts based on N70, N60 and ANEC contours cannot be compared and are presented in separate sections below.

While the existing north-south runway requires aircraft to arrive and depart to the north and south, the proposed east-west runway would require aircraft to arrive and depart to the east and west. Consequently, the operation of the proposed east-west runway will lead to a redistribution of noise impacts on surrounding noise sensitive receptors. The EIS describes noise sensitive receptors as residential dwellings and community facilities including schools, childcare centres and community hubs (for a full list refer to Appendix L of the AEIS). The predicted impacts on these receptors are discussed in the sections below.

The EIS presented aircraft noise modelling for the proposed east-west runway based on a 'busy day' flight schedule, which is unlikely to occur every day of the year. While the EIS presents noise impacts predicted to occur during the summer and winter seasons, the following section describes noise impacts during the summer season when aircraft noise would generally be higher. Furthermore, the impacts are based on weekdays because the greatest amount of flights (72 per cent) occurs during weekday day periods. Therefore, the EIS predictions represent a worst-case assessment.

A number of submissions, including residents in Marcoola and Mudjimba have raised concerns regarding noise impacts associated with aircraft flying, departing from and arriving to the airport. These concerns are addressed in the following section using the N70 event contours.

N70 events: day period (7am to 6pm)

The following section identifies noise impacts during the day (7am to 6pm), for existing dwellings and community facilities. These noise events include noise from jets, turboprop and helicopter operations.

Dwellings

A number of submissions, including residents in Marcoola, Mudjimba, Marcoola, Pacific Paradise, Mount Coolum and Yaroomba have raised issues of noise increases and potential impacts on health and wellbeing. The following section assesses the predicted noise impacts, while section 5.3 of this report (Social impacts) discusses health and wellbeing impacts.

EIS documentation identified that the proposed east-west runway would result in a net reduction of 62 per cent or approximately 3,530 dwellings exposed to five or more N70 events in 2020. By 2040, the proposed east-west runway would result in a net reduction of 70 per cent or approximately 4,946 dwellings exposed to five or more N70 events (refer to Table 5.1). The reduction in noise impacts would occur due to the orientation of the proposed east-west runway and aircraft approaching and departing over less populated suburbs to the west and the ocean to the east of the SCA. These dwellings are located in suburbs of Maroochydore, Twin Waters, Pacific Paradise, Mudjimba, Marcoola, Mount Coolum and Yaroomba.

Table 5.1 Reductions in number of dwellings in N70 event contours during the day (7am to 6pm) - for the existing north-south runway vs. proposed east-west runway⁵ in 2020 and 2040

N70 event contours	Number of dwellings in 2020 in N70 contours		Net reduction in 2020	Number of dwellings in 2040 in N70 contours		Net reduction in 2040
	Existing north-south runway	Proposed east-west runway		Existing north-south runway	Proposed east-west runway	
5–9	2,602	380	2,222	1,971	313	1,658
10–19	1,109	268	841	2,696	85	2,611
20–49	1,536	1,262	274	1,856	1,356	500
50–99	404	228	176	496	345	151
100+	17	0	17	26	0	26
Total	5,668	2,138	3,530 (62% reduction)	7,045	2,099	4,946 (70 % reduction)

A number of submissions received from residents in Mudjimba, Marcoola, Mount Coolum and Yandina Creek raised issues regarding possible increases in noise associated with aircraft flying, departing from and arriving to the airport. EIS documentation identified dwellings that could experience an increase in noise as a result of proposed east-west runway operations in 2020 and 2040. These dwellings could be either newly exposed to aircraft noise or could experience an increase in noise events. These impacts are discussed in the sections below. For impacts associated with health and wellbeing refer to section 5.3 of this report (Social impacts).

Potential impacts by 2020

The proposed east-west runway would result in approximately 2,138 dwellings located in the N70 event contour in 2020 (reduced from 5,668 dwellings). Modelling indicates that of those dwellings located in a N70 contour, approximately 390 dwellings could experience a potential increase in noise (refer to Table 5.2). Out of 390 dwellings predicted to experience a potential increase in noise, approximately 369 dwellings located in suburbs of Mudjimba and the southern part of Marcoola could experience more N70 events and twenty-one dwellings located in Yandina Creek could be newly captured in the N70 event contours.

⁵ N70 data based on noise emissions from jets, turboprop aircraft and helicopters.

Table 5.2 Possible increase in number of dwellings in N70 contours: existing north-south runway vs. proposed east-west runway during the day (7am to 6pm) in 2020⁶

N70 event contours	Number of dwellings in N70 contours 2020		Dwellings - potential noise increase 2020	
	Existing north-south runway	Proposed east-west runway	No. of dwellings exposed to more N70 events	No. of dwellings newly affected by N70 events
5–9	2,602	380	0	14
10–19	1,109	268	90 (from 5–9 events to 10–19 events)	7
20–49	1,536	1,262	150 (from 5–9 events to 20–49 events) 129 (from 10–19 events to 20–49 events)	0
50–99	404	228	0	0
100+	17	0	0	0
Sub-total	5,668	2,138	369	21
Total			390	

Potential impacts by 2040

The proposed east-west runway could result in approximately 2,099 dwellings to be located in the N70 event contour in 2040 (reduced from 7,045 dwellings). Of those dwellings located in a N70 contour, approximately 476 dwellings could potentially experience an increase in noise (refer to Table 5.3). Out of 476 dwellings predicted to experience an increase in noise, approximately 449 dwellings could experience more N70 events. These dwellings are located in the suburbs of Mount Coolum, Mudjimba and Marcoola. Out of 476 dwellings predicted to experience an increase in noise, 27 dwellings located in Yandina Creek could be newly captured in the N70 event contours.

⁶ N70 data based on noise emissions from jets, turboprop aircraft and helicopters.

Table 5.3 Possible increase in number of dwellings in N70 contours: existing north-south runway vs. proposed east-west runway during the day (7am to 6pm)⁷ in 2040

N70 event contours	Number of dwellings in N70 contours 2040		Dwellings - potential noise increase 2040	
	Existing north-south runway	Proposed east-west runway	No. of dwellings exposed to more N70 events	No. of dwellings newly affected by N70 events
5–9	1,971	313	0	5
10–19	2,696	85	8 (from 5–9 events to 10–19 events)	15
20–49	1,856	1,356	118 (from 5–9 events to 20–49 events) 278 (from 10–19 events to 20–49 events)	7
50–99	496	345	45 (from 20–49 events to 50–99 events)	0
100+	26	0	0	0
Sub-total	7,045	2,099	449	27
Total				476

Community facilities

A number of submissions on the AEIS raised issues regarding noise impacts on community facilities in the vicinity of the airport. When compared to the existing north-south runway in 2020, the proposed east-west runway would result in a reduction of N70 events at 10 community facilities. Fourteen facilities would either remain outside of the N70 contour or experience no change in noise impacts from the project. By 2040, the proposed east-west runway would result in a reduction of N70 events at 13 facilities. An additional 13 facilities would either remain outside of N70 contours or experience no change in noise impacts from the project.

Community facilities - potential impacts by 2020 and 2040

By 2020, eight community facilities could potentially experience an increase in noise as a result of the proposed east-west runway. These include C&K Mudjimba Community Kindergarten, Mudjimba lifeguard tower and surf lifesaving club (SLSC), Mudjimba mobile library stop, Mudjimba Community Hall, Mudjimba Skate Park, Mudjimba Power Memorial Park, Mudjimba Rural Fire Brigade and the Mudjimba Beach Caravan Park.

By 2040, six community facilities could potentially experience an increase in noise as a result of the proposed east-west runway. These include the same facilities as affected

⁷ N70 data based on noise emissions from jets, turboprop aircraft and helicopters.

in 2020, except for Mudjimba Community Hall and Mudjimba Skate Park which would not increase beyond the impact predicted at 2020.

N70 events: evening period (6pm to 10pm)

The following section identifies noise impacts during the evening (6pm to 10pm), for existing dwellings and community facilities. These noise events include noise from jets and turboprop aircraft and do not include noise from helicopters. Submissions received from residents in Mudjimba, Marcoola, Twin Waters and Yandina Creek have raised issues regarding noise impacts during evening periods. These are discussed in the sections below.

Dwellings

The proposed east-west runway would result in a reduction of approximately 569 dwellings exposed to five or more N70 events by 2020. By 2040, the project would result in a reduction of approximately 1,131 dwellings exposed to more than five N70 events. These dwellings are located in the suburbs of Marcoola, Mudjimba and Twin Waters. In addition, around 39 dwellings around the proposed east-west runway would be located in contours higher than 10-19 N70 events by 2040 (down from 287).

The N70 events for the evening period reported in the AEIS are based on noise emissions from jets and turboprop aircraft and do not include helicopters. Further information obtained from the proponent identifies a low number of helicopter movements between 6pm to 10pm. The low number of helicopter movements during this period is unlikely to change the predicted aircraft noise impacts.

Dwellings – potential impacts by 2020 and 2040

As a result of the proposed east-west runway in 2020, a number of dwellings located in Mudjimba and the southern part of Marcoola could be newly exposed to 5–9 N70 events during the evening period. In addition, two dwellings in Yandina Creek could be newly exposed to 5–9 N70 events. By 2040, dwellings in the southern part of Marcoola could experience an increase from 5–9 N70 events to 10–19 N70 events. At this time, another 13 dwellings in Yandina Creek could be newly exposed to 5–9 N70 events.

Community facilities – potential impacts by 2020 and 2040

Based on the proposed east-west runway in 2020, the majority of community facilities would not be exposed to N70 contours during the evening hours (6pm to 10pm). Two facilities, the C&K Mudjimba Kindergarten and Mudjimba Community Hall have longer operating hours, with C&K Mudjimba Kindergarten closing at 6.30pm and Mudjimba Community Hall closing at 8.30pm. Consequently, in 2020 these facilities would remain exposed to less than five N70 events during evening hours.

As a result of the proposed east-west runway in 2040, the C&K Kindergarten and Mudjimba Community Hall could experience an increase in noise from less than five N70 events to 5–9 N70 events. Given the longer operating hours at the C&K Kindergarten, the increase in noise could be experienced from 6pm to 6.30pm and from 6pm to 8.30pm respectively.

N60 events: night period (10pm to 7am)

The following section identifies noise impacts during the night period (10pm to 7am) for existing dwellings. These noise events include noise from jets and turboprops and do not include noise from helicopters. A number of submissions raised issues regarding noise impacts on sleep. The following section assesses the predicted night time impacts, while section 5.3 (Social impacts) of this report discusses health and wellbeing impacts.

The EIS reported that jet flights would not occur during night-time until 2040. In 2040, two flights are likely to be scheduled between 6am to 7am. As a result of the two flights, the proposed east-west runway could result in 1,366 dwellings potentially experiencing an increase in noise from two N60 events in 2040. In comparison with the existing north-south runway, the proposed east-west runway would result in a reduction of 138 dwellings exposed to two N60 events.

Summary of impacts based on N70 and N60 events

The project is predicted to result in a significant reduction of noise events on the noise sensitive receptors when compared with the existing north-south runway. At the commencement of the proposed east-west runway in 2020, the project would result in a net reduction of 62 per cent or approximately 3,530 dwellings exposed to five or more N70 events. By 2040, the operation of the proposed east-west runway would result in a net reduction of 70 per cent or approximately 4,946 dwellings exposed to five or more N70 events.

Notwithstanding, the EIS identifies a potential increase in the number of N70 events experienced in Mudjimba, southern Marcoola, Yandina Creek and Mount Coolum. The increase in aircraft noise could occur at approximately 390 dwellings in 2020 and approximately 476 dwellings in 2040. These dwellings could be either newly affected by noise or could experience an increase in noise events.

In 2020, approximately 369 dwellings located in Mudjimba and southern Marcoola could potentially experience increases from 5–9 to 10–19 or 20–49 N70 events. In addition, 21 dwellings in Yandina Creek could potentially be newly exposed to 5–9 and 10–19 N70 events. In 2040, approximately 449 dwellings located in Mudjimba, south Marcoola and Mount Coolum could potentially experience increases from 5–9 to 10–19 or 20–49 N70 events and from 10–19 to 20–49 or 50–99 N70 events. In addition, 27 dwellings located in Yandina Creek could potentially experience increases from 5–9 to 10–19 N70 events and from 10–19 to 20–49 N70 events.

Flights would not operate during night-time (10pm to 7am) until 2040. In 2040, two flights are likely to be scheduled between 6am to 7am and would result in a reduction of 138 dwellings exposed to two N60 events when compared with the existing north-south runway.

ANEC contours

The EIS presented noise impacts using the ANEC contours which identify aircraft noise exposure around the airport, averaged over a 12 month period. These contours include noise from jets, turboprop and helicopter operations.

The *Australian Standard 2021:2015 Acoustics—Aircraft Noise Intrusion—Building Siting and Construction* (AS2021:2015) identifies building acceptability zones of new developments based on ANEF contours (refer to Appendix 5 for further detail). Table 5.4 shows the acceptability zones for the relevant building types.

Table 5.4 Building site acceptability based on ANEF zones (AS2021:2015)

Building type	ANEF zone of site		
	Acceptable	Conditionally acceptable	Unacceptable
House, home unit, flat, caravan park	Less than 20 ANEF	20–25 ANEF	Greater than 25 ANEF
Hotel, motel, hostel	Less than 25 ANEF	25–30 ANEF	Greater than 30 ANEF
School, university	Less than 20 ANEF	20–25 ANEF	Greater than 25 ANEF
Public building	Less than 20 ANEF	20–30 ANEF	Greater than 30 ANEF
Commercial building	Less than 25 ANEF	25–35 ANEF	Greater than 35 ANEF

Note: This table is to be used in conjunction with Table 3.3 of the AS2021:2015 and includes several notes that are relevant to its application (AS2021:2015).

These acceptability zones do not apply to the majority of the community facilities discussed in this section, as most are either open spaces or facilities that are occupied or used for a short-period. The results of the ANEC contours are discussed below and used to assess the potential impacts of aircraft noise on dwellings and community facilities.

Dwellings

At the commencement of the proposed east-west runway operations in 2020, the project is predicted to result in a net reduction of 25 per cent (approximately 392 dwellings) being located in ANEC 20 or more. By 2040, the proposed east-west runway would result in a net reduction of 27 per cent (approximately 540 dwellings) located in ANEC 20 or more (refer to Table 5.5). The noise reductions would occur as a result of aircraft flying over the ocean to the east and less populated suburbs to the west of the proposed east-west runway and the proposed relocation of existing helicopter operations from the southern general aviation (GA) area to the western GA area by 2027.

The AEIS identified a number of dwellings that could experience a reduction in aircraft noise as a result of the proposed east-west runway in 2020 and 2040. By 2020,

operation of the proposed east-west runway would result in 522 dwellings no longer being located in an ANEC contour and 93 dwellings being located in lower ANEC contours. By 2040, operation of the proposed east-west runway would result in 926 dwellings no longer being located in an ANEC contour and 201 dwellings being located in a lower ANEC contour. These dwellings are located in the suburbs of Mount Coolum, Marcoola, Twin Waters and Pacific Paradise. Refer to maps in Appendix L of the AEIS for location of dwellings in relation to the ANEC contours.

The key net benefits are most evident when comparing the proposed east-west runway in 2020 and the proposed east-west runway in 2040. At this time the project would result in a reduction of approximately 59 dwellings located in the high ANEC contours, ANEC 30-35 (46 dwellings) and ANEC 35-40 (13 dwellings). These contours are defined as unacceptable under the AS2021:2015. The 59 dwellings would remain in the ANEC 30-35 and ANEC 35-40 until 2027, at which time the proponent proposes to relocate helicopter operations from the southern to the western GA area. The relocation of helicopter operations would result in a reduction of helicopter noise impacts across all dwellings in ANEC contours and in particular at the 59 dwellings located in ANEC 30-35 and ANEC 35-40. These dwellings would be then located in a lower ANEC 25-30. Although this contour is identified as unacceptable under the AS2021:2015, the change in contours represents a notable reduction in potential aircraft noise.

Table 5.5 Reduction in number of dwellings within ANEC contours: existing north-south runway vs. proposed east-west runway in 2020 and 2040

ANEC	Number of dwellings in ANEC contours at 2020		Net change 2020	Number of dwellings in ANEC contours at 2040		Net change 2040
	Existing north-south runway	Proposed east-west runway		Existing north-south runway	Proposed east-west runway	
20-25	1,162	879	-283	1,510	926	-584
25-30	320	230	-90	430	559	+129
30-35	67	46	-21	85	0	-85
35-40	11	13	+2	0	0	0
Total	1,560	1,168	392 (25% reduction)	2,025	1,485	540 (27% reduction)

A number of submissions, particularly from Mudjimba and Marcoola, raised issues regarding increases in noise and change in ANEC contours resulting from the 310m south-east move in the proposed east-west runway footprint (along the east-west alignment). This section assesses the predicted noise impacts resulting from the proposed east-west runway (including the 310m south-east move in runway footprint). Refer to section 5.2 (Land use planning) of this report for further detail regarding change in runway footprint. Submissions also raised issues regarding effects of aircraft noise on property values in Mudjimba and Marcoola and the possibility of providing compensation for newly affected dwellings that could potentially experience an

increase in noise. Section 5.4 of this report (Economic impacts) discusses impacts on property values, while Appendix 3 lists recommendation for aircraft noise management.

The AEIS also identified dwellings that could experience a potential noise increase when compared with the existing north-south runway at 2020 and 2040 and are discussed in the sections below. These dwellings would either be newly included in an ANEC contour due to the new flight paths west of the airport or could be located in a higher ANEC contour due to their proximity to the airport and aircraft approaching/departing to the east and west (refer to tables Table 5.6 and Table 5.7). These potential impacts are discussed in the sections below.

Potential impacts by 2020

By 2020, the project would result in 154 dwellings either newly included in an ANEC contour or included in a higher ANEC contour (refer to Table 5.6). Out of 154 dwellings, 24 dwellings would move from a lower to higher ANEC contour. These dwellings are located in the southern part of Marcoola, immediately to the south-east of the existing north-south runway:

- 16 dwellings would move from ANEC 20-25 (conditionally acceptable) to ANEC 25-30 (unacceptable)
- 5 dwellings would move from ANEC 25-30 (unacceptable) to ANEC 30-35 (unacceptable)
- 3 dwellings would move from ANEC 30-35 (unacceptable) to ANEC 35-40 (unacceptable).

As indicated in Table 5.6, 130 dwellings would be newly located in ANEC 20-25 (conditionally acceptable). These dwellings are located in Mudjimba and the southern part of Marcoola.

Table 5.6 Increase in number of dwellings in ANEC contours: existing north-south runway vs. proposed east-west runway in 2020

ANEC contour	No. of dwellings in ANEC contours in 2020		Dwellings - potential noise increase	
	Existing north-south runway	Proposed east-west runway	No. of dwellings located in higher ANEC contours	No. of dwellings newly included in ANEC contours
20-25	1,162	879	0	130
25-30	320	230	16 (from ANEC 20-25 to ANEC 25-30)	0
30-35	67	46	5 (from ANEC 25-30 to ANEC 30-35)	0
35-40	11	13	3 (from ANEC 30-35 to ANEC 35-40)	0
Sub-total	1,560	1,168	24	130
Total			154	

Potential impacts by 2040

By 2040, modelling indicates that the project could result in 716 dwellings being either newly included in an ANEC contour or being included in a higher ANEC contour (refer to Table 5.7). Out of the 716 dwellings predicted to experience a potential increase in noise, 330 dwellings would move from a lower to a higher ANEC contour. These dwellings would move from ANEC 20-25 to ANEC 25-30 and are located in the southern part of Marcoola and Mudjimba.

Out of the 716 dwellings predicted to experience an increase in noise, 386 dwellings would be newly included in an ANEC contour as follows:

- 335 dwellings, located in southern Marcoola and Mudjimba, would be newly located in ANEC 20-25 (conditionally acceptable)
- 51 dwellings, located in southern Marcoola, would be newly located in ANEC 25-30 (unacceptable).

Table 5.7 Increase in number of dwellings in ANEC contours: existing north-south runway vs. proposed east-west runway in 2040

ANEC contours	No. of dwellings in ANEC contours in 2040		Dwellings - potential noise increase	
	Existing north-south runway	Proposed east-west runway	No. of dwellings exposed to higher ANEC contours	No. of dwellings newly included in ANEC contour
20-25	1,510	926	0	335
25-30	430	559	330 (from ANEC 20-25 to ANEC 25-30)	51
30-35	85	0	0	0
35-40	0	0	0	0
Sub-total	2,025	1,485	330	386
Totals	716			

Community facilities

Six facilities are located in the ANEC contours for the existing north-south runway. Operation of the proposed east-west runway in 2020 could result in a change to two facilities, with the remaining four predicted to stay in the same ANEC contour. These include:

- Mudjimba Lifeguard Tower and SLSC would move from outside of the ANEC 20-25 to ANEC 20-25 (conditionally acceptable)
- Marcoola Lifeguard Tower and SLSC would move from ANEC 20-25 to outside of ANEC 20 (acceptable).

Operation of the proposed east-west runway in 2040 is predicted to result in: a potential increase in noise at six facilities; a reduction in noise at seven facilities; and

no change in noise at one facility. The community facilities that could experience an increase in noise include:

- Mudjimba lifeguard tower and SLSC (moving from outside of ANEC 20 to ANEC 20-25)
- Mudjimba community hub (moving from outside of ANEC contours to ANEC 20-25)
- Mudjimba mobile library stop (moving from outside of ANEC contours to ANEC 20-25)
- Mudjimba Skate Park (moving from ANEC 20-25 to ANEC 25-30)
- Power Memorial Park (moving from outside of ANEC contours to ANEC 20-25)
- Mudjimba Beach Caravan Park (moving from outside of ANEC contours to ANEC 20-25).

Summary of potential impacts based on ANEC contours

When compared with the existing north-south runway, in 2020 the proposed east-west runway would result in 392 fewer dwellings being located in a contour of ANEC 20-25 or more. By 2040, operation of the proposed east-west runway would result in 540 fewer dwellings located in ANEC 20-25 or more when compared with the existing north-south runway. The changes would occur as a result of aircraft flying over the ocean to the east and the less populated suburbs to west of the proposed east-west runway and also due to the proposed relocation of existing helicopter operations from the southern GA area to the western GA area by 2027.

The project could potentially increase aircraft noise at dwellings in Mudjimba and the southern part of Marcoola. Due to east-west flight paths and flight operations, 154 dwellings in 2020 and 716 dwellings in 2040 could be located in a higher ANEC. However, by 2040 no dwellings would be located in a contour higher than ANEC 30. Furthermore, 59 dwellings located in high ANEC contours (ANEC 30+) in 2020 would be located in lower ANEC contours by 2027. This reduction in noise would occur as a result of helicopter operations being relocated from the southern GA area to the western GA area.

Helicopter movements are a key noise source that form part of the existing SCA operations and therefore contribute to the potential increase in noise at southern Marcoola. The proponent has confirmed that the noise modelling undertaken for the existing north-south runway includes the noise associated with the forecast increase in helicopter movements. This increase would occur irrespective of the project. The existing helicopter operations undertaken at the southern GA area are scheduled to be relocated away from noise sensitive receptors (dwellings in southern Marcoola) by 2027. Over the seven-year period (between planned commencement of the proposed east-west runway in 2020 and scheduled move in helicopter operations by 2027), 46 dwellings would be located in ANEC 30–35 and 13 dwellings in ANEC 35–40.

Although helicopter operations are existing, the proponent is committed to permanently relocating the helicopter operations, subject to commercial contracts, from the southern GA area to the western GA area. As the western GA area is located further away from noise sensitive receptors in southern Marcoola, the potential noise increase for the 59

dwelling would reduce by 2027. The relocation of helicopter operations would result in 59 dwellings being located in ANEC 25-30 or ANEC 30-35. In addition, the orientation of the proposed east-west runway would reduce the number of dwellings in these contours from 78 under the existing north-south runway ANEC contours.

Although the ANEC noise measure presents averaged noise over a 12 month period, it is important to note that the majority (72 per cent) of scheduled flights would occur during the weekday period, from 7am to 6pm. Furthermore, the EIS noise modelling indicated a worst-case scenario. This means that the project is likely to result in less noise impacts than predicted, especially for the ANEC measure.

5.1.6 Proposed noise management measures

A number of submissions raised issues regarding noise management measures for aircraft noise. The proponent currently implements measures to manage aircraft noise and has committed to further measures to manage aircraft noise associated with the proposed east-west runway. The following section describes the measures the proponent has committed to implement.

Mitigation measures through project design

The east–west orientation of the proposed runway is the most effective noise mitigation measure that would have the greatest effect in reducing future aircraft noise. The orientation of the proposed east-west runway requires aircraft to fly over the ocean to the east and less populated suburbs to the west of the airport. As a result, there would be a significant reduction in the number of dwellings exposed to potential aircraft noise impacts.

Together with ASA and CASA, the proponent has undertaken a detailed flight path development process for the proposed east-west runway. The EIS reports that minimising noise impacts was an integral design objective for the development of the proposed flight paths. This process involved analysis of existing and planned developments at the Sunshine Coast.

The east–west orientation of the proposed runway reduces the need for aircraft diversions because the proposed east-west runway would be aligned to the prevailing south-easterly winds. Aircraft would be able to take off and land into the wind. Diversions occur when an aircraft attempts a landing but is unable to complete it due to poor weather (cross-winds) and visibility conditions. In this situation, the aircraft circles the airport until it has clearance to land (or is diverted to another airport). During diversions, additional aircraft noise is produced due to the thrust required to manoeuvre the aircraft and prolonged time spent in the airspace.

The EIS reported that departing aircraft result in less noise impacts than arriving aircraft. Departing aircraft descend more quickly and do not use the entire length of the runway. As a result, departing aircraft cause less noise because they gain altitude more quickly and are more elevated when passing over the end of the runway. To minimise aircraft noise impacts on populated suburbs of Marcoola and Mudjimba, the EIS nominated 77 per cent of aircraft to depart over these suburbs in the future. The

proponent is committed to working with ASA air traffic control in implementing this mode of operation.

Noise abatement procedures

Noise abatement procedures (NAPs) are designed to reduce the impact of aircraft noise on the community. They provide guidance on runway use and flight paths to reduce flights over residential areas. NAPs are prepared by ASA and implemented by ASA aircraft traffic control, however their use is subject to weather conditions and aircraft requirements. ASA reviews NAPs for effectiveness and to identify any possible improvements as part of its noise complaints handling.

The proponent currently implements NAPs for the existing north-south runway. Prior to operation of the proposed east-west runway, the proponent would work with ASA in reviewing the existing NAPs. The revised NAPs would reflect the proposed east-west runway operations and revised operations on the existing north-south runway. The EIS reported that the revised NAPs would provide guidance on the use of flight paths allowing aircraft that are arriving/departing from the south (Sydney or Melbourne destinations) to remain over water and away from populated suburbs of Maroochydore, Buderim, Mooloolaba and Buddina.

Relocation of helicopter operations

Complaints about helicopter operations comprised 52 per cent of all noise complaints received from January 2010 to March 2012. In 2013, the proponent relocated helicopter operations occurring after 4pm within the southern GA area to the western GA area. To further reduce helicopter noise impacts, the EIS reported that the proponent would permanently relocate all helicopter operations from the southern to the western GA area by 2027. The effect of this relocation is that no dwellings will be in ANEC 30 or higher from 2027 which is reflected in the ANEC predictions at 2040.

Fly neighbourly policy

The proponent currently undertakes helicopter, turboprop and small jets operations in a fly neighbourly manner and will continue to do so as part of the project. The proponent's fly neighbourly policy identifies a range of noise reduction principles. The proponent will review the policy to reflect the operation of the proposed east-west runway and revised operations of existing north-south runway. The EIS reported that, due to the east-west orientation of the proposed runway and new flights paths, aircraft would be flying over less populated areas and over the ocean. As a result, the project would give ASA aircraft traffic control more flexibility to accommodate the noise reduction principles stipulated in the fly neighbourly policy.

The proponent currently adheres to the following noise reduction measures that apply to helicopters, small jets and turboprop aircraft operations:

- planning flight paths to minimise flights over built-up areas and avoid low flying over populated areas

- using satellite strips for helicopter or aircraft circuit operations. The satellite strips are defined as other airports or places used to undertake repetitive circuit operations to reduce the noise impacts on the nearby community
- having no training circuits at SCA between 10pm and 7am
- ensuring that pilots are trained in environmental and noise impact matters
- responding to community enquiries about noise in a cooperative manner.

The purpose of these principles is to reduce noise impacts on nearby suburbs by restricting helicopter-training circuits to less sensitive time periods (day and evening hours) and by avoiding flying over populated residential suburbs.

The proponent currently adheres to the following noise reduction measures specific to helicopter operations:

- avoiding tight manoeuvres and turns while operating helicopters over populated areas
- ensuring the number of touch and go and auto rotation training on the existing north-south runway is kept to a minimum, with training to occur east of the existing north-south runway and all operations are to be kept west of the flight strip wherever possible.

The purpose of these measures is to reduce noise impacts on nearby suburbs by reducing the amount of helicopter movements that are known to be particularly noisy.

Existing noise reduction measures specific to turboprop and small jet operations include:

- ensuring that all aircraft are operating in accordance with Instrument Flight Rules (IFR) are fitted with an instrument navigation system and, depart via the appropriate standard instrument departure
- ensuring compliance with NAPs is included in the En-route Supplement Australia (ERSA), which applies irrespective of tower operation. The ERSA is a publication detailing relevant airport information for pilots who are either flying or planning a flight
- subject to safety and aircraft requirements, runway departure is to use full length in order to maximise height over populated areas
- minimising engine failure training over populated areas
- no engine ground running for the purposes of engine testing to occur at night-time (unless approved by airport management for extenuating circumstances)
- ensuring that all non pre-flight engine runs are undertaken in the designated run-up area.

The purpose of these measures is to apply procedures, specifically designed to reduce aircraft noise impacts.

Required navigation procedures

Required navigation procedures (RNP) enables an aircraft to track along an instrument-like approach and achieves significant benefits from reduced track miles

and minimum decision heights in poor weather conditions. RNP also enable aircraft to implement a continuous descent approach (CDA). A CDA is different from a conventional stepped approach in that aircraft approach the runway at a constant rate of descent. The EIS reported that the CDA results in less noise emissions due to reduced thrust and due to aircraft maintaining higher altitudes for a greater proportion of the approach.

The EIS reported that RNP are currently used for the existing north-south runway and that new RNP will be developed for the proposed east-west runway. The new RNP would reduce aircraft noise impacts associated with aircraft using the secondary approach and departure flight path, which is proposed to service the southern coastline (Melbourne and Sydney).

Community Aviation Forum

The proponent currently convenes a quarterly Community Aviation Forum, enabling it to engage with a range of stakeholders, including community members. Issues regarding aircraft noise impacts are discussed at these forums. When required, ASA and the ANO attend the forum. ASA contributes to resolving aircraft noise impacts that are associated with specific flight paths or airport procedures by undertaking noise monitoring and reviewing the relevant procedures. The community aviation forum would continue to be chaired by the proponent as part of the project. The proponent has committed to involve community members representing newly affected suburbs in these forums. Refer to section 5.3 (Social impacts) of this report for further detail.

The ANO has provided advice regarding the proponent's conduct of Community Aviation Forums, advising that the proponent has a history of constructive community engagement and a responsive approach to managing noise complaints.

New generation aircraft

Due to the length and width of the proposed east-west runway, new generation aircraft such as B737-800 and B737-700 would be able to land and depart from the runway. These aircraft include noise reducing technologies including advanced acoustic lining, new engine inlets and nozzles. Consequently, aircraft noise emissions associated with these aircraft would be reduced.

Noise complaints handling

The proponent manages an internal noise complaints system (refer to section 5.3 [Social impacts] of this report for further information regarding complaints handling). Noise complaints are also managed by ASA through the NCIS. This service would continue to be used throughout the operation of the proposed east-west runway. A noise complaint can be submitted by calling a dedicated hotline or writing or emailing ASA, which publishes all noise complaints and associated resolutions on its website each quarter.

5.1.7 Coordinator-General's conclusion

The expanded SCA is identified as key transport infrastructure under SCRC Regional Economic Development Strategy 2013–2033. The planning for the proposed east-west runway is well developed and the predicted noise contours have been published in a range of planning documents particularly the Airport Master Plan 2007. As discussed in section 5.3 (Social impacts) of this report, the proponent has undertaken substantial public consultation to finalise these planning documents prior to the EIS. Notably, 74.6 per cent of all stakeholders consulted during the development of the Airport Master Plan 2007 opposed any further development of the existing north–south runway.

As described in section 5.1.1, the EIS conducted the aircraft noise assessment by comparing predicted aircraft noise from the proposed east-west runway with the existing north-south runway at 2020 and 2040. N70 contours identify the number of noise events that exceed 70 decibels (dB(A)) over a day (7am to 6pm) or evening (6pm to 10pm) period and are used to explain the potential noise impact. ANEC contours indicate aircraft noise exposure around an airport, averaged over a 12 month period. ANEC contours are used to assess the potential impacts of aircraft noise.

The predicted aircraft noise is based on projected growth in annual aircraft movements – an increase of 20 per cent from 2012 to 2020 and an additional 30 per cent from 2020 to 2040.

The EIS assessment concludes that in 2040, the proposed east-west runway could result in a net reduction of 70 per cent or approximately 4,946 dwellings exposed to five or more N70 events when compared with the existing north-south runway. This assessment is based on the summer season and weekday days, which are representative of a worst-case situation for potential aircraft noise impacts.

ANEC contours were the second noise measure used to assess the potential impacts of the proposed east-west runway. ANEC contours are used for development assessment decision making purposes. Following detailed design, ASA would need to decide on whether to endorse the ANEC contours for the proposed east-west runway. The endorsed contours would be included in the Sunshine Coast Planning Scheme 2014 (as an ANEF), allowing for future land use decisions to be made in line with relevant ANEF contours.

The EIS concluded that the proposed east-west runway could result in a reduction in dwellings located within ANEC 20 or more (considered a threshold) when compared with the existing north-south runway. At the commencement of operations in 2020, the project could result in a net reduction of 25 per cent or approximately 392 dwellings located in ANEC 20 or more. In 2040, the proposed east-west runway could result in a net reduction of 27 per cent or approximately 540 dwellings located in ANEC 20 or more. The noise reduction could occur as a result of aircraft flying over the ocean to the east and less populated suburbs to the west of the SCA and proposed relocation of existing helicopter operations from the southern GA area to the western GA area by 2027.

Whilst there are significant reductions predicted in dwellings affected, the EIS identified a potential increase in aircraft noise at some dwellings in Yandina Creek, Mudjimba

and the southern part of Marcoola. Due to east–west flight paths and flight operations, approximately 154 dwellings in 2020 and approximately 716 dwellings in 2040 could be located in a higher ANEC. Although the ANEC noise measure presents averaged noise over a 12 month period, it is important to note that the majority (72 per cent) of scheduled flights would occur during the weekday period, from 7am to 6pm. Furthermore, the EIS noise modelling indicated a worst-case scenario. This means that the project is likely to result in less noise impacts than predicted, particularly when future noise mitigation measures are fully implemented.

Helicopter movements are a key noise source that form part of the existing SCA operations and therefore contribute to the potential forecast increase in noise at southern Marcoola. The proponent has confirmed that the noise modelling undertaken for the existing north-south runway includes the noise associated with the gradual increase in helicopter movements. This increase would occur irrespective of the project. The helicopter operations currently undertaken at the southern GA area are scheduled to move further away from noise sensitive receptors (dwellings in southern Marcoola) by 2027. Over the seven-year period (between planned commencement of the proposed east-west runway in 2020 and scheduled move in helicopter operations by 2027), 46 dwellings could be located in ANEC 30–35 and 13 dwellings in ANEC 35–40.

The most effective noise mitigation measure is the project design as the east–west orientation of the proposed runway requires planes to fly over the ocean to the east and less populated suburbs to the west of the SCA. In addition, the proponent would conduct operations in line with NASF. This includes noise reduction measures detailed in the fly neighbourly policy, noise abatement procedures, required navigation performance procedures and runway modes of operation. Key future actions required include:

- revising the fly neighbourly policy to reflect the proposed east-west runway and maintaining existing measures to manage helicopters, jets and turboprop movements
- revising and enhancing the noise abatement procedures to reflect the modes of operation for the proposed east-west runway. In particular and subject to the safe operation of aircraft, require arriving aircraft to approach (generally at lower altitudes than at take-off) over rural residential areas from the north-west and aircraft to depart over the coast due to departing aircraft climbing at a steeper rate than when descending. Accordingly, this mode would result in less noise impacts on the suburbs of Mudjimba and Marcoola
- revising the required navigation performance procedures to reflect the proposed east-west runway. In particular, by implementing the continuous descent approach allowing aircraft to approach the runway at a constant rate of descent resulting in less noise emissions due to reduced thrust and maintaining higher altitudes for a greater proportion of the approach
- including community groups from the newly affected suburb (Yandina Creek) in the community aviation forums

- relocating helicopter operations from the southern to the western GA area by 2027 at the latest. The effect of the relocation is that no dwellings will be in ANEC 30 or higher from 2027.

Furthermore, advice received from the ANO confirms that the proponent has a history of constructive community engagement and a proactive and responsive approach to managing noise complaints.

DIRD has advised that my conclusions and the proponent's commitments listed above are consistent with the principles of the NASF.

While I accept the proponent's conclusions and proposed measures to manage aircraft noise, I acknowledge that some residences living near the SCA in some locations may experience increased noise impacts. Therefore, I recommend that the proponent act on the following additional measures to further reduce potential aircraft noise impacts:

- implement additional measures to manage aircraft noise from the noise source and/or at the sensitive receptor (dwellings and community facilities) beyond the measures specified in the EIS. The additional measures should be reasonable and practical and focus on noise sensitive receptors (dwellings and community facilities) assessed to experience an increase in noise
- engage directly with all affected sensitive receptors (dwellings and community facilities) that may potentially experience increases in noise due to the project to determine suitable noise management measures
- report progress on further managing aircraft noise to the Community Aviation Forum and publish a report on the proponent's website detailing progress to further manage aircraft noise
- to reduce helicopter noise impacts, work with helicopter operators to relocate helicopter operations from the southern to the western GA area earlier than the 2027 date as proposed in the EIS.

I also recommend that the proponent implement the following actions to further enhance community engagement, provide detailed information for the public and inform land-use planning:

- update the ANEF and Australian Noise Exposure Index (ANEI) contours every five to ten years and publish them on the proponent's website to inform the community of the predicted and actual aircraft noise contours
- cooperate with ASA to implement the WebTrak (or similar) online portal and the Noise and Flight Path Monitoring System to provide real-time information to inform the community of property specific flight paths and associated noise levels
- provide ASA with noise complaints made directly to the proponent so that all noise complaints about the SCA are captured in the ASA quarterly online noise reports
- provide the necessary data to enable the Sunshine Coast Planning Scheme 2014 to be updated to reflect the changes to Sunshine Coast Airport operations resulting from the project's development, including the Airservices endorsed ANEF contours for the expanded Sunshine Coast Airport and reflect the principles relating to noise in the NASF

- seek to establish a memorandum of understanding with the Real Estate Institute of Queensland to promote real estate agents' use of the WebTrak online portal and the Noise and Flight Path Monitoring System. This would provide flight path information and aircraft noise levels to prospective property buyers and ensure they are fully informed of potential aircraft noise impacts.

I conclude that, on balance, the proponent's proposed east-west runway would substantially reduce potential noise impacts overall on noise sensitive receptors.

I note that noise management measures outlined in the assessment are consistent with the principles of the NASF as advised by the DIRD. Further, the ANO supports the proponent's constructive approach to community engagement. Accordingly, I require the proponent's proposed measures to be fully implemented.

I acknowledge the potential increase in aircraft noise at dwellings in Yandina Creek, Mudjimba and the southern part of Marcoola. Consequently, I require the proponent to enhance community engagement, provide detailed information for the public, and inform land-use planning. I also require the proponent to engage with affected community members to determine further measures to reduce potential aircraft noise, particularly relocating helicopter operations earlier.

For the reasons outlined above, I consider that potential aircraft noise impacts on the community can be effectively managed.

5.2 Land use planning

5.2.1 Existing land use

Planning of the airport site commenced in 1958 when Queensland Government set aside 300 acres of Crown land for the airport's development. The use of the site commenced in 1961 and has continued to operate for the last 55 years.

The site has an area of approximately 430ha. It accommodates two intersecting runways (existing north-south runway and cross runway), an ATC tower to the west of the airport site, a series of tarmac taxiways, an airport terminal and aeronautical service buildings.

Undeveloped remnant bush land and two properties currently used for storage of equipment and machinery also form part of the site. Approximately 65ha of the site was previously used for sugar cane farming. In 2003 farming on this land ceased with the closure of the Moreton Sugar Mill at Nambour. No strategic cropping land (SCL) or good quality agricultural land is present on the site.

The site consists of seven parcels of land, with four parcels owned by SCRC, one parcel leased by SCRC and the remaining two are pending transfers of ownership from Australian and Queensland governments to SCRC.

5.2.2 Planning framework

South East Queensland Regional Plan 2009-2031

The purpose of the South East Queensland Regional Plan (SEQRP) is to manage regional growth in the most sustainable way to protect and enhance quality of life in the SEQ region. The SEQRP sits within the Queensland land use planning framework and informs the State Planning Policy 2014 (SPP). The SEQRP identifies SCA as a specialist aviation area and one of SEQ's major existing and expanding specialist locations.

State Planning Policy 2014

The State Planning Policy (SPP) sets out policies about matters of State interest in the planning and development assessment system and forms part of the government's broader commitment to planning reform. SCA is identified as a strategic airport which is considered by the State to be essential to the national and state air transport network or the national defence system. The SPP aims to ensure that strategic airports and aviation facilities are protected from any development that may impact on safe and efficient operation of the airport. Consequently, it requires local governments to integrate six policies into their development assessment requirements. These regulatory requirements include airport overlays, such as the Australian Noise Exposure Forecast contours (ANEF), Obstacle Limitation Surface (OLS), Public Safety Areas (PSA) and others. These overlays are included in the Sunshine Coast Planning Scheme 2014 (the planning scheme) and are discussed in section 5.2.4.

State Development Assessment Provisions (SDAP)

SDAPs set out the matters of interest to the State for development assessment, where development applications are assessed by the State. As detailed in section 4 (Project approvals) of this report, the project would require development approvals for tidal works and material change of use development applications for ERAs. These development applications would be assessed by the State Assessment Referral Agency (SARA) through the Integrated Development Assessment System (IDAS). The following SDAP codes would be applicable to the assessment:

- tidal works, or development in the coastal management district state code
- removal, destruction or damage of marine plants state code.

Refer to section 4 (Project approvals) of this report for further detail.

Sunshine Coast Planning Scheme 2014

Development of the airport site is regulated by the SCRC through the planning scheme and associated Maroochy North Shore Local Area Plan. The planning scheme reflects the State government's planning objectives as identified in the overarching *Sustainable Planning Act 2009* (SP Act), the SPP and the SEQRP. Five airport overlays regulate the operation of the airport, consisting of the ANEF contours, OLS, PSA, runway separation distances and the aviation facility sensitive areas. Changes to PSAs and

ANEF contours would occur as a result of the project and these are described in section 5.2.4.

The airport site is zoned for Community Facilities – Air Services under the planning scheme. The intent of the Community Facilities – Air Services zone is to facilitate implementation of the Sunshine Coast Council Airport Master Plan 2007. The Sunshine Coast Council Airport Master Plan 2007 identifies development of the proposed east-west runway as the key strategic direction for SCA. During the construction stage of the project, a part of Marcoola beach would be used as a pipeline assembly and laydown area and an access track. This part of the beach is zoned as Environmental Management and Conservation Zone.

Public Safety Areas

A PSA is an area at the end of a runway where there is a potential for an aircraft accident to occur. PSAs indicate an area where the risk per year, resulting from an aircraft crash, to an individual is of the order of 1 in 10,000 per year⁸. The SPP requires local governments to plan development of future land uses and avoid increasing public safety risks in PSAs. Development of accommodation activities, manufacture or bulk storage of flammable, explosive or noxious materials and uses that attract large numbers of people (stadiums, shopping centres) and institutional uses (hospitals or schools) are not allowed in PSAs.

The planning scheme identifies four PSAs at the SCA, two at the ends of the existing north-south runway and two at the ends of the existing crossrunway and the proposed east-west runway. One-hundred and sixteen dwellings are included in PSAs located at the ends of the existing north-south runway and no dwellings are located within PSAs at the ends of the existing cross runway and the proposed east-west runway. Other land uses in the PSAs include the Keith Royal Park. Keith Royal Park is located within the PSA at the southern end of the existing secondary runway and proposed east-west runway. It is used by the local community and includes a concrete cricket pitch and other facilities.

Australian Noise Exposure Forecast contours

The ANEF contours for the existing north-south runway, existing cross runway and the proposed east-west runway are included in the planning scheme. The ANEF contours were based on information about runway design, fleet mix, noise levels and aircraft movements forecasts that were available in 2009. These ANEF contours were produced for the year 2025. ASA endorsed these contours in 2010 and they were exhibited in the draft Sunshine Coast Planning Scheme 2012 and then included in the gazetted Sunshine Coast Planning Scheme 2014. As a result these ANEF contours are different to ones presented in the EIS. The ANEF contours for the proposed east-west runway do not include the 310m south-east move in the runway footprint (along the east-west alignment) that was determined during the EIS process as well as further design and planning for the project (refer to section 5.2.4 for further detail).

⁸ Department of State Development, Infrastructure and Planning. 2014. State Planning Policy. Accessed on 18 April 2016 from <http://www.dilgp.qld.gov.au/resources/policy/state-planning/state-planning-policy-jul-2014.pdf>

Flood hazard overlay code

Suburbs of Mudjimba, Marcoola and Pacific Paradise are identified as drainage deficient areas under the planning scheme. While the project is consistent with the planning scheme and not deemed assessable development, the proponent would construct and operate the proposed east-west runway in accordance with the flood hazard overlay code.

The purpose of the code is to be achieved through the following outcomes⁹:

- development does not occur on land subject to flooding except in specified circumstances and only where the impacts of flooding can be effectively ameliorated such that there is no foreseeable risk to life or property
- development to protect floodplains and the flood conveyance capacity of waterways
- development in areas at risk from flood and storm tide inundation is compatible with the nature of the defined flood or storm tide event
- the safety of people is protected and the risk of harm to property and the natural environment from flood and storm tide inundation is minimised
- development does not result in a material increase in the extent or severity of flood or storm tide inundation.

Key Resource Areas

Two key resource areas (KRA) namely KRA150 Maroochy North Bli Bli and KRA156 Maroochy North Coolum are located in the vicinity of the SCA. KRA150 is located approximately 2km to the south west and KRA156 is located approximately 6km to the north of the SCA. These KRAs are designated for sand extraction under the SPP 2014.

5.2.3 Submissions received

The key issues regarding land use planning raised in submissions on the EIS and AEIS included the following:

- change in ANEF contours throughout planning documents
- move in the proposed east-west runway footprint and consequent noise impacts on surrounding residents
- potential impacts on residential dwellings and associated community safety in new PSAs
- potential impacts on road safety from aircraft landing and taking-off over major roads.

I have considered each submission and the responses provided by the proponent in my evaluation of the potential impacts of the project and my assessment is provided in relevant sections below.

⁹ <https://www.sunshinecoast.qld.gov.au/Development/Planning-Documents/Sunshine-Coast-Planning-Scheme-2014/View-the-Sunshine-Coast-Planning-Scheme-2014-Text/Part-8-Overlays>

5.2.4 Impacts and mitigation measures

Land use

The project would not have any direct impacts on the existing land use as the project site is already used for aviation purposes.

During the construction stage of the project, a section of the Marcoola Beach would be utilised as a pipeline assembly area. The beach would be closed over a period of eight weeks, split into two four-week blocks. The first four-week block would allow for assembly and installation of the pipeline, while the second block of time would allow for disassembly of the pipeline following delivery of the sand to the site. As a result of these works, a temporary land use impact would occur. Based on the conclusion in section 5.5 (Natural hazards) of this report, once the dredge spoil is delivered to site, the pipeline would be removed and the disturbed section of dune system would be rehabilitated to its former state. I have stated conditions in Appendix 1 to ensure that this area is rehabilitated to its former state.

The EIS reports that these works could also pose a risk to public safety. To manage this impact, public access to the beach would only be provided after the pipeline is installed. Once the pipeline is installed, a sand ramp over the pipeline would be created from the adjacent beach area and/or temporary stair/ramp crossing.

Furthermore, the AEIS reported that the works would be undertaken during colder months when the public is less likely to use the beach. An access detour would also be provided during this period and communication protocols would be established between the construction supervisor and the Marcoola and Mudjimba Surf Lifesaving Clubs to ensure appropriate access provisions in the event of an emergency.

The proponent has committed to maintaining safe and convenient pedestrian and emergency vehicle access during the pipeline construction and sand delivery. With these measures in place, the public safety risks associated with the use of the beach during the relevant construction periods would be appropriately managed.

State Development Assessment Provisions

Based on my assessment of the project in section 5.5 (Natural hazards) of this report and section 5.8 (Matters of state environmental significance) and stated conditions included in Appendix 1 (Stated conditions), the project is consistent with the performance objectives of relevant SDAP codes (refer to section 5.2.2).

Sunshine Coast Planning Scheme 2014

As discussed in section 5.2.4, the SCA is located on land that is zoned as Community Facilities – Air Services. As the intent of this zone is to facilitate implementation of the Sunshine Coast Council Airport Master Plan 2007, the project is consistent with this zone.

As discussed in section 5.2.4, the proposed pipeline assembly area and the access track are proposed to be located on land that is zoned as Environmental Management and Conservation Zone under the planning scheme. The intent of this zone is to

provide for protection and rehabilitation of land to maintain biodiversity, ecological processes, coastal processes, water quality, landscape character, scenic amenity, cultural heritage significance and community wellbeing.

As discussed in section 5.2.4, during the construction stage of the project, a 17m by 500m section of Marcoola Beach would be used for assembly and disassembly of the delivery pipeline. A 20m wide access track would also be established through the dune system to David Low Way. The delivery pipeline would be in place for 33 weeks and would take 3-4 weeks for assembly and dismantling. During this 3-4 week period, the Marcoola Beach would be closed.

These works have potential to affect the existing coastal processes, in particular coastal erosion, longshore sediment transport and disturbance of vegetation and sand dunes. To ensure these impacts are managed, I have stated conditions of approval for tidal works in Appendix 1 (Stated conditions) regarding erosion and sediment control measures, rehabilitation of the dune system and management of material deposited during the construction phase of the project. Refer to section 5.5 (Natural hazards) for further detail.

With these measures in place, the project would be consistent with the intent of the Environmental Management and Conservation Zone.

Aviation facility sensitive areas, runway separation distances and OLS overlays

The project does not propose introduction of new land uses, as a result it would not be inconsistent with the overlays of aviation facility sensitive areas and runway separation distances.

Prior to operation of the project, the OLS overlay would be updated to reflect the 310m south-east move in the proposed east-west runway footprint, while maintaining the east-west alignment. The EIS reports that the impact of this change on land use and tenure is negligible.

Public Safety Areas

Prior to operation of the project, the proposed east-west runway would become the primary runway at SCA. The existing north-south runway would become a secondary runway for use by 10 per cent of general aviation aircraft (small jets and turboprop aircraft).

Accordingly the planning scheme would be updated to include revised PSA mapping, showing:

- removal of two existing PSAs at the ends of the existing north-south runway
- inclusion of revised PSAs at the ends of the proposed east-west runway. These PSAs would consider the 310m south-east move in the runway footprint (along the east-west alignment).

The revised PSAs would include:

- 68 dwellings in the PSA located at the south-eastern end of the proposed east-west runway

- no dwellings in the PSA located at the north-western end of the proposed east-west runway.

A number of submissions have raised the issue of impacts on dwellings in PSAs and on road safety from aircraft landing and taking off over major roads particularly in Marcoola and Mudjimba. The project would result in a reduction of 48 dwellings located in PSAs. Furthermore, the proponent has undertaken a risk assessment for the proposed east-west runway using the 2020 and 2040 forecast aircraft movements. This risk assessment was based on the United Kingdom (UK), Department of Transport approved Third Party Risk methodology and UK Public Safety Zone policy, which is an internationally recognised standard. This assessment provided risk contours which are indicative of locations where third parties would be at risk of public safety. This risk is estimated to be 1 in 10,000 per annum. The AEIS reported that the proposed east-west runway would not result in any dwellings or major roads being located within the critical 1 in 10,000 risk contour.

Furthermore, the EIS Risk Management Plan reports that the likelihood of an aircraft crash occurring on the proposed east-west runway is considered to be highly unlikely. The chance of a fatality occurring outside the PSA is also considered very low, with a less than 1:10,000 chance.

The EIS reports that the Keith Royal Park would remain in the PSA located at the southern end of the proposed east-west runway. The SCRC will continue to manage the risks to public safety in this park in line with existing policies.

Australian Noise Exposure Forecast contours

Once the final detailed design of the project is completed, the ANEC contours would be reviewed by DTMR and ASA.

DMTR would review the noise modelling to ensure that the contours are consistent with the State interests for the airport under the SPP. ASA would review the contours for the purposes of technical accuracy and to ensure that modelling inputs include:

- appropriate selection of aircraft types
- operationally feasible runway use, flight path data and aircraft movement forecasts.

ASA would also ensure that the proponent has addressed all issues raised by the State in their review of the ANEC contours.

ASA require the following information before giving endorsement:

- the intensity, duration and tonal content and spectrum of audible frequencies of the noise of aircraft take offs, approaches to landing, and reverse thrust after landing
- the forecast frequency of aircraft types and movements on the various flight paths, including flight paths used for circuit training
- the average daily distribution of aircraft arrivals and departures in both daytime and night-time.

The Sunshine Coast Planning Scheme 2014 would then be updated to reflect the endorsed ANEC contours as ANEF contours. Given that the detailed design stage of the project would confirm forecast aircraft movements, fleet, runway mode of operation

and other matters, the ANEF contours are likely to be more accurate than presented in the EIS.

Changes in ANEC/ANEF contours

A number of submissions raised issues regarding changes to the ANEC contours and runway alignment in the EIS and in key planning documents developed by the proponent. These planning documents included the Maroochy Plan 2000, Master Plan 2007, Draft Sunshine Coast Planning Scheme 2012 and the Sunshine Coast Planning Scheme 2014.

Inputs to ANEC/ANEF contours are made for a certain forecast period and reflect the inputs relevant at the time. These assumptions include but are not limited to the forecast period, runway usage, aircraft fleet mix, aircraft movement schedules and volumes, wind direction and speed and aircraft arrival and departure paths. ANEC/ANEF contours would change depending on variations to assumptions into the noise modelling undertaken for each forecast period.

The proponent has confirmed that there has been no significant change in the proposed east-west runway alignment since the concept was developed in 1976. Consequently, the key planning documents reflect the proposed east-west runway alignment.

Following geotechnical investigations undertaken for the EIS, the proponent determined a need to move the runway footprint 310m south-east, while maintaining the east-west alignment presented in the key planning documents. The EIS reported that the move in the runway footprint was required to avoid poor geotechnical conditions in the north-western section of the site (for further detail refer to section 5.7.4 [Geology and soils]).

The ANEC contours presented in the EIS are the most recent contours for the proposed east-west runway and reflect the 310m south-east move in the runway footprint (along the east-west alignment). The Sunshine Coast Planning Scheme 2014 was gazetted prior to the commencement of the EIS process and would be updated to include endorsed ANEF contours reflecting the 310m south-east move in the runway. Aircraft noise expert advice was obtained by the proponent during the EIS process to confirm if the 310m south-east move in the runway footprint (along the east-west alignment) would result in increases in noise exposure predicted to be experienced in Mudjimba and Marcoola. The AEIS reports that the move in the runway footprint would not result in particular increase in noise exposure. In addition, the aircraft noise assessment contained in section 5.1 of this report, concludes that while there are a number of dwellings that will experience an increase in noise impacts, there are significantly more dwellings that will experience a reduction in noise.

The proponent undertook a considerable amount of public consultation during the preparation of the EIS and other relevant planning documents (refer to section 5.3 [Social impacts] for further details). In addition, since 1999, the proponent has applied property notes to all lots west of David Low Way adjacent to the airport, advising that the properties are subject to aircraft noise. These documents have informed the public

of potential impacts in noise and were based on projected growth in annual aircraft movements for the year 2025.

To further manage potential noise impacts from relevant noise sources or at affected sensitive receptors (dwellings and community facilities) I recommended noise management measures in Appendix 3. To ensure future development around the airport considers the proposed east-west runway, I have also recommended that the proponent provides endorsed ANEF contours to the SCRC for inclusion in the Sunshine Coast Planning Scheme 2014.

Flood hazard overlay code

Section 5.5 (Natural hazards) of this report concluded that in a 100-year ARI event, construction of the proposed east-west runway would result in nine houses likely to experience over-floor flood impacts and a further five houses with potential to experience over-floor flooding. These houses are located in Marcoola and are predicted to experience 10 – 18.5 mm of over-floor flooding.

To manage these impacts, the proponent has committed to undertake further flood modelling, surveys of identified properties and to negotiate appropriate property level mitigation measures. With these measures in place, the project would be consistent with the objectives of the flood hazard overlay code.

Key resource areas

Air traffic associated with the project may limit future development of KRA 150 and KRA 165 for sand extraction purposes. These activities may create water voids that would attract birds and increase the risk of bird strike for aircraft departing and arriving to/from the northern and western approaches.

While no development of these KRAs is currently proposed, any future development of the KRAs would be required to consider potential impacts on the SCA operations. As a result of these regulations, the operation of the project is unlikely to be under a risk.

5.2.5 Coordinator-General's conclusions

I am satisfied that the proponent has adequately addressed the potential development impacts of the project in accordance with the State Planning Policy 2014, State Development Assessment Provisions 2016, Sunshine Coast Planning Scheme 2014 and the associated airport environs overlay code.

I note that the proponent has moved the proposed east-west runway to the south-east, while maintaining the east-west alignment presented in the key planning documents. The proponent determined the need for this move during the EIS process, after the Sunshine Coast Planning Scheme 2014 was gazetted. As a result, I require the proponent to provide relevant information to the SCRC to enable updating of the airport environs overlay code, PSAs and OLS prior to operation of the project. I also require the proponent to provide ASA endorsed ANEF contours to the SCRC for inclusion in the Sunshine Coast Planning Scheme 2014.

To ensure that the state interest for protection of the SCA is safeguarded in accordance with the State Planning Policy 2014, I require the proponent to comply with DTMR recommendations detailed in Appendix 3.

5.3 Social impacts

The proponent undertook a social impact assessment (SIA) consistent with the principles outlined in the Coordinator-General's *Social impact assessment guideline*¹⁰ and the project terms of reference.

The components of the SIA assessed in this section are:

- Social baseline
- community and stakeholder engagement
- workforce management
- housing and accommodation
- health and community wellbeing.

Section 5.1 (Operational aircraft noise) of this report assesses potential aircraft noise impacts on the community.

5.3.1 Study area

When considering social impacts the EIS used the Australian Bureau of Statistics' (ABS) Marcoola-Mudjimba Statistical Area Two (SA2) Census block (Marcoola-Mudjimba) as the boundary for data collection. This boundary is approximately 33km² and includes Coolum Beach to the north and Twin Waters to the south of the existing north-south runway and Mudjimba to the east and Yandina Creek to the west of the proposed east-west runway.

The EIS described social impacts located within the following distance ranges from the airport: 5km; 5–10km; 10–20km; and 20–40km.

5.3.2 Social baseline

Population

The EIS stated that between 2001 and 2012 the population of the study area increased by more than 10 per cent, with an annual average growth rate of 2.6 per cent. This is higher than the annual average growth rate for Queensland during the same period, which was estimated at 1.9 per cent.

The ABS predicts the average annual growth rate for the study area up to 2036 is 0.6 per cent, which is lower than the SCRC Local Government Area (LGA) growth rate of 2.3 per cent and the Queensland growth rate of 1.9 per cent.

¹⁰ <http://www.statedevelopment.qld.gov.au/resources/guideline/social-impact-assessment-guideline.pdf>

The highest population cohort in the study area is the 45–64 year old age group, which is slightly younger than the rest of the Sunshine Coast. The second highest percentage of the population is the 25–44 year old age group. These figures correlate with the Commonwealth Department of Social Services data for the September 2015 quarter, which reports that 70.5 per cent of families in Marcoola-Mudjimba area receive Family Tax Benefit A¹¹.

Table 5.8 presents the estimated resident population for Marcoola-Mudjimba, the SCRC LGA and Queensland.

Table 5.8 Estimated resident population by age, Marcoola-Mudjimba, SCRC LGA and Queensland, 30 June 2014¹²

Area	Age group									
	0–14		15–24		25–44		45–64		65+	
	No.	%	No.	%	No.	%	No.	%	No.	%
Marcoola-Mudjimba	1,871	17.2	1,316	12.1	2,678	24.7	3,166	29.2	1,830	16.8
SCRC LGA	52,340	18.5	33,261	11.8	67,801	24.0	75,782	26.8	53,638	19.0
Queensland	934,862	19.8	645,774	13.7	1,323,000	28.0	1,159,012	24.5	659,799	14.0

Home ownership

The study area has a lower rate of fully owned private dwellings than the rest of the Sunshine Coast and Queensland (Table 5.9). The EIS stated that close to 40 per cent of Marcoola-Mudjimba dwellings are being rented. This is higher than the proportion of rental dwellings in the balance of the SCRC LGA, which is close to 30 per cent.

Table 5.9 Occupied private dwellings by tenure type, Marcoola- Mudjimba SA2 and SCRC LGA, 2011

SA2/LGA	Fully owned		Being purchased		Rented		Other		Total
	No.	%	No.	%	No.	%	No.	%	No.
Marcoola-Mudjimba	1,068	27.0	1,227	31.0	1,493	37.8	50	1.3	3,953
Sunshine Coast	32,641	33.4	32,350	33.1	28,945	29.6	1,623	1.7	97,798

Rental accommodation

The EIS reported that the study area has a higher rate of holiday rentals than most communities, which in turn often attracts a weekly rental rate higher than long-term rental properties. Rental prices in the study area are generally \$15 per week higher

¹¹ Department of Social Services payments, Marcoola - Mudjimba SA2 - Sunshine Coast Regional Council LGA- Queensland, September quarter 2015, accessed 23 March 2016.

¹² ABS 3235.0, Population by Age and Sex, Regions of Australia, 2014

than the average Sunshine Coast rental and \$35 a week higher than the Queensland average.

There are 543 apartment-style accommodation facilities located at Marcoola, including Ramada Marcoola Beach, Sanmarino by the Sea, Atlantis Marcoola, Marcoola Motel, Pacific Palms Motor Inn, Marcoola Beach Resort and Sand Dunes Resort. These apartments are located adjacent to the existing north-south runway, with the closest facilities located within 350m of the runway.

Given their position adjacent to the proposed east-west runway, the accommodation facilities experience noise from both arrival and departure of aircraft. On a summer weekday these facilities experience between 20–49 N70 noise events.

Income

The Sunshine Coast has lower median personal incomes than Queensland and the Marcoola-Mudjimba area, based on ABS census data (as evidenced in Table 5.10).¹³

Table 5.10 Median total personal income

Location	Median total personal income
Marcoola-Mudjimba SA2	\$558 per week (\$29,016 per year)
Sunshine Coast Regional Council LGA	\$522 per week (\$27,144 per year)
Queensland	\$578 per week (\$30,056 per year)

A greater proportion of households (27.2 per cent) had a weekly income of less than \$600, when compared to 22.8 per cent for Queensland. A lower proportion of households (6.2 per cent) had a weekly income of more than \$3,000 (compared to 10.2 per cent across the state).

Employment

The Sunshine Coast region had an estimated unemployment rate of 6.1 per cent in the December 2015 quarter. This was similar to the unemployment rate of 6.3 per cent for Queensland in the same period.¹⁴ According to the Department of Social Services, in the September quarter of 2015, 6.1 per cent (or 380 residents) received the Newstart allowance.¹⁵

Persons with a disability

Three hundred and sixty-three persons (or 3.6 per cent) in the study area have a profound or severe disability, compared with 12,823 (or 5 per cent) of the SCRC LGA. ABS data estimates that 17.7 per cent of the Queensland population has a disability.

¹³ ABS, Census of Population and Housing, 2011, Basic Community Profile - B02 and B17, accessed 23 March 2016.

¹⁴ Australian Government Department of Employment, *Small Area Labour Markets Australia*, various editions: December quarter 2015

¹⁵ Department of Social Services payments, Marcoola-Mudjimba SA2—Sunshine Coast Regional Council LGA-Queensland, September quarter 2015, accessed 23 March 2016.

The Department of Social Services report that 3 per cent of the Marcoola-Mudjimba area receive the Carer allowance, and 3.9 per cent receive the Disability support pension. It is assumed that people with disabilities and their carers will be domiciled in their homes during the day.

Sensitive receptors

Sensitive receivers in the area around the airport include dwellings, community facilities and commercial accommodation. Section 5.1 of this report (Operational aircraft noise) lists the sensitive receptors affected by the airport's current and proposed operations.

5.3.3 Submissions received

Key issues raised in submissions on the EIS and AEIS regarding potential social impacts included:

- health impacts
- poor community consultation about the proposed east-west runway
- lack of information about the project for people purchasing property in the vicinity of the airport and impacts on property values
- potential overdevelopment of the Sunshine Coast
- potential impacts on Pacific Paradise State School.

I have considered each submission and the responses provided by the proponent in my evaluation of the potential impacts of the project on the community and my assessment is provided in relevant sections below.

5.3.4 Key social impacts and opportunities

Benefits

The proponent predicts that the project would generate the following benefits:

- reduction in the number of dwellings impacted by noise from SCA
- reduced need for private vehicles to travel to Brisbane Airport on the Bruce Highway
- employment diversification and increased employment opportunities in the aviation and aerospace industry
- broadening the Sunshine Coast economic base by providing export and supply chain opportunities
- assisting in the retention of the 19–34 age population demographic
- increased tourism numbers associated with economic benefits
- ability for locals to fly to and from more destinations in Australia and potentially overseas, for both business and recreational purposes.

Predicted economic benefits and impacts of the project are discussed in section 5.4 (Economic impacts) of this report.

Predicted noise impacts

Potential aircraft noise impacts are presented in the EIS documents and are assessed in Section 5.1 (Operational aircraft noise) of this report. Section 5.1 identifies that the proposed east-west runway operations in 2020 would result in a net reduction of 62 per cent or approximately 3,530 dwellings exposed to five or more N70 events during a summer weekday day (7am to 6pm). By 2040, the operation of the proposed east-west runway would result in a net reduction of 70 per cent or around 4,946 dwellings exposed to five or more N70 events during a summer weekday day.

Residential dwellings—potential impacts by 2040

By 2040, out of approximately 2,099 dwellings in the N70 contour for the proposed runway 2040 scenario, the project could result in approximately 476 dwellings experiencing an increase in noise. Out of approximately 476 dwellings predicted to experience an increase in noise, approximately 449 dwellings would experience more N70 events and 27 dwellings located in Yandina Creek would be newly exposed to aircraft noise.

Community facilities—potential impacts by 2040

By 2040, approximately six community facilities could experience a potential increase in aircraft noise as a result of the proposed east-west runway. These include the same facilities as affected in 2020, except for Mudjimba Community Hall and Mudjimba Skate Park which would not increase beyond the impact predicted at 2020.

Construction impacts—traffic

The EIS stated that people living along Finland Road and other roads in close proximity to the airport would experience an increase in both heavy vehicle and light vehicle movements once construction starts and the workforce and plant, equipment and materials are transported to the construction site.

SCA considers that the traffic generated by construction activities would not be significant and can be adequately accommodated at acceptable levels of service within the existing road network. For further information on the traffic impacts of the project, refer to section 5.12 of this report (Traffic and transport).

5.3.5 Community and stakeholder engagement

A number of submitters expressed concern about there being inadequate consultation on the airport and its impact on land planning and individuals' decisions to purchase property close to the proposed east-west runway.

The proponent advises that the first documented reference to a 2,500-metre east-west runway alignment occurred in 1976. The long-term growth and expansion of the airport has been included in Council's planning instruments since the Maroochy Shire strategic plan of 1985 and has featured in every local planning scheme since that time. Further detail about planning instruments is discussed in section 5.2 of this report (Land use planning).

Airport master plan

SCA indicate the Preliminary Draft Airport Master Plan was released for consultation between 15 June 2006 and 14 August 2006. 723 submissions were received. SCA advises the consultation results indicated a strong preference for a proposed east–west runway. Of those consulted, 74.6 per cent opposed development of the existing north–south runway, citing issues of public safety, noise and air traffic movements.

Following the public consultation and a technical review, the Sunshine Coast Airport Master Plan was adopted by SCRC in September 2007.

The Draft Sunshine Coast Planning Scheme was available for public comment from 19 October 2012 to 14 December 2012. ANEF contours for the proposed east-west runway were included in the draft planning scheme and subsequently gazetted in the Sunshine Coast Planning Scheme in 2014.

EIS and AEIS public notification

During the EIS process, the proponent implemented an extensive engagement program for impacted communities and stakeholders. The program included, but was not limited to:

- 1800 information line
- Sunshine Coast Council Facebook page
- displays at the airport, shopping centres, libraries and council offices during the public notification period
- aircraft noise information booklet
- online aircraft noise tool
- community newsletters
- advertising/media releases.

The project web page initiating the community and stakeholder engagement program was uploaded to the SCA website in February 2012.

In June 2012, I determined that the community and stakeholder engagement plan complied with the requirements for community engagement outlined in the TOR.

Information incorporated in property notes

SCRC reports that since 1999 it has applied property notes to all lots west of David Low Way adjacent to the airport, advising that the properties are subject to aircraft noise. A copy of these notes was forwarded to me in correspondence dated 18 February 2016.

A discussion on the impacts of the project on property values is presented in section 5.4 of this report (Economic impacts).

5.3.6 Health and community wellbeing

A number of submitters raised concerns about potential health impacts such as impacts on children's hearing and interrupted sleep, from exposure to aircraft noise.

The potential change in noise is discussed in detail in section 5.1 (Operational aircraft noise).

The proponent advises that the planning scheme and SPP 2014 have been used to manage development (i.e. residential dwellings) in areas that will potentially be exposed to unacceptable levels of aircraft noise. The ANEF system is the official index used to inform land-use planning in areas subject to aircraft noise. More information about the use of the ANEF system can be found in the section 5.1 (Operational aircraft noise) and section 5.2 (Land use planning) of this report.

The EIS reviewed studies on the impacts of aircraft noise on human health. The studies in the EIS are recognised in professional journals and by statutory organisations such the National Acoustic Laboratories (Commonwealth Department of Health) and Brisbane Airports Corporation (BAC).

The EIS notes that the populations at greatest risk from exposure to excessive noise include infants and children, the aged, people with mental or physical medical conditions and shift workers. Several of these groups were cited by submitters as being likely to be impacted by the proposed east-west runway. Submitters also asked if the potential noise exposure forecasts were in keeping with advice or standards from the National Acoustic Laboratories (NAL).

This report has considered NAL reports on the effects of noise on people. The NAL reports that permanent hearing loss from noise is related to the loudness of the noise and the duration of the exposure. NAL also report that exposure to sounds above 85 dB(A) for more than 8 hours a day significantly increases the risk of subsequent hearing loss.

This report concludes that the EIS correctly asserts that noise generated by aircraft at the SCA will not be at a level, frequency or exposure length to cause physical damage to hearing.

In relation to potential impacts on sleep the proponent has advised that there are a limited number of night flights planned and they have committed to revise the airport's fly neighbourly policy to reflect the proposed east-west runway. They have also committed to comply with the NASF including noise management measures detailed in the fly neighbourly policy, noise abatement procedures, required navigation performance procedures, and runway modes of operation.

Furthermore, recommendations are listed in Appendix 3 of this report that will assist in the development of measures to address potential aircraft noise impacts at sensitive receptors such as dwellings.

5.3.7 Workforce management

The EIS estimates for the project's construction workforce numbers appear in Table 5.11. The EIS stated that the workforce would be local and would consist of permanent, contract, full-time and part-time employees. No on-site workers accommodation is proposed.

Typical construction hours would be between 7:00am to 6:00pm Monday to Friday. The EIS stated that there could be some construction periods requiring 24-hour works; however, these would be kept to a minimum to avoid impacting current SCA operations.

Table 5.11 Estimates of construction workforce numbers

Works package	Supervision and professionals	Labour (skilled and unskilled)
Package 1: civil works	10	30
Package 2: dredging & reclamation	10	10
Package 3: runway, taxiway and apron construction	15	45
Package 4: building works	10	40
Total	45	125

5.3.8 Local procurement policy

The EIS stated that if SCRC constructs the project, there will be a strong focus on local employment and procurement. I note that SCRC's 2015/16 strategic procurement policy¹⁶ encourages the development of competitive local business and industry when conducting procurement and contracting activities. In addition to price, capability, performance, quality and suitability, Council's procurement policy may also consider the following factors when undertaking procurement:

- creation of local employment opportunities
- economic growth within the local area
- readily available servicing support and supply chain capability
- the benefit to SCRC of contracting with local suppliers and the associated local commercial transactions that flow from that contracting.

In the AEIS, SCRC stated that it has contacted the Industry Capability Network (ICN) to maximise opportunities for local participation in the project. The ICN is a business network where government and private project owners list their projects with ICN. Potential suppliers search for work using the ICN project database while ICN consultants actively work with both project owners and suppliers to build procurement partnerships.

5.3.9 Coordinator-General's conclusion

Overall, I consider that the project will generate net social benefits for the region by employing a local workforce, using local providers for construction and professional services.

¹⁶ Sunshine Coast Council. (2013). Procurement policy. <http://cms.sunshinecoast.qld.gov.au/addfiles/documents/policies/procurement.pdf>, accessed 29 January 2016.

According to the Queensland Government Statistician's Office, new development opportunities for the study area are limited which correlates with ABS predictions of limited growth for the future.

Furthermore, I have recommended that the proponent publish the ANEF contours for the SCA (every 5 to 10 years) so that the SCRC planning schemes have relevant standards for building design noise mitigation for construction of new buildings that could be impacted from the project.

Noise from existing airport operations currently affects the community, with helicopters being the main source of noise complaints. It is for this reason that SCRC proposes to move helicopter operations following the expiry of leases by 2027. I agree with the EIS conclusion that moving helicopter operations would reduce noise impacts from SCA and I recommend SCRC brings this relocation forward as much as possible.

While there are a number of dwellings that would experience an increase in noise impacts, there are significantly more dwellings that would experience a reduction in noise.

I have also made a series of recommendations to the proponent to address potential noise impacts for residents who may experience increased levels of exposure to aircraft noise (refer to Appendix 3 of this report).

Community and stakeholder engagement

While there were numerous submitters who raised issues about the community engagement process, I consider that SCRC has taken adequate steps to inform the community about the airport expansion, prior to and during the EIS process.

I note the advice from the ANO which indicates that SCRC has a proven record of constructive engagement and responsive management of noise complaints.

SCRC has committed to expanding the stakeholder consultation group to include representatives from newly affected areas. I consider this is an appropriate mechanism to gauge community response to the proposed new airport operations and I encourage SCRC to work with the forum to reasonably manage noise impacts.

I recognise the importance of ongoing engagement between the SCRC and the community and I have further recommended the proponent implement a targeted consultation with community members who are potentially adversely impacted by aircraft noise (refer to Appendix 3 of this report).

Complaints mechanisms

Existing consultation and complaints mechanisms established for current airport operations would continue for the new operations. The ANO confirmed that the proponent has a history of constructive community engagement and a responsive approach to managing noise complaints.

I note the proponent's commitment to expand the membership of the community aviation forum to include representatives from newly affected areas. This will

complement ASA's proposal to introduce noise modelling at SCA at some point this year.

I recommend that SCRC provide all complaints received to ASA to incorporate into their quarterly reports so that the community has a complete picture of how the changes to the airspace are received.

Community health and wellbeing

The EIS assertion that community health outcomes will be improved as a result of the reduction in the number of dwellings impacted by noise is technically correct. However I acknowledge some members of the community are sensitive to aircraft noise and it can be a source of irritation. I have recommended the proponent engage with the community to identify and implement measures to manage these potential impacts.

I note the noise generated by SCA operations is sporadic and that the health impacts associated with noise from the operation of the proposed airport expansion would be in line with national and international standards.

Workforce management

With regards to workforce management and worker accommodation, I note the proponent's advice that employees will be largely sourced from the local workforce and there is no purpose-built workers accommodation is required.

The project's construction and operational workforce will create a net economic benefit for the region and will create flow on benefits for service providers and the retail sectors.

Local procurement

I am satisfied that the proponent's procurement policies to use local providers for construction and professional services will ensure that the Sunshine Coast can gain the greatest benefit from the construction of the project.

I note that the ICN is a proven way to engage with and maximise local supplier content, and provide opportunities to implement second and third-tier supply chain opportunities. I consider that this network would benefit companies involved in tendering for work on the project.

5.4 Economic impacts

5.4.1 Regional economy

The SCRC area encompasses approximately 2,200 km² that includes significant beaches and waterways, coastal urban centres, inland towns and rural areas. The

region supports a diverse economy dominated by construction, health care and retail trade with a Gross Regional Product (GRP)¹⁷ of \$12.94 billion¹⁸ (in 2013–14).

SCRC has adopted the Regional Economic Development Strategy 2013–2033 as a framework for sustainable economic growth. The strategy identifies the expansion of the airport and other local transport infrastructure as critical for attracting investment in ‘high value’ industries such as tourism, aviation and aerospace, and agribusiness.

Tourism activities contribute significantly to the regional economy. There were over 2.89 million domestic and 253,000 international overnight visitors to the Sunshine Coast during 2014, with total visitor expenditure exceeding \$2 billion.

During this period there were 872,348¹⁹ passenger movements at the Sunshine Coast Airport. Inbound passengers accounted for 435,464 movements including 430,049 passengers on regional and domestic airlines, and 5,415 passengers on international airlines.

In discussing the need for the project, the EIS noted that if the airport runway was not upgraded there could be a loss of services from Code 4C aircraft. Under this scenario passenger numbers are said to decline by 736,456 per year between 2020 and 2040.

The proposed expansion of the Sunshine Coast Airport seeks to address operational constraints, open up additional domestic and international destinations, and provide opportunities for the region to benefit from increasing demand in emerging tourism markets.

5.4.2 Future demand

To estimate passenger growth forecasts, the EIS considered the impact of forecasted development in tourism infrastructure, advice from economic stakeholders in the region and anticipated changes in airline capacity as well as socioeconomic factors such as growth in population and income. The EIS noted that qualitative and quantitative measures were used because these (measures) captured the range of factors that determine potential future growth scenarios for traffic at the airport.

The EIS included passenger growth forecasts completed in 2012 as the basis for assessing the project’s economic impacts. The baseline growth forecast represented a mid-point scenario and was identified as the most appropriate for assessment purposes. Assumptions for the baseline forecast included:

- the proposed airport expansion is completed by 2020
- economies in Europe and the United States of America will return to pre-global financial crisis rates of growth and the Australian dollar will weaken slightly against these currencies

¹⁷ GRP represents the value of economic activity in a region during a period of time. GRP is the sum of the value of sales generated by each industry in the economy minus the cost of their inputs, along with an estimate for the ongoing value of the ownership of rental and owner occupied dwellings.

¹⁸ Unless otherwise stated all amounts are cited in 2014 AUD dollars.

¹⁹ Bureau of Infrastructure, Transport and Regional Economics airport traffic data
https://www.bitre.gov.au/publications/ongoing/airport_traffic_data.aspx

- low-cost carrier services will continue to expand throughout Asia and Australia
- large development projects underway or planned on the Sunshine Coast, including the Kawana Hospital, Maroochydore Principal Activity Centre and Bruce Highway upgrade, are completed
- international services will increase beyond existing destinations in New Zealand to China, South East Asia and elsewhere.

Table 5.12 shows the predicted increase in annual passenger and aircraft movements under the baseline scenario.

Table 5.12 Baseline forecast annual passenger and aircraft movements

	Actual			Forecast			CAAGR*	
	2012	2018	2020	% increase	2030	2040	% increase	2012–40
Passenger movements	790,002	1,168,449	1,288,215	63%	2,098,367	2,959,954	275%	4.8%
Busy day	2,842	4,280	4,700	65%	7,660	10,810	280%	4.9%
Commercial aircraft movements	5,559	8,020	8,900	60%	13,660	18,210	228%	4.3%
Busy day	15.2	22	24.4	146%	37.4	49.9	228%	4.3%

* Compound annual average growth rate

The EIS estimates a 63 per cent growth in passenger movement by 2020 and by 2040 passenger movements will be 275 per cent greater than those recorded in 2012. Similar percentage increases are reported for commercial aircraft movements.

5.4.3 Submissions received

Key issues raised in submissions on the EIS and AEIS regarding potential economic impacts included:

- methodology of the economic impact assessment—comparisons between the preferred and non-preferred project options
- questions about the validity of the assumptions and data used in the economic impact assessment—for example, flight predictions, and whether the change in CASA regulation could be used as a reason for proposing the proposed eastwest runway
- lack of risk analysis to underpin methodology
- alleged devaluation of property in close proximity to the airport and under flight paths
- the estimates of flow-on economic development are not accurate.

I have considered each submission and the responses provided by the proponent in my evaluation of the potential economic impacts of the project and my assessment is provided in relevant sections below.

5.4.4 Economic impact methodology and assessment

The EIS used Benefit Cost Analysis (BCA) and Gross Value Added activity (GVA)²⁰ to estimate the potential benefits to the Sunshine Coast economy during the construction and operational phases. Submitter issues about the methodology used to assess the project's flow on impacts were considered as part of the assessment of this information. Table 5.13 identifies the source economies for key construction activities based on the location of potential suppliers.

Table 5.13 Source of key activities during construction

Activity	Sunshine Coast	Airport catchment area	Queensland	Australia
Heavy and civil engineering construction	69%	73%	85%	87%
Construction services	31%	40%	98%	100%
Structural metal product manufacturing	76%	82%	92%	96%
Cement, lime and ready-mixed concrete	66%	68%	78%	81%
Professional, scientific and technical services	25%	35%	100%	100%
Transport support services and storage	25%	35%	100%	100%

The project cost in 2020 dollars is estimated to be \$347 million. The EIS stated that this expenditure is expected to provide a direct benefit to the Sunshine Coast economy of approximately \$144.6 million in additional GVA activity, mostly within the construction, manufacturing and professional services sectors. Up to 86 full-time equivalent (FTE) jobs are expected to be created during construction.

The EIS estimated that, by 2040, the expanded airport would attract over 450,000 additional visitors per year to the region based on the following assumptions:

- half of the predicted increase in passenger movements comprise visitors travelling to and returning from the Sunshine Coast, or travelling to another destination
- 70 per cent of visitor growth is 'induced' by the airport expansion with the remaining 30 per cent transferring from the Brisbane Airport

²⁰ GVA for an economy represents the total value of goods and services produced by all industries over a period of time, minus the value of inputs used in production.

- over 90 per cent of induced passenger demand will be domestic overnight visitors with the remainder drawn from overseas.

The EIS stated that the direct benefit to the Sunshine Coast economy associated with these additional visitors and increased expenditure on airport operations is expected to deliver \$37.6 million in GVA activity in 2020-21 and grow to \$310.5 million in GVA activity during 2040, with most of the growth occurring within the retail trade: accommodation and food services; and transport, postal and warehousing sectors. Up to 1,538 FTE additional direct jobs are expected to be created by 2040.

A number of submitters suggested that the SCRC would have to increase council rates to meet the costs of the proposed runway. The commercial viability of an expanded airport, along with any funding arrangements for the project, is not in the scope of this evaluation report.

I also note Queensland Treasury has legislative requirements ²¹ of regional councils prior to entering into certain financial and contractual arrangements. I expect that the proponent is aware of this as part of the project's funding strategy.

Benefit–cost analysis

The EIS included a BCA to determine whether the benefits that would accrue to the region or the regional economy as a result of the project proceeding outweigh the associated costs. Three potential scenarios were assessed:

- the proposed east-west runway would be built at the airport to accommodate unrestricted narrow-body and wide-body aircraft operations to unlimited domestic and international destinations ('proposed east-west runway' scenario and the preferred option)
- the airport would do minimum work on the existing north-south runway to avoid future restrictions to existing domestic and trans-Tasman destinations ('do minimum' scenario)
- no runway work is completed and the airport is restricted to primarily turboprop aircraft and jet aircraft smaller than Code 4C soon after 2020 ('do nothing' scenario).

The BCA identified significant benefits and costs associated with the 'proposed east-west runway'. All values were discounted at a real interest rate of 7 per cent for the period 2014–40, and sensitivity testing was undertaken on the induced demand and consumer surplus assumptions.

Regional benefits identified for the 'proposed east-west runway' included:

- \$336 million in reduced travel costs and cost savings associated with fewer accidents and less vehicle pollution from passengers choosing to fly from Sunshine Coast Airport rather than the Brisbane Airport
- \$132 million of additional consumer surplus or value accruing to passengers deterred from travel by current travel costs to the Brisbane Airport.

²¹ *Statutory Bodies Financial Arrangement Act 1982*

Costs identified for the 'proposed east-west runway' scenario included \$189 million for runway construction, \$56 million in operating costs, and \$6 million for terminal and building works. The net present value (NPV) for the proposed east-west runway is \$297 million and its benefit–cost ratio (BCR) is 2.45.

Submitter comments on the economic modelling for the proposal, the impacts of CASA regulations and the risk analysis used in the BCA were considered in determining the merits of the project's economic information.

It is noteworthy that the BCR for the proposed east-west runway does not include the benefits that accrue from having planes flying over less populated areas near the airport. Nor does it consider the benefits from potential growth in commercial activity for industries and areas that adjoin the airport.

5.4.5 Property values

Submitters raised issues regarding the possible impact of the airport expansion on property values. There have been numerous Australian and international studies published on the impact of airport noise on residential real estate prices. The literature concludes, generally, that construction of any new infrastructure can impact on property prices, both positively and negatively. As an example of the inconsistent conclusions regarding the impact of airport noise on property values, one submitter referred to a study done on the Brisbane airport in 1982 which determined that property prices always go down in the vicinity of an airport.

Conversely, a 2013 study released by the Queensland University of Technology (QUT) found that aircraft noise has little to no impact on property prices in suburbs under Brisbane Airport flight paths.²² The study concluded:

"....housing and units in Brisbane located under designated flight paths have their value and price determined by a range of factors and these factors are not detrimentally impacted by aircraft noise. The location of a property under a flight path will have minimal if any impact on the price, saleability, investment performance and capital growth of that property."

I note that since 1999 the SCRC has applied property notes to all lots west of David Low Way adjacent to the airport, advising that the properties are subject to aircraft noise. A copy of these notes was forwarded to me in correspondence dated 18 February 2016. Moreover, as plans for the proposed east-west runway at the SCA have been in public circulation since 1985, the impacts of proposed airport expansion may have already been factored into property prices.

Whilst it is not possible to be definitive about the impact of infrastructure developments on property values it is important to note the influence that market forces have on residential property prices.

I acknowledge the conflicting views on the evidence about this matter and I have taken this factor into account in my evaluation.

²² The Impact of Aircraft Noise on Brisbane Residential Property Sectors: 1988-2013: Prof Chris Eves & Andrea Blake

5.4.6 Coordinator-General's conclusions

The demand growth forecasts in the EIS suggest that the project could support a significant increase in passenger movements from domestic and international locations not currently serviced by the airport. This predicted increase in passenger movements and tourist expenditure forms the basis for estimating the benefits of the project for the Sunshine Coast economy.

Future demand for air travel to and from the Sunshine Coast will be influenced by factors other than the capacity of the airport. These factors include international and domestic tourism trends, commercial decisions by aircraft operators, and upgrades to Brisbane Airport and the Bruce Highway which may influence the travel preferences of inbound and outbound passengers.

I acknowledge that Code 4C aircraft utilising the airport's existing north-south runway require a manufacturer's flight manual supplement, and that responsibility for maintaining this exemption rests with commercial operators. However, these operations could reasonably be expected to continue in the foreseeable future.

The BCA in the EIS found that the proposed east-west runway would provide a net economic benefit for the Sunshine Coast.

I also note the BCA for the proposed runway did not assess the beneficial impacts of having fewer dwellings exposed to aircraft noise or the potential for increased commercial activity in areas adjoining the airport.

The construction phase of the project would have a positive impact on the Sunshine Coast economy by creating an additional 86 jobs at the peak of construction and will provide a benefit to the Sunshine Coast economy of approximately \$144.6 million in GVA activity drawing on the capacity of local construction and manufacturing firms.

Whilst I acknowledge there are limitations to developing estimates for passenger movements and visitors numbers I consider the EIS has provided sufficient information to conclude that the benefits from the project are significant.

5.5 Natural hazards

5.5.1 Flooding

The project site lies on the Maroochy River floodplain, mostly draining west through a system of constructed open drains into the Maroochy River. Part of the site, including some of the existing runway and nearby residential areas, drains south into the Twin Waters canal. The Maroochy River catchment is approximately 620km² with relatively steep upper reaches and flatter mid and lower reaches. The floodplain makes up about 30 per cent of the catchment area, most of which supports agriculture and national parks with urbanised areas making up less than half the floodplain area.

Flooding at the site is primarily influenced by extended rain events within the catchment although downstream conditions including storm surges and tides can also influence flood levels. Major river floods causing the Maroochy River to break its banks were

recorded in 1893, 1951, 1974 and 1992. Flood events that break the banks of the river reverse the flow of water from west to east as it is pushed back over the floodplain. As these events peak, flows to the floodplain are controlled by the culverts and bridges of the Sunshine Motorway. The 1992 flood resulted in the inundation of about 225 homes with Pacific Paradise being the worst affected area.

5.5.2 Submissions received

Key issues raised in submissions on the EIS and AEIS regarding natural hazards included:

- flood impacts on property
- reduced capacity of the floodplain from runway fill
- adequacy of the flood modelling
- flood impacts exacerbated by sea level rise
- increased risk of extreme weather events.

I have considered each submission and the responses provided by the proponent in my evaluation of the project and my assessment is provided in relevant sections below.

Potential impacts and mitigation

The project includes a total development footprint of 230ha of which 30ha is currently elevated above the floodplain. Designs for the new runway incorporate flood immunity from the 100-year average recurrence interval (ARI) and a sea level rise of 0.8m by the year 2100, consistent with the expected sea level rise adopted for planning purposes in Queensland.

The flood assessment undertaken for the EIS includes the Twin Waters canal system, the Maroochy River mouth and the confluences of Eudlo Creek and Petrie Creek with the Maroochy River. Hydraulic modelling was undertaken for this area to assess potential impacts with respect to changes in peak water levels, duration of inundation and peak flow velocities for 2-year, 5-year, 10-year, 20-year, 50-year and 100-year ARIs. The model considered pre- and post-development scenarios and allowed testing of the proposed mitigation measures. The regional flood model developed for the Maroochy River by the SCRC was used to validate the outputs of the EIS model for 2-year ARI and 100-year ARI events.

The potential changes to the flood regime may occur because the project could change flows in the floodplain and reduce floodplain storage capacity once the new runway is constructed. The flood assessment identified changes to flood levels, duration and flow velocities at 11 locations in residential and non-residential areas. Potential impacts were described using a risk assessment that considered the significance of an impact and the likelihood of the impact occurring. Where a potential impact was rated as a medium risk or higher, mitigation measures were proposed and a residual risk assessment then considered the effectiveness of the proposed measures.

Flood levels and duration

Potential flood impacts to property, particularly in the adjacent suburbs of Marcoola and Mudjimba, and the adequacy of flood modelling undertaken for the EIS were key issues raised by submitters. The EIS reports potential flooding impacts from the project would not occur in areas that do not already experience flooding. More floodwater would be detained north of the proposed east-west runway resulting in a small rise in flood levels greater than in the undeveloped scenario. Localised impacts predicted in the EIS include a decrease in flood duration and levels entering Mount Coolum National Park during large events and a small rise in flood levels detained north of the proposed east-west runway.

Mitigation measures proposed in the EIS include the addition of a western perimeter drain to increase flows around the western end of the proposed east-west runway and to increase the capacity of the northern perimeter drain to improve local run-off from the site for flood events that do not cause the Maroochy River to back up into the floodplain.

A number of drainage options were assessed including upgraded culverts along the eastern perimeter drain however the sensitivity of the drainage system typically resulted in increases in water levels greater than 10mm to the south of the proposed east-west runway. The EIS found potential impacts of an increase in flood levels of less than 10mm would be negligible in developed areas.

Over-floor flooding

Submissions on the EIS discussed increased flooding risks to surrounding areas from the placement of sand fill on the floodplain. Many houses in Marcoola currently experience flooding above the constructed house floor levels during a 100-year ARI event. The EIS found construction of the proposed east-west runway would potentially result in an additional 14 additional houses in the area experiencing over-floor flooding during a 100-year ARI event.

A floor level survey reported in the EIS identified houses at risk of over-floor flooding as a result of the modelled 10–18.5mm increase in a 100-year ARI flood event. Of the 14 new properties identified as at risk, 9 are likely to experience flood impacts and 5 would potentially experience impacts. The properties identified as potentially affected require additional surveys to accurately assess the risk of over-floor flooding.

For properties where new over-floor flooding was identified as a potential risk, the proponent has committed to undertake additional high-accuracy surveys and reach agreement on appropriate mitigation measures with the property owner where required. This would occur after potential flooding impacts have been remodelled to incorporate detailed project design.

Flow velocities

A minor increase in the flow velocity of flood waters was predicted for the eastern side of the Sunshine Motorway bridge crossing Marcoola drain. The increase would be less than 0.2m/s for 10, 20 and 50-year ARI events and less than 0.3m/s for a 100-year ARI event. Floodwaters in the area move slowly across the floodplain and these velocities

were considered unlikely to increase scour potential at any of the locations assessed for the EIS.

Climate change

The EIS considered potential future flood impacts in the context of climate change projections. A 2050 scenario with a 0.3m sea level rise, 10 per cent increase in rainfall intensity and 2°C increase in average temperatures was modelled to assess potential impacts. This scenario was selected because it was close to the project design year of 2040 and uncertainties regarding development within the catchment beyond that time may alter flooding events. The assessment predicted flood levels would rise by 200–350mm across the catchment. In the modelled scenario, development of the proposed east-west runway would lead to an increase in flood levels of between 20–35mm north and east of the runway.

The EIS reported climate change impacts on flood levels would be widespread across the catchment and require a regional approach to mitigation regardless of the project's development.

Coordinator-General's conclusion

I am satisfied the EIS has adequately identified the potential flooding impacts of the project. I have been advised by the Department of Science, Information Technology and Innovation that the adequacy of the flood modelling undertaken for the EIS is consistent with industry practice and appropriate to identify the potential impacts of the project. The results and parameters are considered to occur within the expected range given the vegetation, soils and landforms present in the study area and the results give a reliable prediction of potential impacts.

With respect to risks of over-floor flooding and submitter issues regarding flood modelling and flood impact, I have imposed a condition to ensure no adverse flow impacts or actionable damage occurs to properties as a result of the project. Following the completion of detailed project design, the proponent will remodel potential flooding impacts and undertake additional surveys of the properties identified as at risk of over-floor flooding due to the project. Where a property is identified as at risk of flooding, the proponent will need to reach agreement on appropriate property level mitigation measures.

I accept the predicted increase in flow velocities is unlikely to adversely impact the Bli Bli Road Bridge over Maroochy River or the section of David Low Way near the northern end of the runway.

I consider the airport drainage described in the EIS is appropriate to manage floodwaters moving across the project site. My imposed conditions and the proposed mitigation measures will ensure no adverse flooding impacts as a result of the project.

5.5.3 Coastal impacts

Potential impacts and mitigation

Potential impacts to the beach dune system are associated with the laydown and assembly area required for the sand delivery pipeline and operating the pipeline. The potential impacts identified in the EIS include:

- vegetation clearing and sand dune disturbance
- interruption of longshore sediment transport
- coastal erosion.

The Marcoola Beach shoreline is a morphologically dynamic environment subject to waves and currents transporting sediment to and from the beach. Analysis of historic beach profiles indicates a net stability where sediment deposited by and lost to wave actions is balanced over the course of the year. The region is subject to large-scale storm systems capable of removing significant sand loads from the beach and dune systems. The EIS noted wave conditions associated with ex-Tropical Cyclone Oswald in January 2013 were likely to have removed 50,000 to 100,000m³ of sand from the upper beach and dune system at Marcoola Beach. Longshore sediment transport occurs at a relatively low rate to the north for much of the year. During summer months where low pressure systems and tropical cyclone events generate waves from the north east, sediment is transported back to the south.

The EIS assessment drew on previous studies, historical data and numerical modelling of wave conditions at local, medium and regional scales. Predictions of longshore sediment transport and storm erosion potential were also considered in the assessment.

Pipeline laydown and assembly

The steel pipeline to deliver sand fill material from the pump-out site to the reclamation areas would be assembled at Marcoola Beach in sections up to 500m in length before being moved into position. Dismantling the pipeline would take 3–4 weeks and require the closure of a section of the Marcoola beachfront to public access. During this period, a short detour around the assembly area will be provided.

The pipeline would be located within a corridor approximately 20m wide through the dune system to David Low Way. Clearing the corridor would require removal of 1,500m² of vegetation from the dune and significant modification of the dune profile. Lowering the dune height temporarily increases the vulnerability of the dune to storm erosion and overtopping from waves. As an avoidance measure, the EIS identified assembly works would be undertaken outside of summer months when wave conditions and storm tides are less likely to promote coastal erosion.

Pipeline operation

Once assembled, the pipeline would be positioned perpendicular to the shoreline on the seabed and beach face. Depending on the type of dredger used, the pipeline would be in place for up to 33 weeks. During this period, it has the potential to form a barrier

to local longshore sediment transport. The EIS estimated sediment accumulation of approximately 130m² per month on the southern side of the pipeline. If the pipeline was to remain in place during summer months, sand would be expected to accumulate on the northern side. To manage the accumulation of sediment, the EIS proposed a reactive mitigation strategy including weekly inspections and relocation of excessive material using a small excavator if required.

For the section of pipeline laid between the beach and the pump-out site, the EIS concluded impacts to local beach morphology and sediment characteristics would rapidly recover following removal of the pipeline due to the high energy nature of this environment as sediments are mobilised by winds, waves and currents.

Coastal erosion

The EIS assessed the potential for short-term erosion at the proposed pipeline corridor from severe wave and storm tide conditions. The assessment considered wave conditions associated with a 50-year ARI event and a 100-year ARI storm tide for the existing beach profile and a modified beach profile where the dune height is reduced to 4m AHD to accommodate the sand delivery pipeline. The probability of the erosive conditions included in the assessment occurring in any one year is expected to be less than one per cent and considerably less than one per cent for the proposed 33-week dredging period.

The EIS found the erosion impacts of the assessed conditions on the existing beach profile were 123m³/m of sand over a 30-metre-wide area. For the developed case, with the lowered dune height, the erosion volume was 97m³/m over a 37-metre-wide area, reflecting the lower volume of sand in the upper beach and dune system. The risk of a significant erosion event occurring during the dredging operation can be reduced if the works are undertaken during milder winter conditions. The EIS considered impacts from enhanced erosion during dredging works would not lead to long-term impacts to the beach system.

Following completion of the dredging, the proponent has committed to rehabilitate disturbed sections of the dune. As the disturbed sections would be more vulnerable to erosion until the vegetation cover matures, the rehabilitated area would need to be inspected after erosive events and remedial works undertaken as required.

5.5.4 Coordinator-General's conclusion

I accept the proposed pipeline alignment and pump-out site proposed in the EIS are appropriate for the project. The final dredge mooring location would be determined by the size and draught of the dredger used for the project and the mooring orientation determined by currents and the prevailing wind and wave conditions within the pump-out area identified in the EIS.

I have stated conditions of approval for tidal works in Appendix 1 regarding erosion and sediment control measures, rehabilitation of the dune system and the management of material deposited during the construction phase of the project. Within two months of completing the works, the proponent must remove all infrastructure from the dune and reinstate the dune crest to its original height. Rehabilitation of the dune must adopt the

species list and planting density contained in the terrestrial flora management plan to match native dune vegetation in adjacent areas and be maintained for a period of 12 months.

Prior to the commencement of works, the proponent must submit certified plans to EHP for all coastal works prepared by a registered engineer. The information supporting an application for a development permit for tidal works must include the layout and cross sectional drawings of the infrastructure and details of the construction methodology and materials used in construction.

The proponent must also develop the Dredge Management Plan outlined in the EIS to coordinate the sand pumping operation and ensure the potential impacts identified are monitored and corrective actions implemented as required.

5.6 Water quality

5.6.1 Airport site and surrounds

Submissions received

Key issues raised in submissions on the EIS and AEIS regarding potential impacts on water quality included:

- discharge of tailwater from the reclamation area
- water quality impacts in the Maroochy River and Marcoola drain
- run-off from ASS
- groundwater impacts and monitoring
- management of the sand delivery pipeline.

I have considered each submission and the responses provided by the proponent in my evaluation of the project and my assessment is provided in relevant sections below.

Potential impacts and mitigation

Hydraulic sand delivery and runway construction

Construction of the runway would require dredging of 1.1 million m³ of fill material from the Spitfire Realignment Channel in Moreton Bay. The channel has been subject to dredging by PBPL under a current approval for the purpose of improving shipping navigation and providing a source of fill for ongoing port development.

Sand from the extraction area would be transported to a pump-out site at Marcoola before being hydraulically delivered via pipeline to a reclamation area at the airport. Before selecting a 33-week program, the proponent considered a number of different construction and tailwater discharge regimes to simulate a worst-case impact scenario with regard to total suspended solids (TSS) in the water column. The EIS identified potential impacts resulting from this activity as:

- increased groundwater salinity concentrations
- increased groundwater levels

- groundwater drawdown (reduced water levels)
- groundwater acidification from ASS.

Potential impacts to water quality in the Spitfire Realignment Channel and at the pump-out site, located offshore from Marcoola Beach, are discussed in section 5.6.2 of this report. The management of ASS is discussed further in section 5.7.4 (Geology and soils) of this report.

Groundwater levels and salinity

The project site has a very shallow slope down to the north and west where monitoring has shown a tidal influence on shallow groundwater quality. A groundwater system located across the site is formed of two key lithologies:

- unconsolidated alluvial sediments, which generally act as one groundwater system
- indurated sand, or coffee rock, which has a relatively low permeability and could act as a barrier to groundwater flow.

Average groundwater salinity is 450mg/L and is moderately acidic with pH ranging from 4.5 to 6.0. Generally, the depth to groundwater ranges from 0.2m to 3.4m below ground level (BGL) across the site and flows from the reclamation area to the east and north-east towards the coast. Above the coffee rock layer, groundwater is likely to be semi-perched locally with flows only occurring where voids or weaknesses are present in the formation.

Conceptual and numerical models were developed for the EIS to assess potential impacts to groundwater levels and quality before, during, and up to 300 years after sand delivery. The models predicted groundwater levels could increase following the hydraulic delivery of sand to the site and from increased pore pressure in the water as soils are compacted for construction of the runway.

Developing the project could result in groundwater head (water pressure) increasing by up to 0.1m within 250m of the reclamation area, which would extend approximately 80m into the Mount Coolum National Park. Seawater seepage rates were predicted to be approximately 860m³/day without and 0.003m³/day with a liner placed under the reclamation area.

Salinity concentrations in groundwater could also be increased from seawater infiltration following delivery of sand to the site. The EIS estimated increases would peak at 1,000mg/L near the Mount Coolum National Park boundary (50m north of the proposed northern perimeter drain) approximately 200 years after filling is complete. Salinity concentrations at 150m from the northern perimeter drain were not predicted to exceed 500 mg/L over the 300-year modelling period.

To reduce potential impacts associated with increased groundwater levels and salinity, the proponent has proposed to:

- place a high-density polyethylene (HDPE) liner under the reclamation area prior to sand filling, to minimise seawater infiltration to the groundwater—this would confine an expected increase in groundwater head of 0.1m to within 200m of the reclamation area

- install a permanent low-permeability cut-off wall parallel to the northern perimeter drain to prevent groundwater drawdown from the north of the wall and direct saline tailwater into the drainage system
- develop and implement a groundwater management plan detailing trigger levels and corrective action plans, including at least 12 months of baseline data to account for natural seasonal variation, prior to commencing construction
- review monitoring bore locations during detailed project design and install additional bores as required
- install additional monitoring bores between the Marcoola drain and the Mount Coolool National Park
- assess potential groundwater and surface water exchange and where required, develop a reactive monitoring program to meet water quality objectives (WQOs) based on 12 months of baseline data.

Monitoring of the integrity of the reclamation bund/HDPE liner, tailwater seepage and drainage pathways would be undertaken during installation to prevent any punctures and during delivery of sand to the site. If tailwater escapes the intended drainage regime, it would be contained and pumped back to the reclamation area as required.

Groundwater drawdown

If left unmitigated, groundwater drawdown could occur in areas including the Mount Coolool National Park following construction of the northern perimeter drain. The drain would intercept and drain saline tailwater infiltration to the upper layers of the aquifer from the reclamation area. Modelling undertaken for the EIS predicted reduced groundwater levels of up to 0.1m extending 200–300m from the drain during typical dry conditions for the site.

To mitigate potential drawdown, the proponent committed to install a permanent low-permeability cut-off wall down to the coffee rock on the northern side of the drain to intercept groundwater flows. This would ensure drawdown only occurs between the drain and the wall and does not affect the Mount Coolool National Park.

The groundwater monitoring program would measure the success of the cut-off wall, by installing additional bores between the cut-off wall and the Mount Coolool National Park, and inform the proponent of appropriate trigger levels and any corrective actions required.

Acid sulfate soils

The project site lies below 5m AHD on Quaternary alluvial deposits of sands and mud likely to contain ASS. The soils contain low to moderate levels of net acidity where soils of actual acidity are uniformly distributed across the site and soils of potential acidity are limited to approximately 1m below ground and to silty clays in the northern end of the site.

ASS assessments undertaken for the EIS were conducted in accordance with the requirements of the State Planning Policy 2014 with the sampling and analysis planned

using the DNRM *Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils in Queensland 1998*.

Run-off from ASS to the receiving environment was raised as a key issue in submissions on the EIS. With regards to water quality, potential impacts from disturbing ASS were identified in the EIS as:

- acidification of groundwater from runway fill placement at the north-western portion of the runway footprint
- mobilisation of ASS at surface level following placement of saturated fill material for the runway
- oxidation and mobilisation of ASS from soil excavated for the proposed drains

To mitigate these impacts, the proponent has proposed to:

- construct a cut-off wall on the northern side of the northern perimeter drain to prevent groundwater drawdown and oxidation of PASS
- place a layer of agricultural lime within drains to intercept and neutralise any acidity mobilised from normally unsaturated actual ASS
- place a liner beneath the reclamation area to minimise tailwater moving through the soils and mobilise actual acidity in soils.

Any lime treatment used on the project site would need to consider naturally acidic ecological habitats and be carried out in accordance with relevant Queensland ASS management guidelines. Water quality monitoring at the drain and receiving water bodies would also be conducted, with corrective actions implemented as required such as retreatment of water that fails to meet release criteria.

The management of ASS is discussed further in section 5.7.4 (Geology and soils) of this report.

Tailwater discharge

Following hydraulic sand delivery to the reclamation area, tailwater would be directed to a polishing pond and discharged through the partially tidal Marcoola drain to follow the natural drainage pathway of the Maroochy River to the sea. The discharge point into Marcoola drain is located downstream of Mount Coolum National Park. The catchment also supports urban developments and two golf courses located upstream of the project site which may influence water quality in the drain. Discharge of tailwater could potentially result in:

- changes to water quality within the Maroochy River and Marcoola drain including salinity, turbidity and TSS
- changes to hydrology including flow patterns, flow volumes and water levels in the Marcoola drain
- mobilisation of existing bed sediments in the Marcoola drain.

Discharge of tailwater was a key issue raised in submissions on the EIS. Potential impacts and associated management for each of these matters is discussed below.

Marcoola drain and Maroochy River water quality

Potential impacts to water quality in the Maroochy River and Marcoola drain were a key issue raised in submissions on the EIS. The EIS found the most likely impacts from tailwater discharge into the Marcoola drain during construction of the project could be:

- an increase in turbidity and TSS of 25 to 38 per cent immediately downstream of the northern perimeter drain discharge point
- an increase in median salinity levels from 3.5ppt (parts per thousand) to 26ppt in the lower Marcoola drain (between the culverts at Finland Road and the intersection of the drain and the Maroochy River).

The EIS concluded that any impacts upstream of the culverts at Finland Road would be minor and within the natural variation of existing conditions as the Marcoola drain, a man-made channel, is partially influenced by tidal conditions. Changes to turbidity and TSS levels would be negligible as discharged water would mix with water in the Marcoola drain before reaching the Maroochy River. Minor increases in salinity are anticipated however this is also considered to be within the natural variation of the drain.

Potential water quality impacts were modelled to simulate flows, water levels, pollutant loads and transport in the catchment and receiving waters. Baseline conditions were modified to account for the effects of the proposed northern perimeter drain as this would be the first outlet for discharge prior to entering the Marcoola drain. The model included typical rainfall conditions (based on 60 years of data) and adopted a summer wet-season tailwater discharge to allow for a conservative assessment.

WQOs are established under Environmental Protection (Water) Policy 2009 to protect environmental values of waterways while also supporting ecologically sustainable development. The EIS found existing conditions in the Marcoola drain exceed WQOs for turbidity. Modelling indicated these exceedances would continue during the tailwater discharge phase with the greatest increase occurring downstream of the Finland Road culverts.

Median salinity levels in the lower drain were predicted to increase from 3.5ppt to 26ppt. Upstream of the culverts, salinity impacts were considered minor as changes in salinity and sedimentation levels fall within the natural variation of existing conditions. No exceedances for suspended sediment were predicted.

The EIS concluded any changes to water quality would be temporary and associated with sand delivery to the reclamation area. Long-term or permanent changes to water quality in the Marcoola drain or Maroochy River are not expected to occur as tailwater discharge would cease following the reclamation period. To mitigate potential impacts during reclamation, the proponent has proposed to:

- construct a polishing pond at the north-western end of the sand placement equipped to hold 3 days of tailwater storage so fine material can settle prior to discharge into the Marcoola drain. Sand pumping would cease if storage capacity is affected by inclement weather
- install a tidal flap at the culvert under Finland Road to prevent tailwater flowing upstream during discharge periods

- implement a monitoring program requiring corrective actions if water quality trigger levels are exceeded, including:
 - only discharging tailwater during ebb tides
 - keeping the tidal flap closed for longer periods following discharge periods and above-average high-tide events
 - suspending tailwater discharges until water quality conditions improve
 - increasing tailwater residence time elsewhere on site prior to entering the polishing pond
 - installing silt curtains in the polishing pond and conducting weekly inspections and appropriate maintenance
 - developing a sediment spill budget and assessing the discharge of cumulative sediment loads throughout the duration of the project
 - setting trigger level warnings to implement corrective actions to reduce turbidity, based on background levels and a trigger at which discharges cease
 - promoting non-toxic flocculation of the pond to group fine particulates together
- conduct bi-monthly audits of the dredge contractor to ensure compliance with the tailwater discharge requirements of the Dredge Management Plan.

Marcoola drain hydrology

The existing drainage system at the airport discharges to the Maroochy River via the southern and eastern drain. The expansion project proposes construction of two additional drains:

- (1) a northern perimeter drain to direct overland flow from the north of the runway to Marcoola drain
- (2) a western perimeter drain to connect the northern perimeter drain to the existing southern perimeter drain.

Constructing the drains and converting open space to a runway would alter the volumes and flow patterns of surface water entering the Marcoola drain in the following ways:

- increasing flows in the lower Marcoola drain (at the northern perimeter drain entrance) by 40 per cent under low flow conditions and 50 per cent under high flow conditions
- decreasing flows at the existing southern perimeter drain by 20 to 40 per cent
- decreasing average flows in the eastern airport drain, which discharges to tidal canals of Twin Waters, by 20 per cent.

With regard to tailwater discharge, the EIS predicted the impacts listed above would increase due to the constant flow over the sand-pumping period, particularly under low flow conditions. Changes to surface water levels within the Marcoola drain were predicted to result in a 10mm increase at low tide and 3mm increase at high tide, however no observable impacts are predicted for the Maroochy River.

The EIS modelled base flows, rainfall run-off, sewage treatment plant discharge and other parameters to account for upstream land uses. Water level and flow measurements were used at four locations in the Maroochy River and Marcoola drain to validate the models.

Due to the proximity of the Maroochy River and southern canals, both of which are influenced by tidal waters, the EIS considered that any potential impacts to the hydrology of the Marcoola drain would be negligible.

In response to submissions on the EIS, the proponent undertook an additional study to assess the potential of tailwater discharges to result in Marcoola drain overtopping its banks. The assessment considered a baseline scenario and a 33-week tailwater discharge period and found a minor increase of water levels in the drain during low tide (maximum 0.1m) and no observable increases during high tides. For water levels to reach the levels of the drain banks, a rainfall event of 100mm in one day would be required. During such an event, tailwater discharges would be required to cease and no additional risk to the drain banks overtopping would arise from tailwater discharges.

Marcoola drain bed sediments

Bed sediments in the Marcoola drain are predominantly comprised of fine materials (silts). Increases in bed shear stress (water force) can mobilise sediments and contaminants within a water channel. With respect to the bed sediments in the Marcoola drain, the EIS considered a critical shear stress of 0.2N/m^2 to be the point at which sediment would be mobilised, although this would vary according to the degree of consolidation in the bed materials.

Maximum shear stresses were compared at four locations under baseline conditions and during sand pumping to determine potential impacts to the Marcoola drain. A minor decrease in shear stress was predicted at three of these locations following increasing water levels (and decreased velocities) and a minor increase was predicted at one location. As such, tailwater discharge is unlikely to result in mobilisation of sediment in the Marcoola drain.

Runway operation

Stormwater run-off

Increased surface run-off from the runway pavement could mobilise sediment during the project's operation and potentially affect water quality in nearby waterways. Based on a comparison of baseline conditions and operational projections (Table 5.14), the EIS concluded potential water quality impacts to the Maroochy River and surrounds would be negligible.

Table 5.14 Comparison of stormwater run-off loads

Parameter	Baseline	Operation
TSS (t/yr)	395	391
TN (t/yr)	8.31	8.30
TP (t/yr)	0.800	0.799

As baseline data on stormwater quality is unavailable for the existing airport site, the proponent adopted TSS concentrations typical for the region and modelling based on the BAC New Parallel Runway project EIS to enable a worst-case scenario to be assessed.

The EIS proposes to establish a 150m strip of grass to control stormwater flow from the runway and taxiways and mitigate a potential increase in sediment loads. Erosion and sediment control measures would be implemented to manage pollutant run-off during project construction. These are discussed further in section 5.7 (Geology and soils) of this report.

Airborne pollution

A number of public submissions on the EIS raised issues regarding impacts from airborne pollutants on water quality, particularly on domestic rainwater tanks, during runway operation. The proponent response in the AEIS advised that emissions from the airport operations would comply with air quality objectives established under the Environmental Protection (Air) Policy 2008 (EPP Air) even in a worst-case emissions scenario of forecast aircraft movements. Aircraft emissions may make a very small contribution to residues accreting on rooftops and other outdoor surfaces, however this contribution is negligible in comparison to other sources of emissions such as road traffic, agriculture and other industries.

Coordinator-General's conclusions

Hydraulic sand delivery and runway construction

I am satisfied the EIS has identified the potential impacts of sand delivery and runway construction and the management measures proposed can adequately mitigate impacts to surrounding water resources, the Mount Coolum National Park and the WHMA.

To ensure this outcome, I have stated conditions in Appendix 1 for inclusion in the environmental authority for Environmentally Relevant Activity 16 (dredging, extractive industry and screening) (ERA16) requiring the proponent to install HDPE lining on the base and sides of the reclamation area and control structures on drains to prevent groundwater drawdown and contamination of waters.

My conditions require the preparation of an ASSMP to ensure disturbances are appropriately managed and impacts are minimised during project construction. I have also made a recommendation that the ASSMP be applied to all aspects of the project that may disturb ASS or potential ASS, such as earthworks and drain construction.

My stated conditions include a requirement to construct a permanent low-permeability cut-off wall, from the ground surface down to the confining coffee rock layer, adjacent to the northern perimeter drain to manage tailwater discharge and protect the Mount Coolum National Park from groundwater drawdown.

To prevent lowering the water table below PASS in the western section of the project site and to protect conservation areas south of the proposed runway, I have included a condition regarding the installation of a second cut-off wall west of the western perimeter drain. The proponent must also install control structures, such as weirs, on drains traversing the Mount Coolum National Park to prevent groundwater drawdown and contaminant ingress into the park.

Before lodging an application for an environmental authority, the proponent will need to provide further information on the proposed monitoring program for surface water and groundwater and the characterisation of ASS on the site.

Water quality limits for surface water and groundwater should be derived in accordance with the methodology in accordance with the *Department of Environment and Heritage Protection (2009) Queensland Water Quality Guidelines, Version 3*.

The placement of saline dredge material, disturbance of ASS or lowering of groundwater levels must be managed to ensure compliance with the water quality limits.

My conditions and recommendations would ensure the issues raised in submissions regarding potential impacts to groundwater and surface water quality and run-off from ASS are adequately managed by the proponent.

Tailwater discharge

I am satisfied the potential impacts on water quality and hydrological processes resulting from tailwater discharge were adequately identified in the EIS and the mitigation measures proposed by the proponent are appropriate to manage the impacts.

I have stated conditions for inclusion in the environmental authority (ERA16) to ensure surface water and groundwater quality is protected. My conditions require the proponent to install a tidal flap on Marcoola drain at the Finland Road crossing culvert to minimise salt water ingress upstream to the Mount Coolum National Park. The tidal flap must allow for conveyance of floodwaters and not submerge mangrove roots for extended durations.

I have also included conditions limiting the timing of tailwater discharge where necessary to the period one hour after local high water until one hour before local low water to ensure potential salinity impacts upstream of the Marcoola drain discharge point are appropriately managed.

The conditions include requirements to: establish water quality limits for surface water and groundwater; the development of a monitoring program to identify potential impacts and address submissions regarding groundwater monitoring. The water quality limits for surface water and groundwater are to be developed in accordance with *Department of Environment and Heritage Protection (2009) Queensland Water Quality Guidelines, Version 3*.

Further information on background water quality and the monitoring program should be provided in accordance with these recommendations in support of an application for an environmental authority.

Runway operation

I am satisfied that the potential impacts of airborne pollution from the project were adequately assessed in the EIS and would comply with air quality objectives regulated under the EPP (Air). With regard to stormwater run-off, I have stated conditions for inclusion in the environmental authority to ensure impacts during project construction are minimised. Once operational, stormwater flows from the new runway would be controlled through grassed run-off pathways to minimise pollutant run-off.

5.6.2 Dredging and dredge movements

Potential impacts and mitigation

Sand extraction at Moreton Bay

The proposed sand extraction area is located at the Spitfire Realignment Channel, offshore from Woorim in northern Moreton Bay (southern end of Bribie Island). The Spitfire Realignment Channel was identified in the MBSES, undertaken by the Queensland Government in 2005, to consider future sand extraction proposals in Moreton Bay. The study examined the environmental, social and economic impacts of increasing sand extraction from the bay. Long-term impacts on coastal geomorphological processes and alternative sources of fine sand were also considered in the study.

PBPL holds an approval to dredge 15 million m³ of sand from the channel and has removed a total of 7.19 million m³ to date. The proponent proposes to deepen the approved dredge footprint held by PBPL by extracting an additional 1.1 million m³ of sand, leaving a final channel depth of approximately -17.05 CD.

The extraction area is part of the Moreton Bay Northern Tidal Delta supplied by longshore drift of sediment along the coast from Moreton Island. Bed sediments in the area are clean, fine-to-medium silica sands with negligible levels of nutrients and toxicants. Levels of naturally occurring suspended sediment, or 'background turbidity', in the area are considered to be low as it is a high-energy marine environment, approximately 7.5km from the nearest shore, and not subject to fluvial deposition of fine sediments from rivers.

A desktop review of previous site specific dredging studies in the Spitfire Realignment Channel was undertaken for the EIS to assess the potential impacts of dredging for the project. The assessment reviewed bathymetric surveys, geotechnical studies, sediment characterisation and contamination of sediment in Moreton Bay. The EIS also undertook numerical modelling of coastal processes and water quality for existing and developed scenarios to identify risks and quantify potential impacts on water quality.

The assessment of dredge plume impacts on water quality were undertaken for an 'expected case' considering seasonal scenarios and an 'extreme case', where the

extraction area contains finer sediments than indicated by previous studies to allow for a conservative assessment. The EIS identified the potential impacts from dredging as changes to: water quality through the dispersion of dredge plumes; and hydrodynamic processes in Moreton Bay.

Water quality and hydrodynamic impacts

The EIS found that some minor changes to the magnitude and direction of currents would occur in the immediate extraction area although significant changes to wave height, duration or direction are unlikely to occur at any shoreline.

The assessment of potential impacts on water quality considered the dispersal of sediment plumes under different tidal influences. Dredging operations undertaken during an ebb tide would result in dispersion to the north-west of the extraction area and those undertaken during a flooding tide would result in a sediment plume being transported south of the extraction area. During summer months, higher wave energy and winds from the south-east could transport plume material slightly further to the north than would occur during winter operations.

Small temporary increases in TSS were predicted to occur in the south-western corner of Marine National Park Zone 03. Dredge plumes would occasionally enter this area although bed shear stress (water force) is high enough to prevent any material from settling.

Exceedances of WQOs in this area were considered to be of low significance if mitigation measures are implemented as the exceedances would be temporary and lasting only a few hours per dredge cycle. The EIS noted two previous dredge operations in the channel by the PBPL which did not result in measureable changes to water quality in the eastern bay.

Sediments in the Spitfire Realignment Channel have a low content of fines (silt), less than 3 per cent, and negligible nutrient and toxicant loads. The modelled 'extreme case', which assumed all sediment lost in overflow from the dredger was silt, found TSS levels would be only slightly higher than those modelled for the 'expected case'.

To manage the potential impacts of dredging works, the proponent proposes to:

- monitor water quality to validate modelled outputs at the beginning of operations
- establish appropriate trigger values for water quality at sensitive receptors
- implement a reactive monitoring program to ensure dredging operations are adaptive and impacts can be minimised
- implement corrective actions triggered by the monitoring program such as dredging during flood tides so that the sediment plume disperses away from the Marine National Park Zone 03
- fit the dredger with a valve to reduce overflow turbulence and surface water turbidity.

Potential impacts of dredge plumes and water quality on benthic fauna and seagrass, are discussed in section 5.8 (Matters of state environmental significance) and section 6 (Matters of national environmental significance) of this report.

Sand spillage at Marcoola Beach pump-out site

After extraction, sand would be transported to a pump-out site, located approximately 600–1000m off-shore of Marcoola Beach. Sand spillage from the dredge may occur from the water inlets of the vessel's pump-out system and/or the discharge doors.

Depending on the type of dredger used, sand spillage at the pump-out site may temporarily decrease local seabed depths by a maximum of 1–2m. The amount of spilled sediment will depend on the type and age of dredger used as older models will typically spill more material than newer models.

The pump-out location covers depths from –13m to –22m AHD. The EIS indicated very little change to sea bed morphology below –15m AHD in the area and predicted that any spilled material would only become mobilised under relatively extreme wave conditions. Excessive spills would be re-dredged, however, this is unlikely to impact water quality as the works would be undertaken infrequently and over short timeframes.

Waste and chemical release from dredge vessels

Water quality impacts from dredge vessels at the sand extraction area and the pump-out site could include release of contaminants from wash-down operations and release/spillage of wastewater, sewage, solid waste, hazardous materials, fuel and oil.

To manage these potential impacts, the EIS proposed a Dredge Management Plan to ensure the dredge contractor follows appropriate waste handling, storage, transfer and disposal methods. The Dredge Management Plan includes commitments to:

- engage a licensed contractor where required
- install and monitor bins/hazardous waste storage containers
- treat sewage to Grade A standard using an on-board system
- monitor surrounding waters during deck washing and fuel transfer
- monitor fuel levels
- comply with discharge requirements of the *Transport Operations (Marine Pollution) Act 1995*, refuelling requirements of licensed port facilities and wash-down requirements of permits/approvals
- ensure spill response equipment is available during storage/transfer of hazardous waste.

If a leak or spill were to occur, the Dredge Management Plan includes commitments to:

- notify the relevant authority (project superintendent, Maritime Safety Queensland [MSQ] and/or DEHP) where required
- review procedures and re-train staff
- implement contingency and clean-up procedures for oil spills
- maintain a shipboard oil pollution emergency plan for the dredge vessel which would be provided to relevant authorities prior to the commencement of works.

Coordinator-General conclusions

I am satisfied the EIS has identified the potential impacts of dredging operations and the proposed management framework can adequately protect water quality values. To ensure this, I have stated conditions for inclusion in the environmental authority (ERA 16) requiring the proponent to develop a Dredge Management Plan including a monitoring program and management actions to be implemented if WQOs are exceeded. The conditions apply to dredging in Moreton Bay and unloading of dredge materials offshore of Marcoola Beach and would ensure the project does not result in erosion or damage to the banks of waters, impacts to riparian vegetation, or environmental harm to receiving waters. The conditions address submissions regarding the management of the sand delivery pipeline and require all infrastructure installed for sand delivery to be removed within 2 months of completion of the dredging program.

I have stated a condition for inclusion in the environmental authority requiring that handling of dredged material at the pump-out site minimises potential spillage and any spillage must not occur outside of the area nominated in the EIS.

5.7 Geology and soils

5.7.1 Existing environment

Geology and soils

The geology of the SCA site and surrounds is generally characterised by Quaternary (Pleistocene) age undifferentiated coastal plains, consisting of sand, mud and clay/silt. The proposed east-west runway footprint is underlain by two distinct ground conditions, a layer of dense/very dense indurated sand, commonly known as coffee rock, and soft/very soft marine clay.

The layer of dense or very dense indurated sand or coffee rock has been encountered across the majority of the proposed east-west runway footprint, generally between 0.2m–4.6m thick.

The soft/very soft marine clay was encountered over an approximately 30ha area, in particular at the north-western portion of the proposed east-west runway footprint at depths between 4.5m to more than 8m BGL. The thickness of the marine clay within this area was found to decrease outwards to the edges of the area. The EIS reports the clay is associated with low lying waterlogged areas supported by two drainage channels feeding into it from north-east and south-east directions of the site. The EIS found the clay is highly compressible and any future fill placed on it would cause consolidation due to the pressure placed on it.

Soils across the site are classed as podosols, are acidic, and fail the pH and water storage capacity criteria for SCL. Land types at the site are considered suitable for pasture grazing and are classified as Class C Good Quality Agricultural Land (GQAL).

Previous land uses on the project site include sugar cane farming on 65ha which ceased in 2003. This is discussed further in section 5.7 (Land use planning) of this report.

In terms of erosion, the project site is stable, with the typical annual erosion potential of 1 tonne/ha/year. Due to the presence of sand, the EIS reports that site soils are only slightly dispersive on the subsurface layer. For assessment of erosion and sediment control related to the dredge pipeline and assembly area, refer to section 5.6 (Water quality).

Acid sulfate soils

The EIS reported ASS are present across the SCA site, with majority of the site containing low to moderate levels of net acidity (up to 50 and 50-300 moles of acid per tonne (moles H⁺/t). Areas with lower levels of net acidity (less than 50 moles H⁺/t) were identified at the eastern extent of the proposed east-west runway and towards the north-western extent of the proposed east-west runway. Moderate levels of net acidity were identified predominantly to the south-west of the proposed east-west runway, with a few areas at the northern extent indicating moderate levels of net acidity. Acid soils are present as actual and potential however the PASS appear to be limited to depths of generally greater than 1m.

The marine clay present within the north-western portion of the proposed east-west runway footprint contains organic matter and accretions of sulphides. As a result, this area contains very high levels of PASS, with acidity ranging from more than 600 moles H⁺/t. Other parts of the east-west runway footprint consisting of indurated sand contain varied levels of acidity (less than 300 moles H⁺/t), present as both actual ASS and PASS.

Contaminated land

The EIS found the following five potentially contaminated sites located within the project area:

- sugarcane fields
- farm sheds used to maintain farming equipment/pesticide storage and mixing
- night soil disposal area
- fuel storage at the existing airport
- aviation rescue and firefighting service (ARFF) facilities
- aircraft maintenance facilities.

To assess the levels of contaminants in these areas, the EIS adopted criteria from the following guidelines:

- National Environmental Protection Measures (NEPM) Health Investigation Levels L-F Commercial/Industrial (NEPM HIL-F)
- CRC CARE Pty Ltd 2011 Health Screening Levels – D for Direct Contact (CRC HSL-D)
- NEPM 1999 Ecological Investigation Levels (NEPM EIL).

With the exception of the farm sheds, no exceedances of relevant environmental or human health criteria were identified from analysis of soil samples taken at these sites. Two farm sheds on the site showed hydrocarbon contamination above health-based assessment criteria for industrial/commercial land use. One surface sample from the farm sheds had concentrations of lead (2,340 mg/kg) exceeding levels in the adopted assessment criteria. The western perimeter drain and construction compound would be located in this area, and would require implementation of hydrocarbon and heavy metal contamination management measures.

The airport site is listed on the Environmental Management Register (EMR), for storing petroleum products or oil and because the site has been subject to a hazardous contaminant. Historical spills in the area have been the subject of separate soil and groundwater assessments undertaken by the airport tenant.

5.7.2 Methodology

Geotechnical assessments were undertaken for the proposed east-west runway footprint and associated infrastructure areas. The proponent conducted geotechnical drilling in 2010 and 2012, which consisted of borehole drilling and dynamic cone penetrometer (DCP) testing. Laboratory analysis provided an indication of the mechanical strength and load bearing capacity of the sub-surface soils. It also comprised of Atterberg limits and percentage fines assessments to confirm visual classifications of the soils and consolidation testing to confirm soil parameters for refinement of settlement analysis. The assessment was used to inform the proposed east-west runway design and ensure compliance with Part 139 of CASA Manual of Standards (MOS).

Preliminary ASS investigations were undertaken by the proponent in 2012 and 2013 with boreholes drilled across the proposed east-west runway footprint, northern and western perimeter drains, northern part of the proposed east-west runway and within the proposed biodiversity offsets area. The EIS reports these investigations do not entirely meet the requirements of the *State Planning Policy 2/02 Guideline: Planning and managing development involving acid sulfate soils* that was in place at the time of ASS sampling (replaced with SPP 2014).

ASS assessments undertaken for the EIS were conducted in accordance with the requirements of the SPP with the sampling and analysis planned using the Queensland Department of Natural Resources and Mines *Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils in Queensland*, 1998. Prior to construction of the project, the proponent has committed to undertake detailed ASS investigations to confirm the extent and severity of ASS and to refine the mitigation measures proposed in the EIS.

Contaminated land assessments were conducted in accordance with the DEHP, *Guideline for Contaminated Land Professionals*²³ 2012.

²³ Department of Environment and Heritage Protection, Guideline for contaminated land professionals, Department of Environment and Heritage Protection 2012, Brisbane, viewed 24 April 2016, <http://www.aclca.org.au/qld-docs/ehp-guideline-contaminated-land-professionals.pdf>

With respect to the erosion hazard assessment undertaken for the EIS, procedures were adopted from the International Erosion Control Association (IECA) *Best Practice Erosion and Sediment Control*, 2008.

5.7.3 Submissions received

Key issues regarding soils and contaminated land raised in submissions on the EIS and AEIS included the following:

- management of ASS, in particular runoff from sand placement into surface water
- potential impacts of ASS on groundwater and bore water
- likelihood of whether calcareous material will buffer soil acidity of sand deposits in a terrestrial environment
- the need for a more detailed ASS environmental management framework
- contamination of shallow groundwater by hydrocarbons
- management of contaminated land in the proposed construction compound.

I have considered each submission and the responses provided by the proponent in my evaluation of the project and my assessment is provided in relevant sections below.

5.7.4 Impacts and mitigation measures

Geology and soils

Following an assessment of clay soils in the north-west portion of the proposed east-west runway, the EIS proposed a revision of the runway footprint. The revision included a 310m move in the runway footprint to the south-east, while maintaining the east-west alignment. This move reduced 500,000m³ of required surcharge fill and potential flooding impacts (discussed further in section 5.5 [Natural hazards]).

Soft soils underlying the north-west portion of the proposed east-west runway would still require a 1m high surcharge fill to be placed and allowed to consolidate to create a stable platform for construction of the proposed east-west runway pavement. The soils are expected to settle by 600mm over a 12 month period with additional settlement of 50mm expected over the 100 year design life of the proposed east-west runway.

The EIS reports that compression and consolidation of soils is not expected to extend more than 20m from the surcharge area. Consequently, it is unlikely to affect the Sunshine Motorway.

Acid sulfate soils

The key environmental risks associated with ASS identified in the EIS include:

- acidification of groundwater table caused by ASS settling beneath the groundwater table during surcharge
- mobilisation of acidity in soils at the surface of the soil profile following placement of saturated fill materials in the reclamation area
- disturbance of ASS/PASS during excavation of drains

- groundwater drawdown as a result of northern perimeter drain excavation.

Northern perimeter drain

The AEIS estimated that excavation of the northern perimeter drain could result in disturbance of 74,000m³ of ASS/PASS material with very high net acidity levels. Excavation of these soils has potential to result in oxidation and mobilisation of ASS into the Maroochy River and Mount Coolum National Park.

To neutralise the acidity in the northern perimeter drain, a guard layer of lime would be placed within the drain to manage potential seepage of saline water into groundwater or runoff into surface waters. This would be done in accordance with the Queensland *Acid Sulfate Soil Technical Manual: Soil management guidelines* 2014²⁴.

Excavation of the northern perimeter drain has the potential to result in groundwater drawdown due to shallow groundwater levels. As a key mitigation measure, the EIS proposed construction of a low permeability cut-off wall on the northern side of the drain down to the layer of coffee rock. The cut-off wall would extend along the full length of the northern perimeter drain to minimise groundwater drawdown and subsequent oxidation of PASS. The cut-off wall would also maintain the groundwater level north of the drain and the Mount Coolum National Park. These measures address the matters raised in submissions concerning management of ASS.

Western and southern perimeter drains

Excavation of the western perimeter drain is predicted to result in disturbance of approximately 30,000m³ material with low to moderate levels of net acidity. As a result of the excavation works, there is potential for oxidised ASS to enter into groundwater, which would be treated using the methods proposed for the northern perimeter drain. A low permeability cut-off wall, westwards of the drain would be installed down to the layer of the coffee rock to prevent lowering of the water table below potential ASS and protect conservation areas located south of the proposed east-west runway.

General drainage

Excavation of the proposed east-west runway drain would result in disturbance of approximately 1,500m³ material with low to moderate levels of net acidity. Given the low to moderate levels of net acidity, this material is unlikely to result in significant environmental risks.

The AEIS reports that proposed maintenance works to the existing southern perimeter drain include clearing and reshaping of the existing drainage channel. Likely acidity levels of soils in this drain are currently unavailable and would be confirmed through additional ASS investigations. Notwithstanding, the EIS reports any ASS material would be neutralised in accordance with relevant guidelines.

²⁴ Department of Science, Information Technology, Innovation and the Arts 2014, Queensland Acid Sulfate Soil Technical Manual: Soil Management Guidelines. Brisbane: Department of Science, Information Technology, Innovation and the Arts, viewed 16 May 2016, <https://publications.qld.gov.au/storage/f/2014-09-01T07%3A37%3A45.276Z/queensland-ass-management-guideline-2014.pdf>

Dredge material placement

The project proposes to fill the north-western part of the site with sand fill 2m–3.5m above existing ground levels. Settlement of the natural surface following placement of the fill is expected to be up to 600mm. Compression of the deep soft clay layer could result in shallow unsaturated soils at the surface settling and remaining below the water table. ASS present in this normally unsaturated layer could be mobilised into the groundwater system, resulting in groundwater acidification.

To mitigate this risk, the EIS proposed installing a high density polyethylene (HDPE) liner in the reclamation area prior to placement of fill to prevent tail water moving through the soil beneath the proposed east-west runway footprint. This measure addresses the submissions concerning ASS impacts on groundwater.

Erosion and sediment control

The EIS reports that the project would increase the site's annual erosion rate of 1 tonne/ha/year to 14t/ha/year during the construction phase from activities such as clearing vegetation, excavating drains and exposure of steep slopes on the drain banks and the reclamation area bunds. Under the Sunshine Coast Council Erosion Control Manual, this rate is considered to be a very low erosion hazard.

Erosion risks during project operations are associated with increased runoff from the proposed east-west runway pavement and mobilisation of sediment into nearby waterways. This is discussed further in section 5.6 of this report (Water quality).

In accordance with the IECA *Best Practice and Erosion Sediment Control*, 2008, a detailed Erosion and Sediment Control Management Plan (ESCMP) would be prepared and implemented prior to construction. The ESCMP would include, but not be limited to, prescribing control measures such as staging of clearing works, stormwater management during construction, stockpile management, soil stabilisation and protection and relevant sediment control infrastructure.

Contaminated land

The AEIS reported contaminated soil (hydrocarbons and heavy metals) found at the farm sheds could be disturbed as a result of farm shed removal and establishment of a construction compound. Removal of the sheds is required to allow for construction of the western perimeter drain.

To manage potential environmental and human health risks associated with disturbance of contaminated soils at this site, the proponent must undertake a detailed contaminated land and risk assessment prior to construction. The assessment would define the area of contamination and identify appropriate remediation and management measures. Prior to undertaking remediation of the soils, the proponent would need to obtain an approved remediation plan under the EP Act.

The EIS reported that while soil samples taken at the night soil disposal area indicated high concentrations of nitrogen, these concentrations are generally considered unlikely to pose environmental or human health risk. Concentrations of pesticides and heavy metals at the sugarcane fields were below the relevant health and environmental

criteria, therefore no environmental or human health risks would occur. No disturbances are proposed for the other potentially contaminated areas identified on the project site.

Should high concentrations of contaminants be identified during detailed assessment, the proponent has committed to remediate the soils in accordance with an approved remediation plan.

5.7.5 Coordinator-General's conclusions

I am satisfied that the EIS and AEIS have identified the potential impacts associated with acid sulfate soils, erosion and disturbance of contaminated land and that the management measures proposed can adequately mitigate the potential impacts.

To ensure this, I have stated conditions for inclusion in the environmental authority (ERA 16) requiring the proponent to submit a site specific ASSMP. I have also made a recommendation in Appendix 3 that the ASSMP be applied to all aspects of the project that may disturb ASS or PASS, such as earthworks and drain construction. This will ensure submitter issues regarding ASS impacts on groundwater and bore water are addressed.

To protect the Mount Coolum National Park and prevent drawdown of groundwater from the northern perimeter drain, I have stated conditions requiring installation of a low permeability cut-off wall along the northern perimeter drain from the ground surface down to the confining coffee rock layer. I have also included conditions requiring the installation of a low permeability cut-off wall along the western perimeter drain where necessary to protect conservation areas south of the proposed east-west runway and to prevent lowering the water table below potential ASS.

With respect to erosion and sediment control, I have stated a condition for inclusion in the environmental authority (ERA 16) requiring the proponent to develop and implement erosion and sediment controls in accordance with *Best Practice Erosion and Sediment Control (BPESC) guidelines for Australia (International Erosion Control Association)*.

Where disturbance of contaminated land is required, the proponent would need to develop a remediation plan for approval under the EP Act to ensure environmental and human health risks are adequately managed. In response to submissions regarding hydrocarbon contamination of groundwater, my stated conditions also address the storage of hazardous contaminants and include requirements to install secondary containment systems to prevent the release of contaminants to land, groundwater or surface water.

5.8 Matters of state environmental significance

This section assesses potential impacts on matters of state environmental significance (MSES). Impacts on MSES that are also listed as MNES under the EPBC Act are addressed in the MNES section of this report (section 6).

The MSES found within the project area are:

- regulated vegetation (endangered and 'of concern' regional ecosystems [REs] and essential habitat for threatened flora and fauna), and wetlands and watercourses (wetlands of high ecological value [HEV])
- connectivity areas
- protected wildlife habitat (protected plants and animals)
- protected areas (Mount Coolum National Park and Moreton Bay Marine Park)
- FHAs (Maroochy River FHA).

5.8.1 Submissions received

Key issues raised in submissions on the EIS and AEIS regarding potential impacts to MSES included:

- effectiveness of the proposed connectivity corridor in supporting ecosystem functions due to aircraft noise impacts and restrictions on airport safety requirements (vegetation trimming to maintain specific vegetation heights around the runway) and edge effects (weed invasion and predation) on the corridor
- appropriateness and likelihood of the proposed translocation of Mount Emu she-oak being successful and contingency measures
- suitability of the 'Palmview' site in providing a conservation gain for the acid frogs and the Mount Emu she-oak (as a contingency measure to translocation)
- potential for the construction of the dredge pipeline to impact on the wallum orchid
- requirement for pre-clearing flora surveys, species management plans and compliance with the Nature Conservation (Wildlife Management) Regulation 2006
- the effectiveness of a linear strip beside a runway being maintained as ground parrot and acid frog habitat
- potential salinity impacts from tailwater discharge on acid frogs in the east drain which is connected to the Marcoola drain
- potential impacts on water mouse habitat in the Maroochy River associated with tailwater discharge to Marcoola drain and sediment runoff/land disturbance
- impacts of aircraft noise on fauna, particularly impacts on wedge-tailed shearwaters that nest on Mudjimba Island, and increased risk of bird strike with the new flight path
- lighting impacts on nesting turtles/hatchlings on Marcoola Beach during airport operations and from subsequent airport-related development
- timing of sand pumping works to avoid impacts on nesting turtles and hatchlings and dredging impacts on turtles including transit of the dredge vessel

- reinstatement of the dune following the cessation of sand delivery.

I have considered each submission and the responses provided by the proponent in my evaluation of the potential impacts of the project on the MSES and my assessment is provided in relevant sections below.

5.8.2 Regulated vegetation

Background

Under the *Queensland Environmental Offsets Policy Significant Residual Impact Guideline*, regulated vegetation is a 'prescribed regional ecosystem' that:

- is an 'endangered' or 'of concern' RE, as defined under the *Vegetation Management Act 1999* (VM Act)
- intersects with watercourses on the 'vegetation management watercourse map', or with wetlands on the 'vegetation management wetlands map'
- is an essential habitat area for wildlife declared 'endangered' or 'vulnerable' under the *Nature Conservation Act 1992* (NC Act).

Regional ecosystems

Vegetation management mapping for the project area indicates that:

- 56.01ha (27 per cent) of the project area is mapped as containing remnant vegetation including one 'of concern', and four 'least concern' RE types
- 3.17ha (2 per cent) is mapped as containing regrowth REs
- 144.80ha (71 per cent) is mapped as non-remnant vegetation.

The following REs in the project area are considered 'regulated vegetation':

- broad-leaved paperbark open forest and palustrine wetland (RE 12.2.7)
- closed or wet heath (RE 12.2.12)
- closed sedgeland in coastal swamps (RE 12.2.15)
- *Casuarina glauca* open forest on margins of marine clay plains (RE 12.1.1).

These REs are described in more detail in Table 5.15.

Table 5.15 Impacted regulated vegetation

RE	VM Act class	Area impacted (ha)	Definition	Essential habitat for ground parrot (GP), wallum froglet (WF), wallum sedgefrog (WSF) and wallum rocketfrog (WRF)
12.1.1	Of concern	1.2	<i>Casuarina glauca</i> open forest on margins of marine clay plains	Not essential habitat
12.2.7	Least concern	24.4 5.8 transition to dwarf heathland	Broad-leaved paperbark open forest and palustrine wetland	Essential habitat for the GP, WSF, WF, WRF
12.2.12	Least concern	23.8	Closed or wet heath	Essential habitat for the GP, WSF, WF, WRF
12.2.15	Least concern	0.3	Closed sedgeland in coastal swamps	Essential habitat for the WSF, WF, WRF

Watercourse vegetation

A map of referable wetlands generated for the airport site indicates that most of the project footprint includes areas mapped as 'wetlands of HEV'. These areas are based on the presence of REs 12.2.7, 12.2.12 and 12.2.15 which are defined as palustrine (freshwater) wetland, and RE 12.1.1 which is defined as estuarine wetland (e.g. mangrove).

Essential habitat

Essential habitat for the wallum sedgefrog, wallum froglet and wallum rocketfrog include REs 12.2.7, 12.2.15 and 12.2.12 within the project area, and essential habitat for the ground parrot includes REs 12.2.12 and 12.2.15.

Impacts and mitigation

The project is expected to result in the permanent removal of approximately 50ha of remnant vegetation, and the transition of approximately 6ha of remnant vegetation to dwarf heathland that is regulated vegetation. The impacted regulated vegetation is listed in Table 5.15.

A portion of vegetation that would be lost includes vegetation that is essential habitat for the wallum sedgefrog, wallum froglet, wallum rocket frog (47.07ha) and the ground parrot (22.84ha). The loss of essential habitat for these species on the project site constitutes a significant residual impact and requires an offset.

The offset requirements and proposed offset strategy for the three frog species and the ground parrot are discussed in detail under 'Protected wildlife habitat—protected animals (terrestrial)' section below.

Only one of the impacted REs (12.1.1) is classed as 'of concern' vegetation under the VM Act. As the project is expected to result in the loss of a small area of this RE (1.2ha), this would not constitute a significant residual impact and would therefore not require an offset.

Coordinator-General's conclusion

I am satisfied the EIS has identified and assessed the project's impacts on regulated vegetation. A more detailed evaluation is provided for the project's impacts on essential habitat in the threatened species chapter of this report for the wallum froglet, wallum rocketfrog and ground parrot.

5.8.1 Connectivity areas

Background

Under the *Queensland Environmental Offsets Policy Significant Residual Impact Guideline* 'connectivity areas' are defined as areas of remnant vegetation outside urban areas containing prescribed REs that are required for ecosystem functioning.

Regulated vegetation management mapping for the project area shows that the proposed east-west runway footprint includes a section of remnant vegetation, which directly connects with the northern and southern sections of Mount Coolum National Park. In the wider region the two sections of Mount Coolum National Park form part of a wildlife corridor from Lake Weyba to the Maroochy River.

This tract of vegetation is the only remaining connection between the two sections of National Park. Most of the land between these sections has been cleared or is cropping land. This tract of vegetation is therefore considered to be significant in terms of maintaining a functioning ecosystem between the two sections of national park.

Impacts and mitigation

The construction of the runway would remove connectivity between the northern and southern sections of Mount Coolum National Park and subsequently reduce connectivity in the wider region between Lake Weyba and the Maroochy River.

To compensate for this loss, the proponent proposes to revegetate/rehabilitate a 100-metre-wide corridor around the western extent of the new runway to create a new ecological corridor between the sections of Mount Coolum National Park.

Revegetation works would be undertaken to establish native vegetation of sufficient density to allow fauna passage, and native canopy tree species would be planted along most of the corridor. However, due to operational aircraft safety requirements a number of vegetation management regimes would be required as follows:

- Along the northern boundary, vegetation would be maintained at a height that does not exceed 1.5m. Revegetation in this area would consist of locally occurring native shrubs and wallum vegetation
- On either side of the northern end of the runway, vegetation would be maintained at a height that does not exceed 6m. Plantings would exclude flowering species (i.e.

Melaleuca, Corymbia, Angophora, Lophostemon and Eucalyptus) to avoid attracting flying foxes and reduce the risk of aircraft strike

- On the far northern end of the runway within the runway splay area, vegetation would be maintained at a height that does not exceed 2m. Plantings would exclude flowering species to avoid attracting flying foxes and reduce the risk of aircraft strike.

As raised in submissions on the EIS and AEIS, the airport safety restrictions on vegetation within the corridor may impact the effectiveness of the corridor in providing connectivity between the two sections of National Park. The proponent would be required to demonstrate that the proposed corridor is of sufficient size or configured in a way that maintains a functioning ecosystem. If it is found that connectivity is not sufficiently maintained, the proponent would be required to undertake additional measures.

Submissions on the AEIS also raised issues about the potential for the proposed corridor to create negative edge effects (i.e. increased risk of predation and competition from invasive species). Edge effects would be managed as part of the offset management plan and operational environmental management plan (EMP) for the project site. This would include management of weeds and ensuring that dense plantings are undertaken on the edges. The proponent would also be obligated to keep these areas free of declared animal and plant pests as required under the *Land Protection (Pest and Stock Route Management) Act 2002*.

Coordinator-General's conclusion

I am satisfied the EIS has identified the project's potential impacts on connectivity areas. I consider that the project is unlikely to have an adverse impact on connectivity, provided the proponent implements the proposed mitigation measures and commitments, and complies with the conditions stated and recommended in Appendix 1 of this report. In addition I draw the proponent's attention to my recommendations in Appendix 3.

The conditions I have stated for the inclusion in ERA16 (dredging, extractive industry and screening), that are relevant to protecting the proposed connectivity corridor from project impacts, include conditions requiring the proponent to:

- install HDPE lining on the base and sides of the reclamation area to prevent contaminant ingress into the adjacent areas of National Park that connect to the corridor and the corridor offset area
- construct a permanent low-permeability cut-off wall from the ground surface down to the confining coffee rock layer, adjacent to the northern perimeter drain, to protect the Mount Coolum National Park from groundwater drawdown
- install a permanent groundwater cut-off wall along the western perimeter drain, westwards of the drain where necessary, to protect the proposed site for the connectivity area offsets by avoiding lowering groundwater below the PASS
- prepare an ASSMP for all aspects of the project that may disturb ASS or PASS, (such as earthworks and drain construction) to ensure disturbances are appropriately managed and impacts are minimised during project construction

- determine pre-disturbance background groundwater elevations and quality for the area rehabilitated for conservation offset purposes and the habitat corridor between, and to monitor the effects of the activity to ensure there are no adverse impacts (and take corrective action, if required).

5.8.2 Protected wildlife habitat—protected plants

Background

Under the Queensland Environmental Offsets Regulation 2014 'protected wildlife habitat' is defined as:

- an area of essential habitat on an essential habitat map for an animal or plant that are 'endangered' or 'vulnerable' wildlife
- an area that is shown as a high-risk area on a flora trigger survey map and that contains plants that are 'endangered' or 'vulnerable' wildlife
- an area not shown as a high-risk area on a flora trigger survey map, to the extent the area contains plants that are 'endangered' or 'vulnerable' wildlife
- an area of habitat (e.g. foraging, roosting, breeding habitat) for an animal that is 'endangered', 'vulnerable' or a 'special least concern' animal.

Habitat assessment

Desktop studies and field surveys recorded a detailed flora inventory of the site. Table 5.16 shows the 20 flora species, listed in the Queensland Nature Conservation (Wildlife) Regulation 2006, identified as potentially occurring within the project area.

Table 5.16 Protected flora species potentially occurring in the project area

Common name (species name)	NC Act listing status	EPBC Act listing status
Mount Emu she-oak (<i>Allocasuarina emuina</i>)	Endangered	Endangered
Mount Coolum she-oak (<i>Allocasuarina thalassoscopica</i>)	Endangered	Endangered
Hairy-joint grass (<i>Arthraxon hispidus</i>)	Vulnerable	Vulnerable
Minature moss-orchid (<i>Bulbophyllum globuliforme</i>)	Near threatened	Vulnerable
Marbled balogia (<i>Baloghia marmorata</i>)	Vulnerable	Vulnerable
Stinking cryptocarya (<i>Cryptocarya foetida</i>)	Vulnerable	Vulnerable
Bopple nut (<i>Macadamia ternifolia</i>)	Vulnerable	Vulnerable
Lesser swamp-orchid (<i>Phaius australis</i>)	Endangered	Endangered
Wallum leek-orchid (<i>Prasophyllum wallum</i>)	Vulnerable	Vulnerable
Mount Berryman phebalium (<i>Phebalium distans</i>)	Endangered	Critically endangered
Glossy spice bush (<i>Triunia robusta</i>)	Endangered	Endangered
Attenuate wattle (<i>Acacia attenuata</i>)	Vulnerable	Vulnerable
Mount Coolum bertya (<i>Bertya sharpeana</i>)	Near threatened	Not listed

Common name (species name)	NC Act listing status	EPBC Act listing status
<i>Plectranthus torrenticola</i>	Endangered	Endangered
Tiny wattle (<i>Acacia baueri</i> subsp. <i>Baueri</i>)	Vulnerable	Not listed
Swamp stringybark (<i>Eucalyptus conglomerate</i>)	Endangered	Endangered
Mountain tee-tree <i>Leptospermum oreophilum</i>	Vulnerable	Not listed
Durringtonia (<i>Durringtonia paludosa</i>)	Near threatened	Not listed
Slender milkvine (<i>Marsdenia coronata</i>)	Vulnerable	Not listed
<i>Gonocarpus effusus</i>	Vulnerable	Not listed

As discussed in the 'listed threatened species and communities' section of the MNES section, the following species are considered unlikely to occur in the project area based on limited suitable habitat, or the site being located outside known population range:

- Mount Coolum she-oak
- hairy-joint grass
- miniature moss-orchid
- stinking cryptocarya
- bopple nut
- *Plectranthus torrenticola*
- marbled balogia
- Mount Berryman phebalium
- glossy spice bush.

Species of flora which are not listed under the EPBC Act and are considered unlikely to occur based on the absence of suitable habitat include:

- Mount Coolum Bertya—has only been recorded within the montane heath communities on the steep slopes of Mount Coolum
- *Leptospermum oreophilum*—has been only been recorded within montane heath communities on Mount Coolum and the rocky slopes of the Glass House Mountains.

As discussed in the MNES section, the attenuate wattle, swamp stringybark, and the wallum leek-orchid may occur based on the presence of potentially suitable habitat. Additional species that may also occur, based on the presence of the potentially suitable habitat include the:

- tiny wattle— was previously recorded on the airport site in 2003
- durringtonia—occurs in closed sedgeland communities in coastal swamps and wet heath.

While field surveys did not locate any individuals of these species in the project area, the proponent has committed to conduct pre-clearance surveys for all threatened species. This commitment would address the issue raised in a submission made on the AEIS about the requirement for pre-clearance surveys.

Impacts and mitigation

Only two of the species in Table 5.16 were identified during field surveys: the Mount Emu she-oak (*Allocasuarina emuina*) and lesser swamp-orchid (*Phaius australis*).

Mount Emu she-oak

Potential impacts on the Mount Emu she-oak are discussed in section 6 of this report (Matters of national environmental significance). I concluded the project is unlikely to have an unacceptable impact on this species, provided that the proposed avoidance and mitigation measures are undertaken by the proponent in addition to the conditions stated in Appendix 1 of this report. In addition I draw the proponent's attention to my recommendations in Appendix 3.

For the Mount Emu she-oak, the conditions I have stated for inclusion in ERA16 that are relevant to protecting the remaining AEP1 population, AEP2 and proposed translocation site include conditions requiring the proponent to:

- install HDPE lining on the base and sides of the reclamation area to reduce the saltwater ingress into the groundwater (the remaining AEP1 population, AEP2 and translocation site)
- construct a permanent low-permeability cut off wall from the ground surface down to the confining coffee rock layer, adjacent to the northern perimeter drain, to protect the Mount Cooloom National Park from groundwater drawdown (AEP2 and translocation site)
- prepare an ASSMP for all aspects of the project that may disturb ASS or PASS, (such as earthworks and drain construction) to appropriately manage disturbances and minimise impacts during project construction (the remaining AEP1 population).

I have recommended a condition requiring the proponent to offset the significant residual impact of 4.4ha of Mount Emu she-oak.

Submissions made on the EIS and AEIS raised issues about the appropriateness and likelihood of the proposed translocation of Mount Emu she-oak being successful, and whether contingency measures would be employed in the event translocation is not successful.

The proponent has proposed to undertake translocation using a heath tile translocation methodology which has been used for other heathland vegetation on the Sunshine Coast with a high level of success (i.e. 95 per cent of the re-established vegetation surviving). Being a heathland species, it is considered that this heath tile translocation methodology would be appropriate for the Mount Emu she-oak.

As a contingency the proponent has proposed to collect and store seeds for future propagation and planting into a suitable site. The proponent has identified a potentially suitable site at the 'Palmview' site where the acid frog offsets are proposed. I have included a recommendation in Appendix 3 requiring the proponent to develop contingency measures, in the event that the proposed translocation is not successful.

Lesser swamp-orchid

Potential impacts on the lesser swamp-orchid are discussed in section 6 of this report (MNES). I concluded the project is unlikely to have an unacceptable impact on this species, provided that the proposed avoidance and mitigation measures are undertaken by the proponent in addition to the conditions recommended in Appendix 3 of this report.

I have recommended conditions requiring the proponent to:

- ensure vegetation clearing and any construction activities are limited to areas outside of the lesser swamp-orchid population and any supporting habitat within the site
- ensure tree protection fencing and signage are established prior to the commencement of works
- undertake pre-clearing surveys within the clearing footprint and apply appropriate measures to conserve individual plants identified during these surveys.

A submission made on the AEIS indicated that construction of the dredge pipeline has the potential to impact on the lesser swamp orchid. To ensure the protection of this flora species, I have recommended conditions requiring the proponent to take all reasonable steps to avoid disturbances to this population and appropriate measures are undertaken to conserve any individual plants if identified during pre-clearance surveys.

Coordinator-General's conclusion

I am satisfied the EIS has identified and assessed the project's potential impacts on protected plants. I consider that the project is unlikely to have an adverse impact on protected plants provided that the proponent implements the proposed mitigation measures and commitments, and complies with the conditions stated in Appendix 1 of this report.

The proponent has committed to address all of the relevant provisions of the NC Act, including obtaining and implementing protected plant permits. This commitment would address the issue raised in a submission made on the AEIS about the requirement for pre-clearance surveys.

To address the provisions of the NC Act the proponent would be required to undertake pre-clearance surveys in the high-risk areas to determine if protected plants are located in the clearing impact area. The proponent would need to provide an impact management plan, which has been developed in accordance with the *Nature Conservation (Wildlife Management) Regulation 2006: Protected plants assessment guidelines*.²⁵ That plan would provide detail on the actions that would be undertaken to avoid and minimise the removal of protected plants.

²⁵ Department of Environment and Heritage Protection, *Nature Conservation (Wildlife Management) Regulation 2006: Protected plants assessment guidelines*, Department of Environment and Heritage Protection, 2014, <https://www.ehp.qld.gov.au/licences-permits/plants-animals/documents/protected-plants-assessment-guidelines.pdf>

5.8.3 Protected wildlife habitat—protected animals (terrestrial)

Background

Under the Queensland Environmental Offsets Regulation 2014 'protected wildlife habitat' is defined as:

- an area of essential habitat on an essential habitat map for an animal or plant that is 'endangered' or 'vulnerable' wildlife
- an area of habitat (e.g. foraging, roosting, breeding habitat) for an animal that is 'endangered', 'vulnerable' or a 'special least concern' animal.

Under the NC Act, 'special least concern' includes least concern birds which are listed under international agreements: JAMBA, CAMBA and the Bonn Convention.

Habitat assessment

Special least concern species

Figure 5.1 shows the 12 species, listed as 'special least concern' under the NC Act, identified as potentially occurring within 5km of the project area.

Figure 5.1 'Special least concern' species potentially occurring in the project area

Common name (species name)	NC Act listing status	EPBC Act listing status
Mammals		
Short-beaked echidna (<i>Tachyglossus aculeatus</i>)	Special least concern	Not listed
Birds		
Rainbow bee-eater (<i>Merops ornatus</i>)	Special least concern	Marine, migratory
Satin flycatcher (<i>Myiagra cyanoleuca</i>)	Special least concern	Marine, migratory
Spectacled monarch (<i>Symposiachrus trivirgatus</i>)	Special least concern	Marine, migratory
Black-faced monarch (<i>Monarcha melanopsis</i>)	Special least concern	Marine, migratory
Fork-tailed swift (<i>Apus pacificus</i>)	Special least concern	Marine, migratory
White-throated needletail (<i>Hirundapus caudacutus</i>)	Special least concern	Marine, migratory
Rufous fantail (<i>Rhipidura rufifrons</i>)	Special least concern	Marine, migratory
Glossy ibis (<i>Plegadis falcinellus</i>)	Special least concern	Marine, migratory
Eastern great egret (<i>Egretta alba</i>)	Special least concern	Marine, migratory
Cattle egret (<i>Ardea ibis</i>)	Special least concern	Marine, migratory
Eastern osprey (<i>Pandion haliaetus</i>)	Special least concern	Marine, migratory

Eleven of these species are also listed as migratory species under the EPBC Act. I concluded in section 6.8.5 (Terrestrial migratory birds) that the following species are not expected to be adversely impacted by the project due to the limited availability of habitat on the site resulting in the low likelihood of these species occurring:

- black-faced monarch
- spectacled monarch
- satin fly-catcher
- eastern osprey.

The glossy ibis is also considered unlikely to be impacted as this species is not known to occur on the project site.

The rainbow bee-eater, rufous fantail, white-throated needletail, fork-tailed swift, cattle egret and eastern great egret were identified on the project site. I concluded in the MNES section that the project is unlikely to have an adverse impact on these species, provided that the proponent implements the mitigation measures and commitments described in the EIS. This includes providing a connectivity corridor around the western end of the new runway (discussed in section 5.8.1 [Connectivity areas]), rehabilitating land at the 'Palmview' site (discussed in section 5.8.3 for the wallum froglet and wallum rocketfrog) and managing feral predators on the site.

Endangered and vulnerable species

Table 5.17 shows the five species listed as 'endangered' and ten species listed as 'vulnerable' under the NC Act, identified as potentially occurring within 5km of the project area.

Table 5.17 Endangered and vulnerable species potentially occurring in the project area

Common name (species name)	NC Act listing status	EPBC Act listing status
Mammals		
Water mouse (<i>Xeromys myoides</i>)	Vulnerable	Vulnerable
Koala (<i>Phascolarctos cinereus</i>)	Vulnerable	Vulnerable
Large-eared pied bat (<i>Chalinolobus dwyeri</i>)	Vulnerable	Vulnerable
Birds		
Ground parrot (<i>Pezoporus wallicus wallicus</i>)	Vulnerable	Not listed
Glossy black cockatoo (<i>Calyptorhynchus lathami</i>)	Vulnerable	Not listed
Red goshawk (<i>Erythrorhynchis radiatus</i>)	Endangered	Critically endangered
Regent honeyeater (<i>Anthochaera Phrygia</i>)	Endangered	Critically endangered
Coxen's fig-parrot (<i>Cyclopsitta diophthalma</i>)	Endangered	Endangered

Common name (species name)	NC Act listing status	EPBC Act listing status
Swift parrot (<i>Lathamus discolor</i>)	Endangered	Endangered
Black-throated finch (southern) (<i>Poephila cincta cincta</i>)	Endangered	Endangered
Australian painted snipe (<i>Rostratula australis</i>)	Vulnerable	Endangered
Black-breasted button-quail (<i>Turnix melanogaster</i>)	Vulnerable	Vulnerable
Frogs		
Wallum sedgefrog	Vulnerable	Vulnerable
Wallum froglet	Vulnerable	Not listed
Wallum rocketfrog	Vulnerable	Not listed

A number of species that were listed as 'threatened' under the NC Act at the time of the EIS have been revised to 'least concern' since the proponent's EIS assessment. These include the black-necked stork, Lewin's rail and grey goshawk. These species are not considered in this evaluation.

Some species identified in Table 5.17 are also listed under the EPBC Act. I concluded, in the MNES section, that the following species are not expected to be adversely impacted by the project:

- large-eared pied bat
- red goshawk
- regent honeyeater
- Coxen's fig-parrot
- swift parrot
- black-throated finch (southern)
- Australian painted snipe
- black-breasted button-quail.

These species are unlikely to be adversely impacted due to the limited availability of habitat and the low likelihood of these species occurring within the airport site.

Records for the areas close to the airport site indicate that koalas and glossy black cockatoos may occur in the project area. There are eight koala recordings within 5km of the project area, with the closest recording being less than 1km from the south-western end of the new runway. Koala habitat is limited at the airport site and no koalas were recorded on the site during surveys. Similarly, no glossy black cockatoos were identified during surveys and there is limited foraging habitat on the airport site. Given the limited availability of habitat and the low likelihood of these species occurring on the airport site, the project is unlikely to have an adverse impact on the koala and the glossy black cockatoo.

Of the species listed in Table 5.17 the ground parrot, wallum sedge frog, wallum froglet, wallum rocketfrog and the water mouse are known to occur in the project area.

The wallum sedgefrog and water mouse are assessed in detail in the 'listed threatened species and communities' section of the MNES section of this report.

Water mouse

The project is not expected to have an adverse impact on this species, provided that the proponent implements the proposed project mitigation measures and commitments, and complies with the conditions stated and recommended in this report. The conditions I have stated in Appendix 1 (for inclusion in ERA16) that are relevant to protecting water mouse habitat downstream from Marcoola drain include conditions requiring the proponent to:

- install HDPE lining on the base and sides of the reclamation area
- prepare an ASSMP for all aspects of the project that may disturb ASS or PASS, (such as earthworks and drain construction) to ensure disturbances are appropriately managed and impacts are minimised during project construction
- ensure settled tailwaters that are released comply with surface water release limits, that a monitoring program be undertaken to determine the effects of the activity on the water quality of the Maroochy River, and for corrective actions to be undertaken where any limits are exceeded.

A submission made on the EIS and AEIS raised issues about the potential impacts on water mouse habitat in the Maroochy River associated with tailwater discharge to Marcoola drain and sediment runoff/land disturbance during construction. The EIS indicated that tailwater discharge to Marcoola drain is not expected to significantly change water quality in the Maroochy River (i.e. at the mouth of the drain and downstream of the drain) from existing conditions, as tailwater would first be mixed in Marcoola drain and subsequently mixed with tidal waters at the Maroochy River/Marcoola drain confluence. Conditions of the ERA include conditions to manage the quality of water being released from the project site (stormwater run-off and ASS), and tailwater discharge during reclamation works. The proponent would be required to adhere to water quality limits.

Ground parrot (*Pezoporus wallicus wallicus*)

Background

In Queensland, the ground parrot's known distribution is restricted to the south-east coastal region, mainly around Cooloola, and ranges from Fraser Island in the north, to Mooloolah River National Park in the south.

The ground parrot typically occurs in wet and dry coastal heathland vegetation (0.25 to 1.5m in height and composed of diverse range of shrubs, sedges and rushes), and dense sedgeland vegetation containing a high density of food plants. Parrots forage on the seeds of a variety of sedges, grasses, herbaceous plants and shrubs, and occasionally green shoots, leaves, buds, flowers and small fruits.

Ground parrots are almost entirely terrestrial (remaining on the ground), but can fly short distances when disturbed. The species is mostly active during the day however territorial and mating calls occur around 20 to 25 minutes prior to sunrise and after

sunset. Breeding typically occurs between August and December, but may occur as early as July and as late as March. The ground parrot mostly nests on the ground in dry heathland vegetation, however sometimes nest in moist areas or areas which transition between dry and wet habitats. Nests are usually beneath low, dense vegetation such as sedges, rushes, ferns and shrubs including *Xanthorrhoea*, *Banksia*, *Empodisma* and *Leptospermum*.

The airport site has created optimal conditions for the ground parrot. Parrots within the airport boundary are protected from predation by foxes and other feral predators, by the security fencing that surrounds its perimeter. In addition, vegetation-slashing activities within the airport site have created more areas of suitable foraging habitat for the ground parrot by reducing the growth of shrubs and woody vegetation. These areas include the WHMA, a narrow strip immediately east of the WHMA, and the helicopter training area.

During EIS surveys, ground parrots were mostly recorded on the airport site from within the WHMA, and the highest densities were identified from the central portion of the WHMA where low open heath is the dominant vegetation type. The EIS indicated that parrots appear to prefer open drier heath and slashed vegetation to wetter and/or denser heath and sedgeland, vegetation and disturbed areas dominated by weeds.

Approximately 241ha of vegetation (associated with REs 12.2.12 and 12.2.15) mapped as essential habitat for the ground parrot, is on or within 5km of the airport site.

Impacts and mitigation

The project would involve a number of activities which have the potential to impact on the ground parrot including:

- vegetation clearing and other activities associated with runway construction
- vegetation slashing activities during airport operation
- reclamation works and construction of the associated drainage infrastructure
- noise and light generated by construction activities and aircraft operations
- introduction and spread of weeds and introduction of feral pest animals.

Vegetation clearing and other construction activities

The project is expected to result in the permanent removal of 22.84ha of vegetation that is mapped essential habitat for the ground parrot. However, surveys undertaken for the EIS indicated that only 7.88ha is used by the ground parrot. A temporary loss of 0.81ha of essential habitat would also be expected during construction of the sand delivery pipeline for a period of 6–9 months. The pipeline would also place a physical barrier between foraging birds and refuge during this time. The proponent proposes to rehabilitate this area after filling activities are complete, which would provide habitat for the ground parrot post-rehabilitation.

Vegetation slashing activities

Adult ground parrots are unlikely to be impacted during vegetation clearing and slashing activities, as they are mobile and likely to avoid direct mortality and/or injury.

However, nestlings and fledglings would not be able to relocate quickly and would be at risk. To reduce this risk, the proponent is required to restrict vegetation-clearing activities to outside of the ground parrot breeding period.

Slashing activities may also directly destroy nests and/or create unsuitable density of groundcover for nesting birds where vegetation is cut too low. This risk would be reduced by the proponent's commitment to ensure that slashing occurs from heights 0.5m above the base of the vegetation. This would address the issue raised in a submission made on the AEIS about the effectiveness of the strip of vegetation next to the runway being maintained as ground parrot habitat.

Reclamation and drainage infrastructure works

Ground parrot habitat (including heath and sedgeland) on the airport site is influenced by groundwater hydrology. As discussed in the groundwater section of this report, the proponent has committed to implement mitigation measures to reduce the potential for increased groundwater levels and salinity through the provision of a:

- HDPE liner under the reclamation area to minimise seawater infiltration to groundwater
- permanent, low permeability cut-off wall parallel to the northern perimeter drain to prevent groundwater drawdown to the north of the wall.

The proponent has also committed to undertake further baseline monitoring to characterise baseline groundwater quality and groundwater levels which would support ongoing groundwater monitoring to detect changes and allow for the application of corrective actions.

I have stated conditions to ensure any impacts on surrounding groundwater are adequately managed and I have included recommendations for the development of management plans for ASS, groundwater monitoring and implementation of the corrective actions. The management plans would coordinate protection of the WHMA in addition to other sensitive areas within and adjacent to the airport site.

Light and noise—construction

As the ground parrot calling period occurs when there is low ambient light (i.e. around dawn and dusk), there is potential for calling behaviour to be affected by artificial light during this period. Any interference with calling behaviour could affect mate selection and territory establishment, leading to a reduction in breeding success.

Impacts associated with artificial light on ground parrots would be reduced by restricting the use of artificial lighting (e.g. in compound and works areas) to the hours of construction and operation listed in the EIS. Most construction activities will be undertaken between 6:30am and 6:30pm (with the exception of dredging and reclamation works). For most of the year, these periods will not affect ground parrot calling, with the exception of months when there are shorter day lengths when there could be some overlap.

Twenty-four-hour construction lighting would be required during dredging and reclamation works for three to six months. This would involve using mobile light towers

(around two to four 1000-watt lights on 6m to 9m extendable poles), which would result in localised light spill. Light exposure on the WHMA and other areas of ground parrot habitat would only occur for a few weeks. Lighting would also be used for a short duration at the face of the fill area during sand delivery, which would move north-west across the platform and therefore away from the WHMA.

Twenty-four-hour security lighting would also be required for a concrete batching processing plant. Light spill impacts would be reduced through light spill guards and locating the light source away from any area where there is possible ground parrot movement passage, in particular, at the northern or southern end of the runway.

Due to the temporary nature and timing of the works, construction light is not expected to have an adverse impact on ground parrot calling behaviour.

Noise levels associated with construction are likely to equate to the existing noise environment within the WHMA. The EIS indicated that this area is already exposed to aircraft noise and experiences background noise levels ranging between 58 dB(A) during the day (between 7am and 6pm) and 47 dB(A) at night (between 10pm and 7am).

Construction noise is predicted to range between 50 dB(A) at the southern end of the WHMA and 40 dB(A) at the northern end of the WHMA. Construction activities at night would only be for a relatively short duration (approximately 4 weeks) and only a slight number of noise events above 42 dB(A) are expected. Due to the temporary nature and timing for the works and only a slight number of events above the ambient noise environment, the noise generated during construction would not have an adverse impact on the ground parrot. In addition, the proponent would implement the following measures during construction to further reduce noise impacts:

- monitoring calling cues for ground parrot bouts (according to light levels—lux) for a period of at least six months prior to construction in order to clearly define call conditions
- monitoring noise levels during call bouts within 50m of development throughout construction. Contractors in particular will be encouraged to avoid the sensitive dawn and dusk calling periods (of 30-minute durations) for noisy operations
- avoid construction activities near the WHMA to reduce noise impacts on the ground parrot.

Light and noise—airport operation

The EIS forecast that increased activity, noise and light around the new runway would deter the passage of birds over the runway during operational hours. It is expected that ground parrot movement across the new runway would be confined to quieter periods (i.e. after 9.30pm or the last scheduled flight).

Ground parrots in the WHMA would experience similar lighting conditions to that of the existing runway. During the operation of the new runway, lighting would be used during poor light conditions on approach and departures (i.e. at night and during inclement weather). This lighting would be restricted to a few hours following dusk (with less impact during longer summer days).

The retained habitats within the WHMA would be at least 130m away from the simple approach lighting systems and 150m away from the high intensity runway lighting. It is expected that at this distance, light intensity would be 1.2 and 0.6 lux respectively. This would be a similar illuminance generated by the full moon on clear night, which ranges between 0.27 to 1 lux. In addition this lighting would also be highly directional (only lighting a selected area). It is therefore unlikely that intense light spill would occur within the WHMA during the operation of the airport.

The precision approach path indicator lighting will be approximately 95m from ground parrot habitat. At a distance of 75m, light spill from precision approach path indicator lighting would be no more than 2.7 lux. The light impact on ground parrot habitat is expected to be lower than 2.7 lux because of the distance between the habitat and the light source and also the directional nature of the lighting (i.e. the light source is not directed towards ground parrot habitat). The lighting levels are expected to be well below the intensities that start or end at dusk and dawn calling bouts. At dusk calling bouts start at 13.8 lux and end at less than 0.5 lux and at dawn calling bouts start at less than 0.5 lux and end at 4.3 lux.

Apron flood lighting is expected to project towards the WHMA. These lights are currently positioned on and around the existing terminal and are in use for extended periods during aircraft boarding and departure. Impacts from apron lighting are expected to be low. There are four existing apron lights and the project would require one additional apron light in close proximity to the existing lights. The existing apron lights do not appear to affect ground parrot populations and are in operation during dusk call bouts without any notable impact on the frequency or duration of calls.

The construction of the runway would remove ground parrot habitat and increase the distance between the apron lighting and the remaining area of habitat in the WHMA. Tall vegetation separating the southern section of the national park would also screen most of the light spill generated during construction.

Noise levels associated with aircraft operations are not expected to be significantly different from the existing noise environment within the WHMA. The presence of the healthy breeding population in the WHMA indicates that calling activities are not adversely affected by existing aircraft noise.

Introduction and spread of weeds and introduction of feral pest animals

EIS surveys identified an area in the south-western corner of the WHMA that is infested by exotic grass. As part of compensatory measures for impacting on habitat in the WHMA, the proponent has proposed to rehabilitate this area by removing this infestation and creating more suitable habitat for the ground parrot.

The proponent has also committed to undertake additional weed monitoring and ongoing management within the WHMA. The weed hygiene management measures would be undertaken during construction to prevent the introduction and spread of weeds and pest plants. In addition, under the requirements of the *Land Protection (Pest and Stock Route Management) Act 2002* the proponent would be required to implement measures to manage declared pest plants on the airport site.

Predation by European red fox and feral cats is considered to be a significant threat to the ground parrot. Being a mostly a ground-dwelling species, ground parrots are highly susceptible to predation.

The existing perimeter security fence surrounding the airport currently excludes predators and other feral pests from the airport. The large number of ground parrots found in the WMHA supports the effectiveness of the perimeter fencing in excluding predators. The new runway would require perimeter fencing to maintain airport security, and as such, predators would continue to be excluded from the airport site. In addition, the proponent would be required to monitor the site for predators and to undertake appropriate action to remove them.

Significant residual impacts and offsets

The project is expected to result in a residual impact of 7.88ha of ground parrot habitat. This residual impact is considered to be significant as it would disrupt an ecologically significant area (i.e. breeding habitat) for this species and could reduce its occurrence. According to the Queensland Government environment offset calculator (using a multiplier of 4), the proponent would need to find an offset for 31.52ha.

I require the proponent to consider the following options to meet offset obligations for the ground parrot and finalise the biodiversity offsets strategy by providing one of the following options:

- providing a financial settlement to EHP to offset the full significant residual impact of 7.88ha. Based on the offset calculations, the full financial value (e.g. without the land-based offset) would be \$1,391,324.32 (under the *Environmental Offsets Act 2014*)
- providing a land-based offset (e.g. 5.84ha, assessment unit 9 or another land-based option, if available) and financial settlement for the remaining offset requirement. Based on offset calculations the part-financial value (with the land-based offset of 5.84ha) would be \$1,078,806.04 (as defined under the *Environmental Offsets Act 2014*).
- providing a land-based offset, a direct benefit management plan and/or financial settlement combination (as defined under the *Environmental Offsets Act 2014*)
- providing any combination of these arrangements, ensuring the full offset obligation is met.

Coordinator-General's conclusion

I am satisfied that the project's impacts on ground parrots have been identified and assessed in the EIS. I also consider that the project is unlikely to have an adverse impact on the ground parrot provided that the proponent implements the proposed mitigation measures and commitments described in the EIS.

I require that the proponent makes a decision on an appropriate offset arrangement that provides a measurable conservation outcome for the ground parrot. I have imposed a condition in Appendix 2 requiring the proponent to prepare a notice of election to address the significant residual impacts on ground parrot habitat..

The conditions stated in Appendix 1 (for inclusion in ERA16) that are relevant to protecting ground parrot habitat in the WHMA and the adjacent areas of Mount Coolum National Park include conditions requiring the proponent to:

- install HDPE lining on the base and sides of the reclamation area to reduce the saltwater ingress into the groundwater
- construct a permanent low-permeability cut-off wall, from the ground surface down to the confining coffee rock layer, adjacent to the northern perimeter drain, to prevent groundwater drawdown on the cut-off wall (i.e. in the WHMA and Mount Coolum National Park)
- prepare an ASSMP for all aspects of the project that may disturb ASS or PASS (such as earthworks and drain construction) to ensure disturbances are appropriately managed and impacts are minimised during project construction.

The proponent has committed to address all of the relevant provisions of the NC Act including obtaining and implementing an approved species management program for the ground parrot and other threatened species known or likely to occur within the project area. The species management program is to be developed by a suitably qualified person, and must document the ongoing impact mitigation and management measures intended to maximise the ongoing protection and long-term conservation of threatened species. This requirement would address the issue raised in a submission on the AEIS, about the requirement for a species management program to address impacts on protected species.

Wallum sedgefrog, wallum froglet and wallum rocketfrog

Background

Wallum sedgefrog

The wallum sedgefrog is assessed in detail in the 'listed threatened species and communities' section of the MNES section of this report. I concluded in Section 6 (Matters of national environmental significance) that the project is not expected to have an adverse impact on this species provided that the proponent implements the proposed project mitigation measures and commitments, and complies with the conditions stated in Appendix 1 of this report.

I have stated conditions in Appendix 1 (for inclusion in ERA16) to protect wallum sedgefrog habitat in the wallum heath management area (WHMA) and the adjacent areas of Mount Coolum National Park requiring the proponent to:

- install HDPE lining on the base and sides of the reclamation area to reduce the saltwater ingress into the groundwater
- construct a permanent low-permeability cut-off wall from the ground surface down to the confining coffee rock layer, adjacent to the northern perimeter drain, to prevent groundwater drawdown on the northern side of the cut-off wall (i.e. in the WHMA and Mount Coolum National Park)

- prepare an ASSMP for all aspects of the project that may disturb ASS or PASS, such as earthworks and drain construction to ensure disturbances are appropriately managed and impacts are minimised during project construction.

A submission made on the EIS raised issues about potential salinity impacts from tailwater discharge on the wallum sedge frog in the east drain which is connected to the Marcoola drain. The east drain is considered to provide unsuitable habitat for this species due to the absence of tannin-stained wallum waters, the presence of common reeds and bulrushes which are not consistent with waterbodies that are used by wallum sedgefrogs, and the presence of mosquito fish.

Wallum froglet

The wallum froglet is listed as 'vulnerable' under the NC Act. Distribution is currently restricted to the coastal lowlands and sand islands of South East Queensland (Moreton, Bribie, North Stradbroke and Fraser Islands), and north-east New South Wales.

The species typically inhabits paperbark (*Melaleuca*) swamps, sedgelands and drainage lines in wet heath vegetation. This species is sometimes found in disturbed wallum habitat such as quarries, 4WD-impacted areas and roadsides, and recently burnt heathland. The species breeds in acidic ephemeral (short-lived) swamps and breeding usually occurs in autumn or early winter.

There is approximately 448ha of vegetation mapped as essential habitat for the wallum froglet within 5km of the airport associated with REs 12.2.7, 12.2.9, 12.2.12, 12.2.15 and 12.3.5a. During surveys, a large number of wallum froglets were recorded within the WHMA, helicopter training area, low-lying areas of slashed grass/sedgeland along the existing RWY 12/30 and in the northern and southern sections of Mount Coolum National Park (but in lower densities than in the WHMA and helicopter training area). Wallum froglets were also recorded on sites in cleared land to the east of Finland Road and east of David Low Way.

Wallum rocketfrog

The wallum rocketfrog is listed as vulnerable under the NC Act. Distribution is currently restricted to the coastal lowlands and sand islands (Great Sandy National Park and Moreton, Bribie and North Stradbroke Islands) of South East Queensland and New South Wales. This species is known to inhabit coastal wet heath around sedge swamps, freshwater lakes and drainage lines on low nutrient soils. The species is acid tolerant and breeds in shallow tannin-stained waters that have a pH of approximately 3.5 or less. Wallum rocketfrog breeding occurs in spring and summer following rain.

There is approximately 431ha of vegetation mapped as essential habitat for the wallum rocketfrog within 5km of the airport (associated with REs 12.2.7, 12.2.12, 12.2.15 and 12.3.5a). Within the airport site, wallum rocketfrogs were primarily recorded from wet heath in the centre and northern section of the WHMA. They were also recorded within wet heath in the southern section of the WHMA, the helicopter training area and a small number (one or two individuals) were recorded from slashed grassland/sedgeland adjacent to the existing north-south runway.

Surveys indicate that suitable breeding habitat occurs within the WHMA and the helicopter training area, and that the wetter areas of slashed grassland/sedgeland fringing these areas could also be utilised for breeding, but only where surface water is present for long enough to allow the complete development of tadpoles.

Impacts and mitigation

As the wallum froglet and wallum rocketfrog occupy a similar habitat to the wallum sedge frog, the potential impacts described for the wallum sedgefrog in section 6 (Matters of national environmental significance) of this report would be the same for these listed species. Project activities that have the potential to impact these species include vegetation clearing, stormwater management, reclamation works and construction of the associated drainage infrastructure, noise generated by construction activities and aircraft operations, and light generated during construction and operation.

I concluded in the MNES section that the project would not have an adverse impact on the wallum sedgefrog provided that the proponent implements the proposed mitigation measures and commitments including:

- managing surface water run-off to protect surface water quality in the WHMA
- constructing a perimeter bund around reclamation area
- placing a HDPE liner under the reclamation area prior to sand filling
- installing a low permeability cut-off wall parallel to the northern perimeter drain and directing saline tailwater into the drainage system
- prior to construction, developing and implementing a groundwater management plan detailing trigger levels and corrective action plans, including at least 12 months of baseline data to account for natural seasonal variation
- installing additional monitoring bores between the Marcoola drain and the Mount Coolool National Park
- assessing potential groundwater and surface water exchange and, where required, developing a reactive monitoring program to meet WQOs
- placing a layer of agricultural lime within drains to intercept and neutralise any acidity mobilised from normally unsaturated actual ASS
- monitoring water quality at the drain and receiving water bodies, and undertaking corrective actions such as retreating water where water quality fails to meet release criteria
- restricting construction activities (with the exception of dredging and sand pumping works) to between 6:30am and 6:30pm and not using heavy machinery during wet weather (when frogs are least active)
- avoiding dredge pumping works during the summer months (wallum rocketfrog and wallum sedgefrog breeding period). This measure would not be relevant to the wallum froglet as it typically breeds from autumn to early winter
- rehabilitating the 2.52ha of potential habitat (mapped as essential habitat) at the northern tip of the existing north-south runway that would be temporarily impacted during the construction of the pipeline. This would be rehabilitated back to its original condition

- ensuring that vegetation slashing is only undertaken during dry weather and that slashing does not occur below 0.5m. This would address the issue raised in a submission made on the AEIS about the effectiveness of the strip of vegetation next to the runway being maintained as ground parrot habitat.

These mitigation measures and commitments would also apply to impacts on the wallum froglet and the wallum rocketfrog.

Significant residual impacts and offsets

Wallum rocketfrog

While around 47ha of essential habitat is mapped on the project site for the rocketfrog, less than half of these areas are known or likely to be used by this species. In addition it is considered that most of the wallum rocketfrog breeding habitat on the site would be retained with the central and northern parts of the WHMA. Subsequently the project is expected to have a significant residual impact of 21.85ha of wallum rocketfrog habitat which includes 20.8ha of non-breeding habitat and 1.67ha of breeding habitat.

Wallum froglet

The project is expected to have a significant residual impact of 60.63ha of wallum froglet breeding habitat. This includes breeding habitat and adjoining habitat used by non-breeding animals for foraging, shelter and/or dispersal between areas of breeding habitat. The proponent has used a more conservative estimate for the wallum froglet as all areas of remnant and regrowth melaleuca woodland and wet heath containing records of the wallum froglet may be considered breeding habitat for this species. It should be noted that the significant residual impact of 1.67ha for the wallum sedgefrog and 21.85ha for the wallum rocketfrog overlap with the 60.63ha for the wallum froglet.

Proposed offset for the wallum froglet and wallum rocketfrog

The Biodiversity Offset Strategy for the EIS proposes a number of options to offset the loss of breeding and non-breeding habitat for the wallum froglet and the wallum rocketfrog. In section 6 (Matters of national environmental significance) of this report I discussed the land-based offsets proposed to offset the loss of wallum sedgefrog habitat. This included the creation of 2.28ha of breeding habitat in the WHMA and 5.84ha of additional habitat through the slashing of a linear strip of vegetation adjacent to the northern perimeter drain. I consider that these strategies would also create suitable habitat on the project site for the wallum rocketfrog and wallum froglet.

Off the airport site, the proponent has proposed to provide land-based offsets for the wallum froglet and the wallum rocketfrog on the Lower Mooloolah River Environmental Reserve (LMRER), located south of the project area at Palmview (Palmview site). I note that this site is owned by SCRC and is currently secured for conservation purposes.

A submission on the AEIS raised issues about the suitability of the 'Palmview' site in providing a conservation gain for the acid frogs. Surveys undertaken for the EIS identified areas on the 'Palmview' site that would be suitable for creating habitat for the wallum rocketfrog and wallum froglet. The proposed offset works would involve a mix of

revegetation works and assisted regeneration of degraded melaleuca open forest/wetland and sedgeland vegetation communities. Assisted regeneration works would involve excluding cattle, removing weed and exotic grass and implementing appropriate fire regimes. These works are expected to create 63.15ha of habitat for the wallum froglet and wallum rocketfrog. The EIS also indicated that 9.8ha of breeding habitat would be created by augmenting frog breeding ponds.

To ensure the offset areas achieve a conservation outcome for the species the proponent has proposed to manage these through an offset management plan. The plan would include a monitoring program outlining a range of performance criteria including frog abundance and reproductive success, and habitat criteria to determine the effectiveness of the proposed offset works.

Coordinator-General's conclusion

I am satisfied that the proposed mitigation measures and commitments that are relevant to mitigating impacts on the wallum sedgefrog would also be adequate for mitigating impacts on the wallum froglet and wallum rocketfrog.

I consider that the project is unlikely to have an adverse impact on the wallum rocketfrog and wallum froglet provided that the proponent implements the proposed mitigation measures and commitments, and complies with the stated conditions in Appendix 1 of this report. I have included a recommendation in Appendix 3 regarding vegetation slashing activities on frogs and frog habitat.

The conditions that I have stated in Appendix 1 (for inclusion in ERA16) which are relevant to protecting wallum froglet and wallum rocketfrog habitat in the WHMA and the adjacent areas of Mount Coolum National Park include the conditions requiring the proponent to:

- prepare and implement a surface water monitoring program to monitor background water quality and the effects of the activity on surface water and the environmental values in the project area (including habitat for the wallum froglet and wallum sedgefrog in the WHMA and adjacent sections of Mount Coolum National Park)
- install HDPE lining on the base and sides of the reclamation area and install control structures, such as weirs, on drains to prevent groundwater drawdown and contaminant ingress in to the corridor offset area and the adjacent areas of National Park which connect to the corridor
- construct a permanent low-permeability cut-off wall from the ground surface down to the confining coffee rock layer, adjacent to the northern perimeter drain, to manage tailwater discharge and protect the Mount Coolum National Park from groundwater drawdown
- install a permanent groundwater cut-off wall along the western perimeter drain, westwards of the drain where necessary, to protect the proposed site for the connectivity area offsets by avoiding lowering of groundwater below the PASS
- prepare an ASSMP for all aspects of the project that may disturb ASS or PASS (such as earthworks and drain construction) to ensure disturbances are appropriately managed and impacts are minimised during project construction

- determine pre-disturbance background groundwater elevations and quality for the area rehabilitated for conservation offset purposes, and the habitat corridor between, and monitor the effects of the activity to ensure no there are no adverse impacts (and take corrective action, if required).

The proponent has committed to address all of the relevant provisions of the NC Act, including obtaining and implementing an approved species management program for the wallum froglet, wallum rocketfrog and other threatened species known or likely to occur within the project area. The species management program is to be developed by a suitably qualified person, and must document the ongoing impact mitigation and management measures intended to maximise the ongoing protection and long-term conservation of threatened species. This requirement would address the issue raised in a submission on the AEIS, about the requirement for a species management program to address impacts on protected species.

5.8.4 Protected wildlife habitat—protected animals (marine)

Endangered and vulnerable and special least concern shorebirds

Table 5.18 shows the 26 species of ‘conservation significant’ shorebird identified as potentially occurring within 5km of the airport site.²⁶

Table 5.18 ‘Conservation significant’ shorebird species potentially occurring in the project area

Common name (species name)	NC Act listing status	EPBC Act listing status
Beach stone-curlew (<i>Esacus magnirostris</i>)	Vulnerable	Marine
Eastern curlew (<i>Numenius madagascariensis</i>)	Vulnerable	Critically endangered Marine, migratory
Little curlew (<i>Numenius minutus</i>)	Special least concern	Marine, migratory
Curlew sandpiper (<i>Calidris ferruginea</i>)	Special least concern	Critically endangered Marine, migratory
Common sandpiper (<i>Actitis hypoleucos</i>)	Special least concern	Marine, migratory
Sharp-tailed sandpiper (<i>Calidris acuminata</i>)	Special least concern	Marine, migratory
Broad-billed sandpiper (<i>Limicola falcinellus</i>)	Special least concern	Marine, migratory
Terek sandpiper (<i>Xenus cinereus</i>)	Special least concern	Marine, migratory
Common greenshank (<i>Tringa nebularia</i>)	Special least concern	Marine, migratory
Whimbrel (<i>Numenius phaeopus</i>)	Special least concern	Marine, migratory

²⁶ Wildlife Online report, generated 6 April 2016; and EPBC Act Protected Matters Search Tool (PMST) report, generated 28 January 2015.

Common name (species name)	NC Act listing status	EPBC Act listing status
Ruddy turnstone (<i>Arenaria interpres</i>)	Special least concern	Marine, migratory
Great knot (<i>Calidris tenuirostris</i>)	Special least concern	Marine, migratory
Red-necked stint (<i>Calidris ruficollis</i>)	Special least concern	Marine, migratory
Sanderling (<i>Calidris alba</i>)	Special least concern	Marine, migratory
Black-tailed godwit (<i>Limosa lapponica</i>)	Special least concern	Marine, migratory
Bar-tailed godwit (<i>Limosa lapponica</i>)	Special least concern	Marine, migratory
Wandering tattler (<i>Heteroscelus incanus</i>)	Special least concern	Marine, migratory
Grey-tailed tattler (<i>Tringa brevipes</i>)	Special least concern	Marine, migratory
Greater sand plover (<i>Charadrius leschenaultii</i>)	Special least concern	Marine, migratory
Double-banded plover (<i>Charadrius bicinctus</i>)	Special least concern	Marine, migratory
Lesser sand plover (<i>Charadrius mongolus</i>)	Special least concern	Marine, migratory
Pacific golden plover (<i>Pluvialis fulva</i>)	Special least concern	Marine, migratory
Grey plover (<i>Pluvialis squatarola</i>)	Special least concern	Marine, migratory
Swinhoe's snipe (<i>Gallinago megala</i>)	Special least concern	Marine, migratory
Pin-tailed snipe (<i>Gallinago stenura</i>)	Special least concern	Marine, migratory
Latham's snipe (<i>Gallinago hardwickii</i>)	Special least concern	Marine, migratory

The species identified in Table 5.18 are also listed as migratory species under the EPBC Act. In the 'migratory shorebirds' section of the MNES section of this report, I concluded that the airport site and Spitfire Realignment Channel area do not contain any significant area of shorebird habitat.

Latham's snipe is also discussed in the MNES section. I concluded that the project is unlikely to have an adverse impact on this species, given the low likelihood that this species uses the site on a regular basis and the adaptability of the species to use a wide range of habitats including artificial waterways and degraded habitats.

The closest area of known shorebird habitat occurs within 2.5km of the Maroochy River mouth (more than 4km south of the airport) and along the Maroochy River. The species known to occur in this area include the bar-tailed godwit, whimbrel, eastern curlew, double-banded plover and the red-necked stint, and to a lesser degree the terek sandpiper, grey-tailed tattler, curlew sandpiper, great knot, lesser sand plover, greater sand plover and beach stone-curlew. Shorebird habitat is also identified around Bribie Island which is 6km east of the proposed dredging works.

A number of submissions made on the EIS and AEIS raised issues about the increased risk of bird strike with the new flight path. The risk of bird strike is likely to be reduced around the mouth of the Maroochy River, due to the proposed east-to-west flight paths. Under the current airport operations aircraft bank and turn above the mouth of the Maroochy River when using the existing north-south runway. The change in flight path is likely to result in a reduction in the risk of bird strike in this area.

The risk of bird strike is also likely to be reduced by locating drainage channels outside of the graded runway strip. This would ensure there is no standing water adjacent to the runway that would attract birds.

The project is not expected to have an adverse impact on migratory shore bird species, provided the proponent implements the mitigation measures and commitments, and complies with the conditions stated in Appendix 1 of this report.

The conditions in Appendix 1 (for inclusion in ERA16) that are relevant to protecting shorebird habitat include conditions requiring the proponent to:

- ensure any settled tailwaters released comply with surface water release limits, that a monitoring program is undertaken to determine the effects of the activity on the water quality of the Maroochy River, and for corrective actions to be undertaken where water quality limits are likely to be exceeded
- develop a dredge management plan, including a monitoring program and management actions to be implemented if WQOs are exceeded.

Albatross and petrels

Table 5.19 shows the 14 species of albatross and petrel identified as potentially occurring within 5km of the airport site.²⁷

Table 5.19 Albatross and petrel species potentially occurring within 5km of the project site

Common name (species name)	NC Act listing status	EPBC Act listing status
Southern giant petrel (<i>Macronectes giganteus</i>)	Endangered	Endangered Marine, migratory
Antipodean albatross (<i>Diomedea antipodensis</i>)	Vulnerable	Vulnerable Marine, migratory
Gibson's albatross (<i>Diomedea exulans gibsoni</i>)	Vulnerable	Vulnerable Marine, migratory
Wandering albatross (<i>Diomedea exulans</i> [sensu lato])	Vulnerable	Vulnerable Marine, migratory
Northern giant petrel (<i>Macronectes halli</i>)	Vulnerable	Vulnerable Marine, migratory
Sooty albatross (<i>Phoebastria fusca</i>)	Vulnerable	Vulnerable Marine, migratory
Shy albatross (<i>Thalassarche cauta</i> (sensu stricto))	Vulnerable	Vulnerable Marine, migratory
White-capped albatross (<i>Thalassarche cauta steadi</i>)	Vulnerable	Vulnerable Marine, migratory
Tristan albatross (<i>Diomedea exulans exulans</i>)	Special least concern	Endangered Marine, migratory
Salvin's albatross (<i>Thalassarche salvini</i>)	Special least concern	Vulnerable Marine, migratory
Chatham albatross (<i>Thalassarche eremita</i>)	Special least concern	Endangered Marine, migratory
Black-browed albatross (<i>Thalassarche melanophris</i>)	Special least concern	Vulnerable Marine, migratory
Campbell's albatross (<i>Thalassarche melanophris impavida</i>)	Special least concern	Vulnerable Marine, migratory
Light-mantled sooty albatross (<i>Phoebastria palpebrata</i>)	Special least concern	Marine, migratory

All of the albatross and petrel species identified in Table 5.19 are also listed under the EPBC Act. I concluded in the MNES section that, based on the low likelihood of these species occurring the project area, the project is not expected to adversely impact these species.

²⁷ Wildlife Online report, generated 6 April 2016; and EPBC Act PMST report, generated 28 January 2016.

Other seabirds

Table 5.20 shows the 14 other species of seabird identified as potentially occurring within 5km of the airport site.²⁸

Table 5.20 'Special least concern' seabird species potentially occurring in the project area

Common name (species name)	NC Act listing status	EPBC Act listing status
Wedge-tailed shearwater (<i>Puffinus pacificus</i>)	Special least concern	Marine, migratory
Short-tailed shearwater (<i>Ardenna tenuirostris</i>)	Special least concern	Marine, migratory
Flesh-footed shearwater (<i>Puffinus carneipes</i>)	Special least concern	Marine, migratory
Lesser frigatebird (<i>Fregata ariel</i>)	Special least concern	Marine, migratory
White-tailed tropicbird (<i>Phaethon lepturus</i>)	Special least concern	Marine, migratory
Little tern (<i>Sternula albifrons</i>)	Special least concern	Marine, migratory
Common tern (<i>Sterna hirundo</i>)	Special least concern	Marine, migratory
Caspian tern (<i>Hydroprogne caspia</i>)	Special least concern	Marine, migratory
Gull-billed tern (<i>Gelochelidon nilotica</i>)	Special least concern	Marine, migratory
White-winged black tern (<i>Chlidonias leucopterus</i>)	Special least concern	Marine, migratory
Bridled tern (<i>Onychoprion anaethetus</i>)	Special least concern	Marine, migratory
Arctic jaeger (<i>Stercorarius parasiticus</i>)	Special least concern	Marine, migratory
Masked booby (<i>Sula dactylatra</i>)	Special least concern	Marine, migratory
Brown booby (<i>Sula leucogaster</i>)	Special least concern	Marine, migratory

I concluded in the MNES section of this report that the short-tailed shearwater and flesh-footed shearwater are not expected to be adversely impacted by the project, due to the limited availability of habitat and the low likelihood of these species occurring within the airport site. In addition, I concluded that the wedge-tailed shearwater and little tern are not expected to be adversely impacted by the project (see section 6.4 Listed threatened species and communities).

A submission made on the EIS and AEIS raised issues about the impacts of aircraft noise on fauna, particularly impacts on wedge-tailed shearwaters that nest on Mudjimba Island, associated with the new flight path. Flight paths under the 'new runway' scenario would pass over Mudjimba Island, and may potentially impact on nesting wedge-tailed shearwaters. While there would be a slight increase in noise over the island (an increase from less than 5 events over 70 dB(A) to 5-9 events over 70 dB(A)) these birds are not expected to be adversely effected as they nest in burrows beneath the ground and this species appears to be unaffected by aircraft noise on other islands also exposed to aircraft noise.

²⁸ Wildlife Online report, generated 6 April 2016; and EPBC Act PMST report, generated 28 January 2016.

The remaining ten species listed in Table 5.20 are considered unlikely to be adversely impacted by the project as they are unlikely to use the airport site and would only be expected to occur in the surrounding marine areas on the rare occasion.

The mitigation measures and commitments that are relevant to mitigating impacts on the migratory shore bird species are also relevant to these seabird species. I consider that the project is not expected to have an adverse effect on these seabird species, provided that these measures and commitments are undertaken.

Marine turtles

Table 5.21 shows the six species of marine turtle, listed as 'threatened' under the NC Act, identified as potentially occurring in the project area.²⁹

Table 5.21 Threatened marine turtles potentially occurring in the project area

Common name (species name)	NC Act listing status	EPBC Act listing status
Loggerhead turtle (<i>Caretta caretta</i>)	Endangered	Endangered, marine, migratory
Olive ridley turtle (<i>Lepidochelys olivacea</i>)	Endangered	Endangered, marine, migratory
Leatherback turtle (<i>Dermochelys coriacea</i>)	Endangered	Endangered, marine, migratory
Flatback turtle (<i>Natator depressus</i>)	Vulnerable	Vulnerable, marine, migratory
Green turtle (<i>Chelonia mydas</i>)	Vulnerable	Vulnerable, marine, migratory
Hawksbill turtle (<i>Eretmochelys imbricata</i>)	Vulnerable	Vulnerable, marine, migratory

As all six species of turtle are listed as threatened and/or migratory under the EPBC Act, the project's impacts have been discussed in detail under 'marine turtles' and 'migratory marine turtles' in the MNES section of this report. While all six species have been recorded in the Moreton Bay region, the green and loggerhead turtles are considered most likely to occur in the project area.

A number of project activities could potentially affect marine turtles including dredge operations within the Spitfire Realignment Channel, transit of the dredge vessel to the pump-out site, mooring works and sand pump-out operations, and pipeline construction on Marcoola Beach.

A submission made on the AEIS raised issues about lighting impacts on nesting turtles/hatchlings on Marcoola Beach during airport operation and from subsequent airport-related development. As the new runway would be set further back from the beach than the existing north-south runway, the project is not expected to increase lighting impacts on nesting turtles and hatchlings in the project area.

Lighting impacts from subsequent airport-related development is outside of the project scope. These developments would be subject to a separate approval process and the

²⁹ EHP Wildlife Online and EPBC Act PMST reporting.

potential for lighting impacts from these developments would be assessed as part of these approvals.

I concluded in section 6 (Matters of national environmental significance) that the project is not expected to have an adverse impact on marine turtles provided that the proponent implements the proposed mitigation measures and commitments, and complies with the conditions stated in Appendix 1 of this report.

The conditions stated in Appendix 1 (for inclusion in ERA16) that are relevant to protecting marine turtles include conditions requiring the proponent to:

- develop a dredge management plan including a monitoring program and management actions to be implemented if WQOs are exceeded and measures which would minimise the risk of interactions with dredge equipment (vessel strike or entrainment)
- ensure any settled tailwaters released comply with surface water release limits, and that a monitoring program is undertaken to determine the effects of the activity on the water quality of the Maroochy River, and for corrective actions to be undertaken where any limits area exceeded
- reinstate the dune crest height to its original height within two months of completing the works and to rehabilitate the dune with native dune vegetation on completion of works.

These conditions address that issues that were raised in the submissions made on the EIS and AEIS regarding dredging impacts on turtles (i.e. interaction with dredge vessel and water quality impacts on seagrass), and the impacts associated with disturbance of the dune from pipeline construction on Marcoola Beach.

A submission on the AEIS raised issues about the timing of beach activities (i.e. pipeline construction) and risk of impacting on turtle nesting. I note that the proponent has made a commitment to undertake dredge pipeline construction works on Marcoola Beach outside of turtle nesting season (i.e. November to March). To ensure this I recommended a condition requiring dredge pipeline construction works to be undertaken outside the turtle nesting period between November and March, to minimise potential impacts on nesting turtles on Marcoola Beach during construction.

The proponent has committed to address all of the relevant provisions of the NC Act, including obtaining and implementing an approved species management program for marine turtles and other threatened species known or likely to occur within the project area. The species management program is to be developed by a suitably qualified person, and must document the ongoing impact mitigation and management measures intended to maximise the ongoing protection and long-term conservation of threatened species. This requirement would address the issue raised in a submission on the AEIS, about the requirement for a species management program to address impacts on protected species.

Sharks and rays

One threatened species of marine shark was identified as potentially occurring in the project area: the grey nurse shark (*Carcharias taurus*), which is listed as 'endangered' under the NC Act.

As this species is listed as 'critically endangered' under the EPBC Act, the project's impacts have been discussed in detail in section 6.7.4 (Marine fish and sharks) of this report. I concluded that the project is not expected to adversely affect this species, provided that the proponent implements the proposed project mitigation measures and commitments, and complies with the conditions stated and recommended in Appendix 1 and Appendix 3 of this report. The conditions stated in Appendix 1 (for inclusion in ERA16) that are relevant to protecting the grey nurse shark include conditions requiring the proponent to develop a dredge management plan. The recommendation in Appendix 3 requiring measures to minimise the risk of marine mega-fauna interactions with dredge equipment (vessel strike or entrainment) would also be relevant.

Marine mammals

Two species of marine mammal, listed as threatened under the NC Act, were identified as potentially occurring in the project area. These are listed in Table 5.22.

Table 5.22 NC Act listed marine mammals potentially occurring in the project area

Common name (species name)	NC Act listing status	EPBC Act listing status
Humpback whale (<i>Megaptera novaeangliae</i>)	Vulnerable	Vulnerable marine, migratory,
Dugong (<i>Dugong dugon</i>)	Vulnerable	Marine, migratory

As both species are listed as threatened and/or migratory under the EPBC Act, the project's impacts have been discussed under 'marine mammals' and 'migratory marine mammals' in the MNES section of this report. I concluded that the project is not expected to have an adverse effect on threatened and migratory marine mammals, provided that the proponent implements the proposed mitigation measures and commitments, and complies with the conditions stated in Appendix 1 of this report.

The conditions stated in Appendix 1 (for inclusion in ERA16) that are relevant to protecting marine mammals include conditions requiring the proponent to develop a dredge management plan. The recommendation in Appendix 3 requiring measures to minimise the risk of marine mega-fauna interactions with dredge equipment (vessel strike or entrainment) would also be relevant.

5.8.5 Protected areas—Mount Coolum National Park

Background

Two sections of the Mount Coolum National Park are situated to the north and south of the proposed runway. The Mount Coolum section of the National Park was gazetted in 1990, with the two sections at Marcoola added at a later date.

The park protects 50 per cent of vascular plant species recorded for the Sunshine Coast area and represents approximately 40 per cent of the fern species found globally. The park provides for the conservation of several threatened flora species, including *Allocasuarina thalassoscopia* (Mount Coolum she-oak), Mount Emu she-oak (*Allocasuarina emuina*) and *Bertya sharpeana* (Mount Coolum bertya), amongst others.

Impacts and mitigation

As discussed in section 5.6 (Water quality) the project would involve a number of activities that have the potential to impact on the adjacent Mount Coolum National Park including the:

- excavation of the northern perimeter drain, which (if left unmitigated) has the potential to result in groundwater drawdown in the adjacent National Park and could subsequently affect groundwater-dependent vegetation by reducing water availability and oxidation of PASS
- placement of sand in the reclamation area, which has the potential to result in saltwater ingress into the underlying groundwater system and subsequently affect groundwater-dependent ecosystems in the National Park through increased groundwater salinity
- saline tailwater discharge, which has the potential to impact on the salinity of upstream freshwater sections of the drain that traverse the National Park, and subsequently affect palustrine (freshwater) wetland vegetation.

Excavation of the northern perimeter drain

In the water quality section of this report, I concluded that the proposed mitigation measures will prevent groundwater drawdown within the Mount Coolum National Park. The installation and maintenance of a permanent groundwater cut-off wall between the northern perimeter drain and the Mount Coolum National Park is expected to limit any groundwater drawdown to the area between the cut-off wall and northern perimeter drain. I require the proponent to monitor groundwater levels prior to and after disturbance to determine the effectiveness of the cut-off wall and to undertake corrective action where required.

Placement of sand in the reclamation site

Placing sand into the reclamation site has the potential to result in saltwater infiltration into the underlying groundwater. Key measures to address saltwater ingress into the National Park include installation of a HDPE liner under the reclamation area prior to

sand filling and a cut-off wall between the northern perimeter drain and the National Park.

The provision of the HDPE liner is expected to reduce the rate of saltwater infiltration into the underlying groundwater. The EIS indicated that with a HDPE liner in place, a maximum salinity of 500mg/L extending up to 100m from the reclamation area below the National Park, would be reached after about 300 years.

The provision of the cut-off wall in the northern perimeter drain down to the coffee rock layer is expected to prevent the migration of saline water in the upper aquifer layer (above the coffee rock layer) on the northern side of the cut-off wall. As discussed above, the migration of saline water would be restricted to the regional aquifer (below the coffee rock layer) with the exception of any areas where the coffee rock layer is discontinuous.

As a result the vegetation communities, which are dependent on the groundwater in the upper aquifer, are unlikely to be affected, with the exception of some areas where the coffee rock is discontinuous. In these areas any changes in groundwater salinities are expected to be highly localised. In addition, the vegetation communities in these areas would be able to tolerate a salinity level of 500mg/L. The vegetation communities to the north of the northern perimeter drain consist of Melaleuca open forest, open heath, and open heath with emergent broad-leaved paperbark. These communities' expected maximum tolerances to salinity range between 3700mg/L and 7400mg/L.

I have required the proponent to monitor groundwater to measure the effectiveness of the cut-off wall. Additional bores must also be installed between the cut-off wall and the National Park, to inform the appropriate trigger levels and corrective actions if required.

Tailwater discharge

Tailwater would be discharged into Marcoola drain, at a point 650m downstream of the culvert under Finland Road and the boundary of Mount Coolum National Park. The sections of the drain upstream of the Finland Road culvert traverse the northern section of Mount Coolum National Park. Surveys indicated that the characteristics of vegetation communities upstream of the Finland Road culvert and along the National Park are more freshwater to slightly brackish than the vegetation communities downstream of the culvert.

The vegetation communities along the most eastern part of the drain (east drain) were identified as palustrine (freshwater) wetland. As the tailwater would be saline, there is the potential for salinity levels to increase in the areas upstream of the drain which traverse the northern section of the National Park.

A key measure to address salinity impacts on the National Park is installation of a tidal flap on Marcoola drain at the Finland Road culvert. The flap would be closed during and immediately following tailwater discharge to minimise saltwater ingress upstream. The flap would be opened when tailwater is not being discharged to ensure normal fish passage is maintained.

Coordinator-General's conclusion

I am satisfied the EIS identified the potential impacts of sand delivery and runway construction and that the management measures proposed can adequately mitigate any potential impacts on Mount Coolum National Park.

I have stated conditions in Appendix 1 (for inclusion in ERA16) requiring the proponent to install HDPE lining on the base and sides of the reclamation area and control-structures on drains to prevent groundwater drawdown and water contamination.

My conditions require the preparation of an ASSMP to ensure disturbances are appropriately managed and impacts are minimised during project construction. I have also made a recommendation that the ASSMP be applied to all other aspects of the project that may disturb ASS or PASS, such as earthworks and drain construction.

My stated conditions include a requirement to construct a permanent low-permeability cut-off wall from the ground surface down to the confining coffee rock layer, adjacent to the northern perimeter drain, to manage tailwater discharge and protect the Mount Coolum National Park from groundwater drawdown.

The proponent must also install control structures, such as weirs, on drains traversing the National Park to prevent groundwater drawdown and contaminant ingress in to the park.

I have required the proponent to undertake monitoring to ensure that the tidal flap in Maroola drain is working successfully and to take corrective action if monitoring indicates that the flap is not operating correctly.

Before lodging an application for an environmental authority, the proponent will need to provide further information on the proposed monitoring program for surface water and groundwater and the characterisation of ASS on the site.

Water quality limits for surface water and groundwater should be derived in accordance with the *Queensland Water Quality Guidelines*, 2009 methodology. The placement of saline dredge material, disturbance of ASS or lowering of groundwater levels must be managed to ensure compliance with the water quality limits.

5.8.6 Protected areas—Moreton Bay Marine Park

Background

The Spitfire Realignment Channel is located within the General Use Zone of the Moreton Bay Marine Park. Activities such as shipping, maintenance of shipping channels and sand extraction may be permitted in a General Use Zone under State approval. The closest zone of 'conservation significance' to the sand extraction area is a Marine National Park Zone 03 'Northern Wedge' located at Spitfire Banks to the north of the extraction area. This zone was declared a Marine National Park Zone on the basis of its fishery values and is also declared HEV waters under EPP (Water). Other areas of high conservation value in the Marine Park where there may also be water quality impacts during dredging include the areas on the north-western side of Moreton

Island around 6km east of the sand extraction area, which are also HEV waters and within the boundaries of the Moreton Bay Ramsar site.

Impacts and mitigation

As concluded in Section 5.6 (Water quality) of this report only small temporary increases in TSS would be predicted to occur within the Marine National Park Zone 03. Dredge plumes are expected to occasionally enter this area, but are not expected to settle due to high bed shear stresses (water force) in this area. I consider that the project would have no adverse impact on water quality in this area provided that the proponent implements the proposed mitigation measures and commitments in the EIS. These measures are discussed in section 5.6 (Water quality) of this report.

In the MNES section I concluded that only temporary minor increases in TSS are expected to occur around the areas adjacent to Moreton Island. Again I consider that the project would have no adverse impact on water quality in this area provided that the proponent adheres to the proposed mitigation measures and commitments in the EIS.

Conclusion

I am satisfied that the EIS has identified and assessed the potential impacts of dredging operations on the Moreton Bay Marine Park. I consider that the proposed dredge management framework can adequately protect water quality values in the Marine Park. To ensure this, I have stated conditions for inclusion in the environmental authority (ERA16) requiring the proponent to develop a dredge management plan including a monitoring program and management actions to be implemented if WQOs are exceeded.

5.8.7 Fish habitat areas

Background

FHAs are declared under the *Fisheries Act 1994* for the protection and management of high value fish habitat along the Queensland coast. All FHAs are defined as a prescribed environmental matter and therefore approvals for works within a FHA are subject to offset considerations.

Declared FHAs

Spitfire Realignment Channel

There are four declared FHAs with 24km of the sand extraction area. The closest FHAs are the Pumicestone Channel FHA, which includes Pumicestone Passage between the mainland and Bribie Island (12km), and the Moreton Banks FHA which is located on the south-western side of Moreton Island (15km). The EIS indicated that dredge plumes are not expected to extend within the bounds of these FHAs.

Airport site and surrounds

There are no declared FHAs within or adjacent to the airport site. The closest declared FHA is the Maroochy River FHA (FHA-008). It was gazetted to protect important

fisheries habitat for the purpose of recreational fishing and to protect mangroves and saltmarsh which support recreational fish, crab and prawn fisheries. The FHA covers most of the Maroochy River including the reaches of the Maroochy River, which the Marcoola drain flows into.

Impacts and mitigation

The proposed discharge of tailwater to Marcoola drain has the potential to affect the water quality of the Maroochy River and the Maroochy River FHA. Such impacts may include changes to salinity, turbidity and TSS.

In the water quality section of this report, I concluded that tailwater impacts on water quality are not expected to extend beyond Marcoola drain. Any increases in turbidity and TSS are expected to occur immediately downstream of the discharge point and the discharged water would mix with water within the Marcoola drain before reaching the Maroochy River.

Coordinator-General's conclusion

I conclude that the project is unlikely to have an adverse impact on the Maroochy FHA, provided that the proponent implements the proposed mitigation measures and commitments described in the EIS for managing tailwater impacts. I have stated conditions for inclusion in the environmental authority (ERA16) to ensure surface water quality is protected.

Water quality limits for surface water and groundwater should be derived in accordance with the methodology in accordance with the Queensland *Water Quality Guidelines*, 2009. Further information on background water quality and the monitoring program should be provided in accordance with these guidelines in support of an application for an environmental authority.

Marcoola drain—tidal flap

An environmental offset may be required for any part of a waterway that provides for passage of fish (other than that part of a waterway within an urban area) if the construction, installation or modification of waterway barrier works carried out under an authority will limit the passage of fish along the waterway.

The proponent's proposed key mitigation measure for preventing saltwater ingress upstream of the Finland Road culvert in Marcoola drain is likely to create a temporary barrier to fish passage in Marcoola drain. As such, the proponent may require a waterway barrier works approval depending on the duration for which the tidal flap would be in place. The tidal flap would be installed temporarily and would remain until the end of the tailwater discharge program. The duration of the tailwater discharge program would depend on the size of the dredger used in the Spitfire Realignment Channel.

The EIS indicated that the program may last as long as 33 weeks (231 days) however may only last between 12.5 weeks (87.5 days) and 9.5 weeks (66.5 days). The proponent considers that the program is more likely to be completed between 9.5 and 12.5 weeks, if a dredge plant with 10,000 to 12,500m³ capacity is used. The proponent

would be required to apply for a development approval for waterway barrier works if the tidal flap remains in place for more than 180 calendar days or if the tidal flap does not meet any other requirement of the WWBW02 code.

Impacts on marine plants

Background

As defined in the 2014 *Queensland Environmental Offsets Policy Significant Residual Impact Guideline*³⁰ an action is likely to have a significant residual impact on marine plants where the impacts of the development shall result in:

- private infrastructure works impacting more than 17m² (0.0017ha) of fish habitat or public infrastructure works impacting more than 25m² (0.0025ha) of fish habitat
- temporary impacts are expected to take 5 years or more for the impact area to be restored to its pre-development condition
- a proposed reduction in the extent of marine plants through removal, destruction or damage of marine plants
- fragmentation or increased fragmentation of a marine ecological community
- adverse changes affecting survival of marine plants through modifying or destroying abiotic (non-living) factors (such as water, nutrients, or soil) necessary for a marine plant's survival
- alteration in the species composition of marine plants in an ecological community, that causes a decline or loss of functionally important species
- interference with the natural recovery of marine plant communities.

Mangroves

The construction of the northern perimeter drain and the discharge outlet is expected to result in the removal of less than 10m² of mangrove vegetation. This loss is not considered to constitute a significant residual impact.

Seagrass

Airport site and surrounds

Marine field surveys undertaken for the EIS indicated that no seagrass was observed within the pump-out site or the near-shore pipeline alignment. There is a small area of seagrass covering 0.025km² located at Eudlo Creek and Maroochy River confluence. This area is approximately 8km downstream from Marcoola drain confluence with the Maroochy River. Based on tailwater discharge modelling, tailwater impacts on water quality are not expected to extend beyond Marcoola drain and therefore unlikely to affect seagrass at the confluence Eudlo Creek and Maroochy River.

³⁰ Department of Environment and Heritage Protection, Queensland Environmental Offsets Policy, Significant Residual Impact Guideline, State of Queensland, December 2014, viewed 7 April 2016, <http://www.ehp.qld.gov.au/assets/documents/pollution/management/offsets/significant-residual-impact-guide.pdf>

Spitfire Realignment Channel

The PBPL has an existing approval to extract 15 million m³ of sand from the Spitfire Realignment Channel and has removed approximately 7.19 million m³ of sand to date. I note that the current approval authorises the complete removal of seagrass and any other marine plant (e.g. algae) present within the proposed Spitfire Extraction site, and that no offsets have been required for these works. Surveys undertaken in 2013 indicated that there are a number of sparse patches of *Halophila ovalis* present throughout the sand extraction area. As such, seagrass in this area is already subject to disturbances and is likely to be regrowth. The proponent proposes to extract an additional 1.1 million m³ of sand from this channel as a source of fill material for the new runway reclamation works.

The EIS stated that seagrass could be removed during these works, however the extent of seagrass that could be removed is not quantified. The proponent would be required to undertake seagrass surveys in this area to obtain approval to disturb marine plants and to determine whether any offsets would be required.

5.8.8 Offsets

Under the *Environmental Offsets Act 2014* a prescribed activity is an activity that is authorised under another Act (i.e. SPA, EP Act). An offset condition may be imposed under an authority granted under another Act for disturbance to a prescribed environmental matter (i.e. a matter of state environmental significance).

The jurisdiction of the EP Act and SPA do not extend to disturbances to the prescribed environmental matters as the project is not a prescribed activity. Accordingly I have imposed an offset condition under the SDPWO Act in Appendix 2 to give effect to the Queensland environmental offsets framework. The condition requires the proponent to prepare a notice of election consistent with the *Environmental Offsets Act 2014*. The notice of election must address the significant residual impact on the prescribed environmental matters identified in the 'Sunshine Coast Airport Expansion Biodiversity Offset Strategy' dated 3 September 2015. The condition also includes the maximum disturbance limits to the prescribed environmental matters listed in Table 5.23.

Table 5.23 Authorised significant residual impacts to prescribed environmental matters

Prescribed environmental matter	Maximum extent (ha)
Habitat for the animal that is vulnerable—wallum froglet (<i>Crinia tinnula</i>)	60.63
Habitat for the animal that is vulnerable—wallum rocketfrog (<i>Litoria freycineti</i>)	21.85
Habitat for the animal that is vulnerable—ground parrot (<i>Pezoporus wallicus wallicus</i>)	7.88

Where a significant residual impact occurs for MNES (i.e. Mount Emu she-oak (*Allocasuarina emuina*) and wallum sedgefrog (*Litoria olongburensis*)) the proponent must provide an offset in accordance with the EPBC Act *Environmental Offsets Policy*

2012 and *Offsets Assessment Guide*. The offsets condition is not intended to duplicate MNES offset requirements.

5.9 Air quality

5.9.1 Existing environment

The EIS identified carbon monoxide (CO), nitrogen dioxide (NO₂), sulphur dioxide (SO₂), oxides of nitrogen (NO_x), particulates (PM₁₀ and PM_{2.5}³¹) and volatile organic compounds (VOCs) as the key air pollutants in the Sunshine Coast region. Air quality objectives for these pollutants are identified under the EPP (Air) and the National Environment Protection (Ambient Air Quality) Measure 1998 (NEPM [Air]). Due to major dust storms, eight allowable exceedances of PM₁₀ air quality objectives occurred in 2009 and one to two from 2003 to 2008. Concentrations of all other pollutants were below the air quality objectives.

A number of pollution sources contribute to the current air quality in the region. These include industrial activities, existing airport operations and natural sources. Sixteen industrial activities are located within 40km of SCA, with the nearest being two landfill sites and a quarry. The two landfill sites are located 9km from SCA at Buderim and Coolum, and the Boral quarry is located 10km from SCA at Coolum. The emissions from these industries and others in the region were collected by the Australian Government, former Department of Sustainability, Environment, Water, Population and Communities (now Department of the Environment) as part of the National Pollution Inventory (NPI) in 2012.

Existing airport on-ground operations and aircraft movements are also sources of emissions. On-ground activities include operating diesel generators and conveyor engines and movement of airport and lessee vehicles. These activities emit mostly CO, NO_x and PM, with negligible emissions of VOCs.

Operation of aircraft including taxiing, take-off, approach and engine start-ups emit CO, NO_x, SO₂, particulate matter and VOCs—in particular, xylenes. Commercial flights are identified as the primary source of NO_x and SO₂, while helicopters are primary sources of CO and PM₁₀ emissions. In comparison to other industries in the region, SCA emits similar amounts of NO₂ and PM₁₀ as other large industries in the region. SCA aircraft operations are identified as significantly larger emitters of CO than other industries reporting to the NPI. However, the NPI does not include vehicle traffic emissions, which are also major sources of CO, NO_x and PM₁₀.

The EIS reported that other pollution sources generally include dust storms and bushfires. On average, dust storms are expected to occur less than once per year. Other sources include traffic travelling on roads closest to SCA, including Sunshine Motorway, David Low Way, Airport Drive and Kittyhawk Close.

³¹ Particulate matter with an aerodynamic diameter less than 2.5 or 10 micrometres. Particles of 2.5 micrometres make up a large proportion of dust that can be drawn deep into the lungs, while particles of 10 micrometres tend to be trapped in the nose, mouth or throat.

Air quality sensitive receptors

The EIS identified six areas around the SCA that are sensitive to air quality impacts, including built up areas and vegetated areas. Nearest built-up areas, including residential development, community and accommodation facilities, are located: to the north in Mount Coolum and Yaroomba; to the east in Mudjimba and southern Marcoola; to the south in Twin Waters and Maroochydore; and to the west in Bli Bli. Vegetated areas, including forests, cultivated agricultural land or uncultivated regions are located predominantly north-west and south-west of SCA.

Due to the coastal location of these receptors, they are exposed to strong south-easterly winds which are influenced by the sea. These winds are predominant throughout summer and autumn, with a more even distribution of winds occurring in winter and spring. Average wind speed is 4.6m per second (m/s), with the strongest wind speed of 6m/s recorded during summer and throughout all seasons during the afternoon. The EIS reported that in 2009, eight allowable³² exceedances of particulate matter (PM₁₀) concentrations occurred as a result of major dust storms and passage of wind-blown dust transported by a weather front.

5.9.2 Methodology

DSITI monitors compliance with air quality objectives set under relevant standards through a number of air quality monitoring stations in South East Queensland (SEQ). The Mountain Creek Primary School monitoring station is the closest station to SCA, located 10km south and 2km further inland than the airport. This monitoring station is classified as a generally representative upper bound station, which is indicative of pollutant concentrations in the upper range of levels occurring in populated areas in the region³³. As a result, pollutant concentrations recorded at the Mountain Creek Primary School station would be higher than those expected to occur in the immediate vicinity of SCA.

Submissions received on the AEIS raised the issue of use of air quality data from stations that are not close to the SCA. There is a limited number of monitoring stations in the vicinity of the airport and air quality data from other locations was used to assist in air quality data collection. Data obtained from air quality monitoring stations located at Woolloongabba (Brisbane), Flinders View (Ipswich) and Springwood (Logan City) was used.

Concentrations of CO were obtained from the Woolloongabba air quality monitoring station, as this is the only station in SEQ monitoring CO. This station is classified as a peak station and it is therefore expected that CO levels measured at this station would be above those at SCA. The EIS reported on concentrations of SO₂ obtained from Flinders View monitoring station in Ipswich and monitoring station in Springwood.

³² Exceedances allowed under the EPP (Air).

³³ Department of Science, Information Technology and Innovation. (2014). *Queensland air monitoring report 2014*. Accessed on 19 April 2016 from www.qld.gov.au/environment/assets/documents/pollution/monitoring/air-reports/air-monitoring-report.pdf

Assessment of air quality impacts associated with project construction activities was undertaken using two models: The Air Pollution Model (TAPM) and an air quality dispersion model, California Meteorological Model (CALMET). NPI was used to identify the existing emissions in the region and confirm compliance with the EPP (Air) air quality objectives. Air dispersion modelling was based on activities scheduled to be undertaken as part of Package 1—Civil works, of the construction phase of the project. Civil works include activities with the highest potential for dust emissions due to a high rate of bulldozing and land clearing, movement of haul trucks and wind erosion of cleared areas. As a result, these works are representative of a worst-case scenario for dust emissions.

To estimate air quality impacts associated with aircraft operation, the EIS used forecast annual movements for commercial aircraft, general aviation and helicopters. Movements of aircraft in the vicinity of SCA, up to 3,000 feet in the air, were considered. Emissions from aircraft movements were based on emission factors contained in the Emissions and Dispersion Modelling System (EDMS) version 5.1.3 released in November 2010. EDMS was based on site-specific meteorological data, aircraft movement numbers and emission factors for aircraft engines sourced from the International Civil Aviation Organisation Engine Exhaust Emissions Data Bank.

5.9.3 Submissions received

The key air quality issues raised in submissions on the EIS and AEIS included the following:

- location of air quality monitoring stations
- impact of dust from increased use of unsealed roads during construction
- accuracy of the air pollution model (TAPM) used for the project assessment
- emissions resulting from increased air traffic and consequent air quality impacts.

The effect of aircraft emissions on water resources (rain water tanks and lakes), property (houses and cars) and vegetation, and consequent impacts on community and environmental health was also raised.

I have considered each submission and the responses provided by the proponent in my evaluation of the potential impacts of the project on air quality and my assessment is provided in relevant sections below.

5.9.4 Impacts and mitigation measures

Pre-construction and construction

The EIS predicted that wind erosion of exposed stockpiles and haulage of material would be the biggest contributors to dust generation. These activities would be undertaken as part of civil works, which are scheduled to occur over a 15-month period. Without mitigation, material haulage is predicted to emit 30.86 grams/second (g/s) of particulates, while wind erosion of topsoil stockpiles is predicted to emit 5.14gms/s of particulates. When added to the background of 19.2 micrograms per cubic metre ($\mu\text{g}/\text{m}^3$) (the highest recorded seventy-fifth percentile from Mount Creek

monitoring station), the PM₁₀ concentration would be close to or exceed the EPP (Air) criteria of 50µg/m³ for human health and wellbeing. These impacts would occur at the residential areas located to the east of the airport.

The EIS air quality impact assessment reported that predicted concentrations of total suspended particulate (TSP) matter, PM_{2.5} and dust deposition would be localised and below the relevant EPP (Air) objectives. At locations within four km of SCA, particulate matter would reduce further, falling to below 20 per cent of the criteria.

Mitigation measures

Submissions received on the AEIS raised issues regarding dust impacts from increased use of unsealed roads during construction of the project. The proponent's Air Quality and Dust Management Plan identifies measures to reduce dust generation associated with wind erosion of exposed stockpiles and haulage of material. Dust would be reduced by enclosing and/or minimising exposed surface areas and watering stockpile areas and haulage routes.

Additional watering would be undertaken during periods of strong winds to further reduce dust dispersion from haul roads and stockpiles. If additional watering is not sufficient to prevent visible dust from reaching the site boundary, construction activities would cease until wind direction and speed allowed the works to resume in compliance with the requirements of the Air Quality and Dust Management Plan (refer to Appendix E3 of the EIS). In addition, the proponent proposes to avoid dust-generating activities near residences during periods of high winds, particularly early morning or evening hours. With these measures in place, the potential impacts at the residential areas to the east of the airport would be unlikely to exceed the EPP (Air) objectives.

On-ground airport activities

During the operation of the project, on-ground airport activities such as movement of ground support vehicles, use of on-site fuel storage and existing airport-related traffic movements would increase. The EIS reported that movement of ground support vehicles and operation of auxiliary power units would result in emissions of NO_x, SO_x and PM₁₀. Emission of these pollutants is predicted to remain minor in comparison to other emission sources in the area such as the surrounding industrial uses and traffic. The EIS also reported that CO emissions resulting from movement of ground support equipment would remain a significant CO emitter, similar to emissions from other large-scale industries in the region. However, these CO emissions are not predicted to result in a significant impact on air quality.

In addition, the EIS reported that the project would result in a marginal increase in traffic on all major roads located within 3km of SCA. This increase in traffic would result in an increase in NO_x emissions, particularly from traffic on Airport Drive. However, in comparison to other industrial sources in the surrounding area, NO_x emissions would be minor.

Aircraft movements

The EIS reported that the operation of aircraft has the potential to emit CO, NO_x, SO₂, PM₁₀ and to a lesser extent VOCs as a by-product of fuel combustion. Dispersion modelling indicated that the ground-level concentration of all pollutants would be negligible, apart from NO_x. Due to the predicted increase in commercial flights, the EIS reported that emissions of NO_x are predicted to increase from 24,609kg per year in 2012 to 72,573kg per year in 2040.

Dispersion modelling results indicate that the highest ground-level concentration of NO_x averaged over one hour, would occur to the north-west and south-east of the airport. At these sites, the NO_x concentration is predicted to be 110µg/m³, which when compared to the EPP (Air) criteria of 250µg/m³ is identified to be of minor significance. In addition, dispersion modelling identified a low risk of predicted NO_x emissions exceeding the EPP (Air) annual criteria of 33µg/m³ for health and biodiversity of ecosystems, as the annual concentration of NO_x is predicted to be 0.97µg/m³.

The AEIS identified that predicted off-site ground-level concentrations of VOCs would be less than one per cent of their criteria under EPP (Air). Emission of xylenes would be higher than others VOCs, with predicted ground-level concentrations predicted to be 9.61µg/m³ over a 24-hour period. However, this concentration would not exceed the air quality objectives of the EPP (Air).

A number of submissions have raised issues regarding the collection of dark residue on houses, cars and outdoor objects allegedly by aircraft emissions. The AEIS reported that while these residues could be attributed to low flying aircraft on take-off and landing, these residues can also be caused by other industrial sources in the region. The AEIS reported that the aircraft emissions would be lower than emissions from cars and other industrial sources in the region.

Mitigation measures

The EIS reported that the majority of options to reduce pollutant emissions are the responsibility of airlines operating the aircraft rather than the proponent. Notwithstanding, the proponent is committed to promoting implementation of continuous descent approach (CDA) procedures for all flights. In comparison to conventional descents during which aircraft descend in a stair-step fashion, CDA involves descent at a steady and continuous decline to landing. This approach reduces flight distance and fuel consumption, resulting in reduced emissions. Furthermore, it is anticipated that as older aircraft are replaced, improvements in engine technology will lead to further reductions in emissions.

As part of the flight path design, the proponent has identified a secondary approach and departure corridor path for aircraft arriving from southern destinations (Sydney and Melbourne). As discussed in section 5.1 (Operational aircraft noise), this flight path is shorter than other flight paths and would reduce flight miles and associated air emissions.

5.9.5 Coordinator-General's conclusions

Based on the EIS, I am satisfied that air quality impacts from the construction and operation of the project are unlikely to exceed the air quality objectives of the EPP (Air). I am satisfied that the proponent can adequately manage dust generation associated with wind erosion of exposed stockpiles and haulage of material, by enclosing and/or minimising exposed surface areas and watering stockpile areas and haulage routes. The proponent has prepared an Air Quality and Dust Management Plan which would manage dust impacts on nearby residences during construction of the project.

To ensure that emissions associated with aircraft operations are reduced as far as possible, I recommend that the proponent works with ASA to promote development of CDA procedures and use of the shorter secondary approach and departure corridor path for flights servicing Melbourne and Sydney.

5.10 Greenhouse gas emissions

5.10.1 Background

The EIS provided an assessment of greenhouse gas (GHG) emissions from aircraft operations describing current emission levels and forecasts for the years 2020, 2030, 2040 for commercial aircraft, general fixed wing aviation and helicopter operations.

Under the *National Greenhouse and Energy Reporting Act 2007* (NGER Act), the proponent must report on GHG emissions from a facility when:

- emissions exceed a carbon dioxide equivalent (CO₂-e) of 25,000 t per annum
- energy production or consumption exceeds 100 terajoules per year.

The NGER prescribes an accounting methodology and includes the following scope definitions for emissions attributable to a project:

- scope 1 – direct emissions which must be reported (as a direct result of an activity or series of activities at a facility)
- scope 2 – indirect emissions which must be reported (such as the consumption of purchased electricity)
- scope 3 – all indirect emissions not included in scope 2 that are a consequence of the activities of a facility, such as aircraft emissions (reporting is not mandatory).

Climate impacts from air travel are a result of the combustion of fuels causing GHG emissions and from impacts linked to the emissions of nitrogen oxides, particles and water vapour in the upper atmosphere. These upper atmosphere impacts, known as radiative forcing, have been estimated by the Intergovernmental Panel on Climate Change (IPCC) (1999) to be 2.7 times the impact of aircraft CO₂ emissions. The assessment undertaken for the EIS adopted a Radiative Forcing Index (RFI) of 2.7 although the EIS notes that this estimate has a wide band of uncertainty.

An estimate of current GHG emissions drew on six months of detailed flight movement data, including landing and take-off emissions, and emission factors linked to specific origins or destinations. GHG emissions were divided equally between SCA and other

origin or destination airports. Where SCA was both the origin and destination airport (e.g. training flights) all emissions from those trips were assigned to SCA. Table 5.24 shows the GHG emissions from aircraft movements during 2012.

Table 5.24 SCA GHG emissions from aircraft movements 2012 (t CO₂-e)

Operation	Landing and take-off emissions	Flight emissions
Commercial aviation	6,190	49,670
General aviation	2,030	3,820
Helicopter operation	3,620	7,170
Total	11,840	60,660

5.10.2 Submissions received

Submissions received during the public notification of the EIS and AEIS raised the issue of the environmental impacts of GHG emissions from increased air traffic at the SCA. I have considered each submission and the responses provided by the proponent in my evaluation of the project with respect to GHG emissions and my assessment is provided in relevant sections below.

5.10.3 Impacts and mitigation

Aircraft movements

The EIS reported projections from the IPCC suggesting annual improvements in the fuel efficiency of aircraft of one to two per cent. With traffic growth of five per cent per annum expected in the aviation sector, net growth in GHG emissions would be three to four per cent per annum. Table 5.25 shows the total GHG estimates for 2012 and forecasts to 2040 for aircraft movements at the SCA.

Table 5.25 Predicted GHG emissions from aircraft movements (t CO₂-e)

Operation	2012	2020	2030	2040
Landing and take-off emissions				
Commercial aviation	6,190	12,080	24,020	31,390
General aviation	2,030	2,370	2,880	2,880
Helicopter operation	3,620	4,230	5,130	5,130
Total	11,840	18,680	32,030	39,400
Flight emissions				
Commercial aviation	49,670	140,930	342,590	405,410
General aviation	3,820	4,450	5,400	5,400
Helicopter operation	7,170	8,370	10,150	10,150
Total	60,660	153,750	358,140	420,960
Total applying RFI (2.7)	150,000	390,000	940,000	1,110,000

The RFI is the total radiative forcing of a process with respect to that of its CO₂-e emissions. The EIS reports the science on warming caused by aviation emissions at high altitudes is less well understood than GHG emissions due to fuel burning and that the upper-atmosphere effects are more short-term than the warming impact of CO₂-e emissions. The EIS considered that emissions officially attributed to aviation and airports may increase significantly with the application of the RFI for aircraft climate impacts in the regulation of inter-jurisdictional pollution. The total GHG emissions with an RFI of 2.7 shown in Table 5.25 are applied to flight emissions from commercial and general aviation.

With respect to submissions raising the impacts of increased GHG emissions, opportunities to reduce emissions from aircraft movements can primarily be found in the landing and take-off phases, and through optimisation of aircraft operations. The EIS noted the following opportunities to mitigate GHG emissions by 6–12 per cent published by the IPCC (2007):

- minimising taxiing time
- flying at optimal cruise altitudes
- flying minimum-distance great circle routes (the most efficient path between two airports) and accounting for prevailing winds
- minimising or eliminating holding and stacking around airports.

Reducing aircraft GHG emissions can be achieved through replacing fleets with more efficient aircraft, retrofitting aircraft to improve efficiency, streamlining operations to reduce fuel consumption and substituting fuels with less carbon intensive alternatives. These strategies are largely available to aircraft operators rather than the proponent as the operator of the airport. The primary mitigation measure identified in the EIS that the proponent can implement is the Continuous Descent Approach (CDA) where aircraft descend at a steady continuous decline through to landing. Without implementing CDA, aircraft would approach the airport, requesting permission to descend in a less efficient stair-step fashion for each new altitude.

Construction and airport operation

The EIS identified the GHG emissions from sources associated with the construction and operational phases including:

- terminal operations
- ground support
- civil works (including fuel usage)
- vegetation clearing
- traffic movement
- waste emissions
- embedded emissions of construction materials.

The EIS indicated that emissions from construction activities would be well below the 25 kilotonne (kt) CO₂-e reporting threshold of the NGER Act and therefore would be considered a minor impact. Dredged sand and aggregates for pavement material were

found to account for approximately 70 per cent of all construction emissions. Embedded emissions from construction materials are accounted for as scope 3 emissions. The estimated GHG emissions from project construction include 1,207 t CO₂-e of Scope 1 emissions, 60 t CO₂-e of Scope 2 emissions and 32,414 t CO₂-e of Scope 3 emissions.

Management and mitigation measures for the construction and operation phases of the airport were described in the EIS for scope 1, 2 and 3 emissions. The measures described included:

- scheduling activities of site vehicles to minimise fuel consumption
- substituting regular diesel for biodiesel where available
- locating fuel storages to minimise travel distances for refuelling
- minimising quantities of construction materials required to meet project specifications
- using materials with lower emissions intensities where available
- investigating the suitability of nearby sources of construction materials
- using crushed recycled concrete as an aggregate where possible
- selecting energy efficient materials and systems for the new section of the terminal
- integrating the new terminal section into the existing building management system to optimise energy use.

5.10.4 Coordinator-General's conclusion

I am satisfied that the EIS has quantified the existing and predicted GHG emissions with respect to scope 1 and scope 2 emissions in accordance with the methodology of the NGER Act and NGER determination. The mitigation measures proposed in the EIS would minimise GHG emissions throughout the construction and operation phases of the project. I note that GHG emissions from aircraft operations fall into the category of scope 3 emissions for which the individual airline operators are responsible for the reporting requirements.

5.11 Construction noise

5.11.1 Background

The EIS provided an assessment of noise emissions from construction activities. In Queensland, the environmental impacts of noise emissions, associated with construction activities, are regulated under the EP Act and subordinate legislation, including the Environmental Protection Regulation 2008 (EP Regulation) and the Environmental Protection (Noise) Policy 2008 (EPP [Noise]).

Construction activities proposed for the project including offshore dredging and the placement of sand onshore for construction of the proposed east-west runway, are an ERA (Environmentally Relevant Activity 16 (dredging, extractive industry and screening)). An environmental authority is required to conduct these activities.

This section provides an assessment of noise impacts associated with construction activities on human health and wellbeing and community amenity. Noise impacts on the health and biodiversity of ecosystems is discussed in the section 6 (Matters of national environmental significance) and section 5.8 (Matters of state environmental significance) of this report. Operational aircraft noise is discussed in section 5.1 (Operational aircraft noise) of this report.

The current sources of noise in the project area include existing aircraft operations, and traffic on local and main roads. The typical background noise levels around the project site range from 29 to 50 dB(A).

The EIS identified noise sensitive receptors surrounding the project site including dwellings, educational and health care facilities, libraries, nursing homes, churches and childcare centres (referred to as R1-R14 in the EIS). Background noise levels at these receptors were identified through noise monitoring. All noise measurements were in accordance with DEHPs' *Noise Measurement Manual*, 2013³⁴.

The potential noise impacts from construction activities on these sensitive receptors have been assessed using an Environmental Noise Model (ENM). The proponent used the DEHP *Planning for Noise Control Guideline*, 2015³⁵ to set the noise limits for the purpose of the EIS assessment.

5.11.2 Submissions received

A key issue raised in the submissions about construction noise was the quantification of noise impacts from the dredge booster pump which is proposed to be located near the south-eastern end of the site, and the proposed mitigation and monitoring measures for the pump. I have considered the submission and the response provided by the proponent in my evaluation of the potential impacts of the project and my assessment is provided in relevant sections below.

5.11.3 Impacts and mitigation

Sand pumping to the reclamation site

The EIS indicated that a single 2000-kilowatt booster pump would be required to assist in the delivery of sand from the pump-out site to the north-west part of the proposed east-west runway. The EIS proposes the booster pump be located near the south-eastern end of the site. The pump would be operated only when sand is being pumped to the site. The duration and frequency is likely to be two hours each dredge cycle, up to three times a day (at approximately 8-hour intervals). As the dredging operations are proposed to occur as a 24-hour operation, the booster pump may be operated at any time.

³⁴ Department of Environment and Heritage Protection, *Noise Measurement Manual*, EM1107, Department of Environment and Heritage Protection 2013, viewed 17 May 2016, <https://www.ehp.qld.gov.au/licences-permits/pdf/noise-measurement-manual-em1107.pdf>

³⁵ Department of Environment and Heritage Protection, *Planning for Noise Control Guideline*, EM2371. Version 1.00, Department of Environment and Heritage Protection 2016, viewed 26 April 2016, <https://www.ehp.qld.gov.au/assets/documents/regulation/ts-gl-planning-for-noise-control.pdf>

Based on the noise assessment, noise from the booster pump would need to be attenuated. A combination of measures would be implemented, including enclosing the engine and fitting residential class mufflers. It is expected that with attenuation, the booster pump would have a sound level of 106 dB(A). Noise modelling with one attenuated pump indicates that four exceedances of proponent derived noise limits would occur at R7 (east of the existing north-south runway near Keith Royal Park) during daytime for 10 per cent of the period (six minutes). With mitigation, these noise levels are expected to be generally compliant with the proponent derived noise limits.

Reclamation works

It is anticipated that the general reclamation filling sequence would be from south-east to north-west, which is the general direction of the slope of the existing ground. The filling process will involve pumping the sand and water mix through the main sand delivery pipeline, which will be split into a number of branch pipes in a bunded placement area.

Noise from reclamation works would include emissions from construction equipment including trucks and dozers. Dozers would be used to shift sand around the placement area to achieve the desired reclamation levels and compaction rates. It is expected some activities would be undertaken outside of standard construction hours.

The predictions in the EIS assumed a number of mitigation measures including:

- a 7m high bund along the eastern extent of the reclamation area and another 5m high bund along the northern boundary adjoining the WHMA
- noise attenuation on the dozer.

Construction activities have been predicted to exceed the proponent derived noise limits at some dwellings, as follows:

- the noise limit of 43 dB(A) for the day time period at R8 (along Keith Royal Drive to the east of the existing north-south runway) would be exceeded once by 1 dB(A) for 10 per cent of the period (6 minutes).
- no exceedances are predicted to occur during evening hours
- the noise limit of 40 dB(A) for the night time period at R8 would be exceeded once by 1 dB(A) for 10 per cent of the period (6 minutes).

While there would be minor exceedances for short periods of time, the EIS concluded that these predicted noise levels are considered to be acceptable.

Mitigation measures

The EIS lists measures that would be implemented to reduce and manage noise emissions during the construction period including:

- a noise monitoring programme that would identify areas where noise levels are likely to exceed the statutory noise limits and trigger commencement of appropriate response actions such as time restrictions, changes in work sequences or selection of different equipment

- selection of appropriate plant, and where necessary fitted with silencers, acoustical enclosures and other noise attenuation measures
- undertake an initial plant noise audit and periodic review during works to ensure statutory noise limits for construction activities are not being exceeded
- employment of trained operators to install attenuation measures
- a construction schedule that optimises the most appropriate layout and positioning of noise generating plants to reduce potential noise impacts
- the hours of noisy equipment operation may be limited at the work sites where dwellings or other sensitive receptors could be adversely affected
- a community engagement program prior to and during the construction works (via methods such as letterbox drop, meetings with community groups and complaint procedures).

The above measures would need to achieve noise levels which comply with the statutory limits in the environmental authority once issued by EHP.

5.11.4 Coordinator-General's conclusion

I am satisfied that the EIS has identified and assessed the potential impacts of noise during construction and that the noise impacts can be managed to acceptable levels. To ensure appropriate noise management I have stated conditions for inclusion in the environmental authority. These conditions require the proponent to:

- determine appropriate noise limits in consultation with EHP for construction activities to manage environmental nuisance
- not generate unreasonable interference at sensitive receptors or commercial places
- ensure that the sound power level of the booster pump used for sand pumping does not exceed 106 dB(A). I also require that the sound power level is measured once within the first week after pump installation. The sound power level would need to be measured in accordance with Australian Standard AS 1217 Acoustics—Determination of sound power levels of noise sources.

5.12 Traffic and transport

5.12.1 Background

The EIS traffic and transport chapter presented the findings of the assessment of project-related traffic impacts on the road network surrounding the SCA. The assessment quantified the existing performance of the road network, and compared this data with: predicted traffic volumes during the estimated peak construction year of 2018; the opening year of the upgraded SCA in 2020; and after 10 years of operation, projected for the year 2030.

To determine the necessity and extent of road and intersection upgrades attributed to the project, traffic impacts were assessed in line with the DTMR *Guidelines for Assessment of Road Impacts of Development* (GARID).³⁶

5.12.2 Submissions received

The key issues regarding traffic and transport raised in submissions on the EIS and AEIS included the following:

- increased motor vehicle traffic in the vicinity of the airport
- the signalised upgrade of the Finland Road/David Low Way intersection, including the potential layout and proposed upgrades
- how traffic will be managed during construction, particularly in the road-use management plan.

I have considered each submission and the responses provided by the proponent in my evaluation of the potential impacts of the project and my assessment is provided in relevant sections below.

5.12.3 Impacts and mitigation

Construction traffic

This section addresses the impacts associated with construction traffic on the surrounding road network. Construction activities are predicted to generate the highest number of vehicle movements to and from the site during peak construction (2018). Construction traffic would include light vehicles (construction workers) and heavy vehicles (construction plant, equipment and materials). Heavy vehicle movements are expected for the haulage of quarry material and pipeline segments. The following sections address the issues raised in the submissions about traffic impacts.

Construction hours and haulage regimes

The EIS reported that the movement of construction vehicles to and from the site via Finland Road would predominantly occur between 7.00am and 6.00pm. To minimise disruptions to night-time flight operations, some night works would be required, but are proposed to be kept to a minimum. The EIS stated that activities associated with night works are not expected to generate additional external traffic on the surrounding road network.

Construction plant, equipment and materials are proposed to be retained on site during the construction phase. Any movement of construction plant, equipment and materials to the site would be scheduled to avoid peak periods where possible. Staff arriving for work are expected to be outside of peak traffic periods.

³⁶ Department of Main Roads, *Guidelines for Assessment of Road Impacts of Development*, Department of Main Roads 2006, viewed 24 April 2016, <http://www.tmr.qld.gov.au/business-industry/Technical-standards-publications/Guidelines-for-assessment-of-road-impacts-of-development.aspx>

All construction-related vehicles would use Finland Road to access the site. To facilitate safe and efficient road operation, the proponent has committed in the EIS to upgrade Finland Road prior to commencing construction.

Quarry material haulage

The EIS stated that 100 per cent of the quarried material to be brought to site would be sourced from Moy Pocket Quarry, located approximately 25km west of the site. The Finland Road bridge, which provides a connection over the Sunshine Motorway, is proposed to be used by heavy vehicles to access the site. The structure of this bridge was designed to achieve Australian bridge design and traffic loading standards, and the EIS considered it acceptable for heavy vehicle use. Given that the structure has been designed for heavy vehicle use, the proponent's commitment to further review the suitability of the bridge following detailed design is appropriate.

Pipeline construction traffic

Heavy vehicle movements are expected for the haulage of pipeline segments to a worksite adjacent to David Low Way, east of the SCA. These segments would be delivered to the worksite on 19-metre-long semi-trailers. The proposed haul route from the Sunshine Motorway to the work site via David Low Way requires haulage vehicles to perform a U-turn manoeuvre at the David Low Way/Boardwalk Boulevard roundabout. The EIS concluded that the haulage vehicles would be able to successfully perform a U-turn manoeuvre at the intersection without significant interference to existing structures or other road users.

Construction traffic impacts on intersections

The following intersections were identified as potentially impacted by construction traffic:

- David Low Way/Airport Drive
- Sunshine Motorway/David Low Way
- David Low Way/Finland Road.

A traffic assessment was undertaken to examine the impact of construction traffic on the performance of these intersections. The EIS concluded that only the David Low Way/Finland Road intersection would require upgrading to accommodate construction traffic, and the proponent has committed to upgrading this intersection. The other two intersections would be sufficient for accommodating construction traffic.

The David Low Way/Finland Road intersection would require upgrades to address safety deficiencies. Safety issues may arise as a result of sight distance limitations due to current intersection geometry and vegetation. The absence of suitable acceleration/deceleration lanes along David Low Way and a designated right-turn lane into Finland Road from David Low Way (east) could also increase the potential for rear-end accidents at the intersection.

Additional mitigation measures are also proposed to improve traffic operations at this intersection including:

- installing signs on the approach to the David Low Way/Finland Road intersection informing motorists of the presence of construction vehicles
- investigating the performance of the David Low Way/Finland Road intersection from a safety perspective, to determine the necessity of constructing a short right-turn lane into Finland Road from David Low Way and/or acceleration/deceleration lanes on the approach and departure to and from Finland Road
- signalling the David Low Way/Finland Road intersection to improve the safety of vehicles and property access at this location.

Signalising the David Low Way/Finland Road intersection would address a submission made on the AEIS about the need for signalised upgrade.

Pavement impact assessment

A pavement impact assessment (PIA) is required where traffic generated by a development equals or exceeds 5 per cent of equivalent standard axles (ESAs). ESA is a measure used to define the cumulative impact to pavement, expressed in terms of the equivalent number of 80kN axles (an axle load of 18,000 pounds) passing over a pavement up to the design horizon.

The assessment in the EIS indicates that the traffic generated in the peak construction year (2018) is expected to exceed the 5 per cent ESA threshold along David Low Way and Finland Road. A more detailed PIA assessment is therefore required to assess the impacts of construction traffic in the vicinity of the David Low Way/Finland road intersection. This assessment would be undertaken as part of the project's detailed design.

The proponent has committed to upgrading Finland Road to address poor pavement conditions. The EIS noted that Finland Road will be upgraded as part of the first stage of construction works.

Road-use and traffic management plans

The EIS noted that the proponent is proposing to develop a road-use management plan, in conjunction with the project contractor and submit the plan to DTMR and SCRC for approval prior to obtaining a works permit to haul materials and equipment. The requirement for a road-use management plan was raised in a submission made on the AEIS.

The road-use management plan would require construction contractors to develop a traffic management plan (TMP) to ensure that the impact of construction traffic on the external road network is mitigated or minimised where possible. The TMP would address specific items of construction work, in addition to issues related to the safe and efficient movement of construction vehicles and haulage of material. The TMP would be required by DTMR and SCRC prior to granting a works permit to haul material and equipment.

Consultation with DTMR and SCRC would be undertaken in relation to the specific requirements and would also include requirements by the Queensland Police Service for the safe movement of over-sized/indivisible vehicles.

Over-sized vehicles would also require permits from the National Heavy Vehicle Regulator under the *Heavy Vehicle National Law Act 2012*.

The EIS included an initial road-use management plan in response to the findings and conclusions of the traffic and transport assessment. Actions incorporated into the road-use management plan include:

- identify and agree mitigation measures to address the relative increase in traffic levels on affected road sections of the state-controlled road network in conjunction with DTMR
- install appropriate heavy vehicle and construction warning signs on the access road to the site
- distribute warning notices to advise local road users of scheduled construction activities
- advanced notice of road/lane closures and advice on alternative routes
- install appropriate traffic control and warning signs for areas identified with potential safety risk issues
- vehicles associated with the construction works would use internal and haulage access roads instead of public roads, whenever practicable
- provision for mobility impaired access to and from the site.

Airport operations traffic

The EIS stated that the timing and movement patterns of operations traffic (comprised of airport employees and passengers) on the road network is dependent on the scheduling of flights at the airport.

Operations traffic impacts on intersections

The following intersections were identified as potentially impacted by operations traffic.

- Airport Drive/Kittyhawk Close
- David Low Way/Airport Drive
- Sunshine Motorway/David Low Way
- David Low Way/Finland Road.

A traffic assessment was undertaken to examine the impact of operations traffic on the performance of these intersections for both the airport opening year (2020), and after 10 years of operation (2030). The assessment concluded that the addition of operations traffic is expected to have minimal impact on the performance of these intersections. It is considered that any reduced operational performance of intersections would be more likely due to the normal growth of background traffic rather than traffic generated by the project. As a result, the EIS concludes that no intersection improvements would be required to accommodate 2018 operations for 2020 and 2030.

Pavement impact assessment

The EIS concluded that operations traffic in 2020 and 2030 is not expected to exceed the 5 per cent threshold on the access routes as the increase in heavy vehicle

movements is expected to be minimal for both periods. A PIA is therefore not required on the access routes for these years.

Access beneath Sunshine Motorway

The EIS noted that it would be necessary to establish a local road connecting Finland Road, the cane underpass and the main construction compound. The proponent does not propose to provide direct access to the Sunshine Motorway from the service road. An unsealed road currently provides access along this route, and would need to be upgraded to accommodate the proposed construction vehicles. To ensure there is no direct access from the Motorway to the access road, the EIS stated that a perimeter fence would be installed between the road and Sunshine Motorway. The fence would be left in place, or removed at the completion of works, subject to landowner and DTMR requirement.

As the service road would be at existing ground levels, which are lower than the embankment of the Sunshine Motorway, the upgrade to the access road is not expected to affect drainage of the Sunshine Motorway. The EIS stated that regardless, the access road would be designed to ensure appropriate stormwater drainage for the access road and Sunshine Motorway.

5.12.4 Coordinator-General's conclusion

The EIS concludes that the project would have a minimal impact on the surrounding road network. I consider that the capacity of the existing road network would be adequate to support project traffic.

Despite this, the EIS proposes a number of physical changes to transport networks and disturbance to normal traffic flows that would require mitigation measures. In particular the proponent has committed to upgrade Finland Road and the David Low Way/Finland Road intersection.

I note that there are a number of management plans and assessments based on further detailed information required in consultation with DTMR and SCRC prior to any construction. These plans include:

- mitigation measures to improve the safety of Finland Road
- detailed review of the Finland Road overpass, including actual vehicle specifications following detailed design
- temporary traffic management procedures to ensure safe traffic operations during the pipeline installation across David Low Way
- finalisation of a detailed road-use management plan and traffic management plan based upon a more detailed road impact assessment.

I have included recommended stated conditions in Appendix 3 of this report to address safety, road and traffic operations issues prior to construction. These are aimed at appropriately managing safety, condition and efficiency issues on state-controlled and local roads.

5.13 Cultural heritage

5.13.1 Indigenous cultural heritage

The EIS assessment included searches of relevant state registers and databases, historical literature and previous Indigenous cultural heritage assessments undertaken in the area. A further detailed assessment would incorporate the findings of future cultural heritage surveys and consultation with Aboriginal Party(ies) for the development of Cultural Heritage Management Plans (CHMP).

To comply with the duty of care provisions of the *Aboriginal Cultural Heritage Act 2003* (ACH Act), proponents of projects requiring an EIS must prepare a CHMP with the relevant Aboriginal party for the plan area.

The proponent is negotiating CHMPs with the Kabi Kabi and Quandamooka traditional owners to address works at the airport site and sand extraction in the Spitfire Realignment Channel. The EIS anticipated that the Kabi Kabi People would seek endorsement for the CHMP over the area offshore of the airport, and both the Kabi Kabi People and the Quandamooka People would seek endorsement for the CHMP over Spitfire Realignment Channel.

5.13.2 Non-Indigenous cultural heritage

With the exception of marginal agriculture, including sugarcane farming and the construction of drainage ditches, the project area's locality of Marcoola remained largely undeveloped until the mid-twentieth century, when the airport was first constructed in 1959. No sites of non-Indigenous cultural heritage (NICH) are known to occur on the project site and no shipwrecks protected under the *Historic Shipwrecks Act 1976* (HS Act) are known to occur within the proposed dredge vessel route.

The EIS assessment involved a desktop assessment, stakeholder consultation and field surveys. State significance was determined using standard criteria under the *Queensland Heritage Act 1992* (QH Act) and Queensland Heritage Council Guidelines. Local significance was determined based on criteria in the Sunshine Coast Planning Scheme 2014 and the Maroochy Plan 2000.

5.13.3 Submissions received

Key issues raised in submissions on the EIS and AEIS regarding potential impacts on cultural heritage related to consultation with traditional owners and impacts on heritage values. I have considered each submission and the responses provided by the proponent in my evaluation of the project and my assessment is provided in relevant sections below.

5.13.4 Impacts and mitigation

Indigenous cultural heritage

Indigenous cultural heritage sites across the region are known to include bora rings, shell middens and assemblages of stone tools and other artefacts. Artefact scatters have been found in cultivated sugar cane lands in the region however the EIS reports no known sites have been identified within the project site. Potential impacts on Indigenous cultural heritage values and the significance of those values are determined by the Aboriginal Party and would be reported in a final assessment following consultation and field surveys undertaken for each CHMP. The CHMPs would manage all aspects of Indigenous cultural heritage and include:

- processes for engaging with Indigenous people
- measures to avoid or minimise harm to Aboriginal cultural heritage
- cultural heritage survey methodologies
- processes for conflict resolution
- cultural heritage induction and awareness training
- procedures in the event of a cultural heritage find during construction.

The CHMPs would be completed prior to commencement of works and implemented throughout the project's development and address submitter issues regarding consultation with traditional owners.

With respect to dredging activities, particularly at the pump-out location and pipeline, works would be undertaken with regard to the cultural heritage duty of care outlined in the ACH Act and associated guideline.

Where archaeological material is identified during dredging and associated activities, work would cease in the vicinity of the material and a course of action identified in the CHMP would be implemented.

Non-Indigenous cultural heritage

The EIS found that potential impacts on NICH may occur from ground surface/sub-surface disturbance, vegetation clearance, seabed disturbance from dredging activities, construction of the dredge pipeline and reclamation for the new runway. Targeted vehicular surveys of the onshore project area identified the Aero Club and Finland Road as the only sites of interest.

Assessment of these sites considered the likelihood of significant archaeological material to be present and the existing level of disturbance in the area. The EIS concluded the removal of part of Finland Road during site clearing is acceptable from a cultural heritage perspective, as the site does not meet state or local significance criteria.

On balance, the EIS assessed the potential impacts on NICH across the entire project area to be negligible. Should an incidental find occur, work would cease and the find would be secured by a 20m buffer zone from other works. A historical archaeologist would also be on call during construction to inspect any incidental finds and would

provide management recommendations to the site manager. In addition, the QH Act requires that the Chief Executive of the DEHP be notified if a discovery is deemed significant.

The proponent has committed to develop and deliver induction material for work crews documenting specific instructions and obligations regarding NICH material. The induction will ensure works comply with the QH Act and include:

- presentation of NICH material so that work crews are aware of what constitutes a NICH find
- clear instructions on what to do should any such material be found
- a process for the collection, transport and storage of any NICH items.

In addition, visual inspections and weekly audits will be undertaken during project construction to monitor compliance and ensure corrective actions to be implemented where required.

5.13.5 Coordinator-General's conclusion

I am satisfied that the proponent's commitments and the requirements of the ACH Act would ensure the adequate identification and management of ICH places and items by the proponent and the Aboriginal party as custodians of their cultural heritage.

With respect to NICH, I am satisfied the proposed mitigation measures and legislative requirements of the QH Act would ensure potential impacts on NICH are appropriately managed.

6. Matters of national environmental significance

6.1 Introduction

This section addresses the potential impacts of the Sunshine Coast Airport Expansion project (the project) on matters of national environmental significance (MNES) protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

On 31 January 2011 the project was referred to the Department of Sustainability, Environment, Water, Population and Communities (now the Department of the Environment) as the Sunshine Coast Airport Master Plan Implementation Project. On 7 October 2011 the project was declared a controlled action under the EPBC Act (reference number EPBC 2011/5823) for the following controlling provisions:

- wetlands of international importance (sections 16 and 17B)
- listed threatened species and communities (sections 18 and 18A)
- listed migratory species (sections 20 and 20A).

The EIS process has been undertaken in accordance with the requirements of the Bilateral Agreement between the Queensland and Australian Governments.

6.2 Project description

The Sunshine Coast Regional Council (the proponent) proposes to construct and operate a new main runway within the existing Sunshine Coast Airport (SCA) site, at Marcoola on the Sunshine Coast, South East Queensland. The new runway, aligned in a north-west/south-east direction, would be 2450m in length and 45m wide. To support the new runway the project would also involve the:

- construction of two-end taxiway loops to allow aircraft access between the new runway and the existing terminal, and additional runway capacity
- expansion of the apron at the existing terminal
- construction of a combined new air traffic control (ATC) tower and aviation rescue and fire-fighting (ARFF) station
- extension of the existing Airport Drive to provide access to the new ATC tower and ARFF station facility.

The existing VHF omnidirectional radio range (VOR) navigational aid would be relocated to the north-west end of the new runway to accommodate the construction of the northern perimeter drain. The existing helipads would also be relocated to a site near the relocated VOR.

The project would also include the construction of a new airside perimeter fence to ensure the security of the new runway and an airside perimeter road to facilitate access around the runway for maintenance and emergency response purposes.

The proposed new runway site would need to be filled to ensure a level runway and solid foundation for high-strength airfield pavements. Reclamation of this area would address the soft soils at the western end of the runway alignment and provide flood immunity for the runway.

Fill material for this reclamation is proposed to be sourced from the Spitfire Realignment Channel, located in northern Moreton Bay near the southern end of Bribie Island. The Port of Brisbane Pty Ltd (PBPL) has an existing approval to extract 15 million cubic metres (million m³) of sand from this channel. The proponent would require an additional 1.1 million m³ of sand from this channel for the runway reclamation area. The sand would be extracted from the Spitfire Realignment Channel using a dredger and would be transported via this dredge vessel from the dredging site to an area 600 to 1000m offshore from Marcoola Beach. It is anticipated that dredging would be undertaken using a small to medium-sized trailing suction hopper. The sand would be then transported to the airport site from this offshore area via a pipeline which would be submerged from the pump-out point to Marcoola Beach, buried under the Marcoola Beach dune and then be above ground within the airport site to the west of David Low Way. The pipeline would then follow an above-ground perimeter track west of the existing north-south runway to the reclamation area.

To manage tailwater generated during reclamation works and to provide ongoing stormwater management for the airport site, the proponent has also proposed to construct a drain along the northern perimeter of the new runway (northern perimeter drain). The drain would direct overland flow from the north of the runway north-west into the Marcoola drain. A western perimeter drain would be constructed to connect the northern perimeter drain to the existing southern perimeter drain to improve the conveyance of floodwater around the end of the runway. The existing southern perimeter drain would receive stormwater run-off from the western perimeter drain, runway, taxiways and the existing developed area of the airport.

The proponent has proposed a minor realignment of the existing eastern perimeter drain at the end of the new runway to maintain the required clear distance from the runway end.

6.3 Project location

6.3.1 Airport and surrounds

The project area is within the coastal zone of South East Queensland. This coastal zone is considered to be one of the most biologically diverse areas in Australia and a fast developing zone for urban development.

The airport site is surrounded by a mix of land uses including residential development to the north, east and south; former sugar cane farmland and remnant bushland to the west; and National Park directly north and south of the site. The airport is also bounded by major roads including the Sunshine Coast Motorway to the west, and David Low Way to the east.

While most of the site has been previously cleared and cultivated for sugar cane farming, it has not been productively cultivated for over 10 years. As a result of previous land uses, a small portion of the site contains remnant and regrowth vegetation. These areas of vegetation comprised of a number of regional ecosystems (REs) (Queensland classification) including broad-leaved paperbark open forest and palustrine wetland, closed or wet heath, and sedgeland and coastal she-oak woodland.

The parcel of land where the dredge pipeline construction compound would be established includes areas of paperbark open forest and palustrine wetland, closed or wet heath REs and a small area of vegetation classified as closed sedgeland in coastal swamps. The narrow linear strip of coastal dune habitat to the east of David Low Way, where the pipeline access area is proposed, is classified as foredune complex RE.

Marcoola Beach is broadly classified as an intermediate beach type. Intermediate beaches are typically characterised by moderate wave heights and a medium beach slope.

The airport site is located on relatively flat low-lying land within the Maroochy River catchment. The site has been largely drained and natural waterways have been channelised into artificial waterways (drains). The waterways to the north-east of the project site flow in either a northerly direction to Coolum Creek or easterly to the

Maroochy River. There are two existing drains on the airport site the eastern perimeter drain on the eastern side of the existing north-south runway which flows south into the tidal canals within the suburb of Twin Waters; and the southern perimeter drain which flows west from the western side of the existing airport boundary into the Maroochy River.

Marcoola drain, located to the north-west of the site, is a shallow, partially tidally influenced man-made waterway that drains to the Maroochy River approximately 320m south of the confluence with Coolum Creek.

6.3.2 Spitfire Realignment Channel

The Spitfire Realignment Channel is located within northern Moreton Bay, near the southern end of Bribie Island. The area is within the General Use Zone of the Moreton Bay Marine Park, which allows for activities such as shipping, maintenance of shipping channels and sand extraction under the State approvals process. This area has been subject to ongoing dredging by the PBPL under its current approval for the purpose of improving shipping navigation and providing a source of fill for ongoing port development. The PBPL currently has approval to extract 15 million m³ of material and has removed total 7.19 million m³ to date.

The area is wholly comprised of well-graded, low-silt-content mobile marine sands. It contains no hard-bottom or coral communities or significant areas of marine vegetation (seagrass and/or algae). The nearest such known hard-bottom/coral communities are located at the Bulwer drop-off adjacent Cowan on Moreton Island, some 8km south-east of the channel, and the Curtain Artificial Reef approximately 8km south-east of the site. Extensive seagrass areas are known to occur approximately 6km from the site on the western shores of Moreton Island and west of Bribie Island.

6.4 Listed threatened species and communities

In deciding whether or not to approve the proposal for the purposes of a subsection of section 18 or section 18A of the EPBC Act, and what conditions (if any) to attach to such an approval, the Commonwealth Environment Minister must not act inconsistently with Australia's obligations under the:

- Convention on Biological Diversity (CBD)
- Convention on Conservation of Nature in the South Pacific (Apia Convention)
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
- a recovery plan or threat abatement plan (TAP).

The Minister must also, in deciding whether to approve the taking of the action, have regard to any approved conservation advice for the threatened species or ecological community that are likely to be or would be significantly impacted by the proposed action.

6.4.1 Threatened ecological communities

A search of the EPBC protected matters search tool (PMST) database identified two threatened ecological communities (TEC) potentially occurring in the project area including:

- Subtropical and Temperate Coastal Saltmarsh
- Lowland Rainforest of Subtropical Australia.

The Subtropical and Temperate Coastal Saltmarsh TEC was listed under the EPBC Act after the controlled action decision was made for the project and therefore, in accordance with EPBC Act subsection 158A(4), it is not considered in this assessment.

Equivalent Queensland RE classifications, which are representative of the Lowland Rainforest TEC, include those which comprise of notophyll vine forest. No REs representative of this TEC were identified by mapping or on-ground surveys. Given the absence of suitable habitat within the project area, the TEC is considered highly unlikely to be present and therefore is not expected to be impacted by the proposed action.

Based on the low likelihood of the Lowland Rainforest TEC occurring within the project area, I consider that the proposed action is unlikely to result in unacceptable impacts on this TEC.

6.5 Threatened terrestrial and aquatic flora

A search of the PMST database identified 18 threatened flora species, listed under the EPBC Act, as potentially occurring within 5km of the project site. These species are listed in Table 6.1.

Table 6.1 EPBC Act listed threatened flora species potentially occurring in the project area

Common name (species name)	EPBC Act listing status
Mount Coolum she-oak (<i>Allocasuarina thalassoscopica</i>)	Endangered
Mount Emu she-oak (<i>Allocasuarina emuina</i>)	Endangered
Hairy-joint grass (<i>Arthraxon hispidus</i>)	Vulnerable
Marbled balogia (<i>Baloghia marmorata</i>)	Vulnerable
Heart-leaved bosistoa (<i>Bosistoa selwynii</i>)	Vulnerable
Three-leaved bosistoa (<i>Bosistoa transversa</i>)	Vulnerable
Minature moss-orchid (<i>Bulbophyllum globuliforme</i>)	Vulnerable
Stinking cryptocarya (<i>Cryptocarya foetida</i>)	Vulnerable
Small-fruited Queensland nut (<i>Macadamia ternifolia</i>)	Vulnerable
Lesser swamp-orchid (<i>Phaius australis</i>)	Endangered
Mount Berryman Phebalium (<i>Phebalium distans</i>)	Critically endangered

Common name (species name)	EPBC Act listing status
<i>Plectranthus torrenticola</i>	Endangered
Wallum leek-orchid (<i>Prasophyllum wallum</i>)	Vulnerable
Siah's backbone (<i>Streblus pendulinus</i>)	Endangered
Glossy spice bush <i>Triunia robusta</i>	Endangered
Leafless tongue-orchid (<i>Cryptostylis hunteriana</i>)	Vulnerable
Swamp stringybark (<i>Eucalyptus conglomerate</i>)	Endangered
Attenuate wattle (<i>Acacia attenuata</i>)	Vulnerable
Dwarf heath casuarina (<i>Allocasuarina defungens</i>)	Endangered

6.5.1 Habitat assessment

Terrestrial vegetation surveys were undertaken in the project area for the EIS on: 30 July and 3 August 2012; 8, 10 and 23 October 2012; and 15 January 2013.

Additional targeted terrestrial surveys were undertaken in October 2014 specifically to detect the presence of the lesser-swamp orchid and wallum leek-orchid. These surveys were undertaken during spring (when the species can be distinguished by the characteristics of their flowers) and were therefore in accordance with the *Draft Survey guidelines for Australia's threatened orchids*.

Whilst a number of threatened flora species have been identified as potentially occurring within the project area, desktop and field surveys indicate that the project area provides limited suitable habitat for several of the flora species identified in Table 6.1:

- The Mount Coolum she-oak is considered unlikely to occur given that the species is known only to occur within the montane heath communities on the summit of Mount Coolum. Therefore there is no suitable habitat within the project area.
- Hairy-joint grass has a low likelihood of occurring due to limited suitable habitat. Most records of this species in Queensland are from south of Noosa.
- As of September 2015 the EPBC Act Threatened Species Scientific Committee determined that *Bosistoa selwynii* (three-leaved bosistoa) is not considered to be a valid species and to place it in synonymy with *Bosistoa transversa* (heart-leaved bosistoa). The nearest record of *Bosistoa transversa* is from Buderim approximately 9km south of the airport. The *Bosistoa transversa* is considered unlikely to occur due to the absence of suitable habitat.
- The miniature moss-orchid is considered unlikely to occur as this species is known to only grow on hoop pines which are not present on the SCA site. The nearest records of this species are from Noosa and Maleny.
- Stinking cryptocarya is considered unlikely to occur due to the absence of suitable habitat. The species is conserved within Cooloolia and Noosa National Parks.

- Small-fruited Queensland nut is considered unlikely to occur due to the absence of suitable habitat. The nearest record of this species is from Mount Coolum National Park approximately 2km north of the airport.
- *Plectranthus torrenticola* is considered unlikely to occur due to the absence of suitable habitat. This species is known from eight locations in the Sunshine Coast hinterland of south-eastern Queensland, from the Blackall Range to Kin Kin.

Desktop surveys undertaken for the EIS identified that the project area falls outside the known population range for the:

- marbled balogia—distribution is confined to Lismore in north-east NSW and the Tamborine mountains and Springbrook in SEQ
- Mount Berryman Phebalium—distribution is restricted to Mount Berryman near Laidley, Kingaroy and Mount Walla, near Coalstoun Lakes
- glossy spice bush—distribution is restricted to a small area in the Sunshine Coast region between Pomona and Woombye (mainly in the Maroochy River catchment). The closest record of this species is 26km from the project site
- Siah's backbone—distribution is restricted to Norfolk Island. In 2015 Barry J Conn's studies highlight that the mainland species (*Streblus brunonianus*) was incorrectly included as a synonym of (*Streblus pendulinus*) and is now considered to be a distinct species. The species (*Streblus brunonianus*), widely spread throughout Queensland and New South Wales, is not listed under the EPBC Act. Siah's backbone is therefore not considered as part of this assessment.

While potentially suitable habitat for the dwarf heath casuarina associated with REs 12.2.12 and 12.2.15 exists on site, this species is considered unlikely to occur as it has not been recorded within or in close proximity to the airport.

Four of the flora species in Table 6.1 are considered to possibly occur based on the presence of the potential suitable habitat including:

- attenuate wattle—this species is known to occur in the ecotone between wet heathland open eucalypt forest communities. The closest record of this species is from Mooloolah River National Park 12km south of the project area.
- swamp stringybark—this species grows on the margin between open forest and heathland has been previously recorded 1km north of Maroola.
- leafless tongue-orchid—this species occupies a wide variety of habitats including coastal districts, heathlands, heathy woodlands, sedgeland, forests, and spear grass-tree plains. Records of this species exist to the north of the Glass House Mountains to Tin Can Bay.
- wallum leek-orchid—this species is known to occur within wallum communities and on adjacent stabilised dunes, and coastal Melaleuca swamp wetlands. Suitable habitat exists where the pipeline construction compound is proposed and the central part of the site where runway is proposed. The closest record of this species is 2km north of Coolum Beach.

While targeted field surveys did not locate any individuals of these species in the project area, the proponent has also committed to conduct pre-clearance surveys for all

threatened species from clearing areas. Notwithstanding this commitment, I have conditioned the proponent to undertake pre-clearance surveys for construction works and to take appropriate measures to protect any identified individuals.

Two of the species in Table 6.1 were identified during field surveys: the Mount Emu she-oak (*Allocasuarina emuina*) and lesser swamp-orchid (*Phaius australis*).

6.5.2 Mount Emu she-oak (*Allocasuarina emuina*)

Background

The Mount Emu she-oak is listed as endangered under the EPBC Act. The distribution of this species is restricted to heathland environments on the Sunshine Coast between Beerburrum and Noosa. The EIS states that 11 populations of Mount Emu she-oak occur on the Sunshine Coast, two of which occur within the study area.

The two populations which are referred to as AEP1 and AEP2 in this report are identified as the Finland Road population and Mount Coolum National Park–North Marcoola section respectively in the 2007 *National Recovery Plan for the Mount Emu she-oak Allocasuarina emuina*.³⁷ The EIS stated that the Finland Road population represents the largest known stand of Mount Emu she-oak in the Sunshine Coast region, representing 47 per cent of the known population. The AEP1 population is located to the west of the existing north-south runway and the AEP2 population is located approximately 1km north of the runway.

Terrestrial flora surveys undertaken for the EIS in 2012 and 2013 estimated that the AEP1 population contains 12,152 individual plants. The AEP2 population is estimated to include 59 individual plants based on surveys undertaken by Lamont in 2006.³⁸

There is currently no approved conservation advice in place for this species, however there is a national recovery plan: *2007 National Recovery Plan for the Mount Emu she-oak*.

The recovery plan identifies a number of key threats to this species including: alteration or loss of suitable habitat through urban development, agriculture and forestry plantations; construction of transportation corridors and associated drainage works; altered fire regimes, increased stormwater run-off; and weed infestation.

Key recovery actions in the plan which are relevant to the project include:

- protecting, restoring and maintaining known populations and locating and/or establishing new populations
- addressing and reviewing the key threats

³⁷ Environmental Protection Agency, *National recovery plan for the Mt Emu she-oak Allocasuarina emuina*. Report to Australian Government Department of the Environment and Water Resources, Queensland Parks and Wildlife Service, Brisbane, 2007.

³⁸ Lamont, R, *Conservation genetics and ecology of the endangered heathland shrub, Allocasuarina emuina*, Submitted in the fulfilment of the requirements of the degree of Doctor of Philosophy, University of the Sunshine Coast, 2010, viewed 5 February 2016, http://research.usc.edu.au/vital/access/manager/Repository/usc:6545?exact=sm_creator%3A%22Lamont%2C+R+W%22

- developing research programs that assist with the recovery and conservation of the species
- promoting community awareness and education in relation to the species.

Impacts and mitigation

The proposed action would involve a number of activities which have the potential to impact on the Mount Emu she-oak including:

- vegetation clearing for the construction of the new runway (direct removal)
- stormwater management during construction and operation of the airport (surface water impacts)
- reclamation works and construction of the associated drainage infrastructure (surface and groundwater impacts).

The potential impacts that these activities would have on the Mount Emu she-oak, and how these will be managed to ensure no unacceptable impacts on this species, are discussed in the following section.

Clearing impacts

The EIS indicated that the AEP2 population would not be directly impacted by the project. However construction of the new runway and associated infrastructure would result in clearing of 4.4ha (including 550 plants) of the AEP1 population.

During the design development stage, the proposed east-west runway footprint was moved 310m to the south-east, while maintaining the east-west alignment. This move avoided poor ground conditions at the north-west section of the site and reduced vegetation clearing requirements, particularly of the AEP1 population.

The EIS indicated that impacts on the AEP1 population have been avoided by locating the proposed Airport Drive extension to the new ATC tower and ARFF station facility away from this area.

A range of mitigation measures have also been proposed to reduce the likelihood and severity of impacts on the Mount Emu she-oak. These include:

- undertaking pre-clearing surveys within the clearing footprint and applying appropriate measures to conserve individual plants identified during these surveys
- limiting clearing of remnant and native vegetation to areas required for construction.

Habitat fragmentation is not considered to be a significant issue for the AEP1 and AEP2 populations. Studies undertaken by Lamont indicate that these two populations appear to be unaffected by fragmentation due to their clonal reproductive strategy.³⁹

³⁹ Lamont, R, *Conservation genetics and ecology of the endangered heathland shrub, Allocasuarina emuina*, Submitted in the fulfilment of the requirements of the degree of Doctor of Philosophy, University of the Sunshine Coast, 2010, viewed 5 February 2016, http://research.usc.edu.au/vital/access/manager/Repository/usc:6545?exact=sm_creator%3A%22Lamont%2C+R+W%22

Surface water run-off

The recovery plan indicates that native heathland species are particularly sensitive to eutrophication, given their preference for the naturally nutrient-poor heathland soils. The EIS indicated that soils across the majority of the site have low to moderate nutrient levels.

During project construction, erosion and sediment control measures would be implemented to manage pollutant run-off. Surface water impacts on the AEP1 population adjacent to the new runway would be managed by building a perimeter bund around the reclamation area which would collect any run-off from the reclamation area.

With regard to stormwater run-off, I have stated conditions for inclusion in the environmental authority to ensure surface water quality impacts are minimised during project construction. Based on these proposed measures, the AEP1 population is unlikely to be adversely impacted by stormwater run-off during the construction.

During operation, surface water run-off from the new runway and taxi-ways would be directed to drains that would be constructed along the runway through a series of vegetated pathways which would filter out sediments. These drains would direct run-off into the existing southern perimeter drain.

In addition, the proponent would be required to undertake surface water monitoring to ensure the release of any water from the site during construction complies with the surface water release limits in the environmental authority. Based on these proposed measures, the AEP1 population is unlikely to be adversely impacted by stormwater run-off during the operation of the airport.

Groundwater impacts

The airport site is low-lying and has a generally flat topography that typically slopes towards the north-western part of the site and the Maroochy River at a gradient of less than 0.5 per cent. A shallow aquifer system located across the site is comprised of two key lithologies:

- unconsolidated alluvial sediments, which generally act as one groundwater system
- indurated sand, or coffee rock, which has a relatively low permeability and could act as a barrier to groundwater flow.

Average groundwater salinity is 450mg/L and is moderately acidic with an average pH ranging from 4.5 to 6. Generally, the depth of groundwater ranges from 0.2m to 3.4m below ground level (BGL) across the site, and flows to the east and north-east towards the coast. Above the coffee rock layer, groundwater is likely to be semi-perched locally with flows only occurring where voids or weaknesses are present in the formation.

The Mount Emu she-oak is considered to be a groundwater-dependent species and its distribution is likely to be affected by the presence of coffee rock and the depth of groundwater. This species is considered to have a moderate tolerance to changes in salinity. At the root zone, the trees have a moderate tolerance to soil salinities of 4 to 8dS/m or 2560mg/L to 5120mg/L.

Two main Mount Emu-she oak populations are identified in the project area, with the AEP1 population occurring directly adjacent to the western side of the proposed reclamation area, and the AEP2 population located about 1km north of the proposed northern perimeter drain. The site proposed to receive the translocated portion of the AEP1 population is in close proximity to the AEP2 population (also around 1km north of the northern perimeter drain).

The proposed reclamation filling activities and construction of the drains have the potential to impact on the Mount Emu she-oak through groundwater impacts, including:

- increased groundwater salinity concentrations and groundwater levels
- groundwater drawdown (reduced water levels) and groundwater acidification from acid sulfate soils (ASS).

To reduce potential impacts associated with increased groundwater levels and groundwater quality, the proponent has committed to implement the following mitigation measures:

- placing a high-density polyethylene (HDPE) liner under the reclamation area prior to sand filling to minimise seawater infiltration to the groundwater system —this would confine an expected increase in groundwater head of 0.1m to within 250m of the reclamation area. The EIS indicated that this increase would be undetectable from natural variation in groundwater pressures.
- installing a low permeability cut-off wall parallel to the northern perimeter drain to prevent drawdown from the north of the wall and direct saline tailwater into the drainage system
- developing and implementing a groundwater management plan detailing trigger levels and corrective action plans, including at least 12 months of baseline data to account for natural seasonal variation prior to commencing construction
- installing additional monitoring bores between the Marcoola drain and the Mount Coolum National Park
- assessing potential groundwater and surface water exchange and, where required, developing a reactive monitoring program to meet WQOs.

AEP2 population and translocation site

The combination of the mitigation measures and the location of the AEP2 population (more than 1km away from the runway) mean that changes to groundwater quality and groundwater levels for the AEP2 population are unlikely. The HDPE liner would reduce the rate at which tailwater would infiltrate into the groundwater below the coffee rock layer.

In addition, the permanent low-permeability cut-off wall (located parallel to the northern perimeter drain) would prevent any salinity increase north toward the AEP2 population in the alluvial sediments above the coffee rock. This would assist the northern perimeter drain to capture groundwater above the coffee rock layer for management through the surface water drainage system.

The EIS indicated that with the provision of the liner and cut-off wall, higher salinity concentrations of 1000mg/L would only be expected to extend 50m from the northern perimeter drain, 200 years from the completion of filling, in groundwater below the coffee rock layer. Furthermore, groundwater monitoring between the cut-off wall and the AEP2 population would allow the proponent to implement corrective actions as required. As a result, no changes to groundwater quality or groundwater levels are expected at the AEP2 population.

AEP1 population

As discussed above, the AEP1 population is immediately west of the proposed runway and 4.4ha would be removed during construction. Changes to both groundwater quality and levels are not expected at the remaining AEP1 population. The HDPE liner would reduce the rate at which tailwater would infiltrate into the underlying groundwater and any salinity increases would move north-east, away from the AEP1 population. The modelling also indicates negligible change in groundwater levels in this area. Groundwater monitoring between the reclamation area and the AEP1 population would allow the proponent to implement corrective actions as required. As a result, any changes to groundwater quality or groundwater levels are not expected to adversely affect the AEP1 population, particularly given that the species is also moderately salt tolerant.

To ensure groundwater impacts are adequately managed, the proponent has committed to undertake further baseline monitoring to characterise baseline groundwater quality and groundwater levels to support the application of corrective actions where required.

In addition I have stated conditions that the proponent must:

- undertake a groundwater monitoring program during construction to ensure groundwater impacts are identified and adequately managed and that mitigation measures are undertaken
- implement best practice ASS management practices to protect the surface water quality and the water quality of the underlying groundwater aquifers.

Acid sulfate soils

Due to the low-lying topography of the site (below 5m AHD) and the underlying geology, the proposed action has the potential to disturb ASS which could result in groundwater quality impacts through oxidation and mobilisation of ASS. Activities which have the potential to disturb ASS include the construction of the drains and the construction of the reclamation area. To mitigate these impacts, the proponent has committed to:

- construct a cut-off wall on the northern side of the northern perimeter drain to prevent groundwater drawdown and oxidation of potential ASS
- place a layer of agricultural lime within drains to intercept and neutralise any acidity mobilised from normally unsaturated actual ASS

- place a liner beneath the reclamation area to minimise tailwater moving through the soils and mobilising actual acidity in soils.

Any lime treatment used on the project site would need to consider naturally acidic ecological habitats and be carried out in accordance with relevant Queensland ASS management guidelines. Water quality monitoring at the drain and receiving water bodies would also be conducted, with corrective actions such as retreatment of water failing to meet release criteria implemented as required.

Fire regimes and weed management

Studies indicate that germination and recruitment success of the Mount Emu she-oak is dependent on fire regimes.⁴⁰ The EIS indicated that the project is not expected to result in any changes to the current fire management practices within or adjacent to the airport, and that fire regimes will be specifically amended in the proposed translocation area to support ongoing management of this specific population.

The recovery plan identifies introduced weeds as one of the key threats affecting the long-term viability of the Mount Emu she-oak and that managing such threats is a key recovery action for this species. Based on the information provided by the proponent, weeds would be adequately treated within the airport and the proposed translocation site. As per section 77 of the Queensland *Land Protection (Pests and Stock Route Management) Act 2002*, the proponent would also be required to ensure that the land is kept free of class 2 Pests. The proponent has committed to keeping the project site free of invasive weeds in accordance with a weed management plan.

The proponent has committed to consult with Queensland Department of National Parks, Sport and Racing (NPSR) to coordinate management of the Mount Emu she-oak population within the airport site and the southern section of Mount Coolum National Park. A key element of this management would be the coordination of fire regimes and weed infestation management for the adjacent properties.

Significant residual impact and offsets

The proposed action is expected to result in a significant residual impact of 4.4ha or 550 plants. This residual impact has been considered significant as all populations of this species are considered important to its survival.

To offset this significant residual impact, the proponent has proposed to translocate the entire 4.4ha of impacted vegetation to a suitable site which is located in close proximity to the AEP2 population. The EIS indicated that a land-based offset using a translocation methodology is the most suitable option for this species given that the other 11 known populations identified in the Mount Emu she-oak recovery plan occur in the Queensland conservation estate or have other levels of protection. It is therefore considered that there is limited scope to suitably offset the impact on the Mount Emu she-oak through increasing the protection of existing populations.

⁴⁰ Lamont, R, *Conservation genetics and ecology of the endangered heathland shrub, Allocasuarina emuina*, Submitted in the fulfilment of the requirements of the degree of Doctor of Philosophy, University of the Sunshine Coast, 2010, viewed 5 February 2016, http://research.usc.edu.au/vital/access/manager/Repository/usc:6545?exact=sm_creator%3A%22Lamont%2C+R+W%22

The proponent has proposed to undertake this translocation using a heath tile translocation methodology. This would involve the removal of the heath tile containing topsoil and the existing seed bank from the impacted site using an excavator with a tray-shaped bucket and placing it into a suitably prepared area. This methodology has been used for other heathland vegetation with a high level of success. For example, 12.2ha of coastal heath was successfully translocated using heath tile translocation methodology from a site in Bundilla on the Sunshine Coast to a reserve on the University of Sunshine Coast campus.⁴¹ Ongoing monitoring of this project indicates that translocation has been highly successful with a 95 per cent of the re-established vegetation surviving. Being a heathland species, it is considered that this heath tile translocation methodology would be appropriate for the Mount Emu she-oak.

The proponent has considered that 10 years would be an adequate time period for establishing a population of 1,420 plants at the translocation site. Starting with 550 plants this would be an increase of 61 per cent.

As a contingency the proponent has proposed to collect and store seed from the impacted Mount Emu she-oak plants which could later be propagated and planted into a suitable site. The species is considered to be readily propagated and has been successfully established using this method in a number of areas on the Sunshine Coast. Based on preliminary investigations the 'Palmview site' which is also the proposed site for offsetting impacts on acid frog species, is considered to provide suitable conditions for establishing Mount Emu she-oak.

The proponent would be required to undertake measures to maintain the translocated population including managing weeds, implementing pests and fire regimes, and undertaking monitoring to ensure the offset has been successfully delivered. The offset area would also be protected in perpetuity through a conservation tenure mechanism.

Coordinator-General's conclusion

I am satisfied that the proponent has adequately identified the potential impacts that the proposed action could have on Mount Emu she-oak.

I am satisfied that the proponent has committed to implement fire regimes, weed management measures and monitoring requirements that are appropriate for maintaining this species.

I require the proponent to manage impacts through the recommended conditions to ensure there are no unacceptable impacts on Mount Emu she-oak, including:

- avoiding and limiting the disturbance to habitat
- managing the quality of water being released from the project site
- undertaking pre-clearing surveys within the clearing footprint and applying appropriate measures to conserve individual plants identified during these surveys
- providing offsets for significant residual impacts

⁴¹ USC Compensatory Habitat Project, Inquiry into Environmental Offsets Submission, University of the Sunshine Coast, Submission 80, viewed 19 April 2016, <http://www.aph.gov.au/DocumentStore.ashx?id=01187bf8-be1f-48bc-ace6-12cd399bb7e1&subId=251361>.

- undertaking contingency measures including seed collection and storage in the event that the proposed offset strategy is not successful.

In addition, I have stated conditions under the environmental authority for dredging and reclamation works to protect surface and groundwater quality, to protect the remaining AEP1 population to the south as well as the AEP2 population and the translocation site to the north from water quality impacts during reclamation activities.

In light of the proposed avoidance and mitigation measures and conditions recommended in this report, I consider the impacts on the Mount Emu she-oak are not unacceptable and the proposed management actions are not inconsistent with the recovery plan for this species.

6.5.3 Lesser swamp-orchid (*Phaius australis*)

Background

The lesser swamp-orchid is listed as endangered under the EPBC Act. The species is commonly associated with coastal wet heath/sedgeland wetlands, swampy grassland or forest, and often where broad-leaved paper bark or swamp mahogany is found. The species is endemic to Australia and occurs in eastern Queensland and northern New South Wales.

There is no recovery plan for this species. However there is a conservation advice currently in place: *Approved Conservation Advice for Phaius australis (Common swamp-orchid)*. The conservation advice identifies a number of key threats to this species, including illegal collection, loss of habitat, inappropriate fire regimes, invasive weeds, grazing and trampling by feral pigs and domestic stock animals.

Key priority recovery actions identified in this conservation advice which are relevant to the project include:

- protecting populations from illegal collection by ensuring their locations are kept confidential
- minimising adverse impacts from land use at known sites
- managing sites to prevent introduction of invasive weeds that could become a threat to the species, using appropriate methods
- developing and implementing a suitable fire management strategy
- encouraging landholders with existing populations of this species to manage populations appropriately.

Impacts and mitigation

Habitat disturbances

A targeted survey conducted in October 2014 identified 42 lesser swamp-orchid plants on the project site, over an area of 0.27ha. As this area would not be disturbed, the proposed action is not expected to directly impact on the lesser swamp-orchid.

The Queensland Department of Environment and Heritage Protection (EHP), in its submission on the AEIS, raised the issues of the construction of the pipeline impacting on this species and recommended that appropriately timed pre-clearance surveys are undertaken in this area to avoid impact on the lesser swamp-orchid.

Whilst the proponent has committed to conduct pre-clearance surveys for all threatened, I have conditioned the proponent to undertake pre-clearance surveys and to undertake appropriate measures to conserve individual plants.

Significant residual impact and offsets

Based on the information provided by the proponent, I consider that the proposed action is not expected to result in any significant residual impact on this species provided that appropriate measures are undertaken to avoid and mitigate impacts.

Coordinator-General's conclusion

I am satisfied that the proponent has adequately identified the potential impacts of the project on the lesser swamp-orchid. To ensure that there are no unacceptable impacts, I have recommended conditions to ensure:

- vegetation clearing and any construction activities are limited to areas outside of the lesser swamp-orchid population and any supporting habitat within the site
- tree protection fencing and signage are established prior to the commencement of works
- pre-clearance surveys are undertaken within the clearing footprint and appropriate measures are applied to conserve individual plants identified during these surveys
- weeds are removed and treated within the area of supporting habitat, with a focus on lantana and groundsel.

In light of the proposed avoidance and mitigation measures, and conditions recommended in this report, I consider the impacts on the lesser swamp-orchid are not unacceptable or inconsistent with the TAP relevant to this species.

6.6 Threatened terrestrial and aquatic fauna

6.6.1 Amphibians

A search of the PMST database identified one threatened frog species listed under the EPBC Act as potentially occurring within 5km of the project area: the wallum sedgefrog (*Litoria olongburensis*) which is listed as vulnerable under the EPBC Act.

The survey methodologies and survey effort undertaken by the proponent to identify the presence of threatened frog species, are considered to be appropriate, and generally in accordance with the 2010 *Survey Guidelines for Australia's Threatened Frogs*.⁴²

⁴² Department of the Environment, Water, Heritage and the Arts, *Survey guidelines for Australia's threatened*

6.6.2 Wallum sedgefrog (*Litoria olongburensis*)

Background

The wallum sedgefrog was recorded within the project site during the 2010/2011 EIS surveys within the helicopter training area (directly adjacent to the helicopter training pads), the wallum heath management area (WHMA) and along a drainage channel to the south of the WHMA.

The species distribution ranges from SEQ to north-eastern New South Wales, and is commonly associated with acidic, ephemeral, semi-permanent and permanent wetlands with emergent reeds, ferns and/or sedges, in undisturbed coastal wallum. The wallum sedgefrog mainly breeds following heavy rain in perched swamps among sedges in still water 0.5m to 1.5m deep. The species typically shelters during the day, near the base of vegetation, and climbs to higher positions at night and during periods of wet weather to forage and call.

There is currently no conservation advice in place for this species, however there is a recovery plan: *National Recovery Plan for the Wallum Sedgefrog and Other Wallum-dependent Frog Species*.

The recovery plan identifies the following as key threats to the species: habitat loss and degradation, fragmentation of habitat; inappropriate fire regimes; predation by the introduced mosquito fish; use of biocides in weed and mosquito control; feral pigs; disease, and vehicle strike.

Key recovery actions in the plan that are relevant to the proposed action include:

- protection of wallum frog populations and management of habitat
- acquisition of information on threats to inform management activities
- rehabilitation of degraded wallum frog habitat.

Impacts and mitigation

The proposed action would involve a number of activities which have the potential to impact on the wallum sedgefrog including:

- vegetation clearing and other activities associated with the construction of the new runway
 - stormwater management during construction and operation of the airport
 - reclamation works and construction of the associated drainage infrastructure
 - noise generated by construction activities and aircraft operations
 - light generated during construction and the operation of the airport.
-

frogs: Guidelines for detecting frogs listed as threatened under the EPBC Act, Department of the Environment, Canberra, 2010, viewed 20 February 2016, <http://www.environment.gov.au/system/files/resources/ff3eb752-482d-417f-8971-f93a84211518/files/survey-guidelines-frogs.pdf>

The potential impacts that these activities could have on the wallum sedgefrog and how these would be managed to ensure no unacceptable impacts on this species are discussed in the following section.

Habitat clearing

Mapping indicates that the airport site and surrounding areas of national park include approximately 491ha identified as 'essential habitat' for the wallum sedgefrog. These mapped areas contain RE types which are known to support wallum sedgefrog breeding habitat including REs 12.2.12 (wet heath), 12.2.15 (sedgeland), and 12.2.7 (Melaleuca open-forest to woodland on sand plains).

The EIS indicated that the proposed action is expected to result in the permanent loss of 47.07ha of essential habitat for the wallum sedgefrog. While this area is mapped as potentially suitable habitat, surveys indicate that most of these mapped areas do not provide suitable habitat to support this species, as follows:

- in the helicopter training area, ground-truthing indicates that only less than 4 per cent of the mapped area contains suitable habitat for breeding (i.e. areas with deeper water, more than 10cm deep with upright sedges)
- the high number of a more common and competitive species, the common sedgefrog and presence of mosquito fish in the drains adjacent to the WHMA and north-south of the runway, have been considered as factors which would make these areas unsuitable for this species
- due to the absence of tannin-stained wallum waters, the presence of common reeds and bulrushes which are not consistent with waterbodies that are used by wallum sedgefrogs, and the presence of mosquito fish, the east drain is considered to provide unsuitable habitat for this species
- the northern section of Mount Coolool National Park, east of Finland Road provides limited habitat to support this species as the area has mostly sparse sedge cover and there is relatively little surface water present
- the southern section of the national park also contained limited suitable habitat to support recruitment of this species
- the linear strip of vegetation, adjacent to northern section of the runway where slashing activities are proposed for maintaining visibility around the runway, is considered to be too densely vegetated to support this species.

Based on ground-truthing, the construction of the runway is expected to result in the permanent removal of 1.67ha of wallum sedgefrog breeding habitat from the WHMA and the existing helicopter training area.

The proposed action is also expected to result in the temporary loss of 2.52ha of vegetation mapped as 'essential habitat' for the wallum sedgefrog from the northern tip of the existing north-south runway for pipeline laydown during construction. The area would be affected for a period of 6 to 9 months, then rehabilitated post construction. The proponent is required to rehabilitate this area after sand delivery works have been completed.

Surface water quality

The majority of the surface water run-off from the existing airport drains west through a series of constructed open drains (a combination of airport drainage and old cane drains), discharging to the Maroochy River approximately 1km west of the Sunshine Motorway. A portion of run-off from existing north-south runway also flows to a drain on the eastern boundary which discharges to the canals to the south of the airport.

As discussed in section 6.2 (Project description), surface water run-off would be directed away from the WHMA via the proposed northern perimeter drain and the western perimeter drain. Drains would also be constructed along the runway, to direct run-off into the southern perimeter drain. Surface water run-off from the new runway and taxi-ways would be directed to the drains through a series of vegetated pathways which would filter out any sediment that may accumulate on the runway.

To ensure surface water run-off is adequately managed during construction the proponent has proposed to construct a perimeter bund around the reclamation area. Bunds would be constructed of a non-cohesive or high permeability material, and a HDPE liner would be installed under the reclamation area to contain the tailwater from the sand delivery. Tailwater from sand placement works would be gradually drained from the reclamation site through a series of bunded reclamation cells and into a settlement polishing pond located at the north-western end of the sand placement area. The polishing pond would allow for fines in the tailwater to settle prior to being discharged into the northern perimeter drain. The pond would also help control the rate of water discharge into this drain.

All run-off from the reclamation area would be collected in the polishing pond for treatment before being discharged from site. Based on the proposed surface water management measures and conditions of approval, I consider that surface water quality impacts on wallum sedgefrog would not be unacceptable.

Groundwater quality

The wallum sedgefrog is typically found amidst heath vegetation and sedges where water collects above coffee rock layers forming 'perched' swamps and lakes. These perched swamps and lakes are considered to be essential breeding habitat for this species.

Groundwater interaction between the regional and perched aquifer is considered limited by the coffee rock layer with the exception of areas where coffee rock layers are deeper or discontinuous or where there are any voids and weaknesses in the coffee rock.

Groundwater within the regional aquifer has relatively low salinity, with salinities between 210 to 310mg/l within parts of the aquifer below the WHMA. While the northern perimeter drain would intercept and drain saline water away from the upper layers of the aquifer between the reclamation area and the drain, some tailwater would be expected to migrate through the coffee rock layer into the regional aquifer. The EIS concluded that, with the provision of the liner, salinity concentrations in the regional aquifer are expected to peak at 1000mg/L 200 years after filling is completed, within

50m from the northern perimeter drain. Salinity concentrations 100m beyond that are expected to peak at 500mg/L within 300 years after filling is completed.

The provision of the cut-off wall within the northern perimeter drain down to the coffee rock layer would assist in reducing lateral movement of salt through groundwater, above the coffee rock layer. The EIS indicated that any flow of higher salinity water from the regional aquifer into the perched aquifer would be expected to be localised where the coffee rock layer is deeper and discontinuous. Given the proximity of the WHMA to the northern perimeter drain, any localised mixing between the aquifers may affect water quality of frog breeding areas.

The proponent has proposed to undertake baseline monitoring to understand groundwater dynamics to inform the preparation of a detailed groundwater monitoring and management plan. The plan is proposed to detail how groundwater impacts would be monitored and managed on site, including parameters (e.g. levels, salinity, pH) to be tested, action thresholds and remedial actions to be undertaken.

Groundwater levels

The EIS indicated the installation of a cut-off wall in the northern perimeter drain would prevent groundwater drawdown in the perched aquifers in the areas immediately north of the drain (i.e. WHMA). As such, the extent and duration of surface water ponding in the WHMA would be expected to remain unaffected, and would therefore continue to provide breeding habitat for the wallum sedgefrog.

Acid sulfate soils

Due to the low-lying topography of the site which ranges between 0m and 5m AHD and the underlying geology beneath the entire site, the proposed action would be highly likely to disturb ASS. The proposed activities that are likely to disturb ASS include reclamation works and the construction of the drains. As previously discussed, the proponent has proposed a number of mitigation measures to ensure that ASS are appropriately managed to avoid adverse impacts on groundwater and surface waters.

To protect the water quality of underlying groundwater aquifers and receiving waterways I have conditioned the proponent to implement best practice ASS management practices. I require a site-specific ASS management plan to be submitted for approval, prior to any development permit applications for operational works involving disturbance of potential and actual ASS. The plan must address:

- the treatment of excavated or disturbed soils/sediments, and the management of disturbed soils
- management of groundwater levels to avoid oxidation of ASS
- monitoring and compliance with surface water and groundwater limits in the environmental authority.

Noise impacts—construction

Studies suggest that noise associated with road traffic and other noise sources (i.e. aircraft) can influence calling behaviour of frogs. As the WHMA is located within 100m

of the existing north-south runway, wallum sedgefrogs in this area are already exposed to aircraft noise. This population is considered to be a healthy population, which suggests that breeding activities are not adversely impacted by noise generated by the existing airport operations.

Noise associated with construction is not expected to be significantly different from the existing noise environment within the WHMA. The EIS indicated that this area already experiences background noise levels ranging between 58dB(A) during the day (between 7am and 6pm) and 47dB(A) at night (between 10pm and 7am).

It is considered that noise impacts on the wallum sedgefrogs would be limited during construction through:

- construction activities (with the exception of dredging and sand pumping works) only being undertaken between 6:30am and 6:30pm and not using heavy machinery during wet weather. This would avoid periods when frogs are most active (which is at night and after rainfall)
- avoiding dredge pumping works during the summer months, which would reduce construction noise impacts on the wallum sedgefrog (these works would coincide with some of the wallum sedgefrog breeding period which typically occurs between September and March).

Construction noise is predicted to range between 50dB(A) at the southern end of the WHMA and 40dB(A) at the northern end of the WHMA. Construction activities at night would only be for a relatively short duration (approximately 4 weeks) and only a slight number of noise events above 42dB(A) would be expected. Due to the temporary nature and timing of the works and only a slight number of exceedances above the ambient noise environment, it is considered that noise generated during construction would not have an unacceptable impact on the wallum sedgefrog in the project area.

Noise impacts—aircraft operations

Noise levels associated with aircraft operations are not expected to be significantly different from the existing noise environment within the WHMA and most flights would be during daylight hours between 7am and 6pm. Being a nocturnal species, this would occur when wallum sedgefrogs are least active, with the exception of periods of rainfall when frogs may call during the day.

Based on noise modelling, under the 'do minimum' scenario, the WHMA is exposed to 50 to 99 events over 70dB(A) during day time (7am to 6pm), from 10 to 19 events over 70 dB(A) during evening periods (6pm to 10pm), and from 2 to 10 events over 60 dB(A) during night periods (10pm to 7am).

Noise events predicted to be experienced within the WHMA under the 'new runway' scenario would range from 19 to 100 events over 70dB(A) during day time (7am to 6pm), 5 to 49 events over 70dB(A) during evening periods (6pm to 10pm) and 2 to 10 events over 60dB(A) during night-time. Based on these predictions, noise events under the 'new runway' scenario are not expected to be significantly different from the 'do minimum' scenario for daytime and night-time periods. Increased noise events are only expected to occur for the evening period under the 'new runway' scenario.

The EIS indicated that due to the proposed east–west flight paths under the ‘new runway’ scenario, noise levels from aircraft are expected to increase in the northern section of Mount Coolum National Park and the areas mapped as wallum sedgefrog habitat in the Maroochy River Conservation Park. However, noise levels in these areas would be lower than those experienced by frogs in the WHMA.

Lighting impacts—construction

Field surveys undertaken for the EIS identified a large number of frogs in the WHMA adjacent to the existing north-south runway. While studies on other nocturnally breeding frog species indicate that artificial light can influence the breeding behaviour of frogs, the presence of healthy breeding population in the WHMA suggests that breeding activities in this area are not being adversely affected by artificial light generated from the existing airport.

During construction, the use of artificial light would be reduced by restricting lighting of compounds and works areas to agreed hours. Most construction activities will be undertaken between 6:30am and 6:30pm with the exception of dredging and reclamation works. Twenty-four-hour construction lighting would be required during dredging and reclamation works for the duration of 3–6 months. This would involve using mobile light towers (around 2–4 1,000 watt lights on 6–9m extendable poles) which would be expected to result in some localised light spill. Lighting would also be used for a short duration at the face of the fill area during sand delivery. Filling would be undertaken from the south-east to the north-west, and the light would progressively move across the platform and away from the WHMA. Light spill into the WHMA would therefore only be for a short duration.

Lighting impacts—airport operation

The EIS indicated that frogs in the WHMA would experience similar lighting conditions to that of the existing north-south runway. During the operation of the new runway, lighting would be used during poor light conditions on approach and departures (i.e. at night and during inclement weather). This lighting would be restricted to a few hours following dusk (with less impact during longer summer days). The retained habitats within the WHMA would be at least 150m away from the simple approach lighting systems (SALS) and high intensity runway lighting (HIRL). It is expected that at a distance of 130m from the SALS and HIRL light intensity would be 0.6lux and 1.2lux respectively. This would be equivalent to illuminance generated by the full moon on a clear night which ranges between 0.27lux to 1lux. Therefore it is considered that no intense light spill would occur within the WHMA during the operation of the airport.

Threat abatement

Impacts from Chytrid fungus

The wallum sedgefrog is listed as a species of interest in the *Threat abatement plan for infection of amphibians with chytrid fungus resulting in chytridiomycosis*.⁴³

Chytridiomycosis is a highly infectious disease of frogs, caused by the chytrid fungus. The disease is known to occur in the coastal areas in Queensland and poses a risk to the wallum sedgefrog.

Key goals of the TAP are to prevent the spread of this fungus to populations that are not affected and to reduce the spread of this disease within populations that are already affected. The proponent would need to adhere to hygiene and handling protocols for any handling of frogs to ensure project activities do not contribute to the spread of this pathogen.

Weeds

EIS surveys indicated that there is a large area infested by exotic grass in the south-western corner of the WHMA. As part of compensatory measures for impacted acid frog habitat, the proponent has proposed to rehabilitate impacted areas, by removing the infestation and creating more suitable habitat. The proponent has also committed to undertake additional weed monitoring and ongoing management within the WHMA. The weed hygiene management measures would be undertaken during construction to prevent the introduction and spread of weeds and pest plants. In addition under the requirements of the *Land Protection (Pest and Stock Route Management) Act 2002*, the proponent would be required to implement measures to manage declared pest plants on the airport site.

Significant residual impact and offsets

The project is expected to have a significant residual impact of 1.67ha on wallum sedgefrog breeding habitat. To offset the loss of this breeding habitat the proponent has proposed to augment 2.28ha of existing habitat within the northern section of the WHMA. This would include the creation of purpose-built breeding ponds and appropriate sedge plantings to form a mosaic of wet and dry heath habitats which would be expected to support breeding activities.

It is widely acknowledged that the species is capable of rapidly re-colonising disturbed areas, provided suitable physical characteristics are present. Examples where compensatory acid frog ponds have been created include the Tugun bypass project where breeding ponds were established to offset the project's impacts on the wallum sedgefrog. These were considered to be moderately successful as frogs were recorded using these ponds, however there was no evidence of breeding.

The EIS proposes that 5.84ha of additional suitable habitat would be created through regular vegetation slashing activities along a linear strip adjacent to the northern

⁴³ Department of the Environment and Heritage, Threat Abatement Plan for Infection of amphibians with chytrid fungus resulting in chytridiomycosis, Commonwealth of Australia, Canberra, 2006, viewed 9 January 2016, <http://www.environment.gov.au/system/files/resources/8d01e983-3619-4d83-9b5a-6f9fb4d34e3b/files/chytrid-report.pdf>

perimeter drain. Regular vegetation slashing would be required to maintain visibility around the runway (i.e. ensuring that tree/shrub cover remains below 1.5m). At present the linear strip is too densely vegetated to support the wallum sedgefrog and regular vegetation slashing activities would make this area more suitable.

To reduce the risk of frog injury/mortality, the proponent proposes to undertake vegetation slashing activities during dry conditions, and at heights of more than 0.5m above the base of these vegetated areas. The proponent considers this to be an effective mitigation, as frogs are more likely to shelter near the base of vegetation under dry conditions.

Additional offset areas for this species are listed in the EIS. The offset areas are outside of airport site on the Lower Mooloolah River Environmental Reserve (LMRER), located south of the project area at Palmview. This site is owned by SCRC and is currently secured for conservation purposes.

Surveys undertaken for the EIS identified a number of areas on the site that would be suitable for the creation of acid frog habitat. The proposed offset works would involve a mix of revegetation works and assisted regeneration of degraded Melaleuca open forest/wetland and sedgeland vegetation communities. Assisted regeneration works would include exclusion of cattle, weed and exotic grass removal and implementation of appropriate fire regimes. These works would be expected to create 63.15ha of habitat. The EIS also indicated that 9.8ha of breeding habitat could be created for the wallum sedgefrog by augmenting frog breeding ponds.

To ensure the offset areas achieve a conservation outcome for the species, the proponent proposes to manage these through an offset management plan. The plan would include a monitoring program outlining a range of performance criteria including frog abundance and reproductive success, and habitat criteria to determine the effectiveness of the proposed offset works.

The proponent would also monitor water quality to ensure that these areas are not adversely affected during construction and operation. The proponent would be required to take corrective action if these performance criteria were not being achieved.

Coordinator-General's conclusion

I am satisfied that the proponent has adequately identified the potential impacts that the proposed action could have on the wallum sedgefrog.

I require the proponent to manage impacts through the recommended conditions to ensure there are no unacceptable impacts on the wallum sedgefrog, including:

- avoiding and limiting the disturbance to habitat
- providing offsets for significant residual impacts.

In addition, I have stated conditions under the environmental authority (ERA 16) to ensure the protection of surface and groundwater quality.

In light of the proposed avoidance and mitigation measures and conditions recommended in this report, I consider the impacts on the wallum sedgefrog are not

unacceptable and the proposed management actions are not inconsistent with the recovery plan for this species.

6.6.3 Mammals

A search of the EPBC protected matters database identified seven threatened terrestrial mammal species, listed under the EPBC Act, as potentially occurring within 5km of the project area.

Table 6.2 EPBC Act listed threatened mammal species potentially occurring in the project area

Common name (species name)	EPBC Act listing status
Large-eared pied bat (<i>Chalinolobus dwyeri</i>)	Vulnerable
Northern quoll (<i>Dasyurus hallucatus</i>)	Endangered
Spotted-tail quoll (<i>Dasyurus maculatus maculatus</i>)	Endangered
Koala (<i>Phascolarctos cinereus</i>)	Vulnerable
Grey-headed flying fox (<i>Pteropus poliocephalus</i>)	Vulnerable
Water mouse (<i>Xeromys myoides</i>)	Vulnerable
Long-nosed potaroo (<i>Potorous tridactylus tridactylus</i>)	Vulnerable

The koala was listed under the EPBC Act as a 'listed threatened species' after the controlled action decision and therefore, in accordance with EPBC Act subsection 158A(4), is not considered in this assessment.

Whilst a number of threatened mammal species have been identified as potentially occurring within the project area, desktop and field surveys indicate that the project area provides limited suitable habitat for several of the mammal species identified in Table 6.2:

- The large-eared pied bat is considered highly unlikely to occur as there are no local records or suitable habitat in the project area. The species roosts predominantly in caves and overhangs in sandstone cliffs which are absent from the site.
- The northern quoll is considered highly unlikely to occur as local records are limited and there is marginal habitat (no records in past 22 years) on the site. This species is most abundant in rocky environments which are absent from the site.
- The spotted-tail quoll is considered highly unlikely to occur as local records are limited (no records in past 21 years) and there is marginal habitat on the site. The absence of rocky outcrops would limit the use of the site by the spotted-tail quoll.
- The long-nosed potaroo is considered highly unlikely to occur as local records are limited (only two records in past 35 years) and there is marginal habitat on the site.

The survey methodologies and survey effort undertaken by the proponent to identify the presence of threatened mammal species are considered to be appropriate and generally in accordance with the 2011 *Survey Guidelines for Australia's Threatened Mammals* and 2010 *Survey Guidelines for Australia's Threatened Bats*.

Two of the species identified in Table 6.2—the grey-headed flying fox and the water mouse—are known to occur within the project area.

6.6.4 Grey-headed flying fox (*Pteropus poliocephalus*)

Background

The grey-headed flying fox is listed as 'vulnerable' under the EPBC Act. It is a canopy-feeding frugivore and nectarivore, typically found in rainforests, open forests, closed and open woodlands, Melaleuca swamps and Banksia woodland habitats. Grey-headed flying fox roost sites are typically located near water, such as lakes, rivers or the coast, within patches of rainforest, stands of Melaleuca, mangroves and riparian vegetation.

The species' range extends along the coastal belt from Bundaberg in central Queensland to Melbourne in Victoria. This species makes seasonal migrations in response to flowering and fruiting vegetation and is highly irregular in its distribution patterns. While no roosting camps were identified in the project area, the EIS reported that 21 roosting sites are known within 50km of the project area.

There is currently no conservation advice in place for this species, however there is a draft national recovery plan: *Draft National Recovery Plan for the Grey-headed Flying fox (Pteropus poliocephalus)*.

Key threats identified in the recovery plan include loss of foraging and breeding habitat from urban and agricultural development, electrocution, aircraft strike, competition with other foraging species (black flying foxes), climate change and disease.

Recovery actions identified in the plan which are relevant to the proposed action include:

- identification, protection and enhancement of winter and spring foraging habitat critical to the survival of the species across their range
- providing information and advice to managers, community groups and members of the public that are involved with flying fox camps
- assessing the impacts on the species of electrocution on powerlines and entanglement in netting and barbed wire, and implementing strategies to reduce these impacts.

Impacts and mitigation

The proposed action would involve a number of activities which have the potential to impact on the grey-headed flying fox including:

- vegetation clearing across the site for the construction of the new runway and associated infrastructure
- increased aircraft flights during the operation of the airport.

The potential impacts that these activities could have on the grey-headed flying fox and how these will be managed to ensure no unacceptable impacts on this species are discussed in the following section.

Vegetation clearing

The construction of the new runway would result in the removal of 41.8ha of vegetation which is considered suitable foraging habitat for the grey-headed flying fox. This habitat includes flowering eucalypts and melaleucas. Based on desktop studies, this represents 0.65 per cent of all potential foraging habitats within 15km of the Maroochydore flying fox camp.

No residual impacts are anticipated for this species as the offsets for the State listed wallum froglet and wallum rocket frog would be expected to compensate the loss of grey-headed flying fox foraging habitat from the project site. The proposed and regenerative works would involve the creation of similar habitat to that being lost from the runway construction footprint.

Aircraft strike

Flying fox aircraft strike statistics in the EIS report that most incidents occur below 300m with almost 76 per cent occurring at 150m. For reasons unknown, more strikes occur on departure (74 per cent of strikes) than landing. As flying foxes leave their roosts to fly to foraging sites within 30 minutes of sunset, strikes are most common between 5 and 8pm, particularly during the months of February/March and August/September. Under the 'new runway' scenario there would be around 18 flights (weekday) to 19 flights (weekend) during this time period.

The risk of flying fox strike is likely to increase as a result of the proposed action as the new east–west alignment would take aircraft across the favoured flight path of flying foxes in this area and the approach height of aircraft would be well below 150m, in areas where the species is known to occur.

The risk of aircraft strike on the grey-headed flying fox is considered to be very low (0.025 per cent for every 10,000 flights). However, the EIS also noted that the risk is difficult to quantify.

While the proponent has not discussed any specific measures to manage this risk, I note that the proponent would have legislative obligations under the Commonwealth Civil Aviation Safety Regulations 1998 to manage the risk of wildlife hazards within the airport site.

The National Airports Safeguarding Framework, Guideline C: Managing the Risk of Wildlife Strikes in the Vicinity of Airports recommends that land use planning around airports should minimise the potential for wildlife to be in conflict with aircraft operations in addition to airport operators avoiding wildlife attracting land uses within the boundaries of the airport.

It is considered that the risk of flying fox aircraft strike would be reduced by excluding flowering species from any vegetation plantings around the northern end of the runway. As such I recommend the proponent to avoid planting any flowering species immediately adjacent to the runway.

Significant residual impact and offsets

The proposed action is not expected to result in any significant residual impacts on the grey-headed flying fox.

Coordinator-General's conclusion

I am satisfied that the proponent has adequately identified the potential impacts that the proposed action could have on the grey-headed flying fox. To ensure that there are no unacceptable impacts, I require the proponent to comply with the conditions recommended in this report, including:

- avoiding and limiting disturbance to habitat
- providing compensatory habitat (which also provide for offsets for the three acid frog species).

In light of the proposed mitigation measures and conditions recommended in this report, I consider the impacts on the grey-headed flying fox are not unacceptable or inconsistent with the recovery plans relevant to this species.

6.6.5 Water mouse (*Xeromys myoides*)

Background

The water mouse is listed as vulnerable under the EPBC Act. The species occurs in three regions of coastal Australia including the Northern Territory, central-south Queensland and SEQ. In SEQ, water mouse habitat includes mangrove communities and adjacent sedgeland, grasslands and freshwater wetlands. Mangrove habitats are particularly important for the water mouse as they provide a variety of micro-habitats such as tidal pools, crab holes and crevices in bark and around roots.

There is no approved conservation advice available for this species, however a national recovery plan is currently in place: *National recovery plan for the water mouse (false water rat) Xeromys myoides*.

The recovery plan considers habitat loss, fragmentation and degradation of habitat through changed hydrology and disturbance of ASS, and feral predators, particularly foxes, as major threats to the water mouse.

The EIS identified suitable water mouse habitat along the northern/eastern bank of the Maroochy River from the Bli Bli Bridge to Coolum Creek (north of Marcoola drain). Studies undertaken by Kaluza et al. indicate that the Maroochy River system supports an important population of water mouse, and habitats supporting active nests along the river are considered to be critical to the survival of this population.⁴⁴ Surveys undertaken for this study along the lower Maroochy River between September 2011 and December 2014 indicate a total of 765ha of suitable habitat for this species along

⁴⁴ Kaluza, J, Donald R.L., Gynther I.C., Leung L. K, Allen B.L., 'The Distribution and Density of Water Mice (*Xeromys myoides*) in the Maroochy River of Southeast Queensland, Australia', *PLoS One*, 11(1), 2016, viewed 28 January 2016, <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4720426/>

the lower Maroochy River. Based on the number of active nests found during these surveys the local population in this area is likely to be between 340 and 500 individuals.

During targeted water mouse surveys for the EIS along the Marcoola drain, and north and south of the Marcoola drain along the banks of the Maroochy River, no individuals or evidence of habitation were found. The EIS stated that the narrow fringe of mangroves along the drain are expected to provide little low-tide habitat as the drain is generally steeply incised and the area is also considered to be too dry to support abundant prey (small crabs and molluscs) species.

Impacts and mitigation

The proposed action would involve a number of activities which have the potential to impact on the water mouse including:

- vegetation clearing across the site and construction activities associated with the reclamation works
- vegetation clearing and other works required for the construction of the northern perimeter drain and tailwater discharge outlet in Marcoola drain
- tailwater discharge to Marcoola drain during reclamation works
- stormwater control during the construction and operation of the airport
- reclamation works to raise the runway above the floodplain.

Changes in water quality associated with these activities have the potential to impact on the abundance and diversity of the water mouse's prey species (such as crabs and molluscs). The potential impacts that these activities could have on the water mouse and how these will be managed to ensure no unacceptable impacts on this species are discussed in the following section.

Vegetation clearing

The proposed action is not expected to result in any direct loss of water mouse habitat. While the construction of the northern perimeter drain and the discharge outlet is expected to result in the removal of less than 10m² of mangrove vegetation, surveys indicate that this area is unlikely to provide suitable habitat for the water mouse.

Water quality impacts—construction

Constructing the runway and drains would involve removing vegetation, which would increase the risk of erosion and sediment run-off into the Maroochy River.

To ensure there are no unacceptable increases in sediment and nutrient loads entering the Maroochy River, the proponent has committed to use best practice erosion and sediment control measures. Such measures would be designed in accordance with the International Erosion Control Association *Best Practice Erosion and Sediment Control for Building and Construction Sites* 2008.

Due to the low-lying topography of the site and the underlying geology, the proposed action would be highly likely to disturb ASS. The proposed activities that are likely to disturb ASS include reclamation works and drain construction, and as previously

discussed the proponent would be required to ensure that ASS are appropriately managed to avoid adverse impacts on groundwater and surface waters.

Water quality impacts—tailwater discharge

A large proportion of the identified and potential water mouse habitat occurs along the mid-estuary section of the Maroochy River including the areas upstream and downstream of the Marcoola drain/Maroochy River confluence. The EIS indicated that tailwater discharge to Marcoola drain is not expected to significantly change water quality in the Maroochy River (i.e. at the Marcoola drain/Maroochy River confluence and downstream of the drain) from existing conditions, as tailwater would first be mixed in Marcoola drain and subsequently mixed with tidal waters at the Maroochy River/Marcoola drain confluence. Turbidity levels in the Maroochy River already exceed the water quality objectives (WQO) (mid-estuary section) and there would only be a slight increase during the discharge period. Total suspended sediment levels would remain below the WQO and salinity levels are expected to remain within the natural variation of the river. As no significant changes in water quality are expected to occur in the Maroochy River, the abundance of prey where water mouse are known to occur would remain unaffected.

To ensure no adverse impacts on the water quality of the receiving environment, tailwater quality would be tested for key parameters in the polishing pond prior to releasing to the northern perimeter drain and corrective measures (i.e. retreatment of tailwater) would be undertaken where any parameters did not comply with the environmental authority (ERA 16). In addition, the water quality of the receiving environment would be monitored to ensure compliance with proposed trigger values and WQO, and appropriate mitigation measures would be undertaken in the event of any exceedances (i.e. cease discharge if threshold exceeded.)

Water quality impacts—airport operation

During operation, stormwater run-off would be directed into the northern and southern perimeter drains via the runway drains. The EIS stated that surface water run-off from the new runway and taxi-ways would be directed to the drains through a series of vegetated pathways, which would filter out sediments.

The proponent used stormwater data collected for the Brisbane Airport to estimate stormwater run-off water quality from the proposed SCA runway. This data was considered appropriate given the Maroochy and northern coastal Brisbane regions have similar climatological regimes and that the SCA would use a comparable stormwater strategy to the Brisbane Airport. Based on this data, the EIS indicated that the new runway is likely to only have minor water quality impacts.

Flooding impacts

Flood modelling indicated that the proposed action is not expected to significantly increase flooding within the Maroochy River. Flood levels in the Maroochy River are expected to increase by less than 10mm. The areas where water mouse habitat have been identified along the Maroochy River would already be inundated under the 2, 5,

20, 50 and 100-ARI events. As a result, flooding impacts on water mouse habitat are not expected to change as a result of the proposed action.

Threat abatement

Feral cats and European red fox

The water mouse is listed as a species of interest in the *Threat abatement plan for predation by feral cats* and *Threat abatement plan for predation by the European red fox*.

Feral cats and the European red fox are scheduled as class 2 pests under the *Land Protection (Pest and Stock Route Management) Act 2002*. Under this Act, landowners are required to ensure that land is kept free of class 2 pests. The proponent would control pests on site through a pest management plan, which would assist in reducing the number of feral animals in the project area and subsequently reduce the risk of predation on the water mouse around the Maroochy River. I consider that the pest management measures proposed by the proponent would not be inconsistent with the TAPs for the predation of feral cats and the European red fox.

Significant residual impact and offsets

The proposed action is not expected to result in a significant residual impact on water mouse habitat.

Coordinator-General's conclusion

I am satisfied that the proponent has adequately identified the potential impacts that the proposed action may have on the water mouse. I require the proponent to implement measures to manage impacts on the water mouse through conditions stated in this report, including:

- limiting disturbance to habitat
- managing the quality of water being released from the project site (stormwater runoff and ASS), and tailwater discharge during reclamation works.

Subject to the mitigation measures and conditions stated in this report, I consider that the impacts on the water mouse are neither unacceptable nor inconsistent with the recovery plan for the water mouse and relevant TAPs.

6.6.6 Avifauna (terrestrial birds)

A search of the EPBC protected matters database identified eight species of terrestrial threatened birds, listed under the EPBC Act, as potentially occurring within 5km of the project area. These species are listed in Table 6.3.

Table 6.3 EPBC Act listed threatened terrestrial bird species potentially occurring in the project area

Common name (species name)	EPBC Act listing status
Regent honeyeater (<i>Anthochaera Phrygia</i>)	Critically endangered
Australasian bittern (<i>Botaurus poiciloptilus</i>)	Endangered
Coxen's fig-parrot (<i>Cyclopsitta diophthalma</i>)	Endangered
Red goshawk (<i>Erythrorchis radiatus</i>)	Vulnerable
Swift parrot (<i>Lathamus discolor</i>)	Endangered
Black-throated finch (southern) (<i>Poephila cincta cincta</i>)	Endangered
Australian painted snipe (<i>Rostratula australis</i>)	Endangered
Black-breasted button quail (<i>Turnix melanogaster</i>)	Vulnerable

Whilst a number of threatened fauna species have been identified as potentially occurring within the project area, desktop and field surveys indicate that the project area provides limited suitable habitat for a number of the terrestrial bird species identified in Table 6.3:

- The black-breasted button quail is considered unlikely to occur as there is limited potential suitable habitat within the project site. The species is known to inhabit a range of vegetation communities but is more commonly associated with coastal scrubs and fragments of vine forest and thickets. No vine forest and thicket communities were identified on site during field surveys. The nearest record of this species is near the Maroochy River approximately 6km west from the project site.
- The red goshawk is considered unlikely to occur as there is limited potential suitable habitat within the project area. Red goshawk has occasionally been reported in the Sunshine Coast hinterland with only a few records in the last 15 years. The site does not contain any tall trees suitable for red goshawk nesting.
- The regent honeyeater is considered unlikely to occur as there are no records of this species occurring in the project area and there is limited potential suitable habitat within the project site. While there are a number of flowering species present within the site that may provide foraging habitat for this species, it is considered unlikely given the absence of ironbark and box-gum associations which are its preferred habitat.
- The swift parrot is considered unlikely to occur given there are no records of this species in the project area and due to the absence of ironbark and box-gum associations which are also the preferred foraging habitat for this species. The

nearest records of this species are from the Maroochy Hinterland and Caloundra South.

- While areas of low swampy vegetation occur within the airport site and surrounds, it is unlikely to provide habitat for the Australasian bittern. The species' preferred habitat includes wetlands with tall dense vegetation. The nearest record of this species is from John Lantry Park approximately 3km south-west of the project site.
- The black-throated finch (southern) is considered unlikely to occur within the project area given there have been no records of this species in the Brisbane area and its surrounds since the 1930s.
- The Coxen's fig-parrot is considered unlikely to occur in the project area as there are no records of this species occurring in the project area and no foraging habitat for this species. This species occurs high in the canopy of rainforests, including subtropical rainforests, dry rainforests, littoral and developing littoral rainforests, and vine forests with figs and soft fruiting trees.
- The Australian painted snipe is considered unlikely to occur. Suitable habitat is limited and the two records within 10km are likely to reflect transient individuals.

The survey methodologies and survey effort undertaken by the proponent to identify the presence of threatened bird species, is considered to be appropriate, and generally in accordance with the 2010 *Survey Guidelines for Australia's Threatened Birds*.⁴⁵

Coordinator-General's conclusion

Based on the low likelihood of these species potentially occurring in the project area I consider that the proposed action is not expected to have an unacceptable impact on any of these terrestrial threatened bird species.

6.6.7 Reptiles

A search of the EPBC Act protected matters database identified three threatened reptile species as potentially occurring within 5km of the project area. These are listed in Table 6.4.

Table 6.4 EPBC Act listed threatened terrestrial reptile species potentially occurring in the project area

Common name (species name)	EPBC Act listing status
Dunmall's snake (<i>Furina dunmalli</i>)	Vulnerable
Three-toed snake-tooth skink (<i>Coeranoscincus reticulatus</i>)	Vulnerable
Collared delma (<i>Delma torquata</i>)	Vulnerable

⁴⁵ Department of the Environment, Water, Heritage and the Arts, *Survey guidelines for Australia's threatened birds: Guidelines for detecting birds listed as threatened under the EPBC Act*, Department of the Environment, Canberra, 2010, viewed 20 February 2016, <http://www.environment.gov.au/system/files/resources/107052eb-2041-45b9-9296-b5f514493ae0/files/survey-guidelines-birds.pdf>

Whilst three threatened terrestrial reptile species have been identified as potentially occurring within the project area, desktop and field surveys indicate that the project area provides limited suitable habitat for these species:

- The Dunmall's snake is considered highly unlikely to occur as the species does not occur within the region and there is an absence of suitable habitat. The species is commonly associated with brigalow, cypress and bullock forest and woodland growing on cracking black clay and clay loam soils. The Dunmall's snake occurs primarily in the Brigalow Belt region in the south-eastern interior of Queensland. The nearest record of this species is from Tarong which is approximately 124km south-west of the project site.
- The three-toed snake-tooth skink is considered unlikely to occur within the project site due to the absence of suitable habitat. The species is typically found in rainforests and adjacent to wet sclerophyll forests. The nearest record of this species is from Maroochydore near the Sunshine Motorway.
- The collared delma is considered unlikely to occur due to the absence of suitable habitat and limited local records (one record from 1956). The majority of records are from woodland sites, including open dry eucalypt woodland dominated by narrow-leaved ironbark *Eucalyptus crebra*, *E. intermedia* and *E. maculata*, and an understorey of grasses and creeping lantana on stony soils or rocky ridges.

The survey methodologies and survey effort undertaken by the proponent to identify the presence of threatened reptile species, are considered to be appropriate and generally in accordance with the 2011 *Survey Guidelines for Australia's Threatened Reptiles*.⁴⁶

Coordinator-General's conclusion

As no listed threatened terrestrial reptile species have been identified as potentially occurring in the project area, the proposed action is not expected to have an unacceptable impact on any of these species.

6.6.8 Freshwater fish

A search of the EPBC Act protected matters database did not identify any threatened freshwater fish species as potentially occurring within 5km of the project site. Based on desktop surveys two EPBC Act listed threatened species of fish (the oxleyan pygmy perch (*Nannoperca oxleyana*) and the honey blue-eye (*Pseudomugil mellis*)) were considered to possibly occur due to the presence of potentially suitable habitat and their known distribution.

The oxleyan pygmy perch have a restricted and patchy distribution, and are known from about 20 localities in Queensland. The species is found in coastal heath or 'wallum' habitats and has also been also found in degraded areas including shallow

⁴⁶ Department of Sustainability, Environment, Water, Population and Communities, *Survey guidelines for Australia's threatened reptiles: Guidelines for detecting reptiles listed as threatened under the EPBC Act*, Department of the Environment, Canberra, 2011, viewed 20 February 2016, <http://www.environment.gov.au/system/files/resources/eba674a5-b220-4ef1-9f3a-b9ff3f08a959/files/survey-guidelinesreptiles.pdf>

artificially constructed drains. Oxleyan pygmy perch are known to inhabit ponds and creeks usually with a dense emergent and submerged marginal vegetation, leaf litter beds, and occasionally woody debris.

The honey blue-eye inhabits slightly acidic (pH 4.4 to 6.8), clear and tannin-stained lakes, streams and wetlands, and is known to be relatively abundant in the Noosa River. The species usually occurs where there is little or no flow, and the fish can find shelter in dense, aquatic vegetation, such as emergent and submerged sedges, along the margins.

Aquatic field surveys undertaken within the project site for the EIS during July and September 2012 indicated that the aquatic habitat on the airport site is of poor quality, and that optimal habitat conditions required for these species were absent and water quality conditions appeared to be near the maximum tolerance limits for these species. Given the results of these surveys, these species are considered to have a low likelihood of occurring within the project area.

Coordinator-General's conclusion

Based on the low likelihood of these threatened freshwater species occurring I consider that the proposed action is unlikely to have an unacceptable impact on these species.

6.6.9 Insects

A search of the EPBC protected matters database identified one threatened insect species as potentially occurring within 5km of the project area: the pink underwing moth (*Phyllodes imperialis smithersi*). The pink underwing moth is considered unlikely to occur due to the absence of the suitable habitat. The species is typically found in undisturbed, subtropical rainforest in association with the vine *Carronia multisepalea*. The nearest record of the species is from Mary Cairncross Scenic Reserve, near Maleny.

Coordinator-General's conclusion

Based on the low likelihood of the pink underwing moth occurring on the project area, I consider that the proposed action is unlikely to have an unacceptable impact on this threatened insect species.

6.7 Threatened marine fauna

6.7.1 Marine birds

Background

An EPBC Act protected matters search identified 19 species of marine bird (including 11 species of albatross, 4 petrel species, 1 prion, and 2 shorebird species), listed as threatened under the EPBC Act, as potentially occurring within 5km of the project site. These are listed in Table 6.5.

Table 6.5 EPBC Act listed threatened marine bird species potentially occurring in the project area

Common name (species name)	EPBC Act listing status
Curlew sandpiper (<i>Calidris ferruginea</i>)	Critically endangered
Antipodean albatross (<i>Diomedea exulans antipodensis</i>)	Vulnerable
Tristan albatross (<i>Diomedea exulans exulans</i>)	Endangered
Gibson's albatross (<i>Diomedea exulans gibsoni</i>)	Vulnerable
Wandering albatross (<i>Diomedea exulans (sensu lato)</i>)	Vulnerable
White-bellied storm petrel (<i>Fregetta grallaria grallaria</i>)	Vulnerable
Southern giant petrel (<i>Macronectes giganteus</i>)	Endangered
Northern giant petrel (<i>Macronectes halli</i>)	Vulnerable
Eastern curlew (<i>Numenius madagascariensis</i>)	Critically endangered
Fairy prion (southern) (<i>Pachyptila turtur subantarctica</i>)	Vulnerable
Sooty albatross (<i>Phoebastria fusca</i>)	Vulnerable
Kermadec petrel (<i>Pterodroma neglecta neglecta</i>)	Vulnerable
Australian painted snipe (<i>Rostratula australis</i>)	Endangered
Shy albatross (<i>Thalassarche cauta cauta</i>)	Vulnerable
Salvin's albatross (<i>Thalassarche cauta salvinii</i>)	Vulnerable
White-capped albatross (<i>Thalassarche cauta steadi</i>)	Vulnerable
Chatham albatross (<i>Thalassarche eremita</i>)	Endangered
Black-browed albatross (<i>Thalassarche melanophris</i>)	Vulnerable
Campbell's albatross (<i>Thalassarche melanophris impavida</i>)	Vulnerable

Albatross and petrels

While a few albatross and petrel species have been observed around Bribie Island (shy albatross and southern giant petrel) and adjacent to the Moreton Bay region (wandering albatross [*Diomedea exulans*] and black-browed albatross [*Thalassarche melanophris*]), these are considered to be rare sightings and likely to be individuals that have strayed from their normal migratory path. Based on the low likelihood of these species occurring, the proposed action is considered to have a very low likelihood of impacting these marine bird species.

Curlew sandpiper and eastern curlew

The curlew sandpiper and eastern curlew's listing under the EPBC Act was amended to critically endangered on 14 May 2015. The EIS indicated that the curlew sandpiper is known to occur within the mud flat habitats at the mouth of the Maroochy River.

The EIS indicated that limited suitable habitat for the eastern curlew occurs north-west of the airport and more extensive areas of suitable habitat (mudflat and mangroves) are located along the Maroochy River and to the south of the airport at the mouth of the Maroochy River on the western side of Goat Island (high-tide roosts). The eastern curlew is likely to move up the river to areas of suitable habitat within the Maroochy Wetland Reserve (approximately 4km west of the airport).

There is an approved conservation advice for the eastern curlew: *Approved Conservation Advice for Numenius madagascariensis (Eastern Curlew)*⁴⁷ and the curlew sandpiper: *Approved Conservation Advice for Calidris ferruginea (curlew sandpiper)*.⁴⁸ The primary conservation objectives of these advices which are relevant to the project include maintaining and enhancing important habitat, and reducing disturbances to key roosting and feeding sites. The eastern curlew and curlew sandpiper are sensitive to human disturbance, and such disturbances can interrupt feeding and roosting behaviour.

Impacts and mitigation

While the project is not expected to directly impact on eastern curlew and curlew sandpiper foraging habitat or roosting sites, the project has the potential to indirectly impact these species through noise generated by aircraft operations under the new alignment, aircraft strike and water quality impacts associated with tailwater discharge.

Water quality impacts

While there is expected to be an increase in suspended solids and salinity around the Maroolia drain during construction, these are expected to be highly localised and temporary. Based on modelling, tailwater discharge is not expected to adversely impact on water quality in the Maroochy River and is therefore not expected to impact foraging habitats for the eastern curlew and curlew sandpiper within the Maroochy River.

The Spitfire Realignment Channel, where dredging is proposed, is wholly subtidal and consequently not used by migratory waders such as the eastern curlew and curlew sandpiper for foraging. Based on the location of the works, the proposed action is not expected to directly impact on shorebird habitat within the boundaries of the Moreton Bay Ramsar wetland. Dredge plume modelling for the EIS, indicated that the intertidal areas to the west and east of the Spitfire Realignment Channel, which are used by

⁴⁷ Threatened Species Scientific Committee, *Approved Conservation Advice for Numenius madagascariensis (Eastern Curlew)*, Department of the Environment, Canberra, 2015, viewed 12 March 2016, <http://www.environment.gov.au/biodiversity/threatened/species/pubs/847-conservation-advice.pdf>

⁴⁸ Threatened Species Scientific Committee, *Approved Conservation Advice for Calidris ferruginea (Curlew Sandpiper)*, Department of the Environment, Canberra, 2015, viewed 15 April 2016, <http://www.environment.gov.au/biodiversity/threatened/species/pubs/856-conservation-advice.pdf>

migratory shorebirds, are not expected to be adversely affected by dredge plumes generated by the dredging works in the channel.

Noise impacts

The EIS found that noise levels from aircraft would be expected to decrease (compared to the 'do minimum' scenario) around the mouth of the Maroochy River, due to the proposed east-to-west flight paths. Under the current airport operations aircraft bank and turn above the mouth of the Maroochy River when using the existing north-south runway. As there will be a reduction in noise exposure, aircraft operations under the 'new runway' scenario are not expected to have an unacceptable impact on the eastern curlew and curlew sandpiper.

Significant residual impact and offsets

The proposed action is not expected to result in a significant residual impact on the eastern curlew and curlew sandpiper.

Coordinator-General's conclusion

To ensure that there are no unacceptable impacts on the eastern curlew and curlew sandpiper, I require the proponent to manage impacts through the stated and recommended conditions of approval, including:

- limiting the area of dredging disturbance
- managing the quality of water being released from the project site (stormwater run-off), and tailwater discharge during reclamation works.

6.7.2 Marine mammals

Background

An EPBC Act protected matters search identified three species of marine mammal listed as threatened under the EPBC Act as potentially occurring within 5km of the project site. These are the humpback whale (*Megaptera novaeangliae*), southern right whale (*Eubalaena australis*) and the blue whale (*Balaenoptera musculus*). All three species have been identified as a conservation value in the *Marine Bioregional Plan for the Temperate East Marine Region*.

Humpback whale

The humpback whale is listed as vulnerable under the EPBC Act. The species occurs extensively throughout Australian waters. The majority of humpbacks in Australian waters migrate north to tropical calving grounds from June to August, and south to the Southern Ocean feeding areas from September to November. The timing of the migration period can change from year to year and may be influenced by water temperature, the extent of sea-ice, predation risk, prey abundance and location of feeding ground. Aerial surveys conducted off North Stradbroke Island suggested that most whales remain within 10km of the coastline during their northward migration, with Moreton Bay a known resting ground for the species. The EIS indicated that humpback

whales migrate relatively close to the coastline along parts of the Sunshine Coast, however are more likely to occur in deeper waters.

There is an approved conservation advice currently in place for this species: *Conservation Advice for the humpback whale Megaptera novaeangliae*⁴⁹, which has replaced its national recovery plan. The conservation actions in this conservation advice which are relevant to the project include:

- addressing infrastructure and coastal development impacts
- minimising vessel collisions
- assessing and addressing anthropogenic noise.

Southern right whale

Southern right whales are found along the Australian coast for several months of the year. The southern right whale is typically an oceanic species feeding mainly on krill. Given its typical habitat range, this species is highly unlikely to occur in the waters adjacent to Marcoola Beach or the waters around the Spitfire Realignment Channel.

Blue whale

The blue whale is typically an oceanic species feeding mainly of krill. In Australia key areas of aggregation include the Perth Canyon off Western Australia, the Bonney Upwelling and adjacent waters off South Australian and Victoria. Given its typical habitat range, this species is unlikely to occur in the waters adjacent to Marcoola Beach or the waters around the Spitfire Realignment Channel.

Impacts and mitigation

A number of project activities could potentially impact marine megafauna, including whales. This includes dredge operations within Spitfire Realignment Channel, transit of the dredge vessel to the pump-out site, mooring works and sand pump-out operations. As this species is likely to remain in oceanic waters, it is expected that any potential interaction with the dredge vessel would be limited.

While interactions are expected to be limited, the EIS outlined a number of strategies in its dredge management plan, which would be implemented in the event of any interaction with marine mega-fauna. These include:

- implementation of marine megafauna exclusion zones (i.e. maintaining a buffer distance between vessels and megafauna), including visual monitoring from dredge vessels and implementation of strategies to avoid interactions
- implementing strategies to avoid interactions including stopping work if megafauna, especially whales, are detected within or near exclusion zones and halting vessel transit where there is potential to encroach on observed whales on their anticipated path

⁴⁹ Threatened Species Scientific Committee 2015, Conservation Advice for *Megaptera novaeangliae* (humpback whale), viewed 18 April 2016, <http://www.environment.gov.au/biodiversity/threatened/species/pubs/38-conservation-advice-10102015.pdf>

- using low wattage and/or directional light fixtures on dredge vessels where practical.

Noise

Noise associated with aircraft operation has the potential to impact on sonar type communication by whales in the area. Studies undertaken by the Defence Science and Technology Organisation on the effects of noise generated by fighter jets, helicopters and military transport aircraft indicate that whales are unlikely to be significantly impacted by noise generated by aircraft. The studies suggest that noise exposure from aircraft is short (less than several seconds) as aircraft would move quickly over water and is limited as underwater sound would be localised to a narrow cone directly under the aircraft. Arriving and departing aircraft would also be expected to be at altitudes, when over open water, that would further reduce noise impacts.

Threat abatement

Marine debris

The 2009 *Threat Abatement Plan for the Impacts of Marine Debris on Vertebrate Marine Life* lists the humpback whale as a species of interest. Stormwater management on the site would reduce the risk of gross pollutants such as litter and debris entering the ocean.

Significant residual impact and offsets

The proposed action is not expected to result in a significant residual impact on any threatened marine mammal species.

Coordinator-General's conclusion

I am satisfied that the proponent has adequately identified the potential impacts that the project could have on marine mammals. To ensure that there are no unacceptable impacts on marine mammals, I require the proponent to manage impacts through the conditions recommended in this report, including implementation of buffer zones for marine megafauna (including whales) observed near dredge vessels and operations.

In light of the proposed mitigation measures and the stated and recommended conditions of approval, I consider the impacts on the humpback whale, blue whale and southern right whale are not unacceptable. I also consider that the proposed mitigation measures and conditions are not inconsistent with the relevant recovery plans: the TAP for impacts of marine debris on vertebrate marine life and the *Marine Bioregional Plan for the Temperate East Marine Region*.

The site of the proposed dredging works and marine areas adjacent to the airport are within state-controlled inshore waters, and therefore not within the area covered by the *Marine Bioregional Plan for the Temperate East Marine Region*. However, key species listed in Schedule 2 of the plan utilise inshore habitats and as such the *Marine Bioregional Plan for the Temperate East Marine Region* is relevant to the controlling provisions in accordance with section 176(5) of the EPBC Act.

6.7.3 Marine turtles

Background

An EPBC Act protected matters search identified six species of marine turtle, listed as threatened under the EPBC Act, as potentially occurring within 5km of the project site. These are provided in Table 6.6.

Table 6.6 EPBC Act listed threatened marine turtle species potentially occurring in the project area

Common name (species name)	EPBC Act listing status
Flatback turtle (<i>Natator depressus</i>)	Vulnerable
Green turtle (<i>Chelonia mydas</i>)	Vulnerable
Hawksbill turtle (<i>Eretmochelys imbricata</i>)	Vulnerable
Leatherback turtle (<i>Dermochelys coriacea</i>)	Endangered
Loggerhead turtle (<i>Caretta caretta</i>)	Endangered
Olive ridley turtle (<i>Lepidochelys olivacea</i>)	Endangered

The green and loggerhead turtles are the species considered most likely to occur in the project area. All six of the marine turtle species known to occur in Australian waters have been recorded in the Moreton Bay region. Moreton Bay is identified as a significant feeding ground for loggerhead and green turtles and both species are known to inhabit Moreton Bay year round in relatively high numbers. The other four species are known to occur occasionally, in much lower numbers.

There is no conservation advice currently in place for marine turtles, however there is a national recovery plan: *Recovery Plan for Marine Turtles in Australia*.

Key threats to marine turtles include deteriorating water quality and the loss of habitat associated with coastal development; by-catch in fisheries; entanglement in marine debris and shark control nets; ingestion of marine debris; and litter and boat strike. Predation of turtle eggs by native and introduced animals also poses a major threat to marine turtles.

Recovery actions in this plan that are relevant to the project include:

- reducing the mortality of marine turtles and, where appropriate, increasing natural survivorship
- managing factors that affect marine turtle nesting
- identifying and protecting habitats that are critical for the survival of marine turtles.

Marine turtles have also been identified as a conservation value in the *Marine Bioregional Plan for the Temperate East Marine Region*.

Impacts and mitigation

A number of project activities could potentially impact marine megafauna, including marine turtles. Activities include dredge operations within Spitfire Realignment

Channel, transit of the dredge vessel to the pump out site, mooring works and sand pump-out operations, and pipeline construction on Marcoola Beach.

Impacts on nesting habitat

The proposed construction of the pipeline has the potential to directly impact nesting turtles and hatchlings on Marcoola Beach where works may temporarily impair beach access for nesting turtles.

Loggerhead turtles are known to sporadically nest at low densities along the Sunshine Coast beaches including Marcoola Beach where construction of the pump-out pipeline is proposed. The nesting season for the loggerhead turtle is between November and February with hatchlings emerging as late as March. No green turtles have been recorded nesting in the project area in recent years however they have been known to nest occasionally in the Moreton Bay region.

To avoid direct impacts on nesting turtles and hatchlings, the proponent committed to undertake pipeline construction works on Marcoola Beach and sand pumping outside of the loggerhead nesting season (approximately late November to early March). This would also be appropriate for green turtles which have a similar nesting season. The proponent has proposed to engage with local community turtle monitoring groups regarding local nesting period activity for that given year.

The proponent has committed to undertake pre-work surveys in and around the pipeline alignment at Marcoola Beach to avoid any possible turtle or shorebird nesting sites. Impacts on sand dunes are expected to be temporary and the dunes would be fully rehabilitated once sand delivery works have been completed.

Lighting impacts—construction

Lighting is not considered to be an issue for marine turtles during pipeline construction and pump-out operations as these works would be undertaken outside of the nesting season (as committed by the proponent). Lighting from dredge equipment is also not considered to be an issue for marine turtles as the operator would aim for low wattage and/or directional light fixtures where practicable.

Lighting impacts—airport operation

As the new runway would be set further back from the beach than the existing north-south runway, the project is not expected to increase lighting impacts on nesting turtles and hatchlings in the project area.

Impacts on foraging resources

Green turtles primarily feed on seagrass and algae and typically forage in shallow benthic habitats including inshore seagrass beds and coral and rocky reefs. While the loggerhead turtle occupies a similar habitat range its diet differs from the green turtle feeding on marine invertebrates.

Airport site and surrounds

Surveys undertaken for the EIS indicated that there are no seagrass beds present at the pump-out site.

The EIS indicated that there is approximately 0.025km² of seagrass in the Maroochy River near the Eudlo Creek confluence which may be used as a foraging resource by green turtles. This area of seagrass is located more than 8km downstream from Marcoola drain and is unlikely to be affected by any change in water quality associated with tailwater discharge activities.

The EIS indicated that tailwater discharge to Marcoola drain is not expected to significantly change water quality in the Maroochy River from existing conditions as tailwater would be first mixed in Marcoola drain and subsequently mixed with tidal waters at the Maroochy River/Marcoola drain confluence. Based on modelling tailwater discharge activities are therefore not expected to adversely impact on green turtle foraging resources in the Maroochy River.

Spitfire Realignment Channel

The proposed sand extraction area within the Spitfire Realignment Channel supports sparse patches of seagrass that have previously been impacted by dredging activities conducted by the PBPL. These patches of seagrass are considered to be regrowth and not an important foraging resource for green turtles. Green turtles may transient the area moving from feeding areas on the eastern and western sides of Moreton Bay.

Green turtles are likely to use more extensive seagrass beds on the western shores of Moreton Island and west of Bribie Island. These beds are over 6km either side of the channel. Dredge plume modelling indicates that these seagrass beds are not expected to be affected by the proposed dredging works. Modelling indicates minor increases in total suspended solid concentrations around these areas which would be expected to have a negligible impact on seagrass. Sediment sampling from the proposed extraction area also indicates that the material is clean and not likely to contain any harmful contaminants.

To ensure no adverse impacts on the water quality of the receiving environment and sensitive marine habitats (i.e. seagrass) the water quality of the receiving environment would be monitored to ensure compliance with proposed trigger values and WQOs, and appropriate corrective actions would be undertaken in the event of any exceedances (i.e. cease dredging works, dredging on flood tide where currents would direct plume to the south).

Interaction with the dredge vessel

Direct interactions with turtles would potentially occur at the dredge site in the Spitfire Channel and in the area off Marcoola Beach during dredge pipeline construction and pump-out operations.

The risk of turtles colliding with dredge vessels during dredging and sand-pumping operations is expected to be low given the slow-moving nature of these vessels. It is expected that marine fauna would actively avoid the dredge area during operations.

The risk of turtles being entrained during dredging operations would be further reduced by installing exclusion devices on the dredge head. The EIS indicated that noise generated by these vessels is not expected to significantly disturb turtles.

The proponent has committed to implement a marine mega-fauna management plan which would include number of measures to minimise impacts on marine turtles, including the provision of a fauna spotter during dredging operations and altering operations when turtles are identified within the vicinity of the dredging area.

Threat abatement

Marine debris

Marine turtles are listed as a species of interest in the 2009 *Threat Abatement Plan for the Impacts of Marine Debris on Vertebrate Marine Life*. Stormwater management on the site would reduce the risk of gross pollutants such as litter and debris entering the ocean.

European red fox

Marine turtles are also listed as a species of interest in the 2008 *Threat abatement plan for predation by the European Red Fox* (flatback, green and loggerhead turtle).

The TAPs for the European red fox relate to marine turtles generally with regard to nesting. European red fox is identified as a predator on marine turtle eggs in parts of mainland Australia. As turtle nesting is known to occur at the proposed project site, these TAPs would be relevant to the site.

European red fox are scheduled as class 2 pests under the *Land Protection (Pest and Stock Route Management) Act*. Under this Act, landowners are required to ensure that land is kept free of class 2 pests. The proponent would control pests on site through a pest management plan which would assist in reducing the number of feral animals in the project area and subsequently reduce the risk of predation on eggs around Marcoola Beach. I considered that the pest management measures proposed by the proponent would not be inconsistent with the TAPs for the European red fox.

Coordinator-General's conclusion

I consider that the proponent has adequately identified the potential impacts that the project poses to marine turtles. In addition to the proponent commitments, I have stated conditions in this report requiring the proponent to:

- limit the area of dredging disturbance
- implement measures to reduce underwater noise impacts on turtles
- limit pipeline construction works on Marcoola Beach and sand-pumping activities to periods outside of the loggerhead and green turtle nesting season (late November to early March)
- undertake pre-work surveys in and around the pipeline alignment at Marcoola Beach to avoid any possible turtle nesting sites
- rehabilitate the sand dune after sand pumping works

- implement buffer zones for marine megafauna observed near dredge vessels and operations
- manage the quality of water released from the project site (stormwater run-off), tailwater discharge and dredging
- manage marine vessel activities to avoid/limit vessel strike.

In addition I have conditioned the proponent to monitor water quality of the receiving environment during dredging operations to ensure compliance with the values required in the environmental authority (ERA 16), and appropriate corrective actions would be undertaken in the event of any exceedances. This would ensure no adverse impacts on the seagrass beds around Moreton and Bribie Islands which are important feeding grounds for the green turtle.

In light of the proposed mitigation measures and conditions recommended in this report, I consider the impacts on marine turtles are not unacceptable. I also consider that the proposed mitigation measures and conditions are not inconsistent with the *Recovery Plan for Marine Turtles in Australia*, the TAPs for the European red fox, and the impacts of marine debris on vertebrate marine life or the *Marine Bioregional Plan for the Temperate East Marine Region*.

6.7.4 Marine fish and sharks

Background

An EPBC Act protected matters search identified one species of fish and three species of shark, listed as threatened under the EPBC Act, as potentially occurring within 5km of the project site. These are listed in Table 6.7.

Table 6.7 EPBC Act listed threatened marine fish and shark species potentially occurring in the project area

Common name (species name)	EPBC Act listing status
Grey nurse shark (<i>Carcharias taurus</i>)	Critically endangered
Great white shark (<i>Carcharodon carcharias</i>)	Vulnerable, migratory
Whale shark (<i>Rhincodon typus</i>)	Vulnerable, migratory
Black rockcod (<i>Epinephelus daemeli</i>)	Vulnerable

The black rockcod (*Epinephelus daemeli*) was listed under the EPBC Act as a threatened species after the controlled action decision was made for the project and therefore, in accordance with EPBC Act subsection 158A(4), is not considered in this assessment. The three shark species including the grey nurse shark (*Carcharias taurus*), great white shark (*Carcharodon carcharias*), and whale shark (*Rhincodon typus*) have been considered. All three species are identified as a conservation value in the *Marine Bioregional Plan for the Temperate East Marine Region* as they are listed under Part 13 of the EPBC Act and live in the Commonwealth marine area or for which the Commonwealth marine area is necessary for a part of their life cycle.

Grey nurse shark

The grey nurse shark is found primarily in inshore waters around rocky reefs and islands, in or near deep sandy-bottomed gutters or rocky caves, and occasionally in the surf zone and shallow bays. Sites that are identified as habitat critical to the survival for this species in Queensland are found near Moreton Island (China Wall, Cherubs Cave and Henderson Rock) and North Stradbroke Island (Flat Rock) and Rainbow Beach (Wolf Rock). In the Sunshine Coast region, this species is known to occur around rocky reef areas at Mudjimba Island and Jew Shoal (off Mooloolaba). Given the proximity of these areas to the development site the proposed action has a low likelihood of impacting this species.

Great white shark

In Australia, great white sharks have been sighted in all coastal areas except in the Northern Territory. Great white sharks can be found close inshore around rocky reefs, surf beaches and shallow coastal bays to outer continental shelf and slope areas. While the great white is unlikely to significantly use or rely on area around the Spitfire Realignment Channel and the waters off the Marcoola Beach, the species may traverse these areas.

Whale shark

The whale shark is an oceanic and coastal, tropical to warm-temperate pelagic shark. It is typically seen far offshore, but is also known to come close inshore. In Australia, the whale shark is most commonly seen in waters off northern Western Australia, Northern Territory and Queensland. Whale sharks have rarely been observed in the waters off the Sunshine Coast around Noosa and in Moreton Bay. Whale sharks are unlikely to significantly use or rely on the project impact areas, however they may traverse these areas.

Impacts and mitigation

A number of project activities could potentially impact marine megafauna, including marine fish and sharks. This includes dredge operations within Spitfire Realignment Channel, transit of the dredge vessel to the pump-out site, mooring works and sand pump-out operations.

Threat abatement

Marine debris

The grey nurse is listed as a species impacted by marine debris in the 2009 *Threat abatement plan for the impacts of marine debris on vertebrate marine life*. Stormwater management on the site would reduce the risk of gross pollutants such as litter and debris entering the ocean.

Significant residual impact and offsets

The proposed action is not expected to result in a significant residual impact on any threatened marine fish and shark species.

Coordinator-General's conclusion

The mitigation measures outlined in the proposed dredge management plan and the conditions of approval for marine mammals would also assist in mitigating any potential impacts on all three shark species. I consider the project not to have an unacceptable impact on these three threatened shark species provided that these measures are implemented.

6.8 Listed migratory species

In deciding whether or not to approve the proposal for the purposes of section 20 or 20A of the EPBC Act, and what conditions to attach to such an approval, the Commonwealth Minister for the Environment must not act inconsistently with Australia's obligations under the following conventions and agreements:

- Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention)
- Japan–Australia Migratory Bird Agreement (JAMBA)
- China–Australia Migratory Bird Agreement (CAMBA)
- Republic of Korea–Australia Migratory Bird Agreement (ROKAMBA)—an international agreement approved under subsection 209(4).

6.8.1 Migratory marine mammals

Background

An EPBC Act protected matters search identified nine species of marine mammal, listed as migratory under the EPBC Act, as potentially occurring within 5km of the project site. These are listed in Table 6.8.

Table 6.8 EPBC Act listed migratory marine mammal species potentially occurring in the project area

Common name (species name)	EPBC Act listing status	Listing under international agreements
Bryde's whale (<i>Balaenoptera edeni</i>)	Migratory	Bonn
Blue whale (<i>Balaenoptera musculus</i>)	Migratory, endangered	Bonn
Southern right whale (<i>Eubalaena australis</i>)	Migratory, endangered	Bonn
Humpback whale (<i>Megaptera novaeangliae</i>)	Migratory, vulnerable	Bonn
Dusky dolphin (<i>Lagenorhynchus obscurus</i>)	Migratory	Bonn
Irrawaddy dolphin (<i>Orcaella brevirostris</i>)	Migratory	Bonn
Orca (<i>Orcinus orca</i>)	Migratory	Bonn

Common name (species name)	EPBC Act listing status	Listing under international agreements
Indo-Pacific humpback dolphin (<i>Sousa chinensis</i>)	Migratory	Bonn
Dugong (<i>Dugong dugon</i>)	Migratory	Bonn

Whales and dolphins

The blue whale, southern right whale and the humpback whale have been assessed in section 6.7.2 (Marine mammals) of this report. It was concluded that the proponent has adequately identified the proposed action's potential impact on these species, and that impacts would be adequately managed through the measures proposed by the proponent and the stated and recommended conditions of approval.

Like the other three baleen species of whale, the Bryde's whale is typically an oceanic species feeding mainly on krill. Given its typical habitat range this species is highly unlikely to occur in the waters adjacent to Marcoola Beach or the waters around the Spitfire Realignment Channel. The proposed mitigation measures and conditions of approval which are relevant to the other whale in the previous section would also be appropriate for mitigating potential impacts on the Bryde's whale.

The dusky dolphin is considered to be primarily an inshore species and the Indo-Pacific humpback and Irrawaddy dolphins are known to occur in shallow coastal, estuarine, and occasionally riverine habitats. Orcas are known to occasionally visit Moreton Bay.

A number of project activities could potentially impact on migratory marine mammals. This includes dredge operations within Spitfire Realignment Channel, transit of the dredge vessel to the pump-out site, mooring works and sand pump-out operations.

The proposed mitigation measures and conditions of approval which are relevant to the threatened marine turtles and sharks in the previous section (section 6.7.3 and section 6.7.4) would also be appropriate for mitigating potential impacts on these migratory whales and dolphins.

Dugong

The dugong is listed as a migratory marine species under EPBC Act. A significant proportion of the world's dugong population is found in north Australian waters from Shark Bay, Western Australia in the west to Moreton Bay, Queensland. Major concentrations of the species occur along the Queensland coast in wide, shallow protected bays and mangrove channels, and around the inside edge of large inshore islands. These areas coincide with significant seagrass beds, which are the primary food source for the species. Dugongs are abundant in Moreton Bay, particularly in the dense seagrass around Amity Banks and are likely to occur throughout Moreton Bay as they move between feeding sites (seagrass meadows) within the bay.

Key threats to this species include marine vessel strikes, disturbance from underwater noise, habitat loss and degradation. Other direct threats to the species include

indigenous harvest, incidental entanglement in commercial fishing nets and shark nets, capture stress and disease and parasites.

The proposed sand extraction area within the Spitfire Realignment Channel supports sparse patches of seagrass that have previously been impacted by dredging activities conducted by the PBPL. These patches of seagrass are assessed to be regrowth and not assessed as an important foraging resource for dugong. Dugong may traverse the area moving from feeding areas on the eastern and western sides of Moreton Bay. More extensive seagrass beds exist on the western shores of Moreton Island over 6km from the site and west of Bribie Island. Based on dredge plume modelling, these seagrass beds are not expected to be affected by the proposed dredging works. Modelling indicated only minor increases in total suspended solid concentrations around these areas which would be expected to have a negligible impact on seagrass. Sediment sampling from the proposed extraction area also indicated that the material is clean and not likely to contain any harmful contaminants.

To ensure no adverse impacts on the water quality of the receiving environment and sensitive marine habitats (i.e. seagrass) the water quality of the receiving environment would be monitored to ensure compliance with proposed trigger values and WQO. An appropriate corrective action would be undertaken in the event of any exceedances (i.e. cease dredging works, dredging on flood tide where currents would direct plume to the south).

The EIS outlined management strategies to be set out as part of its dredge management plan, to mitigate potential impacts on marine megafauna species including dugongs. These include:

- implementation of marine megafauna exclusion zones (i.e. maintaining a buffer distance between vessels and megafauna), including visual monitoring from dredge vessels and implementation of strategies to avoid interactions
- if visual monitoring for megafauna detects megafauna within or headed towards exclusion zones, strategies would be executed to avoid interactions as required (i.e. stopping work if megafauna, especially whales, are within or near exclusion zones; halt vessel transit if potential to encroach on observed whales or their anticipated path)
- use of low wattage and/or directional light fixtures on dredge vessels where practical.

In addition I have conditioned the proponent to monitor water quality of the receiving environment during dredging operations to ensure compliance with the values required in the environmental authority (ERA 16), and appropriate mitigation measures would be undertaken in the event of any exceedances. This would ensure no adverse impacts on the seagrass beds around Moreton and Bribie Islands which are important feeding grounds for dugongs.

Threat abatement

Marine debris

The Bryde's whale, southern right whale, humpback whale and dugong are listed as a species impacted by marine debris in the 2009 *Threat Abatement Plan for the Impacts of Marine Debris on Vertebrate Marine Life*. Stormwater management on the site would reduce the risk of gross pollutants such as litter and debris entering the ocean.

Coordinator-General's conclusion

I consider that the proponent has adequately identified the potential impacts that the project could have on marine mammals.

To ensure that there are no unacceptable impacts on the species, I require the proponent to manage impacts through the stated and recommended conditions of approval, including:

- limiting the area of dredging disturbance
- managing water quality being released from the project site (stormwater run-off), tailwater discharge and dredging
- implementation of buffer zones for marine megafauna observed near dredge vessels and operations
- managing marine vessel activities to minimise vessel strike.

In light of the proposed mitigation measures and conditions recommended in this report, I consider the impacts on migratory marine mammals are not unacceptable. I also consider that the proposed mitigation measures and conditions are not inconsistent with the relevant recovery plans; the TAP for impacts of marine debris on vertebrate marine life or the *Marine Bioregional Plan for the Temperate East Marine Region*.

6.8.2 Migratory sharks and rays

Background

An EPBC Act protected matters search identified three species of shark and two species of ray, listed as migratory under the EPBC Act, as potentially occurring within 5km of the project site. These are listed in Table 6.9.

Table 6.9 EPBC Act listed migratory shark and ray species potentially occurring in the project area

Common name (species name)	EPBC Act listing status	Listing under international agreements
Great white shark (<i>Carcharodon carcharias</i>)	Migratory, vulnerable	Bonn
Whale shark (<i>Rhincodon typus</i>)	Migratory, vulnerable	Bonn

Common name (species name)	EPBC Act listing status	Listing under international agreements
Porbeagle shark (<i>Lamna nasus</i>)	Migratory	Bonn
Coastal manta ray (<i>Manta alfredi</i>)	Migratory	Bonn
Giant manta ray (<i>Manta birostris</i>)	Migratory	Bonn

The coastal manta ray and giant manta ray were listed as migratory under the EPBC Act after the controlled action decision was made for the project. Therefore, in accordance with EPBC Act subsection 158A(4), they are not considered in this assessment.

The porbeagle shark is mostly oceanic and is considered unlikely to significantly use or rely on the area around the Spitfire Realignment Channel and the waters off the Marcoola Beach. However the species may occasionally be transient in these areas.

The proposed mitigation measures and conditions of approval which are relevant to the great white shark and whale shark discussed in the previous section (section 6.7.4) would also be appropriate for mitigating potential impacts on the porbeagle shark.

Coordinator-General's conclusion

I consider that the proponent has adequately identified the potential impacts that the project poses to migratory shark and rays. In light of the proposed mitigation measures and conditions recommended in this report, I consider the impacts on migratory sharks and rays are not unacceptable.

6.8.3 Migratory marine turtles

Background

The green and loggerhead turtles are listed as migratory species under the EPBC Act. The proposed action's potential impacts and measures to mitigate these impacts are discussed in section 6.7.3 (Marine turtles) of this report.

Coordinator-General's conclusion

I consider that the proponent has adequately identified the potential impacts that the project poses to migratory marine turtles. In addition to the proponent commitments, I have stated conditions in this report requiring the proponent to:

- limit the area of dredging disturbance
- implement measures to reduce underwater noise impacts on turtles
- limit pipeline construction works on Marcoola Beach and sand-pumping activities to periods outside of the loggerhead and green turtle nesting season (late November to early March)

- undertake pre-work surveys in and around the pipeline alignment at Marcoola Beach to avoid any possible turtle nesting sites
- rehabilitate the sand dune after sand pumping works
- implement buffer zones for marine megafauna observed near dredge vessels and operations
- manage the quality of water released from the project site (stormwater run-off), tailwater discharge and dredging
- implement buffer zones for marine megafauna observed near dredge vessels and operations
- manage marine vessel activities to avoid/limit vessel strike.

In addition, I have conditioned the proponent to monitor water quality of the receiving environment during dredging operations to ensure compliance with the values required in the environmental authority (ERA 16), and appropriate corrective actions would be undertaken in the event of any exceedances. This would ensure no adverse impacts on the seagrass beds around Moreton and Bribie Islands which are important feeding grounds for the green turtle.

In light of the proposed mitigation measures and conditions recommended in this report, I consider the impacts on marine turtles are not unacceptable. I also consider that the proposed mitigation measures and conditions are not inconsistent with the *Recovery Plan for Marine Turtles in Australia*, the TAPs for the European red fox and feral pigs, and the impacts of marine debris on vertebrate marine life or the *Marine Bioregional Plan for the Temperate East Marine Region*.

6.8.4 Migratory birds

Background

An EPBC Act protected matters search identified a total of 49 bird species, scheduled as migratory under the EPBC Act, as potentially occurring in the project area. This includes:

- 21 migratory shorebird species
- 11 albatross and 2 petrel species
- 10 terrestrial migratory bird species
- 4 other marine migratory bird species.

The white-bellied sea-eagle (*Haliaeetus leucogaster*) and the painted snipe (*Rostratula benghalensis*) were removed from the migratory species list under the EPBC Act on 18 June 2015. Therefore, these species are not considered in this assessment.

Migratory shorebirds

Twenty-two of the 50 migratory bird species identified by the protected matters search tool are migratory shorebird species. These are listed in Table 6.10.

Table 6.10 Migratory shorebird species potentially occurring in the project area

Common name (species name)	EPBC Act listing status	Listing under international agreements
Latham's snipe (<i>Gallinago hardwickii</i>)	Migratory marine	Bonn, JAMBA, ROKAMBA
Common sandpiper (<i>Actitis hypoleucos</i>)	Migratory wetland Migratory marine	Bonn, CAMBA, JAMBA, ROKAMBA
Ruddy turnstone (<i>Arenaria interpres</i>)	Migratory wetland Migratory marine	Bonn, CAMBA, JAMBA, ROKAMBA
Sanderling (<i>Calidris alba</i>)	Migratory wetland Migratory marine	Bonn, CAMBA, JAMBA, ROKAMBA
Curlew sandpiper (<i>Calidris ferruginea</i>)	Critically endangered Migratory wetland Migratory marine	Bonn, CAMBA, JAMBA, ROKAMBA
Red-necked stint (<i>Calidris ruficollis</i>)	Migratory wetland Migratory marine	JAMBA, CAMBA, ROKAMBA
Great knot (<i>Calidris tenuirostris</i>)	Migratory wetland Migratory marine	Bonn, CAMBA, JAMBA, ROKAMBA
Double-banded plover (<i>Charadrius bicinctus</i>)	Migratory wetland Migratory marine	Bonn
Greater sand plover (<i>Charadrius leschenaultii</i>)	Migratory wetland Migratory marine	Bonn, CAMBA, JAMBA, ROKAMBA
Lesser sand plover (<i>Charadrius mongolus</i>)	Migratory wetland Migratory marine	Bonn, CAMBA, JAMBA, ROKAMBA
Swinhoe's snipe (<i>Gallinago megala</i>)	Migratory marine	Bonn, CAMBA, JAMBA, ROKAMBA
Pin-tailed snipe (<i>Gallinago stenura</i>)	Migratory marine	Bonn, CAMBA, JAMBA, ROKAMBA
Grey-tailed tattler (<i>Tringa brevipes</i>)	Migratory marine	Bonn, CAMBA, JAMBA, ROKAMBA
Broad-billed sandpiper (<i>Limicola falcinellus</i>)	Migratory marine	Bonn, CAMBA, JAMBA, ROKAMBA
Bar-tailed godwit (<i>Limosa lapponica</i>)	Migratory marine	Bonn, CAMBA, JAMBA, ROKAMBA
Eastern curlew (<i>Numenius madagascariensis</i>)	Migratory wetland Migratory marine Critically endangered	Bonn, CAMBA, JAMBA, ROKAMBA
Little curlew (<i>Numenius minutus</i>)	Migratory wetland Migratory marine	Bonn, CAMBA, JAMBA, ROKAMBA

Common name (species name)	EPBC Act listing status	Listing under international agreements
Whimbrel (<i>Numenius phaeopus</i>)	Migratory wetland Migratory marine	Bonn, CAMBA, JAMBA, ROKAMBA
Pacific golden plover (<i>Pluvialis fulva</i>)	Migratory wetland Migratory marine	Bonn, CAMBA, JAMBA, ROKAMBA
Grey plover (<i>Pluvialis squatarola</i>)	Migratory wetland Migratory marine	Bonn, CAMBA, JAMBA, ROKAMBA
Wandering tattler (<i>Heteroscelus incanus</i>)	Migratory wetland Migratory marine	Bonn, JAMBA
Terek sandpiper (<i>Xenus cinereus</i>)	Migratory wetland Migratory marine	Bonn, CAMBA, JAMBA, ROKAMBA

Whilst a number of these migratory shorebird species have been identified as potentially occurring within the airport site and surrounds, desktop and field surveys indicate that the project site does not contain any significant area of shorebird habitat. Areas of suitable habitat including sand, mudflat and seagrass habitats are located within 2.5km of the Maroochy River mouth (more than 4km south of the airport) and along the Maroochy River. The habitats around the mouth of the Maroochy are known to support a diverse range of shorebird species. The EIS indicated that four high-tide roosts are known to occur within this area, and are known to support the bar-tailed godwit, whimbrel, eastern curlew, double-banded plover and the red-necked stint, and to a lesser degree the Terek sandpiper, grey-tailed tattler, curlew sandpiper, great knot, lesser sand plover and greater sand plover.

The eastern curlew and curlew sandpiper were discussed in the threatened species section of this chapter. It was concluded in this chapter that the project is not expected to have any unacceptable impact on these species.

No migratory shorebird habitat is assessed as occurring in the Spitfire Realignment Channel area. This area is wholly subtidal and is consequently not used by migratory shorebirds as an intertidal feeding area.

Latham's snipe

Twenty individual Latham's snipe were observed in the south-east corner of the airport during EIS surveys. Of these, 16 were flushed from a relatively small area of modified heath to the east of the existing RWY 12/30 (to the immediate west of Keith Royal Park), 2 were observed in the central section of the WHMA, and 2 were observed within Lot 101 adjacent to David Low Way (outside the SCA to the immediate north of the existing north-south runway). I note that this species has also been previously recorded near Finland Road (to the north-west of the airport), and Muller Park at Bli Bli near the Maroochy River (to the south-west of the airport).

*EPBC Act Policy Statement 3.21—Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species*⁵⁰ states that any habitat that supports at least 18 individuals of Latham's snipe is considered to be important habitat, however, it is considered that the project is unlikely to have an adverse impact on this species because:

- this species has not been regularly observed on the site, so it is considered that this is more likely to be a one-off occurrence for this amount of birds to be present on the site
- the project would not directly remove any of the areas of habitat where they were recorded
- the species is known to utilise a wide range of habitats including freshwater wetlands, brackish and saline habitats, modified or artificial habitats (including pasture, ploughed paddocks, irrigation channels and drainage ditches), and habitats located close to humans or human activity
- the species is highly mobile, and readily moves between sites as conditions change
- birds are already using an area of the airport that is exposed to aircraft noise. Aircraft noise impacts in that area are not expected to be substantially different from the existing conditions as a result of the proposed action.

In addition, the creation of breeding ponds for the wallum sedgefrog in the WHMA, are likely to provide additional habitat in this area for the Latham's snipe.

Based on the above information, it is unlikely that important habitat would be modified or destroyed and unlikely that the proposed action would disrupt the lifecycle of the species, as habitat availability and aircraft noise conditions will remain substantially the same as current conditions. Therefore I consider that the proposed action is unlikely to have an unacceptable impact on this species.

Impacts and mitigation

While the project is not expected to directly impact on migratory shorebird foraging habitat or roosting sites, the project has the potential to indirectly impact migratory shorebirds that use the Maroochy River through:

- noise generated by aircraft operations under the new runway alignment
- aircraft strike
- water quality impacts associated with tailwater discharge.

Bird strike impacts

The EIS indicated that, while it is difficult to accurately quantify the impacts on migratory birds, the risk of aircraft strike is considered to be very low. Although the proponent has not discussed any specific measures to manage this risk, I note that it

⁵⁰ Department of the Environment, EPBC ACT Policy Statement 3.21—Industry Guidelines for Avoiding, Assessing and Mitigating Impacts on EPBC Act Listed Migratory Shorebird Species, Department of the Environment 2015, viewed 20 April 2016, <https://www.environment.gov.au/system/files/resources/67d7eab4-95a5-4c13-a35e-e74cca47c376/files/shorebirds-guidelines.pdf>

would have legislative obligations under the Civil Aviation Safety Regulations 1998 to manage the risk of wildlife hazards within the airport site.

The National Airports Safeguarding Framework, Guideline C: Managing the Risk of Wildlife Strikes in the Vicinity of Airports recommends that land use planning around airports should minimise the potential for wildlife to be in conflict with aircraft operations in addition to airport operators avoiding wildlife-attracting land uses within the boundaries of the airport.

In addition the risk of bird strike is likely to be reduced around the mouth of the Maroochy River, due to the proposed east-to-west flight paths. Under the current airport operations aircraft bank and turn above the mouth of the Maroochy River when using the existing north-south runway. The change in flight path is likely to result in a reduction in the risk of bird strike in over this area.

It is considered that the risk of aircraft strike would be reduced by locating drainage channels outside of the graded runway strip, and grassing the runway strip. This would ensure that standing water does not attract birds next to the runway.

Water quality impacts—airport and surrounds

Shorebird foraging habitat is limited along the Marcoola drain and is considered unlikely to support large numbers of waders. No migratory shorebirds were identified in this area during field surveys. Construction of the northern perimeter drain on the southern bank of the Marcoola drain is expected to result in the removal of less than 10m² of mangrove vegetation.

The EIS indicated that tailwater discharge to Marcoola drain is not expected to significantly change water quality in the Maroochy River from existing conditions as tailwater would be first mixed in Marcoola drain and subsequently mixed with tidal waters at the Maroochy River/Marcoola drain confluence. Based on modelling, tailwater discharge activities are therefore not expected to adversely impact foraging habitats of migratory shorebirds in the Maroochy River.

Water quality impacts—Spitfire Realignment Channel

The nearest area which provides important foraging habitat for a large number of migratory shorebird species is Pumicestone Passage, 5km west of the Spitfire Realignment Channel on the western side of Bribie Island. Given the proximity of this area to dredging works, the proposed action is not expected to have any direct impact on migratory shore bird species.

Disturbances during sand-pumping activities

Marcoola Beach was not identified as providing important habitat for any migratory shorebird species. It already experiences regular human activity and any migratory birds in this area would therefore already experience periodic disturbances.

Construction of the sand delivery pipeline and sand-pumping activities would be temporary and would also be undertaken outside of the summer to avoid the turtle nesting season. This would also be expected to limit impacts on some migratory shorebirds species which visit Moreton Bay during the summer months.

Noise impacts

The EIS indicated that due to the proposed east-west flight paths, noise levels from aircraft would be expected to decrease (from the 'do minimum' scenario) around the mouth of the Maroochy River. Under the 'do minimum' scenario planes bank and turn above the mouth of the Maroochy River when using the existing north-south runway. As there will be a reduction in noise exposure, aircraft operations under the new scenario are not expected to have an unacceptable impact on migratory shorebirds.

Coordinator-General's conclusion

I am satisfied that the proponent has adequately identified the potential impacts that the proposed action would have on migratory shorebirds. I require the proponent to implement measures to manage impacts on migratory shorebirds through conditions stated in this report, which includes managing the quality of water being released from the project site (tailwater discharge and stormwater run-off).

I consider that the impacts on migratory shorebirds are not unacceptable and that approving the proposed action would not be inconsistent with Australia's obligations under the Bonn Convention, CAMBA, JAMBA and ROKAMBA.

6.8.5 Terrestrial migratory birds

Background

The 10 terrestrial migratory bird species, identified by the protected matters search tool as potentially occurring within 5km of the project site, are listed in Table 6.11.

Table 6.11 Terrestrial migratory bird species potentially occurring within 5km of the project site

Common name (species name)	EPBC Act listing status	Listing under international agreements
White-throated needletail (<i>Hirundapus caudacutus</i>)	Migratory terrestrial Migratory marine	CAMBA, JAMBA, ROKAMBA
Rainbow bee-eater (<i>Merops ornatus</i>)	Migratory terrestrial Migratory marine	JAMBA
Black-faced monarch (<i>Monarcha melanopsis</i>)	Migratory terrestrial Migratory marine	Bonn
Spectacled monarch (<i>Monarcha trivirgatus</i>)	Migratory terrestrial Migratory marine	Bonn
Satin fly-catcher (<i>Myiagra cyanoleuca</i>)	Migratory terrestrial Migratory marine	Bonn
Rufous fantail (<i>Rhipidura rufifrons</i>)	Migratory terrestrial Migratory marine	Bonn
Eastern great egret (<i>Egretta alba</i>)	Migratory wetland Migratory marine	JAMBA
Cattle egret (<i>Ardea ibis</i>)	Migratory wetland Migratory marine	JAMBA, CAMBA

Common name (species name)	EPBC Act listing status	Listing under international agreements
Eastern osprey (<i>Pandion haliaetus</i>)	Migratory wetland Migratory marine	Bonn
Fork-tailed swift (<i>Apus pacificus</i>)	Migratory marine	CAMBA, JAMBA, ROKAMBA

The airport site is not identified as providing important habitat for any of the migratory species in Table 6.11. While a number of species are identified as potentially occurring, desktop and field surveys indicate that the airport provides limited suitable habitat for a number of these species, as follows:

- The black-faced monarch is considered unlikely to occur as the extent of suitable habitat within the SCA area is limited. Suitable habitat is limited to the mesic forest habitats (moister) in the coastal dune. This species has been recorded nearby in the Maroochy Wetland Sanctuary in Bli Bli.
- The spectacled monarch is considered unlikely to occur as the extent of suitable habitat within the SCA area is limited. The species typically occurs in dense rainforests and moist eucalypt forests, and sometimes inhabits mangroves and other densely vegetated habitats. Nearest records are from the Maroochy Wetland Sanctuary.
- The satin fly-catcher is considered to be a spring-autumn transient in South East Queensland. This species migrates north in autumn to spend winter in northern Australia and New Guinea and returns south in spring to spend summer in south-eastern Australia. This species has been previously recorded in Mudjimba near Keith Royal Park on the eastern side of the existing airport. Given the transient nature of this species it is considered unlikely to be impacted by the project.
- Eastern ospreys occur in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands. This species occupies a similar habitat range and sometimes interacts with the white-bellied sea eagle. As white-bellied sea eagles are known to occur, it is possible that this species also occurs in the project area.

The migratory terrestrial bird species that were identified on site include:

- rainbow bee-eater—regularly recorded throughout all areas of the airport site, in particular around the coastal dune habitat and areas of heath vegetation
- rufous fantail—noted on five occasions, almost always in association with thick mesic (moist) habitats (particularly forest dominated by eucalypts), and were also observed in the coastal dune area
- white-throated needletail and fork-tailed swift—both are aerial foragers and do not rely on any particular habitat type. Given the site's close proximity to important wetland areas to the north and south, these species are considered likely to use the site in transit to these areas

- cattle egret—regularly observed within the study area and known to occur widely in the Sunshine Coast region
- eastern great egret—regularly observed within the study area around Finland Road swamp and along the Maroochy River. The eastern great egret occurs widely in the locality.

Impacts and mitigation

The proposed action would involve a number of activities which have the potential to impact on terrestrial migratory bird species including:

- vegetation clearing across the site for the construction of the new runway and associated infrastructure
- increased number of aircraft flights during the airport operation.

The potential impacts that these activities could have on the terrestrial migratory bird species and how these will be managed to ensure no unacceptable impacts are discussed in the following section.

Vegetation clearing

The proposed action is expected to result in the permanent removal of 77.3ha of native vegetation associated with the constructing the new runway strip and flyover area, and the temporary removal of 2.8ha of native vegetation associated with constructing the dredge pipeline construction compound and access area. It is proposed that the areas temporarily cleared would be rehabilitated after construction.

The EIS stated that given the wide range of suitable foraging habitats in areas surrounding the airport and diversity of habitats used by these species, removing vegetation from the airport site is not expected to have an unacceptable impact on the these terrestrial migratory bird species.

The proponent also considers that the provision of the connectivity corridor between the northern and southern sections of Mount Coolum National Park and the offsets proposed on the 'Palmview' site for the wallum sedgefrog, would be likely to provide compensatory habitat for these terrestrial migratory bird species. It is expected that the proposed revegetation and regenerative works would involve the creation of similar habitat to that being lost as a result of runway construction.

Bird strike impacts

Although the proponent has not discussed any specific measures to manage this risk, I note it would have legislative obligations under the Civil Aviation Safety Regulations 1998 to manage the risk of wildlife hazards within the airport site.

The *National Airports Safeguarding Framework, Guideline C: Managing the Risk of Wildlife Strikes in the Vicinity of Airports* recommends that land use planning around airports should minimise the potential for wildlife to be in conflict with aircraft operations in addition to airport operators avoiding wildlife-attracting land uses within the boundaries of the airport.

It is considered that the risk of aircraft strike would be reduced by locating drainage channels outside of the graded runway strip, and grassing the runway strip. This would ensure that standing water does not attract birds next to the runway.

Threat abatement

Cane toads and European red fox

The rainbow bee-eater is listed as a species of interest in the 2008 *Threat abatement plan for predation by the European Red Fox* and the 2011 *Threat Abatement Plan for the biological effects, including lethal toxic ingestion, caused by cane toads*.

The European red fox is scheduled as a class 2 pest under the *Land Protection (Pest and Stock Route Management) Act 2002*. Under this Act, landowners are required to ensure that land is kept free of class 2 pests. The proponent would control pests on site, including red foxes, through a pest management plan. In addition, the requirement to maintain a continuous perimeter fence around the airport for security would also assist in excluding pest animals such as foxes on the site.

The proponent would also be required to implement hygiene protocols during construction to ensure cane toads are not introduced or spread on the site. I consider the pest management measures proposed by the proponent would not be inconsistent with the TAPs for the European red fox and the cane toad.

Coordinator-General's conclusion

I consider that the proponent has adequately identified the potential impacts that the proposed action poses to terrestrial migratory birds. I require the proponent to implement measures to manage impacts on terrestrial migratory birds through conditions stated in this report, including:

- limiting habitat disturbance
- providing compensatory habitat through the provision of offsets on the 'Palmview' site, and connectivity corridor between the northern and southern sections of Mount Coolool National Park. The proposed revegetation and regenerative works would involve the creation of similar habitat to that being lost from the runway construction footprint. This would be relevant to the rainbow bee-eater, rufous fantail, white-throated needle-tail, fork-tailed swift, cattle egret and eastern great egret.

I consider that the impacts on terrestrial migratory birds are not unacceptable and that approving the proposed action would not be inconsistent with Australia's obligations under the Bonn Convention, CAMBA, JAMBA and ROKAMBA and relevant TAPs.

6.8.6 Migratory marine birds

Background

Albatross and petrels

Eleven albatross and two petrel species, identified by the protected matters search tool as potentially occurring, are listed in Table 6.12.

Table 6.12 Albatross and petrel species potentially occurring in the project area

Common name (species name)	EPBC Act listing status	Listing under international agreements
Antipodean albatross (<i>Diomedea antipodensis</i>)	Migratory marine Vulnerable	Bonn
Tristan albatross (<i>Diomedea dabbenena</i>)	Migratory marine Endangered	Bonn
Wandering albatross (<i>Diomedea exulans</i>)	Migratory marine Vulnerable	Bonn
Gibson's albatross (<i>Diomedea exulans gibsoni</i>)	Migratory marine Vulnerable	Bonn
Sooty albatross (<i>Phoebastria fusca</i>)	Migratory marine Vulnerable	Bonn
Shy albatross (<i>Thalassarche cauta cauta</i>)	Migratory marine Vulnerable	Bonn
Chatham albatross (<i>Thalassarche eremita</i>)	Migratory marine Endangered	Bonn
Campbell albatross (<i>Thalassarche impavida</i>)	Migratory marine Vulnerable	Bonn
Black-browed albatross (<i>Thalassarche melanophris</i>)	Migratory marine Vulnerable	Bonn
Salvin's albatross (<i>Thalassarche salvini</i>)	Migratory marine Vulnerable	Bonn
White-capped albatross (<i>Thalassarche steadi</i>)	Migratory marine Vulnerable	Bonn
Southern giant petrel (<i>Macronectes giganteus</i>)	Migratory marine Endangered	Bonn
Northern giant petrel (<i>Macronectes halli</i>)	Migratory marine Vulnerable	Bonn

While a few albatross and petrel species have been observed around Bribie Island (shy albatross and southern giant petrel) and adjacent to the Moreton Bay region (wandering and black-browed albatross), these are considered to be rare sightings and likely to be individuals that have strayed from their normal migratory path. Based on the

low likelihood of these species occurring, the proposed action is considered to have a very low likelihood of impacting on these marine bird species.

Other marine migratory birds

Four other migratory marine bird species, identified by the protected matters search tool as potentially occurring, are listed in Table 6.13.

Table 6.13 Migratory marine bird species potentially occurring in the project area

Common name (species name)	EPBC Act listing status	Listing under international agreements
Streaked shearwater (<i>Calonectris leucomelas</i>)	Migratory marine	CAMBA, JAMBA, ROKAMBA
Flesh-footed shearwater (<i>Puffinus carneipes</i>)	Migratory marine	JAMBA, ROKAMBA
Wedge-tailed shearwater (<i>Puffinus pacificus</i>)	Migratory marine	JAMBA
Little tern (<i>Sterna albifrons</i>)	Migratory marine	Bonn, CAMBA, JAMBA, ROKAMBA

While the streaked shearwater and flesh-footed shearwater have been previously recorded in Moreton Bay these are considered to be rare sightings and likely to be individuals that have strayed from their normal migratory path. Based on the low likelihood of these species occurring, the proposed action is considered to have a very low likelihood of impacting on these migratory marine bird species.

The wedge-tailed shearwater and little tern are known to occur in the Marcoola region. Mudjimba Island is known to support a significant breeding colony of wedge-tailed shearwaters which are known to breed on the Island between October and May, and the little tern is likely to use the waters off Marcoola Beach to forage.

Impacts and mitigation

Wedge-tailed shearwater

Noise impact—aircraft operation

Although the project is not expected to directly impact this species, flight paths under the 'new runway' scenario would pass over Mudjimba Island, and may potentially impact on this species (noise generated by aircraft and potential bird strike).

Based on noise modelling, under the existing flight path Mudjimba Island is exposed to less than 5 events over 70 decibels (from 7am to 6pm). Under the new flight path, this would be expected to increase to 5–9 events over 70 decibels (from 7am to 6pm) by 2040. In addition, due to the nesting behaviour of this species (typically nests in burrows in sand and soil) nesting birds would remain in burrows during daylight hours when there would be a higher number of flights. Birds would therefore be less exposed to noise levels during these periods. While there has been no assessment on the effects of aircraft noise on the breeding success of this species, observations on Heron

Island in the Great Barrier Reef suggest that this ground-nesting species can tolerate helicopter noise at close proximity without any adverse effects.⁵¹

Impacts on foraging resources

Pump-out activities off Marcoola Beach would not be expected to interfere with foraging activities as the wedge-tailed shearwater is a mostly pelagic species, which would forage further out at sea.

Based on the information provided in the EIS, I consider that the proposed action is unlikely to have an unacceptable impact on the wedge-tailed shearwater.

Little tern

In Australia, little terns inhabit sheltered coastal environments, including lagoons, estuaries, river mouths and deltas, lakes, bays, harbours and typically occur in inlets with exposed sandbanks or sand-spits. The species is also sometimes found on exposed ocean beaches. On the Sunshine Coast major roosting sites for non-breeding terns include the Caloundra and Noosa sandbanks (with counts of up to 11,300 birds).

The sandbanks in the northern Pumicestone Passage north-west of the Spitfire Realignment Channel are also known to support large numbers of terns.

Little terns are known to forage over open water adjacent to Marcoola Beach. This species typically forages in shallow waters of estuaries, coastal lagoons and lakes, and frequently over channels next to spits and banks or entrances. As pump-out activities are expected to be undertaken in deeper waters, 600m to 1000m offshore from Marcoola Beach, any foraging activities closer to the shore are unlikely to be affected.

I consider that the proposed action is unlikely to have an unacceptable impact on this species.

Coordinator-General's conclusion

I consider that the proponent has adequately identified the potential impacts that the proposed action poses to migratory birds. I require the proponent to implement measures to manage impacts on migratory birds through conditions stated in this report, including:

- limiting habitat disturbance
- timing pipeline construction on Marcoola Beach
- managing water quality
- providing compensatory habitat through the provision of offsets on the 'Palmview' site, and connectivity corridor between the northern and southern sections of Mount Coolool National Park.

⁵¹ Great Barrier Reef Marine Park Authority, *Guidelines for Managing Visitation to Seabird Breeding Islands*, viewed 27 January 2016, Great Barrier Reef Marine Park Authority, Townsville, 2007, http://www.gbrmpa.gov.au/__data/assets/pdf_file/0004/4765/gbrmpa_GuidelinesManagingVisitationSeabirdBreedingIslands.pdf

I consider that the impacts on migratory birds are not unacceptable and that approving the proposed action would not be inconsistent with Australia's obligations under the Bonn Convention, CAMBA, JAMBA and ROKAMBA and relevant TAPs.

6.9 Wetlands of international importance

6.9.1 Moreton Bay Ramsar site

Background

Wetlands that are designated under the Ramsar Convention are those recognised as being internationally important, that are considered to be representative, rare or unique, or important for conserving biological diversity. Ramsar wetlands are recognised as a matter of national environmental significance under the EPBC Act.

Approval is required for an action occurring within or outside a declared Ramsar wetland if the action has, will have, or is likely to have a significant impact on the ecological character of the Ramsar wetland.

The ecological character of a wetland is a combination of ecosystem components, processes, benefits and services that characterise a wetland at any given point in time.

Critical components, processes, benefits and services include:

- diversity, representativeness and connectivity
- near-natural wetland habitat reference sites
- marine and aquatic fauna
- wetland-dependent terrestrial fauna
- wetland communities and species
- shorebird populations
- fisheries, Indigenous cultural significance, research and education tourism and recreational use.

The Ramsar site that is potentially affected by the project is the Moreton Bay Ramsar site. The Moreton Bay Ramsar site was designated as a wetland of international importance under the Ramsar Convention on 22 October 1993, based on six of the nine criteria used to identify wetlands of international importance.

The 2008 *Moreton Bay Draft Ecological Character Description* report identified the following existing impacts as potentially impacting on the ecological character of the Moreton Bay Ramsar site:

- disturbance and reduction of habitat quality for migratory shorebirds
- decreasing water quality in the southern and western bay areas
- seagrass loss in Deception Bay and the southern bay (and its potential impact on fisheries, dugong and turtle populations) and increasing incidence and intensity of lyngbya phytoplankton blooms.

Impacts and mitigation

The proposed action would involve a number of activities which could potentially impact on the ecological character of the Ramsar site. This includes dredge operations within Spitfire Realignment Channel and the transit of the dredge vessel to the pump out site.

Impacts on water quality associated with sand extraction

The proposed sand extraction area for sourcing material for airport reclamation works is located at the Spitfire Realignment Channel, in the northern section of Moreton Bay offshore from the southern end of Bribie Island.

The Spitfire Realignment Channel is not located within, or immediately adjacent to the Moreton Bay Ramsar site. The nearest boundaries of the site are located 5km north-west (Bribie Island) and 5km south-east (Moreton Island) of the channel. These areas are known to contain extensive areas of seagrass which provide important foraging habitat for dugongs, green turtles and a number of shorebird species.

Although dredging works would not be undertaken in close proximity to these sensitive areas, dredge plumes generated have the potential to indirectly impact on seagrass through increased levels of suspended sediments in the water column and sedimentation.

Studies indicate that the sediments within the Spitfire Realignment Channel are expected to contain a low concentration of fines (silty material) (less than 3 per cent) and negligible levels of nutrients and contaminants (i.e. heavy metals and other pollutants). While the sediments are not expected to contain a high concentration of fines, an 'extreme case' where the extraction area contains finer sediments than expected, was assessed to provide a more conservative assessment of the dredge plume impacts on water quality.

Based on the 'extreme case' modelling, only temporary minor increases in total suspended solids and would be expected to occur around the areas adjacent to Moreton (less than 0.20mg/L increases above background for 80th percentile) and Bribie Islands (less than 0.60mg/L increase above the background for 80th percentile). The concentration of suspended sediments and the duration would be expected to have a negligible impact on seagrass in these areas.

In addition, a number of measures would also be undertaken during dredging works to further mitigate water quality impacts including implementing a water quality monitoring program, establishing appropriate trigger values to protect water quality values and undertaking corrective actions where any trigger values are exceeded (i.e. cease dredging works, dredge on flood tide where currents would direct plume to the south).

Rates of sedimentation (accumulation of sediment)

The EIS indicated that the northern part of Moreton Bay, where sand extraction is proposed, is a highly dynamic system which experiences significant rates of sediment transport. Modelling indicated that during the dredging program the highest levels of sedimentation would occur around the northern and southern extent of the channel and maximum sedimentation rates of 2mm per month would be expected to occur within

13km of sand extraction area. The areas of seagrass on the western side of Moreton and Bribie Island are not expected to be adversely affected by sedimentation.

Impacts on hydrodynamics

Based on hydrodynamic modelling the EIS indicated no significant changes in hydrodynamic conditions are expected to occur around nearby shoreline areas including the areas within the boundaries of the Moreton Bay Ramsar wetland (i.e. wetland habitat on the western side of Moreton Island and the eastern side of Bribie Island).

Impacts on wetland-dependent species

Marine mega-fauna

Moreton Bay supports the vulnerable green and hawksbill turtles, the endangered loggerhead turtle and is ranked among the top ten dugong habitats in Queensland.

Impacts on fauna that are important to the ecological character of the Moreton Bay Ramsar wetland, including marine megafauna, are discussed in the threatened and migratory species sections of this chapter. The EIS outlined management strategies (which are to be part of the dredge management plan), to mitigate potential impacts on marine megafauna including:

- implementing marine megafauna exclusion zones (i.e. maintaining a buffer distance between vessels and megafauna), including visual monitoring from dredge vessels and implementing strategies to avoid interactions
- if visual monitoring for megafauna from either vessel detects megafauna within or headed towards exclusion zones, strategies would be executed to avoid interactions as required (i.e. stopping work if megafauna, especially whales, are within or near exclusion zones, and halting vessel transit if potential to encroach on observed whales or their anticipated path)
- using low wattage and/or directional light fixtures on dredge vessels where practical.

Shorebirds

Moreton Bay is recognised as supporting the third highest concentration of migratory shorebird species in Queensland. Over 40,000 migratory shorebirds (around 32 species) are known to use Moreton Bay between September and April to rest and replenish energy reserves whilst undertaking long distance annual migrations.

The bay is particularly significant for the population of wintering eastern curlews (3,000 to 5,000) and the grey-tailed tattler (more than 10,000), both substantially more than one per cent of the known flyway population, and is also recognised as a site of international significance for the bar-tailed godwit (supporting over 11,751 individuals) and the whimbrel (supporting over 1,440 individuals).

The Spitfire Realignment Channel, where dredging is proposed, is wholly subtidal and consequently not used by migratory waders as an intertidal feeding area. Based on the location of the works, the proposed action is not expected to directly impact on shorebird habitat within the boundaries of the Moreton Bay Ramsar wetland.

As discussed above, dredge plume modelling for the EIS indicated that the intertidal areas to the west and east of the Spitfire Realignment Channel, which are used by migratory shorebirds, are not expected to be adversely affected by dredge plumes generated by dredging works in the channel.

Marine pests

The EIS indicated that marine pests would be addressed through a dredge management plan. The spread of marine pests would be controlled by managing ballast water in accordance with Australia's mandatory ballast water management requirements, and minimising the amount of biofouling on vessels through a high standard of vessel cleaning and maintenance.

Coordinator-General's conclusion

I am satisfied that the EIS has adequately identified the potential impacts that the project poses to the ecological character of the Moreton Bay wetland.

I consider that the proposed action is unlikely to result in unacceptable impacts on the ecological character of the Moreton Bay Ramsar site, provided that the proponent undertakes adequate measures to mitigate impacts associated with the proposed works in the Spitfire Realignment Channel (i.e. mitigate impacts on water quality and wetland-dependent fauna).

To protect ecological character values I have conditioned the proponent to monitor the water quality of the receiving environment during dredging operations to ensure compliance with the values required in the environmental authority (ERA 16), and to undertake appropriate mitigation measures in the event of any exceedances.

I also consider that approving the project with conditions would not be inconsistent with Australia's obligations under the Ramsar Convention.

6.10 Bioregional plans

The site of the proposed dredging works and marine areas adjacent to the airport are within state-controlled inshore waters, and therefore not within the area covered by the *Marine Bioregional Plan for the Temperate East Marine Region*. However, key species listed in Schedule 2 of the plan (including marine turtles) utilise inshore habitats and as such the *Marine Bioregional Plan for the Temperate East Marine Region* is relevant to the controlling provisions in accordance with section 176(5) of the EPBC Act.

Pressures on the species identified in Schedule 1 of the marine bioregional plan have been assessed as described in the relevant sections above. While the proposed action is likely to contribute to pressures such as vessel strike and habitat modification, the impacts as a result of the proposed action are unlikely to be unacceptable. I consider that the recommended decision to approve the proposed action with conditions is not inconsistent with the objectives of the *Marine Bioregional Plan for the Temperate East Marine Region*.

6.11 Principles of ecologically sustainable development

My assessment of the project has taken into account the principles of ecologically sustainable development, as defined in Part 1, section 3A of the EPBC Act:

- decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations
- if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation
- the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations
- the conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making
- improved valuation, pricing and incentive mechanisms should be promoted.

I have evaluated the long-term and short-term economic, environmental, social and equitable considerations that are relevant to the project. The potential impacts of the project are addressed by conditions that restrict environmental impacts, impose strict monitoring and adopt environmental standards which, if not achieved, require the application of timely response mechanisms to avoid adverse impacts.

The proposed conditions will ensure protection of listed threatened species and listed migratory species. These conditions allow for the project to be delivered and operated in a sustainable way to protect the environment for future generations and preserve MNES.

I have considered the importance of conserving biological diversity and ecological integrity in relation to all of the controlling provisions for this project, and the assessment provided within my report reflects that consideration.

6.12 Coordinator-General's overall conclusions

I conclude that the proponent has adequately identified the impacts of the project on the ecological character of the Moreton Bay Ramsar wetland, TECs, threatened flora and fauna and migratory species listed under the EPBC Act.

My conclusion on mitigation and management measures proposed by the proponent, and the conditions stated in this report is that the project is not inconsistent with any of the international conventions relevant to threatened species and communities, migratory species and Ramsar wetlands.

6.12.1 Mount Emu she-oak

I am satisfied that the proponent has adequately identified the potential impacts that the project poses to the Mount Emu she-oak. I require the proponent to manage impacts through conditions stated in this report, including:

- avoiding and limiting the disturbance to habitat
- managing the quality of water being released from the project site
- undertaking pre-clearing surveys within the clearing footprint and applying appropriate measures to conserve individual plants identified during these surveys
- providing offsets for significant residual impacts
- implementing contingency measures including seed collection and storage in the event that the proposed offset strategy is not successful.

In addition, I have stated conditions under the environmental authority for dredging and reclamation works to protect surface and groundwater quality, the remaining AEP1 population to the south and the AEP2 population, and the translocation site to the north from water quality impacts during reclamation activities.

In light of the proposed avoidance and mitigation measures and conditions recommended in this report, I consider the impacts on Mount Emu she-oak are not unacceptable and the proposed management actions are not inconsistent with the recovery plan for this species.

6.12.2 Lesser swamp-orchid

I am satisfied that the proponent has adequately identified the potential impacts that the proposed action could have on the lesser swamp-orchid. I require the proponent to implement measures to manage impacts through conditions stated in this report, including:

- limiting disturbance to habitat
- undertaking pre-clearing surveys and applying appropriate measures to conserve individual plants identified during these surveys.

In light of the proposed avoidance and mitigation measures, and conditions recommended in this report, I consider the impacts on the lesser swamp-orchid are not unacceptable or inconsistent with the TAPs relevant to this species.

6.12.3 Wallum sedgefrog

I am satisfied that the proponent has adequately identified the potential impacts that the proposed action could have on the wallum sedgefrog. I require the proponent to manage impacts through the recommended conditions to ensure there are no unacceptable impacts, including:

- avoiding and limiting the disturbance to habitat
- providing offsets for significant residual impacts.

In addition, I have stated conditions under the environmental authority for dredging and reclamation works to ensure the protection of surface and groundwater quality, to protect wallum sedgefrog habitat within the WHMA and potential habitat in Mount Coolool National Park.

In light of the proposed avoidance and mitigation measures and conditions recommended in this report, I consider the impacts on the wallum sedgefrog are not unacceptable and the proposed management actions are not inconsistent with the recovery plan for this species.

6.12.4 Water mouse

I am satisfied that the proponent has adequately identified the potential impacts that the proposed action will have on the water mouse. I require the proponent to implement measures to manage impacts through conditions stated in this report, including:

- limiting disturbance to habitat
- managing the water quality being released from the project site (stormwater run-off and ASS), and tailwater discharge during reclamation works.

In light of the mitigation measures and conditions stated in this report, I consider that the impacts on the water mouse are neither unacceptable nor inconsistent with the recovery plan for the water mouse and relevant TAPs.

6.12.5 Grey-headed flying fox

I am satisfied that the proponent has adequately identified the potential impacts that the project poses to the grey-headed flying fox. I require the proponent to manage impacts through conditions stated in this report, including:

- limiting disturbance to habitat
- providing compensatory habitat through the provision of offsets for the three acid frog species
- managing airstrike to avoid/limit aircraft strike with grey-headed flying foxes.

In light of the proposed mitigation measures and conditions recommended in this report, I consider the impacts on the grey-headed flying fox are neither unacceptable nor inconsistent with the recovery plan for grey-headed flying fox.

6.12.6 Marine turtles

I am satisfied that the proponent has adequately identified the potential impacts that the project poses to marine turtles. I require the proponent to manage impacts through conditions stated in this report, including:

- limiting the area of dredging disturbance
- limiting pipeline construction works on Marcoola Beach and sand-pumping activities to periods outside of the loggerhead and green turtle nesting season (late November to early March)

- undertaking pre-work surveys in and around the pipeline alignment at Marcoola Beach to avoid any possible turtle nesting sites
- rehabilitating the sand dune after sand pumping works
- implementing buffer zones for marine megafauna observed near dredge vessels and operations
- managing the quality of water being released from the project site (stormwater run-off), tailwater discharge and dredging
- managing marine vessel activities to avoid/limit vessel strike with marine turtles.

In light of the proposed mitigation measures and stated conditions, I consider the impacts on marine turtles to be neither unacceptable nor inconsistent with the recovery plan for marine turtles and the relevant TAPs.

6.12.7 Threatened marine megafauna—(dolphins and whales, dugongs, fish and sharks)

I am satisfied that the proponent has adequately identified the potential impacts that the project poses to threatened marine megafauna. I require the proponent to implement measures to manage impacts through conditions stated in this report, including:

- limiting the area of dredging disturbance
- managing the quality of water being released from the project site (stormwater run-off), tailwater discharge and dredging
- implementing buffer zones for marine megafauna observed near dredge vessels and operations
- managing marine vessel activities to avoid/limit vessel strike with marine megafauna.

In light of the mitigation measures and stated conditions, I consider that the impacts on threatened marine fauna are not unacceptable and that approving the project would not be inconsistent with the relevant recovery and/or TAPs.

6.12.8 Migratory shorebirds

I am satisfied that the proponent has adequately identified the potential impacts that the proposed action poses to migratory shorebirds. I require the proponent to implement measures to manage impacts through conditions stated in this report, including:

- limiting the area of dredging disturbance
- managing the quality of water being released from the project site (stormwater run-off), tailwater discharge and dredging
- managing aircraft strike to avoid/limit aircraft strike with migratory shorebirds.

I consider that the impacts on migratory shorebirds are not unacceptable and that approving the proposed action would not be inconsistent with Australia's obligations under the Bonn Convention, CAMBA, JAMBA and ROKAMBA.

6.12.9 Migratory birds

I am satisfied that the proponent has adequately identified the potential impacts that the proposed action poses to migratory birds. I require the proponent to implement measures to manage impacts through conditions stated in this report, including:

- limiting habitat disturbance
- providing compensatory habitat through the provision of offsets for the three acid frog species, and connectivity corridor between the northern and southern sections of Mount Coolum National Park
- managing aircraft strike to avoid/limit aircraft strike with migratory birds.

I consider that the impacts on migratory birds are not unacceptable and that approving the proposed action would not be inconsistent with Australia's obligations under the Bonn Convention, CAMBA, JAMBA and ROKAMBA and relevant TAPs.

6.12.10 Migratory marine megafauna—(dolphins and whales, fish and sharks, dugong and marine turtles)

I am satisfied that the proponent has adequately identified the potential impacts that the proposed action poses to migratory marine megafauna. I require the proponent to implement measures to manage impacts through conditions stated in this report, including:

- limiting the area of dredging disturbance
- managing the quality of water being released from the project site (stormwater run-off), tailwater discharge and dredging
- implementing buffer zones for marine megafauna observed near dredge vessels and operations
- managing marine vessel activities to avoid/limit vessel strike with marine megafauna.

In light of the mitigation measures and stated conditions, I consider that the impacts on migratory marine mega-fauna are not unacceptable and that approving the proposed action would not be inconsistent with Australia's obligations under the Bonn Convention.

6.12.11 Moreton Bay Ramsar site

I am satisfied that the proponent has adequately identified the potential impacts that the proposed action will have on the ecological character of the Moreton Bay Ramsar site. I require the proponent to implement measures to manage impacts through conditions stated in this report, including:

- limiting the area of dredging disturbance
- managing the quality of water being released from the project site (stormwater run-off), tailwater discharge and dredging
- implementation of buffer zones for marine megafauna observed near dredge vessels and operations

- managing marine vessel activities to avoid/limit vessel strike with marine megafauna.

In light of the mitigation measures, I consider that the impacts on the ecological character of the Moreton Bay Ramsar site are not unacceptable and that approving the proposed action would not be inconsistent with Australia's obligations under the Ramsar Convention.

7. Conclusion

In undertaking my evaluation of the EIS, I have considered the following:

- the EIS and AEIS prepared for this project
- submissions on the EIS and AEIS, including agency advice.

I am satisfied that the requirements of the SDPWO Act have been complied with, and that sufficient information has been provided to enable the necessary evaluation of potential impacts, and the development of mitigation strategies and conditions of approval.

The environmental assessment commenced with the declaration of this project as significant project in October 2011 and has involved a comprehensive body of work by the proponent. More detailed work will occur in the detailed design phase of the project.

The potential impacts identified in the EIS documentation and all submissions have been assessed and considered. I consider that the mitigation measures and commitments proposed by the proponent together with the conditions and recommendations stated in this report would result in overall acceptable outcomes.

Section 6 (Matters of national environmental significance) of this report describes the extent to which the material supplied by SCRC addresses the likely impacts on MNES of each controlled action for the project.

Based on the information provided by the proponent and outlined in this evaluation report, I conclude that the project can address longstanding operational constraints, open up additional domestic and international destinations, and provide opportunities for the region to benefit from increasing demand in emerging tourism markets.

Accordingly, I recommend that the Sunshine Coast Airport Expansion project proceed, subject to the conditions in appendices: Appendix 1, Appendix 2 and in accordance with the recommendations in Appendix 3. In addition, it is expected that the proponent's commitments will be fully implemented as presented in the EIS documentation and summarised in Appendix 4 of this report.

To proceed further, the proponent will be required to:

- obtain the relevant environmental authorities under the EP Act
- obtain the relevant development approvals under the SPA
- obtain the relevant airspace approvals under the Commonwealth Airspace Act and Air Services Act

-
- finalise the environmental offsets.

Copies of this report will be issued to:

- The Commonwealth Department of the Environment
- The Department of Environment and Heritage Protection
- The Department of Infrastructure, Local Government and Planning
- The Department of Transport and Main Roads
- Sunshine Coast Regional Council.

A copy of this report will also be available on the Department of State Development, website at **www.statedevelopment.qld.gov.au/scaexpansion**

If there are any inconsistencies between the project (as described in the EIS documentation) and the conditions in this report, the conditions shall prevail. The proponent must implement all the conditions of this report.

This report will generally lapse three years from the date it is published on the department's website, or when an approval application is decided for the project.

Appendix 1. Stated conditions

This appendix includes conditions stated by the Coordinator-General's under section 39 (*Sustainable Planning Act 1999*) and 47C (*Environmental Protection Act 1994*) of the *State Development and Public Works Organisation Act 1971*.

Schedule 1. Environmental Authority

This Schedule includes the Coordinator-General's stated conditions for an environmental authority for Environmentally Relevant Activity 16 (dredging, extractive industry and screening) under the *Environmental Protection Act 1994*, stated under section 47C of the *State Development and Public Works Organisation Act 1971*.

This schedule applies to the extent that the environmental authority application seeks to undertake (all or part of) the activities described in this report.

General conditions

- G1.** Activities conducted under this environmental **authority** must not be conducted contrary to any of the following limitations:
- (a) **dredging** is limited to sand extraction for the purposes of new runway and taxiway construction at the Sunshine Coast Airport;
 - (b) **dredging** may only be undertaken using a trailing suction hopper dredge;
 - (c) no more than 1.1 million cubic metres of **dredge material** is to be removed from the **dredging** area;
 - (d) **dredging** may only occur in the Spitfire Realignment Channel described in the EIS. (Note: The coordinates of this channel are to be provided to the **administering authority** prior to an environmental authority application)
 - (e) **dredge spoil** must be placed in the dredge spoil containment area, as identified in Schedule 1 – Approved Plans, Figure 7.2 –EIS Chapter A5, Figure 5.4o;
 - (f) **dredge spoil** must be transported to the dredge spoil containment area via the pipeline corridor shown in Schedule 1 – Approved Plans, Figure 7.3 –EIS Chapter A5, Figure 5.4e.
- G2.** All reasonable and practicable **measures** must be taken to minimise the likelihood of environmental harm being caused.
- G3.** Any breach of a condition of this environmental authority must be reported to the **administering authority** as soon as practicable, or at most, within 24 hours of **you** becoming aware of the breach. Records must be kept including full details of the breach and any subsequent actions undertaken.
- G4.** Other than as permitted by this environmental authority, the **release of a contaminant into the environment** must not occur.
- G5.** Environmental monitoring results must be kept until surrender of this environmental authority. All information and records required by the conditions of this environmental authority must be provided to the **administering authority**, or **nominated delegate** upon request, within the required timeframe and in the specified format.
- G6.** An **appropriately qualified person(s)** must monitor, record and interpret all parameters that are required to be monitored by this environmental authority and in the manner specified by this environmental authority.

- G7.** All analyses required under this environmental authority must be carried out by a laboratory that has **NATA** certification, or an equivalent certification, for such analyses. Exceptions to this condition are for insitu monitoring of water quality and ground water quality, including: pH, conductivity, temperature, dissolved oxygen and redox potential and any analyses for which such certification is not available.
- G8.** When required by the **administering authority**, monitoring must be undertaken in the manner prescribed by the **administering authority**, to investigate a complaint of **environmental nuisance** or environmental harm arising from the **activity**. The monitoring results must be provided to the **administering authority**, or **nominated delegate**, within the required timeframe and in the specified format upon request.
- G9.** The **activity** must be undertaken in accordance with written procedures that:
- (a) identify potential risks to the environment from the **activity** during routine operations, closure and an emergency;
 - (b) establish and maintain control **measures** that minimise the potential for environmental harm;
 - (c) ensure plant, equipment and **measures** are maintained in a proper and effective condition;
 - (d) ensure plant, equipment and **measures** are operated in a proper and effective manner;
 - (e) ensure that staff are trained and aware of their obligations under the *Environmental Protection Act 1994*; and
 - (f) ensure that reviews of environmental performance are undertaken at least annually.

- G10.** Prior to the commencement of works, submit¹ RPEQ certified plans prepared by a registered engineer for the following structures to palm@ehp.qld.gov.au or mail to:

Department of Environment and Heritage Protection
Permit and License Management
Implementation and Support Unit
GPO Box 2454
Brisbane Qld 4001

The relevant structures are those whose purpose includes:

- the containment of **dredge spoil**
- avoidance of environmental impacts from salinity
- settlement and discharge of saline tail water
- treatment of acid sulfate soils
- ground water cut off walls to prevent ground water level drawdown and ground water contamination beyond the cut off walls
- management of ground and surface water levels in drains within or adjacent to National Parks and or conservation areas.

1: Note: The Department of Environment and Heritage Protection requires that plans submitted as part of an environmental approval or development application be GPS referenced and approved by a suitably qualified and experienced person who is a Registered Professional Engineer of Queensland (RPEQ). The current plans in the Sunshine Coast Airport Expansion Project EIS do not currently meet this requirement. Revised and suitably certified plans must be submitted with the environmental approval application.

- G11.** Submit “as constructed drawings” for the structures in mentioned G10 to palm@ehp.qld.gov.au or mail to:

Department of Environment and Heritage Protection
Permit and License Management
Implementation and Support Unit
GPO Box 2454
Brisbane Qld 4001

Within two (2) weeks of the completion of the works.

- G12.** Prior to commencement of the **dredging activity**, a site based **dredge management plan (DMP)** for the **activity** must be developed and implemented, and the **DMP** must contain the following:
- (a) clearly stated aims and objectives;
 - (b) description of **dredging** operation including:
 - i. type of equipment to be used in **dredging**;
 - ii. volume of **dredge material** to be removed, and duration and timing of the **dredging** campaign;
 - iii. methods to be utilised for transporting **dredge spoil**; and
 - iv. **dredge spoil** disposal methods.
 - (c) maps or plans showing:
 - i. legend, north arrow and scale;
 - ii. boundaries of **dredging** operation;
 - iii. estimated or modelled **zone of influence** of sediment plumes;
 - iv. location of designated disposal sites;
 - v. location of **sensitive receptors**; and
 - vi. all monitoring locations.
 - (d) a detailed description of **sediment plume-associated monitoring** program including:
 - i. sampling regime and methods; and
 - ii. monitoring sites.
 - (e) a detailed description of the assessment methodology to provide data in relation to **trigger values** that will define **alert levels**
 - (f) clearly set out data handling and evaluation procedures that demonstrate how exceedance of **alert levels** will be determined
 - (g) management actions to be initiated if **alert levels** are exceeded.
- G13.** A copy of the **DMP** must be submitted to the **administering authority** at least 20 business days prior to the commencement of the **activity** and, if necessary, amended in accordance with any comments made by the **administering authority**.
- G14.** Provide to the **administering authority** written notification of the date when **dredging** will commence at least five (5) business days prior to establishing a new **dredging activity**.
- G15.** **Dredging** must not commence until provision has been made to lawfully place the **dredge spoil**. Evidence of all necessary approvals must be provided to the **administering authority** upon request.
- G16.** The **DMP** must not be implemented or amended in a way that contravenes or is inconsistent with any condition of this **authority**.

- G17.** A hydrographic survey must be prepared by a registered surveyor of the dredge area and the immediate adjacent area likely to be affected by the **dredging** prior to commencement of works, and following the works being undertaken, and submitted to palm@ehp.qld.gov.au or mail to:

Department of Environment and Heritage Protection
Permit and License Management
Implementation and Support Unit
GPO Box 2454
Brisbane Qld 4001

Prior to the commencement of works and within two (2) weeks of the completion of the works.

Air

- A1.** Odours or airborne contaminants which are **noxious** or **offensive** or otherwise unreasonably disruptive to public amenity or safety must not cause nuisance to any **sensitive place** or **commercial place**.

Noise

- N1.** Noise generated by the **activity** must not cause **environmental nuisance** to any **sensitive place** or **commercial place**.
- N2.** Noise from the **activity** must not include **substantial low frequency noise** components and must not exceed the levels identified in Table 7.1—Noise limits when measured in accordance with the associated monitoring requirements.

Table 7.1 Noise Limits

Values to be advised (TBA).

Associated monitoring requirements

- (a) All monitoring devices must be correctly calibrated and maintained.
 - (b) Any monitoring must be in accordance with the most recent version of the **administering authority's Noise Measurement Manual**.
 - (c) Any monitoring of noise emissions from the **activity** must be undertaken when the **activity** is in operation.
 - (d) Monitoring location(s) must be relevant to the matter(s) under investigation.
- N3.** When required by the **administering authority**, noise monitoring must be undertaken in accordance with the associated monitoring requirements of Noise Limits Table 7.1, and the results notified within 14 days to the **administering authority**.

Land

- L1.** **Land** that has been disturbed by placement of saline **dredge spoil** and disturbance of acid sulfate soils must be monitored and managed so as to comply with surface water and ground water quality limits in this environmental authority and avoid environmental harm.
- L2.** Treatment and management of acid sulfate soils must comply with the current edition of the *Queensland Acid Sulfate Soil Technical Manual* and achieve the environmental outcomes for surface water and groundwater quality specified in this environmental authority.

- L3.** Prior to any disturbance on site of potential and actual acid sulfate soils, carry out soil and environmental investigations in accordance with the following guidance, and keep records of results:
- (a) *Queensland acid sulfate soils technical manual: legislation and policy guide;*
 - (b) *Queensland acid sulfate soils technical manual: laboratory methods guidelines;*
 - (c) *Queensland acid sulfate soils technical manual: soil management guidelines;*
 - (d) *Guidelines for sampling and analysis of lowland acid sulfate soils;*
 - (e) *State Planning Policy 2014 Water Quality code acid sulfate soils.*
- L4.** Based on the environmental investigations in L3, develop and implement a site-specific acid sulfate soil management plan (ASSMP) that achieves the management intent and environmental outcomes prescribed in condition L2.
- L5.** The ASSMP must address the following matters:
- (a) treatment of excavated or disturbed soils/sediments
 - (b) management of ground water levels to avoid environmental harm
 - (c) management of disturbed soils
 - (d) monitoring and compliance with surface water and ground water limits in this environmental authority
 - (e) the location(s) of any treatment pads on design drawings along with cell/bund design and lime guard layer rates
 - (f) the thickness of each soil layer, soil testing rates per volume of material and the type of analysis to be used
 - (g) list equipment to be used for application and incorporation of lime
 - (h) detail the incorporation method, liming rates and verification of quantities
 - (i) set out validation testing rate per volume of material and acceptance requirements
 - (j) describe the sampling technique and what type of analysis will be used
 - (k) consider the likely turnaround times for full treatment of each layer including drying time so that delays do not result in oxidation and acid discharge
 - (l) ensure treatment area is sufficiently large that treated layers are not buried until validation tests show the material has been fully treated
 - (m) establish the rate of treatment and thus duration of these works
 - (n) preferably schedule excavation and treatment during the dry season
 - (o) establish emergency procedures to cope with inclement weather. If treatment extends into or occurs over a **wet season** provide alternative methods or modified procedures
 - (p) outline the roles, responsibilities and how knowledge (as well as oversight) will be conveyed to any contractor/s.
- L6.** An **appropriately qualified person(s)** must design and be responsible for the design and implementation of the ASSMP.
- L7.** A copy of the ASSMP must be submitted to the **administering authority** at least 20 business days prior to the commencement of works and, if necessary, amended in accordance with any comments made by the **administering authority**.

- L8.** Treatment areas for acid sulfate soils must be lined to minimise any seepage and be capable of accommodating rainfall from a **24 hour storm event with an average return interval (ARI) of 1 in 5 years** plus sediment storage without release.
- L9.** **Land**, excluding the runway and taxiway surfaces, that have been disturbed for activities conducted under this environmental authority must be rehabilitated in a manner such that:
- (a) suitable species of vegetation for the location are established and sustained for earthen surfaces;
 - (b) potential for erosion is minimised;
 - (c) the quality of water, including seepage, released from the site does not cause environmental harm;
 - (d) potential for **environmental nuisance** caused by dust is minimised; and
 - (e) the final landform is stable and protects public safety.

Waste

- WS1.** All waste generated in carrying out the **activity** must be reused, recycled or removed to a facility that can lawfully accept the waste.

Water

- WT1.** **Dredging** in the Spitfire Realignment Channel and unloading of dredge spoil at the handling site offshore of Marcoola Beach, must not cause:
- (a) any visual discolouration of the surf zone at Marcoola Beach;
 - (b)
 - (i) the 80th percentile turbidity of the receiving **waters** at any point in the Moreton Bay Marine National Park Zone MNP 03, described in the Moreton Bay Marine Park Zoning Plan, to exceed 1 NTU; or
 - (ii) the 80th percentile turbidity to exceed a value 10 percent greater than the background 80th percentile turbidity (NTU) value only when background 80th percentile turbidity of the receiving waters within 50m of 27° 02.130' S153° 16.770' E in the Spitfire Banks area of MNP 03 zone exceeds 1 NTU for reasons other than the dredging;
 - (c) any release to **waters** of petroleum products, hydraulic fluids nor any other contaminants capable of causing environmental harm; and
 - (d) any erosion or damage to the banks of **waters**, riparian vegetation growing thereon, lawfully authorised structures within any **waters**, nor cause any unauthorised interference to the flow of any **watercourse**.

Associated monitoring requirements:

- Visual monitoring of the extent of turbid plumes at the Marcoola beach surf zone must be undertaken daily during unloading of dredge spoil.
- Monitoring of turbidity in MNP 03 zone must occur within 50 metres of 27° 02.130' S153° 16.770' E at all times.
- Determination of the 80th percentile turbidity values shall be calculated from continuous monitoring data collected at least every 5 minutes at all times.
- Continuous measurements for establishing background turbidity must be taken at least 1 hour prior to any **dredging** commencing.
- Dredge vessel position must be continuously monitored and recorded at all times.

Note: "Background" means the corresponding background water quality for site being tested. Background values are calculated from the full background monitoring program results obtained from the 1 hour prior to any dredging commencing. For example, 80th percentile of background means the 80th percentile value of the background data.

Surface water

WT2. The only contaminants to be released to surface **waters** from the placement and management of **dredge spoil** in the dredge spoil containment area is settled dredge tail waters and saline seepage from the release points specified in Table 7.2—Settled Tail Water and Saline Seepage from Dredge Spoil Placement- Release Points, Sources and Receiving Waters, and depicted in Schedule 1 – Approved Plans, – Figure 7.4 Water release locations, attached to this environmental authority.

Table 7.2 Settled Tail Water and Saline Seepage from Dredge Spoil Placement- Release Points, Sources and Receiving Waters

Release Point (RP)	Contaminant Source and Location	Monitoring Point	Receiving Waters Description
RP1	Polishing Pond serving runway construction	Pond outlet structure to Northern Perimeter Drain	Northern Perimeter drain, then lower section of Maroola drain, then Maroochy River

Note: The coordinates of the release point shall be provided to the **administering authority** no later than two (2) weeks after construction of the tail water discharge drain.

WT3. The settled dredge tail waters and saline seepage released must be in compliance with Table 7.3—Surface Water Release Limits – Settled Dredge Tail Water and the associated monitoring requirement. In addition, the release must:

- (a) not contain other contaminants that may cause environmental harm;
- (b) not contain any litter, slick or other evidence of petroleum hydrocarbons;
- (c) not cause deposits of metal flocculants in drains; and
- (d) be managed in rate and timing so as not to cause overtopping of drains receiving the release or breach surface water and groundwater limits in this environmental authority.

Table 7.3 Surface Water Release Limits – Settled Dredge Tail Water

Monitoring location/s	Water quality characteristics	Release Limit	Monitoring frequency
Discharge Point from Polishing Pond	pH	Not less than 6.5 nor greater than 8.5	Daily
	Acidity mg/L CaCO ₃	Not more than 10% greater than the highest background concentration measured in Mt Coolum National Park Drains	Weekly
	Turbidity (NTU)	No specific limit [see associated monitoring requirements (a) and	Daily

		(b)]	
	Dissolved Oxygen (mg/L)	Dissolved oxygen must be ≥ 6 milligrams per litre	Daily
	Dissolved Aluminium ($\mu\text{g/L}$)	Dissolved aluminium must be ≤ 55 micrograms per litre or sea water inlet concentration + 10%, which is higher	Weekly
	Suspended Solids (mg/L)	Suspended solids must be ≤ 50 milligrams per litre	Weekly

Associated monitoring requirements:

- (a) Potential correlations must be investigated between turbidity and suspended solids concentration. Where a correlation coefficient of 0.9 or greater is demonstrated based on quality assured sampling and analysis, the corresponding value of turbidity may be used as an operational indicator of suspended solid compliance. Correlation investigation results must be confirmed and approved by the **administering authority**. Suspended solid concentrations must still be determined and complied with.
- (b) Turbidity must be monitored to aid compliance with the suspended solid limit and avoid discharge of floc.
- (c) Monitoring must be in accordance with methods prescribed in the latest edition of the Department of Environment and Heritage Protection's *Water Quality Sampling Manual*.
- (d) Water and sediment samples must be representative of the general condition of the water body or sediments.
- (e) All determinations must employ analytical practical quantification limits of sufficient sensitivity to enable comparisons to be made against water quality objectives/triggers/limits relevant to the particular water or sediment quality characteristic.
- (f) Monitoring must be undertaken during a release and at the frequency stated.
- (g) All monitoring devices must be calibrated and maintained according to the manufacturer's instruction manual.

WT4. Monitoring of contaminant release to **waters** must be undertaken in accordance with condition WT2 and WT3 and records of the results must be kept.

WT5. A surface water monitoring program (SWMP) must be designed and implemented by an **appropriately qualified person(s)**, to monitor the background water quality and the effects of the **activity** on surface water and the **environmental values** of the Mount Coolum National Park, East Drain, protected areas under the *Nature Conservation Act 1992*, Marcoola Drain and the Maroochy River.

WT6. The SWMP specified in WT5 must include monitoring outlined in Table 7.4 – Surface Water Monitoring and associated monitoring requirements and include determination of surface water quality for at least the following locations at the stated monitoring frequencies:

- (a) drains in Mount Coolum National Park northern section that connects to the Northern Perimeter drain

- (b) Southern Perimeter drain traversing/adjacent to Mount Coolum National Park southern section and the Coolum Creek and Lower Maroochy River Wetland section
- (c) the area of the Northern Perimeter drain, including sites upstream and downstream of the tail water release (excluding baseline monitoring requirements in Table 1.4 column '*Initial Minimum Frequency to Develop Baseline Values (Minimum 12 rounds of sampling over 12 months)*')
- (d) the area of the Western Perimeter drain (excluding baseline monitoring requirements in Table 1.4 column '*Initial Minimum Frequency to Develop Baseline Values (Minimum 12 rounds of sampling over 12 months)*')
- (e) Marcoola drain including sites upstream of the Finland Road culvert
- (f) East Drain including within the palustrine wetlands
- (g) Maroochy River
- (h) any **waters** rehabilitated or set aside for conservation purposes
- (i) downstream of the cooling water pond (if saline water used for cooling)
- (j) downstream of any fuel storages (if fuel spillage occurs or is suspected)
- (k) downstream of any acid sulfate soil treatment areas
- (l) where a drain(s) arises beyond the boundary of the airport and upstream activities may cause similar water quality impacts to those addressed in this authority, a suitable "upstream background" location in such drain(s).

Note: A monitoring point that effectively characterises water quality and potential impacts at more than one of the above locations may be acceptable.

Table 7.4 Surface Water Monitoring

Indicator	Initial Minimum Frequency to Develop Baseline Values (Minimum 12 rounds of sampling over 12 months)	Minimum Frequency during construction	Minimum Frequency following final placement and shaping of dredged sand for runway and taxiways
Turbidity NTU	Monthly	Weekly	Weekly for 1 month, then monthly for 11 months, then quarterly for at least another year until long term compliance is likely (see note (a) below)
pH	Monthly	Continuous logger to monitor Upper Marcoola drain, East Drain and Mt Coolum National Park Else Weekly	
Electrical conductivity $\mu\text{S}/\text{cm}$	Monthly		
Total Dissolved Solids mg/L	Monthly	Weekly	
Dissolved Iron $\mu\text{g}/\text{L}$	Monthly	Weekly	
Dissolved Aluminium $\mu\text{g}/\text{L}$	Monthly	Weekly	
Titrateable acidity	Monthly	Weekly	

mg CaCO ₃ / L			
Chloride: Sulfate Ratio	Monthly	Weekly	
Other common anions and cations mg/L	Monthly	Monthly	
Total Petroleum Hydrocarbons µg/L (silica gel clean up)	Not applicable	Monthly for any site(s) showing any evidence of hydrocarbon release e.g. visible sheen. Until issue remediated and contamination not present	Monthly if release of hydrocarbons to surface water occurred until issue remediated and contamination not present
BTEX µg/L	Not applicable		
Naphthalene µg/L	Not applicable		

Associated monitoring requirements:

- Monitoring of potential seepage impacts from saline fill and disturbed acid sulfate soil is required for at least two years and, if necessary, a longer time until monitoring demonstrates potential for environmental harm from these sources is minimised, as demonstrated by absence of acid sulfate soil impacts and containment of saline ground water.
- Monitoring must be in accordance with methods prescribed in the latest edition of the **administering authority's** *Water Quality Sampling Manual*.
- BTEX means benzene, toluene, ethylbenzene and xylenes.
- Contamination not present means contaminant concentrations do not exceed respective ANZECC 2000 guideline trigger levels for toxicants (95% species protection and Section 8.3.7 of the guideline).

WT7. Surface water must be managed to achieve the surface water quality limits in Table 7.5—Surface Water Quality Limits. Where limits are based on background condition, they must be derived from 12 months of background monitoring in accordance with the *Queensland Water Quality Guidelines (2009)* and Table 7.4—Surface Water Monitoring.

Table 7.5 Table W4 – Surface Water Quality Limits

Values to be advised (TBA).

Associated requirements

- High ecological value limits apply to **waters** in Mount Coolum National Park North and South sections.
- Moderately disturbed ecosystem limits apply to all other **waters**.
- “Background” means the corresponding background water quality for site being tested. Background values are calculated from the full background monitoring program results obtained prior to any disturbance of the site. For example, 80th percentile of background means the 80th percentile value of the background data.
- 75% confidence limits as calculated in accordance with *Queensland Water Quality Guidelines 2009* Appendix D, See High Ecological Value Waters section

- (e) “median of test site” means the running median value for the site being tested following potential disturbance, calculated from the most recent 4 groundwater monitoring results (initially weekly, then monthly). If less than 4 results are available, it is the running median is to be calculated once two or more consecutive results are available, using available data, until the full 4 results are available.
 - (f) BTEX means benzene, toluene, ethylbenzene and xylenes.
 - (g) \leq means must be less than or equal to.
 - (h) \geq means must be greater than or equal to.
 - (i) Common anions and cations means sodium, calcium, magnesium, potassium, sulfate, chloride, carbonate and bicarbonate.
- WT8.** A copy of the SWMP, specified in condition WT5, must be submitted to the **administering authority** at least 20 business days prior to the commencement of the **activity** and, if necessary, amended in accordance with any comments made by the **administering authority**.
- WT9.** Tidal flap valve(s) must be installed on Marcoola drain at the Finland Road crossing culvert and be operated to:
- (a) minimise salt water ingress upstream;
 - (b) allow any necessary flood water conveyance; and
 - (c) not submerge mangrove roots upstream for extended duration so as to cause mangrove plant deaths.
- WT10.** The base and sides of the dredge spoil containment area and polishing pond must be lined with a HPDE liner, excluding a small area in the dredge spoil containment area surcharge area and under the polishing pond, as shown in Schedule 1 – Approved Plans, Figure 7.5, attached to this environmental authority.
- WT11.** A saline seepage management system must be designed by an **appropriately qualified person(s)** and be designed, installed and maintained to:
- (a) collect saline seepage generated in the dredge spoil containment area;
 - (b) convey the collected saline seepage out of the reclamation impoundment to the polishing pond for treatment and release in accordance with the water management conditions WT3 and WT7.
- WT12.** Control structures such as weirs must be installed and maintained on drains traversing the Mount Coolum National Park and discharging into deeper drains to prevent lowering of the water table in the Park and contaminant ingress into the Park. This includes structures shown in Schedule 1 – Approved Plans, Figure 7.6 attached to this environmental authority.
- WT13.** Spillage of dredge spoil must not occur outside of the potential area of spillage shown in Schedule 1 – Approved Plans, Figure 7.7–EIS Chapter A5, Figure 5.4f.

Stormwater

- S1.** Prior to the commencement of any **dredging** or construction, develop and implement erosion and sediment controls in accordance with the *Best Practice Erosion and Sediment Control (BPESC) guidelines for Australia* (International Erosion Control Association) and maintain sediment control devices to achieve best practice design objectives.
- S2.** Storage areas for hazardous contaminants must be located above the 1% Annual Exceedance Probability flood level.

- S3.** For the proposed works only use materials which are free from contaminants as defined under section 11 of the *Environmental Protection Act 1994*.
- S4.** The facilities for the **activity** must include a storage area for hazardous contaminants with secondary containment systems to prevent any **release of contaminants** from the system, or containers within the system, to land, groundwater, or surface waters.

Groundwater

- GW1.** An appropriately qualified person(s) must design a ground water monitoring program (GWMP) and supervise installation and implementation of a ground water monitoring system to establish background ground water quality, elevations and potential impacts of activities on the ground water system and ground water dependant ecosystems. The GWMP must include, but not be limited to, the installation and monitoring of sufficient bores surveyed to Australian height datum in locations to allow the protection of ground water quality and maintenance of groundwater elevation in areas listed in Table 7.6—Ground Water Protection Areas.

Table 7.6 Ground Water Protection Areas

Value #	Ground water protection location
1	Mount Coolum National Park (north and south sections)
2	Western Perimeter drain
3	Marcoola drain in proximity to Mount Coolum National Park
4	East drain in proximity to Mount Coolum National Park and palustrine wetland
5	Northern Perimeter drain
6	Areas rehabilitated for conservation offset purposes
7	The habitat corridor between the Mount Coolum National Park north and south sections
8	Near acid sulfate soil treatment areas to check effectiveness of lining and bunding
9	Any cooling water pond using saline water
10	Near any fuel storages or refuelling areas (if any underground fuel storage or a spillage event outside an impervious bunded area)

Note:

- A monitoring point that effectively characterises water quality and potential impacts in more than one of the above areas may be acceptable.
 - A monitoring bore adjacent to a National Park means the bore shall be installed as near as practicable to the boundary of the National Park. Results from this bore(s) shall be used for monitoring background conditions and compliance in lieu of bores inside the National Park.
- GW2.** A copy of the GWMP must be submitted to the **administering authority** at least 20 business days prior to the commencement of the **activity** and, if necessary, amended in accordance with any comments made by the **administering authority**. The GWMP must include background ground water quality data and calculated ground water limits in accordance with conditions GW4 and GW5 of this approval.
- GW3.** The GWMP specified in GW1 must include installation of sufficient ground water monitoring bores, surveyed to Australian height datum, to monitor the uppermost aquifer and, for the runway reclamation area and polishing pond, potential leakage to lower aquifers through and via gaps in the reported coffee rock confining layer.

GW4. The GWMP specified in GW1 must include, but not be limited to, the monitoring of the parameters as outlined in Table 7.7—Ground Water Monitoring Requirements and Associated Monitoring Requirements.

Note: A monitoring bore adjacent to a National Park means the bore shall be installed as near as practicable to the boundary of the National Park. Results from this bore(s) shall be used for monitoring background conditions and compliance in lieu of bores inside the Park.

Table 7.7 Ground Water Monitoring Requirements

Indicator	Initial Minimum Frequency Pre-construction to Develop Baseline Values (Minimum 12 rounds over 12 months)	Minimum Frequency during construction	Minimum Frequency following final placement and shaping of dredged sand for runway and taxiways
Ground Water Elevation m AHD	Monthly	Monthly	Monthly for 3 months, then quarterly for 9 months, then biannual for at least another year until long term compliance is likely (except ground water elevation in certain cases) (see notes (a) and (b)) Weekly for 1 month, then monthly for 11 months, then quarterly for at least another year until long term compliance is likely
pH	Monthly	Monthly	
Electrical conductivity µS/cm	Monthly	Monthly	
Total Dissolved Solids mg/L	Monthly	Monthly	
Dissolved Iron µg/L	Monthly	Monthly	
Dissolved Aluminium µg/L	Monthly	Monthly	
Titrateable acidity mg CaCO ₃ / L	Monthly	Monthly	
Chloride: Sulfate Ratio	Monthly	Monthly	
Other common anions and cations mg/L	Monthly	Monthly	
Total Petroleum Hydrocarbons µg/L (silica gel clean up)	Not applicable	Monthly for any site(s) showing any evidence of hydrocarbon release e.g.	Monthly if release of hydrocarbons to surface water occurred until issue remediated and contamination not present
BTEX µg/L	Not applicable		
Naphthalene µg/L	Not applicable		

		visible sheen. Until issue remediated and contamination not present	
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Associated monitoring requirements

- (a) Monitoring of potential seepage impacts from dredge spoil and disturbed acid sulfate soil is required for at least two years and, if necessary, a later time until monitoring demonstrates potential for environmental harm from these sources is minimised, as demonstrated by absence of acid sulfate soil impacts and containment of saline ground water.
- (b) Note that monitoring of ground water elevation will be required on an ongoing basis for bores monitoring maintenance of predevelopment ground water elevation, for example on the outer side of cut off walls.
- (c) Construction of all bores must be logged, records of logs kept and bore top casings surveyed to 0.01 m Australian Height Datum.
- (d) Monitoring bores must be installed in compliance with relevant Australian standards.
- (e) Monitoring must be in accordance with methods prescribed in the latest edition of the **administering authority's** *Water Quality Sampling Manual*.
- (f) BTEX means benzene, toluene, ethylbenzene and xylenes.

GW5. Ground water and saline seepage must be managed to achieve the ground water quality and elevation limits in Table 7.8—Ground Water Quality and Elevation Limits. Where limits are based on background condition, they must be derived in accordance with the *Queensland Water Quality Guidelines (2009)* and at least 12 months of monitoring data in accordance with Table 7.7—Ground Water Monitoring Requirements.

Table 7.8 Groundwater Quality and Elevation Limits

Values to be advised (TBA)

Associated requirements:

- (a) High ecological value limits apply to ground waters in Mount Coolum National Park north and south sections, and if not practicable to install monitoring bores within the park, ground water adjacent to the boundary and likely flowing into the park as inferred by hydraulic gradient.
- (b) Moderately disturbed ecosystem limits apply to all other **waters**.
- (c) "Background" means the corresponding background water quality for site being tested. Background values are calculated from the full background monitoring program results obtained prior to any disturbance of the site. For example, 80th percentile of background means the 80th percentile value of the background data.
- (d) 75% confidence limits as calculated in accordance with *Queensland Water Quality Guidelines 2009* Appendix D, See High Ecological Value Waters section.

- (e) “median of test site” means the running median value for the site being tested following potential disturbance, calculated from the most recent 4 ground water monitoring results (initially weekly, then monthly). If less than 4 results are available, the running median is to be calculated once two or more consecutive results are available, using available data, until the full 4 results are available.
- (f) BTEX means benzene, toluene, ethylbenzene and xylenes.
- (g) <= means must be less than or equal to.
- (h) >= means must be greater than or equal to.

GW6. A permanent impermeable ground water cut off wall, extending from the ground surface down to the confining coffee rock layer, must be installed and maintained for the length of the northern perimeter drain between the drain and the property boundary to the north. The drain must operate to:

- (a) prevent lowering of the water table on the Mt Coolum National Park side of the cut off wall distant from the drain;
- (b) oxidation of potential acid sulfate soils; or
- (c) ingress of contaminants to ground water beyond the wall.

An impermeable ground water cut off wall must be installed along the western perimeter drain, westwards of the drain, where necessary to avoid:

- 1. lowering the water table below potential acid sulfate soil;
- 2. non-compliance with the ground water and surface water limits; and
- 3. protect conservation areas, as shown in Schedule 1 – Approved Plans, Figure 7.8– EIS Appendix B3 Figure 3.7B.

GW7. Decommissioning of the bunding, HDPE lining system and seepage management system following cessation of dredge spoil placement is contingent on compliance with the following environmental outcomes:

- (a) compliance with ground water quality salinity limits (refer Groundwater Quality and Elevation Limits) in high conservation areas; and
- (b) compliance with surface water quality limits for salinity and electrical conductivity (refer Table 7.5 Surface Water Quality Limits) in non-tidal sections of airport drains affecting high conservation areas.

Notes:

- (a) High conservation areas relevant to this condition include: Mount Coolum National Park, Coolum Creek and Lower Maroochy River Wetlands, acid frog and Mount Coolum She Oak habitat, any area set aside for biodiversity offset and the corridor between the Mt Coolum National Park north and south sections.
- (b) An area is not contiguous with a drain if an impermeable structure precludes seepage from entering that area.

Regulated structures

X1. The **consequence category** of any **structure** must be **assessed** by a **suitably qualified and experienced person** in accordance with the *Manual for assessing consequence categories and hydraulic performance of structures* (ESR/2016/1933) at the following times:

- (a) prior to the design and **construction** of the **structure**, if it is not an **existing structure**; or
- (b) prior to any change in its purpose or the nature of its stored contents.

- X2.** A **consequence assessment** report and **certification** must be prepared for each **structure assessed** and the report may include a **consequence** assessment for more than one **structure**.
- X3.** **Certification** must be provided by the **suitably qualified and experienced person** who undertook the assessment, in the form set out in the *Manual for assessing consequence categories and hydraulic performance of structures* (ESR/2016/1933).
- X4.** All **regulated structures** must be designed by, and **constructed** under the supervision of, a **suitably qualified and experienced person** in accordance with the requirements of the *Manual for assessing consequence categories and hydraulic performance of structures* (ESR/2016/1933).
- X5.** **Construction** of a **regulated structure** is prohibited unless:
- (a) the **holder** has submitted a **consequence category** assessment report and **certification** to the **administering authority**; and
 - (b) **certification** for the **design, design plan** and the associated operating procedures has been **certified** by a **suitably qualified and experienced person** in compliance with the relevant condition of this **authority**.
- X6.** **Certification** must be provided by the **suitably qualified and experienced person** who oversees the preparation of the **design plan** in the form set out in the *Manual for assessing consequence categories and hydraulic performance of structures* (ESR/2016/1933), and must be recorded in the **Register of Regulated Structures**.
- X7.** **Regulated structures** must:
- (a) be designed and constructed in accordance with the requirements of the *Manual for Assessing Consequences Categories and Hydraulic Performance of Structures* (ESR/2016/1933);
 - (b) be designed and constructed with due consideration given to ensuring that the design integrity would not be compromised on account of:
 - (i) floodwaters from entering the **regulated dam** from any **watercourse** or drainage line; and
 - (ii) wall failure due to erosion by floodwaters arising from any **watercourse** or drainage line.
 - (c) have the floor and sides of the **dam** designed and constructed to prevent or minimise the passage of the wetting front and any entrained contaminants through either the floor or sides of the **dam** during the operational life of the **dam** and for any period of decommissioning and rehabilitation of the **dam**.
- X8.** **Certification** by the **suitably qualified and experienced person** who supervises the **construction** must be submitted to the **administering authority** on the completion of **construction** of the **regulated structure**, and state that:
- (a) the 'as constructed' drawings and specifications meet the original intent of the **design plan** for that **regulated structure**
 - (b) **construction** of the **regulated structure** is in accordance with the **design plan**.
- X9.** Operation of a **regulated structure**, except for an **existing structure**, is prohibited unless the **holder** has submitted to the **administering authority** in respect of **regulated structure**, all of the following:
- (a) one paper copy and one electronic copy of the **design plan** and **certification** of the '**design plan**' in accordance with condition X6;
 - (b) a set of 'as constructed' drawings and specifications;
 - (c) **certification** of the 'as constructed drawings and specifications' in accordance with condition X8;

- (d) where the **regulated structure** is to be managed as part of an integrated containment system for the purpose of sharing the DSA volume across the system, a copy of the **certified system design plan**;
 - (e) the requirements of this **authority** relating to the **construction** of the **regulated structure** have been met;
 - (f) the **holder** has entered the details required under this **authority**, into a **Register of Regulated Structures**; and
 - (g) there is a current **operational plan** for the **regulated structure**.
- X10.** Each **regulated structure** must be maintained and operated, for the duration of its operational life until decommissioned and rehabilitated, in compliance with the current **operational plan** and, if applicable, the current **design plan** and associated **certified** 'as constructed' drawings.
- X11.** A **Register of Regulated Dams** must be established and maintained by the **holder** for each **regulated structure**.
- X12.** The **holder** must provisionally enter the required information in the **Register of Regulated Dams** when a **design plan** for a **regulated dam** is submitted to the **administering authority**.
- X13.** The **holder** must make a final entry of the required information in the **Register of Regulated Structures** once compliance with condition (X9) has been achieved.
- X14.** The **holder** must ensure that the information contained in the **Register of Regulated Dams** is current and complete on any given day.
- X15.** All entries in the **Register of Regulated Dams** must be approved by the chief executive officer for the **holder** of this **authority**, or their delegate, as being accurate and correct.
- X16.** The **holder** must, at the same time as providing the annual return, supply to the **administering authority** a copy of the records contained in the **Register of Regulated Structures**, in the electronic format required by the **administering authority**.
- X17.** Each **regulated structure** must be inspected each calendar year by a **suitably qualified and experienced person**.
- X18.** At each **annual inspection**, the condition and adequacy of all components of the **regulated structure** must be **assessed** and a **suitably qualified and experienced person** must prepare an **annual inspection report** containing details of the **assessment** and include recommended actions to ensure the integrity of the **regulated structure** or a positive statement that no recommendations are required.
- X19.** The **suitably qualified and experienced person** who prepared the **annual inspection report** must **certify** the report in accordance with the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures* (ESR/2016/1933).
- X20.** The **holder** must, within 20 business days of receipt of the **annual inspection report**, provide to the **administering authority**:
- (a) the recommendations section of the **annual inspection report**; and
 - (b) if applicable, any actions being taken in response to those recommendations; and
 - (c) if, following receipt of the recommendations and (if applicable) actions, the **administering authority** requests a full copy of the **annual inspection report** from the **holder**, provide this to the **administering authority** within 10 business days of receipt of the request.

Definitions

Note that where a term is not defined, the definition in the *Environmental Protection Act 1994*, its regulations or environmental protection policies must be used. If a word remains undefined it has its ordinary meaning.

24 hour storm event with an average recurrence interval (ARI) of 1 in 5 years means the maximum rainfall depth from a 24 hour duration precipitation event with an average recurrence interval of once in 5 years. For example, an Intensity-Frequency-Duration table for a 24 hour duration event with an average recurrence interval of 1 in 5 years, identifies a rainfall intensity of 7.09mm/hour. The rainfall depth for this event is therefore 24 hour x 7.09mm/hour = 170.16mm.

Activity means the environmentally relevant activities, whether resource activities or prescribed activities, to which the environmental authority relates.

Administering authority means the Department of Environment and Heritage Protection or its successor or predecessors.

Alert level represent tiers in a hierarchy of increasing environmental risk and are defined by **trigger values**. Three alert levels (low, moderate, and high) are typically used in a management action framework to indicate adverse conditions and guide management responses that aim to prevent and minimise environmental harm.

Annual inspection report means an assessment prepared by a **suitably qualified and experienced person** containing details of the assessment against the most recent **consequence** assessment report and **design plan** (or **system design plan**):

- (a) against recommendations contained in previous annual inspections reports;
- (b) against recognised **dam** safety deficiency indicators;
- (c) for changes in circumstances potentially leading to a change in **consequence category**;
- (d) for conformance with the conditions of this authority;
- (e) for conformance with the 'as constructed' drawings;
- (f) for the adequacy of the available storage in each regulated **dam**, based on an actual observation or observations taken after 31 May each year but prior to 1 November of that year, of accumulated sediment, state of the containment barrier and the level of liquids in the **dam** (or network of linked containment systems);
- (g) for evidence of conformance with the current **operational plan**.

Appropriately qualified person(s) means a person or persons who has professional qualifications, training, skills or experience relevant to the nominated subject matter and can give authoritative assessment, advice and analysis to performance relative to the subject matter using the relevant protocols, standards, methods or literature.

Assessed or **assessment** by a **suitably qualified and experienced person** in relation to a consequence assessment of a **dam**, means that a statutory declaration has been made by that person and, when taken together with any attached or appended documents referenced in that declaration, all of the following aspects are addressed and are sufficient to allow an independent audit of the assessment:

- (a) exactly what has been **assessed** and the precise nature of that determination;
- (b) the relevant legislative, regulatory and technical criteria on which the assessment has been based;

(c) the relevant data and facts on which the assessment has been based, the source of that material, and the efforts made to obtain all relevant data and facts;

(d) the reasoning on which the assessment has been based using the relevant data and facts, and the relevant criteria.

Associated works in relation to a **dam**, means:

(a) operations of any kind and all things constructed, erected or installed for that **dam**; and

(b) any land used for those operations.

Authority means an environmental authority or a development approval.

Background means noise, measured in the absence of the noise under investigation, as $L_{A\ 90, adj, T}$ being the A-weighted sound pressure level exceeded for 90 per cent of the time period of not less than 15 minutes, using Fast response.

Certification means assessment and approval must be undertaken by a **suitably qualified and experienced person** in relation to any assessment or documentation required by this Manual, including **design plans**, 'as constructed' drawings and specifications, **construction**, operation or an annual report regarding **regulated structures**, undertaken in accordance with the Board of Professional Engineers of Queensland Policy Certification by RPEQs (ID: 1.4 (2A)).

Certifying, certify or certified have a corresponding meaning as 'certification'.

Commercial place means a place used as a workplace, an office or for business or commercial purposes and includes a place within the curtilage of such a place reasonably used by persons at that place.

Concern site means a site where a **sensitive receptor** occurs within the **zone of influence** of a sediment plume.

Construction or constructed in relation to a **dam** includes building a new **dam** and **modifying** or lifting an existing **dam**, but does not include investigations and testing necessary for the purpose of preparing a **design plan**.

Consequence in relation to a **structure** as defined, means the potential for environmental harm resulting from the collapse or failure of the **structure** to perform its primary purpose of containing, diverting or controlling flowable substances.

Consequence category means a category, either low, significant or high, into which a **dam** is **assessed** as a result of the application of tables and other criteria in the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (EM635)*.

Control site refers to a monitoring site located beyond the anticipated **zone of influence** of sediment plumes and has **site pairing** with one or more **test sites** or **sentinel sites**. In monitoring programs, **control sites** serve the same role as do **reference sites** but only for a defined subset of parameters.

Dam means a land-based **structure** or a void that contains, diverts or controls flowable substances, and includes any substances that are thereby contained, diverted or controlled by that land-based **structure** or void and **associated works**.

Design plan is a document setting out how all identified consequence scenarios are addressed in the planned design and operation of a **regulated structure**.

Dredge footprint is the area being dredged including batters.

Dredge management plan (DMP) is an environmental management plan for the **dredging activity**. It defines and describes the:

- scope, timing and duration of the **dredging** operation
- **sediment plume-associated monitoring** programs
- assessment of data, **trigger values** and **alert levels**
- management actions that may be required in response to adverse monitoring results.

The **DMP** includes an aim to prevent and minimise environmental harm to **sensitive receptors** as a result of the **dredging activity**.

Dredge material is the sea, river or lake bed material (e.g. stone, gravel, sand, rock, clay, mud, silt and soil) as it remains *in situ*, prior to **dredging** disturbance, within the **dredge footprint**.

Dredge spoil is **dredge material** that has been disturbed (i.e. extracted, transported, placed or disposed).

Dredging means to clear out **dredge material**.

Environmental Nuisance means unreasonable interference with an environmental value caused by aerosols, fumes, light, noise, odour, particles or smoke. It may also include an unhealthy, **offensive** or unsightly condition because of contamination. For activities that need an environmental authority, the most common causes of **environmental nuisance** are dust, noise and odour.

Environmental values means:

a) a quality or physical characteristic of the environment that is conducive to ecological health or public amenity or safety

(b) another quality of the environment identified and declared to be an environmental value under an environmental protection policy or regulation.

Existing structure means a **structure** that was in existence prior to the adoption of this schedule of conditions under the authority.

Holder means:

(a) where this document is an environmental authority, any person who is the holder of, or is acting under, that environmental authority

(b) where this document is a development approval, any person who is the registered operator for that development approval.

$L_{Aeq\ adj,T}$ means the adjusted A weighted equivalent continuous sound pressure level measures on fast response, adjusted for tonality and impulsiveness, during the time period T, where T is measured for a period no less than 15 minutes when the **activity** is causing a steady state noise, and no shorter than one hour when the approved **activity** is causing an intermittent noise.

Land means any land, whether above or below the ordinary high-water mark at spring tides (i.e. includes **tidal land**).

$Max_{LpA,T}$ means the maximum A-weighted sound pressure level measured over a time period T of not less than 15 minutes, using Fast response.

Measures has the broadest interpretation and includes plant, equipment, physical objects, bunding, containment systems, monitoring, procedures, actions, directions and competency.

Modification or modifying (see definition of '**construction**')

NATA means National Association of Testing Authorities.

Nominated delegate means another government agency that provides services to the **administering authority**.

Noxious means harmful or injurious to health or physical well-being.

Offensive means causing offence or displeasure; is unreasonably disagreeable to the sense; disgusting, nauseous or repulsive.

Operational plan includes:

- (a) normal operating procedures and rules (including clear documentation and definition of process inputs in the DSA allowance);
- (b) contingency and emergency action plans including operating procedures designed to avoid and/or minimise environmental impacts including threats to human life resulting from any overtopping or loss of structural integrity of the **regulated structure**.

Reference site refers to a monitoring site located not only beyond the anticipated **zone of influence** of a sediment plume, but also beyond other sources of environmental impacts, and has **site pairing** with one or more **test sites** or **sentinel sites**. In monitoring programs, **reference sites** serve the same role as do **control sites** but can generally be suitable for a broader set of parameters.

Register of Regulated Structures includes:

- (a) Date of entry in the register;
- (b) Name of the **structure**, its purpose and intended/actual contents;
- (c) The **consequence category** of the **dam** as assessed using the *Manual for assessing consequence categories and hydraulic performance of structures (ESR/2016/1933)*;
- (d) Dates, names, and reference for the design plan plus dates, names, and reference numbers of all document(s) lodged as part of a design plan for the **dam**;
- (e) Name and qualifications of the **suitably qualified and experienced person** who certified the **design plan** and 'as constructed' drawings;
- (f) For the **regulated dam**, other than in relation to any levees –
 - i. The dimensions (metres) and surface area (hectares) of the **dam** measured at the footprint of the dam;
 - ii. Coordinates (latitude and longitude in GDA94) within five metres at any point from the outside of the **dam** including its storage area;
 - iii. **Dam** crest volume (megalitres);
 - iv. Spillway crest level (metres AHD);
 - v. Maximum operating level (metres AHD);
 - vi. Storage rating table of stored volume versus level (metres AHD);
 - vii. Design storage allowance (megalitres) and associated level of the **dam** (metres AHD);
 - viii. Mandatory reporting level (metres AHD);
- (g) The **design plan** title and reference relevant to the dam;
- (h) The date construction was **certified** as compliant with the design plan;
- (i) The name and details of the **suitably qualified and experienced person** who **certified** that the constructed **dam** was compliant with the design plan;
- (j) Details of the composition and construction of any liner;

- (k) The system for the detection of any leakage through the floor and sides of the **dam**;
- (l) Dates when the **regulated dam** underwent an annual inspection for structural and operational adequacy, and to ascertain the available storage volume for 1 November of any year;
- (m) Dates when recommendations and actions arising from the annual inspection were provided to the **administering authority**;
- (n) **Dam** water quality as obtained from any monitoring required under this authority as at 1 November of each year.

Regulated dam means any **dam** in the significant or high **consequence category** as **assessed** using the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (EM635)* published by the administering authority.

Regulated structure includes land-based containment structures, levees, bunds and voids, but not a tank or container designed and constructed to an Australian Standard that deals with strength and structural integrity.

Release of a contaminant into the environment means to:

- deposit, discharge, emit or disturb the contaminant
- cause or allow the contaminant to be deposited, discharged, emitted or disturbed
- fail to prevent the contaminant from being deposited, discharged emitted or disturbed
- allow the contaminant to escape
- fail to prevent the contaminant from escaping.

Sediment plume-associated monitoring (SPAM) means environmental monitoring associated with risk management of **sediment plume-associated impacts**.

Sediment plume-associated impacts are impacts associated with sediment plumes including turbidity and suspended solids concentrations, light attenuation or sedimentation rates elevated above either **control site** or **reference site** readings or baseline conditions for an equivalent time of year. Where **dredge material** possesses acid sulfate soil-related properties, sediment plume-associated impacts may also include pH, dissolved oxygen and metal and metalloid-related toxicity impacts.

Sensitive place includes the following and includes a place within the curtilage of such a place reasonably used by persons at that place:

- a dwelling, residential allotment, mobile home or caravan park, residential marina or other residential premises; or
- a motel, hotel or hostel; or
- a kindergarten, school, university or other educational institution; or
- a medical centre or hospital; or
- a protected area under the *Nature Conservation Act 1992*, the *Marine Parks Act 1992* or a World Heritage Area, excluding the Mt Coolum National Park; or
- a public thoroughfare, park or gardens; or
- for noise, a place defined as a **sensitive receptor** for the purposes of the Environmental Protection (Noise) Policy 2008.

Sensitive receptor includes biological sensitive receptors together with other **environmental values** sensitive to the effects of dredge-generated **sediment plume-associated impacts**.

Sentinel site is a **test site** that is situated between the disturbance source and the **sensitive receptor** and serves to provide earlier warning of developing adverse conditions than does a **test site**

Site pairing refers to monitoring sites that have a functional control-impact relationship, for example, **Control site** A is referenced to assess monitoring data collected from **Concern Sites** AA and AB, thus, **Concern Sites** AA and AB share **site pairing** with **Control Site** A.

Structure means **dam** or levee.

Substantial low frequency noise means a noise emission that has an unbalanced frequency spectrum shown in a one-third octave band measurement, with a predominant component within the frequency range 10 to 200 Hz. It includes any noise emission likely to cause an overall sound pressure level at a sensitive place exceeding 55 dB(Z).

Suitably qualified and experienced person in relation to regulated structures means a person who is a Registered Professional Engineer of Queensland (RPEQ) under the provisions of the *Professional Engineers Act 2002*, and has demonstrated competency and relevant experience:

- for regulated **dams**, an RPEQ who is a civil engineer with the required qualifications in **dam** safety and **dam** design
- for regulated levees, an RPEQ who is a civil engineer with the required qualifications in the design of flood protection embankments.

System design plan means a plan that manages an integrated containment system that shares the required DSA and/or ESS volume across the integrated containment system.

Test site is a **concern site** that functions as a test point for compliance, is a monitoring site situated within the area where a **sensitive receptor** occurs and where environmental monitoring-related assessment criteria (e.g. **trigger values**) apply.

Tidal land means land that is submerged at any time by tidal water.

Trigger values are physicochemical, parameter-specific measurement values used to indicate a condition where an environmental value or **sensitive receptor** may be at low, moderate or high risk, or some other risk-related indicator.

Watercourse has the meaning in Schedule 4 of the *Environmental Protection Act 1994* and means a river, creek or stream in which water flows permanently or intermittently—

- (a) in a natural channel, whether artificially improved or not; or
- (b) in an artificial channel that has changed the course of the watercourse.

Watercourse includes the bed and banks and any other element of a river, creek or stream confining or containing water.

Waters includes river, stream, lake, lagoon, pond, swamp, wetland, unconfined surface water, unconfined water, natural or artificial **watercourse**, bed and bank of any waters, **dams**, non-tidal or tidal waters (including the sea), stormwater channel, stormwater drain, roadside gutter, stormwater run-off, and groundwater and any part thereof.

Wet season means the time of year, covering one or more months, when most of the average annual rainfall in a region occurs. For the purposes of DSA determination this time of year is deemed to extend from 1 November in one year to 31 May in the following year inclusive.

You means the **holder** of the environmental authority.

Zone of Influence of a sediment plume is, in its broadest application, defined by the **dredge footprint** and the area beyond the **dredge footprint** where at least some level of sediment plume-associated impacts are expected to occur. The overall *zone of influence* may be broken

down into more risk-relevant sub-categories, such as the *Zone of Unavoidable Loss* (the **dredge footprint** and immediately adjacent areas), the *Zone of Moderate Impact*, or the *Zone of Marginal Impact*, with each zone being defined according to its purpose or role in environmental management.

Approved plans

The following plans may be revised by the proponent in an application for an environmental authority (ERA16) to include detailed designs undertaken for the project. Any revised plans must be consistent with the plans presented in the EIS and to the satisfaction of the administering authority.



Figure 7.2 EIS Chapter A5, Figure 5.4a

Figure 5.4e: Sand delivery pipeline alignment

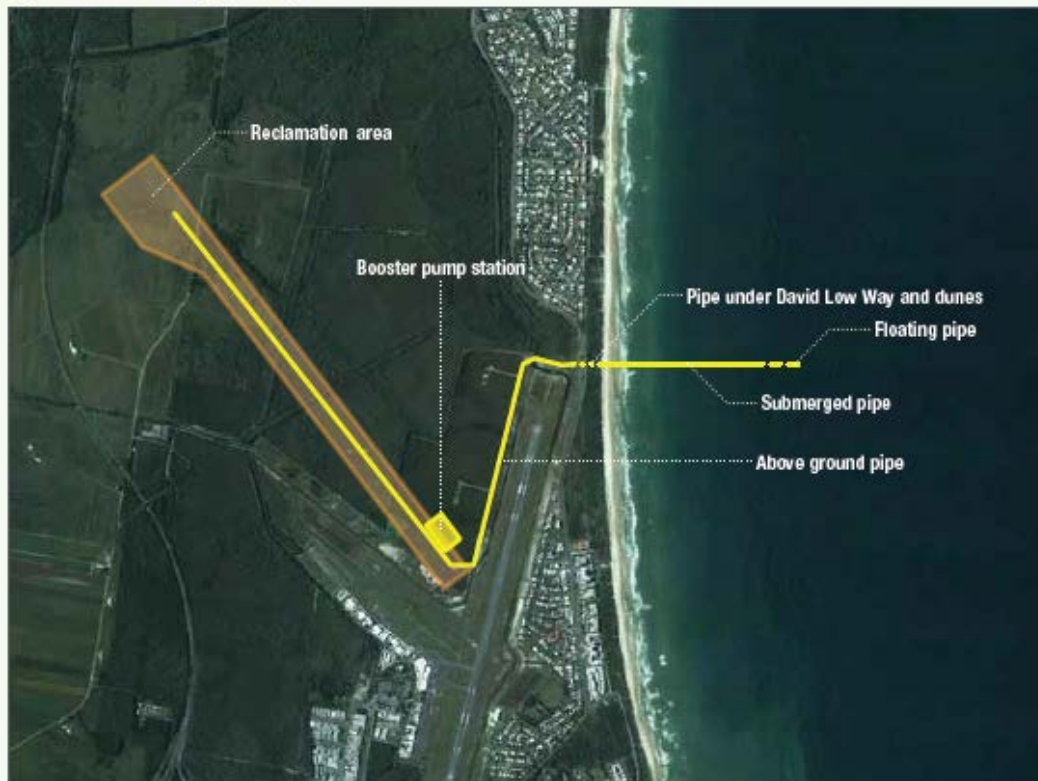


Figure 7.3 EIS Chapter A5, Figure 5.4e

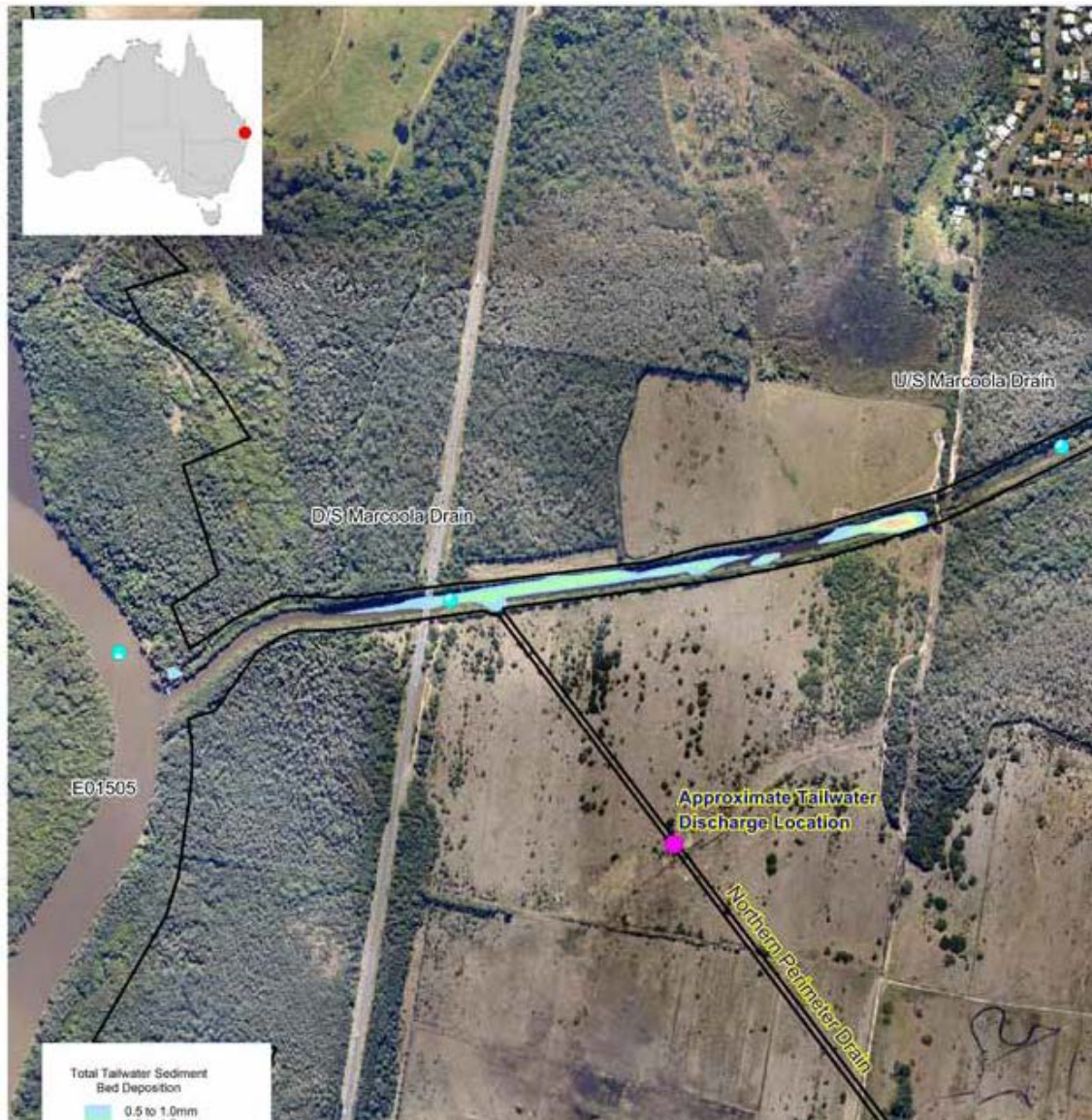


Figure 7.4 Water release locations

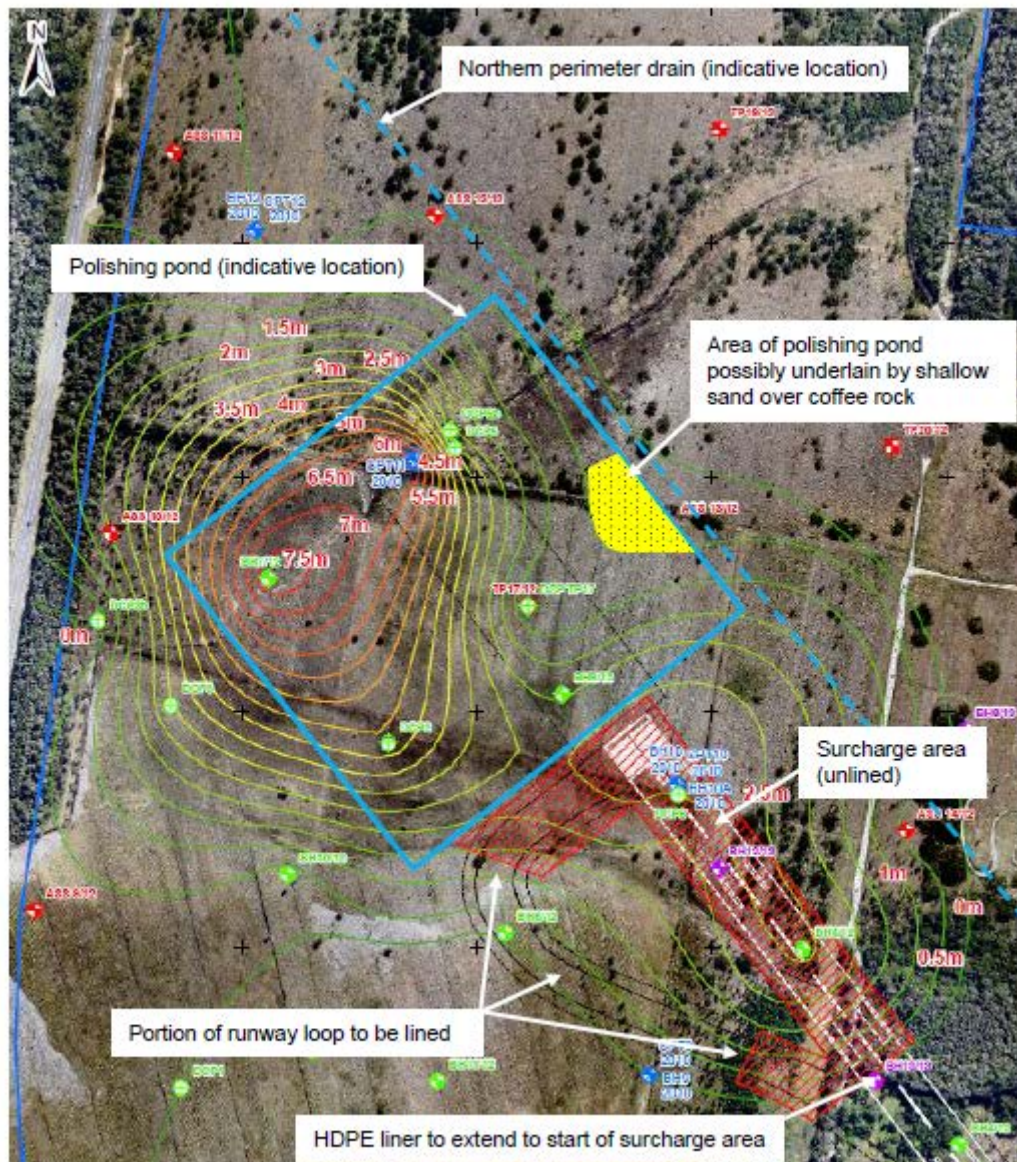


Figure 1: Extract from EIS Chapter B3 Figure 3.5a, showing the indicative location of the polishing pond (polishing pond location based on Figure 5.3f of EIS Chapter A5).

Figure 7.5 Extent of liner under dredge spoil containment area

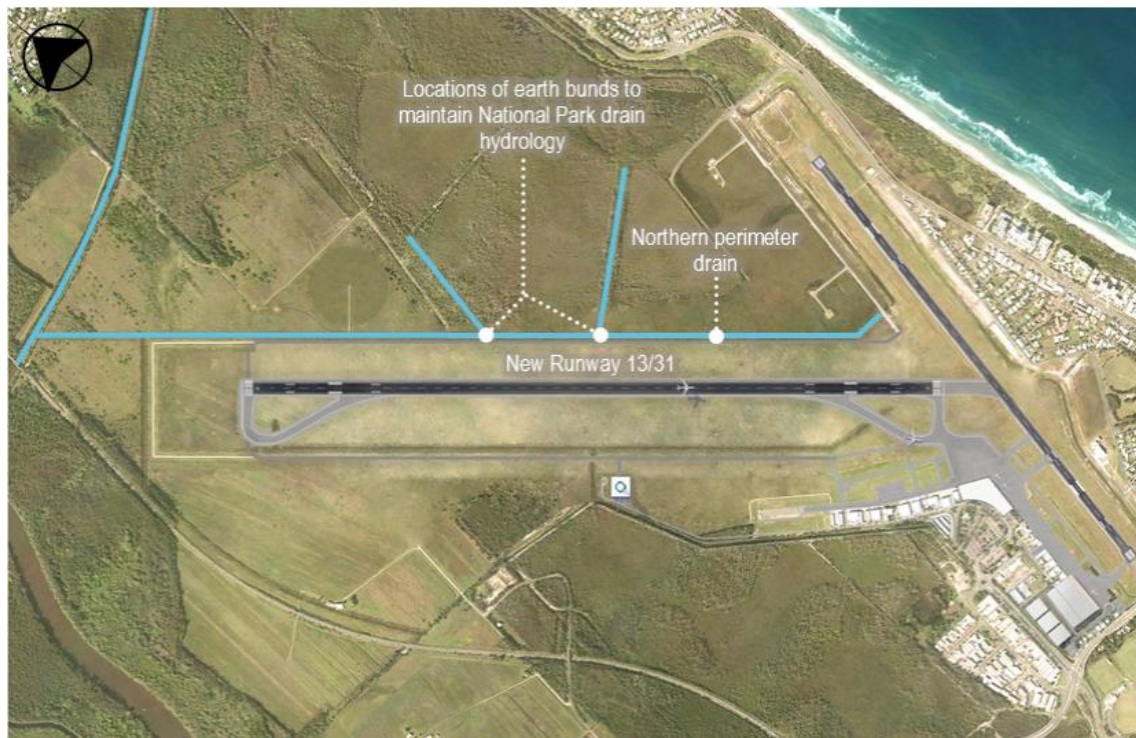


Figure 7.6 Control structures on drains traversing the Mount Coolum National Park

Figure 5.4f: Indicative location of the dredge vessel and pipeline during pump-out

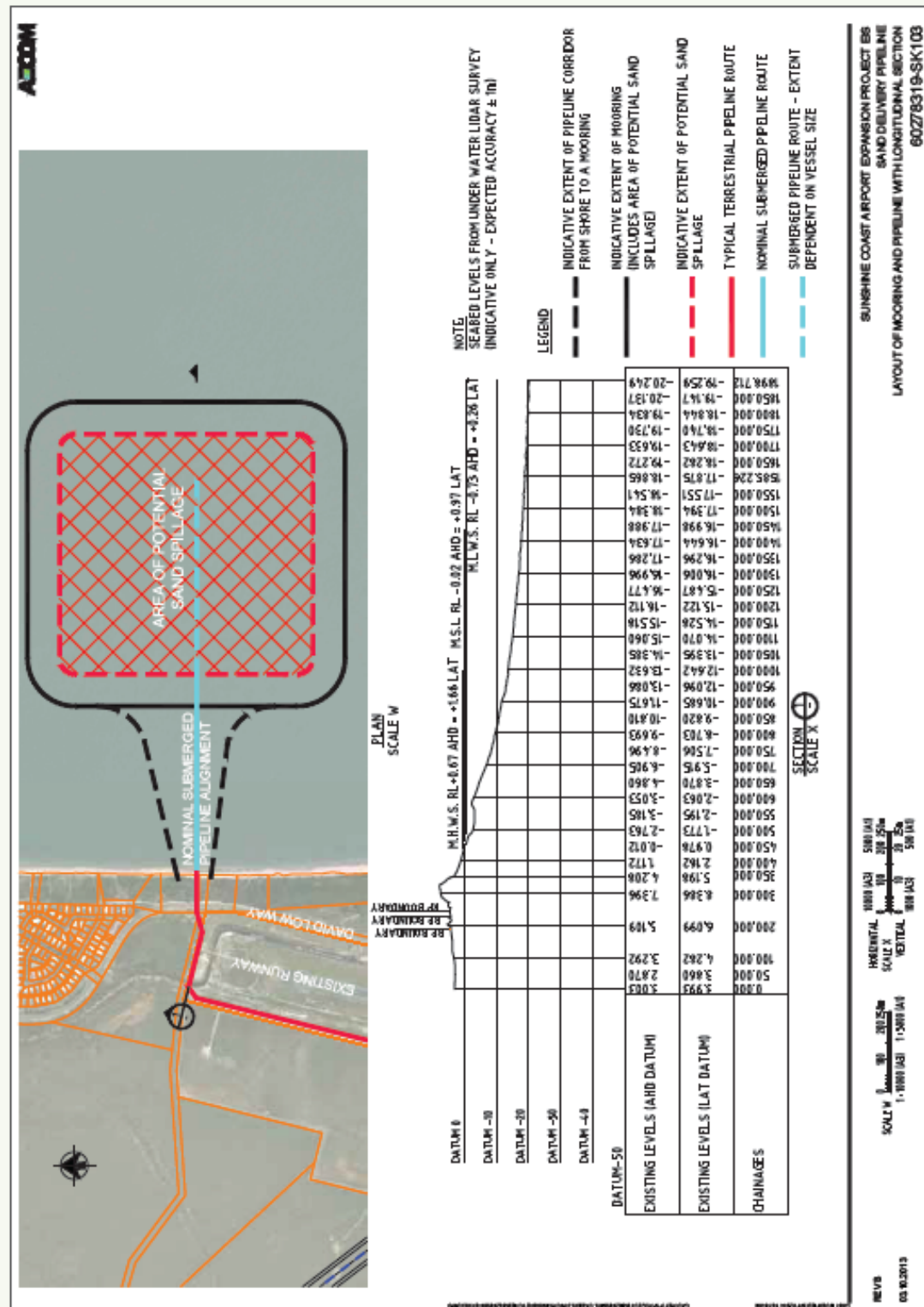


Figure 7.7 EIS Chapter A5, Figure 5.4f

Figure 3.7b: Hydrogeological conceptualisation of tailwater infiltration with a high quality liner indicating reduced infiltration

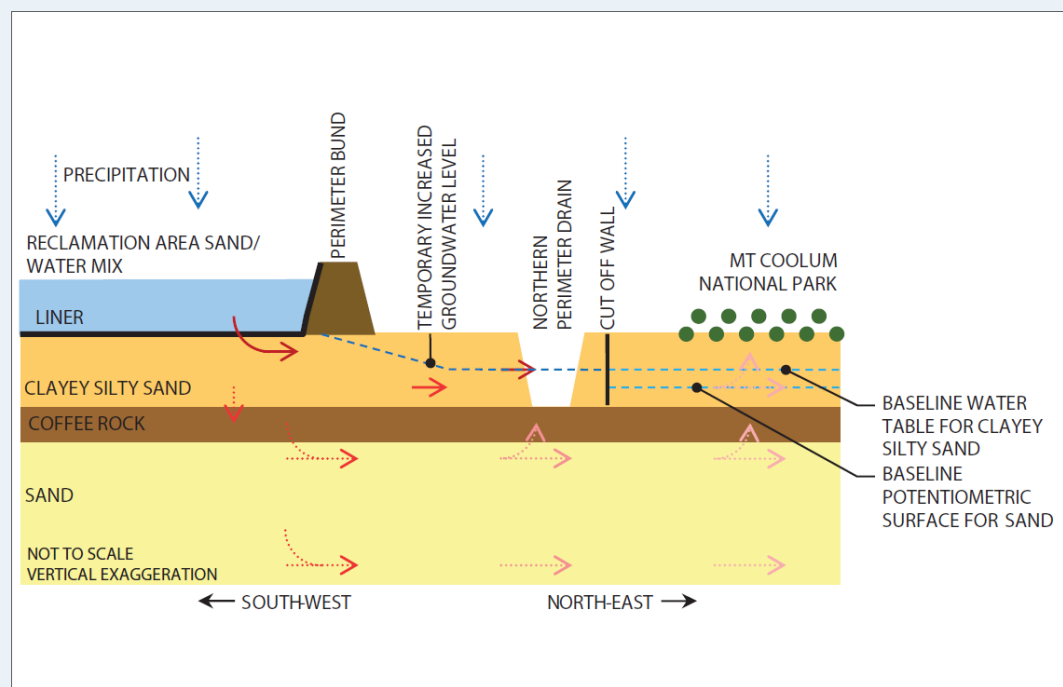


Figure 7.8 EIS Appendix B3, Figure 3.7B

Schedule 2. Tidal Works

This Schedule includes the Coordinator-General's stated conditions for Tidal Works under the *Sustainable Planning Act 2009*, stated under section 39 of the *State Development and Public Works Organisation Act 1971*.

Condition Number	Condition ID	Condition
1.	AD01	<p>The development must be carried out generally in accordance with the following plans, as identified in SCHEDULE 2 APPROVED PLANS—TIDAL WORKS:</p> <ul style="list-style-type: none"> (a) Figure 7.9 (b) Figure 7.10 (c) Figure 7.11. <p>Timing: For the duration of the works the subject of this approval.</p>
2.	CP01	<p>For the proposed works only use materials which are free from contaminants as defined under section 11 of the <i>Environmental Protection Act 1994</i>.</p> <p>Timing: For the duration of the works the subject of this approval.</p>
3.	CP02	<p>Erosion and sediment control measures are to be installed and maintained to prevent the release of sediment to tidal waters.</p> <p>Timing: For the duration of the works the subject of this approval.</p>

4.	CP04	<p>Sand must not be removed from the erosion prone area, and any sand excavated from the site must be placed on the beach, seaward of the work.</p> <p>Timing: At all times.</p>
5.	CP07	<p>Submit "As Constructed drawings" to palm@ehp.qld.gov.au or mail to Department of Environment and Heritage Protection Permit and License Management Implementation and Support Unit GPO Box 2454 Brisbane Qld 4001</p> <p>Timing: Within two (2) weeks of the completion of the works.</p>
6.	CP08	<p>As a result of works the subject of this approval any disturbed or oxidised acid sulphate soil must be treated and managed in accordance with the current <i>Queensland Acid Sulfate Soil Technical Manual: Soil management guidelines</i>, prepared by the Department of Science, Information Technology, Innovation and the Arts, 2014.</p> <p>Timing: For the duration of the works the subject of this approval.</p>
7.	CP10	<p>(a) The dune area must be rehabilitated with native dune vegetation commonly found on adjacent areas using the species list and planting density contained in a terrestrial flora management plan.</p> <p>(b) Any vegetation planted as a result of the work must be maintained for 12 months. This includes but is not limited to the control of weed species and controlled pedestrian and vehicle access.</p> <p>(c) Written evidence from a suitably qualified person that a) and b) has been fulfilled is to be provided to palm@ehp.qld.gov.au or mail to Department of Environment and Heritage Protection Permit and License Management Implementation and Support Unit GPO Box 2454 Brisbane Qld 4001</p> <p>Timing:</p> <p>(a) On completion of the works.</p> <p>(b) For 12 months after completion of works</p> <p>(c) Upon 12 months after completion of the works</p>
8.	CP12	<p>Reinstate dune crest height to its original height within areas impacted by this development. Within two (2) months of the completion of the works.</p> <p>Timing: Within two (2) months of the completion of the works.</p>
9.	CP20	<p>The entire pipeline, offshore mooring structure and booster pump is to be removed and the dune rehabilitated as per condition CP10.</p> <p>Timing: Within two (2) months of the completion of the dredging.</p>
10.		<p>Submit RPEQ certified plans prepared by a registered engineer to palm@ehp.qld.gov.au or mail to Department of Environment and Heritage Protection</p>

		Permit and License Management Implementation and Support Unit GPO Box 2454 Brisbane Qld 4001 Timing: Prior to the commencement of works.
11.		During the construction phase of the works: (a) Install and maintain all measures, plant and equipment necessary to ensure compliance with these conditions; (b) Only use materials which are: a. Clean and free of silt; b. Free from pests, chemical and other contaminants as defined under section 11 of the <i>Environmental Protection Act 1994</i> ; and c. Suitable for the purpose; and (c) Promptly removal any material or debris which has been deposited within the coastal management district of tidal waters, other than in accordance with this approval. Timing: For the duration of the works the subject of this approval.

SCHEDULE 2 APPROVED PLANS—TIDAL WORKS

The following plans may be revised by the proponent in an application for an environmental authority (ERA16) to include detailed designs undertaken for the project. Any revised plans must be consistent with the plans presented in the EIS and to the satisfaction of the administering authority.



Figure 7.9 EIS Chapter A5, Figure 5.4e

NOTES:
 SEALED LEVELS FROM UNDER WATER LIDAR SURVEY
 INDICATIVE ONLY - EXPECTED ACCURACY ± 1m

LEGEND

- INDICATIVE EXTENT OF PIPELINE CORRIDOR FROM SHORE TO A MOORING
- INDICATIVE EXTENT OF MOORING (INCLUDES AREA OF POTENTIAL SAND SPILLAGE)
- INDICATIVE EXTENT OF POTENTIAL SAND SPILLAGE
- TYPICAL TERRESTRIAL PIPELINE ROUTE
- NOMINAL SUBMERGED PIPELINE ROUTE
- SUBMERGED PIPELINE ROUTE - EXTENT DEPENDENT ON VESSEL SIZE

PLAN SCALE 1:1000

SECTION SCALE 1:1000

EXISTING LEVELS (AHD DATUM)

CHAINAGES	EXISTING LEVELS (AHD DATUM)	EXISTING LEVELS (LAT DATUM)
0.000	3.993	3.993
50.000	3.860	3.860
100.000	4.262	4.262
200.000	6.099	6.099
300.000	8.366	8.366
400.000	5.198	5.198
450.000	0.978	0.978
500.000	-2.195	-2.195
550.000	-1.773	-1.773
600.000	-3.105	-3.105
650.000	-2.063	-2.063
700.000	-3.870	-3.870
750.000	-5.915	-5.915
800.000	-8.696	-8.696
850.000	-9.693	-9.693
900.000	-10.810	-10.810
950.000	-12.096	-12.096
1000.000	-13.066	-13.066
1050.000	-11.675	-11.675
1100.000	-12.642	-12.642
1150.000	-13.395	-13.395
1200.000	-15.060	-15.060
1250.000	-15.516	-15.516
1300.000	-16.172	-16.172
1350.000	-16.477	-16.477
1400.000	-16.996	-16.996
1450.000	-17.266	-17.266
1500.000	-17.634	-17.634
1550.000	-17.988	-17.988
1600.000	-18.394	-18.394
1650.000	-18.551	-18.551
1700.000	-18.865	-18.865
1750.000	-19.272	-19.272
1800.000	-19.643	-19.643
1850.000	-19.750	-19.750
1900.000	-19.834	-19.834
1950.000	-19.917	-19.917
2000.000	-20.137	-20.137
2050.000	-19.712	-19.712
2100.000	-19.259	-19.259

PLAN SCALE 1:1000

SECTION SCALE 1:1000

EXISTING LEVELS (AHD DATUM)

CHAINAGES	EXISTING LEVELS (AHD DATUM)	EXISTING LEVELS (LAT DATUM)
0.000	3.993	3.993
50.000	3.860	3.860
100.000	4.262	4.262
200.000	6.099	6.099
300.000	8.366	8.366
400.000	5.198	5.198
450.000	0.978	0.978
500.000	-2.195	-2.195
550.000	-1.773	-1.773
600.000	-3.105	-3.105
650.000	-2.063	-2.063
700.000	-3.870	-3.870
750.000	-5.915	-5.915
800.000	-8.696	-8.696
850.000	-9.693	-9.693
900.000	-10.810	-10.810
950.000	-12.096	-12.096
1000.000	-13.066	-13.066
1050.000	-11.675	-11.675
1100.000	-12.642	-12.642
1150.000	-13.395	-13.395
1200.000	-15.060	-15.060
1250.000	-15.516	-15.516
1300.000	-16.172	-16.172
1350.000	-16.477	-16.477
1400.000	-16.996	-16.996
1450.000	-17.266	-17.266
1500.000	-17.634	-17.634
1550.000	-17.988	-17.988
1600.000	-18.394	-18.394
1650.000	-18.551	-18.551
1700.000	-18.865	-18.865
1750.000	-19.272	-19.272
1800.000	-19.643	-19.643
1850.000	-19.750	-19.750
1900.000	-19.834	-19.834
1950.000	-19.917	-19.917
2000.000	-20.137	-20.137
2050.000	-19.712	-19.712
2100.000	-19.259	-19.259

PLAN SCALE 1:1000

SECTION SCALE 1:1000

EXISTING LEVELS (AHD DATUM)

CHAINAGES	EXISTING LEVELS (AHD DATUM)	EXISTING LEVELS (LAT DATUM)
0.000	3.993	3.993
50.000	3.860	3.860
100.000	4.262	4.262
200.000	6.099	6.099
300.000	8.366	8.366
400.000	5.198	5.198
450.000	0.978	0.978
500.000	-2.195	-2.195
550.000	-1.773	-1.773
600.000	-3.105	-3.105
650.000	-2.063	-2.063
700		

Appendix 1. Stated conditions
Sunshine Coast Airport Expansion project
Coordinator-General's evaluation report on the environmental impact statement

Figure 5.4h: Indicative areas for construction compound and assembly at Marcoola Beach



Figure 7.11 EIS Chapter A5, Figure 5.4h

Appendix 2. Imposed conditions

This appendix includes conditions imposed by the Coordinator-General under section 54B of the SDPWO Act. In accordance with section 54B(3) of the SDPWO Act, I have nominated an entity to have jurisdiction for each of the conditions in this appendix.

In accordance with section 54D(4) of the SDPWO Act, sections 54D(2) and 54D(3) of the SDPWO Act apply to anyone who undertakes the project.

Schedule 1. Flooding

Sunshine Coast Regional Council is nominated as the entity with jurisdiction for this condition.

Condition 1. Certification of design plan and construction for airport infrastructure

- (a) To confirm that flood impacts of the Sunshine Coast Airport Expansion project do not create adverse consequences to personal safety, property damage or property values:
 - (i) a suitably qualified and experienced person must certify the design plan for airport infrastructure. The certification must confirm that the design plan:
 - (A) ensures flood impacts associated with the development are not likely to create adverse consequences (for personal safety, property value or property damage), consistent with impacts identified in Chapter B5 of the EIS
 - (B) does not change the flood risk for adjacent areas beyond that identified in Chapter B5 of the EIS
 - (C) ensures that the risk of any impacts as a result of the development, but external to the site, has a manageable consequence, as assessed across a broad range of event possibilities.
 - (ii) the certified design plan must be provided to the entity with jurisdiction for this condition, prior to the construction of airport infrastructure
 - (iii) the design plan must be accepted in writing by the entity with jurisdiction for this condition, prior to the construction of airport infrastructure.
- (b) Certification by a suitably qualified and experienced person must be submitted to the entity with jurisdiction for this condition on completion of construction of the airport infrastructure and confirm that the 'as constructed' drawings and specifications are generally in accordance with certification provided in condition 1 (a) (i), condition 1 (a) (ii).
- (c) Final certification of the 'as constructed' drawings and specifications must be accepted in writing by the entity with jurisdiction for this condition, prior to commencement of airport infrastructure operations.
- (d) The proponent must confirm in writing to the Office of the Coordinator-General, that the certification specified under condition 1 (b) has been accepted by the entity with jurisdiction for this condition, prior to the commencement of airport infrastructure operations.

'suitably qualified and experienced person' means a person who is a Registered Professional Engineer of Queensland under the provisions of the Professional Engineers Act 2002, who has an appropriate level of expertise in hydrology and hydraulics, flood consequence assessment and flood mitigation (planning and delivery) and prevention of flooding impact to people and property.

Schedule 2. Environmental offsets

The Department of Environment and Heritage Protection is nominated as the entity with jurisdiction for this condition.

Condition 1. Environmental offset requirements for the Sunshine Coast Airport Expansion Project

- (a) Significant residual impacts on prescribed environmental matters as a result of the Sunshine Coast Airport Expansion Project are not authorised unless:
 - (i) the proponent (in consultation with the administering authority) prepares a notice of election consistent with the 'Sunshine Coast Airport Expansion Project–Biodiversity Offset Strategy' dated 3 September 2015 in 'Appendix B of the Additional Information to the Environmental Impact Statement to address significant residual impacts on the prescribed environmental matters listed in Table 1.1
 - (ii) The notice of election must address the significant residual impact for *Pezoporus wallicus wallicus* including 6.01ha that was not identified in the 3 September 2015 'Biodiversity Offset Strategy' dated 3 September 2015
 - (iii) the notice of election must be prepared in accordance with Division 2 (s18(2-5) and s19) of the *Environmental Offsets Act 2014* (EO Act) and given to the entity with jurisdiction for this condition in a form approved under s92 of the EO Act, no less than 90 days prior to the commencement of any disturbance that will result in a significant residual impact on a prescribed environmental matter for which an environmental offset is required
- (b) Significant residual impacts to prescribed environmental matters are authorised to the maximum extent shown in Table 1.1.
- (c) An environmental offset must be provided for the maximum extent for each of the prescribed environmental matters identified in Table 1.1.
- (d) The notice of election must be accepted in writing by the entity with jurisdiction for this condition.
- (e) The proponent must confirm in writing to the Office of the Coordinator-General that the notice of election has been accepted by the entity with jurisdiction for this condition.

Table 1.1 Authorised significant residual impacts to prescribed environmental matters

Prescribed environmental matter	Maximum extent of impact (ha)
Habitat for the animal that is vulnerable—wallum froglet (<i>Crinia tinnula</i>)	60.63
Habitat for the animal that is vulnerable—wallum rocketfrog (<i>Litoria freycineti</i>)	21.85
Habitat for the animal that is vulnerable—ground parrot (<i>Pezoporus wallicus wallicus</i>)	7.88

Appendix 3. Coordinator-General's recommendations

Schedule 1.

This schedule includes Coordinator-General's recommended stated conditions under section 52 of the SDPWO Act.

Part A. Nature Conservation Act

This part applies to decisions made under the *Nature Conservation Act 1992*.

Recommendation 1. Pre- clearance surveys

- (a) Prior to clearing, pre-clearance surveys must be undertaken in the impact area by a suitably qualified person to identify the presence of any protected animals or plants
- (b) If a protected animal or plant is encountered during the surveys, all reasonable steps must be undertaken to avoid impacts on these animals and plants.

Recommendation 2. Maximum disturbance limits

- (a) The maximum extent of the impact must not exceed the area specified for the prescribed environmental matters in Table 1.2.

Table 1.2 Authorised maximum disturbance limits for the prescribed environmental matters

Prescribed environmental matter	Maximum extent of impact (ha)
Habitat for the vulnerable–wallum sedge frog (<i>Litoria olongburensis</i>)	1.67
Habitat for the vulnerable–wallum froglet (<i>Crinia tinnula</i>)	60.63
Habitat for the vulnerable–wallum rocketfrog (<i>Litoria freycineti</i>)	21.85
Habitat for the vulnerable–ground parrot (<i>Pezoporus wallicus wallicus</i>)	7.88
Habitat for the endangered–Mount Emu she-oak (<i>Allocasuarina emuina</i>)	4.41

Recommendation 3. Rehabilitation

- (a) The area (2.52ha) of essential habitat wallum sedgefrog temporarily impacted during pipeline construction at the northern tip of the existing north-south runway must be rehabilitated following construction.

Recommendation 4. Turtle nesting

- (a) Dredge pipeline works on Marcoola Beach must be avoided during the loggerhead and green turtle nesting season (November to March)
- (b) Prior to construction and operation of the pipeline on Marcoola Beach, surveys must be undertaken for nesting turtles and turtle hatchlings
- (c) If any nesting turtles and/or hatchlings are identified during surveys, undertake management protocols to avoid and/or minimise disturbance.

Recommendation 5. Marine mega-fauna interaction with dredge vessel

- (a) If during dredging in the sand extraction area, cetaceans, dugongs and/or turtles (marine mega-fauna) are observed, within the 100 metres (the observation distance) of the

dredging activity, dredging must stop and not recommence until the marine mega-fauna are observed to travel beyond the observation distance or a 30 minute period has passed since any marine mega-fauna was last seen by an appropriately qualified person within the observation distance of the dredging work site.

Recommendation 6. Vegetation slashing impacts on ground parrot

- (a) Avoid vegetation slashing activities within the WHMA during ground parrot nesting season
- (b) Undertake surveys for nesting birds or fledglings prior to slashing
- (c) If any nesting birds or fledglings are identified during surveys undertake management protocols to minimise disturbance.

Recommendation 7. Vegetation slashing impacts on acid frogs

- (a) Vegetation slashing activities must be restricted to areas within the WHMA that exceed a maximum height of 1.5 metres
- (b) Vegetation slashing activities must be restricted to periods of dry weather and during the day
- (c) Vegetation must not be slashed lower than 0.5 metres
- (d) Vegetation slashing must be staged over seasons/years to allow for fauna to move into retained refugia.

Definitions

Acid frogs: wallum sedge frog (*Litoria olongburensis*), wallum froglet (*Crinia tinnula*) and wallum rocketfrog (*Litoria freycineti*)

Vegetation slashing: Slashing activities for maintaining safety for airport operations

WHMA: The area defined in the Sunshine Coast Airport Expansion EIS as the wallum heath management area

Part B. Transport infrastructure Act

This part applies to decisions made under the *Transport Infrastructure Act 1994*.

Condition 1. Road impact assessment and road-use management plan

In consultation with TMR, the proponent shall:

Prepare a road impact assessment (RIA) for each stage of the project to describe impacts on the safety, efficiency and condition of state-controlled and local roads. The RIA must:

- (a) be developed in accordance with the GARID and include a completed TMR 'Transport Generation proforma'—detailing project-related traffic and transport generation information or as otherwise agreed in writing with TMR
- (b) use TMR's Pavement Impact Assessment tools or such other method or tools as agreed in writing with TMR
- (c) clearly indicate where any detailed estimates are not available and document the assumptions and methodologies that have been previously agreed in writing with TMR prior to RIA finalisation.
- (d) detail the final impact mitigation proposals, including contributions to and road works/maintenance and summarising key road-use management strategies. These include:
 - (i) proposed upgrade of Finland Road/David Low Way intersection
 - (ii) proposed road-use management strategies to deal with construction traffic

- (iii) location and mitigation measures for the proposed pipeline crossing of the Sunshine Motorway
- (iv) be approved by TMR prior to the commencement of significant construction works

Condition 2. Prepare a road-use management plan for each stage of the project. The road-use management must:

- (a) be developed in accordance with TMR's Guide to Preparing a Road-use Management Plan, with a view to also optimising project logistics and minimising road-based trips on all state-controlled and local roads
- (b) include a table listing road-use management commitments and provide confirmation that all works and road-use management strategies have been designed and/or will be undertaken in accordance with all relevant TMR standards, manuals and practices
- (c) be approved in writing by TMR six months prior to the commencement of significant construction works, or as otherwise agreed between the proponent and TMR

Condition 3. Prior to the commencement of significant project-related construction works, the proponent must:

- (a) upgrade any necessary intersection/accesses and undertake any other required works in State-controlled road reserves or make contributions towards such work as agreed, in accordance with the current TMR road planning and design policies, principles and manuals, unless otherwise agreed in writing with the TMR North Coast Regional Office
- (b) prior to undertaking any of these works and as required above, obtain the relevant licenses and permits, for example, under the Transport Infrastructure Act (Qld) 1994 for works and project facilities/infrastructure within the State-controlled road corridor. Any required plans, permits and TMPs must be approved by TMR prior to commencement of project construction traffic
- (c) undertake any required works and other impact mitigation strategies as required by the RIA and road-use management plan, in accordance with latest relevant TMR policies and standards at the time of approval or agreement, prior to commencement of significant construction works unless otherwise agree to in writing by TMR.
- (d) Implement any approved Traffic Management Plan for the work during construction and commissioning of the required works.

Condition 4. Infrastructure agreements

- (a) To formalise arrangements about transport infrastructure works, contributions and road-use management strategies detailed and required under the approved RIA and road-use management plan, the proponent may enter into an infrastructure agreement with TMR.
- (b) The infrastructure agreement/s should identify all required works and contributions, and incorporate the following:
 - (i) project-specific works and contributions required to upgrade impacted road infrastructure and vehicular access to project sites as a result of the proponent's use of state-controlled roads by project traffic.
 - (ii) project-specific contributions towards the cost of maintenance and rehabilitation to mitigate road or pavement impacts on state-controlled and local road infrastructure.
 - (iii) performance criteria that detail protocols for consultation about reviewing and updating of project-related traffic assessments and impact mitigation measures that are based on actual traffic volume and impacts, should previously advised project details, traffic volumes and/or impacts change.

- (iv) the proponent's undertaking to fulfil all commitments as detailed in the 'Table for listing road-use management plan commitments'.
- (c) Any infrastructure agreement between the proponent and TMR should be concluded three (3) months prior to commencement of project construction, or as otherwise agreed in writing between the proponent and TMR.

Schedule 2. MNES

It is recommended that the Commonwealth Minister consider the following conditions of approval in addition to the State's conditions and recommendations listed in this evaluation report.

Recommendation 1. Disturbance limits

- (a) The maximum extent of the impact must not exceed the area specified for the MNES species in Table 7.9

Table 7.9 Authorised maximum disturbance limits for MNES

Impacted MNES	Maximum extent of impact (ha)
Habitat for the Mount Emu she-oak (<i>Allocasuarina emuina</i>)	4.41
Habitat for the wallum sedgefrog (<i>Litoria olongburensis</i>)	1.67*

* Includes habitat used regularly by breeding and non-breeding *Litoria olongburensis*.

Recommendation 2. Management of impacts on the retained *Allocasuarina emuina* population (AEP1)

- (a) The approval holder must retain and take all reasonable steps to minimise direct and indirect impacts on the retained *Allocasuarina emuina* population (AEP1)
- (b) The approval holder must ensure there is no net loss of the condition and/or extent of the retained *Allocasuarina emuina* population (AEP1)
- (c) The approval holder must undertake ongoing monitoring and management of the retained population for a period of five years post-construction to ensure the retained population is not adversely impacted by works associated with the proposed action
- (d) The approval holder must ensure an appropriate fire regime is undertaken for the maintenance of retained population.

Recommendation 3. Lesser swamp orchid (*Phaius australis*)

- (a) The approval holder must take all reasonable steps to avoid disturbance to the population of *Phaius australis* identified on the north-eastern perimeter of the project site, such as providing protection fencing and signage
- (b) The approval holder must ensure that appropriate measures are undertaken to conserve any individual plants identified during pre-clearance surveys

Recommendation 4. Biodiversity offset strategy

- (a) Prior to the commencement of land disturbance, the approval holder must prepare Biodiversity Offset Strategy that is consistent with the 'Sunshine Coast Airport Expansion Project-Biodiversity Offsets Strategy' dated 3 September 2015 in 'Appendix B of the Additional Information to the Environmental Impact Statement' to address significant residual impacts to:
 - (i) Mount Emu she-oak (*Allocasuarina emuina*)
 - (ii) Wallum sedge frog (*Litoria olongburensis*)

Recommendation 5. Securing the Mount Emu she-oak offset site

- (a) The approval holder must purchase, obtain and secure tenure to undertake the proposed translocation of *Allocasuarina emuina*.

Recommendation 6. Mount Emu she-oak translocation plan

- (a) Prior to the commencement of land disturbance, the approval holder is to prepare a Mount Emu she-oak translocation plan
- (b) The translocation plan must be prepared by a suitably qualified person
- (c) The translocation plan must include :
 - (i) information demonstrating the proposed receiving translocation site has the appropriate ecological conditions/processes capable of supporting the translocated *Allocasuarina emuina* population
 - (ii) a detailed analysis of the merits on a small scale trial translocation to the receiving translocation site to demonstrate the likely success of the translocation and to inform specific management measures at the site
 - (iii) a detailed description of the translocation methods including but not limited to preparation of the impact site and the timing of the translocation operations.
 - (iv) a description of the performance indicators used to determine the success of the translocation
- (d) The approval holder must not commence land disturbance until the Minister has approved a translocation plan in writing
- (e) The approval holder must implement the translocation plan once approved in writing by the Minister
- (f) Prior to commencing translocation, *Allocasuarina emuina* population surveys must be undertaken to determine the baseline population (i.e. number of individuals present at the time of translocation) that would be translocated to the receiving translocation site. The approval holder must establish the translocated population of *Allocasuarina emuina* at the agreed site and must demonstrate that:
 - (i) the population contains at least the number of individuals that were identified at the time of pre-translocation population surveys, specified under Condition (f)
 - (ii) arrangements are in place to ensure the ongoing management of the translocated population for the conservation of *Allocasuarina emuina* including a suitable fire regime and weed management
 - (iii) the translocated population is viable.
- (g) The approval holder must prepare a monitoring program to demonstrate that the translocation results in a viable population
- (h) The monitoring program must be developed and undertaken by a suitably qualified person
- (i) The approval holder must provide an annual report describing all survey and monitoring results, and how the conditions of the approval have been complied with, for five years following the date of the approval.

Recommendation 7. Contingency plan for Mount Emu she-oak

- (a) The approval holder must ensure a contingency plan is in place, in the event that translocation of *Allocasuarina emuina* is not successful
- (b) The contingency plan must include a detailed description of the methods that would be used to propagation/cultivate *Allocasuarina emuina*

- (c) The approval holder must ensure that an appropriate number of seed stock (i.e. able to establish a viable population) are collected prior to disturbance for propagation.
- (d) The number of seed stock would be based on the size of the baseline population that would be determined during pre-translocation population surveys, specified under Recommendation 6 (f).

Definitions

Approval holder: The approval holder is the person to whom the approval is granted, or any person acting on their behalf, or to whom the approval is transferred under section 145B of the EPBC Act

(AEP1): The remaining population of *Allocasuarina emuina* after translocation.

Translocation: Methodology described in the EIS for translocation of the 4.41ha of Mount Emu she-oak

Viable population: Means plants have reached reproductive maturity and have demonstrated they can/have produced viable offspring

Schedule 3. Aircraft noise, community engagement and community information

Recommendation 8. Additional noise management measures

- (a) The proponent should implement additional measures to those specified in the Sunshine Coast Airport Expansion EIS to manage increases in aircraft noise resulting from the expanded Sunshine Coast Airport.
- (b) The additional measures specified in (a) above, should be reasonable and practical and focus on sensitive receptors (dwellings and community facilities) that experience an increase in noise emissions as predicted by ANEC and subsequent ANEF for the expanded Sunshine Coast Airport.
- (c) To achieve the effective management of noise specified in (a) above, the proponent should consider implementing these reasonable and practical measures to manage noise either from the noise source or at the sensitive receptor (dwellings and community facilities).
- (d) The proponent should engage directly with all affected sensitive receptors (dwellings and community facilities) that may experience a potential increase in noise emissions as predicted by the ANEC and subsequent ANEF for the Sunshine Coast Airport. The proponent should implement suitable measures as specified in (c) above to manage noise from those aircraft operations resulting from aircraft noise from the expanded Sunshine Coast Airport.
- (e) The proponent should report progress to the community to achieve the outcome specified in (a) above at the community aviation forum and on the proponent's website in a timely manner.

Recommendation 9. Helicopter operations

- (a) To manage impacts to sensitive receptors (dwellings and community facilities), the proponent should work with helicopter operators to seek to relocate helicopter operations from the southern general aviation area to the western general aviation area earlier than the 2027 proposed in the EIS.

Recommendation 10. Community engagement and information

- (b) The proponent should update the ANEF and ANEI contours every five to ten years and publish them on the Sunshine Coast Airport website to inform the community of the predicted and actual aircraft noise contours.

- (c) Cooperate with ASA on the implementation of the WebTrak online portal and the Noise and Flight Path Monitoring System (NFPMS) to provide real-time information to inform the community of property specific noise levels and flight path information.
- (d) Provide ASA with noise complaints made directly to Sunshine Coast Airport so that all noise complaints about the Sunshine Coast Airport are captured in the Airservices Australia quarterly online noise reports.

Recommendation 11. Land use planning

- (a) The proponent should provide the necessary data to enable the Sunshine Coast Planning Scheme 2014 to be updated to reflect the changes to Sunshine Coast Airport operations resulting from the project's development, including the Airservices endorsed ANEF contours for the expanded Sunshine Coast Airport and reflect the principles relating to noise in the National Airports Safeguarding Framework 2012.

Recommendation 12. Informing prospective property buyers

- (a) Seek to establish a memorandum of understanding with the Real Estate Institute of Queensland to promote real estate agents' use of WebTrak online portal and the Noise and Flight Path Monitoring System. This would provide flight path information and aircraft noise levels to prospective property buyer(s) and to ensure they are fully informed of potential aircraft noise impacts.

Recommendation 13. Fly neighbourly policy

- (a) Revise and maintain the fly neighbourly policy to reflect the proposed east-west runway operations.

Recommendation 14. Navigation performance procedures and noise abatement procedures

- (a) Work with Airservices Australia to revise the required navigation performance procedures and runway mode of operation procedures to reflect the proposed east-west runway and:
 - (i) implement the continuous descent approach allowing aircraft to approach the runway at a constant rate of descent, to reduce noise emissions
 - (ii) mitigate noise impacts by prioritising departure over the coast where safe and operationally efficient.

Recommendation 15. Community aviation forums

- (a) Expand the community aviation forum to include community groups from the newly affected suburbs.

Schedule 4. Acid sulfate soils and project drainage

Recommendation 16. Acid sulfate soil management

The following recommendation is required to address acid sulfate soils management for activities onshore that are not addressed by ERA16 including activities such as earthworks and drains construction.

- (a) The ASSMP must be prepared in accordance with the Environmental Management Framework for Acid Sulfate Soils (Appendix C from the AEIS).
- (b) Acid sulfate soils investigations and management plan preparation must be conducted in a manner that is sufficient to develop the ASSMP in accordance with:
 - (i) Queensland acid sulfate soils technical manual: legislation and policy guide
 - (ii) Queensland acid sulfate soils technical manual: laboratory methods guidelines

- (iii) Queensland acid sulfate soils technical manual: soil management guidelines
- (iv) Guidelines for sampling and analysis of lowland acid sulfate soils
- (v) State Planning Policy 2014 Water Quality code Acid Sulfate Soils
- (c) The proponent must conduct all works to ensure that no environmental harm as defined under the Environmental Protection Act 1994 is caused.
- (d) The acid sulfate soil management plan (ASSMP) must address the following matters:
 - (i) Treatment of excavated or disturbed soils/sediments.
 - (ii) Management of groundwater levels to avoid environmental harm
 - (iii) Management of disturbed soils.
 - (iv) Monitoring and compliance with surface water and groundwater limits in this environmental authority.
 - (v) The location(s) of any treatment pads on design drawings along with cell/bund design and lime guard layer rates.
 - (vi) The thickness of each soil layer, soil testing rates per volume of material and the type of analysis to be used.
 - (vii) List equipment to be used for application and incorporation of lime.
 - (viii) Detail the incorporation method, liming rates and verification of quantities.
 - (ix) Set out validation testing rate per volume of material and acceptance requirements.
 - (x) Describe the sampling technique and what type of analysis will be used.
 - (xi) Consider the likely turnaround times for full treatment of each layer including drying time so that delays do not result in oxidation and acid discharge.
 - (xii) Ensure treatment area is sufficiently large that treated layers are not buried until validation tests show the material has been fully treated.
 - (xiii) Establish the rate of treatment and thus duration of these works.
 - (xiv) Preferably schedule excavation and treatment during the dry season.
 - (xv) Establish emergency procedures to cope with inclement weather. If treatment extends into or occurs over a wet season provide alternative methods or modified procedure.
 - (xvi) Outline the roles, responsibilities and how knowledge (as well as oversight) will be conveyed to any contractor/s.
- (e) An appropriately qualified person must design and be responsible for the implementation of the ASSMP.
- (f) Treatment areas for acid sulfate soils must be lined to minimise any seepage and be capable of accommodating rainfall from a 24 hour storm event with an average return interval (ARI) of 1 in 5 years plus sediment storage without release.

Recommendation 17. Project drainage

Mitigation of saline egress beyond the drains and management of the groundwater table should be consistent with the conditions of ERA16.

- (a) A permanent impermeable groundwater cut off wall, extending from the ground surface down to the confining coffee rock layer must be installed and maintained for the length of the northern perimeter drain between the drain and the property boundary to the north. The drain must operate to prevent lowering of the water table on the wall side distant from the drain, oxidation of potential acid sulfate soils and ingress of contaminants to groundwater beyond the wall.

- (b) A like impermeable groundwater cut off wall must be installed along the western perimeter drain, westwards of the drain, where necessary to avoid lowering the water table below potential acid sulfate soils, comply with the groundwater and surface water quality limits, and/or protect conservation areas as shown in EIS Appendix B3 Figure 3.7B.
- (c) Groundwater elevation in areas potentially lowered by drains must be measured in suitably sited and installed bores and recorded before any disturbance to establish background elevations. Monitoring and recording must also be undertaken following disturbance to ensure groundwater levels are not lowered below natural levels.
- (d) Background monitoring shall be undertaken by suitably qualified persons monthly for at least one year prior to any drain installation, then monthly during airport construction and thereafter quarterly.

Schedule 5. State Planning Policy Airport Environs Mapping

To ensure that the state interest for protection of the Sunshine Coast Airport is safeguarded, please note the following:

- (a) Before Airservices Australia will endorse the Australian Noise Exposure Forecast (ANEF) contour for the Sunshine Coast Airport, consultation with state government must occur. When the Sunshine Coast Airport refers the Sunshine Coast Airport ANEF contour modelling to TMR, it will be reviewed and comments provided as necessary. This is to ensure the ANEF contour modelling is consistent with the state interest for protecting the airport.

TMR requests that the Sunshine Coast Airport endeavour to provide updated GIS data to TMR within four weeks of Commonwealth endorsement of all updated airport contours, subsequent to an EIS approval. This is in accordance with the executed Deed of Agreement for data supply and use to support protection of strategic airports under the State Planning Policy between TMR and the Sunshine Coast Airport, dated 1 August 2014.

Appendix 4. Proponent commitments

This appendix includes commitments made by the proponent in the EIS and additional information to the EIS.

Commitment number	Proponent Commitment
General commitments	
1.	All necessary permits and approvals required subsequent to a determination on the EIS will be sought and complied with.
2.	SCA will carry out general community engagement activities in accordance with a Stakeholder Management Plan throughout the construction phase of the project.
3.	Specific notification and complaint response procedures will be outlined in accordance with relevant management plans outlined in this Table.
4.	When the project is constructed, encourage procurement processes that promote local suppliers and employment opportunities.
Noise (construction)	
5.	<p>Implement noise control measures during construction and document these in the Environmental Management Plan (construction) and/or the Dredge Management Plan (as relevant), including:</p> <ul style="list-style-type: none"> • Provision of general mitigation measures to meet noise goals set for sensitive receivers for the daytime, evening and night time construction periods. • If it is required, noise from the booster pump is to be mitigated and controlled to an appropriate noise level in accordance with the EPP (Noise). • Restriction of airport site works outside standard construction hours to include essential plant only. • Conducting dredging works during the following times: <ul style="list-style-type: none"> ○ 7:00am to 6:00pm (Monday to Saturday) for site preparation and assembly/disassembly of the dredge pipeline. Deliveries of plant and materials may occur outside those hours ○ seven days per week, 24 hours per day for dredging and placement activities (use of dozers, light towers, dredge booster pump, tug and TSHD) ○ daylight hours for all non-essential maintenance. • Provision of information on construction activities to sensitive receivers and consultation in the event excessive noise complaints received. • Notification of residents of Finland Road when significant heavy vehicle traffic is anticipated. • Training of staff and sub-contractors in noise requirements and compliance monitoring if required.
Aircraft noise	
6.	Work cooperatively with Airservices Australia when a Runway Operating Plan for all new runway operations is developed and implemented.
7.	Expand the Community Aviation Forum to include representatives from newly noise affected areas.

Commitment number	Proponent Commitment
8.	Continue consultation with residents, schools and other essential community infrastructure that can be affected by future aircraft noise.
9.	Continue to manage helicopter noise at the airport in accordance with current policies and procedures.
10.	Publish an updated ANEF on a regular basis at intervals of between 5-10 years.
11.	Make online aircraft noise tool publically available.
12.	Helicopter training operations will be relocated to the two new helicopter training pads that are to be created in the north–west area of the airport site.
13.	The proponent will not renew or extend leases for helicopter operations within the southern general aviation area beyond 2027
14.	The proponent will work with helicopter operators and lessees of helicopter operations sites within the southern general aviation area to relocate helicopter operations to the western general aviation area earlier than 2027 where possible.
15.	Revise the fly neighbourly policy to reflect the proposed east-west runway.
16.	Work with Air Services Australia to develop noise abatement procedures and preferred runway arrangements to help improve aircraft noise outcomes for nearby residents.
17.	Work in cooperation with ASA and CASA when they undertake the design of the RNP for the new runway approaches. RNP is a means of increasing efficiency of operations and improving aircraft noise outcomes.
Surface water quality and aquatic ecology	
18.	<p>Development and implementation of a surface water quality monitoring programme including:</p> <ul style="list-style-type: none"> • twelve months of baseline monitoring at nominated locations prior to commencement of hydraulic sand placement on the site • ongoing monitoring during the construction phase • twenty-four months of post construction monitoring with provision to extend if any attributable impacts are detected • compliance with relevant performance criteria and standards • management response actions for water quality criteria exceedances.
19.	Install a tidal flap (or similar structure) on the Marcoola drain culverts under Finland Road for operation to control tailwater discharge during construction.
20.	Manage the release of tailwater to avoid overtopping of drains receiving the release tailwaters.
21.	Control structures are constructed on drains traversing the Mount Coolum National Park and discharging into the northern perimeter drain to prevent water quality impacts in the adjacent National Park.
Groundwater	

Commitment number	Proponent Commitment
22.	<p>Development and implementation of a groundwater monitoring program, including:</p> <ul style="list-style-type: none"> • installation of a groundwater monitoring system, including bores, to monitor upper and lower aquifers • twelve months baseline monitoring at nominated locations prior to commencement of hydraulic sand placement on the site • ongoing monitoring during construction phase • twenty-four months post-construction monitoring with provision to extent if any attributable impacts are detected • compliance with relevant performance criteria and standards • trigger values and actions in relation to any groundwater exceedances.
23.	Install a high quality HDPE liner beneath the area of hydraulically placed fill excepting the areas identified in the surcharge area and under the polishing pond where the naturally occurring clay layer is of sufficient thickness to be practically impermeable.
24.	Install a low permeability cut off wall on the northern side of the Northern Perimeter drain to protect the Mount Coolum National Park.
25.	If it is required to be constructed in the final design, consider the need for installation of a similar cut off wall along the western perimeter drain.
Erosion and sediment control, stormwater, and regulated structures	
26.	<p>Prepare and implement an Erosion and Sediment Control Plan (ESCP) for earthworks and construction that is in accordance with the International Erosion Control Association of Australia's guidelines, including the following details:</p> <ul style="list-style-type: none"> • staging of clearing and other soils disturbing activities • stormwater management during construction • stockpile management • soil stabilisation and protection • erosion and sediment control infrastructure • maintenance of riparian buffer zones and minimising waterway disturbance (where relevant) • rehabilitation (consistent with the Biodiversity Offset Strategy and any other relevant rehabilitation strategies) • corrective actions in the event management response triggers are exceeded • roles and responsibilities.
27.	Any 'regulated structures' associated with the project are to be designed and constructed in accordance with the <i>Manual for Assessing Consequence Categories and Hydraulic Performance of structures</i> (EM635).
28.	Further development of drainage and stormwater design for the new airfield as part of detailed design and engineering approvals for the project.
Acid sulfate soils	
29.	Carry out an assessment and characterisation of the ASS conditions of the site in identified risk areas in accordance with Queensland ASS Guidelines.

Commitment number	Proponent Commitment
30.	<p>Prepare a site-specific ASS Management Plan that details:</p> <ul style="list-style-type: none"> • staging of earthworks involving ASS • treatment of excavated soils including lime treatment rates, location of treatment areas, validation testing and application methodology • handling, stockpiling and transport of ASS • ground and surface water quality objectives and performance criteria relevant to ASS treatment • soil, surface and groundwater water quality testing • emergency procedures in the event of inclement weather • roles, responsibilities for implementation of the ASSMP • Use of a guard layer of agricultural lime to be placed within sections of the proposed drains to intercept and neutralise any acidity mobilised from normally unsaturated actual ASS that settles beneath the water table.
Contaminated land	
31.	Prepare a Contamination Management Plan for the remediation and/or management of the contaminated sites (two farm sheds) affected by the project.
32.	Remediate contaminated sites if required prior to the commencement of bulk earthworks for that portion of the site.
Flooding	
33.	Confirm flooding objectives and outcomes predicted by the EIS can be achieved during the detailed design and engineering approvals for the project.
34.	Negotiate property specific building modifications to each flood affected dwelling (5 properties predicted to experience minor over floor flooding) with the property owners.
Terrestrial flora and fauna	
Consultation with the Department of National Parks, Sport and Racing to coordinate management of the Mount Emu she-oak population within SCA land and the southern section of the Mount Coolum National Park.	
35.	Development and implement a revised Biodiversity Offset Strategy (see environmental offset commitments)
36.	<p>Development and implementation of the following management plans as part of the Environmental Management Plan (construction):</p> <ul style="list-style-type: none"> • Vegetation Management Plan to minimise impacts to retained vegetation and habitat on and off the site • Weed Management Plan for control of pest plants • Fauna Management Plan to minimise impacts of construction activities on terrestrial and aquatic fauna
37.	Development and implement species management programs for protected species under the <i>Nature Conservation Act 1992</i> as required
38.	Pre-clearing surveys within the clearing footprint for any protected plants; clearing to avoid identified plants or, if necessary, plants to be translocated
Environmental offsets	

Commitment number	Proponent Commitment
39.	Development and implement a revised Biodiversity Offset Strategy, excluding the remaining significant residual impact (6.01ha) for the listed ground parrot (<i>Pezoporus wallicus wallicus</i>).
40.	The remaining residual offset required for the eastern ground parrot is to be dealt with by a financial offset or other approach approved by the Coordinator-General
41.	<p>Key elements of the Biodiversity Offset Strategy include:</p> <ul style="list-style-type: none"> • Translocation of an area of 4.41ha of Mount Emu she-oak to a site adjacent to the SCA site • Creation of a combined 12.23ha of ponds/breeding habitat for wallum sedgefrog at the SCA site and at the Lower Mooloolah River Environmental Reserve (LMRER) site at Palmview • 8.12ha of habitat creation/augmentation for ground parrot at the SCA site and ongoing management of the Wallum Heath Management Area • Creation of 60.63ha of habitat for Wallum froglet and wallum rocketfrog at the LMRER site • Establish a 25ha vegetated corridor to create ecological connectivity between the northern and southern section of Mount Coolum National Park
42.	<p>The approved Biodiversity Offset Strategy will be audited every five years with an audit report that outlines:</p> <ul style="list-style-type: none"> • results of an audit of the delivery of commitments made in the Biodiversity Offset Strategy • Offset Area Management Plan Implementation • acid frog habitat development and progress towards meeting completion criteria • data on threatened species usage of habitat.
Cultural heritage	
43.	<p>Prepare Cultural Heritage Management Plan(s) that details:</p> <p>process for engaging with Indigenous people</p> <ul style="list-style-type: none"> • measures to avoid or minimise harm to Aboriginal cultural heritage • cultural heritage survey methodology • conflict resolution process • cultural heritage induction and awareness training requirements • procedures in the event of a cultural heritage find during construction.
44.	Prepare a Non-indigenous Cultural Heritage (NICH) Induction Booklet prior to ground disturbing activities, and include contents in site inductions.
45.	Prepare a procedure for managing unexpected NICH finds during construction.
Transport and traffic	
46.	Upgrade Finland Road and the David Low Way/Finland Road intersection in consultation with DTMR.
47.	Prepare a detailed Pavement Impact Assessment and agree remedial measures with DTMR prior to construction.

Commitment number	Proponent Commitment
48.	<p>Prepare a Road Use Management Plan that details:</p> <ul style="list-style-type: none"> • mitigation measures to address the relative increase in traffic levels on affected sections of the SCR network • changes to speed restrictions during construction • signage • communication of scheduled construction activities and road closures • traffic controls during construction • measures to minimise total vehicle movements and travel during peak times during construction • construction haul routes • site induction requirements for vehicle operators • mobility impaired access to and from the site.
	Waste and materials management plan
49.	<p>The Environmental Management Plan (construction) shall include measures to reduce waste generation during construction, including:</p> <ul style="list-style-type: none"> • estimation of sources and quantities of waste to be generated • storage of construction waste and contaminants • disposal of waste in accordance with the waste hierarchy i.e. reduce/reuse/recycle/dispose • corrective procedures in the event of a spill/leak • record keeping of waste disposal • upgrade existing operational waste management facilities and arrangements in response to demand.
	Air quality
50.	<p>Implement air quality and dust control measures during construction, and document these in the Environmental Management Plan (construction) including:</p> <ul style="list-style-type: none"> • regular watering of haul roads and stockpiles • additional watering during adverse weather conditions • minimising exposed surfaces, including stockpiles • avoid dust generating activities during periods of high winds • limit work near sensitive receptors during calm conditions when the dispersive capacity of the atmosphere is poor • substitute biodiesel for regular diesel when available • visual dust inspections
51.	Investigate complaints received and apply corrective action where necessary.
52.	If complaints are persistent, conduct high-volume air sampling for particulate matter (PM10) and review dust management practices if guidelines exceeded.
	Climate change

Commitment number	Proponent Commitment
53.	Work with Council, State and Commonwealth agencies to make sure that the Sunshine Coast Airport Expansion Project and any implications for future climate change adaptation are recognised in a regional climate change strategy.
Dredge pipeline and pump out mooring	
54.	Prepare a General Method Statement for the Dredge Pipeline and Pump Out with a description of pump out activities, including methodology for sand delivery pipeline placement and removal.
55.	If required by MSQ, development and implement a Vessel Traffic Management Plan to manage closure of nearshore access during pump out operations.
56.	Develop contingency plans for stabilisation of dredge pipeline from extreme weather as part of the detailed design process.
57.	Conduct assessments of potential impacts to coastal processes and morphology as part of coastal works approvals.
58.	Conduct detailed pre-construction surveys along pipeline alignment and Marcoola Beach to identified potential turtle nesting or shorebird roosting sites.
59.	Undertake dredge pipeline construction works on Marcoola Beach outside of turtle nesting season (i.e. November to March).
60.	Maintain safe, convenient pedestrian and emergency vehicle access during pipeline construction and sand delivery.
61.	Remove pipeline following completion of dredging works and fully rehabilitate the natural habitats within the dune and pipeline alignment in accordance with a Rehabilitation Plan.
Dredging	
62.	Prepare a General Method Statement for Dredging, including the following: <ul style="list-style-type: none"> • introduction • description of the general scope of works • references to relevant international and company standards • responsibilities • clear map of approved areas for dredging activities • general description of dredging, navigation and pump out activities • specific method statements

Commitment number	Proponent Commitment
63.	<p>Prepare and implement a Dredge Management Plan that contains the following:</p> <ul style="list-style-type: none"> • clearly stated aims and objectives • a description of dredging operation, including (i) type of equipment to be used, volume of dredge material to be removed, duration and timing of the dredging campaign, (ii) methods to be utilised for transporting dredge material, (iii) dredge material pump out and placement methods • maps to scale showing all relevant places (boundaries of dredging operation, estimated or modelled zone of influence of sediment plumes, location of designated disposal sites, sensitive receptors and all monitoring locations) • A description of sediment plume-associated monitoring program including (i) sampling regime and methods, (ii) sensitive receptor monitoring sites • A detailed description of the assessment methodology to provide data in relation to trigger values that will define alert levels • clearly set out data handling and evaluation procedures that demonstrated how exceedance of alert levels will be determined • management actions to be initiated if alert levels are exceeded • other requirements for managing and monitoring dredging related to the following matters: <ul style="list-style-type: none"> ○ marine megafauna management ○ navigation and maritime safety ○ vessel wastewater management ○ ballast water and marine pest incursion ○ vessel solid waste ○ fuel and oil spills ○ noise and air quality ○ cultural heritage.

Appendix 5. Aircraft noise information

Schedule 1. Regulation of aircraft noise

Regulation of aircraft noise is dependent on tenure of airport land. Commonwealth leased airports are subject to a planning framework under the Commonwealth *Airports Act 1996* (Airports Act). Under the Airports Act, Commonwealth leased airports are required to publish master plans and/or submit major development plans for major upgrades. Both approval processes under the Airports Act require identification of aircraft noise measures. The key noise measure applied across Commonwealth leased airports is community engagement through community aviation and other forums, online noise information sharing tools such as web track and noise and flight path monitoring systems. Other measures are applied, including but not limited to:

- implementation of noise abatement procedures
- application of a voluntary fly neighbourly policy
- implementation of required navigation performance procedures
- publication of ANEF charts every five years
- noise complaints management through ASA
- provision of guidance to the local council in making informed planning and development decisions in areas around the airport.

Operation of Commonwealth leased airports is also subject to the National Airports Safeguarding Framework 2012 (NASF). The NASF is a national land use-planning framework that provides guidance to all levels of government on protection of airports and communities from inappropriate off-airport development. The NASF provides a guideline for managing impacts of aircraft noise through land use planning, application of the ANEF system and the use of supplementary noise measures (N70 and N60) to inform the community on noise impacts⁵².

Furthermore, all aircraft operating in Australian airspace are required to comply with noise standards and recommended practices specified by the Commonwealth *Air Navigation (Aircraft Noise) Regulations 1984*. These regulations provide for noise certification of aircraft, restriction of operation of large marginally compliant aircraft and prescribe noise standards and testing procedures for certain aircraft. Under these regulations, the aircraft owner/operator is required to obtain a noise certificate from ASA. Development of airports on state, privately owned land or council land within Queensland is subject to the *Sustainable Planning Act 2009* (SP Act). The SCA is located on Council-owned land and is consistent with land use planning objectives of the *Sunshine Coast Planning Scheme 2014*. As a result, the construction of the proposed east-west runway and associated infrastructure does not require a material change of use development approval under the SP Act. For any new dwellings proposed to be located in the ANEF contour 20 or above, the Sunshine Coast Planning

⁵² Department of Infrastructure and Regional Development. 2012. National Airports Safeguarding Framework, Version 0.2.1. Accessed on 18 April 2016 from https://infrastructure.gov.au/aviation/environmental/airport_safeguarding/nasf/files/0.2.3_Principles.pdf

Scheme 2014 and State Planning Policy 2014 (SPP) require the development to be constructed in accordance with the AS2021:2015. The SPP also identifies the SCA as an airport of strategic importance and requires new development to be approved in accordance with the AS2021:2015.

Although SCA is not subject to the Airports Act, the proponent implements the same management measures applied at Commonwealth leased airports. These management measures include community engagement, noise abatement procedures, voluntary fly neighbourly policy and Required Navigation Performance (RNP) procedures.

Schedule 2. Aircraft noise measures

The EIS and AEIS presented aircraft noise impacts based on the following measures: N70 and N60 events and the Australian Noise Exposure Concept (ANEC) contours. An overview of each measure is provided below, with further detail available in Volume D, Chapter D3, Section 3.2.1 of the EIS.

N70 events

N70 events identify the number of noise events that exceed 70 decibels (dB(A)) at a particular location over a set period of time. A noise level of 70 dB(A) is generally equivalent to operating a vacuum cleaner and is identified by the former Australian Government Department of Transport and Regional Services (now Department of Infrastructure and Regional Development) and the former Department of the Environment and Heritage as a level at which conversation would be disturbed⁵³. At this noise level, a speaker would generally be forced to raise their voice to be understood.

A noise level of 70 dB(A) outside a building would result in an internal noise level of approximately 60 dB(A), if windows are open to a normal extent. An internal noise level of 60 dB(A) is likely to cause some words to be missed in speech from television or radio. However, if external windows are closed, a greater noise reduction would occur due to the presence of the façade. In this case an internal noise level of 60 dB(A) would be experienced when the external noise level is approximately 80 dB(A).

N70 events are presented as contour maps for five (5) or more events for daytime periods (7am to 6pm) and evening periods (6pm to 10pm). For the SCAE project, the N70 events are presented using the following thresholds: 5–9, 10–19, 20–49, 50–99 and 100+ N70 events (refer to AEIS, Appendix L N70 maps). It is important to note that while a number of sensitive receptors would be located outside a N70 contour, they would still experience some level of aircraft noise.

N60 events

N60 events identify the number of events exceeding 60 dB(A) external to a building, which would typically result in a highest noise level of 50 dB(A) within a building, with

⁵³ Commonwealth Department of the Environment and Heritage, Aviation and Airports Policy Division, Department of Transport and Regional Services. 2003. Guidance material for selecting and providing aircraft noise information. Accessed on 18 April 2016 from https://infrastructure.gov.au/aviation/environmental/transparent_noise/guidance/index.aspx

windows open to a normal extent. If this was the case in a room where a person is sleeping, a 50 dB(A) maximum noise level is considered to be close to a point at which noise may cause sleep disturbance. As night periods (10pm to 7am) are more sensitive for occupants of dwellings, N60 events are presented for two or more events.

Australian Noise Exposure Forecast

Australian Noise Exposure Forecast (ANEF) is a land-use planning system adopted by the Australian House of Representatives Select Committee in 1985. The ANEF is based on a socio-acoustic investigation undertaken by the National Acoustic Laboratories and Commonwealth Government in 1979. The socio-acoustic investigation assessed the impact of aircraft noise on residential communities in Australia and identified that the ANEF system correlates to the proportion of people who would describe themselves as moderately or seriously affected by noise (refer to Figure 1).

The investigation also identified that high community reaction may occur at receptors that are located outside of the ANEF 20. Furthermore, communities newly exposed to aircraft noise may exhibit a higher reaction than ones that are already exposed to aircraft noise.

Following the opening of the third runway at Sydney Airport in 1994, a significant public debate occurred raising concerns that the ANEF system is not effective in explaining aircraft noise impacts to the community. A Senate Select Committee on aircraft noise was formed, which after a three-year review period recommended use of supplementary noise measures, such as N70 and N60. These supplementary measures would provide aircraft noise information in a way that can be easily understood.

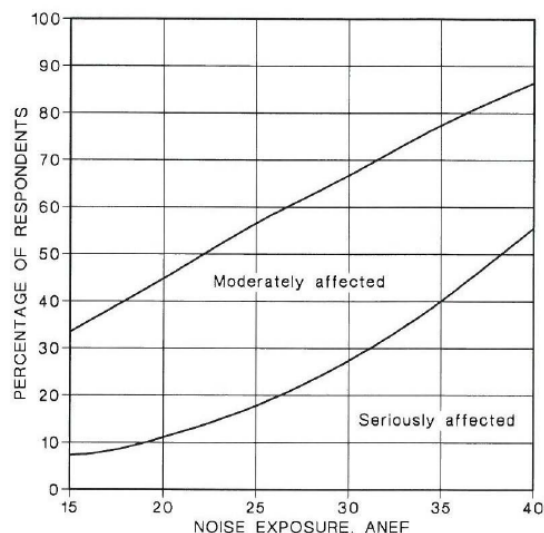


Figure 1 Relationship between noise exposure forecast level and community reaction in residential areas⁵⁴

⁵⁴Commonwealth Department of Health, National Acoustic Laboratories. (1982). Aircraft noise in Australia: A survey of community reaction. Accessed on 18 April 2016 from

The *Australian Standard 2021:2015 Acoustics – Aircraft noise intrusion – Building siting and construction* (AS2021:2015) is based on the ANEF system. The AS2021:2015 defines the ANEF as a single number index for predicting the composite exposure to aircraft noise in communities near airports during a specified time period (normally 12 months). Calculation of this single number index is based on the following:

- measurement of aircraft noise, expressed in Effective Perceived Noise Decibels, (EPNdB), which takes account of spectral, temporary and spatial aspects of noise
- estimates and generalisations of aircraft type groups and mix, number of operations, runway utilisation, flight paths and operational procedures
- time of day.

There are three types of aircraft noise contour charts produced using the ANEF system:

- (a) ANEC
- (b) ANEF
- (c) Australian Noise Exposure Index (ANEI).

All three charts are produced using the same computational procedure; however, they are based on different data as described in the sections below.

Australian Noise Exposure Concept

The ANEC is based on a proposed set of runway conditions, aircraft types and flight paths. It is used when considering options for airport developments and is typically produced for a one-year period. As ANEC contours are based on a proposed set of conditions, these contours have not been formally endorsed by relevant authorities and are therefore not intended for land-use planning purposes by local government agencies.

Once the final detailed design of the project is completed, the ANEC contours would need be reviewed by ASA and endorsed subject to adequacy of the following information:

- the intensity, duration and tonal content and spectrum of audible frequencies of the noise of aircraft take offs, approaches to landing, and reverse thrust after landing
- the forecast frequency of aircraft types and movements on the various flight paths, including flight paths used for circuit training
- the average daily distribution of aircraft arrivals and departures in both daytime and night-time.

https://infrastructure.gov.au/aviation/environmental/transparent_noise/expanding/pdf/88_hede_bullen_NAL_Report_Feb_1982.pdf

The ANEC contours would then be referred to as ANEF and included in the *Sunshine Coast Planning Scheme 2014*.

Australian Noise Exposure Index

Unlike ANECs and ANEFs, an Australian Noise Exposure Index (ANEI) is a contour map based on measured noise level data from a previous year, rather than the proposed set of conditions for an ANEC or ANEF. The noise data used to calculate ANEI is based on exact numbers and types of aircraft used at the airport. ANEI shows the average daily aircraft noise exposure around the airport for a 12-month period.

Building site acceptability based on ANEF

The AS2021:2015 provides guidance on the siting and construction of proposed buildings to mitigate aircraft noise intrusion. The AS2021:2015 also provides guidance on acoustic adequacy of existing buildings in areas near airports. The AS2021:2015 uses ANEF contours to specify the building acceptability for a range of building types, including residential dwellings, public buildings and commercial buildings. The AS2021:2015 does not specify acceptability of outdoor spaces.

ANEF zones relevant to several building types are identified in Table 1, while levels of building site acceptability are as described as follows:

- **Acceptable**

If a building site is classified as 'acceptable', there is usually no need for the building to provide protection specifically against aircraft noise. However, it should not be inferred that aircraft noise will be unnoticeable in areas outside the ANEF 20 contour.

- **Conditionally acceptable**

If a building site is classified as 'conditionally acceptable', the AS2021:2015 provides methods to reduce the indoor noise levels to an 'acceptable level'. The AS2021:2015 provides a methodology for reducing the indoor design sound levels. This methodology calculates aircraft noise reduction on the basis of maximum aircraft noise levels for the different types of aircraft, and levels of aircraft noise that could be expected from the proposed attenuation measures.

- **Unacceptable**

If a building site is classified as 'unacceptable', construction of the proposed building should not be considered. However, where planning authorities determine that a development may be necessary within existing built-up areas designated as unacceptable, it is recommended that such development should achieve the required aircraft noise reduction determined by the AS2021:2015. For residential dwellings or schools, the effect of aircraft noise on outdoor areas associated with the buildings should also be considered.

Table 1 Building site acceptability based on ANEF zones (AS2021:2015)

Building type	ANEF zone of site		
	Acceptable	Conditionally acceptable	Unacceptable
House, home unit, flat, caravan park	Less than 20 ANEF	20–25 ANEF	Greater than 25 ANEF
Hotel, motel, hostel	Less than 25 ANEF	25–30 ANEF	Greater than 30 ANEF
School, university	Less than 20 ANEF	20–25 ANEF	Greater than 25 ANEF
Hospital, nursing home	Less than 20 ANEF	20–25 ANEF	Greater than 25 ANEF
Public building	Less than 20 ANEF	20–30 ANEF	Greater than 30 ANEF
Commercial building	Less than 25 ANEF	25–35 ANEF	Greater than 35 ANEF
Light industrial	Less than 30 ANEF	30–40 ANEF	Greater than 40 ANEF
Other industrial	Acceptable in all ANEF zones		

Note: This table is to be used in conjunction with Table 3.3 of the AS2021:2015 and includes several notes that are relevant to its application (AS2021:2015).

Appendix 6. Threat abatement plans, species recovery plans and conservation advices

The following threat abatement plans and recovery plans relate to MNES as discussed in section 6 (Matters of national environmental significance) of my report.

Species Recovery Plans

Part A. National recovery plan for the Mount Emu-she-oak (*Allocasuarina emuina*)—2007

The overall objective of the National Recovery Plan for the Mount Emu-she-oak (*Allocasuarina emuina*) is to protect known populations of A. emuina in Queensland from further decline and maintain and/or enhance wild populations in the long term.

The specific objectives of the plan are to:

- (1) protect, restore and maintain known populations and locate and/or establish new populations of A. emuina
- (2) address and review the key threats to A. emuina
- (3) develop research programs that assist with the recovery and conservation of A. emuina
- (4) promote community awareness and education in relation to A. emuina.

A summary of the recovery actions, identified in the Recovery Plan are as follows:

- (1) Secure protection and management of all known populations.
 - a) Evaluate and implement measures to secure all populations and potential habitat on reserves and Environmental Protection Agency/Queensland Parks and Wildlife Service (EPA/QPWS) estate.
 - b) Protect and manage existing A. emuina populations, and populations identified in the future, on freehold land.
 - c) Maintain a representative collection of seed ex situ and develop efficient propagation and cultivation techniques in order to generate suitable stock for strategic ex situ and in situ plantings.
- (2) Minimise the impacts of key threats to A. emuina
 - a) Develop and implement a strategy for appropriate fire management practices.
 - b) Develop and implement a strategy to minimise storm water run-off into A. emuina habitat.
 - c) Implement weed management strategies at all known populations.
 - d) Design and implement an ongoing monitoring program to assess the effectiveness of management and rehabilitation strategies.
- (3) Implement weed management strategies at all known populations.
- (4) Design and implement an ongoing monitoring program to assess the effectiveness of management and rehabilitation strategies
- (5) Develop research programs to assist the conservation of A. emuina
 - a) Undertake ground surveys to confirm the location and extent of all known populations and map the extent of potential habitat.
 - b) Investigate the response of A. emuina to fire.
 - c) Identify population parameters and aspects of the biology and ecology that affect the conservation status and persistence of A. emuina.
 - d) Clarify the taxonomic status and distinctiveness of A. emuina and its populations.

- e) Determine the genetic and ecophysiological distinctiveness of *A. emuina* populations and other Sunshine Coast congeners.
 - f) Investigate the potential for hybridisation between *A. emuina* and congeneric species of *Allocasuarina* including *A. thalassoscopia*.
 - g) Define the species' genetic diversity between individuals, within populations and between populations.
- (6) Increase community awareness and education in relation to *A. emuina*.
- a) Develop promotional/interpretive materials relating to the species.
 - b) Ensure the ongoing operation of the recovery team with appropriate and flexible representation.
 - c) Secure resources to support the recovery of *A. emuina*.
 - d) Establish community action groups to 'adopt' and manage sites.

Part B. Draft National recovery plan for the grey-headed flying fox (*Pteropus poliocephalus*)—2009

The overall objective of the Draft National Recovery Plan for the grey-headed flying fox (*Pteropus poliocephalus*) is to:

- (1) reduce the impact of threatening processes on grey-headed flying foxes and arrest decline throughout the species' range
- (2) conserve the functional roles of grey-headed flying foxes in seed dispersal and pollination
- (3) improve the standard of information available to guide recovery of the grey-headed flying fox, in order to increase community knowledge of the species and reduce the impact of negative public attitudes on the species.

The specific objectives and a summary of their recovery actions, identified in the Draft Recovery Plan are as follows:

- (4) to identify and protect foraging habitat critical to the survival of grey-headed flying foxes throughout their range
- (5) to protect and increase the extent of key winter and spring foraging habitat of grey-headed flying foxes
- (6) to identify roosting habitat critical to the survival of Grey-headed flyingfoxes
- (7) to protect and enhance roosting habitat critical to the survival of grey-headed flying-foxes
- (8) to substantially reduce deliberate destruction of grey-headed flying foxes in fruit crops
- (9) to reduce negative public attitudes toward grey-headed flying-foxes and reduce conflict with humans
- (10) to increase public awareness and understanding of grey-headed flying foxes and the recovery program, and to involve the community in recovery actions, where appropriate, to reduce the threat of negative public attitudes and conflict with humans
- (11) to monitor population trends in grey-headed flying foxes so as to monitor the species' national distribution and status
- (12) to assess and reduce the impact on grey-headed flying foxes of electrocution on powerlines and entanglement in netting and on barbed-wire
- (13) to improve knowledge of the demographics and population structure of grey-headed flying foxes in order to increase understanding of the ecological requirements of the species
- (14) to increase the effectiveness and efficiency of recovery initiatives for grey-headed flying-foxes by working cooperatively with conservation and management programs with overlapping objectives to remove or reduce the impact of threatening processes on the species

- (15) to maintain an effective Grey-headed Flying fox National Recovery Team to oversee the implementation of the Grey-headed Flying fox National Recovery Plan to remove or reduce the impact of threatening processes on the species.
- (16) to provide long-term economic benefits associated with the protection of ecosystem services, promotion of sustainable forest management, improved crop protection regimes, promotion of sustainable agricultural practices and increased viability of some commercial fruit industries.

Part C. National recovery plan for the water mouse (*Xeromys myoides*)—2010

The overall objective of the National Recovery Plan for the water mouse (false water rat) *Xeromys myoides* is to improve the conservation status of the water mouse and its habitat through habitat protection, reducing threats to species' survival, research and increasing public participation in recovery activities.

The specific objectives and a summary of their recovery actions, identified in the Water Mouse Recovery Plan are as follows:

- (1) Identify habitats supporting populations of the water mouse and map the current distribution by:
 - a) conducting surveys to confirm the current distribution
 - b) consolidating existing databases to form a national dataset
 - c) producing high-quality GIS mapping and spatial analysis of habitat supporting extant populations
 - d) conducting surveys and assessments of potential habitat.
- (2) Describe key biological and ecological features of the water mouse and its habitat by:
 - a) determining whether genetic differentiation exists across populations
 - b) understanding the reproductive biology
 - c) investigating selected field populations to describe poorly known ecological features.
- (3) Monitor population trends and identify and manage threats to species' survival by:
 - a) conducting a monitoring program of selected populations to measure trends and abundance and efficacy of management action
 - b) assessing the impact of known threats on extant populations
 - c) investigating the relative impact of potential threats.
- (4) Rehabilitate habitat to expand extant populations by:
 - a) regenerating habitat corridors at five specified sites
 - b) evaluating the potential for artificial nesting structures.
- (5) Increase public awareness of, and involvement in, water mouse conservation by:
 - a) collaborating with Indigenous landowners to exchange knowledge
 - b) investigating opportunities for protecting the habitat of extant populations through establishment of voluntary conservation agreement
 - c) developing and implementing management plans for populations of water mouse that occur on land under voluntary conservation agreements
 - d) developing and implementing a community awareness and education program.

Part D. National recovery plan for the wallum sedgefrog and other wallum-dependent frog species—2006

The overall objective of the plan is to improve the conservation status of wallum frog species through effective management, protection and rehabilitation of wallum frog habitat.

The specific objectives of the plan are:

- (1) To identify areas of habitat critical to the survival of wallum frog species more accurately
- (2) To protect habitat critical to wallum frog survival and important wallum frog populations from threatening processes.
- (3) To rehabilitate degraded wallum frog habitat.
- (4) To determine population trends in areas of disturbed undisturbed and rehabilitated habitat.

A summary of the recovery actions, identified in the Recovery Plan are as follows:

- (1) Identify and assess essential habitat:
 - a) Determine non-breeding habitat usage
 - b) Map wallum frog habitat
 - c) Conduct surveys
 - d) Acquire genetic data for prioritising areas/populations for conservation.
- (2) Protect wallum frog populations and manage habitat:
 - a) Ensure appropriate legislative protection of wallum frog habitat
 - b) Protect wallum frog habitat on freehold land
 - c) Apply guidelines for habitat protection and management
 - d) Assess guidelines for habitat protection and management
 - e) Manage fire
 - f) Manage amphibian disease
 - g) Reduce impact of introduced fish
 - h) Control feral pigs.
- (3) Acquire additional information on threats to inform management.
- (4) Engage stakeholders and the broader community in recovery of wallum frog species.
 - a) Produce and distribute fact sheets and poster boards
 - b) Disseminate information on important habitat and management guidelines
 - c) Conduct training workshops
 - d) Expand South-east Queensland Threatened Frog Recovery Team.
- (5) Rehabilitate degraded wallum frog habitat.
- (6) Monitor frog numbers and distribution
 - a) Develop methodology for monitoring
 - b) Undertake monitoring.

Part E. Recovery plan for marine turtles in Australia—2003

The overall recovery objective of the Marine Turtle Recovery Plan (for the green, flatback, leatherback, olive ridley, loggerhead and hawksbill turtle species) is to reduce detrimental impacts on Australian populations of marine turtles and hence promote their recovery in the wild. The Marine Turtle Recovery Plan noted the continued decline of the eastern Australian population of the loggerhead turtle and identified the need for its conservation to be implicit in all actions.

The specific objectives, and a summary of their recovery actions, identified in the Marine Turtle Recovery Plan are as follows:

- (1) To reduce the mortality of marine turtles and, where appropriate, increase natural survivorship, including through developing management strategies with Aboriginal and Torres Strait Islander communities for the sustainable use of marine turtles by:
 - a) reducing bycatch of marine turtles in fisheries
 - b) facilitating sustainable harvesting of turtles and eggs by Aboriginal and Torres Strait Islander people

- c) reducing levels of marine debris
 - d) reducing mortality of marine turtles during shark control activities
 - e) reducing incidences of boat strike on marine turtles
 - f) reducing lighting impacts and entanglement incidences from Pearl Farming and other Aquaculture activities
 - g) reducing potential impacts from Department of Defence activities.
- (2) To develop programs and protocols to monitor marine turtle populations in Australia, assess the size and status of those populations, the causes of their mortality and address information gaps by:
- a) monitoring key populations and strandings of marine turtles
 - b) measuring recovery
 - c) facilitating the genetic identification of Australian marine turtle populations and their ecology.
- (3) To manage factors that affect marine turtle nesting by:
- a) reducing light pollution in the marine environment
 - b) ensuring minimal impacts on turtle habitat (including nesting beaches) from tourism and recreational activities
 - c) managing vehicle access to nesting beaches
 - d) minimising faunal predation of marine turtle eggs.
- (4) To identify and protect habitats that are critical for the survival of marine turtles by:
- a) ensuring that activities impacting land use and water quality on or in proximity to marine turtle habitat are subject to an environmental impact assessment and the development of best practice coastal management guidelines across Queensland
 - b) protecting critical marine turtle benthic and seagrass habitats
 - c) managing of oil spills and operational discharges by lead agencies and appropriate environmental assessment of related activities
 - d) ensuring soft start procedures are implemented in seismic surveys and monitoring literature on the effect of noise on marine turtles.
- (5) To communicate the results of recovery actions and involve and educate stakeholders by:
- a) reviewing the Marine Turtle Recovery Plan and evaluating its effectiveness
 - b) raising awareness and involvement of the community
 - c) raising awareness in northern Australian Indigenous communities.
- (6) To support and maintain existing agreements and develop new collaborative programs with neighbouring countries for the conservation of shared turtle populations by:
- a) the Commonwealth Government maintaining existing and developing new bilateral or multilateral agreements to ensure that international conservation and management of marine turtles is consistent with domestic policies and international treaty obligations.

Threat abatement plans

Part F. Threat abatement plan for predation by the European red fox—2008

The goal of the European red fox threat abatement plan (TAP) is to minimise the impact of foxes on biodiversity in Australia and its territories by protecting affected native species and ecological communities, and preventing further species and ecological communities from becoming threatened. The specific objectives and action items to achieve this are as follows:

- (1) Prevent foxes occupying new areas in Australia and eradicate foxes from high-conservation-value 'islands' by:

- a) collating data on offshore islands and isolated mainland 'islands', assess their conservation value, the likelihood of significant biodiversity impacts from foxes and, if there are no foxes present, rank the level of risk of foxes being introduced and establishing populations
 - b) developing management plans to prevent, monitor and, if incursions occur, contain and eradicate any fox incursion, for 'islands' with high conservation values
 - c) implementing management plans for high-conservation-value 'islands', including prevention and monitoring actions, and containment or eradication actions if incursions occur
 - d) eradicating established populations of foxes from 'islands' with high conservation values (including Tasmania) where this is cost-effective, feasible and a conservation priority.
- (2) Promote maintenance and recovery of threatened species and ecological communities that are affected by fox predation by
- a) identifying priority areas for fox control based on:
 - i) the significance of the population of the affected native species or of the ecological community
 - ii) the degree of threat posed by foxes to species and ecological communities relative to other threats
 - iii) the cost-effectiveness of maintaining fox populations below an identified 'damage threshold' in the region, and
 - iv) the feasibility of effective remedial action
 - b) conducting and monitoring regional fox control, through new or existing programs, in priority areas identified in Action 2.1
 - c) applying incentives (other than bounties), partnerships and negotiated agreements to promote and maintain on-ground fox control on private or leasehold lands within or adjacent to priority sites identified in Action 2.1.
- (3) Improve knowledge and understanding of fox impacts and interactions with other species and ecological processes by:
- a) developing simple and cost-effective methods for monitoring populations of foxes and the impacts of foxes, including reliable methods for monitoring foxes and key native species at different densities, including very low densities
 - b) investigating interactions between foxes and native carnivores to identify the significance of competition and predation by foxes to these native species
 - c) determining the nature of interactions between foxes, feral cats, wild dogs and rabbits to effectively integrate fox control activities for all four species
 - d) Identifying any unintended effects that fox control may have if conducted in isolation from other management activities
 - e) developing means for estimating the environmental and other associated costs of impacts arising from foxes.
- (4) Improve the effectiveness, target specificity, integration and humaneness of control options for foxes by:
- a) conducting research and extension to improve the effectiveness, target specificity and humaneness of existing toxin-bait media and baiting methods
 - b) conducting further work on the development of new, or improvements to existing, control techniques
 - c) testing and disseminating information on exclusion fence designs and other control methods regarding their cost-effectiveness for particular habitats or topography
 - d) investigating the feasibility of control techniques to target foxes, but not dingoes, in some areas

- e) developing training programs to help land managers identify locally appropriate control method(s) and when (i.e. circumstances and times) to apply them in controlling foxes
 - f) ensuring that habitat rehabilitation and management of potential prey, competitors and predators of foxes are considered in fox control programs
 - g) continuing to promote the adoption and adaptation of the model codes of practice and standard operating procedures for humane management of foxes.
- (5) Increase awareness of all stakeholders of the objectives and actions of the TAP, and of the need to control and manage foxes by:
- a) promoting:
 - i) broad understanding of the threat to biodiversity posed by foxes and support for their control
 - ii) support for the actions to be undertaken under this plan
 - iii) the use of humane and cost-effective fox control methods
 - iv) best-practice effective fox control in all tenures
 - v) understanding of predation by foxes as a key threatening process.

Part G. Threat abatement plan for predation by feral cats—2015

The goal of the feral cat TAP is to minimise the impact of cats on biodiversity in Australia and its territories by:

- (1) Protecting affected threatened species
- (2) Preventing further species and ecological communities from becoming threatened

To achieve this goal, the plan has four objectives:

- (1) Effectively control feral cats in different landscapes
 - a) Ensure broad-scale toxic baits targeting feral cats are developed, registered and available for use across all of Australia, including northern Australia
 - b) Develop and register other cat control tools, including devices exploiting cat grooming habits
 - c) Continue research into understanding interactions between feral cats and other predators: (i) in different landscapes; and (ii) any potential beneficial/perverse outcomes if other predator populations are modified
 - d) Continue research into understanding the role of other major landscape modifiers, such as fire or grazing by introduced herbivores, in feral cat activities and control
 - e) Continue research into the scale, efficiency, cost-effectiveness, sustainability and risks of feral cat control options
 - f) Continue development of new or enhanced attractants for cats to improve cat control and monitoring. Ensure availability of any attractants that are developed
 - g) Research into other control and monitoring technologies and enhancing available technology
 - h) Re-investigate diseases and other potential biocontrol agents, biotechnology and immunocontraceptive options for cats, and commence research on promising options. Undertake social research on promising options to gauge community support
 - i) Code of Practice and/or Standard Operating Procedures developed for new tools and agreed by governments
- (2) Improve effectiveness of existing control options for feral cats
 - a) Understand motivations and provide incentives for land managers to include feral cat management into standard land management for biodiversity outcomes

- b) Provide information, in various media and through training, on best practice methods and standard operating procedures for controlling and monitoring feral cats
- c) Ensure areas prioritised for feral cat management across Australia maximise benefits to biodiversity at a local, regional and national level
- d) Governments agree to consistent legislation that identifies feral cats as a pest, has requirements for control, and identifies control techniques that may be used
- (3) Develop or maintain alternative strategies for threatened species recovery
 - a) Eradicate, or control, cats on offshore islands of high, or potentially high, biodiversity value
 - b) Establish, enhance or maintain biosecurity measures for cat-free offshore islands to prevent incursions
 - c) Establish and maintain further fenced reserves ("mainland islands") for threatened species where it is identified cats cannot be controlled to the level required for threatened species recovery
 - d) Research methods to understand thresholds of cat abundance required to improve survival rates for threatened species heavily preyed upon by feral cats. Research ways in which adaptation by threatened species may improve survival rates.
 - e) Continue research into cat diseases, including *Toxoplasma gondii* and sarcosporidiosis, their prevalence, ability to transmit to other species (including livestock and humans) their impacts, and ways to mitigate the impacts.
- (4) Increase public support for feral cat management and promote responsible cat ownership.
 - a) Quantify the proportion of the domestic and stray cat population that transitions to the feral cat population
 - b) Promote to and seek engagement of the community in:
 - i) an understanding of the threat to biodiversity posed by cats and support for their management;
 - ii) an understanding of the transitions between domestic, stray and feral cats, and the need for responsible ownership;
 - iii) support for the containment of domestic cats where their roaming may impact on identified conservation areas
 - c) Promote and seek community engagement on the reduction of food and other resources to stray cats
 - d) Develop specific communication campaigns to accompany the release of new broad-scale cat control techniques and other current/new cat control techniques and management programs–2015

Part H. Marine Debris Threat Abatement Plan

The aim of the Marine Debris TAP is to provide a coordinated national approach to the implementation of measures to prevent and mitigate the impacts of harmful marine debris on vertebrate marine life. The four main objectives and associated recovery actions in order to achieve this goal are as follows:

- (1) Contribute to the long-term prevention of the incidence of harmful marine debris by:
 - a) improving waste management practices on land and at sea through collaboration between, state, territory and Australian Governments, industry, non-government organisations and Indigenous communities
 - b) state and territory governments considering to review legislation to ensure that details of waste reception facilities for ships are included in port environment plan
 - c) state and territory governments to investigate how Australia's obligations under MARPOL (International Convention for the Prevention of Pollution from Ships) (i.e.

to provide adequate waste reception facilities for ship waste) are encompassed in domestic legislation and policies.

- (2) Remove existing harmful marine debris from the marine environment and monitor the quantities, origins and impacts of marine debris and assess the effectiveness of management arrangements over time for the strategic reduction in marine debris by:
 - a) development of a national approach to information collection and management
 - b) improvement of the understanding of the origins of harmful marine debris.
- (3) Mitigate the impacts of harmful marine debris on marine species and ecological communities by:
 - a) facilitating implementation of wildlife research
 - b) identifying measures to promote the use of biodegradable and oxodegradable plastic in marine-based industries.

Part I. Threat abatement plan for the biological effects, including lethal toxic ingestion, caused by cane toads

The goal of the cane toad TAP is to address the key threatening process (lethal toxic ingestion) of this species on native fauna in a feasible, effective and efficient manner. The three main objectives and associated recovery actions in order to achieve this goal are as follows:

- (1) Identifying priority native species and ecological communities at risk from the impact of cane toads by:
 - a) identifying native species, ecological communities and off-shore islands currently known to be at high to moderate risk
 - b) identifying the ways in which cane toads impact the native species and ecological communities listed in (a)(i)
 - c) establishing and supporting research where impacts are unknown but may be high, to further understand the impact of cane toads on the native species and ecological communities. Where appropriate, research ways to assist with the recovery of priority native species and ecological communities
 - d) developing a prioritisation tool to guide allocation of resources for protection of native species and communities. Apply it to native species and ecological communities identified: first from (a)(i), then from (a)(iii)
- (2) Reducing the impact of cane toads on populations of priority native species and ecological communities by:
 - a) focusing the management of cane toad impacts by Australian Government agencies on designated high priority native species and ecological communities, and seek cooperative action on priorities by jurisdictions and other stakeholders
 - b) implementing and monitoring emergency management of cane toad impacts for known high priority native species and ecological communities using currently available tools and techniques (e.g. trapping, fencing of small areas, manual removal from designated sites)
 - c) implementing or adjusting the management of cane toad impacts using available tools and techniques as new species and communities are added to the list of priority native species and ecological communities. Additional tools and techniques will become available with the registration of toxins for euthanasia of captured toads and development of other impact management or cane toad control techniques. Codes of practice and standard operating procedures for cane toad control will provide guidance on these techniques
 - d) preparing guidelines, including codes of practice and standard operating procedures that can be applied to both emergency responses and on-going management for high priority native species and ecological communities for endorsement by the VPC

- e) preparing and implementing management plans, (including identifying and addressing gaps in management techniques and tools) for designated high priority species and ecological communities on land managed by Australian Government agencies
 - f) providing the guidelines for emergency and on-going cane toad management to all stakeholders. Liaising with responsible jurisdictions/agencies to encourage the preparation and implementation of such plans in their areas of responsibility. Where mutual obligations exist the Australian Government will work cooperatively to prepare such plans
 - g) monitoring the development and implementation of guidelines and cane toad management plans for designated high priority species and ecological communities
 - h) monitoring the literature about the spread and impact of the cane toad and review/amend guidelines and develop new management plans as required
 - i) establishing guidelines for humane management actions to control cane toads for VPC and Animal Welfare Committee endorsement
 - j) distributing guidelines to all Australian Government agencies with land management responsibilities
 - k) seek cooperative adoption of guidelines by states/territories including incorporation in state based regulations as appropriate.
- (3) Communicating information about cane toads, their impacts and the TAP by:
- a) implementing a one-stop-shop webpage on the Department of Environment website with links to jurisdictional and stakeholder information on cane toads and including information on:
 - i) the threat cane toads pose to biodiversity
 - ii) management actions to limit this threat
 - iii) guidelines for cane toad management
 - iv) information to help identify cane toads from other amphibians
 - v) codes of practice and standard operating procedures
 - vi) management plans (as they are developed) for areas designated as high priority.
 - b) encouraging monitoring, evaluation and reporting on cane toad management actions is maintained and communicated to stakeholders
 - c) ensuring Australian Government fact sheets and other communications material on cane toads are current and reflect the strategy developed in this TAP.

Conservation advices

Part J. Approved conservation advice for common swamp-orchid (*Phaius australis*)

Research priorities that would inform future regional and local priority actions include:

- (1) Design and implement a monitoring program or, if appropriate, support and enhance existing programs.
- (2) More precisely assess population size, distribution, ecological requirements (including in situ germination and establishment) and the relative impacts of threatening processes.
- (3) Undertake survey work in suitable habitat and potential habitat to locate any additional populations.
- (4) Undertake seed germination and/or vegetative propagation trials to determine the requirements for successful establishment, including mycorrhizal association trials.
- (5) Investigate the precise taxonomic relationship between common swamp-orchid and other closely related *Phaius* species, using appropriate methodologies including DNA marker analysis.

- (6) Investigate the potential and efficacy of DNA-based or other approaches for the identification of individual plants and/or populations to provide a means for detecting and prosecuting illegal collection from the wild (see for example Palsboll et al., 2006).

The following regional priority recovery and threat abatement actions can be done to support the recovery of the common swamp-orchid:

- (7) Habitat loss, disturbance and modification
- a) Monitor known populations to identify key threats.
 - b) Monitor the progress of recovery, including the effectiveness of management actions and the need to adapt them if necessary.
 - c) Identify populations of high conservation priority.
 - d) Ensure there is no anthropogenic disturbance in areas where common swamp-orchid occurs, excluding necessary actions to manage the conservation of the species/ecological community.
 - e) Investigate formal conservation arrangements, management agreements and covenants on private land, and for crown and private land investigate and/or secure inclusion in reserve tenure if possible.
 - f) Identify optimal fire regimes for regeneration (vegetative regrowth and/or seed germination), and response to prevailing fire regimes.
 - g) Manage any other known, potential or emerging threats.
- (8) Invasive weeds
- a) Develop and implement a management plan for the control of lantana (*Lantana camara*), umbrella tree (*Schefflera actinophylla*), groundsel (*Baccharis halmifolia*) and Brazilian Cherry (*Eugenia uniflora*) in the habitat of swamp orchids.
 - b) Ensure chemicals or other mechanisms used to eradicate weeds do not have a significant adverse impact on common swamp-orchid.
- (9) Trampling, browsing or grazing
- a) Develop and implement a stock management plan for roadside verges and travelling stock routes associated with the species habitat.
 - b) Develop and implement a management plan for the control of feral pigs in the species' habitat.
- (10) Fire
- a) Develop and implement a suitable fire management strategy for the habitat of common swamp-orchid.
 - b) Ensure all known occurrences and new records of the species are entered into the NSW Wildlife Atlas to ensure up to date data is available for impact assessment and fire planning
- (11) Conservation information
- a) Engage with private landholders and land managers responsible for the land on which populations occur and encourage these key stakeholders to contribute to the implementation of conservation management actions.
- (12) Enable recovery of additional sites and/or populations
- a) Undertake appropriate seed and mycorrhizal fungi collection and storage.
 - b) Investigate options for linking, enhancing or establishing additional populations.
 - c) Implement national translocation protocols (Vallee et al., 2004) if establishing additional populations is considered necessary and feasible.
 - d) The following local priority recovery and threat abatement actions can be done to support the recovery of common swamp-orchid.
- (13) Habitat loss, disturbance and modification
- a) Control access routes to suitably constrain public access to known sites on public land.

- b) Suitably control and manage access on private land and other land tenure.
 - c) Minimise adverse impacts from land use at known sites.
 - d) Protect populations of the listed species through the development of conservation agreements and/or covenants.
 - e) Protect populations from illegal collection by ensuring their locations are kept confidential.
- (14) Invasive weeds
- a) Identify and remove weeds in the local area, which could become a threat to common swamp-orchid using appropriate methods.
 - b) Manage sites to prevent introduction of invasive weeds, which could become a threat to common swamp-orchid, using appropriate methods.
- (15) Trampling, browsing or grazing
- a) If livestock grazing occurs in the area, ensure land owners/managers use an appropriate management regime and density that does not detrimentally affect this species.
 - b) Where appropriate, manage total grazing pressure at important/significant sites through exclusion fencing or other barriers.
- (16) Fire
- a) Implement an appropriate fire management regime for local populations.

**Part K. Approved conservation advice for eastern curlew
(*Numenius madagascariensis*)**

- (1) Primary conservation objectives
- a) International objectives
 - i) Achieve a stable or increasing population.
 - ii) Maintain and enhance important habitat.
 - iii) Reduce disturbance at key roosting and feeding sites.
 - b) Australian objectives
 - i) Achieve a stable or increasing population.
 - ii) Maintain and enhance important habitat.
 - iii) Reduce disturbance at key roosting and feeding sites.
 - iv) Raise awareness of eastern curlew within the local community.
 - c) Conservation and management actions
 - i) Work with governments along the East Asian – Australasian Flyway to prevent destruction of key migratory staging sites.
 - ii) Develop and implement an International Single Species Action Plan for eastern curlew with all range states.
 - iii) Support initiatives to improve habitat management at key sites.
 - iv) Maintain and improve protection of roosting and feeding sites in Australia.
 - v) Incorporate requirements for eastern curlews into coastal planning and management.
 - vi) Manage important sites to identify, control and reduce the spread of invasive species.
 - vii) Manage disturbance at important sites when eastern curlews are present – e.g. discourage or prohibit vehicle access, horse riding and dogs on beaches, implement temporary site closures.
 - viii) Monitor the progress of recovery, including the effectiveness of management actions and the need to adapt them if necessary.
 - d) Monitoring priorities

- i) Enhance existing migratory shorebird population monitoring programmes, particularly to improve coverage across northern Australia
- e) Information and research priorities
 - i) More precisely assess eastern curlew life history, population size, distribution and ecological requirements particularly across northern Australia.
 - ii) Improve knowledge about dependence of eastern curlew on key migratory staging sites, and wintering sites to the north of Australia.
 - iii) Improve knowledge about threatening processes including the impacts of disturbance and hunting.

**Part L. Approved conservation advice for curlew sandpiper
(*Calidris ferruginea*)**

- (1) Primary conservation objectives
 - a) International objectives
 - i) Achieve a stable or increasing population.
 - ii) Maintain and enhance important habitat.
 - iii) Disturbance at key roosting and feeding sites reduced.
 - b) Australian objectives
 - i) Achieve a stable or increasing population.
 - ii) Maintain and enhance important habitat.
 - iii) Disturbance at key roosting and feeding sites reduced.
 - iv) Raise awareness of curlew sandpiper within the local community.
 - c) Conservation and management actions
 - i) Work with governments along the East Asian – Australasian Flyway to prevent destruction of key migratory staging sites.
 - ii) Support initiatives to protect and manage key staging sites of curlew sandpiper.
 - iii) Maintain and improve protection of roosting and feeding sites in Australia.
 - d) Conservation and management actions
 - i) Work with governments along the East Asian – Australasian Flyway to prevent destruction of key migratory staging sites.
 - ii) Support initiatives to protect and manage key staging sites of curlew sandpiper.
 - iii) Maintain and improve protection of roosting and feeding sites in Australia.
 - iv) Incorporate requirements for curlew sandpiper into coastal planning and management.
 - v) Manage important sites to identify, control and reduce the spread of invasive species.
 - vi) Manage disturbance at important sites when curlew sandpipers are present – e.g. discourage or prohibit vehicle access, horse riding and dogs on beaches, implement temporary beach closures.
 - vii) Monitor the progress of recovery, including the effectiveness of management actions and the need to adapt them if necessary.
 - e) Monitoring priorities
 - i) Enhance existing migratory shorebird population monitoring programmes, particularly to improve coverage across northern Australia.
 - ii) Information and research priorities
 - iii) More precisely assess curlew sandpiper population size, distribution and ecological requirements particularly across northern Australia.

- iv) Improve knowledge about dependence of curlew sandpiper on key migratory staging sites, and wintering sites to the north of Australia.
- v) Improve knowledge about threatening processes including the impacts of disturbance.

**Part M. Approved conservation advice for humpback whale
(*Megaptera novaeangliae*)**

- (1) Conservation and management actions
 - a) Maintain and improve existing legal and management protection
 - i) Continue or improve existing legislative management actions under the EPBC Act, including the Australian Whale Sanctuary provisions.
 - ii) Australia should maintain its position on promoting high levels of protection for humpback whales in all relevant international agreements including the IWC, Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES), Convention on the Conservation of Migratory Species of Wild Animals (CMS), fisheries related agreements, and the Antarctic Treaty Consultative Meetings (ATCM).
 - b) Understanding impacts of climate variability and change
 - i) Continue to meet Australia's international commitments to reduce greenhouse gas emissions and regulate the krill fishery in Antarctica.
 - c) Assessing and addressing anthropogenic noise; shipping, industrial and seismic surveys
 - i) All seismic surveys must be undertaken consistently with the EPBC Act Policy Statement 2.1 – Interaction between offshore seismic exploration and whales. Should a survey be undertaken in or near a calving, resting, foraging area, or a confined migratory pathway then Part B. Additional Management Procedures must also be applied.
 - ii) For actions involving acoustic impacts (example pile driving, explosives) on humpback whale calving, resting, feeding areas, or confined migratory pathways site specific acoustic modelling should be undertaken (including cumulative noise impacts).
 - iii) Should acoustic impacts on humpback calving, resting, foraging areas, or confined migratory pathways be identified a noise management plan should be developed. This can include:
 - (A) the use of shutdown and caution zones,
 - (B) pre and post activity observations,
 - (C) the use of marine mammal observers and / or Passive Acoustic Monitoring (PAMS), and
 - (D) Implementation of an adaptive management program following verification of the noise levels produced from the action (i.e. if the noise levels created exceed original expectations).
 - d) Addressing infrastructure and coastal development impacts
 - i) Environmental assessment processes must ensure that existing information about coastal habitat requirements of humpback whales, environmental suitability of coastal locations, historic high use and emerging areas are taken into consideration.
 - ii) Environmental assessment and approval processes must ensure that the impacts of coastal development on humpback whales are addressed and minimised. Mitigation and management measures for the construction stage and the ongoing operational impacts are to be included in any plans of management. Significant residual impacts must be offset.
 - e) Reducing commercial fishing entanglements

- i) Commonwealth and state governments with the pot and set net fishing industries to develop and implement codes of conduct to minimise interactions between commercial fishers and humpback whales.
 - ii) Investigate alternative fishing techniques and technologies to reduce the risk of entanglement.
- f) Minimising vessel collisions
 - i) Develop a national vessel strike strategy that investigates the risk of vessel strikes on humpback whales and also identifies potential mitigation measures to reduce the risk of collision.
 - ii) Maximise the likelihood that all vessel strike incidents are reported in the National Ship Strike Database. All cetaceans are protected in Commonwealth waters and, the EPBC Act requires that all collisions with whales in Commonwealth waters are reported. Vessel collisions can be submitted to the National Ship Strike Database at <https://data.marinemammals.gov.au/report/shipstrike>
 - iii) Ensure the risk of vessel strike on humpback whales is considered when assessing actions that increase vessel traffic in areas where humpback whales occur and, if required appropriate mitigation measures are implemented to reduce the risk of vessel strike.
 - iv) Enhance education programs to inform vessel operators of best practice behaviours and regulations for interacting with humpback whales.
- g) Survey and monitoring priorities
 - i) Measuring and monitoring population recovery
 - (A) Continue long-term monitoring of east and west coast populations at appropriate multi-annual intervals to quantify rates of population increase, abundance, migratory interchange and population structure
- h) Information and research priorities
 - i) Assess impacts of increasing anthropogenic threats and undertake a risk assessment to determine the increased exposure of these expanding populations to entanglement, ship strike and acoustic noise.
 - ii) Expand genetic analyses to better define population structure and extent of interchange between subpopulations. In particular the genetic structure of the east coast population and interchange with Pacific humpback whale populations.
 - iii) Assess the impact of whale watching on humpback whales detailing the benefits and negatives of human interactions and the potential for cumulative impacts on the species as they migrate along the coast.

Acronyms and abbreviations

Acronym	Definition
µS/cm	microsiemens per centimetre
AAPS	Australian Airspace Policy Statement
ABARE	Australian Bureau of Agricultural and Resource Economics
ABS	Australian Bureau of Statistics
ACH Act	<i>Aboriginal Cultural Heritage Act 2003</i> (Qld)
AEIS	Additional information to the environmental impact statement
AEP	<i>Allocasuarina emuina</i> population
AHD	Australian Height Datum
ANEC	Australian Noise Exposure concept
ANEF	Australian Noise Exposure forecast
ANO	Aircraft Noise Ombudsman
ANZECC	Australian and New Zealand Environment Conservation Council
ARFFS	Aviation Rescue and Fire Fighting Services Station
ARI	average recurrence interval
ASA	Airservices Australia
ASS	acid sulfate soils
ASSMP	acid sulfate soils management plan
ATC	Air Traffic Control
AS/NZS	Australian Standard/New Zealand Standard
ASX	Australian Stock Exchange
BAC	Brisbane Airport Corporation
BCA	Benefit–cost analysis
BCR	Benefit–cost ration
BOS	biodiversity offset strategy
CAAGR	compound annual average growth rate
CALMET	Californian Meteorological Model—A diagnostic meteorological model used to analyse weather
CAMBA	China–Australia Migratory Bird Agreement
CASA	Civil Aviation Safety Authority
CBD	Convention on Biological Diversity
CEMP	construction environment management plan
CD	chart datum
CHMP	cultural heritage management plan
CIS	community investment strategy
CITES	Convention on International Trade in Endangered Species
CLR	Contaminated Land Register
CO	Carbon monoxide
CO ₂ -e	carbon dioxide equivalent

Acronym	Definition
CPM Act	<i>Coastal Protection and Management Act 1995</i>
DAF	Department of Agriculture and Fisheries
DATSIMA	Department of Aboriginal and Torres Strait island and Multicultural Affairs
dB(A)	decibels measured at the 'A' frequency weighting network
DCS	Department of Community Safety
DE	Commonwealth Department of the Environment
DEEDI	The former Department of Employment, Economic Development and Innovation
EHP	Department of Environment and Heritage Protection
DERM	The former Department of Environment and Resource Management
DIRD	Australian Department of Infrastructure and Regional Development
DOC	Department of Communities (Qld)
DSD	Department of State Development
DSITI	Department of Science, Information Technology and Innovation
DTMR	Department of Transport and Main Roads (Qld)
DSQ	Disability Services Queensland
EA	environmental authority
EDMS	emissions and dispersion modelling system
EIS	environmental impact statement
EMP	environmental management plan
EMR	Environmental Management Register
EP	equivalent persons
EP Act	<i>Environmental Protection Act 1994 (Qld)</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 (Cwlth)</i>
EPC	exploration permit for coal
EPP	Environmental Protection Policy (water, air, waste, noise)
EPP (Air)	Environmental Protection (Air) Policy 2008
EPP (Noise)	Environmental Protection (Noise) Policy 2008
EPP (Water)	Environmental Protection (Water) Policy 2009
ERA	environmentally relevant activity
ESA	environmentally sensitive area
FHA	fish habitat areas
FID	financial investment decision
FSL	full supply level
FTE	full-time equivalent
GA	general aviation
GARID	guidelines for assessment of road impacts of development
GHG	greenhouse gas
GRP	gross regional product

Acronym	Definition
GVA	Gross Value Added
HDPE	high-density polyethylene
HEV	high ecological value
HIRL	high intensity runway lighting
IAS	initial advice statement
ICN	Industry Capability Network
ICLR	independent community liaison representative
IDAS	Integrated Development Assessment System
IECA	International Erosion Control Association
JAG	Queensland Department of Justice and Attorney-General
JAMBA	Japan–Australia Migratory Bird Agreement
KRA	key resource areas
kPa	kilopascal
L _{A1}	those noise levels that are exceeded for one per cent of each one-hour sample period
L _{Aeq}	the average A-weighted sound pressure level of a continuous steady sound that has the same mean square sound pressure as a sound level that varies with time
L _{Amax}	the maximum average A-weighted sound pressure measured over a specified period of time
LAN,T	statistical descriptor for the variation of noise
LGA	local government area
LMRER	Lower Mooloolah River Environmental Reserve
LUX	A unit of illumination that is equal to one lumen per square metre
M ³	cubic metres
Mm ³	million cubic metres
m/s	metres per second
max L _{PZ,15 min}	the maximum value of the Z-weighted sound pressure level measured over 15 minutes
MCU	material change of use
mg/L	milligrams per litre
ML	megalitres
µg/m ³	Micrograms
MNES	matters of national environmental significance
MOU	memorandum of understanding
MBSES	Moreton Bay Sand Extraction Study
MRA	<i>Mineral Resources Act 1989</i> (Qld)
MSES	matters of state environmental significance
MSQ	Maritime Safety Queensland
N/m ²	Newton per square metre
NAL	National Acoustics Laboratories

Acronym	Definition
NC Act	<i>Nature Conservation Act 1992 (Qld)</i>
NCIS	Noise Complaints and Information Service
NASF	National Airports Safeguarding Framework
NEPC	National Environmental Protection Council
NEPM	National Environment Protection Measure
NEPM (Air)	National Environment Protection (Ambient Air Quality Measure 1998)
NFPMS	Noise and Flight Path Monitoring System
NGA	National Greenhouse Accounts
NGAF	National Greenhouse Accounts Factors
NICH	Non-indigenous cultural heritage
NPI	national pollution inventory
NPV	net present value
NGOs	non-government organisations
NO _x	oxides of nitrogen
NO ₂	Nitrogen dioxide
NT agreement	Native title agreement
OAR	Office of Airspace Regulation
OLS	Obstacle Limitation Surface
PANS-OPS	Procedures for Air Navigation Services – Aircraft Operational Surfaces
PASS	Potential acid sulfate soil
PBPL	Port of Brisbane Pty Ltd
pH	Measure of acidity
PIA	pavement impact assessment
PM ₁₀	particulate matter with equivalent aerodynamic diameter less than 10µm
PM _{2.5}	particulate matter with equivalent aerodynamic diameter less than 2.5µm
PPT	parts per thousand
PPV	peak particle velocity, which is a measure of ground vibration magnitude and is the maximum instantaneous particle velocity at a point during a given time interval in mms ⁻¹
PSA	Public Safety Areas
QASSIT	Queensland Acid Sulfate Soils Investigation Team
QASSMAC	Queensland Acid Sulfate Soils Management Advisory Committee
QGEOP	Queensland Government Environmental Offsets Policy
QH	Queensland Health
QH Act	<i>Queensland Heritage Act 1992</i>
QWQG	<i>Queensland Water Quality Guidelines</i>
QUT	Queensland University of Technology
RE	regional ecosystem
REDD	Regional Ecosystem Description Database
REIQ	Real Estate Institute of Queensland

Acronym	Definition
RIA	road impact assessment
RMP	road-use management plan
ROKAMBA	Republic of Korea–Australia Migratory Bird Agreement
RPT	Regular passenger transport
RWY	runway
SALS	Simple approach lighting systems
SARA	State Assessment Referral Agency
SCPS	Sunshine Coast Planning Scheme
SCRC	Sunshine Coast Regional Council
SDAP	State Development Assessment Provisions
SDPWO Act	<i>State Development and Public Works Organisation Act 1971 (Qld)</i>
SDWPO Regulation	State Development and Public Works Organisation Regulation (Qld)
SEQ RP	South East Queensland Regional Plan
SIA	social impact assessment
SIAU	Social Impact Assessment Unit
SIDRA	
SIMP	social impact management plan
SLA	statistical local area
SO ₂	Sulphur dioxide
SPA	<i>Sustainable Planning Act 2009 (Qld)</i>
SPP	state planning policy
TAP	threat abatement plan
TAPM	The Air Pollution Model
TDS	total dissolved solids
TEC	threatened ecological communities
TI Act	<i>Transport Infrastructure Act</i>
TMP	traffic management plan
TOR	terms of reference
TSP	total suspended particles
TSS	totally suspended solids
VM Act	<i>Vegetation Management Act 1999 (Qld)</i>
VIA	visual impact assessment
VOC	volatile organic compounds
WHMA	Wallum Health Management Area
WHO	World Health Organisation
WMP	waste management plan
WQO	water quality objective
WRP	water resource plan

Glossary

Term	Definition
air pollution model	A software package which assesses the spread and impact of air pollution
assessment manager	For an application for a development approval, means the assessment manager under the <i>Sustainable Planning Act 2009</i> (Qld).
bilateral agreement	The agreement between the Australian and Queensland governments that accredits the State of Queensland's EIS process. It allows the Commonwealth Minister for the Environment to rely on specified environmental impact assessment processes of the state of Queensland in assessing actions under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cwlth).
Bonn Convention	Convention on the Conservation of Migratory Species of Wild Animals
Biofouling	The attachment of marine organisms to any part of a vessel hull (including the hulls, rudders, propellers and other hull appendages) or internal seawater systems, or any equipment (including mooring devices, bilges and anchors wells etc).
Californian Meteorological model (CALMET)	A diagnostic meteorological model used to analyse weather
construction areas	The construction worksites, construction car parks, and any areas licensed for construction or on which construction works are carried out.
controlled action	A proposed action that is likely to have a significant impact on a matter of national environmental significance; the environment of Commonwealth land (even if taken outside Commonwealth land); or the environment anywhere in the world (if the action is undertaken by the Commonwealth). Controlled actions must be approved under the controlling provisions of the <i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cwlth).
controlling provision	The matters of national environmental significance, under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cwlth), that the proposed action may have a significant impact on.
coordinated project	A project declared as a 'coordinated project' under section 26 of the SDPWO Act. Formerly referred to as 'significant projects'.
Coordinator-General	The corporation sole constituted under section 8A of the <i>State Development and Public Works Organisation Act 1938</i> and preserved, continued in existence and constituted under section 8 of the SDPWO Act.

environment	<p>As defined in Schedule 2 of the SDPWO Act, includes:</p> <ol style="list-style-type: none"> ecosystems and their constituent parts, including people and communities all natural and physical resources the qualities and characteristics of locations, places and areas, however large or small, that contribute to their biological diversity and integrity, intrinsic or attributed scientific value or interest, amenity, harmony and sense of community the social, economic, aesthetic and cultural conditions that affect, or are affected by, things mentioned in paragraphs (a) to (c).
environmental effects	Defined in Schedule 2 of the SDPWO Act as the effects of development on the environment, whether beneficial or detrimental.
environmentally relevant activity (ERA)	An activity that has the potential to release contaminants into the environment. Environmentally relevant activities are defined in Part 3, section 18 of the <i>Environmental Protection Act 1994</i> (Qld).
EIS documentation	EIS documentation consisting of the EIS, AEIS and further information on aircraft noise. Refer to http://www.statedevelopment.qld.gov.au/assessments-and-approvals/sunshine-coast-airport-expansion.html
frugivore	Any animal that subsists totally or primarily on fruit
further information	Further information obtained from the proponent on aircraft noise. Refer to http://www.statedevelopment.qld.gov.au/assessments-and-approvals/sunshine-coast-airport-expansion.html
imposed condition	A condition imposed by the Queensland Coordinator-General under section 54B of the SDPWO Act. The Coordinator-General may nominate an entity that is to have jurisdiction for the condition.
initial advice statement (IAS)	<p>A scoping document, prepared by a proponent, that the Coordinator-General considers in declaring a coordinated project under Part 4 of the SDPWO Act. An IAS provides information about:</p> <ul style="list-style-type: none"> the proposed development the current environment in the vicinity of the proposed project location the anticipated effects of the proposed development on the existing environment possible measures to mitigate adverse effects.

matters of national environmental significance	<p>The matters of national environmental significance protected under the <i>Environment Protection and Biodiversity Conservation Act 1999</i>. The eight matters are:</p> <ul style="list-style-type: none"> a) world heritage properties b) national heritage places c) wetlands of international importance (listed under the Ramsar Convention) d) listed threatened species and ecological communities e) migratory species protected under international agreements f) Commonwealth marine areas g) the Great Barrier Reef Marine Park h) nuclear actions (including uranium mines).
Nectarivore	An animal which derives its energy and nutrient requirements from a diet consisting mainly or exclusively of the sugar-rich nectar produced by flowering plants.
nominated entity (for an imposed condition for undertaking a project)	An entity nominated for the condition, under section 54B(3) of the SDPWO Act.
Particulates PM ₁₀ and PM _{2.5}	Particulate matter with an aerodynamic diameter less than 2.5 or 10 micrometres. Particles of 2.5 micrometres make up a large proportion of dust that can be drawn deep into the lungs, while particles of 10 micrometres tend to be trapped in the nose, mouth or throat
properly made submission (for an EIS or a proposed change to a project)	<p>Defined under section 24 of the SDPWO Act as a submission that:</p> <ul style="list-style-type: none"> i) is made to the Coordinator-General in writing j) is received on or before the last day of the submission period k) is signed by each person who made the submission l) states the name and address of each person who made the submission m) states the grounds of the submission and the facts and circumstances relied on in support of the grounds.
proponent	The entity or person who proposes a coordinated project. It includes a person who, under an agreement or other arrangement with the person who is the existing proponent of the project, later proposes the project.
Significant project	A project declared (prior to 21 December 2012) as a 'significant project' under section 26 of the SDPWO Act. Projects declared after 21 December 2012 are referred to as 'coordinated projects'.

stated condition	<p>Conditions stated (but not enforced by) the Coordinator-General under sections 39, 45, 47C, 49, 49B and 49E of the SDPWO Act. The Coordinator-General may state conditions that must be attached to a:</p> <ul style="list-style-type: none"> • development approval under the <i>Sustainable Planning Act 2009</i> • proposed mining lease under the <i>Mineral Resources Act 1989</i> • draft environmental authority (mining lease) under Chapter 5 of the <i>Environmental Protection Act 1994</i> (EPA) • proposed petroleum lease, pipeline licence or petroleum facility licence under the <i>Petroleum and Gas (Production and Safety) Act 2004</i> • non-code compliant environmental authority (petroleum activities) under Chapter 4A of the EPA.
works	<p>Defined under the SDPWO Act as the whole and every part of any work, project, service, utility, undertaking or function that:</p> <ul style="list-style-type: none"> n) the Crown, the Coordinator-General or other person or body who represents the Crown, or any local body is or may be authorised under any Act to undertake, or o) is or has been (before or after the date of commencement of this Act) undertaken by the Crown, the Coordinator-General or other person or body who represents the Crown, or any local body under any Act, or p) is included or is proposed to be included by the Coordinator-General as works in a program of works, or that is classified by the holder of the office of Coordinator-General as works.
fish habitat	<p>Fish habitat is defined under the <i>Fisheries Act 1994</i> and includes land, waters and plants associated with the life cycle of fish, and includes land and waters not presently occupied by fisheries resources.</p>
marine plants	<p>Marine plants are defined under the <i>Fisheries Act 1994</i> and include the following:</p> <ul style="list-style-type: none"> a) a plant (a tidal plant) that usually grows on, or adjacent to, tidal land, whether it is living, dead, standing or fallen; b) material of a tidal plant, or other plant material on tidal land; c) a plant, or material of a plant, prescribed under regulation or management plan to be a marine plant.

The Coordinator-General
PO Box 15517, City East Qld 4002
tel 13 QGOV (13 74 68)
fax +61 7 3452 7486
info@dsd.qld.gov.au

www.statedevelopment.qld.gov.au