BRISBANE AIRPORT CORPORATION

AIRPORT INDUSTRIAL PARK – STAGE 2

MAJOR DEVELOPMENT PLAN

21 March 2023

Document Control

Version	Date	Section/Page	Authorised by	Comment
A	28/10/2020	Exposure Draft	Ant Halapua	Initial Draft for review by Department of Infrastructure (Cth.)
B	11/2/2021	Preliminary Draft	Ant Halapua	Preliminary Draft for review by Department of Infrastructure (Cth.) and for public comment
C	6/8/2021	Draft	Ant Halapua	Draft for review by the Minister for Infrastructure (Minister)
0	4/2/2022	Final	Ant Halapua	Final MDP as approved by the Minister
1	9/11/2022	Minor Variation Exposure Draft	Ant Halapua	Draft for review by the Department of Infrastructure (Cth.)
2	29/11/2022	Minor Variation Draft	Ant Halapua	Draft for review by the Minister for Infrastructure (Minister)
3	21/03/2023	Final MDP, as varied	Ant Halapua	Final MDP, as varied, as approved by the Minister

Contents

Appendices

Appendix A: AIP Conceptual Lot Plan

Appendix B: MDP checklist

Appendix C: Conceptual Site Model

Figures

Tables

EXECUTIVE SUMMARY

Brisbane Airport Corporation Pty Ltd (BAC) has prepared this Major Development Plan (MDP) – minor variation, as an amendment to the approved MDP, for the delivery of Stage 2 of the Airport Industrial Park (AIP) Neighbourhood, referred to as AIP2. The amendment involves extending the site boundary of the approved AIP2 MDP to accommodate the building development of an adjacent block within the AIP precinct. The proposed project will deliver an additional 44 hectares of gross lettable area for industrial purposes within the AIP Neighbourhood. Services and landscaped road connections are also included within the proposed project. BAC, as the Airport Lessee Company (ALC) under the *Airports Act 1996* (Airports Act), is responsible for the submission of the MDP.

Key findings

Operational assessment

Aviation operations and safety

Prescribed Airspace, Airservices Communications, Navigation, Surveillance and Air Traffic Control operations, vertical plume rises, lighting, reflections and wind shear have been assessed across the AIP2 site and no adverse impacts to aviation operations and safety have been identified for the construction or operational phases.

Ground transport operations

The construction and operation of AIP2 will generate additional vehicle movements to and around the AIP2 site. The existing road network has been analysed to understand the available capacity within the network.

The road network has sufficient capacity to accommodate the estimated additional construction traffic movement without compromising on safety or efficiency.

The existing network has sufficient capacity to accommodate the additional operational traffic without compromising on safety or efficiency with the exception of Lomandra Drive and Enterprise Lane intersection. A single lane roundabout is expected to be required when AIP2 is fully developed to ensure all movements are catered for, and sufficient capacity is provided.

Environment assessment

The environmental impacts from the construction and operation of AIP2 were assessed, including the potential for impacts to soils, ground and surface water, air quality, ecology, noise and vibration, waste, hazardous chemicals and dangerous goods, and cultural heritage.

The assessment of impacts included consideration of the context of the AIP2 development within the broader airport site environment and neighbouring industrial precincts off airport. The AIP2 site is terrestrial and isolated from the majority of BAC identified areas of environmental value. This includes the Moreton Bay Ramsar wetlands located 4.7km to the west.

The assessment has identified a number of areas where impacts may be possible during construction and operation of AIP2. During the construction phase, there is potential for contaminants (such as acid sulfate, or PFAS) to leach into the groundwater. There is also the potential for the disturbance of asbestos materials.

A site-specific risk assessment will be undertaken to inform the design of the development and Environmental Management Plans (EMP). EMP appropriate for the various stages of the development will be approved and CEMP (Construction EMP) effected prior to the commencement of construction.

With the identification and incorporation of mitigation and management measures to be addressed as part of design and EMP development, the residual environmental impacts are not considered to be material.

1. INTRODUCTION

1.1 Background

Brisbane Airport Corporation Pty Ltd (BAC) is the operator of Brisbane Airport which serves as the premier aviation gateway to Queensland. Brisbane Airport currently consists of two runways, two major terminals, and immediately prior to the COVID-19 pandemic accommodated 35 airlines flying to 84 domestic and international destinations.

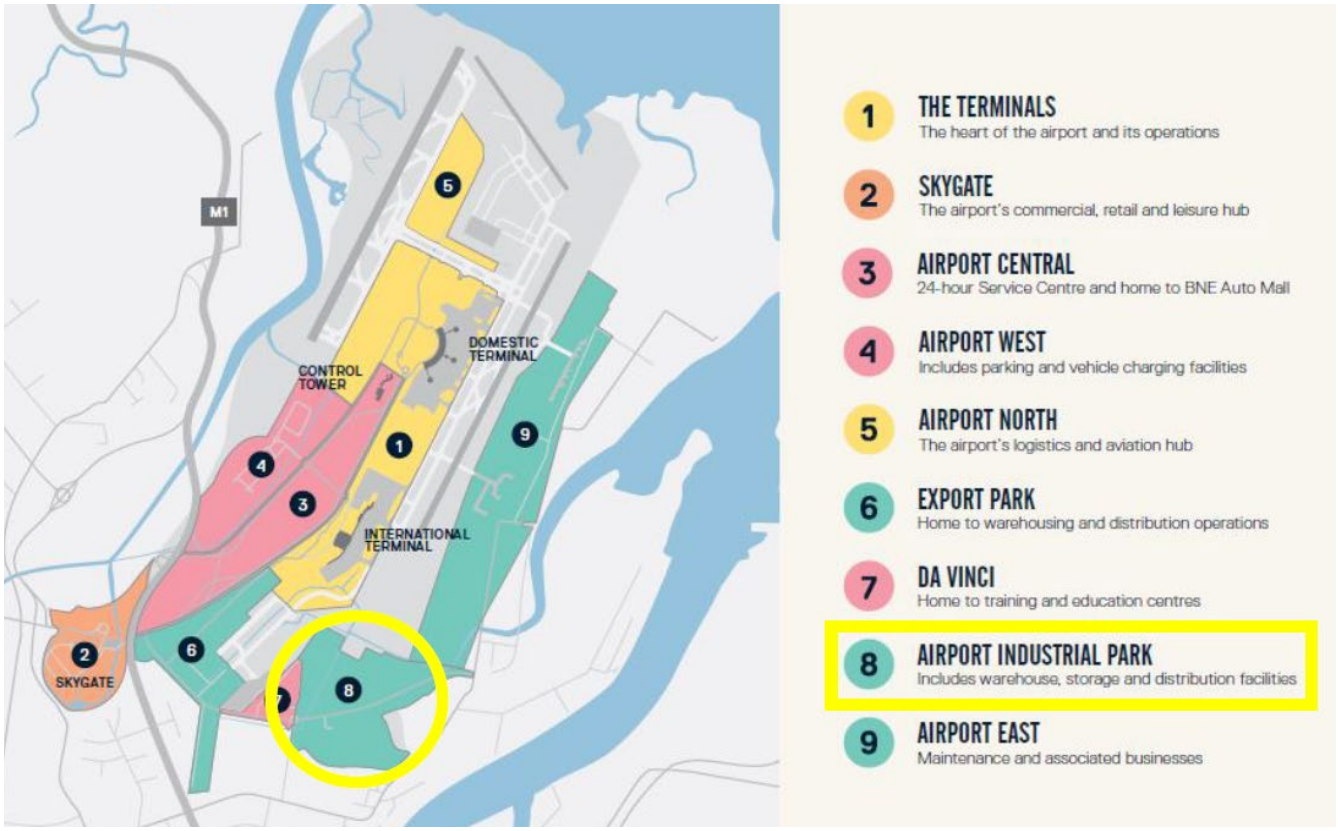
Brisbane Airport is the second largest capital city airport in Australia by land size with 2,700 hectares of land and is located approximately 12km from the Brisbane central business district (CBD).

BAC's extensive landholding in close proximity to Brisbane CBD offers a unique planning opportunity to capitalise on BAC's aim to become a major multimodal transport hub and to provide world class commercial development opportunities.

Over the last three decades, Brisbane Airport has seen growth and diversification of land uses to complement its ongoing aviation development and function.

To support this growth and as documented in the 2020 Brisbane Airport Master Plan (Master Plan), the airport has been organised into definable separate neighbourhoods aligned with the vision of the Brisbane 2022 New World City Action Plan (refer to Figure 1). These neighbourhoods have been designed to create strong complementary communities of interest where businesses located together have the potential to derive benefits from the location in terms of shared or common services and facilities.

Figure 1 Airport neighbourhoods



These include the Airport Industrial Park (AIP) neighbourhood located at the southern end of the airport.

The Master Plan describes AIP as a relatively blank canvas, offering opportunities for industrial development. Opportunities exist across the 100-hectare site for the establishment of a wide range of uses,

including those that benefit from the adjacent specialised education centres of the Da Vinci precinct, and the current large-scale industrial and aviation related uses within Airport East.

AIP will provide opportunity to accommodate a range of warehousing, storage, and distribution operations. The development offers potential linkages to the Pinkenba and Eagle Farm industrial areas, with the opportunity for airside access.

1.2 Development plan

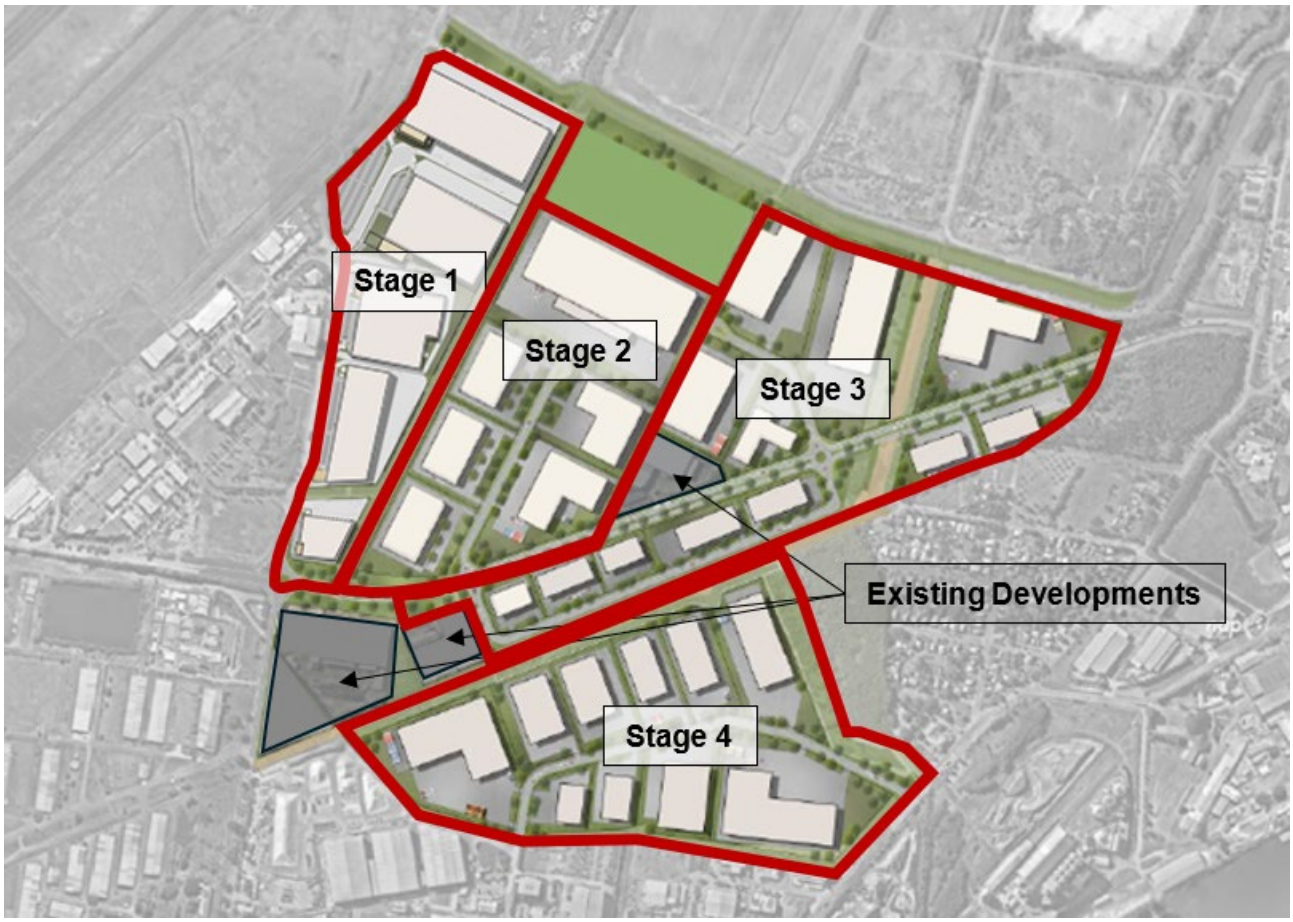
The first phase of AIP neighbourhood planning involved developing an indicative master plan for property lots and supporting infrastructure as shown in Figure 2.

Figure 2 AIP indicative master plan

An indicative lot plan has been included in Appendix A for additional reference.

The indicative AIP master plan has been used as the basis of the current property development plan for the neighbourhood with four major delivery stages identified. The four delivery stages are indicatively shown in Figure 3.

Figure 3 AIP indicative delivery staging



The first phase of the delivery has commenced with the land development and civil infrastructure for Stage 1 of the AIP development being substantially complete.

This initial delivery stage involved bulk earthworks and minor civil infrastructure augmentation to support the new 22-hectare industrial land development site. The construction of this stage commenced in 2015 and did not trigger a Major Development Plan (MDP).

1.3 Project summary

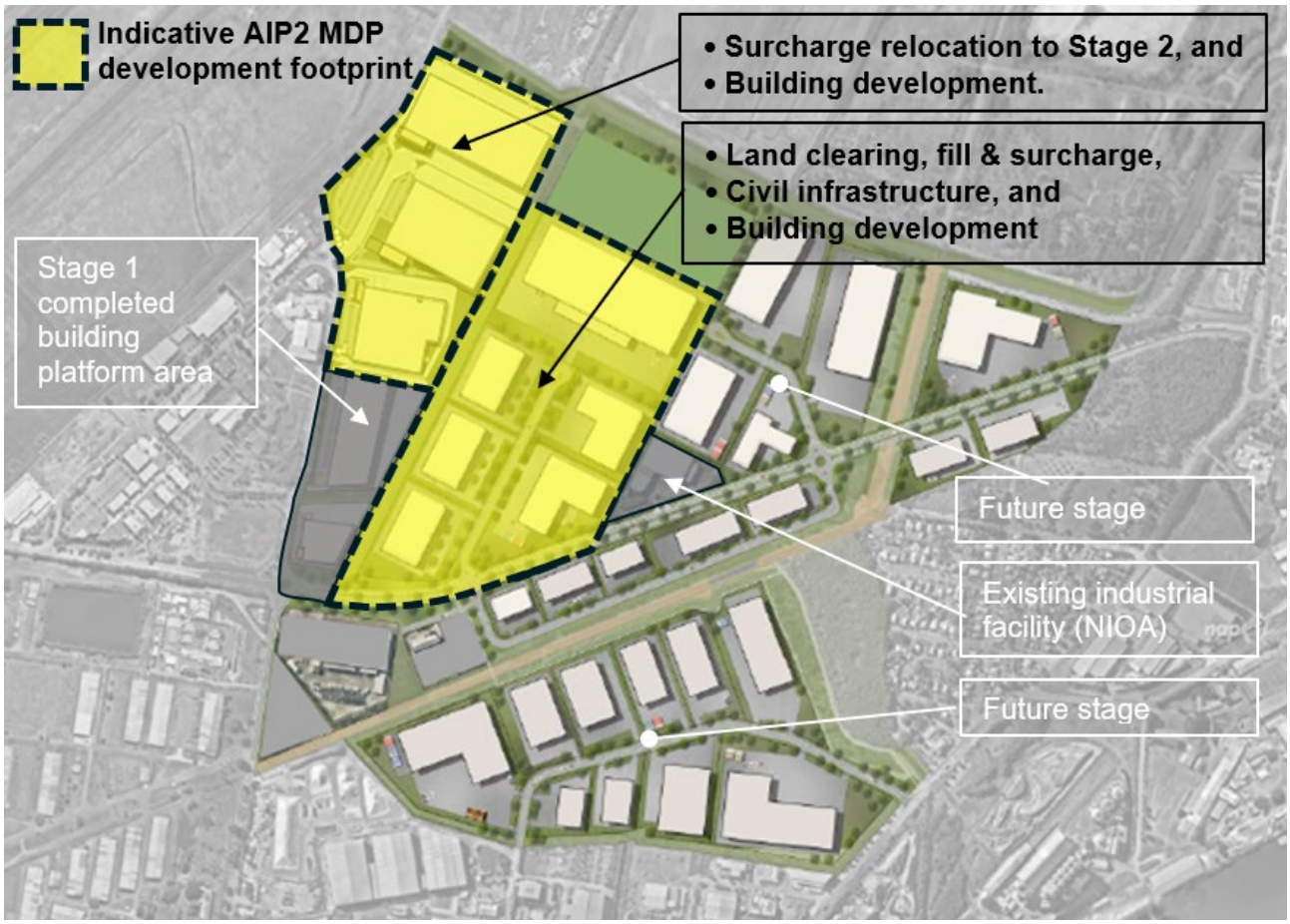
The AIP neighbourhood is classified as a general industrial zone in the Master Plan, providing commercial opportunity for a range of warehousing, storage, and distribution operations.

The project and subject of this MDP is AIP - Stage 2 (AIP2). The AIP2 MDP scope as shown in Figure 4 includes:

- The relocation to the AIP2 greenfield area of excess fill stockpiled on the northern lot of the first stage of the AIP precinct (Lot ID number AIPN004), and any building development on the completed northern lot.

- Adjustment to the previously approved development boundary to incorporate an adjacent lot with a previously completed building platform (Lot ID number AIPN003), including the building development
- Property lot development within that second stage of the land development area, AIP Stage 2 (Lot ID numbers AIPN005 to AIPN009, and AIPN013 to AIPN014) including:
    - Site clearing.
    - Building platform and surcharge earthworks.
    - Construction of civil infrastructure to service the property lots.
    - Building development.

Figure 4 AIP2 scope of works



Upon completion, the AIP2 MDP development will deliver:

- A cleared, filled, surcharged, and serviced additional site within the AIP neighbourhood of approximately 44 hectares of gross lettable area for industrial purposes.
- A fully serviced and landscaped road to connect the new development stage.
- Building developments on the northern lots of Stage 1 and within the Stage 2 footprint.

The approximately 44 hectares of gross lettable land is made up of approximately 27 hectares of currently greenfield land, with the balance (circa 17 hectares) to be made available by the relocation of surcharge (excess fill) stockpiled on the northern lots on the substantially completed first stage of AIP land development (Stage 1).

1.4 Project objectives and justification

The Master Plan defines the vision for Brisbane Airport as the creation of a "sustainable world-class airport, a distinctive place that visitors keep coming back to, and the best possible neighbour and business partner, building collaborative relationships, exploring opportunities for sustainable growth and acting with integrity in guiding the airport towards a brighter future for all" by:

- Continuing to grow the airport to provide a wider range of services to the people of Brisbane, Queensland, and the rest of Australia.
- Focusing on responsible development, ensuring that it will continue to be viewed with pride by future generations.
- Connecting Brisbane and the state of Queensland to the rest of the world.

The vision is delivered through Brisbane Airport's Land Use Plan (detailed in the Master Plan) which aims to increase Brisbane Airport's contribution to the regional economy and respond to market demand, with opportunities for a mix of business, retail, industrial and tourism activities.

AIP2 will enable the development of a currently undeveloped parcel of airport land to create an industrial business community, promote growth and development activity, and support the South-East Queensland economic engine.

1.5 Location of proposed development

The development is located within the AIP neighbourhood at the southern end of the airport. The AIP2 footprint consists of a mostly undeveloped parcel of land accessed via Lomandra Drive which forms the southern boundary of the development. AIP is currently home to existing industrial businesses which include the new 11,260m^2 distribution centre for Quality Food and Beverages.

The northern boundary of AIP2 is the airfield which will provide an opportunity for limited airside access for the adjacent building lots.

1.6 MDP purpose

This MDP has been prepared for the delivery of AIP2 by BAC. The Airports Act 1996 (Airports Act), section 91 (1A) states that the purpose of an MDP in relation to an airport is to establish the details of a major airport development that:

(a) relates to the airport, and

(b) is consistent with the airport lease for the airport and the final master plan for the airport.

An MDP must be prepared by the airport-lessee company in accordance with the contents outlined in section 91 of the Airports Act and submitted to the Minister for Infrastructure, Transport and Regional Development (the Minister) for approval.

Accordingly, this MDP outlines:

- Details of the development including design considerations, supported infrastructure, and staging.
- Legislative requirements.
- Operational and environment assessment.

Subsequent to the AIP2 MDP approval, a minor amendment to include the adjacent lot AIPN003 (AIP1) and building work on lot AIPN003 is proposed, in accordance with Section 95 of the Airports Act.

1.7 Project proponent

All works associated with the proposed development are on land within the existing boundary of the Brisbane Airport. BAC is an “airport lessee company” under the Airports Act. The proponent for this proposed MDP as defined under the Act is:

Brisbane Airport Corporation Pty Ltd
11 The Circuit
Brisbane Airport Qld 4008

The contact in connection with this proposal is Ant Halapua, Program Manager – Commercial & Trunk Infrastructure, telephone (07) 3406 5781.

2. PROJECT DETAILS

2.1 Proposed land uses

The Master Plan establishes that the AIP precinct falls within a general industrial zone. This land use zone provides for a range of uses which capitalises on its proximity to extensive transport networks as well as the Port of Brisbane and Trade Coast Central. Typical uses permitted in the industrial land use zone include distribution centres, freight handling facilities, storage, offices or research and technology industries.

A key feature of AIP is its proximity to the airside environment which lends itself to produce markets, freight handling, distribution centres and emergency service activities - any of which would benefit from direct airside access that will be available in AIP. BAC anticipates other areas of AIP that will not have direct airside frontage would ideally suit offices, showrooms or warehouses, animal keeping, work depots or hardware and trade supplies.

Some areas of AIP are in the vicinity of approach and departure paths for RWY 01R/19L. BAC expects those areas would be ideally suited to land uses relating more to industrial processes, transport depots, warehousing, or storage facilities.

A development of this scale also requires a level of support services to be offered. These types of services could include telecommunications facilities, food and drink outlets, car parks, recreation areas or public transport facilities.

2.2 Consistency with Brisbane Airport 2020 Master Plan

The Master Plan considers all aspects of airport operations for the next five years, including the planning framework for new development and aviation activity, environmental management, and transport planning. The Master Plan also considers strategic investment opportunities and initiatives at the Brisbane Airport over a 20-year planning horizon.

The Master Plan provides a foundation for BAC to plan for growth and to create Brisbane Airport's future. To create this, the Master Plan focusses on four key areas:

- Growing Aviation Markets.
- Excellence in Customer Satisfaction.
- Supporting Business Growth.
- Driving Economic Prosperity.

The AIP2 development is consistent with the Master Plan and aligns with the overarching development objectives outlined in Table 1.

Table 1 MDP alignment with development objectives

Development Objective	Alignment
Growing aviation markets: • Increasing connectivity. • Delivering capacity to meet demand. • Secure, safe, and efficient airport operation. • Investing in collaborative partnerships.	Investing in operating capacity is essential to ensure business continuity and the sustainable growth in demand for aviation. AIP will provide opportunities for aviation support businesses to operate and expand, including: • freight and distribution operations. • storage facilities. • industrial warehousing. • aviation education facilities. • office space.

Development Objective	Alignment
Excellence in customer satisfaction: • Smarter journeys. • Better journeys. • Accessibility for all.	The AIP development allows for flexible land divisions and good transport connections to Greater Brisbane and South East Queensland. Combined, these opportunities provide businesses agility to meet growing customer demand. A guiding principle for BAC is that facilities are accessible to the community, passengers, staff, and visitors. Site-specific accessibility will be addressed through the development approval process and reflect the operational needs of the specific buildings and uses.
Supporting business growth: • Creating collaborative business neighbourhoods. • Maximising ground connectivity. • Investing in sustainability. • Connecting business.	AIP is about supporting growth in business and providing opportunities for businesses to collaborate and connect at Brisbane Airport. The AIP neighbourhood offers opportunities for industrial development across the site including a wide range of uses that benefit from the adjacency of the Da Vinci precinct to the west and the large scale industrial and aviation related uses within Airport East.
Driving economic prosperity: • Enabling growth in economic wealth. • Proactive community engagement. • Enabling long term job creation. • Connecting Brisbane to the world.	The global connection Brisbane Airport offers is a catalyst for Brisbane and the surrounding regions to create business and tourist opportunities with the economies of Asia and beyond. The AIP precinct development will provide direct employment for local communities, during both construction and operations, thereby continuing to support long-term job creation.

From a land use perspective, the area covering AIP is zoned as general industry. General industry allows for a range of possible uses such as:

- Animal keeping.
- Car parking.
- Distribution centre.
- Freight handling facility.
- Sport and recreation.
- Office.
- Produce market.
- Storage premises.
- Warehouse.
- Works depot.

The Master Plan also contains the Airport Environment Strategy (AES). The AES assesses the environmental values of the airport and provides action plans and measurable goals for the ongoing management and improvement of environmental outcomes. The proposed development is consistent with the AES and is not located in the Brisbane Airport Biodiversity Zone or any Environmentally Significant Areas identified in the AES. BAC will ensure reasonable and practicable efforts are made to mitigate any environmental impacts identified in this MDP during construction and operation. This is to be achieved through the submission of this MDP, submission of staged Building Approval, preparation of EMP, and subsequently the development and implementation of CEMP for construction. Depending on the activities

within the future building facilities, tenants may also be required to develop and implement Operational Environmental Management Plans (OEMP) to address potential environmental impacts due to operations.

2.3 Project design

The indicative AIP master plan provides a high-level overview of potential precinct development opportunities. All design elements required for AIP2 will be undertaken in accordance with overarching guidelines which include:

- Brisbane Airport Planning Guidelines.
- BAC Master Industrial Tenancy Brief.
- BAC's suite of technical and design guidelines (Airport Technical Guidelines).

Further to the indicative AIP master plan, BAC has undertaken engineering assessments to understand the impacts and constraints applicable to AIP2. Key considerations to be addressed in future design development are outlined in the following sections.

2.3.1 Building design

All AIP2 developments will be designed in accordance with:

- All relevant Australian Standards.
- Brisbane Airport Planning Guidelines.
- BAC Master Industrial Tenancy Brief.
- Airport Technical Guidelines.

In most circumstances, building design will be undertaken following an agreement with a potential tenant. The building will be designed in consultation with BAC to ensure that the tenants' needs are met within the constraints of the site. There are opportunities within AIP2 to alter the internal lot boundaries to accommodate the needs of a future developer, however these opportunities will be reviewed against BAC's planning guidelines.

The Brisbane Airport Planning Guidelines establish the minimum planning requirements for each aspect of a property development. In addition, they outline the details of a series of performance-based planning objectives.

2.3.1.1 Expected building quality and set out

Buildings must achieve a high standard of design and must make a positive contribution to the desired precinct character and amenity. Typical requirements would require that the proposed buildings:

- Should contribute positively to the desired character, urban form, and function of the precinct.
- Be consistent with surrounding development and streetscape.
- Must not compromise existing or future service corridors or infrastructure delivery.
- Will consider and incorporate emergency services access requirements and specific building requirements, particularly fire protection.
- Will not adversely impact the amenity of public spaces.

Minimum building setbacks are detailed in the Brisbane Airport Planning Guidelines. The following setbacks to the building face are generally acceptable:

- Six metres from the front boundary (main street frontage).
- Three metres from the side boundary.

- Three metres from the rear boundary.
- Four metres from a secondary street frontage.
- For a corner site, setbacks maintain sightlines for all road users.

2.3.1.2 Building materials

All prospective developers must comply with BAC's Master Industrial Tenancy Brief, the requirements of an Agreement to Lease, and appropriate and relevant BAC guidelines and requirements. Generally, the external building materials will consist of the following:

- External walls to be a mixture of a painted compressed fibre cement, Colorbond metal or painted precast concrete to suit architectural design intent.
- Coloured (standard Colorbond colours) steel sheeting complete with all necessary head and sill flashings and fixings, above paint finished concrete dado wall construction.
- Concrete dado walls to be 2400mm high solid wall, reinforced concrete tilt, externally painted with "light texture finish".
- Colorbond metal deck roof sheeting with concealed fixings laid over foil backed fibreglass blanket insulation and safety mesh.
- Must have a non-reflective finish to ensure that glare from the buildings do not impact the safe operation of aircraft and air traffic control.

2.3.1.3 Building noise attenuation

The developments must adequately attenuate for noise in buildings to protect the health and wellbeing of occupants and to ensure no adverse impacts from noise affecting adjoining developments.

Developments must comply with Schedule 4 of the *Airports (Environment Protection) Regulations 1997 (excessive noise guidelines)* and BAC's Noise Impact Assessment Policy.

2.3.1.4 Building heights

Safe aviation operations rely on maintaining an airport environment as free as practical from obstacles that might impede the safety, efficiency, or regularity of current and future aircraft operations.

Under the Regulations, the 'prescribed airspace' for Brisbane Airport is made up of the obstacle limitation surface (OLS) and procedures for air navigation services – aircraft operations (PANS-OPS) surfaces. To ensure that there is no impact to aircraft and air traffic control operations the developments must not create a permanent obstruction into the airspace above the OLS and PANS-OPS surfaces.

Proposed developments will be reviewed against the airspace requirements to ensure no impairment of aircraft operations.

2.3.1.5 Building sustainability

Long term environmental sustainability is a fundamental tenet of BAC's operating philosophy and is therefore intrinsically linked to the successful attainment of economic, operational, and social objectives. Consideration of sustainability and environmental responsibility remains at the heart of every investment and development project at Brisbane Airport. BAC manages its growth and operations in a manner that minimises environmental and social impacts and embeds sustainability principles and practices into its operations.

BAC aims to achieve best practice economic sustainability performance for development projects at Brisbane Airport by incorporating principles of sustainable and efficient design in both the construction and operational phases.

As outlined in the Industrial Tenancy Building Brief, applicants are also required to undertake a high-level sustainability assessment as part of concept design. The focus of the assessment is generally:

- Energy efficiency and renewable energy.
- Waste minimisation.
- Climate responsive design.
- Water efficiency and re-use.
- Whole of life costs.
- Indoor environment quality.

At a minimum, any new building developments must conform to the energy efficiency requirements of the Australian Building Code NCC 2022 Energy Efficiency.

2.3.2 Environmental

The Master Plan includes an Airport Environment Strategy (AES). The AES outlines BAC's continuing commitment to best practice in environmental compliance and sustainability and includes details of affirmative measures and actions to be implemented over the next five years at Brisbane Airport to ensure continuous improvement in all aspects of environmental management.

In addition to the AES, AIP2 will be developed in accordance with applicable standards and guidelines.

While environmental aspects are principally administered by Federal legislation relevant to airports, State laws may be applicable in certain circumstances. In practice, the application of State laws is resolved using two principles:

- Commonwealth legislation is always paramount, and State law is excluded where there is direct or indirect inconsistency between Commonwealth and State law.
- State legislation is applicable in specific circumstances (e.g., where no Commonwealth law exists or where State law can operate concurrently).

Whilst the following list is not comprehensive, relevant standards and guidelines may include:

- *Airports (Environmental Protection) Regulations 1997* (AEPR 1997).
- *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) (EPBC Act).
- *AS/NZS 4482.1 – 2005, Guide to the Sampling and Investigation of potentially contaminated soil – Non-volatile and semi-volatile compounds* (Standards Australia 2005).
- *AS/NZS 4482.2 – 1999, Guide to the Sampling and Investigation of potentially contaminated soil – Volatile compounds* (Standards Australia 1999).
- *Environmental Protection Act 1994* (EP Act).
- *Environmental Protection Regulation 2019.*
- *Health Screening Levels for Petroleum Hydrocarbons in Soil and Groundwater* (CRC CARE) (Friebel and Nadebaum 2011).
- *Heads of EPA Australia and New Zealand 2020, PFAS National Environmental Management Plan (PFAS NEMP), Version 2.0*, January 2020.
- *National Environment Protection (Assessment of Site Contamination) Measure 1999 (amendment 1, 2013)* (ASC NEPM 2013).
- *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG 2018).
- *Guidelines for the Assessment, Remediation and Management of Asbestos – Contaminated Sites in Western Australia 2009.*

- National Acid Sulfate Soils Guidance: National acid sulfate soils sampling and identification methods manual (Sullivan et al. 2018a).
- National Acid Sulfate Soils Guidance: National acid sulfate soils identification and laboratory methods manual (Sullivan et al. 2018b).
- National Acid Sulfate Soils Guidance: Guidance for the dewatering of acid sulfate soils in shallow groundwater environments (Shand et al. 2018).

2.3.3 Aviation

AIP2 developments will be designed to comply with the requirements of the following guidelines and standards:

- National Airports Safeguarding Framework:
  - Guideline A: Measures for Managing Impacts of Aircraft Noise.
  - Guideline B: Managing the Risk of Building Generated Windshear and Turbulence at Airports.
  - Guideline C: Managing the Risk of Wildlife Strikes in the Vicinity of Airports.
  - Guideline D: Managing the Risk of Wind Turbine Farms as Physical Obstacles to Air Navigation.
  - Guideline E: Managing the Risk of Distractions to Pilots from Lighting in the Vicinity of Airports.
  - Guideline F: Managing the Risk of Intrusions into the Protected Airspace of Airports.
  - Guideline G: Protecting Aviation Facilities — Communications, Navigation and Surveillance (CNS).
  - Guideline H: Protecting Strategically Important Helicopter Landing Sites.
  - Guideline I: Managing the Risk in Public Safety Areas at the Ends of Runways.
- Civil Aviation Safety Authority Manual of Standards Part 139.
- International Civil Aviation Organisation Annex 14.
- Queensland State Planning Policy.
- Civil Aviation Safety Authority Advisory Circular AC 139-05 Plume Rise Assessments.

2.3.4 Civil infrastructure

AIP2 development will include the required civil infrastructure to support the industrial operations within the neighbourhood. The civil infrastructure developed will be consistent with the Master Plan and be designed and delivered in accordance with the relevant Austroads and Australian Standards.

BAC will work closely with the successful design and construction contractors to develop a detailed design that is aligned with the objectives of the Master Plan.

2.3.4.1 New access road

To enable access to the proposed development, a new access road will be developed linking to Lomandra Drive. The access road will accommodate all required vehicle movements and supporting civil infrastructure, such as utilities, drainage, and pedestrian and active transport facilities. The design will be consistent with the Master Plan, BAC's road hierarchy, Austroads and relevant Australian Standards.

2.3.4.2 Parking

Parking areas are to be provided within the tenancies of AIP2 and will be designed to create a comfortable space for staff, visitors, and customers. Parking will be developed in accordance with the Brisbane Airport Planning Guidelines.

2.3.4.3 Public transport, pedestrian, and active transport network

While the primary mode of transport to access the AIP2 neighbourhood is expected to be private and commercial vehicles, the development will consider design features to accommodate public transport and allow for active transport to and from the site. The AIP2 will provide a pedestrian network consistent with the Master Plan and active transport strategies. The facilities will be developed in accordance with Brisbane Airport Planning Guidelines and Austroads Guide to Road Design, Part 6A.

2.3.4.4 Water quality

Successful design and construction contractors will be required to comply with BAC's Landside Stormwater Quality Management Strategy and consider water-sensitive urban design within the scope of their development.

2.3.5 Landscaping

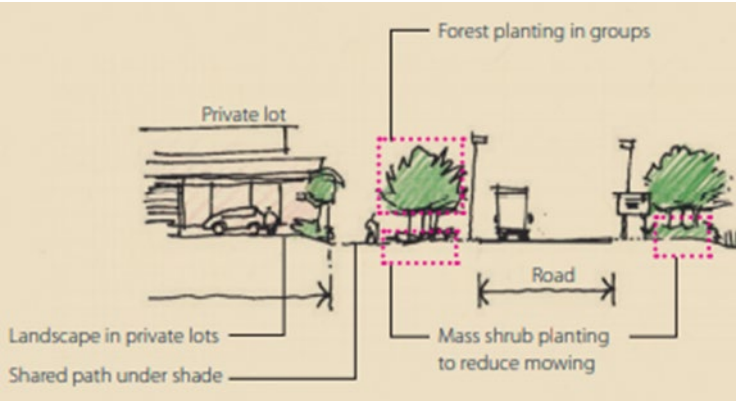
Landscaping around AIP2 will be consistent with the Brisbane Airport Landscape Setting Strategy focusing on providing the following characteristics:

- Adopts a use of a naturalistic and limited palette of native species.
- The structure of planting is to be used to clearly define and articulate precinct 'gateways'.
- Careful consideration of species choice, to:
    - provide shade.
    - minimise wildlife attraction (i.e., non-edible, non-roosting).
    - minimise maintenance requirements.

AIP2 is located within the 'BNE Business Parklands' zone as defined in the current BAC Landscape Setting Strategy. This designation will guide the landscaping design for the area.

An example of typical landscaping for a local access corridor and adjacent lot within the 'BNE Business Parklands' zone is illustrated in Figure 5.

Figure 5 Typical landscaping around the local access corridor within the 'BNE Business Parklands' Zone



2.3.6 Work health and safety

Work health and safety requirements within and adjacent to the AIP2 site will be in accordance with relevant BAC requirements, Federal Government requirements and all applicable statutory requirements including the *Work Health and Safety Act 2011* (Cth), *Work Health and Safety Act 2011* (Qld), *Electrical Safety Act 2002 (Qld), applicable subordinate legislation* and National and State Codes of Practice.

2.3.7 Equity of access

All proposed buildings will be designed and constructed to meet the applicable requirements of the *Disability Discrimination Act 1992*. Provisions for mobility-impaired people within the building will comply with the applicable codes, including the Disability (Access to Premises – Buildings) Standards of the Building Code of Australia (BCA).

2.3.8 Security

Developments within the AIP2 will provide a safe and secure environment for visitors, customers, and employees. The detailed security measures will be confirmed during the detailed design phase; however, will need to comply with any aviation security requirements and for general property purposes align with the relevant principles contained in the *Crime Prevention Through Environmental Design: Guidelines for Queensland* (Queensland Government, 2007).

2.4 Project development stages

The AIP2 site will be developed in stages to appropriately manage development activity. All works will be managed to minimise construction impacts on existing lots and network infrastructure.

A high-level overview of project stages is outlined in Table 2 below however this will be subject to change as building development will be influenced by commercial demand.

Table 2 Anticipated staging

Phase	Indicative staging and timing
AIP Stage 2 clearing and surcharge	Stage 1 excess fill removal & Stage 2 fill earthworks commencement – early 2022
AIP Stage 2 civil infrastructure	Targeted commencement – 2024
AIP Stage 1 northern lots building development	Targeted commencement – 2023
AIP Stage 2 building developments	Targeted commencement – 2024

The targeted commencement of the AIP Stage 1 northern lots building development has been updated to include the AIPN003 building development and reflect the adjusted MDP minor variation approval timeline.

2.5 Economic and social contribution

2.5.1 Brisbane Airport

Brisbane Airport continues to be an economic driver in Queensland and is home to more than 400 businesses employing thousands of people. The airport's location, combined with 24/7 operations, means Brisbane Airport is a critical enabler for both the Brisbane and Queensland economies. In recent years, Brisbane Airport has contributed $4 billion to the Queensland economy annually. The main components that made up Brisbane Airport's contribution to the economy included:

1. Direct inputs (in $) from wages and added business value of the airport businesses.

2. Indirect contributions or associated flow-on benefits (in $) from the business transactions between airport businesses and the broader economy.

Prior to Covid-19, over 23,000 people were employed at Brisbane Airport in aviation, light industry, retail, and freight sectors although employment at Brisbane Airport cover most industries of the Australian economy. Direct employment at Brisbane Airport also has an indirect economic contribution in the supply chain industries that provide goods and services to businesses that operate from Brisbane Airport. This indirect impact occurs both in Queensland and throughout Australia.

The Covid-19 pandemic has had significant impacts on the number of airline services and the number of passengers utilising Brisbane Airport, and it is expected that the recovery to pre-pandemic levels will take a number of years. This will have a flow on effect to the broader economic contribution of Brisbane Airport during the recovery period. BAC is not expecting any material Covid-19 impacts on the demand for industrial land at Brisbane Airport. Hence, BAC needs to provide additional land areas to accommodate continuing demand for light industry tenancies at the Airport.

2.5.2 Airport Industrial Park Precinct

The AIP2 precinct development will enable BAC to unlock long-term development opportunities by way of improving unfilled land to ensure a forward supply of developable land for the foreseeable future. The result of undertaking this development will provide a catalyst for economic growth including:

- Land to be prepared to enable future building development.
- Providing BAC with the opportunity to broaden its offering and accommodate larger scale industrial tenants.

One of the strongest contributions to economic growth AIP2 will deliver is the number of jobs created both during the construction and operational phases. It is estimated that the construction phase alone will create more than 400 jobs. For the operational phase, BAC forecasts nearly 1100 jobs will be created once the individual lots have been fully developed and companies commence operations. Table 3 outlines the approximate timeline for the forecast of construction and operational jobs created through AIP2.

Table 3 Forecast jobs created by AIP2

	FY22	FY23	FY24	FY25	FY26	FY27	FY28
Construction jobs	50	90	110	80	180	60	50
Operational jobs	-	-	175	150	150	425	185

It is expected that the jobs created by AIP2 will be created within the freight, logistics and industrial sectors, with fewer linked to the passenger-related aviation sector. This indicates that ongoing impacts due to the Covid-19 pandemic will have less impact on the forecast jobs created by AIP2.

2.5.3 Local community

Brisbane Airport is vital to connecting families and local communities across Queensland and Australia. With an estimated 50 per cent of Queenslanders living outside Greater Brisbane, Brisbane Airport provides a vital link for businesses, freight, export, and regional tourism. BAC expects the jobs created during the construction and operation of AIP2 will be filled by people living in Brisbane. This means the indirect effects of higher employment in the local area will also be reflected in the local economy.

The land use zones adjacent to AIP are also zoned as industry, establishing a consistent land use zoning between AIP and the adjacent area in Brisbane City Council. This region of Brisbane is home to the Port of Brisbane, Trade Coast Central as well as the heavy industrial areas around the suburbs of Myrtletown and Pinkenba. AIP2 will extend the availability of industrial-zoned land and provide more opportunities for indirect economic growth and flow-on effects by increasing transactions between new or expanding businesses operating in the local area.

3. LEGISLATIVE CONTEXT

The following section provides an overview of legislation and policy that is relevant for airport development. As BAC holds a long-term lease over Brisbane Airport from the Commonwealth Government all building and development activities are regulated by Commonwealth legislation including:

- Airports Act 1996.
- Airports Regulations 1997.
- Airports (Building Control) Regulations 1996.
- Airports (Environment Protection) Regulations 1997.
- Airports (Control of On-Airport Activities) Regulations 1997.
- Airport (Protection of Airspace) Regulations 1996.
- Aviation Transport Security Act 2004 and regulations.
- Biosecurity Act 2015.
- Environment Protection and Biodiversity Conservation Act 1999.
- National Environment Protection Council Act 1994.
- National Greenhouse and Energy Reporting Act 2007.

3.1 Commonwealth Legislation

3.1.1 Airports Act 1996

The Airports Act requires an MDP to be prepared for each “major airport development” at Brisbane Airport. Section 89 of the Act prescribes those activities that are included as a major airport development. The proposed development outlined in this MDP is defined as a ‘major airport development’ by virtue of Section 89(1)(e), defined as ‘constructing a new building where:

i. The building is not wholly or principally for use as a passenger terminal.

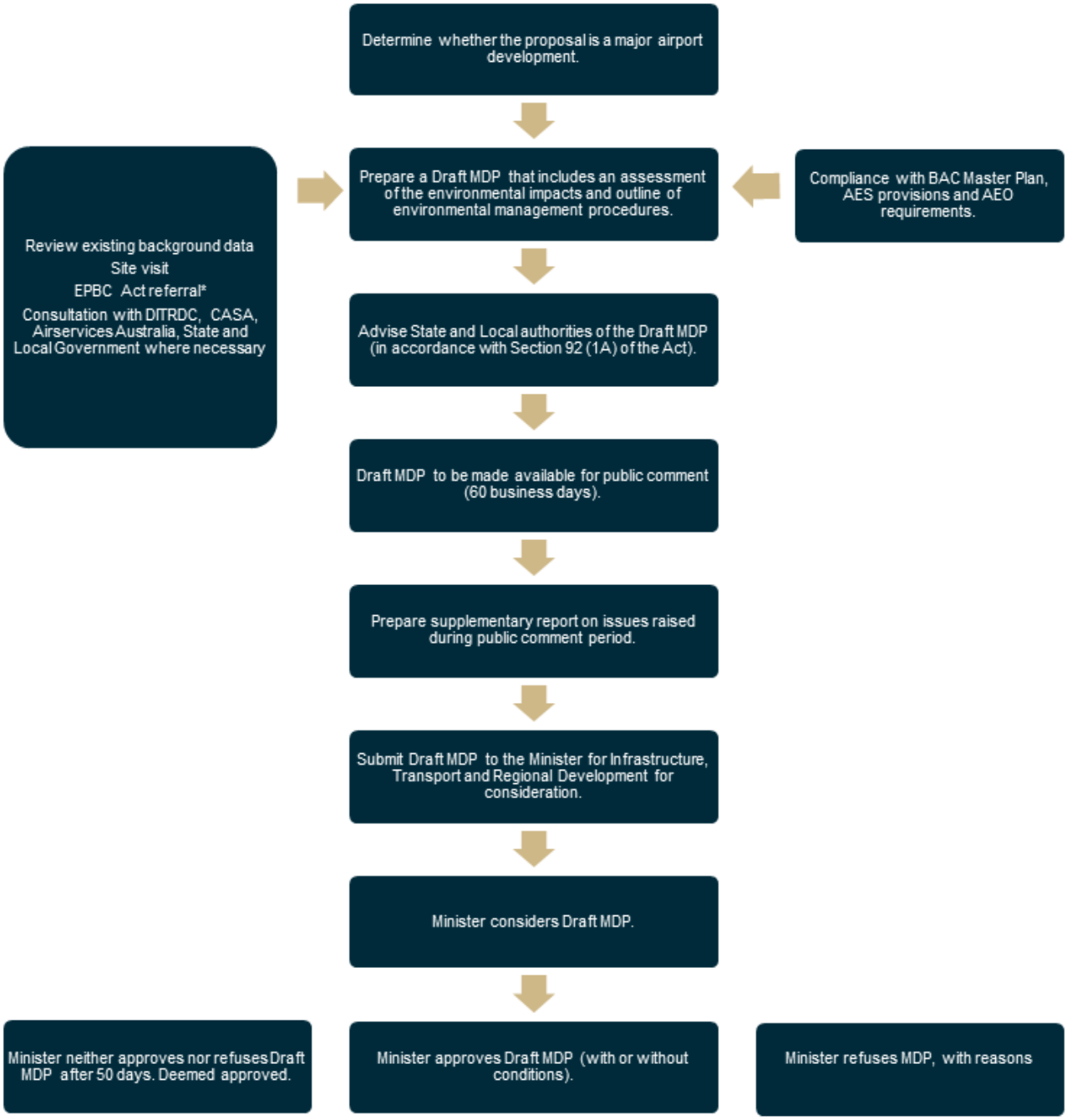
ii. The cost of construction exceeds the threshold amount (which is currently $25 million).

Section 90 of the Airports Act 1996 states that major airport developments must not be carried out except in accordance with an approved MDP.

This document has been prepared in accordance with and to meet the requirements of the Airports Act. The key steps in the approvals process for an MDP are presented in Figure 6.

An MDP checklist is provided in Appendix B to demonstrate the compliance with Section 91 of the Airports Act, which sets out the matter which must be included in an MDP.

Figure 6 MDP key steps



Subsequent to the AIP2 MDP approval, a minor amendment to include the adjacent lot AIPN003 (AIP1) and building work on lot AIPN003 is proposed. This document has been prepared as a MDP minor variation, in accordance with Section 95 of the Airports Act.

3.1.2 Environmental Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act) is the Australian Government's central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities, and heritage places – defined in the Act as matters of national environmental significance (MNES). There are nine MNES currently protected under the EPBC Act, these are:

- World Heritage properties.
- National Heritage properties.
- Wetlands of international importance.
- Nationally threatened species and communities.
- Migratory species.
- Commonwealth marine areas.
- The Great Barrier Reef Marine Park.
- Nuclear actions.
- A water resource, in relation to coal seam gas development and large coal mining development.

The EPBC Act also protects the environment where actions are on or will affect Commonwealth land and regulates those actions of Commonwealth departments and agencies that may have a significant impact on the environment. As Brisbane Airport is located on Commonwealth land it is subject to the provisions of the EPBC Act.

Under the EPBC Act, if an action will have or is likely to have a significant impact on MNES or is deemed to require approval under Section 26 or 28 of the EPBC Act by nature of a potential significant impact on Commonwealth land or by a Commonwealth agency, a referral should be made to the Minister for the Environment. The Minister would decide if the impacts are significant and whether an approval is required. The Minister's response to the referral would determine the level and nature of environmental assessment required for final approval by the Minister for Infrastructure, Transport and Regional Development.

Based on the assessment detailed in Section 5.5 the proposed development, including construction and operation, is not likely to result in a significant impact on a MNES or the environment.

3.2 Pre-existing Airport Land

When BAC became the airport lessee company for Brisbane Airport in July 1997, it assumed certain pre-existing lessor obligations under various leases. BAC also became the head-lessee under the airport lease subject to a number of other interests in the airport land (such as easements). Some of those contractual and other rights and obligations remain in existence while others have expired. However, none of the existing rights and obligations are affected by AIP2.

3.3 Consistency with Airport Lease

An essential requirement of the airport lease is that the lessee must comply with all legislation relating to the airport site. In particular, Section 91 (1A) of the Airports Act which states that all major development is to be consistent with the airport lease and the final Master Plan.

BAC, as the airport lessee company for Brisbane Airport, has an obligation to ensure all developments on airport land comply with applicable legislation. BAC must confirm that any proposal on airport land is consistent with:

1. The final Master Plan for the airport.
2. The approved Airport Environment Strategy contained within the final Master Plan.
3. Any approved Major Development Plan for the airport, if applicable (as per Airports Act, section 89).

AIP2 as described in this MDP is consistent with the above documents and the Master Plan's land use intents. With BAC's guidance, the development will be constructed in line with the provisions of the *Airports (Building Control) Regulations 1996* and *Airports (Environment Protection) Regulations 1997* and in accordance with the relevant airport lease requirements.

Accordingly, the AIP2 development is consistent with the airport lease for Brisbane Airport.

3.4 Consistency with State and Local Government planning

Being Commonwealth land, planning requirements for airport land is administrated under the Airports Act and other relevant legislation such as the EPBC Act. As a result, state and local planning development provisions are not applicable to development occurring at the airport.

The Airports Act, does however, require that an MDP address where possible, the extent (if applicable) of any inconsistencies with planning schemes in force under a law of a state or territory in which the airport is located. The commentary in the following sections details AIP2's consistency with relevant planning policies/schemes.

3.4.1 State Planning Policy

In preparing this MDP, consideration has been given to the State Planning Policy (SPP) operating in Queensland and effective at the time of publishing this MDP. The SPP became effective on 3 July 2017. The SPP identifies the Queensland Government's interests in planning and development, as well as these interests are dealt with in planning schemes, council development assessment processes and in designating land for infrastructure.

Relevant SPP interests include:

- Facilitating a range of commercial, industrial, and mixed-use development opportunities to support economic growth and employment.
- Tourism, including that appropriate infrastructure to support and enable tourism development is provided.
- Water quality, including that development is located, designed, constructed, and operated to avoid or minimise adverse impacts on environmental values of receiving waters and meets applicable stormwater management design objectives.
- Strategic airports and aviation facilities, including that development and associated activities will not create incompatible intrusions or compromise aircraft safety in operational airspace and avoid increasing risk to public safety in a public safety area.

AIP2 will be developed to ensure that the final design meets the SPP interests.

3.4.2 Brisbane City Plan 2014

Brisbane Airport is located within the "Special Purpose (Airport) Zone" under Brisbane City Plan 2014 (City Plan). Council's Strategic Plan within the City Plan acknowledges the airport as being a major industrial location (as part of the broader Australia TradeCoast region) which is a key centre in the city and provides major air access to and from the city for passengers and freight.

The objective of the Special Purpose (airport) Zone in City Plan is to:

a. Provide for public facilities and infrastructure that are publicly or privately owned or operated.
b. Ensure that incompatible uses do not encroach on the public facilities and infrastructure.

Overall outcomes of the Airport Zone Precinct of the Special Purpose Zone are:

a. Development provides areas for:
    i. Housing, servicing, maintenance, and repair of aircraft.
    ii. Landing and departure of aircraft.
    iii. Assembly and dispersal of passengers and goods on or from aircraft.
    iv. Ancillary activities serving the needs of workers, passengers, and visitors to an airport, such as Shopping, food and drink outlets and tourism services.
    v. Associated training, education, and aviation facilities.

While the industrial land use is not explicitly set out in the City Plan's Special Purpose Airport Zone (6.2.6.7), the 2020 Master Plan sets out how the airport is compatible with surrounding land uses within the City Plan including industrial and commercial land uses. The proposed development meets the objective of the Special Purpose Zone in that it will provide infrastructure to support the continued growth of Brisbane Airport and is a compatible use for this area. The proposed development also meets the overall outcomes in the provision of ancillary infrastructure that will service the needs of passengers and visitors.

3.5 Airport development and Building Approvals

In addition to the preparation and approval of an MDP, new development is subject to Airport Lessee Consent from the airport lessee company and a Building Approval from the appointed Airport Building Controller (ABC).

The Building Approval cannot be issued by the ABC without written consent from BAC, confirming that the new development is consistent with:

- Brisbane Airport Master Plan.
- Brisbane Airport Environment Strategy.
- Planning objectives for the Airport.
- An approved MDP.

4. OPERATIONAL ASSESSMENT

4.1 Aviation operations and safety

Developing land near an aerodrome has the potential to impact aviation operations and safety. In accordance with the requirements of Section 91 of the Airports Act, an assessment of the aviation operational and safety impacts of AIP2 has been performed.

AIP2 has been assessed against the National Airports Safeguarding Framework (NASF), updated to include the extended site boundary and AIPN003 building development. The findings of the assessment have been summarised in Table 4.

Table 4 Assessment against NASF Guidelines

NASF Guideline	Comment
Guideline A: Measures for Managing Impacts of Aircraft Noise	Applicable Aircraft noise is discussed in Section 4.1.7
Guideline B: Managing the Risk of Building Generated Windshear and Turbulence at Airports	Not Applicable Windshear and turbulence are discussed in Section 4.1.4
Guideline C: Managing the Risk of Wildlife Strikes in the Vicinity of Airports	Applicable Wildlife strikes are discussed in Section 4.1.9
Guideline D: Managing the Risk of Wind Turbine Farms as Physical Obstacles to Air Navigation	Not applicable The Project is not a wind turbine farm
Guideline E: Managing the Risk of Distractions to Pilots from Lighting in the Vicinity of Airports	Applicable Distraction from lighting and/or reflection are discussed in Section 4.1.5.2
Guideline F: Managing the Risk of Intrusions into the Protected Airspace of Airports	Applicable Protected Airspace for operation and construction are discussed in Sections 4.1.1
Guideline G: Protecting Aviation Facilities — Communications, Navigation and Surveillance (CNS)	Applicable CNS and Air Traffic Control are discussed in Section 4.1.1.3
Guideline H: Protecting Strategically Important Helicopter Landing Sites	Not applicable The Project is not located within a helicopter landing site
Guideline I: Managing the Risk in Public Safety Areas at the Ends of Runways	Not applicable The Project is not located within the public safety areas at Brisbane Airport

4.1.1 Prescribed airspace – operation

The potential impact of the operational phase of AIP2 to Brisbane Airport's prescribed airspace has been assessed and is detailed in the following sections.

The assessment is based on the possible extension of Runway 01R/19L and the future airspace surfaces. The potential runway extension is to create an increased take off length for 19L (take off from the northern end) to accommodate future aircraft models. It should be noted that this assessment is a safeguard, and at the time of printing there is no known future aircraft models that require an increased take-off length. The

01R threshold is not planned to be moved from its current location for arrivals, and as such, will become displaced in the future configuration.

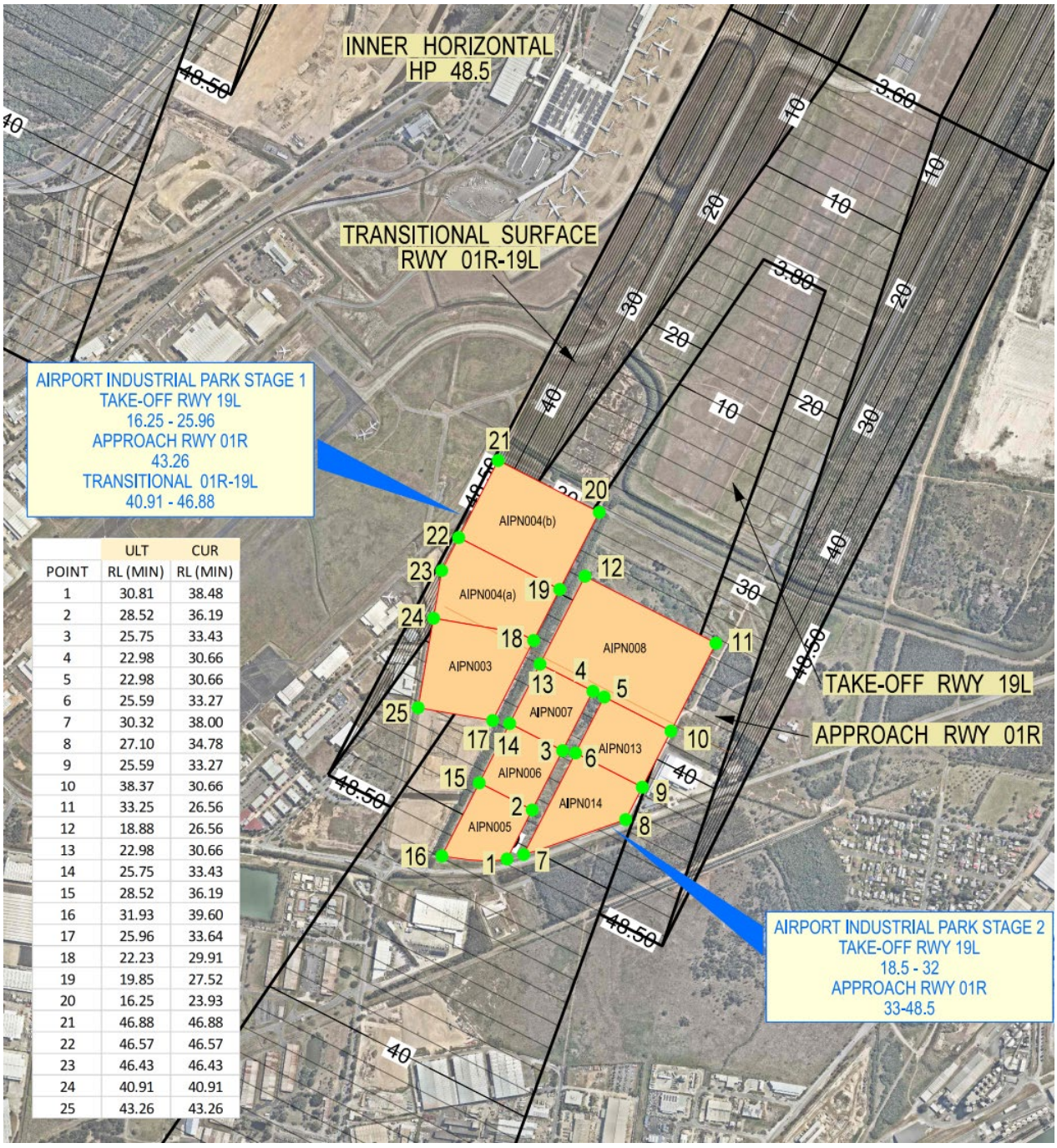
4.1.1.1 Obstacle Limitation Surface

An obstacle limitation surface (OLS) is a conceptual surface that sets the maximum height limits of objects within an aerodrome airspace to protect aircraft operations and safety in clear weather conditions. Any object that breaches the OLS will become an obstacle to aircraft operations. The relevant OLS surfaces for the assessment of AIP2 include the:

- Inner horizontal surface.
- Approach surface for 01R.
- Take off surface for 19L.

Maximum building heights for AIP2 have been determined by the application of the OLS and the potential future OLS defined by the potential extension of Runway 01R/19L. This ensures that the buildings will not create obstacles for aircraft during take-off and landing on the current or future runway configuration. Figure 7 illustrates the OLS across the AIP2 conceptual building layout and includes a table showing the minimum OLS heights for both the current and ultimate 01R/19L Runway scenario.

Figure 7 Potential future Runway 01R/19L OLS



POINT	ULT RL (MIN)	CUR RL (MIN)
1	30.81	38.48
2	28.52	36.19
3	25.75	33.43
4	22.98	30.66
5	22.98	30.66
6	25.59	33.27
7	30.32	38.00
8	27.10	34.78
9	25.59	33.27
10	38.37	30.66
11	33.25	26.56
12	18.88	26.56
13	22.98	30.66
14	25.75	33.43
15	28.52	36.19
16	31.93	39.60
17	25.96	33.64
18	22.23	29.91
19	19.85	27.52
20	16.25	23.93
21	46.88	46.88
22	46.57	46.57
23	46.43	46.43
24	40.91	40.91
25	43.26	43.26

The constraining surface for a large portion of the AIP2 (inclusive of AIPN003) is the future Runway 19L Take Off Surface with a Reduced Level (RL) of between 16.25-32m AHD (Australian Height Datum). Based on a minimum development level (MDL) of 3.1m AHD, the maximum building heights for the conceptual AIP2 building layout is between RL 13.15m and 28.9m AHD, taking into account potential future extension Runway 01R/19L.

A detailed assessment will be undertaken as part of the future building development approvals to ensure compliance within this constraining surface. Any buildings or structures within AIP2 that will infringe the OLS, will not receive required approvals from BAC to proceed.

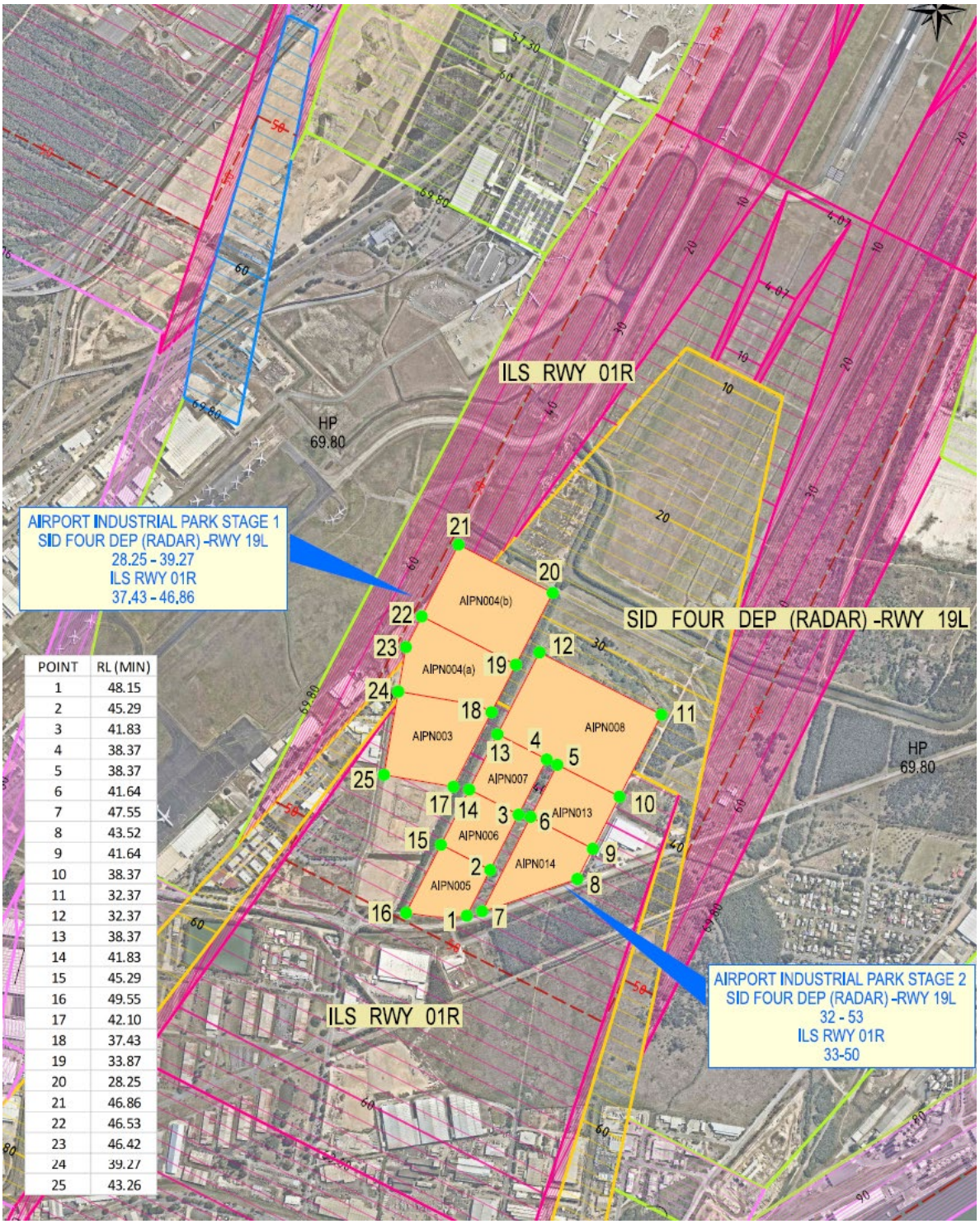
4.1.1.2 PANS-OPS

Similar to the OLS, PANS-OPS refers to a conceptual surface which is intended to protect aircraft operations in poor weather or non-visual conditions (i.e. operating in instrument meteorological conditions). In these conditions, visibility can be significantly compromised due to cloud or fog. To avoid collisions, pilots need assurance that the airspace is free of obstacles. This is achieved by ensuring that no permanent structures are to extend beyond the PANS-OPS surface.

The future PANS-OPS surface across the AIP2 conceptual building layout (inclusive of AIPN003) is illustrated in Figure 8.

The future PANS-OPS surface ranges from RL 28-53m AHD. These levels sit above the OLS and thus, is not the controlling constraint.

Figure 8 Potential future Runway 01R/19L PANS-OPS and ILS



POINT	RL (MIN)
1	48.15
2	45.29
3	41.83
4	38.37
5	38.37
6	41.64
7	47.55
8	43.52
9	41.64
10	38.37
11	32.37
12	32.37
13	38.37
14	41.83
15	45.29
16	49.55
17	42.10
18	37.43
19	33.87
20	28.25
21	46.86
22	46.53
23	46.42
24	39.27
25	43.26

4.1.1.3 Navigation aids

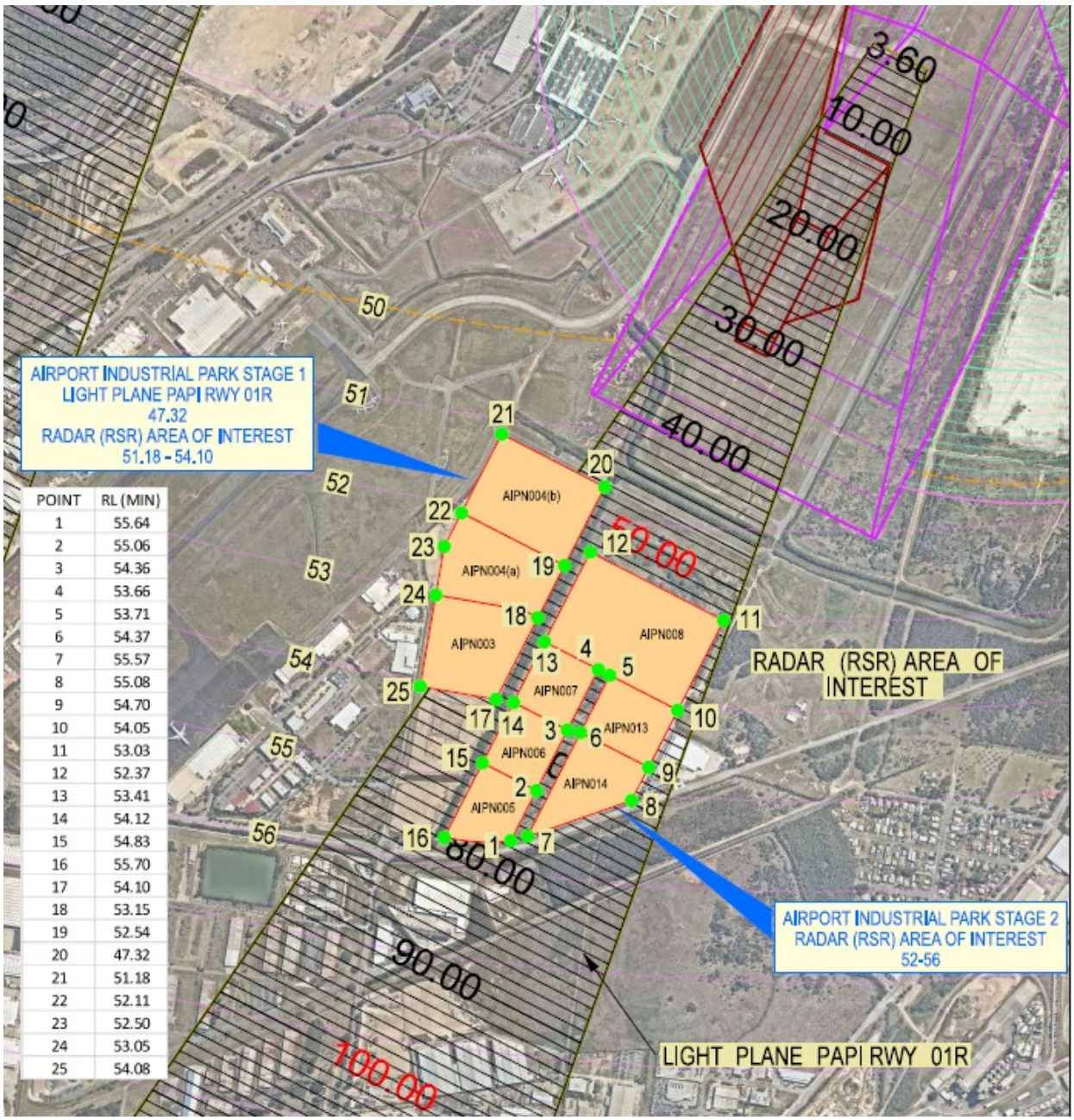
There are a number of airport navigation aids and radar systems installed across Brisbane Airport that assist in aircraft guidance. These systems are essential tools of the air transport system and rely on the transmission of radio waves. The efficiency and reliability of these systems can be affected by structures such as large buildings.

Instrument Landing System and en-Route Surveillance Radar

The proposed site is outside of the navigation aid surfaces for Runway 01R's Instrument Landing System (ILS). This surface is unaffected by any potential future runway extension as the 01R threshold will remain in its current location.

The site is located beneath the en-Route Surveillance Radar (RSR), a designated secondary radar facility at Brisbane Airport. Figure 9 illustrates the RSR surface across the AIP2 conceptual building layout, in the instance of a RWY 01R extension in future.

Figure 9 Potential future Runway 01R/19L RSR



The RSR operates with a minimum surface range of RL 52- 56 AHD. These levels sit above the OLS and is therefore not the controlling constraint.

Advance Surface Movement Guidance and Control System

Airservices Australia has established an Advance Surface Movement Guidance and Control System (A-SMGCS) at Brisbane Airport. The system operates via a surface movement radar (SMR) with remote units (RUs) to triangulate and manage movements within the aircraft operating areas.

AIP2 will not infringe upon the established A-SMGCS operations.

Runway 01R High Intensity Approach Lights

Runway 01R operates with a High Intensity Approach Light (HIAL) to aid landing aircraft. The approach lights extend approximately 900m in advance (south) of the runway 01R threshold.

The visual plane associated with the approach lighting has been checked against the conceptual AIP2 building layout. AIP2 will not infringe upon the HIAL.

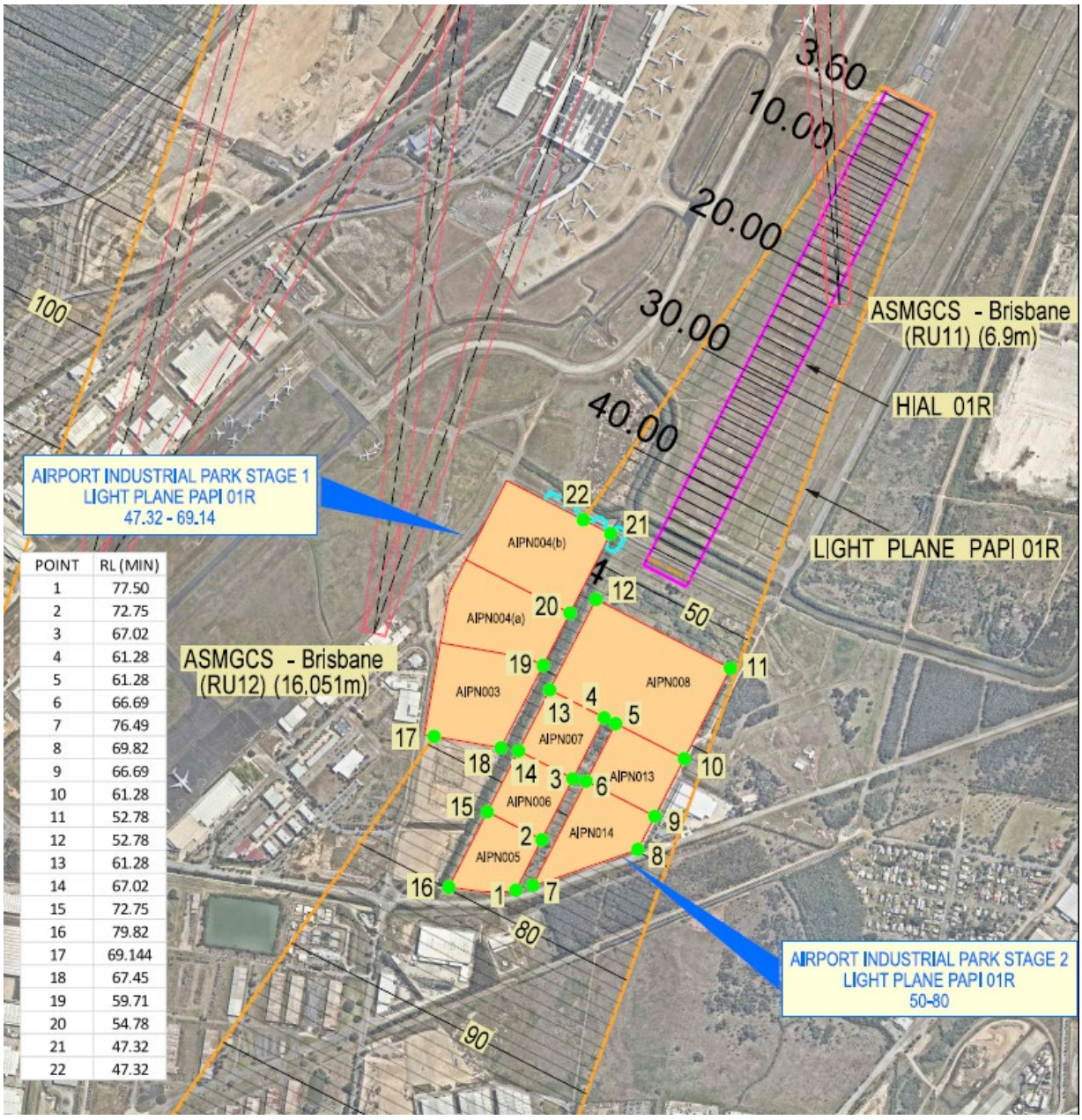
Runway 01R Precision Approach Path Indicator System

Runway 01R operates with a Precision Approach Path Indicator system (PAPI). PAPI provides guidance to pilots through visual feedback of the aircraft's position against the ideal approach angle. AIP2 will not infringe upon the PAPI.

The A-SMGCS, HIAL and PAPI surface across the AIP2 conceptual building layout (inclusive of AIPN003) is illustrated in Figure 10.

These levels sit above the OLS and are not the controlling constraints.

Figure 10 Runway 01R/19L A-SMGCS, PAPI and HIAL Light Plane



POINT	RL (MIN)
1	77.50
2	72.75
3	67.02
4	61.28
5	61.28
6	66.69
7	76.49
8	69.82
9	66.69
10	61.28
11	52.78
12	52.78
13	61.28
14	67.02
15	72.75
16	79.82
17	69.144
18	67.45
19	59.71
20	54.78
21	47.32
22	47.32

4.1.1.4 Emergency access

Emergency Access will be considered and maintained in the development of AIP2. A future airside emergency access may be required if Runway 01R/19L is extended. AIP2 will maintain a suitable corridor to ensure the development does not prohibit a future emergency access track, if required.

4.1.2 Prescribed airspace – construction

The construction methodologies proposed for AIP2 will be assessed as they are developed to ensure the approved methodologies do not materially impact aviation operations and/or safety. The main aviation impacts from construction are anticipated to be:

- Dust generated during the earthworks phase of the project.
- Construction craneage activity in proximity to the operating airspace surfaces.

Following consultation and approval, BAC will monitor construction activities to ensure there are no material impacts to airport operations. Any such impacts will be limited in time and extent.

4.1.3 Air traffic control line of sight

A review of the air traffic control tower line of sight against AIP2 has indicated that there is no impact to the line of sight in both current and potential future extended Runway 01R/19L.

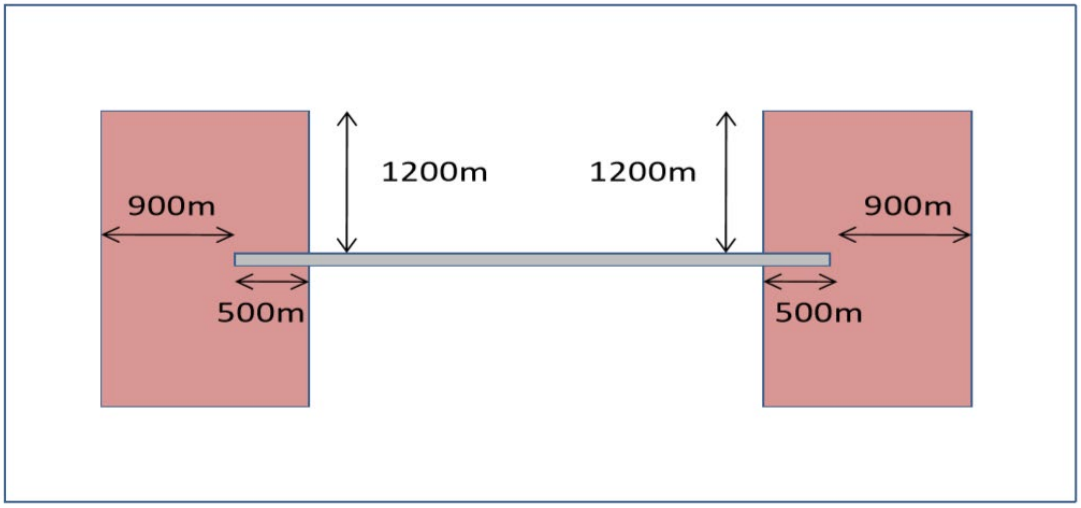
4.1.4 Windshear

NASF Guideline B, 2018 – Managing the Risk of Building Generated Windshear and Turbulence at Airports contains benchmark assessment trigger points for a new building development or building expansion.

AIP2 has been reviewed against the 'assessment trigger area' defined in NASF Guideline B (Refer Figure 11). The assessment trigger area extends:

- 1200m or closer perpendicular from the runway centreline (or extended runway centreline).
- 900m or closer in front of runway threshold (towards the landside of the airport).
- 500m or closer from the runway threshold along the runway.

Figure 11 NASF Guideline B assessment trigger area



The defined assessment trigger area is shown in Figure 12.

AIP2 is located approximately 1400m from the 01R threshold and is outside the defined assessment trigger area for both the existing and potential future extended Runway 01R/19L scenarios. AIP2 (inclusive of AIPN003) is therefore not expected to impact windshear and turbulence.

Figure 12 NASF Guideline B assessment trigger assessment area

4.1.5 Pilot distraction from lighting and reflections

Light emissions near runway approaches are a potential cause for concern to the safe operation of landing aircraft. Potential issues include:

- Pilots momentarily dazzled by bright lights.
- Light patterns that could be confused with approach and runway lighting particularly for pilots unfamiliar with the airport.
- Lighting that may reduce the night vision of air traffic controllers.

There are three potential AIP2 sources of glint and glare concerns: (i) solar panels; (ii) building and street lighting; and (iii) reflectivity of building materials.

4.1.5.1 Solar panels

There are currently no prescribed assessment requirements or Australian Standards that apply to solar panels near aerodromes. The main consideration would be glare towards the air traffic controllers and glare experienced by pilots on approach and take off.

The use of solar panels within AIP2 is part of the building consideration of future building operator/developer. If solar panels are proposed as part of the building design, the following considerations will be included within the detailed design:

- Solar panels are to be installed so that their location, orientation, and angle of incidence will avoid glare to air traffic controllers and landing, taking off and manoeuvring aircraft.
- A glare analysis will be conducted using a recognised assessment tool (e.g., the Sandia Laboratories Glare Assessment Tool) as per US Federal Aviation Administration (FAA) Guidelines. The assessment should consider various solar panel configurations (e.g.: tilt, orientation, inclination, shape, and location) to mitigate glare but also maximise energy protection.
- Consideration to use anti-reflective coating or textured glass noting that generally modern solar panels are designed to absorb light rather than reflect it.

Further consultation with the relevant aviation agencies will be undertaken on an as-needed basis during the building detailed design phases.

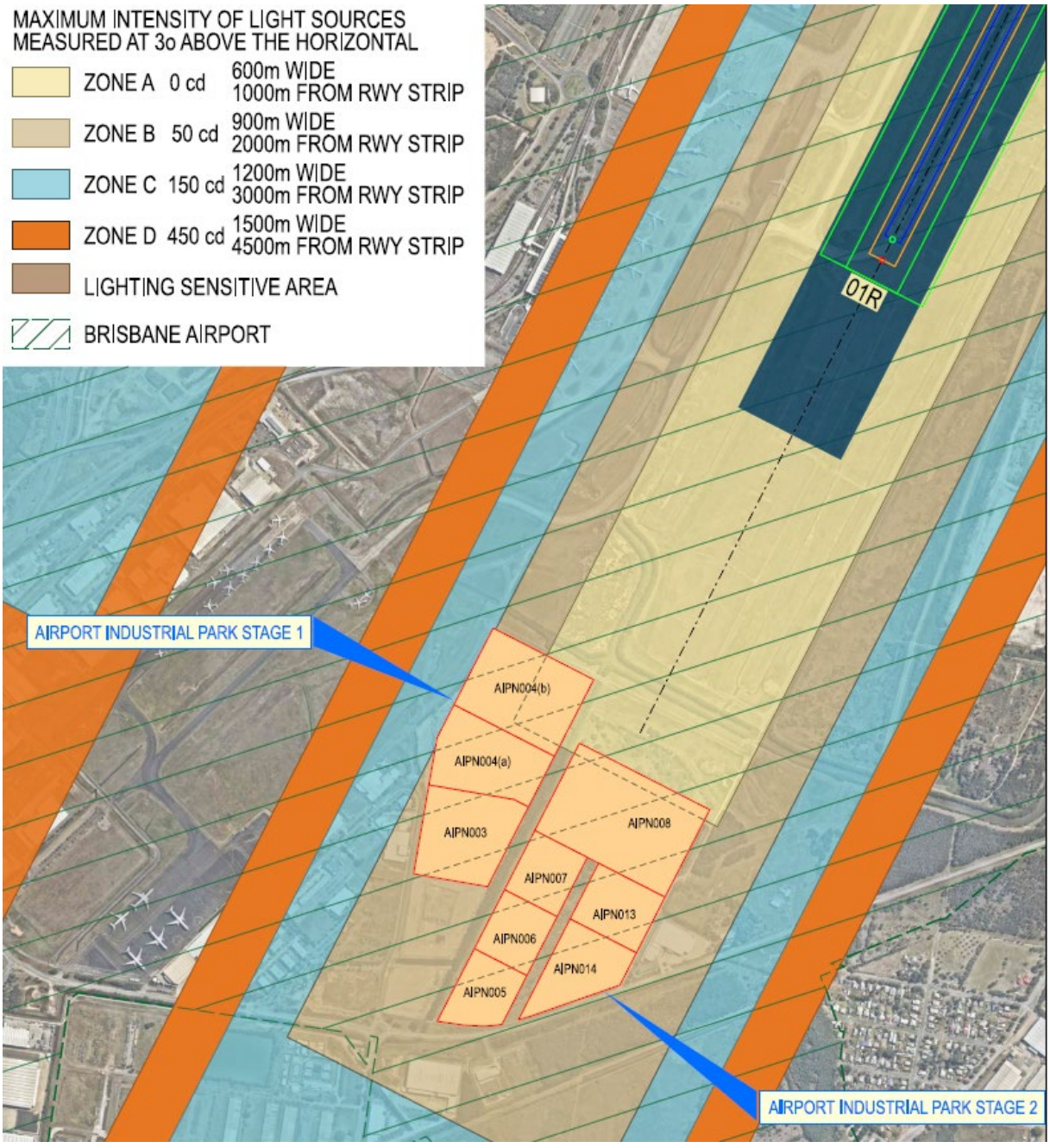
4.1.5.2 Building and street lighting

AIP2 (inclusive of AIPN003) sits within Zone A and B outlined within the NASF guideline associated with its proximity to Runway 01R/19L. Figure 13 indicates that the maximum allowable candela (measure of light intensity) at 3° above the horizontal plane is 0cd for Zone A, however a significant portion of the site is location in Zone B where the maximum allowable candela is 50cd.

AIP2 external lighting will be installed in accordance with Regulation 94 of the Civil Aviation Regulations 1988, Part 139 (Aerodromes) Manual of Standards 2019 including Sections 9.143 and 9.144 and Australian Standards.

Lighting arrangements will be developed during detailed design by a qualified lighting designer. Following design, further consultation with Airservices Australia will be conducted to ensure that the proposed lighting designs will not impact the safe operation of aircraft and air traffic control. Further consultation with CASA will be undertaken during design development to ensure lighting does not infringe upon the provisions within the Civil Aviation Regulations 1988.

Figure 13 Maximum intensity of light sources



4.1.5.3 Reflectivity of building materials

The external surfaces of AIP2 buildings and structures will be constructed from materials with low reflectivity to minimise the risk of reflected glare from the buildings impacting the safe operation ok aircraft or air traffic controllers.

4.1.6 Vertical gas plume rise and dust

Regulation 139.180 of the Civil Aviation Safety Regulations 1998 (along with Civil Aviation Safety Authority Advisory Circular AC 139-5(v3.0)) identifies the need to assess potential hazards to aviation posed by vertical exhaust plumes greater than 4.3 metres per second (m/s) velocity at the point of emission.

Vertical exhaust plumes in excess of this velocity may also require approval under the Airports (Protection of Airspace) Regulations 1996.

The types of activities that are likely to generate such vertical exhaust plumes include, power stations, smelters or activities requiring the use of pressurised gas systems.

AIP2 developments are not expected to include infrastructure or activities that would generate vertical exhaust plumes greater than 4.3m/s. During the development of every site within AIP2, the potential for vertical gas plume rise will be assessed to ensure that there is no impact to the safe operation of aircraft or air traffic controllers.

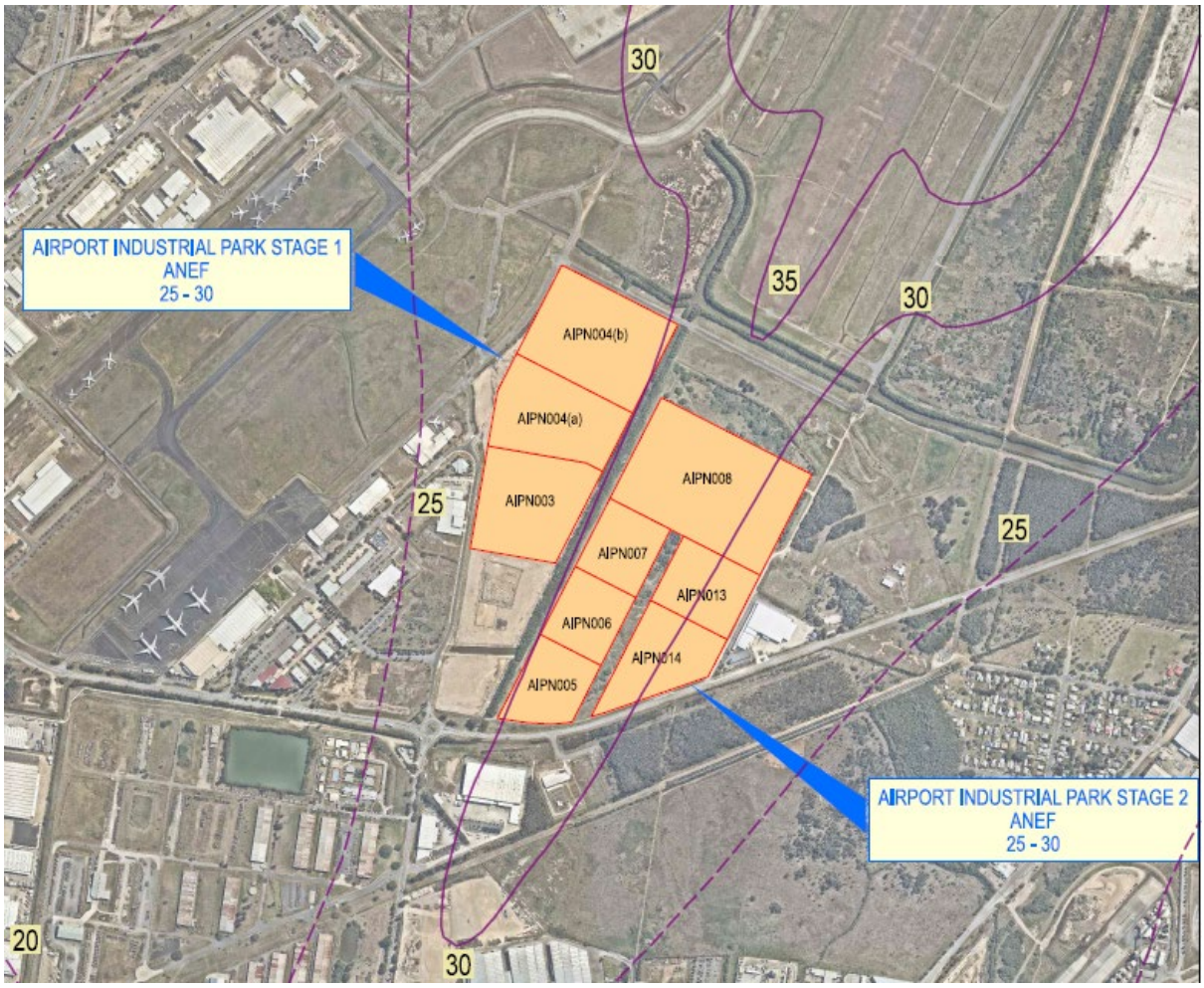
Any proposed site that may generate vertical exhaust plumes greater than 4.3m/s will be assessed in accordance with the regulatory requirements noted above.

During construction dust suppression will maintain line of sight and visibility for aircraft and air traffic controllers.

4.1.7 Aircraft noise – Australian Noise Exposure Forecast

The 2020 ANEF noise contours are shown in Figure 14 and shows that AIP2 (inclusive of AIPN003) is located within the ANEF 25-35 noise contours. AIP2 is zoned as general industrial in the Master Plan, which is consistent with the land-use compatibility standards of AS2021 and the Queensland State Planning Policy for areas between ANEF 25-35 zone contours.

Figure 14 2020 ANEF contours



4.1.8 Public Safety Area

Public Safety Area (PSA) is a designated area of land at the end of an airport runway where development may be restricted to minimise risk to the public in the event of an aircraft accident on take-off or landing.

The PSA implemented at Brisbane Airport is based on the Queensland State Planning Policy (SPP), Public Safety Area (PSA) definition documented in the SPP guidance document for strategic airports and aviation facilities. This model applies a single defined PSA template as shown in Figure 15.

Figure 15 Queensland Public Safety Area

AIP2 (inclusive of AIPN003) is located outside of the PSA of both the current and potential future extended 01R/19L runway. Figure 16 shows AIP2 positioned against the potential 01R/19L extended runway PSA.

Figure 16 Public Safety Area

4.1.9 Landscaping

As referred to in Section 2.3.5 landscaping around AIP2 will be consistent with the Brisbane Airport Landscape Setting Strategy. This includes wildlife attraction mitigation measures, such as:

- Plant selection to minimise bird and flying fox attraction.
- Maintain grass and groundcover planting at a length which deters birds.
- Minimise available food from outdoor dining and rubbish bins.
- Avoid bird roosting potential.
- Consider addition of products such as Avanex in seed mixes to deter birds.

The Landscaping Setting Strategy requirements will be addressed in the detailed design stages of the development sites. Landscape related wildlife mitigation measures to be considered during construction will be assessed and detailed in the relevant EMP.

4.1.10 Mitigation measures

AIP2 building height restrictions vary across the site and are driven by the Brisbane Airport potential future extended Runway 01R/19L OLS. The buildings within the AIP2 site will not exceed the potential future runway OLS and will be subject to detailed review as part of the respective building approval submissions. The building heights for each development will be finalised in close consultation with Airservices Australia.

AIP2 sits within two lighting control zones (Zone A and B) outlined within the NASF guideline associated with the location of Brisbane Airport Runway 01R/19L. All external lighting within AIP2 will be designed and installed in accordance with Regulation 94 of the Civil Aviation Regulations 1988. Following design, further consultation with Airservices Australia will be conducted to ensure that the proposed lighting designs will not impact the safe operation of aircraft and air traffic control. Further consultation with CASA will be undertaken to ensure lighting does not infringe upon the provisions within the Civil Aviation Regulations 1988.

Other mitigation measures related to aviation operations and safety include:

- BAC will continue to liaise with Airservices Australia to ensure there will be no disruption to existing or future communications, navigation, and surveillance systems (CNS) equipment, Navigational Aids (NAVAID) protection surfaces and the continuous line of sight for air traffic controllers to arrival or departing aircraft.
- BAC will continue to engage with CASA and Airservices Australia during the detailed design phase of AIP2 to ensure there is no negative impact on current and/or future PANS-OPS surfaces and to ensure that any vertical exhaust plumes from proposed developments are properly considered and assessed.
- BAC will engage with CASA and Airservices Australia as the various construction stages are progressed to ensure that any crane or elevated plant operations comply with the maximum operating height requirements on airport. Should any proposed construction methodology consider that cranes will penetrate the prescribed airspace, approvals under the Airports (Protection of Airspace) Regulations 1996 (APAR) will be sought.
- If required, a vertical plume assessment will be undertaken in close consultation with CASA.
- Dust suppression activities will be undertaken throughout construction to maintain line of sight and visibility for aircraft and air traffic controllers.

4.2 Road network

The development and operation of AIP2 has the potential to generate traffic and transport impacts within the Brisbane Airport road network. As part of the MDP process, traffic studies have been completed to assess the impact of AIP2 and ensure that the Project will meet the requirements of Section 91 of the Airports Act.

4.2.1 Baseline conditions

AIP2 is located north of Lomandra Drive and East of Sugarmill Road and Boronia Road. Figure 17 outlines the site location relative to the existing road network.

Lomandra Drive is a two lane, single carriageway road with an existing roundabout intersection at Sugarmill Road and Boronia Road.

The Lomandra Drive, Sugarmill Road and Boronia Road intersection operates as a single lane roundabout with a left slip lane from Sugarmill Road to Lomandra Drive West.

Directly south of the AIP2 site is an existing priority intersection on Lomandra Drive that provides access to 2-4 Enterprise Lane. The existing intersection has a right turn pocket on Lomandra Drive approximately 60 metres long.

Figure 17 AIP2 locality plan

4.2.2 Assessment of construction impacts

Construction is expected to take place in stages in line with the target development program. The traffic impact assessment undertaken for AIP2 has indicated that there is capacity within the existing network to allow for construction traffic.

Prior to construction works commencing a traffic assessment will be undertaken to ensure that the construction works do not have a negative impact on the road network. Peak construction traffic generation is expected to occur during the earthworks phase where previous projects have recorded approximately 160 heavy vehicles per day, or approximately 16 vehicles per hour inbound (towards AIP2) and outbound (leaving AIP2). The construction traffic is expected to access the AIP2 site via Lomandra Drive East, and Sugarmill Road as the Main Myrtletown Road and Lomandra Drive intersection is not suitable for heavy vehicle access.

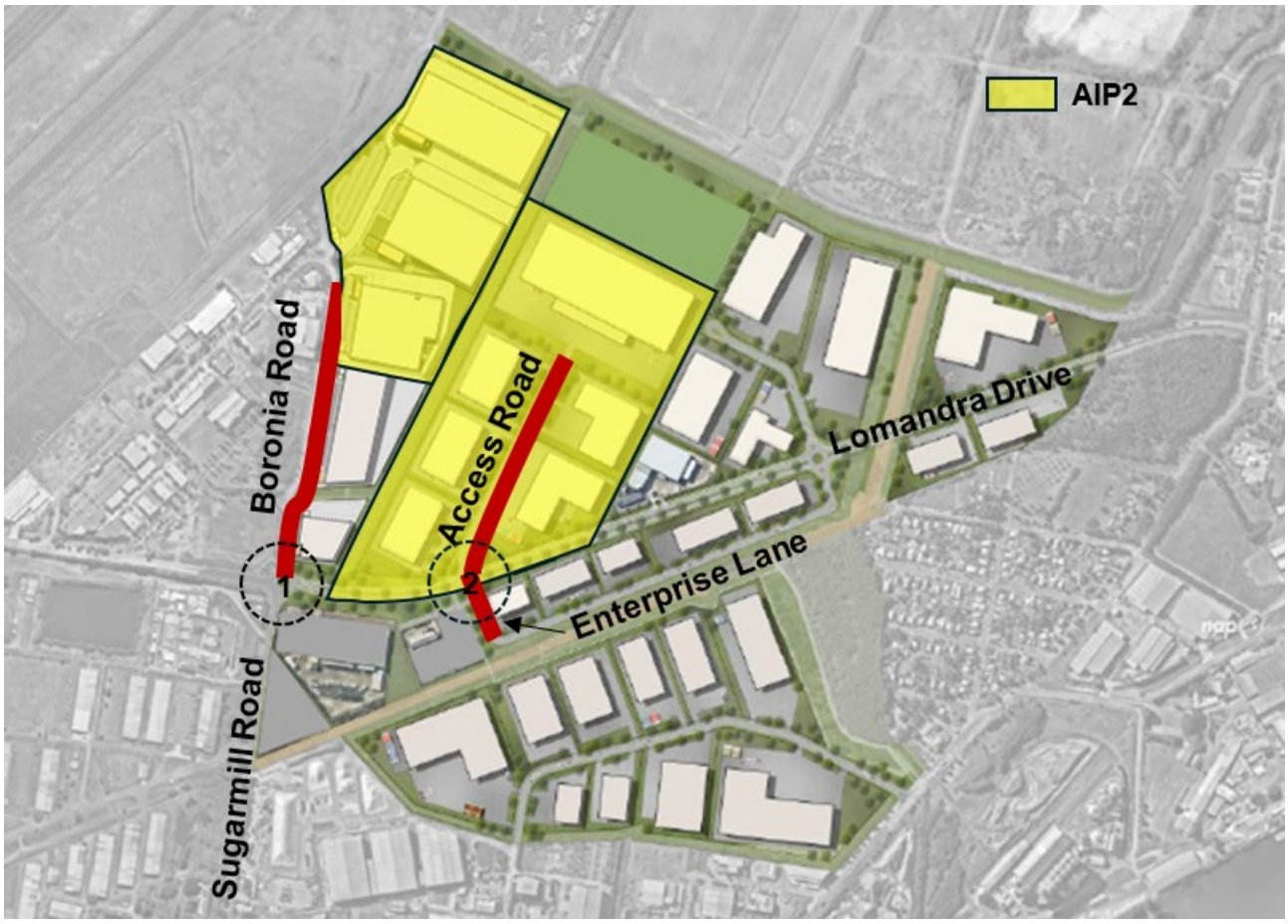
It is considered that the short-term impacts of the construction traffic, when carefully managed, will not have a material impact due to the landside road network having adequate spare capacity in the near term to cater for the expected construction traffic demand.

Further to the above, an additional traffic study was undertaken and confirmed that there is sufficient capacity within the existing road network to accommodate the increased traffic generated by AIPN003 site building construction.

4.2.3 Assessment of operational impacts

AIP2 will be accessed via two roads: the existing Boronia Road and a new access road as demonstrated in Figure 18.

Figure 18 AIP2 access roads



The estimated traffic generation is shown in Table 5.

Table 5 AIP2 estimated traffic generation

Site	Site Area (m^2)	Estimated GFA (m^2)	AM Peak Hour Vehicle Trips (0.4 / 100m2 GFA)	PM Peak Hour Vehicle Trips (0.5 / 100m2 GFA)
AIPN003	46,976	25,070	100	125
AIPN004 (a & b)	135,982	60,000	240	300
		Boronia Road TOTALS	**340**	**425**
AIPN005	29,886	11,954	48	60
AIPN006	27,725	11,090	44	55
AIPN007	27,725	11,090	44	55
AIPN008	100,570	40,228	161	201
AIPN013	31,997	12,799	51	64
AIPN014	39,812	15,925	64	80
		Access Rd TOTALS	**412**	**515**

The estimated traffic generation has been based on similar industrial parks within Brisbane Airport. The peak distributions are based on 60 per cent of AM Peak trips and 40 per cent of PM peak trips headed inbound (towards AIP2). It is also assumed that the traffic generated will access AIP2 via Sugarmill Road and Lomandra Drive West with very few vehicles using Lomandra Drive East.

Two intersections potentially impacted by the operation of AIP2 have been assessed using microsimulation modelling to understand the impacts:

1. Existing Lomandra Drive / Sugarmill Road / Boronia Road Roundabout; and
2. New Access Road / Lomandra Drive / Enterprise Lane Intersection.

The existing roundabout at Lomandra Drive / Sugarmill Road / Boronia Road has sufficient capacity for the estimated AIP2 generated traffic. A supplementary traffic study was conducted to review the additional traffic generated by the AIPN003 site, noted in Table 5, and confirmed there is sufficient capacity in the existing roundabout. No upgrades to this intersection are expected to be required.

The existing intersection of Lomandra Drive and Enterprise Lane does not have capacity to accommodate the development generated traffic from AIP2. Several scenarios were tested to determine the optimal intersection arrangement. A single lane roundabout is expected to be required when AIP2 is fully developed to ensure all movements are catered for, and sufficient capacity is provided.

Based on how vehicles are travelling to and from Brisbane Airport presently, it is considered that the estimated traffic generation is not expected to materially increase the traffic on Lomandra Drive, east of AIP2, therefore the intersection of Lomandra Drive and Main Myrtletown is not expected to be impacted.

4.3 Other infrastructure and services

4.3.1 Stormwater

AIP2 is located within the Boggy Creek catchment, one of the major drainage catchments across the Brisbane Airport site. Master drainage planning across the airport has been carried out which considers the proposed long-term development across the site and identifies trunk drainage requirements and associated Minimum Development Levels (MDLs). MDLs are set to ensure an appropriate level of flood immunity is achieved and maintained over the design life of the proposed development.

For AIP2, the master drainage planning has considered increased runoff from upstream catchment areas that need to be conveyed through AIP2 to Boggy Creek as well as increased local runoff from the AIP2 development. In addition, potential inundation from storm tide events and climate change provisions to the year 2100 have been considered.

This comprehensive review has determined the trunk drainage requirements and MDLs (based on 1per cent AEP at 2100) for AIP2. This information will be used to inform and guide the detailed design, ensuring it remains compliant.

4.3.2 Utility requirements

The supply requirements of energy, water, sewer services and telecommunications for AIP2 will require an extension of the existing distribution networks.

The intended extensions are consistent with the projected rate of utilities network development at the airport and the key objectives contained in the ’Plan for Utilities Development’ as part of the Master Plan. The objectives include:

- Ensuring distribution networks meet the required future demand and continue to improve network performance.
- Promote energy efficiency and sustainability by harnessing available technologies and encouraging tenants to adopt sustainable operations.
- Active engagement with utility suppliers to ensure that the development is in line with agreed future plans.
- Establish collaborative relationships with the local, state, and federal governments if required.
- Meet all legal, compliance and corporate governance obligations.

5. ENVIRONMENT ASSESSMENT

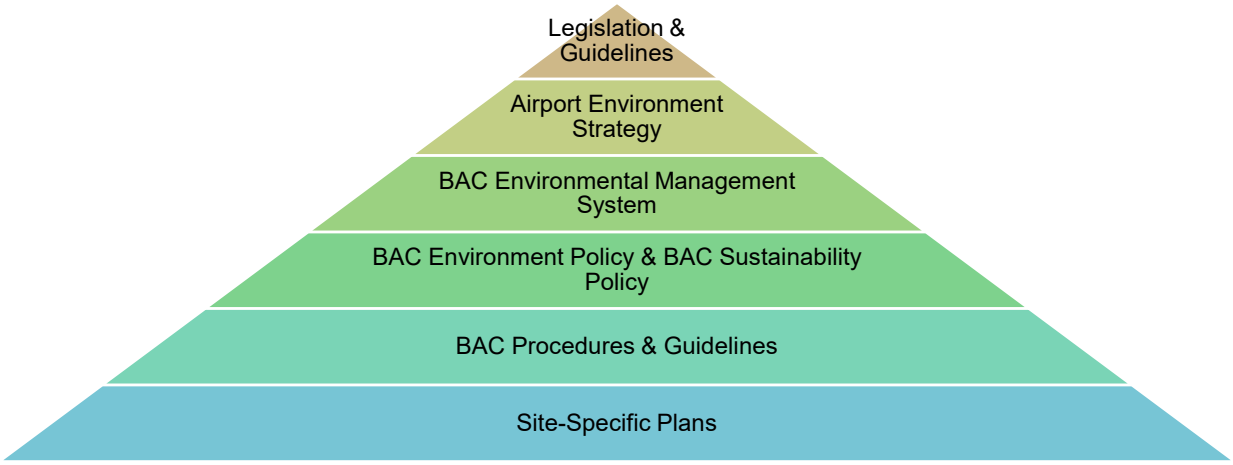
5.1 Environment management overview

Primary environmental compliance at Brisbane Airport is governed by the Airports Act 1996 (Cth), the Airports Regulations 1997 (Cth) and the Airports (Environment Protection) Regulations 1997 (Cth) (AEPR). Locally, the Airport Environment Officer, appointed by the Department of Infrastructure, Transport, Regional Development and Communications is responsible for administering the AEPR.

The Brisbane Airport Master Plan includes the Airport Environment Strategy (AES) that covers all environmental matters arising from the operation and ongoing development of the airport. The AES outlines BAC's commitment to best practice in environmental compliance and sustainability with documented affirmative measures to ensure continuous improvement in all aspects of environmental management.

The hierarchy of environmental guidance for development plans including MDPs is illustrated in Figure 19.

Figure 19 BAC Environmental Overarching Framework



BAC's commitment to environmental responsibility extends beyond ensuring compliance with regulatory standards and controls. Maintaining long-term environmental sustainability is a fundamental tenet of BAC's operating philosophy. The AES includes specific and detailed plans of action across several categories, including:

1. Cleaner air: Reducing the sources of ground-based air quality emissions and supporting sustainable transport and active living options.
2. Best practice water quality management: Protecting surrounding waterways and ecosystems from adverse stormwater run-off and pollution.
3. Soil and groundwater management: Driving improvements in soil and groundwater quality through research, tenant engagement and risk management.
4. Minimising ground-based noise: Ensuring sources of ground-based noise have minimal impact on airport workers, the local community and the environment through appropriate planning, design, and operations.
5. Sustainable development: Minimising the impact on the environment, local community, and airport workers from airport development through responsible planning, construction, and procurement practices.

6. Reducing greenhouse gas emissions: Reducing carbon emissions and taking steps to manage related issues across all airport operations.
7. Climate change adaptation: Addressing climate change impacts across all levels of normal airport operations and development activities.
8. Water conservation: Ensuring the reduction and efficient use of potable water and increased use of recycled water on airport.
9. Reducing waste: Reducing waste to landfill by encouraging recycling and the reuse of resources.
10. Protecting biodiversity: Maintaining the airport's biodiversity values and contributing to Brisbane's biodiversity.
11. Preserving and promoting our heritage: Ensuring that the airport's heritage values are maintained and promoted.
12. Tenant and contractor obligations: Ensuring airport tenants and contractors are aware of their obligations to develop and implement Operational Environment Management Plans.

The AES principles are considered and headline the AIP2 environmental assessment sections.

5.2 Airport site environmental context

Brisbane Airport is situated on a reclaimed portion of a river delta at the mouth of the Brisbane River. The area surrounding Brisbane Airport is largely industrialised. With a coastal location the airport also contains and is adjacent to some areas of environmental importance.

More than 10 per cent of the 2,700 hectare Brisbane Airport site is dedicated to biodiversity conservation, including the foreshore, mangrove and saltmarsh communities, casuarina plantations and Phragmites wetlands/unmanaged grasslands that are home to locally significant bird species, the Lewin's Rail, Eastern Grass Owl and King Quail.

Areas of environmental value within and adjacent to the airport (Figure 20) include:

1. Moreton Bay Marine Park – a wetland of international importance under the Ramsar Convention on Wetlands.
2. The Brisbane Airport foreshore – feeding grounds for international migratory shorebirds.
3. Mangrove and saltmarsh communities under Serpentine Inlet, Jackson's Creek, Jubilee Creek and Pinkenba.
4. The Boondall Wetlands – listed under the Ramsar Convention as an internationally important wetland for international migratory shorebirds.
5. Bulwer Island and Boggy Creek wetlands.

The airport site is also seen as culturally and spiritually significant to the Traditional Owners of the land and has European historic heritage significance.

Aboriginal cultural and spiritual significance within and adjacent to the site include Dreaming Tracks and Dreaming Sites (an integral part of Aboriginal people's connection to country), the Nudgee to Eagle Farm Pathway (which connected ceremonial sites, hunting grounds and camp sites in the local area), ceremonial grounds, food and water resources, temporary campsites, isolated archaeological finds, and a former burial site.

European historic heritage sites at Brisbane Airport include remnants of the former Cribb Island residential community, the former Cribb Island school site, the Kingsford Smith Memorial, Southern Cross aircraft, a memorial to the 460 bomber squadron from WWII, and an unofficial memorial garden for the scattering of ashes.

Significant industrial neighbours include the Port of Brisbane, the Luggage Point Wastewater Treatment Plant, the BP jet fuel import terminal at Bulwer Island, the Viva Energy fuel storage and distribution terminal at Pinkenba, Caltex oil refinery at Lytton and heavy industries including fertilizer and concrete manufacturing plants.

The AIP2 development context is shown in Figure 20 with the development site being neighbour to the surrounding industrial precincts and facilities.

The AIP2 site is terrestrial and isolated from the majority of BAC identified areas of environmental value which are predominantly to the northwest of the overall airport precinct. The exception is a mangrove community (located in a BAC designated Environmentally Sensitive Area [ESA]) to the southeast of the AIP2 site. While within the overall AIP precinct, for the purposes of the AIP2 development it is considered to be isolated as there is physical separation with a road, pipeline and landscaped areas, and any surface water runoff drains towards the Boggy Creek system and away from this ESA (see Figure 26).

Figure 20 Areas of environmental value within or adjacent to the airport

5.3 Soil, groundwater, and surface water

Airport Environment Strategy Focus – Soil and Groundwater Management

Driving improvements in soil and groundwater quality through research, tenant engagement and risk management.

Airport Environment Strategy Focus – Best Practice Water Quality Management

Protecting surrounding waterways and ecosystems from adverse stormwater run-off and pollution.

5.3.1 Baseline conditions

5.3.1.1 Site history

A review of historical aerial imagery of the AIP2 development area was undertaken to document the site history – Aerial photographs from 1946, 1958, 1969, 1978, 1987, 1994, 2002 and 2020 were available. Select images are included below for reference.

Key milestone observations:

Historically, the site was primarily used for agricultural purposes. By 1946 the site was mostly cleared with two tributaries meandering across the site as shown in Figure 21. Adjacent to the site, the historical airfield (Eagle Farm Aerodrome) continued to expand and evolve up to 1987.

Figure 21 1946 historic aerial, AIP2 (Source: Department of Natural Resources, Mines and Energy, 2020)

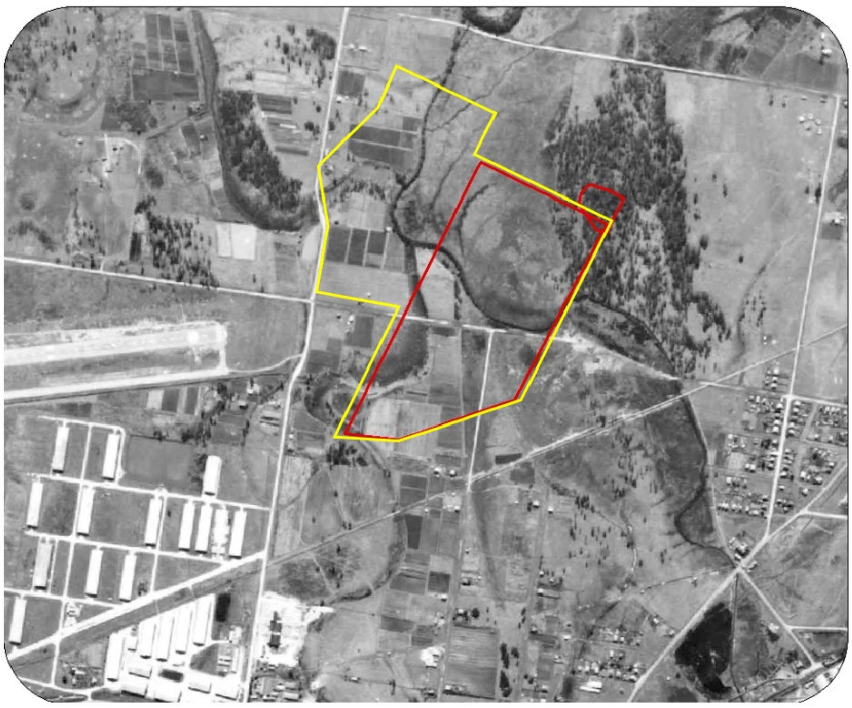
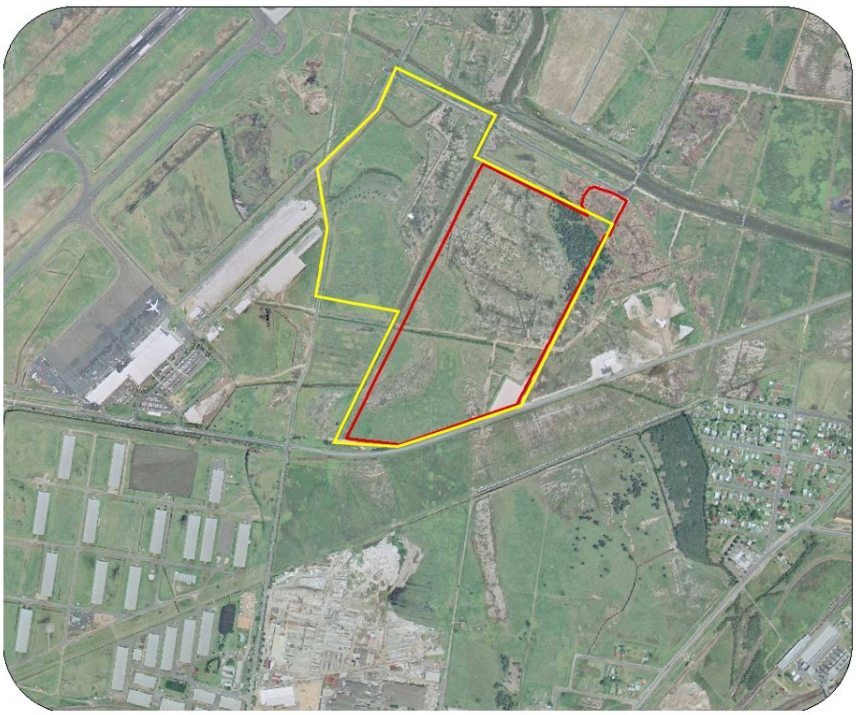


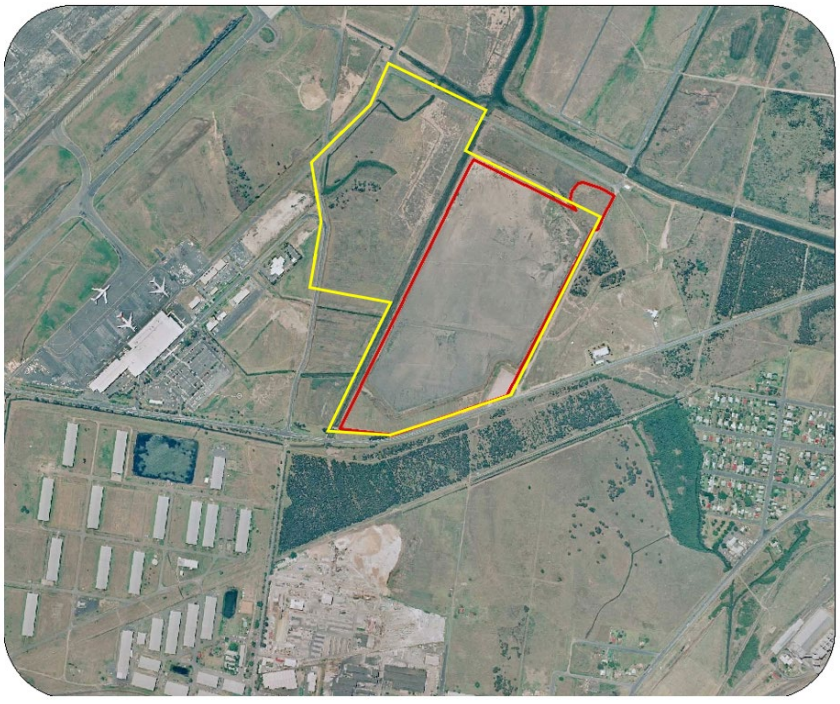
Figure 22 shows the aerial imagery of the site in 1987. Earth works relating to the development of Brisbane Airport are evident across the site, including the infilling and redirection of the creeks into an engineered surface water channel to the north of the site (Boggy Creek). Lomandra Drive has been built to the south of the site and there are commercial developments commencing around the Pinkenba residential community area.

Figure 22 1987 historic aerial, AIP2 (Source: Department of Natural Resources, Mines and Energy, 2020)



By 1994 additional earthworks have occurred across the site, likely levelling the site. The historical unsealed road which crossed the site from east to west is no longer visible and the vegetation within the north eastern portion of the site has been cleared. The 1994 aerial image is shown in Figure 23.

Figure 23 1994 historic aerial, AIP2 (Source: Department of Natural Resources, Mines and Energy, 2020)



The current 2020 aerial image included in Figure 24 shows no major development on the site other than the re-establishment of sparse vegetation and stockpiled material in several locations across the site. The AIP Stage 1 building platform and remaining surcharge on the (northern lot) are clearly visible to the west of the

AIP Stage 2 footprint. Additional commercial infrastructure is visible, relating to Brisbane Airport development including the NIOA building located immediately east of the site on Lomandra Drive.

Figure 24 2020 aerial, AIP2 (Source: Nearmap, 2020)

5.3.1.2 Topography, geology, and soils

The overall site is relatively flat with an elevation for the unsurcharged footprint ranging from 2.5m to 3.5m Airport Datum (AD), with some higher areas where fill from historic developments has been stockpiled within the site.

Based on geological mapping, the site is mostly underlain by Holocene alluvial soils comprising undifferentiated alluvial plains: sand, silt, and gravel with linear depressions (oxbows): mud and clay. The Holocene soils are underlain by Pleistocene alluvium comprised primarily of sand, silt, and clay.

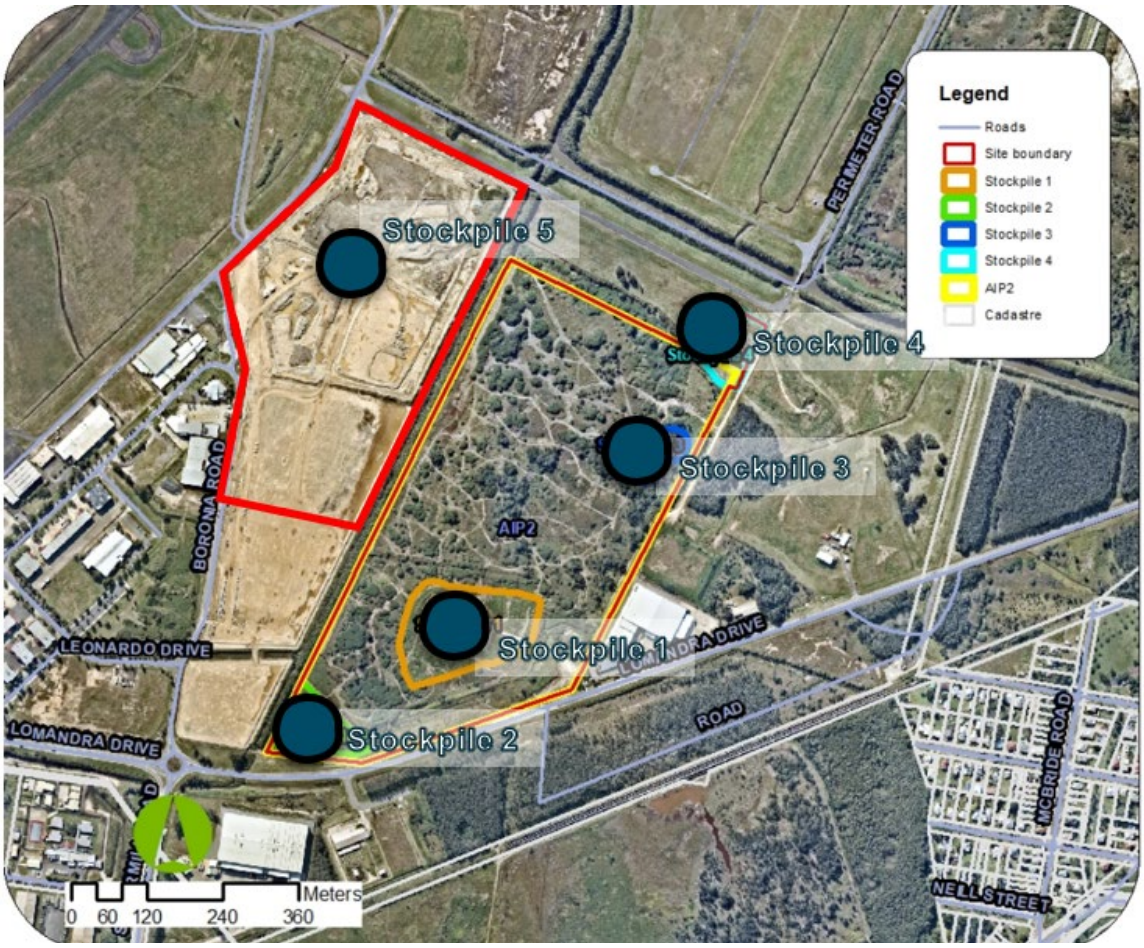
Soils identified during intrusive investigations performed at the site were generally described as:

- Historic fill material from the surface to a depth of approximately 1.6m with localised deeper areas up to 6m. This generally comprised of soft to firm silty clays with fine gravel and sand intermixed.
- Upper Holocene alluvium encountered below the fill material and generally comprised of soft silty clay. The thickness ranges from 1.5m to 5.5m.
- Intermediate Holocene alluvium comprised of fine to medium grained, very loose silty sand interbedded with soft and firm clays up to approximately 5.0m thick.
- Lower Holocene alluvium comprised of a layer of high plasticity silty clay of varying thickness from 3m to 18m. The clay is firm initially and becoming stiff with depth.
- Pleistocene alluvium encountered below the Lower Holocene to the termination depth of investigation. This layer is generally stiff to hard silty clays.

5.3.1.3 Existing fill stockpiles

There are several stockpiles located within the AIP2 site with indicative locations shown in Figure 25.

Figure 25 AIP2 stockpiles



A summary of the known background of these stockpiles is provided below:

- Stockpile 1 contains material from several historic developments across Brisbane Airport dating from late 2012.
- Stockpile 2 was formed from excavations for a hangar development on Pandanus Avenue in 2008 and includes treated acid sulfate soil material.
- Stockpile 3 contains material from a recent warehouse development on Boronia Road with known asbestos contamination. This is currently a secured and sealed stockpile with control measures in place including ongoing monitoring. Any works required as part of the MDP development that may disturb and impact this stockpile will be undertaken in accordance with an approved design and Asbestos Management Plan (as a sub-set to an EMP).
- Stockpile 4 contains material from several historic developments including taxiway, road works and treated acid sulfate soil from a trunk watermain project.
- Stockpile 5 located on lot AIPN004 consists primarily of excess surcharge material from the completed land development section of AIP Stage 1. Within the Stockpile 5 area are also a number of smaller stockpiles from various sources around the airport.

These stockpiles have been placed in the area with the intent of re-use. The AIP2 development is seeking to realise the benefit of re-use of this material with detailed mitigation measures to be identified as part of site-specific risk assessments to be developed during the detailed design phase of the project. Potential design mitigation options are considered in Section 5.3.3.3.

Soil investigations within AIP2 including characterisation has been undertaken for all these stockpiles as part of the MDP assessment. This can be supplemented if required as part of design development to inform the

required risk assessment and related fill re-use plan. The relevant legislative requirements and building standards will apply to all fill required to complete the works. Further discussion regarding any potential contamination risks with the stockpiles is provided in the related sections that follow.

5.3.1.4 Acid Sulfate Soils

The airport is situated on a coastal plain and as such, Potential Acid Sulfate Soils (PASS) conditions commonly exist across the airport site.

An Acid Sulfate Soil (ASS) investigation was undertaken in July 2020, by an environmental consultancy familiar with Brisbane Airport (Aurecon), to inform this MDP and future AIP2 design development. The investigation scope undertaken in accordance with the relevant guidelines and standards included:

- A desktop study including a review of historic environmental investigation reports for AIP2 and adjacent areas.
- Soil sampling of both the greenfield site and stockpiles.
- Quantitative analysis of the soil samples primarily utilising the SPOCAS method.
- Groundwater and surface water sampling.

The investigation findings for the assessed areas indicated that PASS material is present across AIP2 from the ground surface through to depth, in reworked natural material, fill material, natural clay and sandy clay soils.

There is also Active ASS (AASS) material present, although these soils are mostly located within deeper soils (>1.0m below ground level) within the natural clay and sandy clay soils. This AASS material is predominately beneath the historic fill material and is considered to be a result of historic exposure and oxidation.

The excess surcharge fill to be relocated from the northern lot of AIP Stage 1 (‘Stockpile 5’) does not require ASS management as this risk was remedied under the surcharge placement during that stage of the development. The other stockpiles within the greenfield AIP2 area however are similar to the general site condition with primarily PASS conditions but some AASS material.

The groundwater quality collected from wells within the AIP2 footprint suggests a combination of undisturbed and disturbed environments with groundwater results indicating that acidification from AASS has previously occurred within the site and surrounds.

Surface water collected from the drainage channels immediately surrounding AIP2 displayed some past impact from ASS due to the presence of high dissolved iron and aluminium concentrations. However, most surface water samples contained net alkaline balance.

The presence of ASS throughout AIP2 and a low buffering capacity of the groundwater will need to be addressed in the development of a detailed design solution and related EMP for AIP2. The assessed ASS results were typically similar to those identified for the first stage of the AIP development and are therefore considered to be a manageable risk.

The ground conditions of the AIPN003 development site are similar to the adjacent AIP1 northern block. The site was previously surcharged, with all excess surcharge material removed from the AIPN003 site under a previous building approval. The remaining earthworks for the AIPN003 development are minimal and limited to cut and fill works relating to the final site grading and adjacent pavement and utility works. Section 9 of the WSP 2022 Technical Memorandum notes that as the site has been previously surcharged and compressed, the likelihood of groundwater impact is considered low. Furthermore, as the remaining earthworks component is minor, ASS is considered pose a low risk to the receiving environment.

5.3.1.5 Soil contamination

To assess the current state of potential contamination of the AIP2 site and the suitability of stockpiles for reuse, historic environmental reports relating to the development were assessed. A contamination

investigation was also undertaken in July 2020 to identify and characterise any potential contaminants of concern. The scope of the investigation included the development footprint to be surcharged and the existing fill stockpiles within AIP2 (including the excess surcharge fill located on the northern lot of the completed first stage of the AIP precinct.

The frequency and location of sampling points for the investigation was generally determined in accordance with the relevant guidelines, including those listed in 2.3.2. The coverage of the sampling and related investigations was further assessed as part of preliminary design development with no material gaps identified. An additional monitoring groundwater well only has been added since the preliminary investigations to provide an improved baseline for construction activities management taking into account an improved understanding of the earthworks scope.

The preliminary site investigation scope as undertaken by specialist environmental consultancies and detailed in the referenced reports broadly included:

- A desktop study including a review of historic environmental investigation reports for AIP2 and adjacent areas.
- Soil sampling of both the greenfield site, and stockpiles. This included a number of boreholes.
- Installation and monitoring of groundwater wells including sampling for laboratory analysis and aquifer testing. This included 6 no. as part of the Aurecon July 2020 investigative effort.
- Collection and analysis of sediment samples from several surface water locations. This included 5 no. as part of the Aurecon July 2020 investigative effort located both within existing shallow drainage on the AIP2 site, and in the adjacent shared open drains.

The results of the investigation indicate that contamination in soil and sediment across the site was not present at concentrations considered likely to have an adverse effect on human health and/or the environment. The basis of this assessment is discussed in Section 5.3.2.

The initial investigation and testing for AIP2 noted above has been supplemented with additional testing for the AIPN003 development site. The results of the WSP 2022 investigative effort (refer to Section 8.1.1 of WSP 2022) indicate that contamination in soil and sediment across the AIPN003 site, PFOA <0.0002mg/kg and Sum of PFHxS and PFOS max 0.004mg/kg, was below the NEMP Human Health threshold for Industrial/Commercial Land Use (HIL-D) of 50mg/kg and 20mg/kg respectively. Furthermore, the highest PFOS level of 0.0032mg/kg detected at the AIPN003 site is below the NEMP Ecological Indirect Exposure threshold of 0.14mg/kg applicable to this substantially developed site. Therefore, concentrations present at the AIPN003 site are considered not to have an adverse effect on human health and/or the environment.

Stockpiles

A summary of the status of the stockpile investigation at AIP2 is presented in the following table. The basis of the status is discussed further in Section 5.3.2.

Table 6 AIP2 Stockpile Contamination

Stockpile	Summary of Contamination Assessment
1	All metals and hydrocarbon results for soils were not considered to have an adverse effect on human health and/or the environment. Some trace PFAS detections were observed in the stockpile material but below the relevant PFAS NEMP criteria for soils.
2	All metals and hydrocarbon results for soils were not considered to have an adverse effect on human health and/or the environment. Some minor PFAS detections were observed in the stockpile material but below the relevant PFAS NEMP criteria for soils.
3	All PFAS, metals and hydrocarbon results for soils were not considered to have an adverse effect on human health and/or the environment.

Stockpile	Summary of Contamination Assessment
	Some trace PFAS detections were observed in the stockpile material but below the relevant PFAS NEMP criteria for soils. Stockpile 3 is known and has been constructed to contain bonded and friable asbestos bundles from a historic building development on airport. This material has been capped on site in accordance with an associated Building Approval and will continue to be monitored up until incorporation into the AIP2 land development.
4	All metals and hydrocarbon results for soils were not considered to have an adverse effect on human health and/or the environment. Some minor PFAS detections were observed in the stockpile material but below the relevant PFAS NEMP criteria for soils.
5	Stockpile 5 is the excess surcharge material from the first stage of the AIP development (AIP1) and is stored on the northern lot (Lot 4) of AIP1. All PFAS, metals and hydrocarbon results for soils were below the adopted PFAS NEMP and ASC NEPM criteria for human health and/or the environment.

Based on the assessment and level of contamination, with some control measures to be implemented, all the stockpiled material was considered suitable for re-use. Mitigation measures are discussed further in 5.3.3

Based on the PFAS detections in all onsite stockpiles, incorporation of these stockpiles into the development earthworks will require PFAS mitigation measures to be implemented to control PFAS risk (discussed in Section 5.3.3). The upper-limit PFAS ASLP concentrations observed for the stockpiles particularly for Stockpile 4 are the exception / outlier rather than the mean, hence are not representative of the worst-case leachate potential. Leachate concentrations are likely to be nearer the lower limit given the aggressiveness of the ASLP test and low soil PFAS concentrations reported.

Irrespective, this risk has been identified and is to be addressed through construction and design controls to be finalised and documented in the Building Approval and related EMP. An outline of these mitigation measures is discussed in Section 5.3.3.

5.3.1.6 Groundwater

While there are no discrete aquifers present at Brisbane Airport, the geology can be divided into two distinct layers: Upper Holocene alluvia and Lower Holocene alluvia. The shallow aquifer is present in the Upper Holocene, which comprises interlayered clays, silts, and sands with low permeability.

The shallow aquifer fluctuates significantly with tidal and rainfall events and discharges to creeks and drains within Brisbane Airport. The Lower Holocene alluvia comprises homogenous clays and silts and contains a deeper groundwater aquifer. Permeability of the deeper aquifer is very low and groundwater movement is not considered to be material.

A groundwater investigation was conducted on the site and included the gauging and sampling of six boreholes. Groundwater was shallow, with depths ranging between 0.5m below ground level (BGL) and 1.5m BGL (1.46mAD – 2.11mAD). The deeper water levels are typically associated with areas of higher elevation.

Groundwater quality was typical of a moderately disturbed system with some acidification having previously occurred, particularly in the shallow aquifer. No detectable concentrations of benzene, toluene, ethylbenzene, xylene or polycyclic aromatic hydrocarbons were recorded however concentrations above the adopted assessment criteria (derived primarily from the ASC NEPM 2013 and ANZG 2018: toxicant default guideline values for 95% level of species protection for Marine waters.) were recorded for cadmium (minor), copper and zinc.

The supplementary investigation fingings undertaken (refer WSP 2022, Section 8.6) for the AIPN003 site are consistent with the findings for AIP2. The AIPN003 site had concentrations of Cadmium <0.1 to 1 µg/L, Copper 6 to 51µg/L and Zinc 21 to 207 µg/L, which are in the same order of magnitude as AIP2 of Cadmium 0.1 to 0.3 µg/L, Copper 2 to 94 µg/L and Zinc 21 to 170 µg/L. As no known contaminating activity has

occurred at AIP2 and AIPN003that could result in the release of metal contamination to groundwater (e.g. electroplating), cadmium, copper and zinc concentrations are considered to be reflective of natural groundwater concentrations beneath AIP2 and AIPN003, and are not considered to be a cause of concern or require mitigation.

As a requirement of the EMP, ongoing groundwater monitoring will be completed throughout the AIP2 development with action to be required if significant changes in metals concentrations are observed.

PFAS was only detected on two occasions. Due to the standard Limit of Reporting (LOR) used, these PFAS detections were rated above the ecological screening criteria for 99% species protection. All samples were below the adopted screening criteria for protection of human health (recreational water) and the ecological screening criteria for 95% species protection.

5.3.1.7 Surface water

Surface water quality in the drainage channels is tidally influenced and flows into Boggy Creek, which discharges into the Brisbane River mouth and subsequently Moreton Bay.

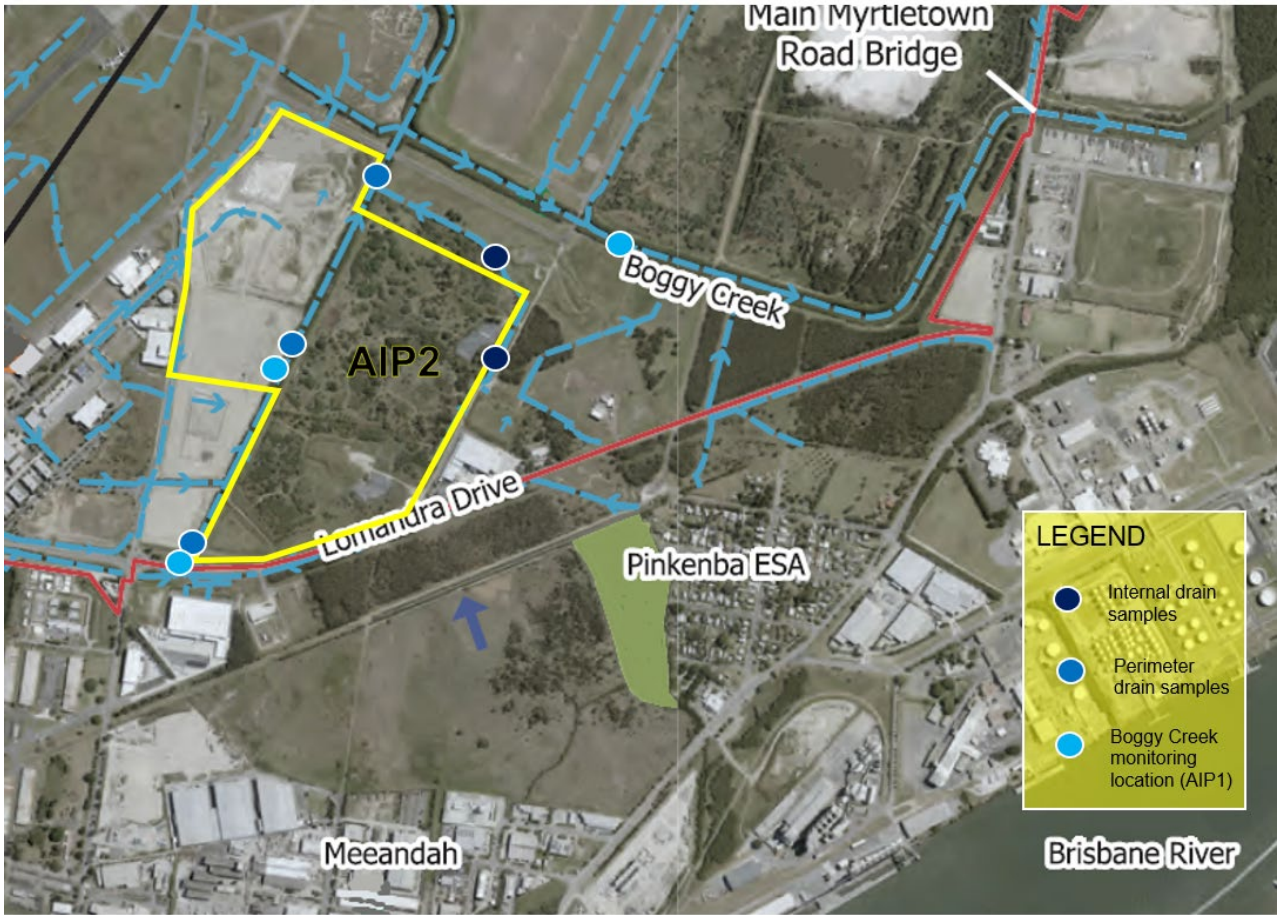
Surface water samples were collected from five locations within the western drain, and within some shallower drainage channels within AIP2 (see Figure 26).

Table 7 Summary of surface water contamination

Sampling location	Summary of contamination
Site internal drain samples (refer Figure 26)	Slightly elevated metal concentrations relative to the adopted criteria were observed for cadmium, copper and zinc. The concentrations are not considered a cause of concern and have been interpreted as the result of the naturally acidic surface water interacting with onsite soils of AIP2 (i.e. a natural occurrence). The occurrence of PFAS detections in this ponded surface water indicates that PFAS can be released from the soil into solution, which is in keeping with the CSM. The mechanism of sorption and desorption (i.e. equilibrium) is typical and not evident of a significant release of PFAS to surface water
Tidally influenced perimeter drain samples including AIP1 monitoring locations (refer Figure 26)	The tidally influenced perimeter and Boggy Creek drainage samples show elevated metal concentrations and PFAS detections relative to the internal drain samples indicative of water way impacts from other off site and upgradient sources. This been considered in the CSM and the ongoing collection of data from these points will form the basis of baseline monitoring for the development. This is consistent with the draft PFAS Framework CSM developed for Brisbane Airport.

The exposure/disturbance of ASS and potential risk to impact adjacent vegetation communities (including adjacent Swamp oak TEC [Threatened Ecological Communities as defined in the EPBC Act] and mangrove communities within the drains) will require control measures to be identified and applied during construction particularly for the preparatory earthworks phase.

Figure 26 Surface Water and Sediment Sampling Locations



5.3.1.8 Sediment

Sediment sampling was conducted at the five surface water sampling locations. All five samples contained PFAS above the LOR. Concentrations of PFOS ranged from 0.0018mg/kg to 0.013mg/kg including 3 samples with detections of PFOA above the LOR.

The PFOA concentrations ranged from <0.0002mg/kg to 0.001mg/kg. There are understood to be no defined screening criteria for sediment for PFAS.

Metal/metalloid exceedances were recorded in some of the sediment samples when assessed against the ANZG 2018 low screening criteria however all sediment results were below the ANZG 2018 upper guideline values, indicating that there are no high-level toxicity problems in sediment at AIP2.

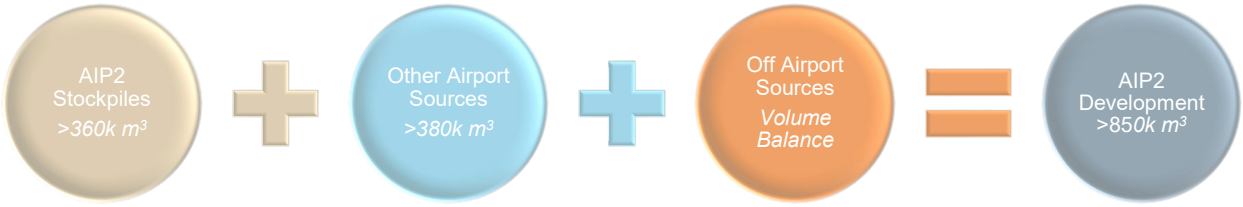
5.3.2 Assessment of impacts

5.3.2.1 Topography, geology, and soils

To develop the site, the existing area requires fill to be placed and compacted across the footprint to:

- Elevate the site above future flood levels (inclusive of climate change considerations).
- Surcharge and consolidate the site to provide a suitable foundation for future building developments.

Over 850,000 cubic metres of fill material is estimated to be required to undertake the development. This is to be made up of material sourced from the existing stockpiles within the AIP2 footprint, material from other sources around airport, and off airport sources where required.



Existing stockpiles

As they form part of the existing state of the site and need to be moved, the stockpiles within the AIP2 footprint have been characterised. The investigation identified varying levels of contamination however concluded that the reuse of existing stockpile material is feasible.

The method of incorporation into the final development is to be based on a site-specific risk assessment which will be completed as part of detailed design and subsequent EMP.

Other airport fill sources

Other fill sources across the airport have been identified for incorporation into the AIP2 development. This includes excess fill material from the BNE Auto Mall development.

Any fill sourced from airport areas external to the AIP2 development have the potential to impact the site and the imported fill (from around the airport) will need to be characterised and approved for use within the AIP2 development as the respective projects are progressed. The approval criteria will be identified as part of the detailed design development and associated site-specific risk assessment. The threshold criteria and any control measures will be documented in the Building Approval design submission and any related EMP.

With the exception of material from areas within and adjacent to primary pollutant sites (which does not apply for the AIP2 development), reuse of secondary low level impacted material from around the airport is considered to be consistent with the principles of the applicable guidelines and the draft PFAS framework. In particular, the application of the waste hierarchy principle which is aligned with the sustainability focus for BAC as documented in the AES.

Off airport fill sources

The AIP2 earthworks design will include:

- Consideration of the need for imported clean fill material from off airport sources as a potential mitigative control measure to support the reuse of existing material on site (e.g., for use as a capping material); or
- To provide the balance of fill material should identified fill sources on airport be inadequate or unsuitable for incorporation into the development.

Where fill is to be imported from off airport sources this would be subject to the BAC approval procedure and guideline for the importation of fill material.

The BAC approval approach is to undertake a preliminary site investigation and review of any imported material source sites (e.g., land use both current and historic, contaminated land register reviews, and flora/fauna considerations) to determine the need and if required the extent of any further investigative effort. This is undertaken with consideration of the regulatory guidelines for the use of fill material.

Earthwork impacts on the existing site

During construction, the disturbance of existing soils and the movement and placement of fill introduces an erosion risk particularly during the clearing and earthworks phase. Key erosion risks are:

- Sediment runoff during rainfall events with impacts to adjacent drainage.

- Tracking or dropping of sediment on off-site areas including access roads due to construction plant movements.
- Dust generation from wind events with the potential of nuisance impacts to sensitive receptors and/or the low likelihood possibility of impact to airfield operations.

There is also a potential for erosion during the settlement phase of the site including as a result of differential settlement impacts on constructed and stabilised surfaces.

These risks will be assessed during the design and development of construction methodologies with mitigative controls and measures to be developed within the relevant Erosion and Sediment Control plans.

5.3.2.2 Acid sulfate soils

Any excavation within the in-situ AIP2 soils will disturb ASS and require the development of an ASS Management Plan, which will include lime treatment and capture of acid generation.

To minimise the disturbance of ASS and to mitigate the risk of contaminant transport to groundwater, a key objective for the detailed design is the minimisation of excavation in in-situ soils as indicated in the design and construction considerations outlined in Section 5.3.3.3. The ASS investigation (to a depth of 2 metres below ground level) as undertaken is considered suitable for the purposes of the planned drainage design for the development however if there is a need for supplementary investigations to be undertaken to inform a short section of potentially deeper drainage, this will be identified and addressed as part of the detailed design phase and will form part of the Building Approval submission (and related EMP).

Any filling, surcharging, and preloading of the site will result in a total settlement anticipated to range from 500mm to 600mm. Due to the resulting submersion of in situ fill material, this will result in the saturation of some ASS, including actual and potential ASS. This will result in the release of acid to the groundwater and the subsequent stripping and mobilisation of metals, including iron.

As assessment has been completed as part of the preliminary earthworks design for the development with any perching effect to the groundwater assessed as being unlikely due to the high permeability of the Intermediate Holocene layer with is located above the Lower Holocene Alluvium where the largest settlement contribution occurs (approximately 350 to 450 mm).

The risk of ASS release and unlikely potential for a perched groundwater table will be monitored and mitigated where reasonable and practical as part of the development of the ASS Management Plan and detailed design (refer to the mitigation measures section below for further discussion).

5.3.2.3 Contaminated land impacts

Material assessed in the recent contamination investigations is considered suitable to remain in-situ and reused based on the commercial/industrial land use criteria outlined in AEPR 1997 and the ASC NEPM.

Based on the PFAS detections in all onsite stockpiles, incorporation of these stockpiles into the development earthworks will require PFAS mitigation measures to be implemented to manage the PFAS risk (discussed in 5.3.3).

The upper-limit PFAS ASLP concentrations observed for the stockpiles and noted above are the exception / outlier rather than the mean and therefore not representative of the worst-case leachate potential. Irrespective, the leachate potential which exists in the baseline and planned built condition is considered to be one of the key risks to mitigate.

Additionally Stockpile 3, due to the asbestos impact, will require management during the development (e.g. encapsulation on site in designated cell to reduce asbestos risk to an acceptable level).

5.3.2.4 Groundwater impacts

Dewatering

It is expected that dewatering of the excavation will be required during the construction phase of the works. Management options to mitigate any assessed risks will be considered, developed, and documented as part of the development of the related CEMP. Options may include recirculation and/or aquifer recharging.

Surcharge impacts

Groundwater modelling has been carried out to assess the potential magnitude of the impact from the site surcharging required to prepare the development site.

As part of the preliminary earthworks design for the development the assessment concluded that any perching effect to the groundwater is unlikely due to the high permeability of the Intermediate Holocene layer with is located above the Lower Holocene Alluvium where the largest settlement contribution occurs (approximately 350 to 450 mm)..

5.3.2.5 Surface water and sediments

Development of the AIP2 development site is expected to improve the hydrology and water quality of the stormwater run-off with the establishment of water sensitive urban design (e.g., swales, landscaping etc).

Surface water quality impacts that have potential to occur during construction and operation of the development, include:

- Potential construction impacts to be managed:
    - Sedimentation of the drain and downstream watercourses from construction activities due to inadequate erosion and sediment control measures and high rainfall incidence.
    - Potential disturbance of AASS and PASS, resulting in a decline in water quality.
    - Release of PFAS-impacted surface water and increase to the PFAS load in the Airport drainage system.
    - Hydrocarbon and chemical spills from construction plant and vehicles.
    - Release of weed seeds and pathogens into drainage lines from vehicles and machinery traversing the site.
    - Litter and rubbish from occupation by construction workers.
- Potential operational impacts to be managed:
    - Spills or leaks from storage and use of fuels and other hazardous chemicals, resulting in a decline in water quality.
    - Litter and rubbish from tenants and visitors to the AIP2 development.

5.3.2.6 Conceptual site model and risk assessment

A conceptual site model (CSM) is a representation of site-related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. The development of a CSM is an essential part of all site assessments and provides the framework for identifying potential risks to human health or environmental receptors either in the present or the future.

In accordance with ASC NEPM, potential risks to receptors are based on three components:

- Source: a potentially hazardous substance that may be released to the environment e.g. PFAS.
- Pathway: a mechanism by which the hazardous substance may reach and be exposed to receptors through interaction with environmental media.

- Receptors: person(s) or ecosystem(s) that may be detrimentally affected by exposure to the hazardous substance.

If all three components are present in a system, the source-pathway-receptor linkage is considered complete and a receptor is potentially at risk. If one of the components is absent, no risk is present.

The aim of the CSM is to identify source-pathway-receptor linkages to inform an environmental risk assessment and appropriate mitigation approaches to be adopted for the project.

A preliminary CSM was created as part of preliminary land investigations and has been further developed as part of the preliminary design. The current CSM is included for reference in Appendix C and is the basis of the mitigation measures outlined in the MDP. The CSM will continue to be developed and will be finalised as part of the Building Approval and associated EMP documentation required prior to the commencement of any construction works.

The CMS has considered and is based on BAC's PFAS CSM for the Boggy Creek catchment as presented in BAC Brisbane Airport PFAS Management Framework (Version 1, dated March 2021).

5.3.3 Mitigation measures

5.3.3.1 Topography, geology, and soils

Erosion and sedimentation impact during the excavation works will be managed through a site-specific Erosion and Sediment Control Plan (ESCP). Effective and flexible ESCP will be developed taking into consideration the existing site conditions, weather risks and construction methodologies. These will be prepared as part of CEMP for each stage of works.

The ESCP will need to identify suitable control measures to be implemented to mitigate the erosion risk with key considerations to include:

- Staging of the clearing and placement works where practical to manage the extent of exposed areas.
- The assessment of stormwater runoff risk across the site and the implementation of suitable measures to control the movement of runoff water and to capture sediment.
- The stabilisation of exposed areas as necessary based on appropriate risk assessment.
- Controls to mitigate the risk of sediment being tracked or dropped on off-site areas particularly roads.
- The ongoing maintenance and monitoring of any implemented ESCP measures.

5.3.3.2 Acid Sulfate Soils

Where disturbance of ASS material is expected, an ASS Management Plan will be developed and implemented to ensure adverse impacts to stormwater run-off and groundwater from increased acidity are avoided.

The ASS Management Plan will be required to comply with the Queensland Acid Sulfate Soil Technical Manual – Soil Management Guidelines (v4.0) and the National acid sulfate soils sampling and identification methods manual (2018).

Where excavations occur within the natural material underlying the fill material imported during the site preparatory works, soil material is to be assumed to be ASS until proven otherwise and is to be managed by stockpiling within a nominated location (as agreed by the BAC Environmental Advisor) and neutralised through lime treatment.

As a contingency measure for the project ASS Management Plan, the design is considering the incorporation of a limed interceptor trench to manage any potential ASS mobilisation. This risk assessment mitigation measure is to be finalised as part of the Building Approval and EMP stages.

5.3.3.3 Contamination

During excavation works into the natural soil, if any unexpected contamination is encountered (e.g., odours, staining or other signs of contamination), a suitably qualified consultant will be commissioned to assess the potential impact and recommend additional management strategies if required.

An EMP will be developed and implemented for the relevant stages of the AIP2 development. The EMP will contain procedures for assessing and managing all contaminants including PFAS impacted soils, groundwater, and surface water.

The CEMP to be developed by construction contractors prior to the commencement of any construction stages will be developed in accordance with the overarching EMP and the BAC CEMP guidelines.

In alignment with the BAC CEMP guidelines, any EMP and CEMP will address the relevant guidelines including the PFAS NEMP. Key areas of focus will be determined by a site-specific risk assessment and are expected for the AIP2 development to include but not be limited to:

- Conceptual site model - including maps and any monitoring data - identifying the extent of concentrations of possible contamination within the project footprint and nearby. As noted in Section 5.3.2.6, the preliminary design stage CSM is included for reference in Appendix C and will be further developed for submission with the Building Approval and form the basis of the associated EMP documentation.
- Possible exposure pathways and ecological receptors - both directly within the AIP2 site and also from the AIP2 site to any nearby receptors.
- The site-specific risk assessment that identifies possible risks tailored to the reported or expected PFAS concentrations, exposure pathways, and potential receptors on and off the AIP2 site.
- Procedures for the management of PFAS contamination of soil and water relating to the AIP2 site development.
- Procedures for the management of asbestos contamination where encountered including for Stockpile 3.
- Strategies to reduce runoff and migration of contamination within and off the proposed AIP2 site.
- Operational procedures for managing earthworks and the stockpiling or storage of contaminated water / soil / rock / concrete / tarmac / etc, including in relation to encapsulation, bunding, leachate control and disposal.
- If necessary, a contingency action plan for unexpected PFAS contaminant discoveries.
- Any one-off or ongoing soil and water monitoring requirements and testing procedures, and their relevant quality assurance and quality control procedures.

The EMP and CEMP will also need to consider requirements for:

- Soil re-use.
- Any PFAS contaminated material (including but not limited to excavated soil or sediment, leachate from soil or sediment, water arising from de-watering of soil or sediment, concrete, tarmac, appliances, pumps, pipes, hoses, fittings) must be handled appropriately and managed of in an environmentally sound manner such that potential for the PFAS content to enter the environment is minimised.
- Any PFAS contaminated material with a PFOS, PFHxS or PFOA content above 50mg/kg or 50mg/L (as appropriate), must be stored or managed of in an environmentally sound manner that will achieve nil environmental release of their PFAS content.
- Detail how materials at or over the concentrations listed above, if encountered, would be handled to achieve PFAS NEMP compliance.

The PFAS management will also need to align with the BAC PFAS management framework that is currently being developed for application across all airport projects. This framework is being developed in consultation with the relevant regulators.

Design and construction considerations

The CSM has identified low to medium risks associated with identified low and medium risks to human health and the environment during the construction phase of the AIP2 development.

Current technologies to treat PFAS impacted material, when applied to a large-scale setting can be impractical and many have adverse outcomes. As documented above, PFAS impact at AIP2 site is the result of natural interactions with the background environment burden including the transport of PFAS via drainage features and these processes will continue to occur into the future. Therefore, it is not practical for AIP2 site, including the imported fill, to be subject to remediation for PFAS contamination.

The focus for PFAS management therefore for the AIP2 development is on reducing the magnitude of ongoing natural releases to receiving waterways as opposed to source removal.

This is addressed both in the design of the bulk earthworks and importation of fill, the outcomes of which include:

- To manage the PFAS risk during the construction phase where the potential for PFAS-impacted runoff to waterways increases due to exposed soil surfaces.
- Following the removal of surcharge, the risk profile reduces and continues to reduce as the development progresses with surface completions and construction mitigating future runoff (when compared to the undeveloped site).
- Once developed, PFAS risk from the site will be lower than the site in its current undeveloped state (as measured by a reduction in PFAS mass released from the site to the environment).

The bulk earthworks for AIP2 is being designed to reduce the mass of PFAS that would otherwise mobilise from impacted soils to the receiving environment. Contamination pathways such as infiltration, surface water runoff and windblown migration of dust can be managed so that during periods where there is the potential for increase in risk (i.e. during surcharging) can be significantly reduced.

The importation of fill has been designed to allow the beneficial reuse of low-level PFAS impacted fill from sites impacted by low-level PFAS concentrations. This strategy is to be supported by the following rationale:

- Assessments of reuse options for PFAS-contaminated materials to ensure no unacceptable risk to human health and/or the environment.
- The reuse of soil at AIP2 aligns with strategies in National Waste Policy and Queensland's Waste Management and Resource Recovery Strategy, which requires waste to be avoided, reused and recycled to the greatest extent possible.
- Reduces consumption of natural resources, such as use of virgin excavated natural material (VENM) for filling, as well as reducing carbon emissions associated with quarrying, crushing and transport.
- Provides a reliable and local source of material that is fit for purpose, which can reduce development delays associated with supply-chain risk.
- Low technology solution for managing PFAS-impacted soils, the benefits of which can be tracked and measured at the site level. The technology is easily and readily implemented, able to be documented with minimal ongoing management requirements or costs.
- The approach is complementary to managing other environmental development risks such as acid sulphate soils (ASS) and other potential contamination types.
- Placement of PFAS-impacted soils under future hardstand areas markedly reduces the mass of PFAS that would have otherwise discharged from the site via contamination pathways.

Based on the determined strategy, PFAS within fill material placed on AIP2 for surcharging will be managed through the establishment of a control measures that address the following pathways:

- PFAS migration in infiltrating rainwater through the fill material to groundwater – To be mitigated by the incorporation of a stabilised base layer. The stabilised base layer being a thin (approximately 100mm) layer of fill material spiked with an ameliorant, powdered activated carbon, designed to intercept any leachate.
- PFAS migration in runoff to surface water – To be mitigated by stabilisation and optimised site grading. Stabilisation methods being chemical for the interim construction and surcharge periods, and though hardstands and/or landscaping for the ultimate development. Site grading optimisation has been undertaken to minimise drainage excavation into in-situ soils and to minimise groundwater or tidal flushing influence on the drainage system.
- PFAS migration via groundwater - To contingently be managed through the incorporation if required of a PFAS Guard Layer in drainage.

These complementary management controls have been considered in reference to the site setting and how application to the site facilitates compliance with the objectives of the PFAS NEMP.

As noted in the sections above, the asbestos contamination identified within Stockpile 3 will be contained within a designed cell underneath a future hardstand area to manage the ongoing risk to airport operations. Similar to other asbestos burial sites on airport, this is captured in the overarching BAC Asbestos register and within BAC as-built records to inform future development plans.

5.3.3.4 Groundwater

Groundwater will require management procedures including appropriate control of pH and containment of groundwater to mitigate off site migration of PFAS to surface water bodies. A Dewatering Management Plan is to be developed as a sub-section of the EMP to outline the methodology and control options for the construction works.

As noted in the sections above, an additional groundwater well installation has been installed and additional rounds of groundwater sampling at the site will be undertaken prior to surcharge to reconfirm groundwater concentrations and to establish baseline characteristics. A groundwater and surface water monitoring regime will be included in the EMP.

The monitoring regime will be commensurate to the risk identified during the respective construction stages however for the earthworks will be required at minimum quarterly to verify the design and EMP compliance in relation to the established controls. These include:

- Surface water monitoring of drainage lines for comparison against baseline (pre-disturbance) data.
- Groundwater monitoring around AIP2 against background concentrations.

5.3.3.5 Surface water

Erosion and sedimentation impact during construction of the AIP2 development will be managed through an Erosion and Sediment Control Plan, which will be prepared as part of a CEMP for each of the construction stages.

Subject to the implementation of the above mitigation measures, there is not considered to be a material impact by the AIP2 development to soils, groundwater, and surface water.

5.4 Air quality and odour

Airport Environment Strategy Focus – Cleaner Air

Reducing the sources of ground-based air quality emissions and supporting sustainable transport and active living options.

5.4.1 Baseline conditions

Brisbane Airport is surrounded by heavy industry including the Port of Brisbane, Viva Energy fuel storage and distribution terminal at Pinkenba, the Caltex oil refinery, and an Advanced Wastewater Treatment Plant at Luggage Point. Major roadways also border the site, impacting the local air quality.

Within the airport boundary, local air quality impacts associated with ground-based operations are regulated by the *Airports (Environment Protection) Regulations 1997* (AEPR). Air quality associated with emissions from aircraft (excluding aircraft ground-running and idling on aprons) is regulated under the *Air Navigation (Aircraft Engine Emissions) Regulations (AEPR) 1995.*

Air quality outside the boundary is regulated by the Queensland Government in accordance with the National Environment Protection (Ambient Air Quality) Measure with the nearest air quality monitoring stations located in the Wynnum area (including Lytton).

Regional air quality monitoring results are reviewed annually by Brisbane Airport with assessment undertaken in accordance with the regulations. There has been no recent exceedance of Schedule 1 of the AEPR limits from nearby monitoring stations.

Air quality goals are to be defined based on legislation and approved as part of any EMP, CEMP or OEMP.

There is no statutory or official air quality criterion for dust annoyance set at a State, Federal or World Health Organisation level. As part of the development and approval of a EMP for each of the AIP2 development stages, this guideline value will be determined to ensure compliance with required standards and relevance to the planned activities.

5.4.2 Assessment of impacts

The main air quality impacts for AIP2 are expected to be dust generated during construction activities. These may include vegetation clearing works, transportation and placement of fill material, and any excavation activities. Dust is generally a nuisance issue, however depending on the type of dust, and the sensitivity of some receptors it can cause material damage. The AIP2 site is in the proximity of an operating apron. High winds and high dust levels could impact on operations on the apron.

Dust generation, resulting from construction earthworks (i.e., vegetation clearing, traffic movement over bare surfaces, and rock crushing activities), has the potential to impact upon neighbouring mangroves and other native vegetation.

Additional vehicle emissions from the traffic generated during construction and operation may impact on air quality, however as the anticipated traffic generation does not significantly increase the existing overall traffic volumes in the area, the impact is expected to be insignificant.

Some operational activities may adversely impact air quality. Some examples for activities consistent with the nominated land use could include:

- Industrial and commercial processes, including building extensions and demolition.
- Plant, equipment, and vehicle operations (including storage tanks for fuel and chemicals).

The potential environmental impacts of adverse air quality include the release of air pollutants, greenhouse gas emissions and ozone depleting substances, dust, and smoke generation, reducing visibility, smothering ecological systems and infrastructure and offensive odours.

5.4.3 Mitigation measures

The following mitigation measures will be implemented to manage any potential air quality and odour impacts:

- Dust generated during the construction phases will be controlled through a CEMP for each construction contract. Example control measures in the CEMPs may include dust monitoring, dust suppression techniques and plant maintenance. As shown in the CSM (Appendix C), a chemical fixant is to be utilised as required particularly during the surcharge phase of the earthworks to manage this risk.
- Project equipment, machinery and vehicles will meet exhaust air quality standards in the normal manner for all vehicles sold in Australia and will be maintained to relevant standards to reduce emissions to as low as reasonably practicable.
- All potential developments proposed for AIP2 will be assessed for air quality and odour impacts. All developments will be required to meet minimum criteria to be considered acceptable.
- Developers will ensure buildings are responsive to the subtropical climate of the region.

Subject to the implementation of the above mitigation measures, the risk of air quality impact from AIP2 is not considered to be material for both construction and operations.

5.5 Ecology

Airport Environment Strategy Focus – Protecting Biodiversity
Maintaining the airport's biodiversity values and contributing to Brisbane's biodiversity.

5.5.1 Baseline conditions

The current condition of the AIP2 site is illustrated in Figure 27. The AIP2 site is highly disturbed and has been subject to landscape modification including use for historic soil stockpiling by BAC. The AIP2 site is heavily infested with weed species with some managed grasslands bounding the site to the north and south.

Clearing of the adjacent AIP Stage 1 area (located directly south-west of the AIP2 footprint) has been completed with the land development substantially complete.

There are active business premises and planted Swamp Oak communities near the AIP2 site typically separated by roadways and overland drainage channels. More broadly, the surrounding area includes BAC and Brisbane city industrial developments, the Brisbane Airport airfield operations, and urban areas (i.e., Pinkenba residential community).

Previous reports for the area were referenced and supplemented with an ecological desktop review and field surveys to inform the development planning, design, construction, and operational stages of AIP2.

5.5.1.1 Matters of national environmental significance

A desktop review was undertaken using the online EPBC Protected Matters Search Tool (PMST) to derive an initial list of MNES (matters of national environmental significance) predicted to potentially occur within a 2km radius of the AIP2 site. An ecologist then undertook an assessment of the likelihood of each MNES to occur within the AIP2 site considering the context of the existing environment and surrounds. The key outcomes relevant to the MDP are summarised in Table 8.

Table 8 Summary of MNES Assessment Key Outcomes

Matter	EPBC Act status	Habitat preference	Likelihood of occurrence
Wetlands of International importance, Moreton Bay	Protected (RAMSAR wetland)	n/a	*Absent* – the AIP2 site is terrestrial. The nearest protected area within Moreton Bay RAMSAR wetland is 4.7km west
Threatened ecological communities (TEC) – Coastal Swamp Oak (*Casuarina glauca*)	Endangered	n/a	**Present** (adjacent areas only) – TEC occurs in varying condition in areas adjacent to AIP2 site
TEC – Subtropical and Temperate Coastal Saltmarsh	Vulnerable	n/a	**Present** – TEC occurs within and in adjacent areas to AIP2
Threatened flora	Endangered and vulnerable	Various and not associated with the type of habitat present within AIP2	*Unlikely* - Not identified during the field survey and assessed as unlikely due to no suitable habitat existing within AIP2
Threatened fauna – birds: • Red knot • Curlew sandpiper • Bar-tailed godwit (baueri) • Eastern curlew	Endangered or Vulnerable Typically migratory	Estuarine and marine wetlands, drainage lines and mudflats with roost areas above high tide line	*Possible (adjacent areas)* – suitable roosting habitat in adjacent areas however not identified during field survey
Threatened fauna – bird (exclusively aerial), White throated needletail	Vulnerable, migratory	Exclusively aerial species. May occur over any habitat (from September to April) including urban areas but with a preference for wooded habitat	*Possible (aerial only)* – species may occur over the AIP2 site but exclusively aerial
Migratory species – birds: • Fork-tailed swift • Sandpipers - common, sharp-tailed, and pectoral	Migratory	Estuarine and marine wetlands, drainage lines and mudflats with roost areas above high tide line	*Possible (adjacent areas)* – Either over the AIP2 site or potentially suitable roosting habitat in adjacent areas. Not identified during field survey
Migratory species – birds, satin flycatcher	Migratory	During migration through Brisbane area inhabits eucalypt forests, often near wetlands or watercourses	*Possible (adjacent areas)* – may occur transiently (during migrations) in *Casuarina glauca* habitat onsite or adjacent mangroves along waterways
Migratory species – birds, eastern osprey	Migratory	Mainly coastal habitats but can occur on inland rivers and lakes. Specialist fish predator	**Present** (adjacent areas) – species observed over area adjacent to AIP2

Matter	EPBC Act status	Habitat preference	Likelihood of occurrence
Migratory species – birds, rufous fantail	Migratory	Primarily inhabits wet sclerophyll forests, often in gullies dominated by eucalypts, but also occur in subtropical and temperate rainforests occasionally drier sclerophyll forests and woodlands	**Present** (adjacent areas) – species observed in *Casuarina glauca* habitat adjacent to AIP2
Migratory species – birds, common greenshank	Migratory	Occurs on short grass and bare ground on swamp margins, salt marshes and sewage ponds near coast	*Possible (adjacent areas)* – potential suitable habitat identified adjacent to AIP2 site

The assessment of potential threatened fauna, flora and vegetation communities associated with the AIP2 site, identified several species/communities predicted as potentially occurring. However, as summarised in the Table 8 the species/communities are primarily associated with habitat found in the adjacent areas and not the more disturbed and modified habitat that exists within the AIP2 site.

Flora

The site investigation to support the desktop study identified one TEC, under the Commonwealth EPBC Act, as occurring within the AIP2 footprint: Subtropical and Temperate Coastal Saltmarsh (Vulnerable).

Figure 27 indicatively maps the saltmarsh areas with a minor proportion located within the AIP2 area to be cleared and developed (approximately 1 hectare in a degraded condition). Very little open 'saltpan' habitat was observed diminishing the potential for the area to be utilised by fauna species as roosting or foraging sites.

Saltmarsh TEC is not required to be assessed under the EPBC Act due to its status of Vulnerable.

No other threatened flora as listed under State or Commonwealth legislation were identified as present or potentially present.

Marine plants, as listed under the *Fisheries Act 1994 (Qld)*, are present in the AIP2 site with saltmarsh species (including salt couch) present in the ground layer across the site as discussed above.

Mangroves exist only on the fringes of the planned development footprint within the existing primary drainage channel areas particularly along the western and northern boundaries of the AIP2 site.

The Swamp oak communities identified as part of the ecological assessment are present only in the areas around the AIP2 site and are separated by roadways and/or drainage channels. Swamp oak has been extensively planted throughout the environs surrounding the Brisbane Airport to discourage the occurrence of wetland birds and the dangers they may present to aircraft using the airport. The communities surrounding the AIP2 site are primarily planted areas with most areas not meeting the condition thresholds for TEC (including understorey criteria within the respective patches). Figure 27 shows the indicative areas and assessed categories.

Fauna

Assessment of AIP2 under the EPBC Act guidelines indicate no significant residual impacts on the threatened fauna species identified as present or potentially present utilising the online Protected Matters Search Tool (PMST).

The assessment identified several threatened and/or migratory fauna bird species that occur, or possibly occur, on the site as summarised in Table 8. The majority of these are migratory shorebird/wader species. There is potential roost habitat present for these species associated with the saltmarsh habitat, however the site values are marginal at best for these species with only a small proportion located within the heavily disturbed and modified AIP2 footprint.

Habitat for Koala (Vulnerable under the NC Act and EPBC Act) and Wallum froglet (Vulnerable under NC Act) are mapped as occurring under State habitat mapping.

The field investigation found that there is no habitat for Koala in the AIP2 area (i.e., no eucalypt species present) or surrounding areas. The quality of the saltmarsh habitat within the AIP2 development site was identified as not suitable for Wallum froglet.

An identified MSES (Matter of state environmental significance) associated with the site is the estuarine channel (Boggy Creek drainage channel) located adjacent to the northern boundary of the AIP2 site which is mapped as a tidal waterway under the 'Queensland Waterways for Waterway Barrier Works' mapping layer.

5.5.1.2 Assessment Methodology

The detectability of plants and the ability to accurately identify plants to species level may vary greatly with the time of year, prevailing climate conditions, and the presence of reproductive material (flowers, fruit, seed capsules).

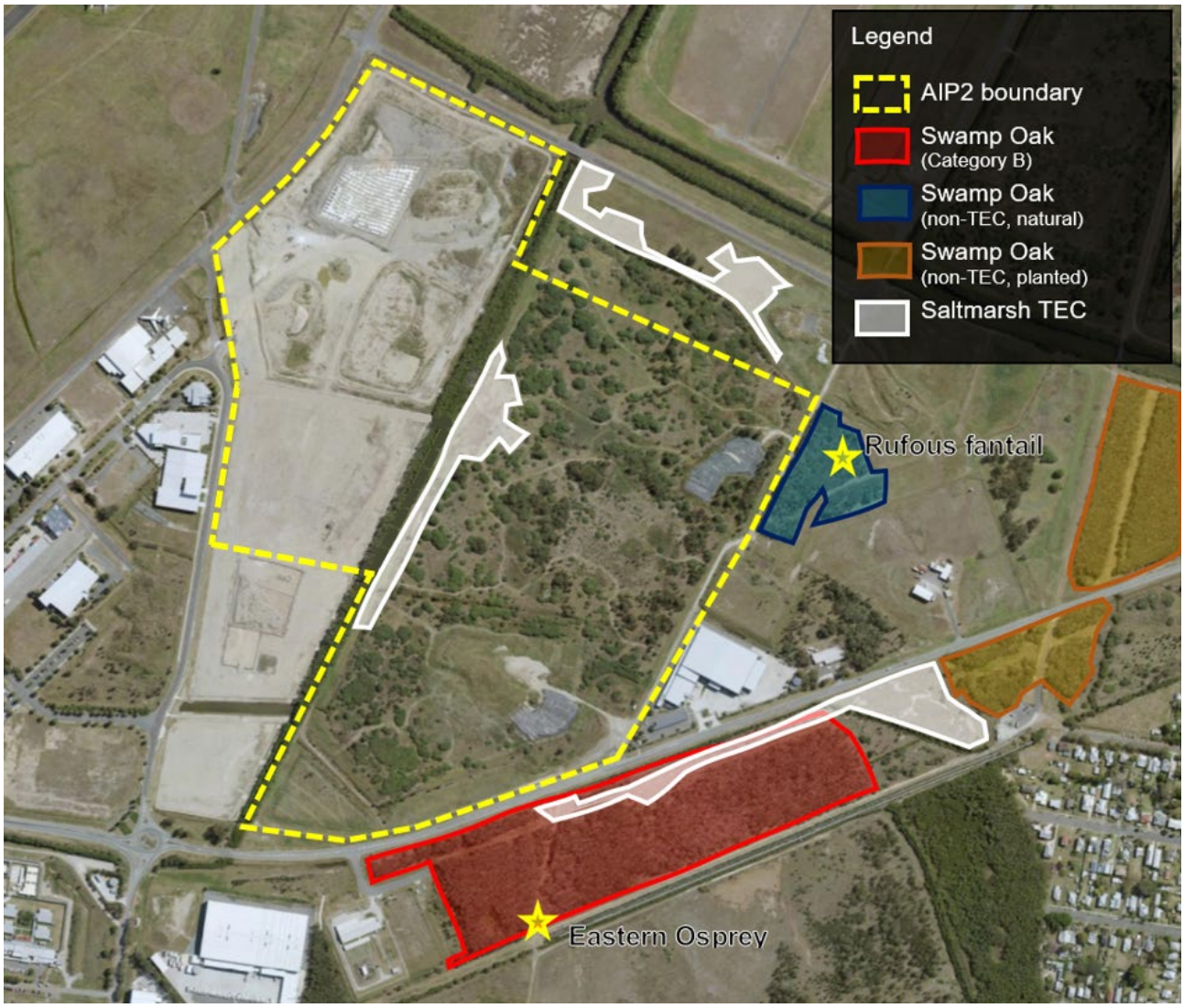
Fauna surveys are also subject to inherent limitations in the detection success of target species. These include annual variance (e.g. with respect to some migratory and nomadic species), the large home range for some species (e.g., owls and raptors, etc), the difficulty in detecting certain species (e.g., cryptic species, low densities etc), biological features that influence habitat usage (such as sex, age-class, and breeding biology), and climatic conditions at the time of survey (e.g., amphibians following heavy rainfall).

The results of the assessment therefore have some limitations however it is considered that every reasonable effort has been made to detect and identify any potentially impacted species, for the purposes of the MDP development and considering the context of the AIP2 site.

This assessment takes into consideration that:

- BAC is committed to protecting biodiversity across the airport. This is documented as a guiding principle within the AES and further detailed in the BAC Biodiversity Management Strategy (BMS).
- The airport wide BMS identifies areas to be developed recognising the requirement for an expanding airport and it has determined high value environmental areas to be retained for conservation (i.e., ESA and Biodiversity Zones, see Figure 20). As described in section 5.2, AIP2 is part of a zone planned for development and is typically isolated from the reserved conservation areas.
- The AIP2 site is highly disturbed and has been subject to landscape modification historically with a degraded habitat particularly relative to the environmental conversation areas which have been identified based on their ecological significance.
- The MDP assessment has consisted of a review of prior reports (including the Environmental Assessment for AIP Stage 1) and supplemented by a specific desktop review and field survey. The assessment has also considered the overall airport BMS and related ongoing wildlife monitoring surveys which focus on the areas of environmental value to the northwest of the airport site.

Figure 27 Ecological impact assessment mapping



5.5.2 Assessment of impacts

5.5.2.1 Flora

Clearing of the vegetated areas across the 27 hectares of greenfield site forming part of the AIP2 development will remove minor areas of degraded saltmarsh (approx. 1 hectare), the majority of which are artificial (planted) in origin. Most vegetated areas within the AIP2 site are either degraded and subject to significant weed invasion, disturbed from historic stockpiling activities or heavily managed around the boundaries (i.e., subject to mowing).

As there are no significant flora species identified within the AIP2 site, it is considered that the development will not have any adverse consequences to significant flora.

Clearing of the site may require the trimming of overhang from the existing mangrove colonies established in the existing perimeter western drain for an 820 metre length where the AIP2 site borders the drain to facilitate the construction of the development fill, drainage, and install environmental controls. The extents of any construction clearing and trimming is to be minimised and is not expected to have a material impact on the existing colonies.

Depending on the fill construction methodology, there may need to be a 20-30 metre clearing across the existing western drain to allow for a temporary access route between the northern AIP Stage 1 lot and the

AIP Stage 2 area. This would be to allow transport of fill material for the development and required surcharge. Any clearing area would be minimised and sited as part of design development with any control and mitigation measures to be documented in the associated EMP and subsequent CEMP by the works contractor when engaged.

The impact of a temporary clearing and constructed access across a drain is not expected to be material subject to adequate siting and the installation of appropriate controls. This methodology has been used successfully for other works across the airport with the impacted drainage channel mangrove vegetation self-seeding and re-establishing post-completion of the works. This would be an item to be monitored post removal of any temporary access.

The machinery and equipment used during the construction phase may facilitate the proliferation of weed species to adjacent areas if control measures are not appropriately implemented to avoid dispersal of seeds. Weeds declared under the provisions of the Biosecurity Act were identified as already common and abundant onsite. These weeds will be destroyed as part of the development and will prevent proliferation of these weeds in areas adjacent to the development site that might otherwise occur if left unattended.

The potential for the surcharging of the AIP2 site to elevate groundwater in close proximity to the surcharge footprint has been identified as a potential risk to the adjacent communities of Swamp oak. The risk of impact however is not considered to be material as the least degraded community (i.e., existing across Lomandra Drive from the AIP2 site) is separated by an existing road and drainage channel which would negate any groundwater perching effect. The risk and impact however will be considered as part of detailed design and the development of any associated EMP controls.

5.5.2.2 Fauna

Migratory species

There were several conservation significant fauna species identified as known or possibly occurring within the AIP2 development site.

AIP2 site provides a marginal habitat for these species and an impact assessment using the MNES Significant Impact Guidelines 1.1 (DoE 2013) considered that the development will not have any adverse consequences to threatened fauna.

This assessment is considered appropriate in the context of the overarching Brisbane Airport Biodiversity Management Strategy (BMS) which documents BAC's commitment as a business, towards protecting biodiversity at Brisbane Airport. The BMS main objectives are to:

- Identify and maintain key elements of the biodiversity values occurring at Brisbane Airport.
- Seek opportunities for research aimed at improved management practices.
- Minimise habitat for species which present a high risk to aircraft safety.

A key outcome of the documented BMS is:

- The identification of areas to be developed as part of the requirements of an expanding airport which includes the AIP precinct.
- Those areas to be retained for conservation (Environmentally Significant Areas and Biodiversity Zone).

The value of the AIP2 habitat for the identified fauna species is considered to be low relative to the BMS conservation areas. The location and planned development of the AIP2 site directly underneath the runway flight path is also considered to support the BMS objective of seeking to minimise habitat for species which present a high risk to aircraft safety.

Other fauna impacts

Direct fauna mortality has the potential to occur during construction due to vegetation clearing, potential ASS exposure and runoff. Where ASS runoff enters estuarine waterways, this has potential to impact marine fauna adjacent to and downstream of the site. Mitigation measures will be required to minimise the risk of direct fauna mortality.

Introduction and encouragement of pest fauna species (under the provisions of the EPBC Act and Biosecurity Act) is considered possible during construction. Mitigation measures will be implemented to decrease the likelihood of proliferation.

Marine plants are an integral feature of coastal environments that provide food-rich environments for fish, crabs, molluscs, and birds. Disturbances to marine plants, even of a minor nature, may potentially lead to a long-term decline in fish production and overall aquatic health. However, the current fragmented and disturbed nature of the site provides limited habitat value, and combined with the absence of conservation significant species, it is considered that removal of the minor areas of these marine plants (salt marsh) will not constitute a material impact. Mitigation measures will ensure that potential impacts to the receiving environment associated with removal of marine plants are minimised.

Displacement of resident fauna adjacent to the AIP2 site may occur as a result of noise and possible artificial lighting during the construction phase. However, considering the proximity to and the exposure to noise generated from the flight path, it is likely that local bird populations are familiar with artificial lighting and high levels of background noise. As such, artificial lighting and noise are not considered to pose a significant impact to fauna within the vicinity of the AIP2 development.

Supplementary MNES impact assessment

To further inform the MDP, a supplementary investigation and review was undertaken during the public consultation period to consider the AIP2 development against overall airport environmental management context.

The review identified that of the three migratory species assessed as likely to occur in or directly adjacent to the AIP2 footprint, two species (Eastern Osprey and White-throated Needletail) are only likely to overfly the Project area and one species (Rufous Fantail) that may regularly use mangrove habitats adjacent to the Project area is in small numbers i.e. fewer than 2-4 birds at most.

For the AIP2 development, the mangroves that are sufficiently well developed to be used by Rufous Fantail are found only in the drainage channels along the western and northern boundaries of the Project area. Impact to these fringing mangroves being limited to controlled trimming of some branches and the possible clearing of mangroves on either side of the channel to a maximum width of 20-30 m to permit access across the channel to move materials between the Stage 1 and Stage 2 development areas.

Consequently, the AIP2 development will have minimal impacts to mangrove habitats that may be used by Rufous Fantail.

Habitat within the Project area that may be used by migratory species does not meet the population or habitat area thresholds for recognition as important habitat for any migratory species. Furthermore, the project area is not located within a site that supports an ecologically significant proportion of the population of a migratory species, so the project is unlikely to seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species. No Project activities that may result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species have been identified (Aurecon 2020). Therefore, the Project is unlikely to have a significant impact on any migratory species.

5.5.3 Mitigation measures

The primary ecological impacts are expected to occur during the earthworks phase of AIP2 however all construction works will consider ecological impacts.

A CEMP is to be developed by each head construction contractor that will identify the ecological impact risks and mitigation measures to be implemented to manage and minimise any ecological impacts to the site. These include consideration to:

- Protection measures for any vegetation to be retained.
- Undertaking works in accordance with a site-specific ASS Management Plan as part of the CEMP.
- Development and implementation of a pest and weed management plan as part of the CEMP including reporting of suspected outbreaks of declared weed species and declared pest animals (as listed under the provisions of the EPBC Act and NC Act). The works management should also not deliberately introduce declared weed and/or pest species as listed under the provisions of the EPBC Act and/or Biosecurity Act. Measures are to be implemented to ensure that all plant and materials brought into the AIP2 development are certified free of declared pests.
- Planning and implementation of staging and sequential clearing measures to enable fauna to disperse to adjoining habitats. The staging and fauna management measures are to be incorporated into the related CEMP.
- Dust, noise, and artificial lighting impacts resulting from construction activities are to be assessed based on planned methodologies and appropriate mitigation measures developed and included in the CEMP for the impacting works.
- Waste management measures are to be planned and implemented to avoid increased abundance of pests and opportunistic native fauna.

Following the implementation of the above mitigation measures, the impact of AIP2 on ecology is not considered to be material.

5.6 Noise and vibration

Airport Environment Strategy Focus – Minimising Ground-Based Noise

Ensuring sources of ground-based noise have minimal impact on airport workers, the local community and the environment through appropriate planning, design, and operations.

Noise sources associated with the Brisbane Airport are regulated principally by the *Airports Act 1996* and the *Airports (Environment Protection) Regulations 1997* (AEPR).

The AEPR defines commercial and sensitive receptors and provides guidelines for excessive noise for a range of noise sources including from construction, road traffic and airport operations.

The AES recognises that any noise issues, if unmanaged, can potentially have an impact on the local community, airport tenants and the environment. Activities identified in the AES and relevant to the AIP2 as potential sources include:

- Road traffic.
- Construction activities.
- Operation of plant and equipment.
- Operation of alarms and warning systems.

Regulation 2.04 of the AEPR defines offensive noise as noise that is “generated at a volume, or in a way, or under a circumstance, that in the opinion of an airport environment officer, offensively intrudes on individual, community or commercial amenity.”

The determination of an offensive noise includes consideration of the following:

- The volume, tonality, and impulsive character (if any) of the noise.

- The time of day, and duration, of the noise.
- Background noise levels at the time the noise is generated.
- The location, in relation to the source of the noise, of:
    - sensitive receptors, or
    - if there is no affected sensitive receptor — commercial receptors.
- The excessive noise guidelines in Schedule 4 of the AEPR.

A commercial receptor is defined in the AEPR as "a business operation, whether for profit, or not."

A sensitive receptor "means:

- A dwelling.
- An impermanent dwelling in a place designed, or reserved, for impermanent dwellings (for example, a caravan park or residential marina).
- A hotel, motel, or hostel.
- A childcare institution, kindergarten, school, college, university, or other educational institution.
- A hospital, medical centre, or nursing home.
- A building that is a church or similar place of worship.

No vibration related goals are discussed in the AEPR.

The Australian Standard AS 2436 "Guide to noise and vibration control on construction, demolition and maintenance sites" also does not provide vibration goals. However, it provides guidance on how vibration control should be undertaken on construction sites.

AS 2436 recommends implementing time restrictions on processes involving exposure to potentially hazardous vibration, low-vibration plant, and equipment, and signposting of vibration hazardous areas. AS 2436 identifies monitoring as an essential component in the effective control of vibration from construction sites.

The Queensland Department of Transport and Main Road (TMR) Transport Noise Management Code of Practice: Volume 2 – Construction Noise and Vibration (2016) provides ground vibrations and recommends safe vibration levels that should be used in construction activities.

5.6.1 Baseline conditions

The AIP2 site is located within an existing high noise environment with high levels of daytime, evening, and night-time ambient noise from a variety of sources, primarily aircraft movements. The site is directly under the flight path and is therefore subject to high levels of related background noise.

Existing ground-based noises are primarily from road traffic with some contribution from existing operations with the area.

The AIP2 site is directly adjacent to the existing and established BAC Da Vinci neighbourhood and there are several existing tenancies within the AIP neighbourhood itself.

For the purposes of any noise assessment, the closest commercial receptors are:

- To the west (Da Vinci neighbourhood):
    - The Australian Research Centre for Aerospace Automation (ARCAA) building which is a joint Queensland University of Technology (QUT) and Commonwealth Scientific and Industrial Research Organisation (CSIRO) facility. This is located at 22-24 Boronia Road and approximately 40m west of the AIP2 site.

- The existing Aviation Australia Training facilities neighbouring the ARCAA building situated approximately 100m west of the AIP2 site.

- To the south (AIP South):
  - The existing Quality Food Services facility and an Australian Federal Police canine holding compound across Lomandra Drive and approximately 100m to the south of the AIP2 site.
- To the east (AIP North):
  - The closest commercial receptor to the AIP2 site is the NIOA facility located at 80 Lomandra Drive. This facility is within 10m of the site and will be a key stakeholder to engage with during the development of detailed design and related construction management plans.
  - Two other commercial facilities exist to the east of the site, ACOEM Ecotech and Enlog Pacific located respectively approximately 160m and 200m to the east.

The Brisbane Airport operating airfield is located to the north with no significantly impacted commercial receptor facilities.

The closest sensitive receptor is the Pinkenba community with the closest dwelling located approximately 460m from the AIP2 eastern site limit.

These key receptors for noise and vibration are shown in Figure 28 below.

Figure 28 Key AIP2 noise and vibration receptors

5.6.1.1 Background noise levels

In July 2020, a noise monitoring terminal was installed close to the site on the opposite side on Lomandra Drive. While the prime reason for installing the terminal was to capture aircraft overflight, background noise levels can be determined when there are no aircraft on take-off or final approach.

Background noise levels measured at this location range between 55 and 60dB(A) which are considered typical during daytime hours. Typical construction sound levels can vary, depending on plant and equipment used. For comparison, the following table outlines typical sound levels.

Table 9 Typical sound levels

Source of Sound	Typical sound level (dB)
Chain saw	110
Front end loader	85
Heavy trafficked road	80
B737-800 arrival at Lomandra Drive	84
B737-800 departure at Lomandra Drive	80

Sources: www.safeworkaustralia.gov.au/noise, www.airservicesaustralia.com/community/environment/aircraft-noise/webtrak

5.6.1.2 Australia Noise Exposure Forecast contours

The ANEF noise assessment is outlined in Section 4.1.7 with the AIP2 development site located within the ANEF 25 – 35 contours.

As the site and surrounding commercial and sensitive receptors are located within or near the high noise levels associated with these ANEF contours, this will influence the level of sensitivity to additional noise generated during construction and future operations relating to the development.

5.6.2 Assessment of impacts

5.6.2.1 Potential noise impacts

Sources of construction noise during the project will comprise a range of heavy vehicles, plant, and equipment, and typically occurs intermittently and varies depending upon the nature or phase of construction (i.e., land clearing, excavation, building etc).

An assessment of construction noise and vibration impacts associated with the completed AIP Stage 1 works was completed based on plant and equipment utilised for bulk earthworks including rock crushing. Based on a conservative assessment of the overall noise levels with a +10dB(A) penalty adjustment for annoying characteristics, the AEPR noise generation limit of 75 dB(A) would not be exceeded for the nearest permanent sensitive receptor dwelling (Pinkenba Community) located approximately 460m from the closest section of the future development site.

There is also an additional sensitive receptor close by, the Brisbane Immigration Transit Accommodation Centre. This facility borders the 25 ANEF contour zone. It is reasonable to expect that aircraft overflight will continue to be the dominant source of noise at this facility and that construction noise will not be an impact at this facility.

Nearby commercial receptors to the development include existing tenants within the AIP precinct – NIOA and the Australian Federal Police. Given the much closer proximity of existing commercial receptors to the AIP2 development, construction noise levels will be higher at these locations rather than at the nearest permanent sensitive receptor community, Pinkenba.

The AEPR outlines how excessive noise for a commercial receptor is to be determined which is based on the indicated limit for a sensitive receptor and consideration of the nature and operations (including times) of the businesses and noise generated by construction activities. This includes background levels with aircraft operational noise being a key consideration given the location of the AIP2 site.

At a distance of 50m, construction noise levels could reach as high as 83 dBA Lmax (+ a 10 dB penalty for annoying characteristics) during peak construction activity if not managed correctly. Such levels could create temporary annoyance; however, it should be noted that peak noise levels would occur only sporadically since not all equipment would be operating at all times and mitigation measures will be implemented.

Noise impacts may also be associated with construction vehicle traffic. Traffic due to workforce movements and delivery of materials will increase the ambient noise levels on-site and adjoining access routes.

It is estimated that the total construction duration for the AIP2 development will be several months for each of the various stages of development however any noisy construction activities would typically be conducted during weekday hours between 7am and 6pm.

With appropriate selection of plant and typical noise mitigation measures, construction noise and vibration from general earth works and typical construction activities are expected to generally comply with the applicable noise and vibration limits at the neighbouring properties.

It is also noted that a number of these receptors are the same as were impacted by the AIP Stage 1 development works commenced in 2015. There were no validated noise complaints raised during these works.

Displacement of resident fauna adjacent to the AIP2 site has also been considered as part of the assessment however as the site is located under the flight path for the runway, the level of noise impact from both construction and operations is not considered to be significant.

5.6.2.2 Potential vibration impacts

Annoyance to sensitive receptors from vibration is possible during construction. Construction activities have the potential to generate ground vibration, the effects of which are influenced by proximity to the vibration source, the energy output of the equipment used and local geological conditions.

The ground vibration levels due to construction work are difficult to be predicted accurately due to the dependence of vibration transmissibility on soil type (soft or hard), intervening geology (i.e., the coupling loss between the soil and the building foundation), the nature of the building foundations and the location of the construction equipment.

The Transport and Main Roads Technical Note 03, Measurement of Ground Vibrations and Airblast (2013) reference a user guide applicable to vibrating roller which approximates the recommended limit of 5 mm/sec.

As part of an impact assessment for the AIP Stage 1 development works by BAC design consultant, Aurecon, for the closest buildings located at distances 50m to 100m from the site, the construction vibration levels for a 15t roller and a bulldozer were assessed as being in the order of 1.5mm/s and 1.2mm/s peak respectively, which is below the suggested 5mm/s limit.

The nearest residential suburb of Pinkenba, which is at least 460m to the east of the AIP2 site would not be impacted as a result of vibration generated by construction activities.

Based on the assessment made during AIP Stage 1, vibration monitoring was only to be undertaken using the guideline of <5mm/s (or other agreed criteria) at the closest receptor if a complaint regarding vibration is validated.

This is intended to be adopted for the AIP2 development with an exception to be considered for the NIOA facility which directly neighbours the AIP2 development and is located within 10m of the eastern boundary of the site.

Due to NIOA's proximity to the works, the contractor will be required to provide a plan to assess, monitor and manage any works that generate vibration.

5.6.3 Mitigation measures

5.6.3.1 Construction

It is considered that a Construction Noise and Vibration Management Plan (CNVMP) constitutes the best practicable option to mitigate the construction noise and vibration effects on the adjacent receptors and to minimise disruption to existing airport facilities and operations.

The CNVMP should, as a minimum, identify the following:

- Proposed construction activities and associated noise and vibration levels.
- Days and hours of site operation.
- Identification of affected neighbours.
- Noise mitigation measures.
- Construction noise monitoring requirements.
- Procedures for community liaison (e.g., distribution of site contact information etc.).
- The CNVMP should adopt mitigation measures outlined in AS2436, Guide to noise and vibration control on construction, demolition, and maintenance sites.

5.6.3.2 Operation

Any operations of the AIP2 development will be consistent with the noise management requirements outlined in the BAC AES, and the BAC planning and technical guidelines. This will form part of any future lease agreements.

5.7 Waste

Airport Environment Strategy Focus – Reducing Waste
Reducing waste to landfill by encouraging recycling and the reuse of resources.

5.7.1 Baseline conditions

Waste is defined in the AEPR and includes refuse of any form, discarded or disused plant or equipment, and industrial by-products. Examples include waste oil and oil containers, surplus or spent chemicals, paints and solvents and their containers, sewage, and wastepaper, litter, and food scraps.

In the AES (BAC 2020), the key objectives for 2020-2025 include:

- Reducing waste to landfill by encouraging recycling and the reuse of resources.
- Supporting Government policies on sustainable waste management.
- Progress towards zero waste and circular economy operations.

The AIP2 Stage 2 footprint where clearing and the earthworks for the building platform and surcharge works are to be undertaken has been disturbed historically by agricultural land use, fill and drainage realignment works as part of the original Brisbane Airport development and more recently by access and stockpiling of fill material.

5.7.2 Assessment of impacts

During construction and operation of the AIP2 development, a number of waste products are expected to be generated, including:

- Packaging materials – any materials used on site that are delivered in packaging material. This includes pallets, crates, cartons, plastics and wrapping materials. All packaging material will need to be disposed of once the product has been used.
- Wastes from construction equipment maintenance – various heavy vehicles and construction equipment will be used during the construction phase. Liquid hazardous wastes from cleaning, repairing and maintenance of equipment may be generated. Leakage or spillage of fuels/oils within the site needs to be managed and wastes disposed of appropriately.
- Regulated wastes – including hydrocarbon waste such as waste oil, oily water, oily sludge, grease, coolant, oily rags, oil filters, drums, detergent, solvents, batteries, tyres, paints, and resins.
- General wastes – this includes retail waste, scrap materials and biodegradable wastes.

Additional waste likely to be generated during construction includes vegetation, fill material and construction equipment waste.

Potential impacts associated with the inappropriate management of waste generated from the above can include, if not managed, contamination of soils, surface water and groundwater.

5.7.3 Mitigation measures

Collection, storage, and disposal of waste will be managed under a EMP to avoid impact or nuisance on and off the identified development site. Appropriate measures will be employed to satisfy the sustainable management of waste generation and disposal in accordance with the AES.

Mitigation measures relating to waste management to be included in a EMP include:

- Vegetation wastes from site clearing should be mulched and used in on site landscaping and erosion and sediment activities.
- Identify possible secondary uses for construction wastes prior to and during construction.
- Designate location of construction compounds and areas for each waste stream to allow for waste segregation.
- Ensure construction and industrial waste is stored in industrial covered skips/bins.
- Contain and capture runoff from designated waste areas.
- No waste is to be burnt on site.
- Ensure waste bin lids are closed and work sites kept tidy to avoid littering and attraction of birds, vermin, and other wildlife.
- Any packaging materials to be collected separately and re-used or recycled including timber, paper, cardboard, pallets, and plastics.
- Waste disposal is to occur at approved facilities.
- Engage the services of a licensed waste contractor and recycler if removing regulated wastes from the AIP2 site.

To align with the AES, a KPI of “no waste impacting surrounding environment” will be included in the EMP. The EMP mitigation measures will need to consider the hierarchy of waste management.

For operations, as the industrial tenant facility uses are determined, a waste management plan and waste contract and collection arrangement will be determined and established by the tenant consistent with the proposed need.

Subject to the implementation of mitigation measures, the potential impact of the development with regards to the management of waste is not considered to be material.

5.8 Hazardous chemicals and dangerous goods

5.8.1 Baseline conditions

The management of hazardous chemicals must be in accordance with the *Work Health and Safety Act 2011 (WHS Act), Work Health and Safety Regulation 2011 (WHS Regulation)* and relevant Australian Standards.

In addition, storage and the use of petroleum products is to comply with the Brisbane City Plan SC6.28 storage and dispensing of petroleum products planning policy and other guidelines and standards/codes that apply.

5.8.2 Assessment of impacts

Due to the nature of activities within an industrial precinct, operations and maintenance of the facilities will involve storage and the use of fuels, oils, solvents, and other potentially hazardous chemicals. Construction activities for each of the development stages will also likely involve the storage and use of hazardous chemicals.

In addition to potential fire and explosion impacts to neighbouring businesses, the storage and use of potential contaminants has the potential to result in soil and/or groundwater contamination.

During operations, the AIP2 tenants will be responsible for the appropriate management and disposal of hazardous chemicals, and compliance with any licences required, under the WHS Act. Compliance with these requirements is monitored by BAC authorised personnel.

5.8.3 Mitigation measures

For both construction and operations, the storage of fuels and hazardous chemicals shall be conducted in accordance with AS1940:2017: The storage and handling of flammable and combustible liquids. These include requirements that:

- A detailed risk assessment be completed according to the nature and scale of hazardous chemicals present and submitted to BAC (including identification of any hazardous areas and ignition sources).
- All hazardous chemicals will be stored with an up-to-date safety data sheet (SDS). A SDS register will be maintained adjacent to the hazardous chemical storage area with the location clearly signed.
- Contractors and tenants are responsible for any licences and/or registrations required under the WHS Act.
- Hazardous chemicals and dangerous goods will be handled, stored, and disposed of in accordance with the WHS Act, WHS Regulation, relevant Australian Standards, and the Brisbane City Plan SC6.28.
- A register of hazardous chemicals stored and used by each tenancy will be kept by BAC, who will undertake an audit and hazard assessment at least every two years (based on the level of risk associated with the facility) to determine the cumulative impact of hazardous material being distributed across the site.

Subject to the implementation of mitigation measures, the impact of the development with regards to the management of hazardous materials and dangerous goods is not considered to be material.

5.9 Cultural heritage

Airport Environment Strategy Focus – Preserving and Promoting our Heritage

Ensuring that the airport's heritage values are maintained and promoted.

Brisbane Airport is located on Commonwealth land and is therefore subject to Commonwealth legislation. For heritage, this includes the *Environment Protection and Biodiversity Conservation Act 1999*, the *Airports Act 1996,* and the *Airports (Environment Protection) Regulations 1997*.

5.9.1 Baseline conditions

The Brisbane Airport Heritage Management Plan was finalised in March 2016 in consultation with traditional owners and heritage consultants, outlining Aboriginal cultural heritage and European historic heritage of the airport site, compliant with the Environmental Protection and Biodiversity Conversation Act.

The 2020 Airport Environment Strategy summarises the sites with known cultural or historic heritage significance at Brisbane Airport. Based on this review, there are no known heritage sites identified within the AIP2 site.

A review of historic aerial photography detailed in Section 5.3.1.1 outlines that the AIP2 area has been subject to extensive impacts from past land management activities. Landscape changes have included the addition of fill, reshaping of water ways and drainage lines, and the planting of Swamp Oak communities to minimise wildlife strike risk.

While the site is identified as having little to no heritage value, it has the potential to contain items or sites that may be unearthed during construction.

5.9.2 Assessment of impacts

The construction phase will involve the clearing, filling, and surcharging of the site that has been disturbed as part of past land management. The excavation requirements are expected to be limited as most of the site will require to be surcharged. It is not expected that the construction works will impact on cultural heritage.

5.9.3 Mitigation measures

The following mitigation measures are proposed to manage the impact of the project on cultural heritage:

- Ensure all staff have completed a site induction that contains appropriate Cultural Heritage content, including:
    - Cultural heritage awareness training.
    - Familiarisation material to identify a cultural heritage find.
    - Stop Work Procedure under the Heritage Management Plan.
    - Process for notification, collection, transport, storage, and recording of any cultural heritage finds.
- Implement the Stop Work Procedure and ensure no impact is sustained to cultural heritage.

Subject to the implementation of mitigation measures, the impact of the development on cultural heritage is not considered to be material during both the construction and operational phases.

6. SUMMARY OF IMPACTS

The assessment component of the MDP has undertaken to meet the requirements of Section 91 (1) (h) of the *Airports Act 1996* (Cth). Table 10 provides a summary of the potential operational, environmental, and social impacts considered in the assessment.

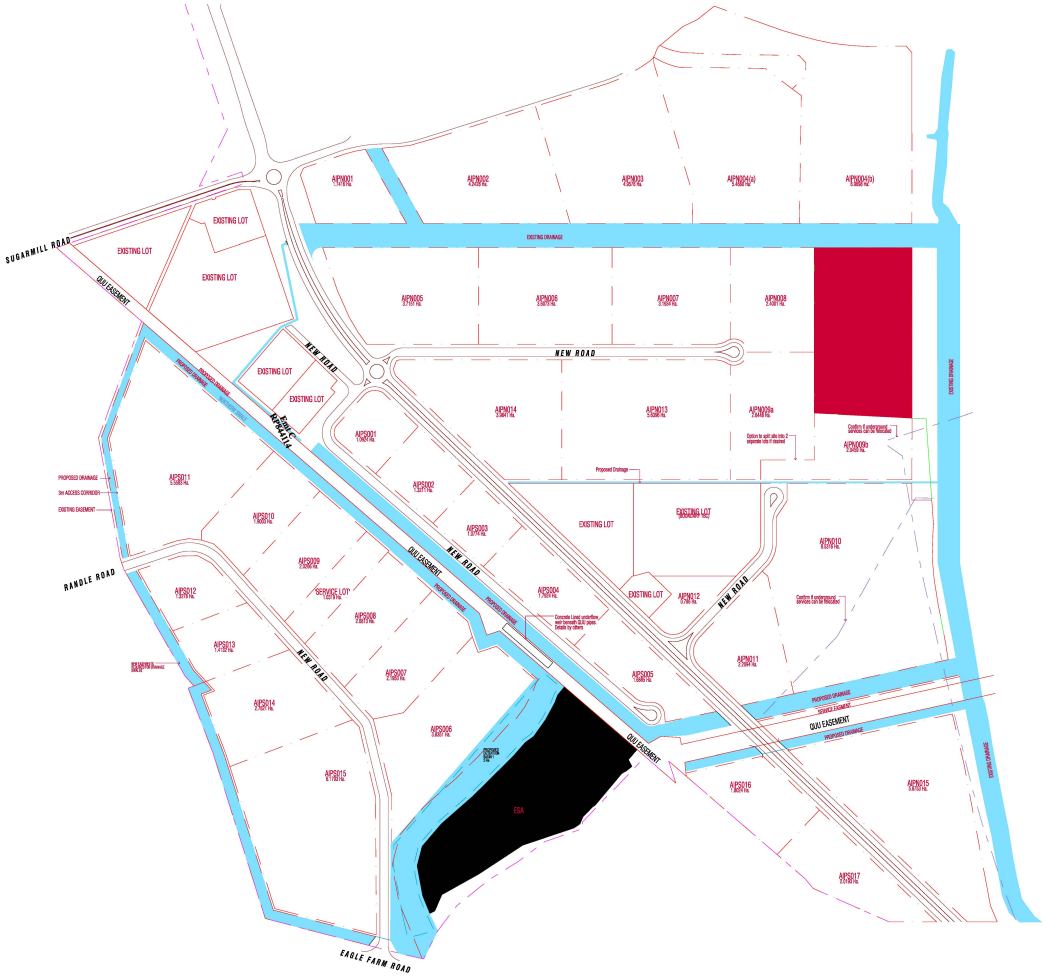
Table 10 Sustainable, responsible and impact investing objectives and commitments

Section	Environmental and Social Factors	Impacts	
		Construction	Operations
4.1	Aviation operations and safety	Immaterial	Immaterial
4.2	Traffic and parking	Low	Immaterial
5.1	Geology, soils, and topography	Low	Immaterial
5.1	Contamination	Immaterial	Immaterial
5.1	Hydrology and water quality	Low	Immaterial
5.2	Air quality and odour	Immaterial	Immaterial
5.3	Ecology	Immaterial	Immaterial
5.4	Noise and vibration	Low	Immaterial
5.5	Waste	Immaterial	Immaterial
5.6	Hazardous chemicals and dangerous goods	Immaterial	Immaterial
5.7	Cultural heritage	Immaterial	Immaterial

7. REFERENCES

- Aurecon (2015) Airport Industrial Park Stage 1A – Lot 1, 2, 3 and 4 Environmental Assessment Report, June 2015
- Aurecon (2020) Airport Industrial Park Stage 2 Contaminated Land Investigation, October 2020
- Aurecon (2020) Airport Industrial Park Stage 2 Groundwater Assessment Report, October 2020
- Aurecon (2020) Airport Industrial Park Stage 2, Ecological Impact Assessment, October 2020
- Aurecon (2020) Airport Industrial Park Stage 2, Acid Sulfate Soil Investigation, October 2020
- Aurecon (2020) Airport Industrial Park Stage 2, Environment Protection and Biodiversity Conservation Act Self-Assessment of Impacts, October 2020
- Aurecon (2020) Airport Industrial Park Stage 2, Stockpile Assessment and Re-Use Report for Lot 4 on AIP1, October 2020
- BAAM (2021) Airport Industrial Park Stage 2 migratory and threatened species assessment technical memorandum, June 2021
- BAC (2018) Landscape Setting Strategy
- BAC (2020) AIP2 Traffic Impact Assessment, October 2020
- BAC 2020 Brisbane Airport Master Plan
- BAC Biodiversity Management Strategy, April 2020
- BAC Airport Technical Guidelines
- BAC Master Industrial Tenancy Brief
- BAC Noise Impact Assessment Policy
- Brisbane Airport Planning Guidelines
- WSP (2022) Major Development Plan: Airport Industrial Park Stage 2 – Technical Memorandum: Contaminated land assessment overview, risks and planned mitigation measures, November 2022

APPENDIX A: AIP CONCEPTUAL LOT PLAN



NOTES:

REFER ENGINEER DETAILS OF PROPOSED DRAINAGE NETWORK.

CONFIRM RELOCATION OF EXISTING UNDERGROUND SERVICES IN LOCATIONS AS NOTED

FINISHED LEVELS TO BE DETERMINED BY CIVIL ENGINEER

TRAFFIC ENGINEER TO REVIEW AND CONFIRM ROAD WIDTHS, LAYOUTS, SIGNAGE LOCATIONS, FOOTPATHS ETC.

BRISBANE
Plaza Level, Mosaic
826 Ann St, Fortitude Valley QLD 4006
T +61 7 3253 9900
bne@modedesign.com.au

BRISBANE AIRPORT INDUSTRIAL PARK - MASTER PLAN
OPTION 2

Do not scale off this drawing

Project No: 17806
Date: 01.11.22
Scale: 1:2500 @ A0

A 002 Rev I

FOR INFORMATION ONLY

APPENDIX B: MDP CHECKLIST

This Appendix indicates the requirements under Section 91 of the Airports Act 1996 for the contents of an MDP and demonstrates that this MDP is consistent with these requirements.

Contents of a Major Development Plan	Section(s) of MDP
(1A) The purpose of a major development plan in relation to an airport is to establish the details of a major airport development that: (a) relates to the airport; and	1
(b) is consistent with the airport lease for the airport and the final master plan for the airport.	2.1 2.2 3.3
(1) A major development plan, or a draft of such a plan, must set out:	
(a) the airport-lessee company's objectives for the development; and	1.4
(b) the airport-lessee company's assessment of the extent to which the future needs of civil aviation users of the airport, and other users of the airport, will be met by the development; and	1.1 1.4
(c) a detailed outline of the development; and	1.3
(ca) whether or not the development is consistent with the airport lease for the airport; and	3.3
(d) if a final master plan for the airport is in force—whether or not the development is consistent with the final master plan; and	2.2
(e) if the development could affect noise exposure levels at the airport—the effect that the development would be likely to have on those levels; and	NA
(ea) if the development could affect flight paths at the airport—the effect that the development would be likely to have on those flight paths; and	4.1.1
(f) the airport-lessee company's plans, developed following consultations with the airlines that use the airport, local government bodies in the vicinity of the airport and—if the airport is a joint user airport—the Defence Department, for managing aircraft noise intrusion in areas forecast to be subject to exposure above the significant ANEF levels; and	NA
(g) an outline of the approvals that the airport-lessee company, or any other person, has sought, is seeking or proposes to seek under Division 5 or Part 12 in respect of elements of the development; and	3.5
(ga) the likely effect of the proposed developments that are set out in the major development plan, or the draft of the major development plan, on: traffic flows at the airport and surrounding the airport; and employment levels at the airport; and the local and regional economy and community, including an analysis of how the proposed developments fit within the local planning schemes for commercial and retail development in the adjacent area; and	 4.2 2.5 3.4 2.5.3
(h) the airport-lessee company's assessment of the environmental impacts that might reasonably be expected to be associated with the development; and	5

(j) the airport-lessee company's plans for dealing with the environmental impacts mentioned in paragraph (h) (including plans for ameliorating or preventing environmental impacts); and	5
(k) if the plan relates to a sensitive development—the exceptional circumstances that the airport-lessee company claims will justify the development of the sensitive development at the airport; and	NA
(3) Consistent with 5.04 of the Airports Regulations 1997 relating to obligations from pre-existing interests.	3.2
(4) In relation to paragraphs (1)(a), (e) or (ga) above, the extent (if any) of consistency with planning schemes in force under a law of the State in which the airport is located; and if the major development plan is not consistent with those planning schemes—the justification for the inconsistencies.	3.4
(6) In developing plans referred to in paragraph (l)(f), an airport-lessee company must have regard to Australian Standard AS 2021—2000 ("Acoustics—Aircraft noise intrusion—Building siting and construction") as in force or existing at that time.	4.1.7

APPENDIX C: CONCEPTUAL SITE MODEL

This Appendix includes details of the conceptual site model (CSM) developed for AIP2.

For the MDP stage, the presented CSM is as developed at the preliminary design stage for the land development earthworks. The CSM will be a key input for all design and construction management plans, and subject to approval of the MDP will be refined as the various development stages for AIP2 progress to detailed design, construction, and operation.

The presented CSM are extracts from the referenced WSP (2022) technical memorandum.

Figure 29 Extract of BAC PFAS Framework Boggy Creek Conceptual Site Model - Plan View

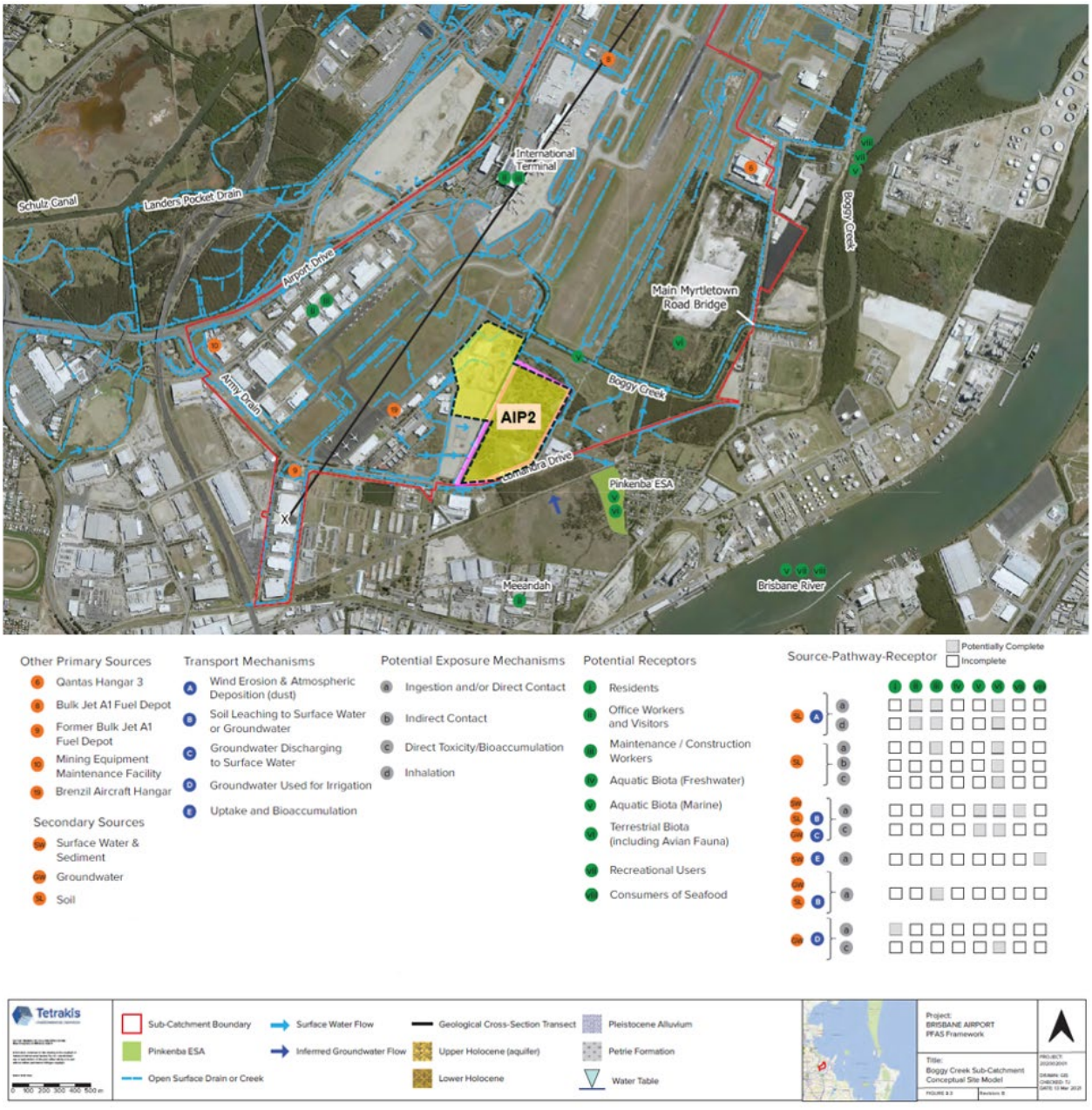


Figure 30 Conceptual site model – Figurative representation of site prior to controls

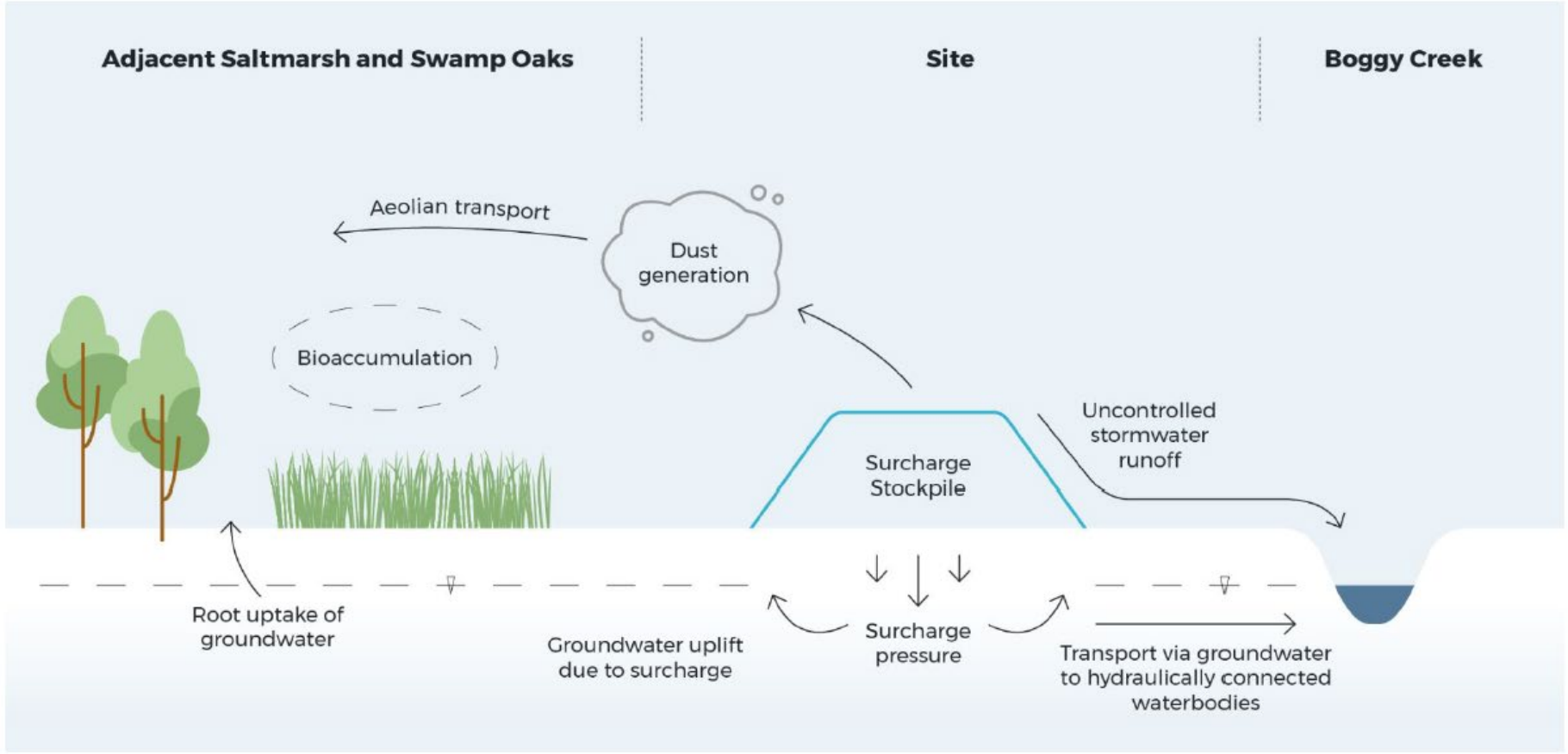


Figure 31 Conceptual site model – Figurative representation of site with controls during construction

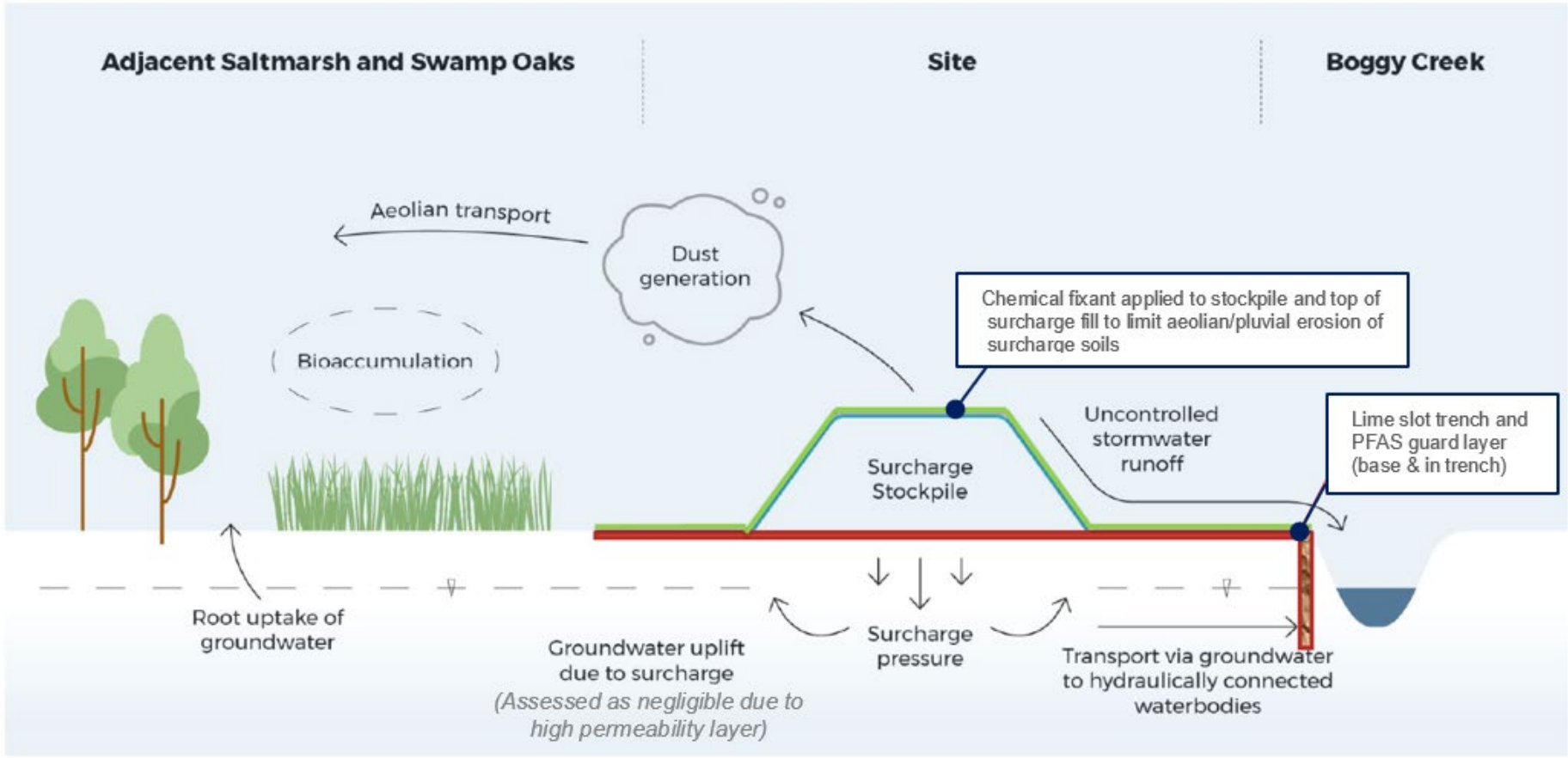


Figure 32 Conceptual site model – Tabulated format with risk assessment

CONCEPTUAL SITE MODEL				CURRENT				CONSTRUCTION				OPERATIONAL			
PRIMARY ON-SITE SOURCE	POTENTIAL SECONDARY ON-SITE SOURCE	TRANSPORT MECHANISM	EXPOSURE PATHWAY	POTENTIAL RECEPTOR	POTENTIAL LINKAGE COMPLETE (YES/NO)	RISK	COMMENT	POTENTIAL RECEPTOR	POTENTIAL LINKAGE COMPLETE (YES/NO)	RISK	COMMENT	POTENTIAL RECEPTOR	POTENTIAL LINKAGE COMPLETE (YES/NO)	RISK	COMMENT
No primary source of PFAS	PFAS impacted soil and stockpiled material on-site	HUMAN HEALTH													
		Direct skin contact with soil	Dermal absorption	On-site maintenance workers (where soil is uncovered and accessible)	Yes (where soil is uncovered and accessible)	Extremely Low	Analytical soil results are orders of magnitude below Human Health guideline values	On-site construction workers (where soil is uncovered and accessible)	Yes (where soil is uncovered and accessible)	Extremely Low	Analytical soil results are orders of magnitude below Human Health guideline values	On-site general land users (only where soil is uncovered and accessible)	Yes (where soil is uncovered and accessible)	Extremely Low	Analytical soil results are orders of magnitude below Human Health guideline values. Finished site to be covered and vegetated.
		Direct skin contact with soil and hand to mouth contact	Ingestion	On-site maintenance workers (where soil is uncovered and accessible)	Yes (where soil is uncovered and accessible)	Extremely Low	Analytical soil results are orders of magnitude below Human Health guideline values	On-site construction workers (where soil is uncovered and accessible)	Yes (where soil is uncovered and accessible)	Extremely Low	Analytical soil results are orders of magnitude below Human Health guideline values	On-site general land users (only where soil is uncovered and accessible)	Yes (where soil is uncovered and accessible)	Extremely Low	Analytical soil results are orders of magnitude below Human Health guideline values. Finished site to be covered and vegetated.
		Wind erosion and dust dispersion	Inhalation	On-site maintenance workers (where soil is uncovered and accessible)	Yes (where soil is uncovered and accessible)	Extremely Low	Analytical soil results are orders of magnitude below Human Health guideline values	On-site construction workers (where soil is uncovered and accessible)	Yes (where soil is uncovered and accessible)	Extremely Low	Analytical soil results are orders of magnitude below Human Health guideline values	On-site general land users (only where soil is uncovered and accessible)	Yes (where soil is uncovered and accessible)	Extremely Low	Analytical soil results are orders of magnitude below Human Health guideline values. Finished site to be covered and vegetated.
		Overland flow, vertical and lateral migration along surface soils and within drainage systems, deposition of dust	Migration to local surface water features	Recreational users of adjacent and down gradient surface waters (BBC20 and Boggy Creek)	Yes (where soil is uncovered and accessible)	Extremely Low	Neutral leach results could be above Human Health recreational guideline values. Surface water results are unlikely to be above these triggers.	Recreational users of adjacent surface waters (drainage culvert)	Yes (where soil is uncovered and accessible)	Extremely Low	Neutral leach results could be above Human Health recreational guideline values. Surface water results are unlikely to be above these triggers.	Recreational users of adjacent surface waters (drainage culvert)	Yes (where soil is uncovered and accessible)	Extremely Low	Neutral leach results could be above Human Health recreational guideline values. Surface water results are unlikely to be above these triggers. Surface completions will reduce mass flux from the site.
		Overland flow, vertical and lateral migration along surface soils and within drainage systems, deposition of dust	Migration to local surface water features	Human consumer of aquatic foods	Yes (where soil is uncovered and accessible)	Extremely Low	Analytical soil results are orders of magnitude below Human Health guideline values.	Human consumer of aquatic foods	Yes (where soil is uncovered and accessible)	Extremely Low	Analytical soil results are orders of magnitude below Human Health guideline values	Human consumer of aquatic foods	Yes (where soil is uncovered and accessible)	Extremely Low	Analytical soil results are orders of magnitude below Human Health guideline values. Surface completions will reduce mass flux from the site.
		Overland flow, vertical and lateral migration along surface soils and within drainage systems, deposition of dust	Migration to local surface water features	Industrial users of water downgradient of the BBC20 and Boggy Creek	Yes (where soil is uncovered and accessible)	Extremely Low	Analytical soil results are orders of magnitude below Human Health guideline values	On-site construction workers and general land users (where soil is uncovered and accessible)	Yes (where soil is uncovered and accessible)	Extremely Low	Analytical soil results are orders of magnitude below Human Health guideline values	On-site general land users (where soil is uncovered and accessible)	Yes (where soil is uncovered and accessible)	Extremely Low	Analytical soil results are orders of magnitude below Human Health guideline values. Surface completions will reduce mass flux from the site.
No primary source of PFAS	PFAS impacted soil and stockpiled material on-site	ENVIRONMENTAL													
		Direct exposure for burrowing animals and plants	Direct absorption and ingestion	On-site fauna and flora	Plausible	Low	Potential uptake by feed trees and grasses	On-site fauna and flora	No	Very Low	Negligible remnant vegetation during construction	On-site fauna and flora	No	Extremely Low	Negligible remnant vegetation post-construction.
		Uptake by ecological receptors	Bioaccumulation/ magnification through the food chain	On-site fauna and flora and terrestrial ecosystems	Plausible	Low	Feed trees and grasses provide a potential linkage	On-site fauna and flora and terrestrial ecosystems	No	Very Low	Negligible remnant vegetation during construction	On-site fauna and flora and terrestrial ecosystems	No	Low	Negligible remnant vegetation post-construction.

CONCEPTUAL SITE MODEL				CURRENT				CONSTRUCTION				OPERATIONAL			
PRIMARY ON-SITE SOURCE	POTENTIAL SECONDARY ON-SITE SOURCE	TRANSPORT MECHANISM	EXPOSURE PATHWAY	POTENTIAL RECEPTOR	POTENTIAL LINKAGE COMPLETE (YES/NO)	RISK	COMMENT	POTENTIAL RECEPTOR	POTENTIAL LINKAGE COMPLETE (YES/NO)	RISK	COMMENT	POTENTIAL RECEPTOR	POTENTIAL LINKAGE COMPLETE (YES/NO)	RISK	COMMENT
		Overland flow, vertical and lateral migration along surface soils and within drainage systems, deposition of dust	Migration to surface water features	On-site fauna and flora and terrestrial ecosystems	Yes (where soil is uncovered and accessible)	Low	All areas are vegetated. Neutral leach values are above Interim Marine 95% species Water Quality GVs, however surface water value remain below this trigger	On-site fauna and flora and terrestrial ecosystems	Yes (where soil is uncovered and accessible)	Medium	Large areas will be uncovered at the same time.	On-site fauna and flora and terrestrial ecosystems	Yes (where soil is uncovered and accessible)	Low	Large areas will be covered by hardstand/road pavement, re-grassed limiting potential area of uncovered soil to interact with overland flow.
		Overland flow, vertical and lateral migration along surface soils and within drainage systems, deposition of dust	Migration to surface water features	Off-site aquatic and terrestrial ecosystems	Yes (where soil is uncovered and accessible)	Low	All areas are vegetated. Neutral leach values are above Interim Marine 95% species Water Quality GVs, however surface water value remain below this trigger	Off-site aquatic and terrestrial ecosystems	Yes (where soil is uncovered and accessible)	Medium	Large areas will be uncovered at the same time.	Off-site aquatic and terrestrial ecosystems	Yes (where soil is uncovered and accessible)	Very Low	Large areas will be covered by hardstand/road pavement, re-grassed limiting potential area of uncovered soil to interact with overland flow.
		Overland flow, vertical and lateral migration along surface soils and within drainage systems, deposition of dust	Migration to surface water features	BBC20 and Boggy Creek	Yes (where soil is uncovered and accessible)	Low	All areas are vegetated. Neutral leach values are above Interim Marine 95% species Water Quality GVs, however surface water value remain below this trigger	BBC20 and Boggy Creek	Yes (where soil is uncovered and accessible)	Medium	Large areas will be uncovered at the same time.	BBC20 and Boggy Creek	Yes (where soil is uncovered and accessible)	Very Low	Large areas will be covered by hardstand/road pavement, re-grassed limiting potential area of uncovered soil to interact with overland flow.
		Overland flow, vertical and lateral migration along surface soils and within drainage systems, deposition of dust	Migration to surface water features	Migratory birds (Rufous fantail and Eastern osprey)	Yes (where soil is uncovered and accessible)	Low	All areas are vegetated. Neutral leach values are above Interim Marine 95% species Water Quality GVs, however surface water value remain below this trigger	Migratory birds (Rufous fantail and Eastern osprey)	Yes (where soil is uncovered and accessible)	Medium	Low – additional activity likely to inhibit migratory species proximate to the AIP2 development	Migratory birds (Rufous fantail and Eastern osprey)	Yes (where soil is uncovered and accessible)	Very Low	Large areas will be covered by hardstand/road pavement, re-grassed limiting potential area of uncovered soil to interact with overland flow.
		Vertical and lateral migration through soil profile	Leaching from soils to groundwater	Off-site aquatic and terrestrial ecosystems	Yes (where soil is uncovered and accessible)	Low	Levels of PFAS identified within soil profile extends to the groundwater. Neutral leach results are above Interim Marine 95% species Water Quality GVs	Off-site aquatic and terrestrial ecosystems	Yes (where soil is uncovered and accessible)	Medium	Neutral leach results could be above interim aquatic 95% species Water Quality GVs.	Off-site aquatic and terrestrial ecosystems	Yes (where soil is uncovered and accessible)	Very Low	Large areas will be covered by hardstand/road pavement limiting potential for infiltration.
No primary source of PFAS	PFAS impacted groundwater underlying the site	HUMAN HEALTH													
		Direct contact with groundwater	Dermal absorption via direct skin contact with groundwater	On-site maintenance workers	Plausible (in low lying areas)	Extremely Low	Analytical results are orders of magnitude below direct contact guidelines	On-site construction workers	Plausible (in low lying areas)	Low	Analytical soil results are orders of magnitude below direct contact guidelines	On-site general land users	No	Extremely Low	Analytical soil results are orders of magnitude below direct contact guidelines

CONCEPTUAL SITE MODEL				CURRENT				CONSTRUCTION				OPERATIONAL			
PRIMARY ON-SITE SOURCE	POTENTIAL SECONDARY ON-SITE SOURCE	TRANSPORT MECHANISM	EXPOSURE PATHWAY	POTENTIAL RECEPTOR	POTENTIAL LINKAGE COMPLETE (YES/NO)	RISK	COMMENT	POTENTIAL RECEPTOR	POTENTIAL LINKAGE COMPLETE (YES/NO)	RISK	COMMENT	POTENTIAL RECEPTOR	POTENTIAL LINKAGE COMPLETE (YES/NO)	RISK	COMMENT
		Direct contact with groundwater	Ingestion (including accidental) of contaminated groundwater through hand to mouth contact or consumption of water or aquatic animals	On-site maintenance workers	Plausible (in low lying areas)	Extremely Low	Analytical results are orders of magnitude below direct contact guidelines	On-site construction workers	Plausible (in low lying areas)	Low	Analytical soil results are orders of magnitude below direct contact guidelines	On-site general land users	No	Extremely Low	Analytical soil results are orders of magnitude below direct contact guidelines
		Lateral migration through the aquifer and discharge to receiving surface water features	Dermal absorption via direct skin contact with groundwater	Recreational users of down gradient surface waters (BBC20 and Boggy Creek)	Yes	Extremely Low	Analytical results are orders of magnitude below direct contact guidelines	Recreational users of surface waters	Yes	Extremely Low	Analytical results are orders of magnitude below direct contact guidelines	Recreational users of surface waters	Yes	Extremely Low	Analytical results are orders of magnitude below direct contact guidelines
		Lateral migration through the aquifer and discharge to receiving surface water features	Ingestion (including accidental) of contaminated groundwater through hand to mouth contact or consumption of water or aquatic animals	Recreational users of down gradient surface waters (BBC20 and Boggy Creek)	Yes	Very Low	Analytical results exceed drinking water guidelines however unlikely groundwater would be used for drinking	Recreational users of surface waters	Yes	Very Low	Analytical results exceed drinking water guidelines however unlikely groundwater would be used for drinking	Recreational users of surface waters	Yes	Very Low	Analytical results exceed drinking water guidelines however unlikely groundwater would be used for drinking
		Lateral migration through the aquifer and discharge to receiving surface water features	Dermal absorption via direct skin contact with groundwater	Industrial users of water downgradient of the BBC20 and Boggy Creek	Yes	Extremely Low	Analytical results are orders of magnitude below direct contact guidelines	Industrial users of water downgradient of the adjacent drainage culvert	Yes	Extremely Low	Analytical results are orders of magnitude below direct contact guidelines	Industrial users of water downgradient of the adjacent drainage culvert	Yes	Extremely Low	Analytical results are orders of magnitude below direct contact guidelines
		Lateral migration through the aquifer and discharge to receiving surface water features	Ingestion (including accidental) of contaminated groundwater through hand to mouth contact or consumption of water or aquatic animals	Industrial users of water downgradient of the BBC20 and Boggy Creek	Yes	Very Low	Analytical results exceed drinking water guidelines however unlikely groundwater would be used for drinking	Industrial users of water downgradient of the adjacent drainage culvert	Yes	Very Low	Analytical results exceed drinking water guidelines however unlikely groundwater would be used for drinking	Industrial users of water downgradient of the adjacent drainage culvert	Yes	Very Low	Analytical results exceed drinking water guidelines however unlikely groundwater would be used for drinking
No primary source of PFAS	PFAS impacted groundwater underlying the site	ENVIRONMENTAL													
		Lateral migration through the aquifer	Discharge to receiving surface water features	Receiving aquatic and/or terrestrial ecosystems	Yes	Low	Groundwater results are below the 95% ecological water quality guideline value	Receiving aquatic and/or terrestrial ecosystems	Yes	Medium	Groundwater results are below the 95% ecological water quality guideline value	Receiving aquatic and/or terrestrial ecosystems	Yes	Low	Groundwater results are below the 95% ecological water quality guideline value
		Uptake by ecological receptors	Bioaccumulation/ magnification through the food chain	Receiving aquatic and/or terrestrial ecosystems	Plausible	Low	Groundwater results are below the 95% ecological water quality guideline value	Receiving aquatic and/or terrestrial ecosystems	Plausible	Low	Groundwater results are below the 95% ecological water quality guideline value	Receiving aquatic and/or terrestrial ecosystems	Plausible	Low	Groundwater results are below the 95% ecological water quality guideline value
Asbestos in Stockpile 3		HUMAN HEALTH													
		Wind erosion and dust dispersion	Inhalation	On-site maintenance workers (where soil is uncovered and accessible)	Yes (where soil is uncovered and accessible)	Medium	Bonded asbestos fragments and friable asbestos fibre bundles are present throughout stockpile	On-site construction workers (where soil is uncovered and accessible)	Yes (where soil is uncovered and accessible)	Medium	Mitigation measures will be required during construction to ensure integrity of stockpile during works prior to final placement	On-site maintenance workers (where soil is uncovered and accessible)	Yes (where soil is uncovered)	Extremely Low	Stockpile will be contained in designated cell on site where disturbance will be highly unlikely (under road)

CONCEPTUAL SITE MODEL				CURRENT				CONSTRUCTION				OPERATIONAL			
PRIMARY ON-SITE SOURCE	POTENTIAL SECONDARY ON-SITE SOURCE	TRANSPORT MECHANISM	EXPOSURE PATHWAY	POTENTIAL RECEPTOR	POTENTIAL LINKAGE COMPLETE (YES/NO)	RISK	COMMENT	POTENTIAL RECEPTOR	POTENTIAL LINKAGE COMPLETE (YES/NO)	RISK	COMMENT	POTENTIAL RECEPTOR	POTENTIAL LINKAGE COMPLETE (YES/NO)	RISK	COMMENT
											Stockpile will be contained in designated cell on site (under road)				
		Overland flow, vertical and lateral migration along surface soils and within drainage systems, deposition of dust	Migration to local surface water features	Recreational users of adjacent and down gradient surface waters (BBC20 and Boggy Creek)	Yes (where soil is uncovered and accessible)	Mediu m	Bonded asbestos fragments and friable asbestos fibre bundles are present throughout stockpile	Recreational users of adjacent surface waters (drainage culvert)	Yes (where soil is uncovered and accessible)	Medium	Mitigation measures will be required during construction to ensure integrity of stockpile during works prior to final placement Stockpile will be contained in designated cell on site (under road)	Recreational users of adjacent surface waters (drainage culvert)	No	Negligible	Stockpile will be contained in designated cell on site where disturbance will be highly unlikely (under road)
Low and moderate levels of AASS		ENVIRONMENTAL													
		Unsaturated soils becoming saturated	Groundwater	BBC20 and Boggy Creek	Yes	Low	Current site condition indicates ASS and PASS exist on site	BBC20 and Boggy Creek	Yes	Medium	Mitigation measures required during construction to manage ASS impacted groundwater during the works	BBC20 and Boggy Creek	No	Low	Site will be covered in hardstand reducing infiltration rates