

Amey

Airport North Precinct Master Plan

Engineering Services Report

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Abbreviations

ABBREVIATION	ABBREVIATED TERM	ABBREVIATION	ABBREVIATED TERM
AD	Average Day	PDA	Priority Development Area
ADWF	Average Dry Weather Flow	PFAS	Per- and Polyfluoroalkyl Substances
AEP	Annual Exceedance Probability	PH	Peak Hour
ASS	Acid Sulfate Soil	PMA	Pressure Management Area
ASSMP	Acid Sulfate Soil Management Plan	PMP	Precinct Master Plan
BYDA	Before You Dig Australia	PRV	Pressure Reducing Valve
DBYD	Dial Before You Dig	PWWF	Peak Wet Weather Flow
EDQ	Economic Development Queensland	QUDM	Queensland Urban Drainage Manual
EP	Equivalent Person	SCA	Sunshine Coast Airport
ESC / E&SC	Erosion and Sediment Control	SEQ WS&S D&C Code	South East Queensland Water Supply and Sewerage Design and Construction Code
FIA	Flood Impact Assessment	SPS	Sewer Pump Station
GFA	Gross Floor Area	SWMP	Stormwater Management Plan
LGA	Local Government Area	TIA	Traffic Impact Assessment
MUTCD	Manual of Uniform Traffic Control Devices	TMR	Department of Transport and Main Roads
NBN	National Broadband Network	WSA	Water Services Association of Australia

Glossary

TERM	DEFINITION
Airport North Precinct	The proposed mixed-use precinct located north of the existing Sunshine Coast Airport and forming part of the Sunshine Coast Airport PDA.
Development Site	The land within the Airport North Precinct subject to the proposed Precinct Master Plan, including Sub-precincts 5A and 5B.
Precinct Master Plan	The concept master plan identifying the intended land use structure, access arrangements, drainage corridors, open space and infrastructure requirements for the precinct.
Priority Development Area	A declared area for coordinated planning and development assessment under the Economic Development Act, administered by EDQ.
Lawful Point of Discharge	The location where stormwater runoff may lawfully discharge from the site to the downstream drainage network.
Detailed Design	A future design stage where final levels, alignments, pipe sizes, pavement design, service connections and construction requirements are confirmed.

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Executive Summary

This Engineering Services Report has been prepared by Amey Australia Pty Ltd to support the Airport North Precinct Master Plan at Sunshine Coast Airport, Marcoola. The precinct forms part of the Sunshine Coast Airport Priority Development Area and incorporates Sub-precincts 5A and 5B.

The report outlines the concept-level engineering servicing strategy for the proposed mixed-use precinct, including earthworks, erosion and sediment control, road access, stormwater management, water supply, sewerage, electrical, telecommunications and gas servicing considerations.

The proposed precinct is expected to be serviceable through a combination of existing and proposed infrastructure, subject to future detailed design, authority approvals, confirmation of downstream network capacity, final flood assessment outcomes and implementation of relevant ASS and PFAS management requirements.

The findings and recommendations in this report are based on the current masterplan and available technical inputs. The servicing strategy will need to be refined as the development layout, staging, detailed earthworks, roadworks, stormwater infrastructure and utility service alignments are progressed.

1. Introduction

Amey Australia Pty Ltd (herein referred to as “Amey”) has been commissioned by Sunshine Coast Airport (SCA) to prepare an Engineering Services Report for the proposed Airport North Precinct Master Plan (PMP) development at Sunshine Coast Airport, Maroocha, Queensland. The site forms part of the Sunshine Coast Airport Priority Development Area (PDA). The Airport North Precinct incorporates Sub-precinct 5A and Sub-precinct 5B as identified within the PDA Development Scheme (the Development Site).

The Airport North Precinct is proposed as a mixed-use development that will contribute to the long-term evolution of Sunshine Coast Airport and support economic growth within the wider Sunshine Coast region. The current concept, as illustrated in the Airport North Precinct Master Plan (refer to Appendix A), comprises a range of commercial and tourism-related land uses, including short-term accommodation, retail and food and drink premises, indoor recreation facilities, showrooms and light industrial activities. Supporting infrastructure is also proposed, including an internal road network, drainage corridors, landscaped areas and associated utility services.

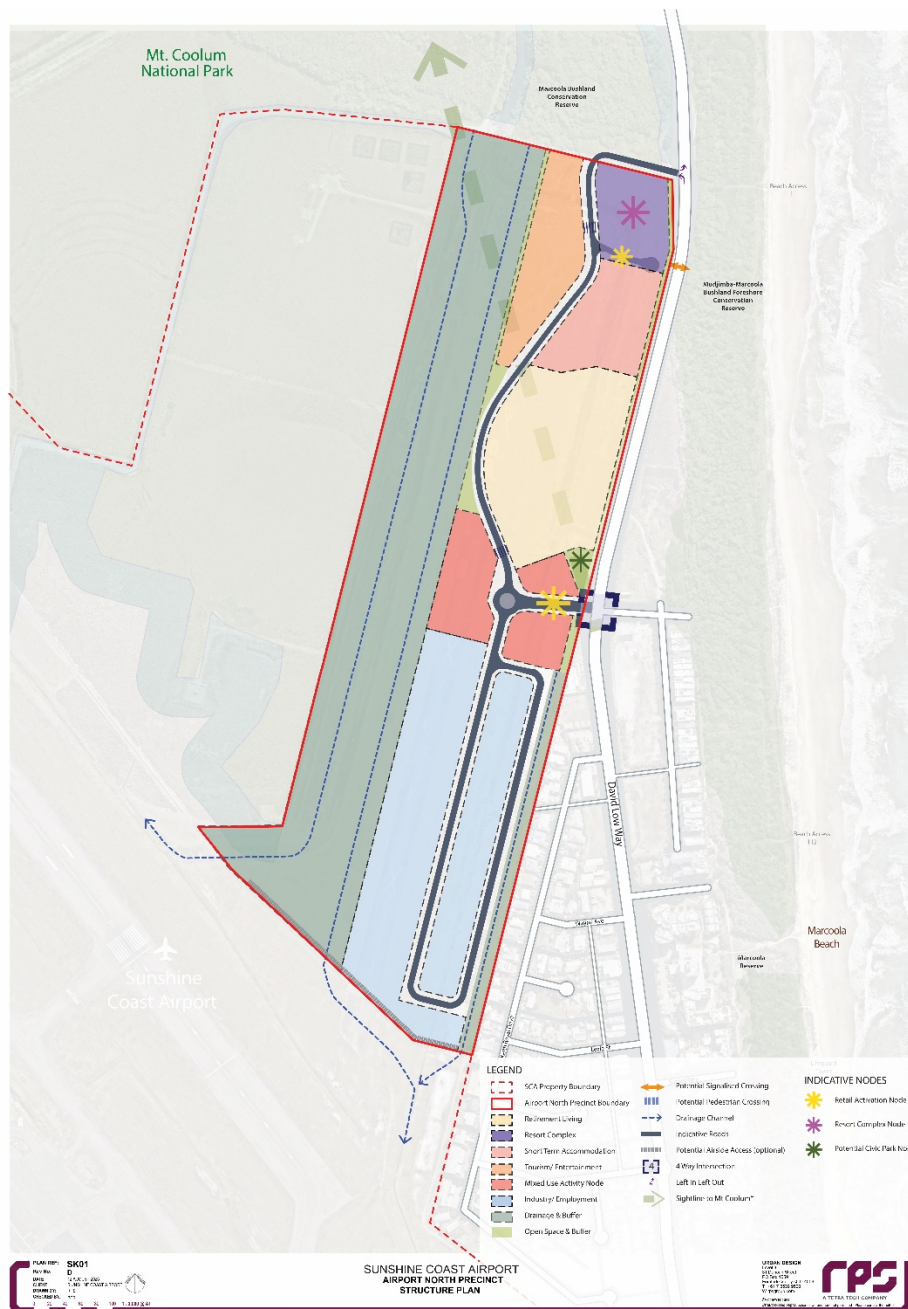


Figure 1-1: Airport North Precinct Concept Master Plan

2. Purpose

The purpose of this Engineering Services Report is to address the engineering requirements needed to service the proposed Airport North Precinct development. The report considers the necessary technical inputs for the following at a conceptual level:

- Earthworks
- Erosion and Sediment Control
- Acid Sulfate Soil Management
- PFAS Management
- Transport Infrastructure and Access
- Stormwater Management
- Water Infrastructure
- Sewer Infrastructure
- Electrical and Telecommunications Infrastructure

3. Existing Site Characteristics

3.1. Site Area and Location

The Sunshine Coast Airport is located at Marcoola on Queensland's Sunshine Coast, approximately 10 km north of Maroochydore and approximately 90 km north of Brisbane. The airport is situated on low-lying coastal land adjacent to the Coral Sea and is accessed primarily via Friendship Avenue and the David Low Way transport corridor. The facility accommodates domestic and international passenger services, general aviation activities, aviation-related businesses and associated transport infrastructure. The Airport North Precinct is located within the north-eastern portion of the airport site. The precinct is bounded by established residential properties to the east, while grassed operational areas associated with the airport are situated to the west. The Coral Sea forms a prominent feature along the north-eastern extent of the precinct.

The location of the Airport North Precinct is shown in Figure 3-1.



Figure 3-1: Aerial Image of Site Location (Source: Queensland Globe)

3.2. Existing Site Conditions

The Airport North Precinct comprises predominantly undeveloped land within the broader Sunshine Coast Airport landholding. Existing site features include grassed areas, gravel access tracks, fencing, drainage infrastructure and associated airport operational land.

The site is generally low-lying and relatively flat, with ground levels varying across the site and localised changes in elevation associated with existing drainage infrastructure, embankments and access tracks. Existing drainage infrastructure includes open drains, culverts, pipe outlets, headwalls and overland flow paths that convey runoff through the broader airport catchment. An existing open drain traverses the site in an east-west direction and receives runoff from both on-site catchments and surrounding areas, including stormwater conveyed from the David Low Way corridor.

Existing services are present within and adjacent to the site, including water, sewer, stormwater, electrical and telecommunications infrastructure. The location, depth and condition of these services will require confirmation through detailed survey, BYDA enquiries and service proving during subsequent design stages.

The site's proximity to airport operations, transport infrastructure, existing drainage corridors and adjacent residential development will be key considerations in the ongoing development of the earthworks, flooding, stormwater and servicing strategies for the site.



Figure 3-2: Existing Development Site Contours

3.3. Existing Water Infrastructure

Existing water infrastructure servicing the Airport North Precinct is provided via the reticulated water network within the North Shore Pressure Management Area (PMA). The network is supplied through dual PRV-controlled feeds connected to the David Low Way trunk water network.

In accordance with the servicing strategy adopted as part of the Sunshine Coast Airport Priority Development Area (PDA) Development Scheme, as documented in the *Sunshine Coast Airport Servicing Report (Revision 7)*, the existing water supply network is capable of accommodating the forecast Airport North Precinct demand until approximately 2036, subject to the maintenance of the existing PRV settings. Beyond this timeframe, augmentation of the trunk water main between David Low Way and Finland Road has been identified to provide additional network capacity and improve network resilience.

Existing water infrastructure located in the vicinity of the site is shown in Figure 3-3.

Unitywater Water Map

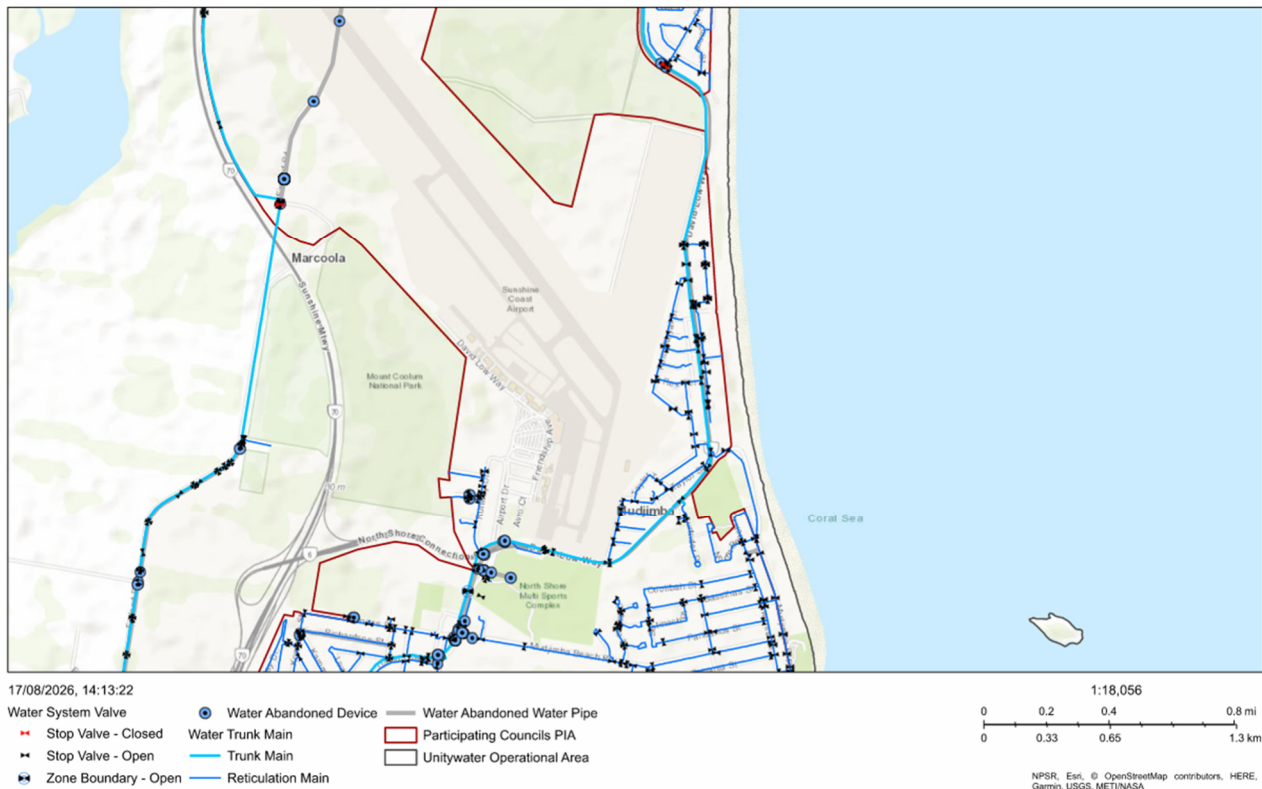


Figure 3-3: Existing Water Infrastructure (Source: Unitywater Mapping)

3.4. Existing Sewer Infrastructure

Existing sewer infrastructure servicing the Airport North Precinct is located along the eastern boundary of the Sunshine Coast Airport PDA. Sewer flows are conveyed south toward SPS-MDJ114 and SPS-MDJ110 prior to transfer through the wider Finland Road catchment and ultimate treatment at the Maroochydhore Sewage Treatment Plant.

In accordance with the servicing strategy adopted as part of the Sunshine Coast Airport Priority Development Area (PDA) Development Scheme, as documented in the *Sunshine Coast Airport Servicing Report (Revision 7)*, capacity constraints have been identified within portions of the wider downstream sewer network, primarily associated with SPS-MDJ108 and upstream gravity sewer infrastructure. The servicing strategy identifies a staged upgrade program to address these constraints and accommodate future growth in development demand.

The existing gravity sewer proposed to receive flows from the Airport North Precinct is understood to comprise vitrified clay pipework prior to discharge to the downstream rising main. The condition and connection requirements of this existing sewer will need to be confirmed during detailed design.

Existing sewer infrastructure located in the vicinity of the site is shown in Figure 3-4.

Unitywater Sewer Map



Figure 3-4: Existing Sewer Infrastructure (Source: Unitywater Mapping)

3.5. Existing Stormwater

Existing stormwater infrastructure within and adjacent to the Airport North Precinct comprises open drains, culverts, pipe outlets and overland flow paths that convey runoff through the broader airport catchment. An existing open drain traverses the site in an east-west direction and receives runoff from both on-site catchments and surrounding areas, including stormwater conveyed from the David Low Way corridor. Under existing conditions, the drain conveys these combined flows to the downstream drainage network.

The site forms part of a wider drainage and floodplain system, with existing drainage corridors and overland flow paths representing key constraints that have informed the proposed development layout, earthworks strategy and stormwater management approach. Existing stormwater infrastructure and drainage corridors have been assessed as part of the Stormwater Management Plan (**Appendix D**).

3.6. Existing Electrical Infrastructure

Existing electrical infrastructure is located within and adjacent to the Airport North Precinct, including along the David Low Way and Airport Drive corridors. The existing network provides potential connection opportunities for the proposed development, subject to confirmation of available capacity, connection requirements and any augmentation works by Energex during future stages of design.

3.7. Existing Telecommunications Infrastructure

Existing telecommunications infrastructure is located adjacent to the Airport North Precinct within the David Low Way and Airport Drive corridors. Telecommunications services are anticipated to be available to the proposed development. The availability of network capacity, connection locations and servicing requirements will be confirmed through consultation with the relevant telecommunications providers during detailed design.

3.8. Existing Gas Infrastructure

No reticulated gas infrastructure is currently known to be available in the immediate vicinity of the site.

4. Proposed Precinct Master Plan

The proposed Airport North Precinct Master Plan is shown in Figure 1-1. The masterplan identifies the intended land use structure for the precinct, including tourism and accommodation uses in the northern portion of the site, mixed-use activity uses in the central portion, and light industry / employment uses in the southern portion.

The masterplan also identifies the proposed internal road network, David Low Way access arrangements, drainage and buffer corridors, open space areas, active transport connections and key activity nodes. These elements form the basis for the concept servicing strategy outlined in this report.

The engineering services described in the following sections have been considered at a master planning level to support the proposed precinct layout. Final lot layouts, staging, earthworks, roadworks, drainage, utility alignments and service connections will be refined during future design stages and confirmed through the relevant technical assessments and authority approvals.

No formal staging plan has been confirmed at this stage. Staging will be subject to future development sequencing, infrastructure delivery requirements, authority approvals and market demand.

5. Services for Development

5.1. Earthworks

Preliminary assessments indicate that earthworks will be required across the development site to establish suitable development platforms and achieve the required flood immunity for the proposed land uses. Finished surface levels, drainage infrastructure and underground services will be designed in accordance with the proposed development layout and informed by the flood impact assessment undertaken by BMT and the associated catchment assessments. Vegetation clearing will be undertaken across the development site as required to facilitate construction activities and the proposed development footprint.

The earthworks strategy will be developed in conjunction with the flood mitigation and stormwater management measures proposed for the site. Flood mitigation works are expected to form a key component of the development and may need to be undertaken prior to, or in conjunction with, the establishment of development platforms. The earthworks design will seek to provide an efficient balance between flood immunity, stormwater management requirements and development outcomes, while minimising the import and export of fill material where practicable.

A concept earthworks model will be prepared to identify required cut and fill volumes, establish appropriate finished surface levels and inform the ongoing development of the precinct layout and servicing strategy. The model will be refined through subsequent design stages and coordinated with the detailed flood impact assessment and stormwater management design to confirm the final earthworks strategy and associated infrastructure requirements.

5.2. Erosion and Sediment Control (ESC)

Erosion and Sediment Control (ESC) measures will be required during all stages of development, from site establishment to project completion.

An Erosion and Sediment Control (E&SC) Plan will be prepared and submitted to the relevant authority. The E&SC Plan will incorporate a strategy for the bulk earthworks required for the proposed development and identify the responsibilities of key project personnel relating to erosion and sediment control during construction activities. Consideration will be given to the construction and stabilisation of the proposed open drainage channel, including its sequencing within the overall earthworks and construction program.

Exposed areas will be stabilised as soon as practicable following completion of earthworks within each area. Sediment control devices will be removed once construction works are complete and the site is operational. The detailed E&SC program will be developed during the detailed design phase.

5.3. Acid Sulfate Soil Management

An overarching Acid Sulfate Soil Management Plan (**refer to Appendix E**) has been prepared for the Airport North Precinct, being the Sunshine Coast Airport – Airport North Precinct Master Plan Acid Sulfate Soil Management Plan prepared by RPS, dated 11 August 2026. The ASSMP identifies that acid sulfate soils are likely present across the precinct, typically within silty topsoils and dark grey coffee sands from the seasonal groundwater interface to the base of the investigated soil profile, to approximately 2.5 m below ground level. Disturbed ASS will require management and lime neutralisation during construction.

The ASSMP provides the precinct-level framework for managing ASS, groundwater, surface water and dewatering risks associated with the Airport North Precinct masterplan, including future road, drainage, infrastructure and services works. Development/project-specific ASSMPs will be required for future stages or work packages once detailed design, excavation depths, earthworks extents and construction methodologies are confirmed. These are to be endorsed by EDQ prior to soil or groundwater disturbance activities commencing.

5.4. PFAS Management

PFAS contamination is a known environmental management consideration at Sunshine Coast Airport due to historical airport operations and the former use of PFAS-containing firefighting foams. PFAS management for the Airport North Precinct is to be undertaken with reference to the PFAS Management Plan, Sunshine Coast Airport, Qld (**refer to Appendix F**), prepared by RPS, dated 14 June 2024. The PFAS Management Plan applies to operational, maintenance and construction activities that interact with soil, groundwater or surface water potentially impacted by PFAS.

For the Airport North Precinct masterplan and associated road, infrastructure and services design, PFAS management will need to be considered where proposed works involve disturbance of existing soils, drainage corridors, groundwater, stormwater infrastructure or excavated materials. This is particularly relevant to proposed roadworks, drainage realignment, service trenching, sewer infrastructure, dewatering and any reuse or disposal of excavated material.

At this stage, the PFAS Management Plan provides the relevant management framework for the precinct planning and concept design phase. Specific PFAS controls, sampling requirements and material management measures will be confirmed during detailed design and construction planning, once excavation depths, drainage works, dewatering requirements and material reuse or disposal pathways are confirmed.

5.5. Traffic and Roadways

5.5.1. General

Access to the Airport North Precinct is proposed via two concept access arrangements, comprising a primary access connection from David Low Way and a secondary access connection at the northern end of the site. The primary access is proposed at the existing Green Turtle Place intersection and is expected to form the principal access to the development. The northern access is proposed to provide an additional access point to support site access, circulation and connectivity within the development.

The proposed road network has been developed to support the future commercial, tourism, retail and light industrial land uses proposed within the Airport North Precinct, while maintaining integration with the surrounding transport network and Sunshine Coast Airport operations. The concept street network and internal roadworks layout are provided in **Appendix C**.

A Traffic Impact Assessment (TIA) prepared by Arup has been undertaken to assess the traffic impacts associated with the proposed masterplan. The assessment considers the operational performance of the proposed access arrangements, internal road network and surrounding intersections under future traffic conditions and identifies any upgrades required to the surrounding transport network. The findings and recommendations of the TIA are provided in **Appendix G**.

The development concept also incorporates consideration of pedestrian, cycling and public transport connectivity to support active transport movements and broader accessibility objectives.

5.5.2. Internal Road Network

The concept internal roadworks layout provides access throughout the Airport North Precinct and connects the proposed development parcels to both the David Low Way access and the northern access connection.

The internal road network has been developed to support the proposed development layout and provide connectivity between development areas, drainage corridors and supporting infrastructure. Internal roads within the PDA will be designed in accordance with the relevant Economic Development Queensland (EDQ) requirements and applicable PDA provisions, together with Austroads guidelines and other relevant authority requirements. Pavement design will be confirmed during detailed design based on geotechnical investigations, while line marking and signage will be designed in accordance with the Manual of Uniform Traffic Control Devices (MUTCD).

The final internal road layout remains subject to confirmation through detailed design, service coordination, drainage design, pavement design and relevant authority approvals.

5.5.3. Concept Access and Road Layouts

The concept access and road layout drawings identify the proposed access arrangements and indicative internal street network. This includes the primary access at Green Turtle Place and David Low Way, the northern access connection, internal intersections and the broader street hierarchy proposed for the development.

These layouts are indicative only and are intended to identify the likely spatial requirements for external roadworks, intersection treatments, access geometry, turn lanes, pedestrian and active transport infrastructure, service corridors and connections to the existing road network.

External roadworks within the PDA will be designed in accordance with the relevant EDQ and PDA requirements. External roadworks outside the PDA will be subject to the relevant Sunshine Coast Council standards and approval requirements. Intersections and works associated with David Low Way will also be required to satisfy the relevant TMR standards and approval requirements.

The final extent and form of the external roadworks will be informed by the findings of the Traffic Impact Assessment (**Appendix H**) and confirmed through detailed design, survey, service location investigations, drainage assessment and consultation with EDQ, Sunshine Coast Council and TMR.

5.6. Stormwater

Stormwater management for the Airport North Precinct has been considered with reference to the Sunshine Coast Airport North Precinct Stormwater Management Plan (*refer to Appendix D*) prepared by Premise, dated 19 August 2026. The SWMP provides a conceptual stormwater servicing strategy for the precinct, including conceptual sizing of the proposed stormwater pipe network and open drain infrastructure.

The proposed stormwater strategy includes a combination of underground stormwater infrastructure and open drain works to collect and convey runoff from the precinct to the identified discharge points. The concept stormwater layout and discharge points are shown in Figure 5-1.

The stormwater infrastructure shown at this stage is conceptual and will be refined during detailed design, having regard to the SWMP, civil servicing drawings, flood assessment outcomes, authority requirements and future lot development requirements.

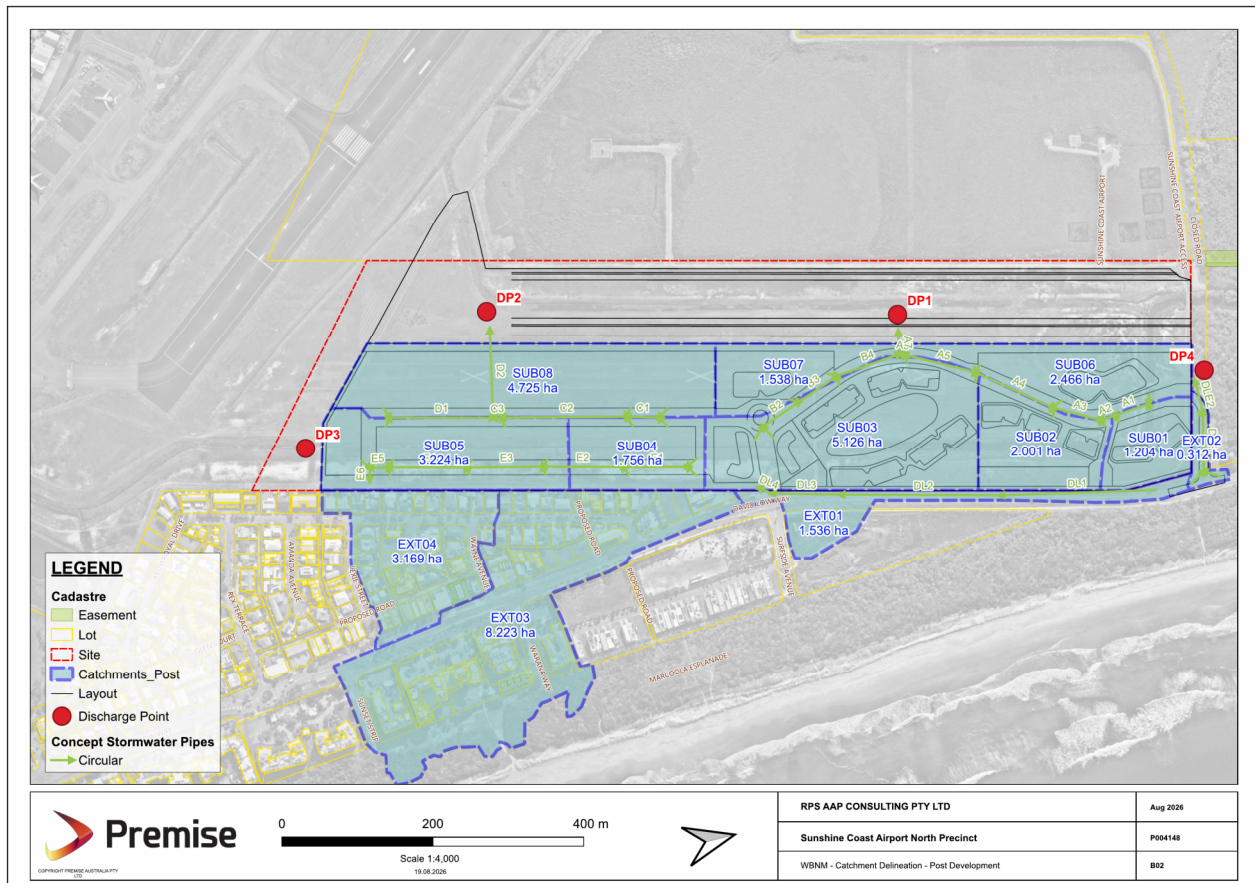


Figure 5-1: Concept Stormwater Layout and Discharge Points (Source: SWMP Rev B)

5.6.1. Stormwater Quality and Quantity

The SWMP conceptual hydrologic modelling and stormwater quantity assessment for the Airport North Precinct, including pre-development and post-development peak discharge comparisons at the identified discharge points DP1, DP2, DP3 and DP4. The SWMP identifies DP3 as being close to the site lawful point of discharge.

The future tenancy design parameters in the SWMP note that post-development peak discharges increase due to the proposed increase in impervious area. Stormwater quantity attenuation and stormwater quality treatment have not been assessed as part of the SWMP and are to be addressed by future tenancies at the detailed design stage in accordance with the parameters set out in the SWMP.

Stormwater quality treatment for future tenancies will need to satisfy the applicable State Planning Policy stormwater quality objectives, including pollutant load reduction targets for total suspended solids, total phosphorus, total nitrogen and gross pollutants, together with waterway stability management requirements.

Construction phase erosion and sediment control will be required for the precinct works and future lot development, with controls to be coordinated with relevant ASS and PFAS management requirements where earthworks, dewatering, stockpiling or material reuse/disposal are proposed.

5.6.2. Hydraulics and Flooding

Flooding and overland flow are key considerations for the Airport North Precinct due to the site's low-lying coastal location, existing drainage corridors and surrounding floodplain areas.

The flooding section of the SWMP notes that the precinct is located within an area subject to flooding under the Sunshine Coast Council Planning Scheme flood overlay. The SWMP is focused on the post-development drainage strategy and hydrologic assessment, with a separate Flood Impact Assessment / hydraulic assessment being undertaken for the broader airport development.

Flood management for the precinct will need to be considered in accordance with the Sunshine Coast Airport PDA Development Scheme requirements, the broader airport Flood Impact Assessment and the proposed flood mitigation works. The outcomes of the flood assessment will inform the future detailed design of earthworks, road levels, drainage corridors, overland flow paths and stormwater infrastructure. Flood overlay mapping from the SWMP is shown in Figure 5-2.



Figure 5-2: SCC Flood Overlay (Source: SWMP Rev B)

5.7. Water and Sewer Demand

Water and sewer demands for the proposed Airport North Precinct have been determined using an Equivalent Person (EP) assessment methodology, with supporting calculations provided in the Water and Sewer Demand Calculations (**refer to Appendix B**). EP conversion rates have been adopted from Unitywater planning documents, with accommodation occupancy rates adopted from the *Gateway Engineering Services Report (Stantec (Rev B) July 2025)*. This is to provide consistency over the whole development and adjacent precincts.

The calculated EP loading has been used to determine the applicable water and sewer design demands in accordance with the South East Queensland Water Supply and Sewerage Design and Construction Code (SEQ WS&S D&C Code).

The assessment considers the proposed tourism, accommodation, mixed-use and employment land uses within the preferred Airport North Precinct masterplan. Accommodation-based uses were assessed on an EP per room basis, while commercial, retail and employment uses were assessed using EP conversion rates based on gross floor area. Detailed demand calculations are provided in Appendix B.

Water and sewer infrastructure internal to the Airport North Precinct is proposed to comprise private infrastructure owned, operated and maintained by Sunshine Coast Airport, with connection to the external Unitywater water supply and sewerage networks occurring at agreed connection locations.

The resulting development demand assessment is summarised in Table 5-1

Table 5-1: Summary Water and Sewer Demand Assessment

Parameter	Value
Equivalent Persons (EP)	1,833
Average Day Water Demand (AD)	260L/EP/Day
Peak Day Water Demand (PD)	2
Peak Hour Water Demand (PH)	2.8
Average Dry Weather Flow (ADWF)	200L/EP/Day
Peak Wet Weather Flow (PWWF)	5

The preferred Airport North Precinct masterplan generates an estimated demand of 1,833 Equivalent Persons (EP). These calculated demands form the basis of the water supply and sewer infrastructure assessments presented in Sections 5.8 and 5.9.

A general assessment surrounding network impacts have been benchmarked against the *Sunshine Coast Airport Development Scheme Engineering Services Report (Stantec (Rev 7), 2024)*. The calculated EP this report made for the Airport North Precinct was 1,894EP. The proposed Airport North Precinct has a calculated EP less than the earlier development scheme report has calculated. Further details of the impact and comparison to this report has been made in Sections 5.8 and 5.9.

5.8. Water Infrastructure

The Airport North Precinct is proposed to be serviced by the existing reticulated water network within the North Shore Pressure Management Area. The network is supplied through dual pressure reducing valve controlled feeds connected to the David Low Way trunk water network.

The proposed internal water reticulation network will be designed in accordance with the South East Queensland Water Supply and Sewerage Design and Construction Code and relevant Unitywater requirements. The network will provide potable water supply and fire-fighting capability to the proposed development parcels.

The projected water demands for the ultimate build-out of the Airport North Precinct masterplan are summarised in Table 5-2.

Table 5-2: Water Demand Assessment

SOURCE	EQUIVALENT PERSONS (EP)	AVERAGE DAY DEMAND AD (L/S)	PEAK DAY DEMAND PD (L/S)	PEAK HOUR DEMAND PH (L/S)
Airport North Precinct	1,833	5.5	11.0	15.4
Development Scheme*	1894	5.7	10.7	17.9

*References the North precinct Demand calculations from the Sunshine Coast Airport Development Scheme Engineering Services Report (Stantec (Rev 7), 2024)

5.8.1. Water Network Capacity

The *Sunshine Coast Airport Development Scheme Engineering Services Report (Stantec (Rev 7), 2024)* identifies that the existing water supply network is capable of accommodating the Airport North Precinct development demand through to approximately 2036, subject to the maintenance of the existing PRV settings. Beyond this timeframe, augmentation of the trunk water main between David Low Way and Finland Road has been identified to provide additional network capacity and improve network resilience.

As the current masterplan demand does not exceed the Development Scheme assessment the recommendations within this original report would remain.

5.8.2. Water Reticulation System Requirements

Water supply to the Airport North Precinct is proposed via connection to the existing reticulated water network servicing the Airport North within the North Shore Pressure Management Area. Supply will be provided through the existing pressure reducing valve controlled feeds from the David Low Way trunk water network.

A new internal water reticulation network will be provided to service each development parcel. The internal network will comprise a private water network owned, operated and maintained by Sunshine Coast Airport, with connection to the external Unitywater network occurring at agreed connection points. The network will be designed and constructed in accordance with the South East Queensland Water Supply and Sewerage Design and Construction Code and Unitywater requirements.

The internal network will include appropriately sized water mains, property service connections, isolation valves, scour valves and fire hydrants. Final main sizes, connection locations, fire-flow requirements and staging arrangements will be confirmed during detailed design.

5.9. Sewer Infrastructure

5.9.1. Design Sewerage Flows

The sewer design flows for the proposed Airport North Precinct have been determined based on the Equivalent Person (EP) assessment presented in Section 5.7. Average Dry Weather Flow (ADWF) and Peak Wet Weather Flow (PWWF) have been calculated in accordance with the South East Queensland Water Supply and Sewerage Design and Construction Code (SEQ WS&S D&C Code). The adopted PWWF has been used as the governing design flow for assessment of the gravity sewer network and associated sewer infrastructure.

The calculated sewer design flows for the ultimate development are summarised in Table 5-3.

Table 5-3: Sewerage Flow Assessment

SOURCE	EQUIVALENT PERSONS (EP)	AVERAGE DRY WEATHER FLOW (ADWF) (L/S)	PEAK WET WEATHER FLOW (PWWF) (L/S)
Airport North Precinct	1,833	4.2	21.2
Development Scheme*	1,894	4.2	16.7

*References the North precinct Demand calculations from the Sunshine Coast Airport Development Scheme Engineering Services Report (Stantec (Rev 7), 2024)

5.9.2. Sewer Network Capacity

Sewer flows from the proposed Airport North Precinct are proposed to discharge to the existing gravity sewer network located along the eastern boundary of the Sunshine Coast Airport PDA. Flows are conveyed south towards SPS-MDJ114 and SPS-MDJ110 prior to transfer through the wider Finland Road catchment and ultimate treatment at the Maroochydore Sewage Treatment Plant.

Previous servicing assessments indicate that, while short-term modelling does not identify surcharge within the downstream sewer network, capacity constraints exist within the wider catchment, primarily associated with SPS-MDJ108 and upstream gravity sewer mains. A staged upgrade program has been identified to accommodate future increases in development demand.

The updated Airport North Precinct masterplan exceeds the original PDA sewer demand allowance. Accordingly, confirmation of downstream sewer network capacity and the timing of the identified upgrades will be required as development staging and demand profiles are refined in consultation with Unitywater.

While the current Airport North Precinct demand exceeds the original PDA sewer demand allowance, the servicing strategy identifies future infrastructure upgrades within the wider catchment to accommodate increasing development demand. The ultimate timing and extent of these upgrades should be confirmed through detailed design and consultation with Unitywater; however, the identified upgrade pathway indicates that additional sewer network capacity can be provided as development across the catchment progresses.

5.9.3. Sewer Reticulation Requirements

Sewer servicing for the Airport North Precinct is proposed via a new internal gravity sewer reticulation network connecting to the existing gravity sewer network servicing the airport precinct. The proposed servicing layout shown on the concept civil drawings has been developed generally in accordance with the servicing assumptions adopted within the Sunshine Coast Airport Servicing Report (Rev 7).

The internal sewer reticulation network will comprise of a private sewer network designed and constructed in accordance with the South East Queensland Water Supply and Sewerage Design and Construction Code (SEQ WS&S D&C Code) and Unitywater requirements. Final pipe sizes, alignments, maintenance structures and connection locations will be confirmed during detailed design.

5.9.4. Sewer Pump Station Requirements

A private sewer pump station (SPS) is proposed to service the northern and central portions of the Airport North Precinct that cannot be practically conveyed to the downstream connection by gravity. The pump station will receive flows from the internal gravity sewer catchment and pump via a private rising main to the internal gravity sewer network, where flows will continue by gravity to the downstream connection.

Based on the preferred masterplan demand assessment, the total Airport North sewer PWWF for the North and Central land uses is 19.6 (**refer to Appendix B**). For concept sizing, an adopted SPS design flow of 20L/s has been allowed. The SPS, gravity sewer branches and rising main are to be designed in accordance with the SEQ Water Supply and Sewerage Design and Construction Code and WSA 04 Sewage Pumping Station Code of Australia. Preliminary concept parameters are summarised below.

Table 5-4: Concept SPS Parameters

ITEM	PARAMETER
Item	Preliminary Concept Parameter
SPS catchment	Northern and central Airport North catchments
Adopted design flow	20 L/s PWWF
Pump arrangement	Duty / standby submersible pumps
Preliminary pump duty	20 L/s at TBC m Total Head
Preliminary SPS depth	5.5 m to 6.0 m
Preliminary wet-well diameter	2.1 m
Preliminary rising main diameter	DN150

A preliminary DN150 rising main has been adopted based on an indicative velocity check at the adopted 20 L/s design flow. Final rising main diameter and pump duty are to be confirmed during detailed design based on the actual pipe internal diameter, rising main length, detention time, headloss, fittings, valve losses, wet-well operating levels and pump selection.

Final SPS sizing, wet-well configuration, pump duty, operating levels, emergency storage, detention time, odour/septicity risk and access/maintenance requirements are to be confirmed during detailed design.

5.10. Electricity, Telecommunications and Gas

5.10.1. Energex and other Electrical Items

Existing electrical infrastructure is located within and adjacent to the Airport North Precinct site, including along the David Low Way and Airport Drive corridor. It is anticipated that the existing electrical network can be extended throughout the proposed development to service the future mixed-use precinct, subject to confirmation from the relevant service authority.

A new internal electrical reticulation network will be provided to service the development parcels. The internal network, including associated transformers, distribution infrastructure and street lighting, is anticipated to comprise a private network owned, operated and maintained by Sunshine Coast Airport. Final network arrangements, connection requirements and any augmentation works will be confirmed through consultation with Energex during detailed design.

Street lighting will also be installed throughout the internal road network in accordance with the relevant EDQ/PDA requirements, Energex requirements and applicable lighting design standards.

5.10.2. Telecommunications

Existing telecommunications infrastructure is located adjacent to the site along the David Low Way and Airport Drive corridor. It is anticipated that NBN or other telecommunications providers will service the proposed development, with infrastructure extended throughout the precinct via underground conduits within the proposed internal road network.

Due to the proximity of existing telecommunications infrastructure to the site, telecommunications servicing is anticipated to be readily available to the proposed development. A Dial Before You Dig (DBYD) search and further consultation with the relevant telecommunications providers should be undertaken during detailed design to confirm the location and availability of existing connection points and infrastructure corridors.

5.10.3. Gas

No reticulated gas infrastructure is currently known to be available in the immediate vicinity of the site. Gas services are not proposed as part of this development, and any gas requirements will need to be addressed via bottled gas systems at the lot level, if required.

6. Conclusion

This report has considered the concept-level engineering servicing requirements for the proposed Airport North Precinct development at Sunshine Coast Airport, Marcoola.

Based on the current masterplan and available technical investigations, the proposed development is considered capable of being serviced by road, stormwater, sewer, water, electrical and telecommunications infrastructure, subject to detailed design, future network augmentations where required, and the necessary authority approvals.

Key items requiring further confirmation include the final Traffic Impact Assessment, detailed flood modelling outcomes, detailed earthworks strategy, final utility alignments, downstream water and sewer capacity confirmation, and development/project-specific Acid Sulfate Soil Management Plan and PFAS management requirements where soil or groundwater disturbance is proposed.

The servicing strategy should be reviewed and updated as development staging, lot layout, detailed design and supporting technical investigations progress.

Appendix A: Airport North Precinct Master Plan

Airport North Precinct Master Plan

SUB-PRECINCT & LAND USES

Sub-Precinct & PMP Land Use	Description	Site	Approx. Site Area
P5: Airport North			
North - Tourism & Accommodation		A	9.292ha
	Resort Complex		
	Short Term Accommodation (STA)		
	Multiple Dwelling		
	Retirement Facility		
	Entertainment/ Catering (Bar, Food & Drink Outlet, Hotel, Function Facility)		
Central - Mixed Use		B	2.572ha
	Entertainment/ Catering (ie. Bar, Food & Drink Outlet)		
	Commercial Business Uses		
	Retail (Market, Shop, Showroom)		
	Indoor Sports & Recreation		
South - Employment		C	8.298ha
	Low Impact industry		
	Research & Technology		
	Service Industry		
	Warehouse		
	Commercial Business		
	Air Services		
	Aviation		
	Indoor Sports & Recreation		
		Total	20.162ha

Land uses listed for each subprecinct express a development intent only and do not exclude other alternative uses permitted in the Development Scheme.

LEGEND

- SCA Property Boundary
- Precinct Boundary
- Potential Sub-Precinct Boundary (5A/5B)
- Northern Sub-precinct (Tourism & Accom)
- Central Sub-precinct (Mixed Use)
- Southern Sub-precinct (Employment)
- Drainage & Buffer Sub-precinct
- Hotel Node
- Retail Activation Node
- Potential Civic Park Node
- Indicative Roads
- Indicative Sightline to Mt Coolum*

Note:
This plan must be read in conjunction with the following plans:

- Street Network Plan
- Active Movement Plan
- Interface Plan
- Privately Owned Greenspace Plan

PRECINCT PLAN

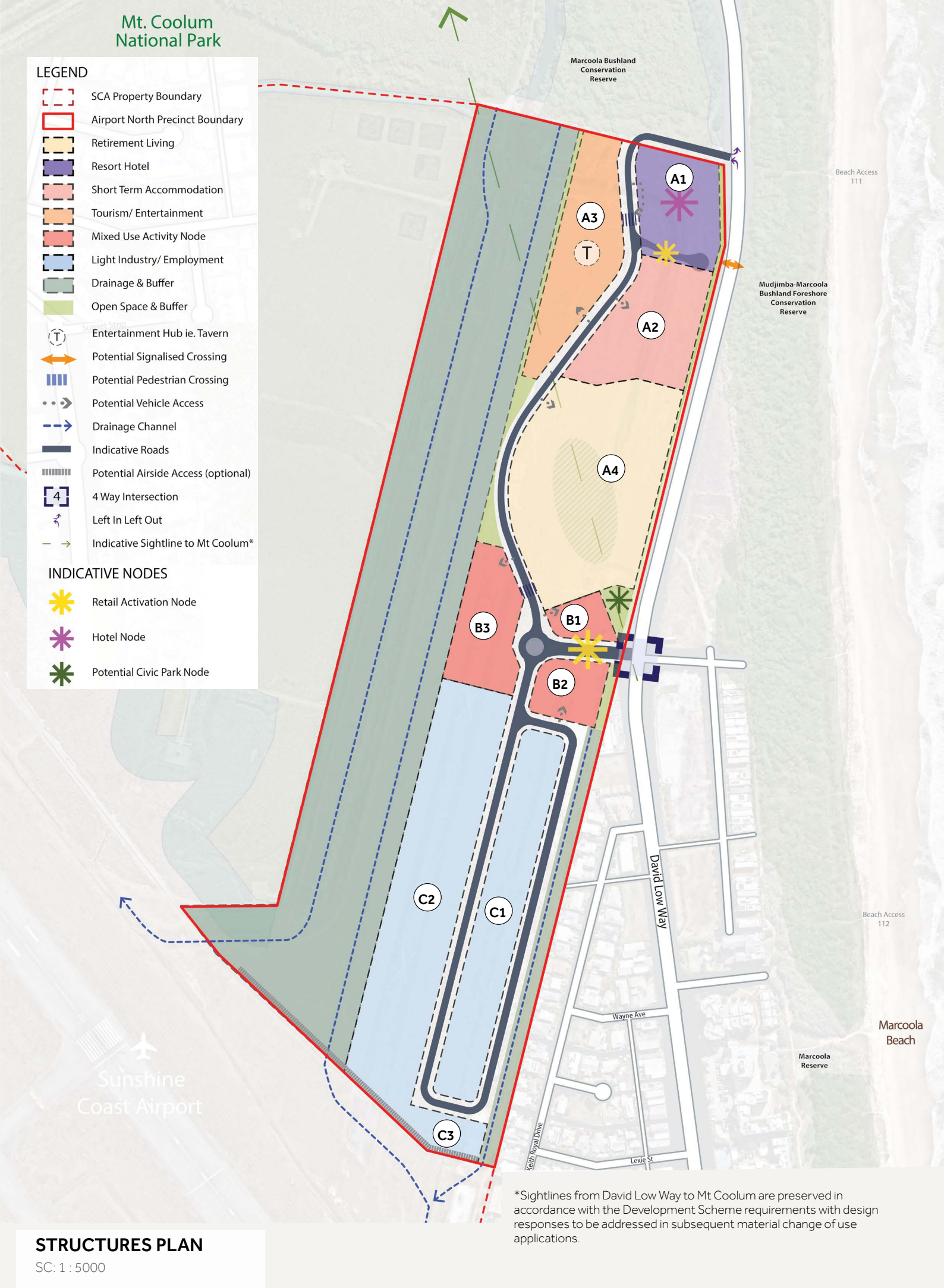
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*Sightlines from David Low Way to Mt Coolum are preserved in accordance with the Development Scheme requirements with design responses to be addressed in subsequent material change of use applications.

Detailed Master Plan

LAND USES

Sub-Precinct/ PMP Land Use	Description	Site
P5: Airport North		
North - Tourism & Accommodation		A1
Resort Complex	Resort Hotel Conference & Events	
Retail (Food & Drink Outlet)	Cafe/ Restaurant/ Bar	
North - Tourism & Accommodation		A2
Short Term Accommodation	Premium Temporary Accomodation	
Retail (Food & Drink Outlet)	Cafe/ Bar/ Restaurant	
North - Tourism & Accommodation		A3
Entertainment/ Catering (Bar, Food & Drink Outlet, Hotel, Function Facility)	Tavern/ Bar	
North - Tourism & Accommodation		A4
Multiple Dwelling	Build to Rent	
Retirement Facility	Retirement Living	
Central -Mixed Use		B1
Entertainment/ Catering (Bar, Food & Drink Outlet)	Cafe/ Bar/ Restaurant	
Retail (Market, Shop, Food & Drink Outlet)	Retail Shop	
Commercial Business Uses	Commercial Office	
Open Space	Civic Plaza	
Central -Mixed Use		B2
Entertainment/ Catering (Bar, Food & Drink Outlet)	Cafe/ Bar/ Restaurant	
Retail (Market, Shop, Food & Drink Outlet, Showroom)	Café & Showroom	
Commercial Business Uses	Health Care Services, Office, Veterinary Services	
Indoor Sport & Recreation	Children's Playcentre, Gym or Indoor Sport Facility	
Central -Mixed Use		B3
Indoor Sports & Recreation	Children's Playcentre, Gym or Indoor Sport Facility	
Entertainment/ Catering (Bar, Food & Drink Outlet)	Cafe/ Bar/ Restaurant	
Commercial Business Uses	Health Care Services, Office, Veterinary Services	
Retail (Market, Shop, Food & Drink Outlet, Showroom)	Cafe & Showroom	
South - Employment		C1
Employment (low impact industry)	Commercial Office, Low Impact Industry, Research and Technology, Service Industry, Warehouse, Air Services, Aviation, Indoor Sport and Recreation.	
South - Employment		C2
Employment (low impact industry)	Commercial Office, Low Impact Industry, Research and Technology, Service Industry, Warehouse, Air Services, Aviation, Indoor Sport and Recreation, Data Centre	
South - Employment		C3
Employment (low impact industry)	Commercial Office, Low Impact Industry, Research and Technology, Service Industry, Warehouse, Air Services, Aviation, Indoor Sport and Recreation, Data Centre	



Appendix B: Water and Sewer Demand Calculations

Amey

ADWF	200L/EP/Day	AD	260L/EP/Day
PWWF	5	PD	2
		PH	2.8

Site	Preferred Structure Plan line item	Quantity	Unit	Assumed Landuse - Reference Netserv	EP/Lot	EP/100m2	Total EP
North - Tourism & Accommodation							
A1	Resort Hotel	300	rooms	Resort / Hotel	1.93		579.00
A1	Resort Conference and Events	3,863	m2	Resort complex		2.9	112.03
A1	Resort F&B / Restaurant	420	m2	Shop		1.5	6.30
North - Tourism & Accommodation							
A2	Short Term Accommodation	300	rooms	Short-term accommodation	1.93		579.00
A2	F&B / Restaurant	1,050	m2	Food & Drink Outlet		5.4	56.70
North - Tourism & Accommodation							
A3	Tavern	2,880	m2	Club		2.6	74.88
North - Tourism & Accommodation							
A4	Retirement Living	250	rooms	Retirement Living	1		250.00
Central - Mixed Use							
B1	Entertainment / Catering – Retail	776	m2	Retail		0.4	3.10
B1	Commercial Office	776	m2	Office		0.8	6.21
B1	Open Space – Civic Plaza	1,260	m2	Exclude			
Central - Mixed Use							
B2	Entertainment / Catering – F&B			Food & Drink Outlet		5.4	0.00
B2	Retail Showroom	1,109	m2	Showroom		0.4	4.44
Central - Mixed Use							
B3	Indoor Sports & Recreation, Entertainment / Catering – F&B and Retail Showroom	2,012	m2	Indoor sport and recreation		1.1	22.13
South - Employment							
C1	Low Impact Industry	13,600	m2	Low Impact Industry		0.4	54.40
South - Employment							
C2	Low Impact Industry	20,019	m2	Low Impact Industry		0.4	80.08
South - Employment							
C3	Low Impact Industry	1,080	m2	Low Impact Industry		0.4	4.32
Total							1,832.58

Appendix C: Concept Civil Drawings

Appendix D: Stormwater Management Plan

Appendix E: Acid Sulfate Soil Management Plan

SUNSHINE COAST AIRPORT – AIRPORT NORTH PRECINCT MASTER PLAN

Acid Sulfate Soil Management Plan



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11 August 2026
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REPORT

Document status

Version	Purpose of document	Authored by	Reviewed by	Approved by	Review date
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Approval for issue

Kurt Blackman



11 August 2026

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Appendix A: Previous investigation results and figures

EXECUTIVE SUMMARY

Overview

The Sunshine Coast Airport (SCA), operated and managed by Sunshine Coast Airport Pty Ltd (SCAPL), is the gateway to the Sunshine Coast region and a pivotal point of access to southeast Queensland. The Airport North Precinct (the site) is one of six functional zones within the SCA Priority Development Area, designated for a diverse range of land uses intended to be compatible with airport operations and the surrounding Maroocha community. The Airport North Precinct is a ~32.5 hectare (ha) area of land situated within in the north-east portion of the airport and is a key part of the Priority Development Area of the airport which comprises ~460 hectares (ha). The airport is identified as major enabling infrastructure to support the northern gateway regional economic cluster and contributes to the continued economic growth of the Sunshine Coast (EDQ, 2024).

This report forms an overarching framework for the management of ASS at the Airport North Precinct and presents the findings of ASS investigations that have been completed. This framework details the controls and monitoring procedures for which development/project-specific ASSMPs are to be developed, outlining soil excavation, dewatering and discharge activities that will be prepared for each development application. Such development/project specific ASSMPs are required to be submitted to and endorsed by the Economic Development Queensland (EDQ). Each development/project specific ASSMP must be endorsed prior to soil / groundwater disturbance activities commencing, to ensure appropriate management of cumulative impact of disturbing soils across the precinct;

The management and performance indicators set out in this overarching management plan, and to be developed within development/project specific ASSMPs, are set specifically in relation to ASS risks and apply in addition to other water quality limits and indicators outlined as part of other management plans, including the SCA PFAS Management Plan (RPS, 2024).

The management and performance indicators set out in this overarching management plan (and to be developed within development/project specific ASSMPs) are set specifically in relation to ASS risks and apply in addition to other water quality limits and indicators outlined as part of other management plans, including the SCA PFAS Management Plan (RPS, 2024).

ASS summary

Investigations within the Airport North Precinct are limited, however the data reviewed from the vicinity of the site supports a conclusion that ASS is likely present across the precinct. ASS has been identified typically the silty topsoils and dark grey coffee sands that extend from the seasonal groundwater interface to the base of each soil profile (maximum 2.5 mbgl).

Based on the available data collected from the vicinity of the site, soils exceed the management criteria and thus will require management and lime-neutralisation during construction to manage the risk of acidification where these soils are disturbed.

Groundwater summary

No groundwater quality data for bores that have been installed within the Airport North Precinct has been provided.

Groundwater across the wider airport has been found to be slightly acidic and generally contains total acidity at levels that exceed the dewatering treatment criteria. Groundwater also contains low levels of acid buffering capacity (alkalinity) and as such is prone to further acidification should the surrounding ASS be exposed.

Based on these results, groundwater that is abstracted as part of dewatering during construction will require management and treatment prior to be recharged to ground.

Management strategy / framework

The outcomes of the previous ASS investigations prepared for the SCA have been assessed, and management strategies prepared for soil, surface water and groundwater. The strategies provide a framework and requirements to be used in preparing development/project-specific ASSMPs and include:

- Management measurements for excavating, handling, stockpiling and treating (neutralising) ASS
- Managing surface water/dewatering effluent and contain relevant monitoring requirements for dewatering effluent, groundwater and surface water (where required)
- Monitoring frequencies and requirements, and
- Reporting commitments.

1 INTRODUCTION

1.1 Overview

The Sunshine Coast Airport (SCA), operated and managed by Sunshine Coast Airport Pty Ltd (SCAPL), is the gateway to the Sunshine Coast region and a pivotal point of access to southeast Queensland. The Airport North Precinct (the site) is one of six functional zones within the SCA Priority Development Area, designated for a diverse range of land uses intended to be compatible with airport operations and the surrounding Maroolia community. The Airport North Precinct is a ~32.5 hectare (ha) area of land situated within in the north-east portion of the airport and is a key part of the Priority Development Area of the airport which comprises ~460 hectares (ha). The airport is identified as major enabling infrastructure to support the northern gateway regional economic cluster and contributes to the continued economic growth of the Sunshine Coast (EDQ, 2024).

The Airport North Precinct preferred Structure Plan as presented in Airport North Precinct Master Plan is presented in Figure 1 on the following page.

1.1.1 Airport North precinct

The Airport North Precinct (~32.5 ha) is positioned adjacent to a residential precinct and Maroolia Village, and the beach that supports tourism. To best utilise the region's environmental / ecological attributes, cultural identity, and economic potential a pedestrian-orientated mixed land use will assist to diversify the airport's economic capacity beyond aviation with a focus on tourism. Activation of this area will improve community connection, lifestyle amenity, and commercial opportunities.

The precinct is separated into three primary land use areas as described below and shown in Figure 1 on the following page:

- North – Tourism & Accommodation
- Central – Mixed Use
- South – Employment.

These are deemed to be consistent with the precinct intent that the development will provide for a “diverse mix of land uses compatible with wider airport operations which capitalises on its location to surrounding residential and tourist areas. It will provide a level of economic activity and diversification to serve passengers and visitors, in addition to employment opportunities which are compatible with the wider community”.

Further detail on the land uses with reference to Airport North Precinct preferred Structure Plan (Figure 1) are provided in Table 1.

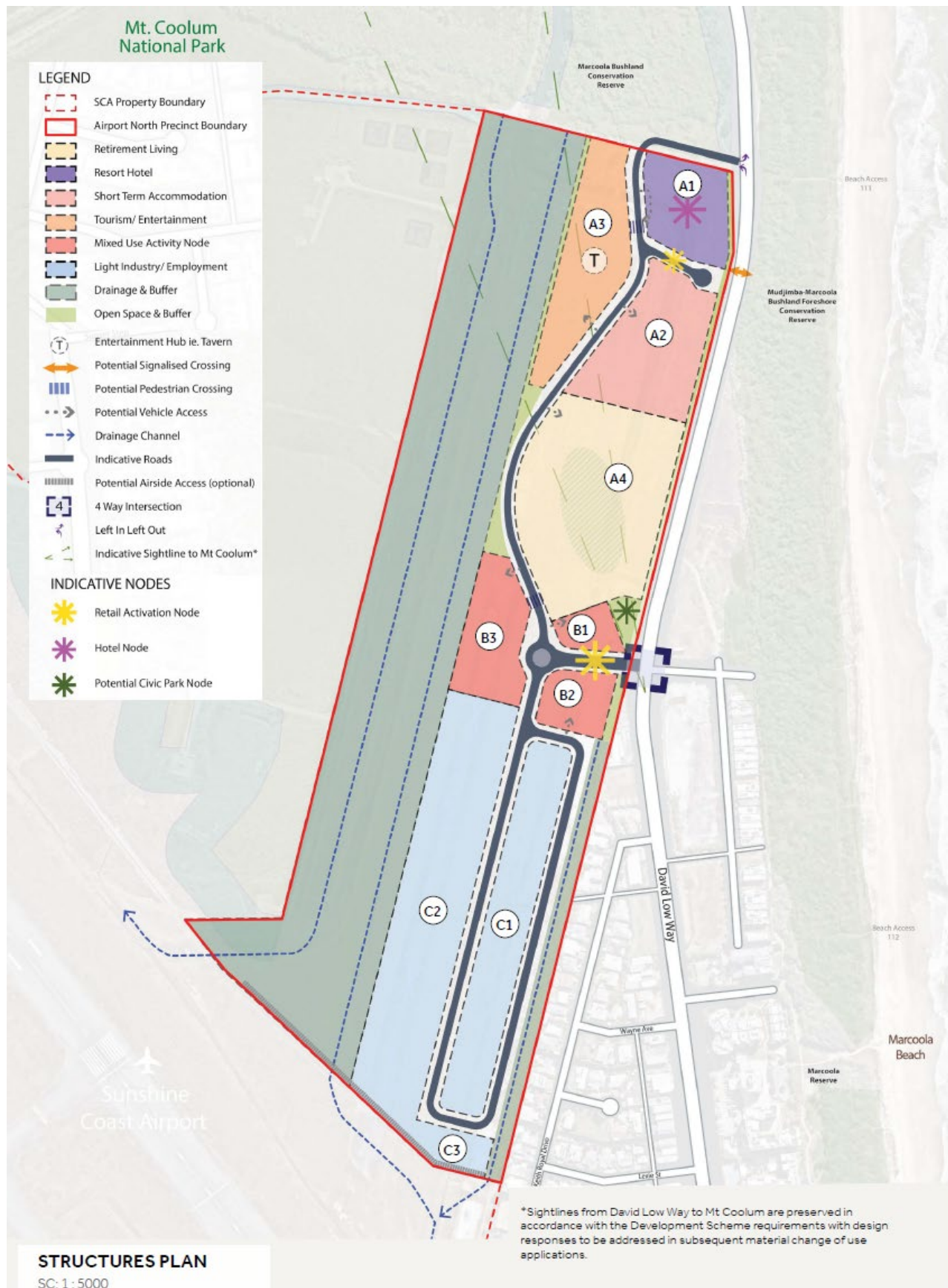


Figure 1: Airport North Precinct Concept Master Plan

Table 1: Precinct Master Plan land use summary

Sub-precinct / land use	Description	Site reference (refer Figure 1)
North – Tourism & Accommodation		
Resort Complex	Resort Hotel (300 rooms), 8 Conference & Events	A1
Retail (F&B)	F&B/ Restaurant	
Short Term Accommodation	STA (300 rooms), F&B/ Restaurant	A2
Retail (F&B)	F&B/ Restaurant	
Tourism Retail	Tavern	A3
Entertainment/ Catering (Bar, F&B, Hotel, Function Facility)		
Multi Dwelling	Retirement Living (180-250 rooms)	A4
Central – Mixed Use		
Entertainment/ Catering	Retail	B1
Commercial Business Uses	Commercial Office	
Open Space	Civic Plaza	
Entertainment/ Catering	F&B/ Restaurant	B2
Commercial Business Uses	Retail Showroom	
Indoor Sports & Recreation	Indoor Sports & Recreation	B3
Entertainment/ Catering	F&B/ Restaurant	
Commercial Business Uses	Retail Showroom	
South – Employment		
Employment (low impact industry)	Commercial Office, Low Impact Industry, Research and Technology, Service Industry, Warehouse, Air Services, Aviation, Indoor Sport and Recreation	C1
		C2
		C3

1.1.2 SCA PDA development scheme

To facilitate development the SCA Priority Development Area (PDA), was declared by regulation in 2023, and covers ~460 hectares (ha) in the suburb of Marcoola on the Sunshine Coast. The SCA is identified in the South East Queensland Regional Plan (SoQ, 2023) as major enabling infrastructure to support the northern gateway regional economic cluster and contributes to the continued economic growth of the Sunshine Coast (Economic Development Queensland (EDQ), 2024). As part of the PDA, a Precinct Master Plan (PMP) must be lodged and approved prior to any development being permitted in that precinct and any development application approved for that precinct.

The PDA indicates that, prior to development, an Acid Sulfate Soils (ASS) Management Plan (ASSMP) is to be prepared for each precinct PMP. Each ASSMP is to be submitted and endorsed by EDQ to ensure appropriate management of the cumulative impact of disturbing soils across the PDA (EDQ, 2024).

The ASSMPs are required as ASS were identified as a key community safety and development constraint within the PDA. The development scheme (EDQ, 2024) indicates that:

1. Development is managed to avoid or minimise the release of acid and metal contaminants, where disturbance of ASS is unavoidable.
2. Development that may disturb potential or actual ASS:
 - a. is supported by an ASS investigation report in accordance with current best practice in Queensland and include an assessment of the source of acidity
 - b. is in accordance with an ASS management plan
 - c. ensures ASS is treated in accordance with current best practice in Queensland, to avoid impacts to surface water and groundwater

- d. ensures the disturbance of ASS is avoided to the greatest extent practical, and where avoidance is not reasonably possible, managed to reduce risks posed to the natural environment, and
 - e. manages any neutralisation of ASS and potential ASS to ensure no adverse, cumulative impacts on wetlands either on site or adjoining the PDA, so that the natural acidity of wetlands is maintained.
3. Development involving filling or excavation:
- a. does not adversely impact the natural environment, including waterways, or adjoining land
 - b. avoids or minimises and manages environmental harm and the environmental values of water and retained significant vegetation are protected, and
 - c. is in accordance with an ASS management plan.

1.1.3 ASS environmental framework

The Development Scheme was based upon the findings of an ASS Detailed Summary Report completed by Core Consultants (CC, 2024) for the Sunshine Coast Airport. The report was prepared to detail the current status of ASS at the airport and outline a recommended process to be implemented by the SCA and the associated concerned parties in relation to the management of ASS.

The ASS Detailed Summary Report (CC, 2024) outlines an environmental management framework which provides guidance on how ASS is to be managed within the precincts, including potential impacts on surface and groundwater quality. The framework outlines the scope, management objectives, actions and performance management information for the management of ASS to be included in each precinct-specific ASSMP, including the following:

- Stockpiling, handling and transport of ASS
- Treatment and validation of excavated ASS
- Monitoring of (surface) water quality
- Groundwater quality monitoring.

This overarching ASSMP presents the findings of ASS investigations across the Airport North Precinct and surrounding land. This report details the proposed management framework and the controls and monitoring procedures for which development/project-specific ASSMPs are to be developed, outlining soil excavation, dewatering and discharge activities that will be prepared for each development application. Such development/project specific ASSMPs are required to be submitted to and endorsed by EDQ, prior to works, to ensure appropriate management of cumulative impact of disturbing soils across the precinct.

The management and performance indicators set out in this overarching management plan, and to be developed within development/project specific ASSMPs, are set specifically in relation to ASS risks and apply in addition to other water quality limits and indicators outlined as part of other management plans, including the SCA PFAS Management Plan (RPS, 2024).

1.2 Acid sulfate soils – definition

ASS are formed naturally under waterlogged, iron and sulfate-rich conditions, being typical of coastal lowlands where the land has been subject to inundation by sea water. Such soils contain iron sulfide minerals (most commonly pyrite) or their oxidation products and remain stable under anaerobic conditions. Upon exposure to air, they may be oxidised, resulting in the formation of sulfuric acid and subsequent release of iron, aluminium and other heavy metals and nutrients from soils into surface water bodies and groundwater.

Acid sulfate soils often contain a mixture of the different forms of acidity (e.g., inorganic sulfur, organic and or metal speciated acidity), and their relative proportions may change during periods of wetting, drying and aeration. This can occur as a natural process related to climatic cycles. Extended periods of drought can lead to a drop in the watertable, allowing near-surface potential ASS (PASS) to oxidise. The return of rainfall and the subsequent rise of the watertable allows acid and iron generated during the dry period to be exported into ground- and surface-waters. In natural environments, this situation is generally not problematic, as the oxidation period is short, temporary and relatively small volumes of ASS are affected (Dear et al., 2024).

Around 35,000 years ago, the sea level in Queensland was higher, and large swamps along the coast. Sea levels have since declined and soils from the hills have migrated toward the coast, covering these former swamps. As such, many coastal plains ASS beneath the topsoil. Coastal areas lower than 5m Australian Height Datum have a high potential for containing materials characteristic of ASS (QG, 2025) as found on the Sunshine Coast.

Development of land containing ASS introduces a risk of environmental harm that requires management. Earthmoving and drainage works can result in exposure of these soils to oxidation either directly, i.e. excavation, or indirectly through the lowering of water tables.

1.3 Documentation

1.3.1 Guidance literature

Preparation of this ASSMP was undertaken with reference to the following key guidance documents on ASS and water quality:

- Queensland Acid Sulfate Soil Technical Manual, Soil Management Guidelines, Version 5.1 (Dear et. al., 2024)
- National Acid Sulfate Soils Guidance. Guidelines for the dewatering of acid sulfate soils in shallow groundwater environments (Water Quality Australia, June 2018a).
- National Acid Sulfate Soils Guidance. National acid sulfate soils identification and laboratory methods manual (Water Quality Australia, June 2018b).
- National Acid Sulfate Soils Guidance. National acid sulfate soils sampling and identification methods manual (Water Quality Australia, June 2018c).
- National Acid Sulfate Soils Guidance. Overview of management of monosulfidic black ooze (MBO) accumulations in waterways and wetland (Water Quality Australia, June 2018d).
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (Water Quality Australia, 2018e)
- State Planning Policy, July 2017.
- State Planning Policy – State Interest Guideline Water Quality, April 2016 (Policy 9).
- Environmental Protection Act, 1994.
- Environmental Protection Policy (Water), 2009.

1.3.2 Airport documentation

A summary of the reports relevant to the to the Airport North Precinct are detailed below:

- Sunshine Coast Airport Priority Development Area Development Scheme (EDQ, 2024)
- Sunshine Coast Airport Master Plan 2040 (SCAPL, 2019)
- Sunshine Coast Airport Environmental Management Plan (BMT, 2023)
- PFAS Management Plan Sunshine Coast Airport, Qld (RPS, 2024).

1.3.3 Previous investigations and reports

A summary of the previous ASS investigations relevant to the airport are detailed below:

- Acid Sulfate Soils Detailed Summary Report Sunshine Coast Airport, Marcoola (Core Consultants, 2024).
- Report on Geotechnical Review Gateway South Precinct – Fill Assessment Sunshine Coast Airport (CC, 2023a).
- Report on Geotechnical Review Gateway South Precinct Sunshine Coast Airport (CC, 2023b).

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- Acid Sulfate Soils Investigation Report Gateway South Precinct Sunshine Coast Airport Friendship Road, Marcoola (CC, 2023c).
- Acid Sulfate Soil Investigation Proposed Carparks Part of Lot 98 SP176239 and Existing “Readybays” Sunshine Coast Airport, Marcoola (CC, 2022).
- Geotechnical & Acid Sulfate Soils Investigation Report Sunshine Coast Airport Terminal Expansion Project (CC, 2022).
- Soil Characterisation Assessment Proposed Lots 4 to 8 Concept Master Plan, Gateway Precinct, Sunshine Coast Airport (CC, 2021).
- Acid Sulfate Soil Management Plan Sunshine Coast Airport Fill Stockpile for Light Industrial Development (Golder, 2013).
- Geotechnical and Acid Sulfate Soil Investigation Sunshine Coast Airport, Southern Precinct (Golder, 2009).

2 MANAGEMENT OBJECTIVES

2.1 ASS environmental management framework

The environmental management framework (EMF) for ASS at the airport (CC, 2024), outlines the following management objectives:

1. To avoid any potentially adverse impacts on the surrounding receiving environment (i.e. Maroochy River, sections of the Mt Coolum National Park and local vulnerable flora and fauna) that may result from the disturbance, treatment and transportation and placement of ASS/PASS material, through the effective management of all works involving ASS at the site.
2. To minimise any potentially adverse impacts resulting from:
 - a. Disturbance of ASS or potential ASS (PASS) via excavation or filling activities
 - b. Treatment and reuse of ASS/PASS spoil from excavations on site
 - c. The construction and operation of the new drainage system or Water Sensitive Urban Design (where required)
 - d. Over treatment of lime on disturbed ASS impacting the surrounding naturally acidic environments (i.e., acid frog habitat areas).
3. To comply with conditions of licences, permits or other approvals issued for the PDA Development Scheme

2.2 ASSMP

To achieve the above objectives, active management of earthworks and dewatering operations is required to minimise potential impacts on the environment and other groundwater users.

At a precinct planning level, this ASSMP presents the framework for managing any proposed earthworking and or dewatering of ASS within the Airport North Precinct. Development/project specific ASSMP must be developed, based upon this ASSMP framework, and endorsed by the EDQ prior to construction works commencing, as part of any future DA application.

This ASSMP framework specifically addresses the following measures:

- Assessment of available groundwater quality data
- Management of soil/sediment (including monosulfidic black ooze; MBOs) during excavation, handling and stockpiling operations, including the neutralisation of acidity associated with ASS
- Surface water and groundwater monitoring and soil/sediment validation to confirm works are undertaken in accordance with the performance objectives detailed herein.

Incorporated within the ASSMP are the findings of various assessments for ASS across or within the vicinity of the precinct. This work provides an assessment of the presence, distribution and magnitude of PASS and actual ASS (AASS) within those areas of the precinct which may be subject to earthworks and dewatering.

2.3 Development/project specific ASSMPs

The development/project specific ASSMPs will be required to specifically address the following measures:

- Water table management to mitigate on and off-site environmental impacts; includes management of dewatering effluent and implementation of monitoring programs (if required).
- Establishing environmental water quality trigger levels based upon the assessment of baseline groundwater and surface water quality data against applicable guidelines (if required).
- Contingency measures and corrective actions that will be implemented to rectify any breaches of the nominated triggers and management measures (specific to each phase of work).

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- Management of soil/sediment excavation, handling and stockpiling operations, including the neutralisation of acidity associated with ASS.
- Groundwater and surface water monitoring and soil/sediment validation to confirm works are undertaken in accordance with the performance objectives.

3 SITE DESCRIPTION

3.1 Site summary

A site summary is provided in Table 2 below:

Table 2: Site summary

Reference name	SCA Airport North Precinct	
Address	Friendship Avenue, Marcoola, Qld 4564	
Titles	Lot 898 on CG4782	
Current owner	Sunshine Coast Council	
Local government authority	Sunshine Coast Council	
Regulatory Authority	Economic Development Queensland	
Gateway precinct area and elevation	Area	Elevation
	~32.5 ha	2-3 mAH ²

1. Sunshine Coast Council Planning Scheme 2014, *mAH² – metres Australian Height Datum, Qld globe (<https://qldglobe.information.qld.gov.au/>).

3.2 Geology and ASS risk

3.2.1 Geology

The 1:100,000 Series Nambour Special Geological Map (Sheet 9444 & Part 9544, First Edition 1999) (Figure 2) indicates that the majority of the SCA is underlain by Quaternary (Pleistocene) age ‘undifferentiated coastal plains’ comprising ‘sands and mud’ that is known to also contain “clay/silt (active stream channel and low terraces)”. The Quaternary deposits are inferred to be underlain by the older Landsborough Sandstone and/or Nambour Formation (CC, 2024).

Natural soils within the SCA are predominantly Podzols, which are soils with a B horizon that is dominated by compounds of organic matter, aluminium and/or iron and is generally highly sandy and acidic. The soil profile (in lithological sequence) based on previous investigations generally consists of:

- A thin layer of topsoil.
- Loose to dense sand with varying silt and/or clay content to depths between 0.15 m below ground level (mbgl) to 3.5 mbgl.
- Dense to very dense indurated sand from depths between 0.5 mbgl and 6.1 mbgl.
- Medium dense to very dense sand to depths of 2.6 mbgl to 14.0 mbgl, with interlayered silt and clay lenses.
- Stiff to hard silty and/or sandy clay to 26.5 mbgl (maximum depth of testing) (CC, 2024).

The indurated sands (referred to as coffee rock) are recognised to influence groundwater resources due to reduced hydraulic conductivity (both vertical and horizontal), porosity, flow velocities, and forming perched water tables. Indurated sand is a distinctive podzol B horizon, characterised by accumulated humus, low iron content and frequent hard cementation, formed at the water table in quartz sands on coastal plains in sub-tropical and tropical climates (Farmer et al. 1983).

3.2.2 Acid sulfate soil mapping

The Queensland NRM&E 1999 1:100 000 scale ASS - Map 2 “Maroochy - Caloundra” map (Figure 3) highlights the majority of SCA as SDL (purple shaded area), being “Disturbed land, e.g. Canal Estate, Marina, Aquaculture, Quarry, Urban, Industrial likely to contain ASS (in some cases partial or full treatment may have been undertaken) - limited field investigation (CC, 2024).

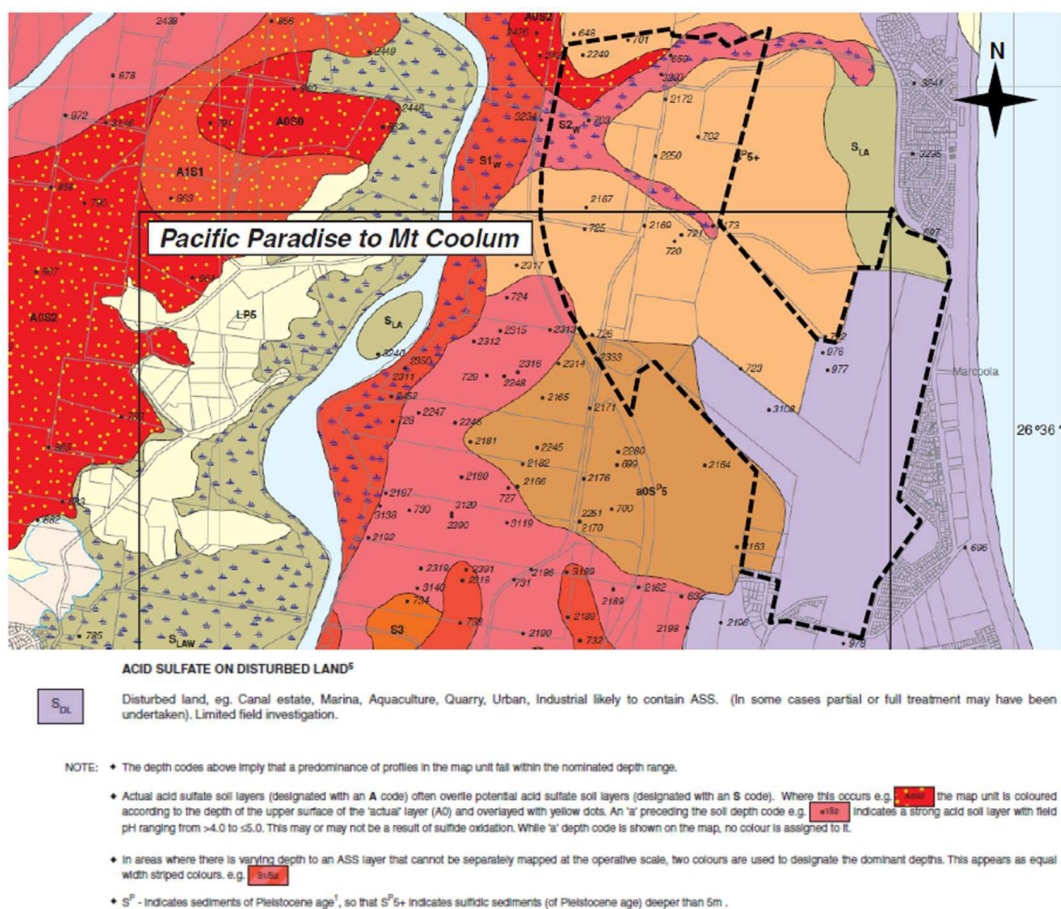


Figure 3: ASS risk mapping

3.3 Hydrogeology and hydrology

3.3.1 Drainage lines and hydrology

Surface water at the airport is managed via a series of open drainage lines, with the main drainage lines being the Eastern and Southern Perimeter Drains. The pre-development drainage and catchment is presented in Figure 4

The Eastern Perimeter Drains traverses the Airport North Precinct, which is the principal drainage channel within the Maroochy North Shore catchment. This Drain conveys runoff southwards to its outfall into the Maroochy River via the Twin Waters Canal system (BMT, 2024) and ultimately Twin Waters and the Maroochy River.

On the western portion of the Airport North Precinct, runoff is directed to a minor drain that connects to the Northern Perimeter Drain.

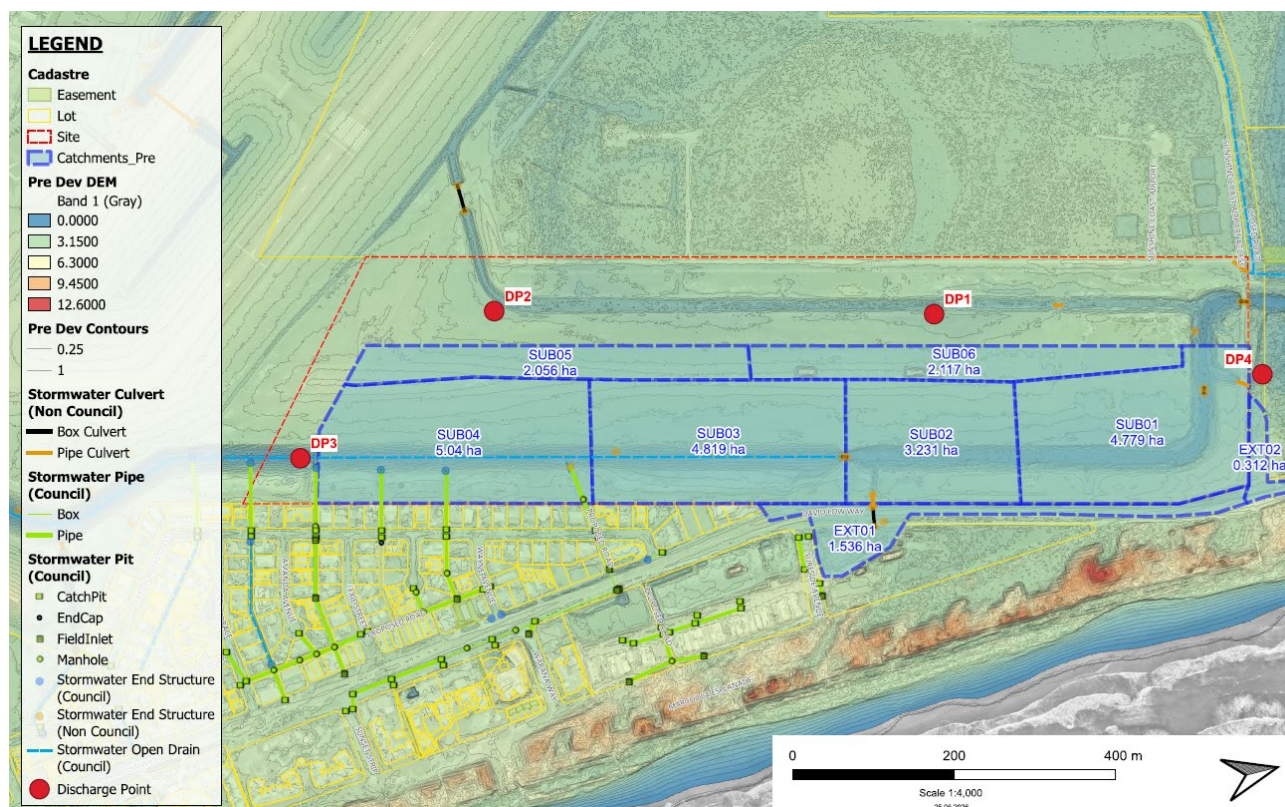


Figure 4: Pre-development Airport North Precinct drainage

The proposed development exceeds the 2,500 m² threshold under the Queensland Government's State Planning Policy (SPP) (Queensland Government 2017) and is therefore subject to the stormwater quality as detailed in *Sunshine Coast Airport North Precinct Stormwater Management Plan* (Premise, 2026).

The proposed drainage strategy aims to convey post-development stormwater flows to the identified lawful discharge points, while limiting increases in peak discharge to predevelopment conditions;

- The existing open drain traversing the site will be removed.
- A larger open drain is proposed on the western side of the precinct to direct catchment flows southward into the existing downstream drainage system.
- A network of underground pipes is proposed to capture flows that are presently being released from existing pipe outlets into the open drain.
- Existing piped flows which discharge into the site are proposed to be picked up in a pit and pipe system and outlet at the southern side of the site (DP3).

outcomes

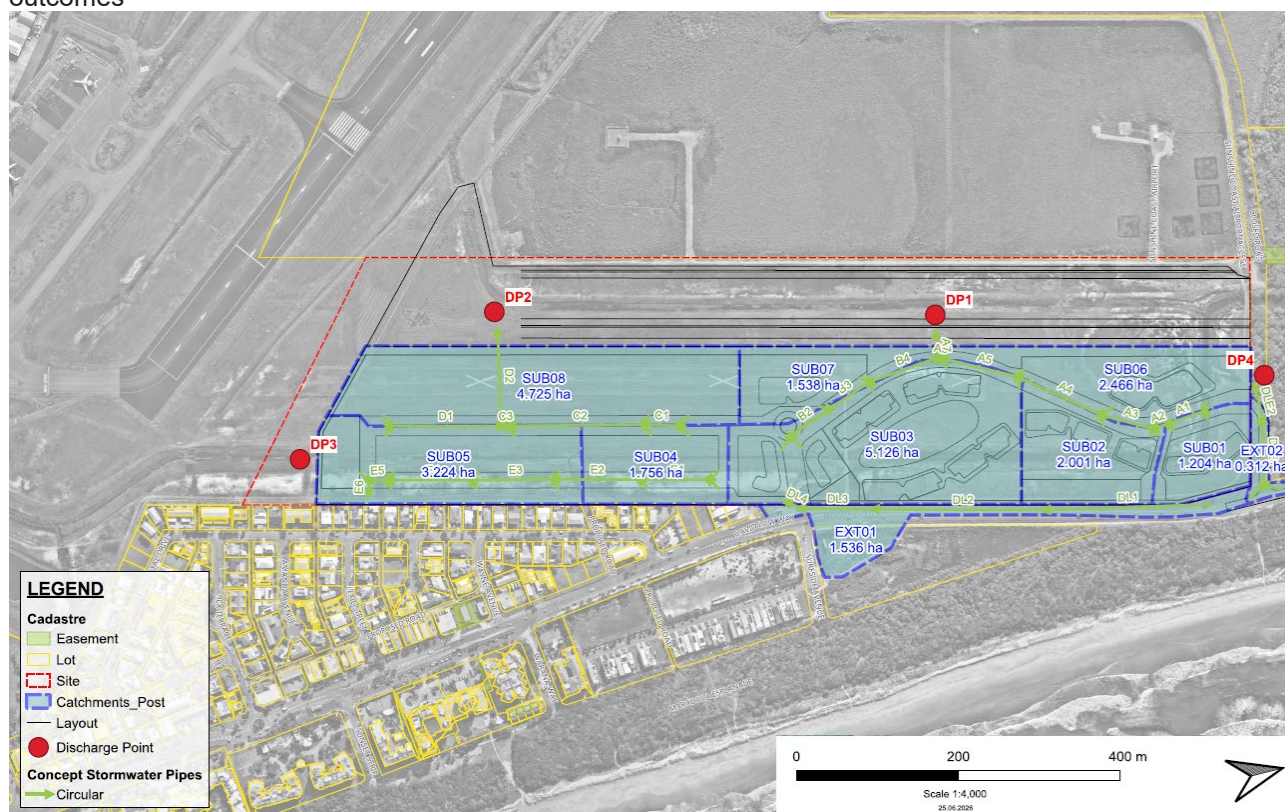


Figure 5: Pre-development Airport North Precinct drainage

3.3.2 Underlying aquifer

The SCA is mapped as having a surficial aquifer consisting of two layers, unconsolidated alluvial sediments and indurated sand (coffee rock). The unconsolidated alluvial sediments comprise a predominantly sandy unit with intermixed sand and silt lenses, or laterally discontinuous layers. The sediments do not have distinct strata and generally act as one hydrostratigraphic unit due to the laterally discontinuous nature of the sediments. The coffee rock layers encountered within the shallow aquifer are expected to have a relatively low permeability compared to the overlying and underlying alluvial sands and clays (SCRC, 2014).

3.3.3 Groundwater depth and flow

Observed groundwater levels across the airport typically range from 0.2 to 3.4 mbgl, with a geometric mean of 0.9 mbgl (SCRC, 2014). Groundwater beneath the site flows in a southerly direction towards the Twin Waters tidal canal system (CC, 2024).

Given the Airport North Precinct's proximity to the Pacific Ocean / Coral Sea, located ~200 m east of the northern boundary, this will likely influence local flows to the east which may be coupled with tidal influence. Tidal fluctuations from the coastline to the east and Maroochy River to the west propagate into the groundwater system (Golder, 2019), however have limited influence on groundwater levels (generally less than 0.1 m).

Groundwater levels can rise to, or close to, the surface in response to large rainfall events. Natural water ponding on the surface is mostly due to the groundwater table rising to the surface.

3.3.4 Groundwater quality

Groundwater within the airport is naturally acidic (pH 4.5 to 6.0) and is fresh to saline (90 $\mu\text{S}/\text{cm}$ to 22,100 $\mu\text{S}/\text{cm}$, average 791 $\mu\text{S}/\text{cm}$) (CC, 2024).

Given the Airport North Precinct's proximity to the Pacific Ocean / Coral Sea, located ~200 m east of the northern boundary, this will likely influence groundwater salinity.

3.3.5 Surface water

Excluding marine waters (Section 3.3.6) the nearest surface water bodies include;

- Twin Waters located ~3 km south of the Airport North Precinct's southern boundary
- Maroochy River located ~2 km north of the Airport North Precinct's northern boundary.

The river is protected by the Water Environmental Protection (Water) Policy (EPP) 2009 (SoQ, 2014) and Maroochy River Environmental Values and Water Quality Objectives (SoQ, 2022). The SCA lies within the Lower Maroochy Estuary sub-catchment and the following environmental values were identified by Core (2024):

- Aquatic ecosystems
- Seagrass
- Aquaculture
- Human consumer
- Oystering
- Primary and secondary recreation
- Visual recreation
- Cultural and spiritual values.

3.3.6 Marine waters

The Pacific Ocean / Coral Sea is located ~200 m east of the northern boundary, and ~500 m east of the southern boundary of the Airport North Precinct.

Twin Waters and the Maroochy River / Estuary are positioned ~2.5 km south of the SCA.

3.4 Protected areas

3.4.1 Wetlands

The Airport North Precinct is positioned adjacent to significant environmental features, including Matters of State Environmental Significance (MSES) wetlands and associated habitats.

Adjacent to the site, the wetlands support Wallum Sedgefrog (*Litoria olongburensis*) breeding habitat that have shown evidence of impacts as a result on construction works (SCC, 2023).

3.4.2 Areas of environmental significance

The Airport North Precinct lies adjacent to the Wallum Heath Management Area which is a 27 ha for vulnerable the Eastern Ground Parrot. Development activities following construction of the airport in 1961 have resulted in a reduction in the extent of heathland habitats and substantial habitat fragmentation.

Other areas of specific environmental significance (Figure 6) around the SCA consist of:

- Mt Emu She-oak population
- Mt Emu She-oak receival area
- Conservation corridor
- Vegetation management areas (SCAPL, 2019).

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The Airport North Precinct is positioned ~200 m from the Mount Coolum National Park which contains approximately 50% of all plant species found on the Sunshine Coast. This is a vegetation management area with portions surrounding the airport, and includes Coolum Creek and Lower Maroochy River Wetlands, which are listed as nationally important wetlands (SCRC, 2014).

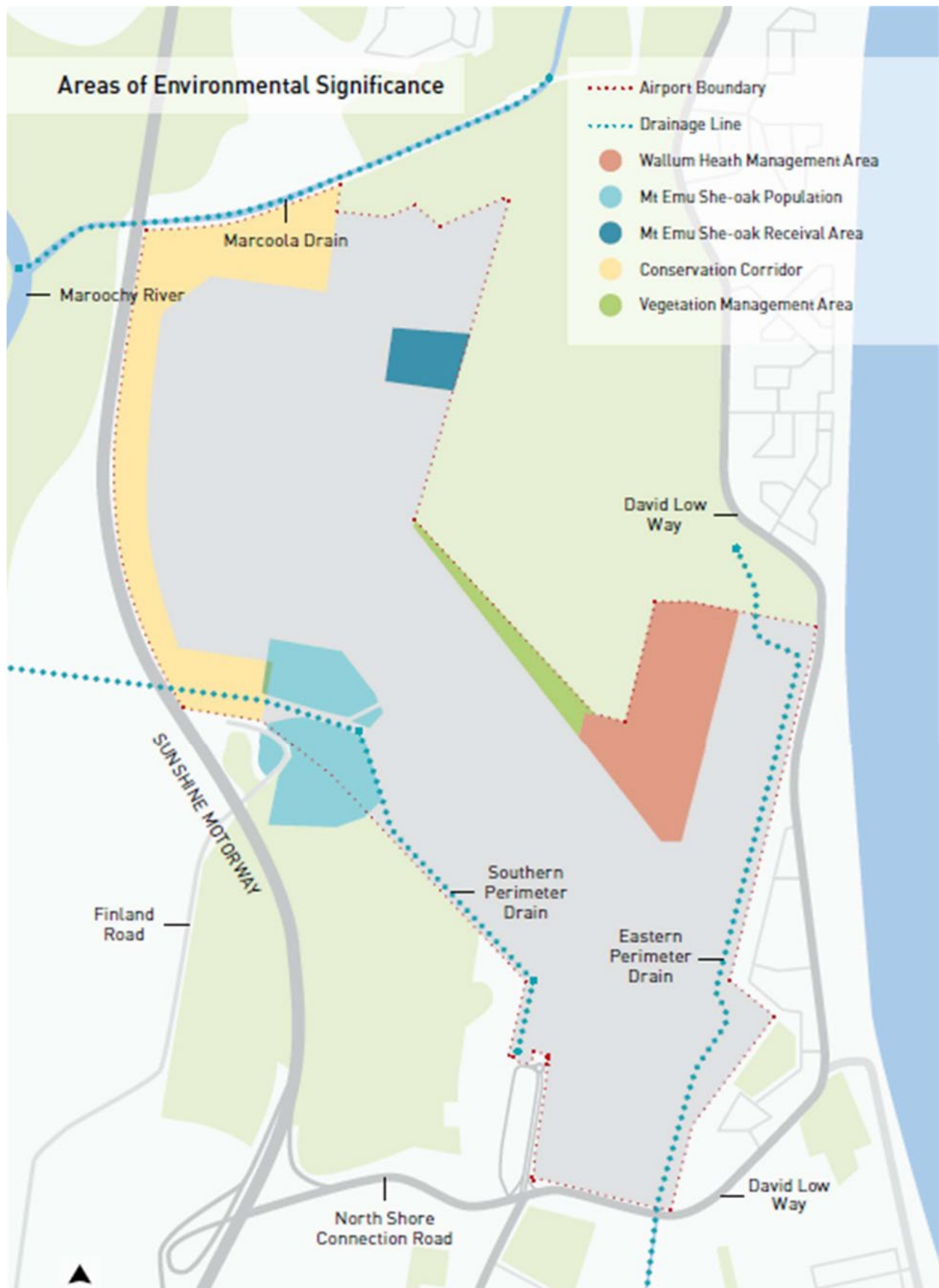


Figure 6: Areas of environmental significance

4 OVERARCHING EARTHWORKS AND DEWATERING PROGRAM

4.1 Earthworks and dewatering program

4.1.1 Approach

A summary of the earthworks and dewatering program for excavation and development of the building envelopes is outlined below (based upon common construction methods), providing context for the subsequent sections detailing ASS, groundwater and surface water management.

Development/project specific ASSDMPs are required to provide more detailed information pertaining to construction. Details pertaining to the minimising ASS, groundwater and surface water impacts should be addressed to the satisfaction of the EDQ.

4.1.2 Potential construction methodology

The major components of the earthworks and potential dewatering programs are outlined in Table 3, providing context for the subsequent sections detailing ASS, groundwater and surface water management. This ASSDMP contains generic management strategies for the Airport North Precinct. These earthwork components are to be reviewed and amended as required.

Table 3: Major earthwork components

Component	Description
Drainage works	- Flood mitigation for the Airport North Precinct is necessary as identified in the Hydraulics Report (BMT, 2025). Based on the most recent information available (BMT, 2026) a scenario has been investigated that involves; - Realign the Eastern Perimeter Drain (EPD) to run in a southerly direction alongside the western boundary of the Airport North Precinct - A 1km section of the EPD is proposed to be moved 130 m to the west, where it will border the northern Airport North Precinct development fill (refer Lot elevation – filling below). - The width of the EPD will vary from 40 m in the north, to 25 m at the west to east crossing, prior to entering the existing location of the EPD. - These modifications will require extension of the Marcoola Bund to the south along the western side of the realigned EPD, joining the southern section of the Airport North Precinct development fill (refer Lot elevation – filling below). - The Northern Perimeter Drain (NPD) will require widening to 40 m along the Marcoola Bund extension to facilitate conveyance of flood waters and increase flood storage to the west of the bund. - Construction of a 10 m wide table drain will be necessary on the eastern edge of the development fill. - These modifications may require upgrades or construction of new culverts.
Lot elevation - filling	- Fill sands will be required to increase lot levels to assist in drainage and flood mitigation, and based on the most recent information available (BMT, 2026) it has been proposed that the Airport North development fill could be separated into two sections; - The northern 15.2 ha portion will extend from David Low Way 170m west, covering the current Eastern Perimeter Drain alignment - The southern 3.5 ha portion is separated from the northern portion by the realigned Eastern Perimeter Drain crossing from west to east - Geotechnically unsuitable material may require removal as part of the proposed works and the area filled to required levels.
Sewer	Sewer servicing is proposed to connect to the existing gravity sewer network along the eastern boundary of the Sunshine Coast Airport precinct. Flows will be conveyed south prior to transfer through the wider Finland Road catchment.
Underground services	Underground services, e.g., power, water, communications, etc, will be installed through the precinct at relatively shallow (i.e., <2 m) depths.

	• Water supply is proposed via connection to the existing reticulated water network servicing the precinct within the North Shore Pressure Management Area.
Lots / developable areas	• Areas for development will be filled to comply with relevant flood mitigation measures and may require removal of natural soils for geotechnical reasons.
Building/car park construction	• Buildings and car parks will be constructed on developable lots, predominantly positioned in the southern portion of the precinct. • Construction of footings, basements or lift shafts may require excavations into insitu soils. • Underground services, e.g., stormwater, may require installation in shallow soils for car parks and building hard stand areas.

The aforementioned earthwork activities have the potential to disturb ASS, and may potentially require dewatering and or management of surface water.

4.2 Surface water/dewatering management and disposal

4.2.1 Overview

It is anticipated that dewatering will be required during various aspects of the precinct's construction activities. The requirement for dewatering is in part dependent on the depth of excavation and the groundwater levels at the time of construction and hence will vary seasonally with rainfall.

4.2.2 Dewatering disposal hierarchy

Based upon the proposed works, the hierarchy for handling of dewatering effluent disposal is as follows:

- Recharge to the superficial aquifer.
- Dust suppression.
- Discharge to a surface water body (drainage line).

Where dewatering effluent from open excavations, 'check dams' or the treatment area is being discharged/infiltrated to land, runoff cannot enter waterways or drains.

Based upon groundwater conditions beneath the Airport North Precinct, dewatering effluent may potentially require treatment in accordance with soil management guidelines (Dear et. al., 2024). Dewatering effluent would be required to be maintained on site following treatment to facilitate the decrease in acidity and increase pH (if required), and settlement of sediment, prior to being preferentially recharged (infiltrated) back into the superficial aquifer.

4.2.3 Dewatering treatment materials

Where dewatering effluent/water in/from excavations requires treatment, the water shall be treated by the addition of hydrated lime and/or liquid caustic¹ to meet the established performance indicators (refer Section 9.5).

A supply of hydrated lime and/or liquid caustic shall be kept on site at all times for the treatment of acidic waters. The supply shall be at least 0.5 tonne of hydrated lime and/or 20L of liquid caustic. Neutralising agents shall be stored in a covered and bunded area to prevent accidental release to waters.

¹ Hydrated lime or calcium based neutralising agents are the preferred dewatering effluent treatment product.

5 SOILS

5.1 Previous investigations

Previous investigations undertaken with respect to ASS at the airport are presented below:

- Acid Sulfate Soils Detailed Summary Report Sunshine Coast Airport, Marcoola (CC, 2024)
- Acid Sulfate Soils Investigation Report Gateway South Precinct Sunshine Coast Airport Friendship Road, Marcoola (CC, 2023c)
- Acid Sulfate Soil Investigation Proposed Carparks Part of Lot 98 SP176239 and Existing “Readybays” Sunshine Coast Airport, Marcoola (CC, 2022)
- Geotechnical & Acid Sulfate Soils Investigation Report Sunshine Coast Airport Terminal Expansion Project (CC, 2022)
- Broadscale Geotechnical Investigation; Gateway South Precinct, Sunshine Coast Airport, David Low Way, Mudjimba (BP, 2021)
- Geotechnical and Acid Sulfate Soil Investigation Sunshine Coast Airport, Southern Precinct (Golder, 2009).

A summary of the investigations is presented in the following section, with sampling locations and results presented in Appendix A.

5.2 Assessment criteria

Assessment criteria for ASS were adopted from Queensland Acid Sulfate Soil Technical Manual, Soil Management Guidelines Version 5.1 (Dear, et. al., 2024) where applicable.

Table 4 below presents the texture-based ASS action criteria for management which previous results have been screened against, assuming >1,000 tonne of material is being disturbed as part of the precinct works.

Table 4: ASS management action criteria

Soil Type		Action criteria (>1,000 tonnes) Existing + Potential acidity	
Texture	Approx. clay content (%<0.002 mm)	Equivalent sulfur (%S)	Equivalent acidity (H+/tonne)
Coarse texture (sands to loamy sands)	≤5	0.03	18
Medium texture (sandy loams to light clays)	5–40		
Fine texture (medium to heavy clays and silty clays)	≥40		

5.3 Summary of previous investigations

Investigations within the Airport North Precinct are limited. However, the review completed provides an overview of the soils present in the vicinity of the site, noting that precinct-specific investigations will be required to determine the nature of extent of ASS in the materials present, liming rates, and specific management requirements.

Table 5: Acid Sulfate Soils Detailed Summary Report, Sunshine Coast Airport, Marcoola (Core, 2024)

Element	Comment					
Sampling locations	13 soil cores (BH51 to BH58 and BH145 to BH149)					
Maximum depth	2.5 mbgl					
Soil description	The soil geology was found to be consistent across the sampling locations; - SILTY SAND – topsoil, dark grey; 0.0 to 0.25 m, overlying - SAND – alluvium, grey; to a depth of 1.0 to 1.5 m, overlying. - SAND – coffee rock, dark grey; to a extent of sampling (i.e., minimum 2.5 mbgl).					
Groundwater	Groundwater was encountered at depths ranging between 0.9 to 1.8 mbgl, with the coffee rock sands typically found at the groundwater interface.					
Results summary	- Samples exceeding the management criteria were observed within both the alluvial and coffee rock sands, with the majority of acidity present as existing acidity. - Negligible concentrations of inorganic sulfur (CRS) were observed. - Soil will require active management when disturbed, i.e., lime treatment.					
Analyte	Unit	Management criteria	Number of samples	Minimum result	Maximum result	Samples exceeding management criteria (%)
Net acidity	%S	>0.03	30	0.02	0.40	18 (60%)
Chromium reducible sulfur (CRS)	%S		30	<0.005	<0.005	0 (0%)
Titrateable actual acidity (TAA)	%S		30	<0.003	0.40	18 (60%)
pH _{KCl}	pH units	Not defined	30	3.8	5.7	n/a
Net acid soluble sulfur (S _{NAS})	%S	>0.03	6	<0.02	<0.02	0 (0%)
ANC	%S	Not defined	0	n/a	n/a	n/a

Indicates an exceedance of the management criteria per Table 4.

5.4 Soil summary

The data supports a conclusion that ASS is likely present across the precinct. ASS has been identified typically associated with the silty topsoils and dark grey coffee sands that extend from the seasonal groundwater interface to the base of each soil profile (maximum 2.5 mbgl). Minimal acidity in the form of inorganic sulfur, i.e., potential acidity, is present within the soil profile.

Soils exceed the management criteria and thus will require management and lime-neutralisation during construction to manage the risk of acidification where these soils are disturbed.

6 GROUNDWATER

6.1 Previous investigations

No groundwater quality data for bores that have been installed within the Airport North Precinct has been provided. Previous investigations undertaken for groundwater with respect to ASS within the broader area are presented below:

- Geotechnical and Acid Sulfate Soil Investigation Sunshine Coast Airport, Southern Precinct (Golder, 2009)
- Acid Sulfate Soils Investigation Report Gateway South Precinct Sunshine Coast Airport Friendship Road, Marcoola (CC, 2023c)

A summary of the investigations is presented below, with sampling locations and results are presented in Appendix A.

6.2 Geotechnical and Acid Sulfate Soil Investigation Sunshine Coast Airport, Southern Precinct (Golder, 2009)

A summary of the investigation is presented below:

- Two groundwater bores (BH2 and BH3) were installed to depth of 3 mbgl.
- The depth to groundwater ranged between 0.85-1.35 mbgl (March 2009)

A summary of key ASS parameters from the investigation are provided in Table 6 below.

Table 6: Groundwater quality summary (Golder, 2009)

Parameter	Unit	BH2	BH3
pH	pH units	4.6	4.4
EC	µS/cm	467	292
Chloride	mg/L	—	75
Sulfate	mg/L	—	19
Alkalinity	mg/L	—	<1
Dissolved aluminium	mg/L	—	2.4
Dissolved iron	mg/L	—	7.0
Total iron	mg/L	—	20

Indicates an exceedance of the dewater management criteria per Table 11Table 4.

The low pH and alkalinity of groundwater indicate that dewatering effluent will require active management prior to discharge, i.e., increase pH and alkalinity, preferably through re-infiltration into the superficial aquifer.

6.3 Acid Sulfate Soils Investigation Report Gateway South Precinct Sunshine Coast Airport Friendship Road, Marcoola (CC, 2023c)

A summary of the investigation is presented below:

- Two groundwater bores (MW1 and MW2) were installed to a maximum depth of 2.2 mbgl.
- An existing bore (MW3) in the southwestern corner of the precinct (potentially BH2 installed by Golder in 2009) was also sampled during the investigation.
- The depth to groundwater ranged between 0.75-1.2 mbgl (July)

A summary of key ASS parameters from the investigation is provided in Table 7 below.

Table 7: Groundwater quality summary (CC, 2023c)

Parameter	Unit	MW1	MW2	MW3
pH	pH units	4.7	5.3	5.3
EC	µS/cm	170	130	150
Chloride	mg/L	13	20	23
Sulfate	mg/L	20	5.4	6.2
Chloride:Sulfate ratio	n/a	0.65	3.7	3.7
Acidity	mg/L	140	100	110
Alkalinity	mg/L	<20	47	64
Dissolved aluminium	mg/L	<0.5	0.77	1.1
Dissolved iron	mg/L	0.23	<0.5	<0.5
Total iron	mg/L	500	1.0	9.0

Indicates an exceedance of the dewater management criteria per Table 11Table 4.

The low pH and alkalinity, and high acidity and metal concentrations of groundwater indicates dewatering effluent will require active management, i.e. increase pH and alkalinity, prior to discharge, preferably through re-infiltration.

6.4 Groundwater summary

Groundwater in across the airport has been found to be slightly acidic and generally contains appreciable levels of measurable total acidity, both of which exceed the dewatering treatment criteria (refer Section 9.5) and require management.

Groundwater contains low levels of acid buffering capacity (alkalinity) and as such is prone to further acidification should the surrounding PASS be exposed.

7 ASSESSMENT OF POTENTIAL ENVIRONMENTAL IMPACTS

The identified potential environmental impacts associated with earth working of ASS for the various proposed construction activities is detailed in the Table 8.

Potential impacts requiring management are addressed in detail within the ASS, surface water and groundwater management strategies, Sections 8 to 10, respectively, which are based upon the ASS EMF detailed in Acid Sulfate Soils Detailed Summary Report Sunshine Coast Airport, Marcoola (CC, 2024c).

Table 8: Potential environmental impacts

Potential impact	Description	Predictions	Management measure
Groundwater drawdown			
Impact on surface water bodies	Groundwater level drop leading to a reduction in water levels in adjacent wetlands/rivers, with associated reduction in water quality.	Groundwater drawdown has the potential to impact water levels within surface water drains, however these are not considered sensitive receptors. No other surface water body in the vicinity of the Airport North Precinct is likely to be impacted from the works, as a result of groundwater drawdown.	Groundwater quality and level monitoring and groundwater and surface water quality monitoring per; • Surface water management strategy (Section 9) • Groundwater management strategy (Section 10).
Vegetation stress	Disturbance to water-dependent vegetation (phreatophytes) via a lowering of groundwater below the root zone.	Lateral extent of drawdown is not anticipated to impact water dependent vegetation, except potentially toward the northern and western boundaries. The vegetation management area may be affected on the southern most portion of the western boundary.	Groundwater quality and level monitoring and groundwater and surface water quality monitoring per; • Groundwater management strategy (Section 10). Vegetation monitoring and or irrigation of areas may potentially be required depending on the potential impacts and lengths of dewatering. Consideration to the selective placement of recharge infrastructure to reduce the radius of influence to sensitive receptors.
Residential users (bores)	Disruption to residential bores through lowering the water table below the intake level.	The radius of influence is not anticipated to extend to off-site residences and or impact off-site bores.	None required.
Oxidation of ASS			
Soils/sediments (excavated)	Problems caused through the inappropriate handling, treatment or disposal of excavated soils.	Not applicable.	Per the ASS management strategy (Section 8).
Soils/sediments (in situ)	ASS oxidation effects caused through exposure of the soils to air via open excavation.	The drawdown, if required, will be limited, temporary and localised.	
Groundwater	Potential for acid and metal leaching through groundwater from oxidised ASS.	The drawdown, if required, will be limited, temporary and localised.	Groundwater level and quality monitoring per the groundwater management strategy.
Surface water	Potential for acid and metal mobilisation into surface water from oxidised ASS.	The drawdown, if required, will be limited, temporary and localised.	Surface water quality monitoring per the surface water management strategy (Section 9)
Dewater disposal			
Poor water quality	Ineffective treatment and or disposal resulting in environmental impacts to soils and or surface waters.	Not applicable.	Per the surface water management strategy (Section 9).

8 ACID SULFATE SOIL MANAGEMENT

8.1 Additional investigations

Following detailed engineering and earthworks design for each development/project, the existing data set will be required to be reviewed, i.e., spatial extent and depth, and supplementary detailed assessment and characterisation of the ASS conditions completed. Work will be completed in accordance with the sampling and analysis requirements indicated in the National ASS guidelines (WQA, 2018b and 2018c), carried out prior to any earthworks. The findings of additional investigation(s) are required to be included in the development/project specific ASSMPs.

Additional sediment (including MBOs²) investigations, in line with National ASS guidelines (WQA, 2018b and 2018c), will also be required where drainage lines are to be disturbed or altered during the construction works.

8.2 Soil / sediment excavation and handling

8.2.1 Overview

Construction activities (including earthworks), once confirmed based upon finalisation of a detailed design, are to be undertaken in accordance with the management procedures outlined below. The management procedures will be reviewed and updated for each development/project specific ASSMPs.

8.2.2 Objectives

The objectives of soil/sediment excavation and handling are to:

- Appropriately manage the stockpiling, handling and transport of confirmed and suspected ASS materials
- Comply with conditions of licences, permits or other approvals issued for the project.

8.2.3 Soil requiring management

Soils within the precinct are characterised as silty topsoils, overlying grey alluvial sands, that overly dark grey sand 'coffee rock' in the vicinity of the seasonal groundwater interface.

The data supports a conclusion that ASS are likely present across the precinct, through the depth of investigated soil profile (maximum 2.5 mbgl). Minimal acidity in the form of inorganic sulfur, i.e., potential acidity, is present within the soil profile. Soils exceed the management criteria and thus will require management and lime-neutralisation during construction to manage the risk of acidification where disturbed.

Based upon the available information the silty topsoil and dark grey sands present from around 1.0 to 1.25 mbgl, exceed the management criteria and will therefore require management and lime neutralisation upon disturbance.

8.2.4 Management principles

The management measures for excavation and trenching activities as outlined in this procedure will be revised and refined following further ASS investigations. All investigations are to be completed in accordance with the sampling and analysis requirements indicated in the National ASS Guidelines (WQA, 2018b and 2018c) following finalisation of precinct designs and construction methodologies.

² The National Acid Sulfate Soils Guidance, Overview of management of monosulfidic black ooze (MBO) accumulations in waterways and wetlands (WQA, June 2018d) describe MBOs as typically black gel-like materials (moisture contents often greater than 70% by weight), frequently "oily" appearance, enriched in acid volatile sulfur (AVS) ($\geq 0.01\%$ S), high in organic matter (typically greater than 10% organic carbon) and can form thick (that is greater than 1 m) accumulations in waters within ASS landscapes.

8.2.4.1 Excavation and trenching

The following management principles are to be implemented to limit the potential impact of oxidation of ASS and subsequent acid leaching of on-site soils.

It is proposed to transport excavated ASS materials to an ASS treatment area located on the development/project site as soon as practicable. The project Site Supervisor or their delegated representative will be responsible for the day-to-day operations and management of the treatment area and for ensuring that the excavated ASS is treated and verified in accordance with the relevant development/project specific ASSMP.

As a general practice in excavation and trenching operations, stockpiles of excavated material should be left exposed for the minimum practical time before being treated (refer Section 8.2.4.1.6).

During earthworks any trenches left exposed at the end of shift must have a lime guard layer applied to prevent the oxidation of any pyritic sediment and mitigation of leachate. Specific rates for lime guard layers for different soil types and ASS regimes will be formulated from current available data and following any additional investigations (refer Section 8.1). This is consistent with the sampling and analysis requirements indicated in the National ASS guidelines (WQA, 2018b and 2018c).

8.2.4.1.1 Lime guard layers

Lime guard layers should be applied to the exposed surfaces during trenching activities as follows;

- Excavate proposed trenches to design, removing all material to treatment pads.
- Spread a lime guard layer over the base, batter and 5 m edge of the excavation at a rate yet to be formulated (minimum rate of 5 kg/m²).
- Mix the lime guard layer to a depth of 200 mm.
- The lime guard layer rates will also take into account the acid tolerant nature of some species in the immediate receiving environment (where applicable).

A guard layer of lime shall be placed within sections of any proposed drains to intercept and neutralise any acidity mobilised from normally unsaturated actual ASS that settles beneath the water table. Liming rates will be established once further assessment has been completed. The lime neutralisation rates will also accommodate the acid tolerant nature of some species in the immediate receiving environment

8.2.4.1.2 Minor trenching

For minor trenching excavations the following backfilling techniques shall be adopted;

- A guard layer (minimum 5 kg/m²) shall be applied adjacent to, and on the up-side gradient of, the proposed trench excavation works prior to placement of excavated materials.
- Excavated materials shall be stockpiled for the shortest possible time prior to lime treatment and backfilling to limit exposure. Lime shall be applied to the base of the excavation prior to further works and backfilling with limed materials.
- Lime shall be applied to excavated material at the nominated rate (refer Section 8.4.2) during backfilling to achieve adequate mixing. The highest liming rate as determined by laboratory analysis within each location shall be adopted for backfilling of representative materials for a 50 m length.
- Excess material that cannot be backfilled into the trench to below ground level shall be transported to the designated banded stockpile/treatment area for lime treatment.
- Where practicable, stockpiling and liming should not be conducted in areas directly adjacent to watercourses or drainage channels.

8.2.4.1.3 Excess treatment prevention

Measures should be undertaken to prevent over liming of ASS material and the potential release of neutral/alkaline leachate (e.g., establishing temporary bunds during in-situ neutralisation treatment).

8.2.4.1.4 Over excavation

Any excavated material retrieved from excavations extending below the depth of investigation and from a new soil horizon must be sampled and analysed at a rate of 1 test per 250 m³ (minimum two tests) for the verification and formulation of lime neutralisation rates (if required).

8.2.4.1.5 Groundwater and surface water management

All waters collected from groundwater and surface water inflow into excavations via seepage and runoff must be retained, monitored and appropriately treated in accordance with the surface water management strategy (refer Section 9) to comply with the appropriate discharge criteria prior to discharge off site or re-use on site.

8.2.4.1.6 Stockpiling, handling and transport of ASS

Wherever practical the earthworks handling should involve transport of ASS directly to treatment areas. Stockpiling of untreated soils with existing or potential acidity should be avoided. The recommended maximum period for which soils can be temporarily stockpiled without treatment is 18 hours (overnight) for coarse sandy material and three days, (e.g. a weekend, 66 hours) for fine textured silty clay material.

All confirmed and suspected ASS materials encountered during excavations will be transported by truck to the designated ASS treatment facility, except for during minor trenching activities. Accurate details of material movements must be kept by the Site Supervisor or their delegated representative with respect to volumes, origin, material type and destination. Materials shall be transported in suitable trucks to prevent spillage of soil and leakage of water.

Due care is to be taken when transporting saturated / supersaturated soils and sediments (e.g., wet, silty/sandy material). Where practicable filling of trucks with wet materials shall be modified to avoid spillage, use of covers and lined trucks should be considered.

The Site Supervisor will be responsible for maintaining the site and ensure that the transport route remains free of spilled and sloughed ASS sediments. All such spilled sediments are to be regularly (daily) collected and transported to the designated treatment area for neutralisation.

Any ASS materials that cannot be transported in the time frame detailed above must be stockpiled on site on a suitably prepared storage area and the following additional management measures should be followed:

- Stockpiles are to be contained by bunds with stormwater runoff directed to a collection sump. Bunds are to be constructed from low permeability materials that are not ASS.
- A guard layer of neutralising agent should be spread across the soil surface prior to placement of the stockpile. The rate of neutralising agent applied should be based on 0.3 times the average total potential plus existing acidity for every 1 m height of soil in the stockpile.
- The surface area of the stockpile is to be minimised by shaping and possibly capping or covering to prevent moisture loss and rainfall entry.

8.3 Treatment and validation of excavated ASS

8.3.1 Overview

The following procedure outlines the requirements for the on-site treatment and validation of ASS.

8.3.2 Objectives

The objectives of soil/sediment excavation and handling are:

- Appropriately treat and manage ASS materials to minimise adverse effects on the natural and built environment (including infrastructure).
- Comply with conditions of licences, permits or other approvals issued for the project.

8.3.3 Management principals

8.3.3.1 Earthworks strategy

An earthworks strategy shall be developed to plan and track movement, treatment and verification of ASS materials for each development/project.

8.3.3.2 ASS treatment facility

A treatment facility shall be constructed (Figure 7) in general accordance with the requirements detailed in Soil Management Guidelines (Dear et. al., 2024) and in conjunction with the following additional requirements:

- The treatment area shall be prepared by stripping vegetation, topsoil and soil containing significant amounts of organic material and compacting the surface with a smooth drum roller. If sandy materials are exposed in the stripped surface, a layer of low permeability material shall be placed over the stripped surface. An area of at least 2 m width shall be left between the treatment areas and bunds to allow collection of runoff and direction to sumps. Refer to Section 9 for monitoring and treatment requirements applicable for collected waters.
- The treatment area should be located within a suitable area of each development/project or potential for the broader precinct.
- Bund walls shall be constructed with clean material (i.e., not ASS or acidic soils). The bunded area shall be designed to retain a 100-year average recurrence interval (ARI) 24-hour rainfall event.
- The treatment area will be divided into five or six cells, each able to hold up to approximately one day's excavated spoil.
- A guard layer of fine ground agricultural lime shall be applied to the treatment areas prior to placement of soils at a rate to be formulated based on data from additional investigations.

The treatment facility and bund walls shall be inspected on a daily basis and maintained to prevent release of soils or water from the treatment facility.

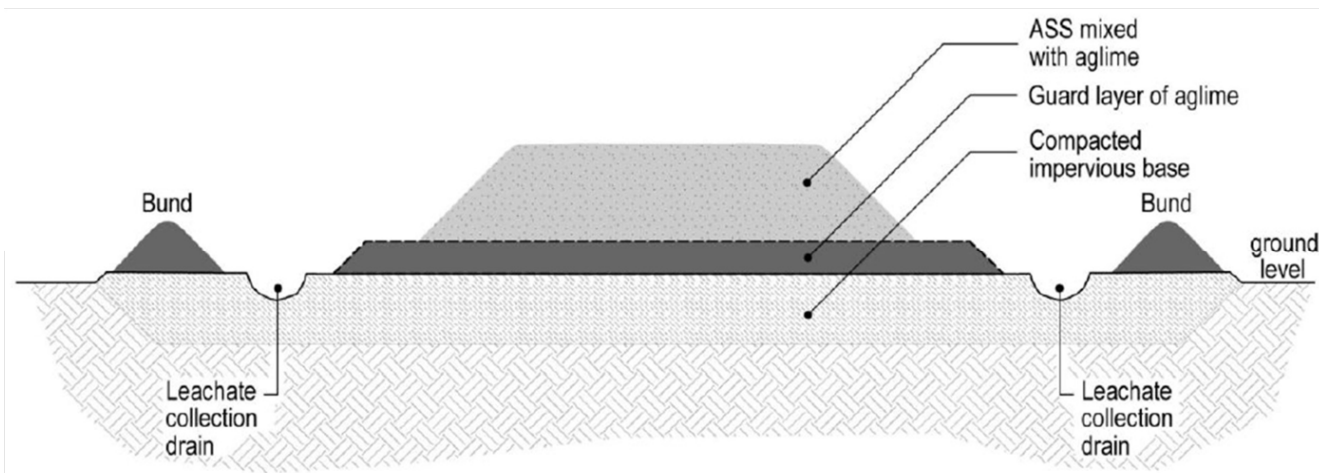


Figure 7: Schematic cross-section of a treatment pad (Dear et. al., 2024)

8.3.3.3 ASS treatment

Lime neutralisation is to be undertaken in accordance with the following:

- ASS materials shall be placed into identified treatment lots (equivalent of one day's excavated spoil) at the treatment facility where the material shall be spread in layers and allowed to dry (if required).
- Spread excavated spoil in layers with a maximum thickness of approximately 300 mm.
- Mechanically turn the spoil to promote thorough mixing through the full depth of the layer.

- Maintain spoil moisture through;
 - controlled irrigation, or
 - covering with plastic to reduce evaporation or
 - application of lime soon after excavation of moist soils.
 - these measures will improve the dispersion of lime throughout the spoil profile.
- Add lime at the required calculated treatment rate and thoroughly mix with the spoil using appropriate mechanical means e.g., a disk plough or harrows.

8.4 Liming rate and material

8.4.1 Lime material

The preferred agent for treating ASS is fine agricultural lime, CaCO_3 with a neutralising value of 97%.

8.4.2 Liming rates

The liming rate for the identified soils at the precinct, based upon current information, has been determined using the maximum net acidity³ (Table 9). Additional assumptions include bulk density of 1.8 tonne/m³, a safety factor of 1.5, and neutralising value (NV) of 97%, per the following calculation;

$$LR = \%S * \rho_{\text{soil}} * CF * SF * \frac{100}{ENV}$$

Where:

- LR = liming rate
- %S = percentage sulfur
- ρ_{soil} = bulk density of soil (tonne/m³) assumed at 1.6 tonne/m³
- CF = conversion factor (%S to kg pure CaCO_3 /tonne) = 31.202
- SF = safety factor of 1.5 as per DWER (2015b) guidelines
- ENV = effective neutralising value.

Table 9: Liming rates

Soils type	Depth	Net acidity (%S)	Liming rate (kg aglime/m ³)
SILTY SANDS; dark grey	Topsoils	0.07	4
SAND; alluvial grey	Above groundwater level	<0.02	0
SAND; coffee sands, dark grey	Where encountered	0.40	34

These liming rates are to be used as a guide only, and require further information relating to the soils located within the Airport North Precinct.

Upon confirmation of the neutralising agent to be used, the liming rate will be adjusted accordingly based on the specific NV of the aglime.

Specific liming rates (following further investigations) shall be formulated for the effective management of ASS during the various proposed precinct development activities providing more certainty in the liming rates and avoiding potential over treatment.

³ The net acidity is to be determined from the Chromium Suite of tests - pH_{KCl} , Chromium Reducible Sulfur (S_{CR}), Total Actual Acidity (TAA) and Retained Acidity (S_{NAS} , if pH_{KCl} is below 4.5) and Acid Neutralising Capacity (ANC, if pH_{KCl} is above 6.5).

8.4.3 Validation sampling

8.4.3.1 Sampling protocol

Validation samples shall be collected for each treated lot (1 per 250 m³). The samples shall be formed by compositing materials from three randomly selected locations across each treated lot. Samples shall be collected over the full thickness of the treated lot. The Chromium suite shall be conducted on each sample to confirm net acidity by Acid Base Accounting.

8.4.3.2 Validation criteria

The treated soils should be well mixed and meet the following conditions to confirm adequate neutralisation of Net Acidity in the treated ASS materials:

- Potential Acidity (SCR) + Existing Acidity (TAA + SNAS) - ANC $\leq$ 0
- pHKCl $\geq$ 6.5

8.4.3.3 Quality control and assurance

A minimum of one field duplicate sample will be collected per 20 primary samples.

8.4.3.4 Contingency measures

Where treated soils do not meet the specified validation criteria (Section 8.4.3.2), additional lime treatment and further validation testing shall be conducted.

8.5 Responsibilities

During stockpiling, handling and transport the following levels of responsibility shall exist:

- The Site Supervisor or delegate is responsible for ensuring
 - that the requirements of the ASSMP are communicated to site staff.
 - the management strategies and procedures prescribed in the ASSMP are implemented at the site.
- All other site personnel are responsible for implementing and undertaking the management strategies and procedures prescribed in the ASSMP, as applicable to their work activities.

8.6 Monitoring and reporting

8.6.1 Soil / sediment excavation and handling

Records shall be kept by the Site Supervisor or delegate to:

- Track soil movements around the site including diagrams, photographs, volumes and soil descriptions for stockpiles in temporary storage areas as well as final placement sites.
- Inspect the condition of stockpile batters, drains, open trenches and structure excavations.
- Maintain records to verify volumes of soils excavated and transported for treatment at the designated ASS treatment facility in conjunction with records of lime dosing and quantities of lime brought onsite

Should an additional or temporary ASS treatment facility be constructed, the following should be maintained by the Site Supervisor

- Records regarding the construction, including photos should be maintained by the Site Supervisor or their delegated representative.

- Details regarding volumes, origin, material type and destination should also be maintained by the Site Supervisor or delegate.
- Lime neutralisation rates and methodologies should also take into account the acid tolerant nature of some species in the immediate receiving environment.

The Site Supervisor or delegate shall be responsible for ensuring that the ASS materials are managed in accordance with details provided above.

8.6.2 Treatment and validation of excavated ASS

The Site Supervisor or delegate shall;

- Conduct an inspection of the transport route between the excavation sites and treatment facility on a daily basis.
- Maintain records tracking soil movements around the site including diagrams, photographs, volumes and soil descriptions for stockpiles in temporary storage areas as well as final fill placements.
- Maintain records to verify volumes of lime used in ASS treatment and balanced against quantities of lime brought onsite.
- Be responsible for ensuring verification tests are completed for each 250 m3.
- Conduct an inspection of the treatment areas including bunds and sumps on a weekly basis.
- Maintain a register of testing results and a record of inspections.

Prepare a summary report of all test results and inspections each week for submission to the development / project Environmental Manager.

9 SURFACE WATER MANAGEMENT STRATEGY

9.1 General

The procedures outlined below are provided to monitor and manage surface water quality in open excavations, sumps/check dams and run-off collection in treatment areas. Contingency measures are also provided for treatment and discharge of water.

9.2 Objectives

The following objectives apply to the surface water monitoring program:

- Appropriately monitor waters entering open excavations.
- Appropriately manage waters to be discharged from open excavations.
- Appropriately monitor and treat (if required) run-off collected in treatment areas.
- Comply with conditions of licences, permits or other approvals issued for the project.

9.3 Dewatering drawdown

Dewatering drawdown resulting from construction and dewatering activities shall be controlled to minimise the time and extent of draining ASS materials outside the extraction footprint.

For excavations where dewatering of ASS materials will occur over extended periods (>7 days) and/or extensive drawdown of the groundwater table is expected, additional procedures for managing groundwater drawdown shall be developed and the development/project specific ASSMPs revised.

Additional procedures/management may include:

- Engineering solutions to minimise dewatering, e.g., sheet piling, diaphragm wall, shoring boxes
- Strategically placed infiltration basins/trenches.

The potential extent of dewatering drawdown should be modelled using available hydrological information to determine the radius of influence and rate and volume of dewatering anticipated, per the Soil management guidelines (Dear et al., 2024).

9.4 Dewatering management

9.4.1 Dewatering disposal hierarchy

Based upon the proposed works, the hierarchy for handling of dewatering effluent disposal is as follows:

- Recharge to superficial aquifer
- Dust suppression
- Discharge to surface water body (drainage line).

Where dewatering effluent from open excavations, 'check dams' or the treatment area is being discharged/infiltrated to land, runoff cannot enter waterways or drains.

Based upon groundwater conditions beneath the site, dewatering effluent may potentially require treatment in accordance with soil management guidelines (Dear et. al., 2024). Dewatering effluent would be required to be maintained on site following treatment to facilitate the decrease in acidity and increase pH (if required), and settlement of sediment, prior to being preferentially recharged (infiltrated) back into the superficial aquifer.

9.4.2 Monitoring of water in open excavations

Where possible, excavations below the groundwater standing water level (SWL) should remain open for as minimal time as possible, and pH monitoring on water accumulated in excavations undertaken. The following will occur:

- pH monitoring with a calibrated meter undertaken daily on each excavation where accumulated water is present.
- Where pH of <5 is detected, the water shall be treated by addition of hydrated lime and/or liquid caustic. Neutralising agents shall be stored in a covered bunded area to prevent accidental release to waters.

9.4.3 Discharge to land / infiltration

When water from open excavations, 'check dams' or the treatment area is being discharged to land, runoff cannot enter waterways or drains, and the following procedures shall apply:

- The pH of seepage waters monitored daily
- Where pH of <5 is detected, the water shall be directed to a holding pond or tank where treatment by addition of hydrated lime and/or liquid caustic⁴ shall be conducted to meet the established performance indicators (Section 9.5).

9.4.4 Discharge to surface water bodies

The following surface water monitoring (Table 10) is to be undertaken where water from open excavations or the soil treatment area is being discharged to surface water bodies, i.e., drainage lines.

Table 10: Surface water monitoring – discharge to surface water bodies

Monitoring Activity	Parameters
Open excavations and the treatment area	
Prior to discharge	Field analysis: pH, dissolved oxygen (DO), ferrous iron, aluminium
Monthly	Laboratory: total acidity, total alkalinity, chloride, sulfate, total and dissolved aluminium and iron
Discharge effluent, 5 m upstream and 20 m downstream of discharge point	
Every two hours	Field analysis: pH, DO, ferrous iron, aluminium
Monthly	Laboratory: total acidity, total alkalinity, chloride, sulfate, total and dissolved aluminium and iron

When water from open excavations or the treatment area is being discharged to surface water bodies the following procedures shall apply:

- Prior to the commencement of discharge to a surface water body:
 - Waters not meeting the required performance indicators (to be established, refer Section 9.5) shall be directed to a holding pond or tank where treatment shall be conducted until performance indicators are met.
 - If ferrous iron is detected, then a water sample shall be collected and laboratory analysed for titratable acidity to confirm total acidity risk and treatment requirements.
- Treatment shall not be permitted as part of direct discharge to an external surface water body. Treatment shall occur in a holding pond or tank.
- When discharge to surface water bodies is proposed, a supply of hydrated lime and/or liquid caustic shall be kept on site at all times for the treatment of acidic waters. The supply shall be at least 0.5 tonne of

⁴ Hydrated lime or calcium based neutralising agents are the preferred dewatering effluent treatment product.

hydrated lime and/or 20L of liquid caustic. Neutralising agents shall be stored in a covered and bunded area to prevent accidental release.

- Discharge to surface water bodies shall be ceased immediately upon discovery of a non-conformance with the performance indicators (refer Section 9.5).

All monitoring of water quality shall be carried out by a suitably qualified person, using calibrated equipment on samples that are representative of the discharge or background.

It should be noted that these performance indicators have been set specifically in relation to ASS risks and apply in addition to other water quality limits and indicators outlined as part of other management plans, including the SCA PFAS Management Plan (RPS, 2024). Any discharge of water shall take into consideration the requirements of all applicable management plans for the PDA Development Scheme.

9.5 Performance indicators

9.5.1 General

To be established for each development/project specific ASSMP and should be based on the Soil management guidelines (Dear et. al. 2024 and the Maroochy River Environmental Values and Water Quality Objectives (SoQ, 2022), where applicable.

9.5.2 Infiltration / dust suppression use of dewatering effluent

Presented in Table 11 is a summary of the recommended dewatering discharge criteria for groundwater dewatering effluent being recharged to the superficial aquifer or for dust suppression, as specified in Treatment and Management of Soil and Water in Acid Sulfate Soil Landscapes (DWER, June 2015), as per Dear et al, (2024).

Table 11: Dewatering effluent discharge quality (infiltration or dust suppression)

Analyte	Discharge criteria
Acidity	<40 mg/L (CaCO ₃ equivalents)
pH	6.5 to 8.5 pH units
Alkalinity	>30 mg/L (CaCO ₃ equivalents)

9.6 Contingency measures

The contingency responses provided below are examples of operating measures that can be applied where water quality/levels in the receiving environment are compromised. The approach to determining a contingency response is based upon identifying, managing and addressing the specific cause of the water quality impact.

If additional measures to those indicated below are required, these will be agreed in consultation with SCA and DESTI.

9.6.1 Surface water

Where the performance indicators are exceeded, the following contingency measures may be implemented in consultation with the development/project environmental manager/SCA/DESTI:

- Dewatering operations to cease immediately should monitoring results show any declining trends, e.g. decreases in pH and increase in acidity, in surface water quality.

9.6.2 Dewatering discharge

Where the performance indicators are exceeded, the following contingency measures may be implemented in consultation with the development/project environmental manager/SCA/DESTI:

- Increased liming of dewater, and or adjustment/enhancement of existing infrastructure

- Pumping rates decreased.
- Reducing the area under abstraction
- Modifications to the settlement infrastructure to promote improved settling and precipitation of metals.

9.6.3 Dewatering management

The dewatering settlement and discharge infrastructure should be maintained in such a state to ensure the integrity of the infrastructure, and all dewater is contained within the infrastructure.

Where the integrity of the infrastructure is compromised and/or effluent is not contained within the infrastructure, the development/project environmental manager is to be notified immediately, and the following measures may be implemented:

- Reduce pump rates or cease all dewatering.
- Reduce the area under abstraction.
- Modifications to the settlement infrastructure to ensure all dewater is contained. This may include the addition of extra storage capacity.

9.7 Monitoring and reporting

Additional procedures shall be developed as required and the development/project specific ASSMP revised for specific excavations requiring dewatering.

- The Site Supervisor or delegate shall:
- Be responsible for ensuring monitoring is conducted at the required frequency.
- Maintain a register of testing results and a record of inspections.
- A summary report of all test results and inspections shall be compiled by the Site Supervisor or delegate each week and submitted to the project/site Environmental Manager and/or the Superintendent.
- Shall inform the development/project Environmental Manager and/or the Superintendent of any non-compliance. The development/project Environmental Manager and/or the Superintendent shall inform SCA of such non-compliances as soon as practicable and instigate an assessment of the impact.

10 GROUNDWATER MANAGEMENT STRATEGY

10.1 General

The procedures outlined below are provided to monitor, manage and mitigate potential transport and export of acidic groundwater and associated heavy metal contaminants due to construction and earthworks activities. Contingency measures are also provided for the mitigation and management of acidic groundwater exportation (if required).

10.2 Objectives

The following objectives apply to the groundwater monitoring program:

- Appropriately monitor down gradient groundwater quality and compare against pre-construction baseline levels (to be established prior to construction).
- Appropriately monitor and treat (if required) acidic groundwater via contingency measures such as the installation of lime trenches or lime slots in suitable down gradient locations and within identified groundwater flow paths.
- Comply with the conditions of licences, permits or other approvals issued for the development/project.

10.3 Groundwater quality monitoring

10.3.1 Baseline

Baseline groundwater parameters shall be established via a groundwater monitoring program of a network of existing and proposed (to be installed) monitoring locations prior to the commencement of earthworks. Previous groundwater monitoring data shall be used in conjunction with the baseline data to establish the baseline criteria.

The locations of the monitoring wells will be confirmed prior to commencement of monitoring and will be located at suitable locations upgradient, down gradient and within each precinct.

It should be noted that the installation of a groundwater monitoring wells within the boundary of any National Park will require the prior approval of the relevant State agency.

Baseline groundwater quality parameters will be established for the following;

- Groundwater levels, pH (field based), electrical conductivity (EC) (field based), chloride, sulfate, total alkalinity, total acidity, dissolved iron and dissolved aluminium.

The groundwater quality objectives for any proposed monitoring location within the National Park (given the high ecological value) would further include total dissolved solids (TDS), total anions and total cations as in accordance with the Water EPP 2009 (SoQ, 2014).

10.3.2 During construction

Monitoring requirements will be confirmed following receipt and review of detained designs and construction/earthworks programs for each development/project and included in the development/project-specific ASSMP.

Water quality parameters to be monitored and the monitoring frequencies are to be based on Appendix 3 of the Soil management guidelines (Dear et al. 2024).

10.3.3 Post construction

Post construction groundwater monitoring will be conducted on a monthly basis for a period of twelve months (then on-going as required by SCA) for the following parameters and compared against the performance criteria (Section 10.4).

- Groundwater levels, pH, EC, chloride, sulfate, total alkalinity, total acidity, dissolved iron and dissolved aluminium.

10.4 Performance criteria

To be set in each precinct-specific ASSMP prior to commencement of during construction groundwater quality monitoring based upon the following:

- Baseline and historical monitoring data
- Australia Water Quality guidelines (2018)
 - Freshwater - 95%
 - Marine water - 95%.

It should be noted that the groundwater quality objectives for any proposed groundwater monitoring location within the National Park (given the high ecological value) would be established to maintain existing water quality (at 20th, 50th and 80th percentiles) and would further include: total dissolved solids (TDS), EC, total anions and total cations as in accordance with the Water Environmental Protection (Water) Policy (EPP) 2009 (SoQ, 2014) for the Maroochy River.

10.5 Contingency measures

The contingency responses provided below are operating measures that can be applied where water quality/levels in the receiving environment are compromised. The approach to determining a contingency response is based upon identifying, managing and addressing the specific cause of the water quality impact. If additional measures to those indicated above are required, these will be agreed in consultation with DESTI.

4. Should groundwater quality fall below established baseline conditions or other nominated performance indicator for any downgradient groundwater monitoring locations over three (3) consecutive monitoring events other management measures such as, localised lime slots or lime trenches shall be discussed with the Environmental Manager for the project and DESTI prior to implementation.
5. During the groundwater monitoring periods should any groundwater monitoring wells be damaged or destroyed they are to be re-instated before the next monitoring round or as soon as practicable. Replacement bores are to be installed to the same depth as the destroyed/damaged bore, by a licensed driller, in accordance with the Minimum Construction Requirements for Water Bores in Australia (NUDLC, 2020).
6. For the any groundwater well adjacent a National Park area, where an exceedance of performance limits (based on baseline data collection) is detected as part of monitoring over two (2) consecutive monitoring events, an investigation will be carried out to the likely cause of the exceedance and if the effects of the exceedance are likely to have any measurable impact on the environmental values present. These findings including corrective actions will be presented and discussed with DESTI.

10.6 Monitoring and reporting

The Site Supervisor or delegate shall:

- Ensure the groundwater monitoring (Section 10.3) is conducted at the required frequency.
- Maintain a register of testing results and a record of inspections.
- Compile a summary report of all test results and inspections weekly and submit to the development/project Environmental Manager and/or Superintendent.
- Inform the development/project Environmental Manager and/or Superintendent of non-compliance with the performance indicators in down gradient groundwater monitoring locations upon detection. The development/project Environmental Manager and/or Superintendent shall inform SCA of such non-compliances as soon as practicable and instigate an assessment of impact.

11 ASS ENVIRONMENTAL REPORTING

11.1 Auditing

The development/project Environmental Manager will be responsible for ensuring that an auditing program is implemented for construction and treatment works. The audit program shall aim to ensure compliance with the precinct specific ASSMPs and relevant statutory requirements.

The development/project Environmental Manager shall appoint an experienced ASS practitioner to conduct regular auditing of activities and ASS management measures. Given the expected construction period a weekly, auditing schedule is recommended. The frequency of these audits may be revised and reduced should a high level of compliance with the development/project-specific ASSMPs is evident.

The audit shall take the form of a visual inspection of the works and treatment sites and associated control measures and a review of monitoring data. A written record of auditing undertaken shall be maintained, including details on the date of the audit, activities undertaken, observations made, and any non-conformances identified.

A copy of the audit report shall be forwarded to the development/project Environmental Manager within two days of the audit.

11.2 Training

All equipment operators, supervisors and subcontractors engaged in excavation works shall participate in induction training for ASS. This training will include basic recognition and identification of ASS, plus an outline of the requirements of the precinct specific ASSMPs.

The Site Foreman shall verify attendance at induction training prior to commencement of site works.

11.3 Closure report

Per the soil management guidelines (Dear et., al, 2024), a closure report must be completed for all developments/activities conditioned for an ASS management closure report under the relevant provisions of the Planning Act 2016, the Environmental Protection Act 1994, and/or the State Development and Public Works Organisation Act 1971.

As such, at the completion of each development/project, a closure report must be completed, at the completion of ground disturbing/dewatering works and submitted to EDQ to demonstrate that site management has complied with the requirements outlined in the soil management guidelines (Dear et., al, 2024).

The closure report, per the soil management guidelines (Dear et., al, 2024), should include as a minimum the following:

- Total volumes and dimensions of disturbed ASS
- Details of soil management strategies undertaken at the site (including evidence of specific management measures such as waste tracking, photographic evidence of neutralisation of bunded treatment pads, liming rates and tonnes of neutralising agent used). Include a discussion of the effectiveness of management strategies employed at the site
- Where dewatering was involved, final location, extent and duration of dewatering. Include details of groundwater management strategies applied to ensure that the rate duration of dewatering variables were optimised to minimise risk to water quality, the receiving environment and neighbouring infrastructure
- Photographic evidence of management and monitoring undertaken
- Details of surface water management strategies undertaken
- Summary of monitoring results for surface water and groundwater (with an emphasis on trends in water quality)
- Location of any off-Airport treatment and/or disposal of ASS and evidence of treatment off-Airport

- Summary of verification testing results for material treated either on- or off-Airport
- Details of any incidence of nonconformity with the ASSMP and corrective actions taken
- A discussion of any potential risks to the water quality, the receiving environment, neighbouring infrastructure or human health
- Proposed future monitoring and/or reporting programs
- Proposed remediation measures if required
- A statement that a suitably skilled and experienced person in ASS science (refer Section 3.2 of Dear et., al, 2024) considers the subject site to have been adequately managed, suitable for the proposed final uses, with minimal impact on water quality, the receiving environment, neighbouring infrastructure and/or human health
- A statement that the suitably qualified engineer considers the site to be geotechnically suitable for its intended end purpose.

The closure report is required to be completed by a suitably skilled and experienced person in ASS science (refer Section 3.2 of Dear et., al, 2024) who was responsible for the ASS management during site works.

11.4 Post construction groundwater monitoring closure report

A post construction groundwater monitoring closure report by a suitably skilled and experienced person in ASS science (refer Section 3.2 of Dear et., al, 2024) and issued to the EDQ at the cessation of the post construction groundwater monitoring period (if required).

The report will contain:

- Summary of construction works
- Findings of the groundwater post-construction monitoring.
- Proposed remediation measures if required.

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Appendix A: **Previous investigation results and figures**

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- Legend**
- Blue circle with cross: Acid Sulphate Soil Borehole Location (2012)
 - Red circle with cross: Proposed Acid Sulphate Soil Borehole Location (No Access)
 - Green circle with cross: Completed Acid Sulphate Soil Borehole Location
 - Black line with triangle: Denotes Cross Sections (Refer to Figures 2a - 6b)

Base plan supplied by Sunshine Coast Council

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CLIENT SUNSHINE COAST AIRPORT		PROJECT SUNSHINE COAST AIRPORT EXPANSION	
DRAWN BY BH	DATE 11.04.2017	DRAWING TITLE ACID SULFATE SOILS INVESTIGATION SITE PLAN (JANUARY 2017)	
CHECKED BY JM	DATE 20/09/2017		
SCALE 1:10,000	SHEET SIZE A3	PROJECT No J000996	DOC No 039
		DOC TYPE R	FIGURE No 002
		REVISION 0	SHEET 1 OF 1

Plot Date: 28 September 2017 Time: 1:12:55 PM By: CAD Path: J:\2015 - J1 to J181\Environmental\J000030 - SCC-SCA Expansion-ASSMP\TASK 9000 - Detailed ASS Investigation\Figures Drawings - File Name: Figure 1 Rev6 ASS Boreholes.dwg

Acid sulfate soil results

Definitions:

- (No Guideline), --- not tested, LOR (Limit of Reporting), mht (mol H+/tonne)
Actual Acid Sulfate Soil (AASS) likelihood is indicated by Low (L)(pHF > 5), Medium (M)(pHF 5 ≤ pHF < 4), and High (H)(pHF ≤ 4).
Potential Acid Sulfate Soil (PASS) likelihood is indicated by Low (L)(Δ pH from pHF to pHFOX is < 2 pH units), Medium (M)(Δ pH from pHF to pHFOX is ≥ 2 pH units OR pHFOX is <3), and High (H)(Δ pH from pHF to pHFOX is ≥ 2 pH units AND pHFOX is <3)
Reaction L = Low strength, M = Medium strength, H = High strength, X = Extreme strength.
Required Lime Rate is calculated from the net Acid-Base Account with a factor of safety = 1.5 and bulk density of 1.8 t/m³

Notes:

This table utilises colour coding to aid data interpretation, avoid black and white reproduction
* indicates that the duplicate concentration has been used
Units are as shown

	Denotes less than LOR
	Field test value indicative of AASS
	Field test value indicative of PASS
	Denotes sample exceeds QASSIT Action Criteria of 0.03 (%S), for excavations of >1,000 tonnes
	Denotes sample collected from below groundwater level

Location	Depth (m)	Sample Description		Field Tests					Acidity Trail					Retained and Net Acidity			ANC	Treatment			
				pH_F	AASS likelihood	pH_{FOX}	PASS likelihood	Reaction Vigour	pH_{KCl}	pH_{ox}	S_{TAA}	S_{TPA}	S_{CR}	S_{NAS}	SCR + S_{TAA}	STPA + STAA	ANC	Liming rate	Liming rate		
				Units	pH	-	pH	-	-	pH	pH	%S	%S	%S	%S	%S	%S	%S	kg CaCO3/t	kg CaCO3/m3	
				AASS	<4.0	-	<4.0	-	-	<4.0	<4.0	0.03	0.03	0.03	0.03	0.03	0.03	0.03	-	-	-
				LOR	0.1	-	0.1	-	-	0.1	0.1	0.003	0.01	0.005	0.02	0.02	0.005	0.01	1	1	
BH51	0.0_0.25	Silty SAND, dark grey		3.9	H	2.5	M	L	4.5	---	0.045	---	< 0.005	< 0.02	0.040	---	n/a	2.1	4.0		
	0.25_0.5	SAND, grey		4.7	M	3.0	L	L	---	---	---	---	---	---	---	---	---	---	---		
	0.5_0.75			4.4	M	3.5	L	L	---	---	---	---	---	---	---	---	---	---	---		
	0.75_1.0			4.5	M	4.1	L	L	---	---	---	---	---	---	---	---	---	---	---		
	1.0_1.25	Becoming dark grey		4.5	M	2.6	M	L	---	---	---	---	---	---	---	---	---	---	---		
	1.25_1.5	SAND, dark grey		4.9	M	2.7	H	L	3.8	---	0.257	---	< 0.005	< 0.02	0.260	---	n/a	12.0	22.0		
	1.5_1.75			4.7	M	2.8	M	L	---	---	---	---	---	---	---	---	---	---	---		
	1.75_2.0			4.7	M	2.9	M	L	---	---	---	---	---	---	---	---	---	---	---		
	2.0_2.25			4.8	M	3.1	L	L	4.4	---	0.120	---	< 0.005	< 0.02	0.120	---	n/a	5.6	10.0		
2.25_2.5			4.6	M	3.1	L	L	---	---	---	---	---	---	---	---	---	---	---	---		
BH52	0.0_0.25	Silty SAND, dark grey		4.4	M	3.5	L	L	---	---	---	---	---	---	---	---	---	---	---		
	0.25_0.5	SAND, grey		4.9	M	3.7	L	L	---	---	---	---	---	---	---	---	---	---	---		
	0.5_0.75			4.7	M	2.9	M	L	5.7	---	<0.003	---	< 0.005	n/a	< 0.02	---	n/a	< 1	1.0		
	0.75_1.0			4.6	M	2.9	M	L	---	---	---	---	---	---	---	---	---	---	---		
	1.0_1.25	Becoming dark grey		4.7	M	2.9	M	L	4.2	---	0.077	---	< 0.005	< 0.02	0.080	---	n/a	3.6	6.0		
	1.25_1.5			4.9	M	2.9	H	L	---	---	---	---	---	---	---	---	---	---	---		
	1.5_1.75	SAND, dark grey		4.9	M	3.0	M	L	---	---	---	---	---	---	---	---	---	---	---		
	1.75_2.0			4.9	M	3.2	L	L	---	---	---	---	---	---	---	---	---	---	---		
	2.0_2.25			4.9	M	3.2	L	L	---	---	---	---	---	---	---	---	---	---	---		
2.25_2.5			5.2	L	3.6	L	L	4.5	---	0.115	---	< 0.005	< 0.02	0.120	---	n/a	5.4	10.0			
BH53	0.0_0.25	Silty SAND, dark grey		4.6	M	2.8	M	L	---	---	---	---	---	---	---	---	---	---	---		
	0.25_0.5	SAND, grey		4.7	M	2.9	M	L	---	---	---	---	---	---	---	---	---	---	---		
	0.5_0.75			5.0	L	3.4	L	L	---	---	---	---	---	---	---	---	---	---	---		
	0.75_1.0			4.7	M	2.9	M	L	5.7	---	<0.003	---	< 0.005	n/a	< 0.02	---	n/a	< 1	1.0		
	1.0_1.25	SAND, dark grey		5.0	L	3.0	H	L	---	---	---	---	---	---	---	---	---	---	---		
	1.25_1.5			4.9	M	3.1	L	L	---	---	---	---	---	---	---	---	---	---	---		
	1.5_1.75			5.1	L	3.0	H	L	---	---	---	---	---	---	---	---	---	---	---		
	1.75_2.0			5.2	L	2.9	H	L	4.0	---	0.192	---	< 0.005	< 0.02	0.190	---	n/a	8.8	16.0		
	2.0_2.25			5.0	M	3.0	H	L	---	---	---	---	---	---	---	---	---	---	---		
2.25_2.5		5.1	L	3.0	H	L	4.4	---	0.095	---	< 0.005	< 0.02	0.090	---	n/a	4.4	8.0				

Location	Depth (m)	Sample Description	Trigger	Field Tests					Acidity Trail					Retained and Net Acidity			ANC	Treatment	
				pH _F	AASS likelihood	pH _{FOX}	PASS likelihood	Reaction Vigour	pH _{KCl}	pH _{OX}	S _{TAA}	S _{TPA}	S _{CR}	S _{NAS}	SCR + S _{TAA}	STPA + STAA	ANC	Liming rate	Liming rate
Units	pH	-	pH	-	-	pH	pH	%S	%S	%S	%S	%S	%S	%S	%S	kg CaCO3/t	kg CaCO3/m3		
ASS	<4.0	-	<4.0	-	-	<4.0	<4.0	0.03	0.03	0.03	0.03	0.03	0.03	0.03	-	-	-		
LOR	0.1	-	0.1	-	-	0.1	0.1	0.003	0.01	0.005	0.02	0.02	0.005	0.01	-	1	1		
BH54	0.0_0.25	Silty SAND, grey		4.2	M	2.1	H	M	---	---	---	---	---	---	---	---	---	---	
	0.25_0.5	SAND, pale grey		4.6	M	2.1	H	L	---	---	---	---	---	---	---	---	---	---	
	0.5_0.75			4.8	M	2.4	H	L	---	---	---	---	---	---	---	---	---		
	0.75_1.0			4.5	M	1.9	H	M	5.3	---	0.004	---	< 0.005	n/a	< 0.02	---	n/a	< 1	1.0
	1.0_1.25	Becoming dark grey		5.1	L	1.9	H	L	---	---	---	---	---	---	---	---	---	---	---
	1.25_1.5			5.4	L	2.9	H	L	---	---	---	---	---	---	---	---	---	---	
	1.5_1.75			5.4	L	2.3	H	M	4.2	---	0.160	---	< 0.005	< 0.02	0.160	---	n/a	7.6	14.0
	1.75_2.0			5.6	L	2.4	H	M	---	---	---	---	---	---	---	---	---	---	---
	2.0_2.25			5.3	L	2.6	H	L	4.6	---	0.067	---	< 0.005	n/a	0.070	---	n/a	3.2	6.0
2.25_2.5			5.2	L	2.6	H	L	---	---	---	---	---	---	---	---	---	---	---	
BH55	0.0_0.25	SAND, grey and pale grey		5.5	L	1.9	H	H	4.2	---	0.075	---	< 0.005	< 0.02	0.070	---	n/a	3.5	6.0
	0.25_0.5	SAND, grey and pale grey		5.6	M	2.0	H	L	---	---	---	---	---	---	---	---	---	---	---
	0.5_0.75			5.7	M	2.2	H	L	---	---	---	---	---	---	---	---	---	---	
	0.75_1.0			5.7	L	2.2	H	L	---	---	---	---	---	---	---	---	---	---	
	1.0_1.25			5.6	M	2.3	H	L	---	---	---	---	---	---	---	---	---	---	
	1.25_1.5	SAND, dark grey		5.6	M	2.4	H	L	---	---	---	---	---	---	---	---	---	---	---
	1.5_1.75			5.6	L	2.4	H	L	4.2	---	0.154	---	< 0.005	< 0.02	0.150	---	n/a	7.2	13.0
	1.75_2.0			5.6	M	2.5	H	L	---	---	---	---	---	---	---	---	---	---	---
BH56	0.0_0.25	Silty SAND, dark grey		5.0	L	2.1	H	H	4.9	---	0.018	---	< 0.005	n/a	0.020	---	n/a	< 1	1.0
	0.25_0.5	SAND, grey		4.6	M	2.3	H	L	---	---	---	---	---	---	---	---	---	---	---
	0.5_0.75			4.6	M	2.3	H	L	---	---	---	---	---	---	---	---	---	---	
	0.75_1.0	Becoming dark grey		4.6	M	3.0	M	L	---	---	---	---	---	---	---	---	---	---	---
	1.0_1.25			4.6	M	2.7	M	L	---	---	---	---	---	---	---	---	---	---	
	1.25_1.5	SAND, dark grey		5.1	L	2.4	H	M	4.2	---	0.208	---	< 0.005	< 0.02	0.210	---	n/a	9.6	17.0
	1.5_1.75			5.1	L	2.5	H	L	---	---	---	---	---	---	---	---	---	---	---
	1.75_2.0			4.9	M	3.8	L	L	---	---	---	---	---	---	---	---	---	---	---
BH57	0.0_0.25	Silty SAND, dark grey		4.0	H	2.2	M	M	---	---	---	---	---	---	---	---	---	---	---
	0.25_0.5	SAND, grey		3.7	H	1.9	M	L	5.5	---	<0.003	---	< 0.005	n/a	< 0.02	---	n/a	< 1	1.0
	0.5_0.75			4.5	M	2.9	M	L	---	---	---	---	---	---	---	---	---	---	
	0.75_1.0			4.8	M	2.4	H	M	---	---	---	---	---	---	---	---	---	---	
	1.0_1.25	SAND, dark grey		5.4	L	2.5	H	M	---	---	---	---	---	---	---	---	---	---	---
	1.25_1.5			5.6	L	2.9	H	H	---	---	---	---	---	---	---	---	---	---	
	1.5_1.75			5.0	M	2.5	H	M	4.0	---	0.401	---	< 0.005	< 0.02	0.400	---	n/a	19.0	34.0
	1.75_2.0			5.1	L	2.2	H	L	---	---	---	---	---	---	---	---	---	---	---
BH58	0.0_0.25	Silty SAND, dark grey		4.1	M	1.8	H	H	---	---	---	---	---	---	---	---	---	---	---
	0.25_0.5	SAND, grey		4.3	M	2.0	H	L	---	---	---	---	---	---	---	---	---	---	---
	0.5_0.75			4.2	M	1.8	H	L	5.5	---	<0.003	---	< 0.005	n/a	< 0.02	---	n/a	< 1	1.0
	0.75_1.0			4.6	M	1.8	H	L	---	---	---	---	---	---	---	---	---	---	---
	1.0_1.25	SAND, dark grey		4.7	M	2.1	H	M	---	---	---	---	---	---	---	---	---	---	---
	1.25_1.5			5.0	L	2.1	H	M	---	---	---	---	---	---	---	---	---	---	---
	1.5_1.75			5.3	L	2.1	H	M	4.4	---	0.125	---	< 0.005	< 0.02	0.130	---	n/a	5.9	11.0
	1.75_2.0			4.8	M	2.2	H	M	---	---	---	---	---	---	---	---	---	---	---

Location	Depth (m)	Sample Description	Trigger	Field Tests					Acidity Trail					Retained and Net Acidity			ANC	Treatment	
				pH _F	AASS likelihood	pH _{FOX}	PASS likelihood	Reaction Vigour	pH _{KCl}	pH _{ox}	S _{TAA}	S _{TPA}	S _{CR}	S _{NAS}	SCR + S _{TAA}	STPA + STAA	ANC	Liming rate	Liming rate
				Units														kg CaCO3/t	kg CaCO3/m3
				ASS	<4.0	-	<4.0	-	<4.0	<4.0	0.03	0.03	0.03	0.03	0.03	0.03	-	-	-
			LOR	0.1	-	0.1	-	-	0.1	0.1	0.003	0.01	0.005	0.02	0.02	0.005	0.01	1	1
BH145	0.0_0.25	Silty SAND		4.7	M	2.4	H	M	---	---	---	---	---	---	---	---	---	---	---
	0.25_0.5	SAND		4.5	M	3.1	L	L	5.4	---	<0.003	---	< 0.005	n/a	< 0.02	---	n/a	< 1	1.0
	0.5_0.75			4.8	M	3.9	L	L	---	---	---	---	---	---	---	---	---	---	---
	0.75_1.0			4.8	M	3.5	L	L	---	---	---	---	---	---	---	---	---	---	---
	1.0_1.25			4.9	M	2.9	H	L	4.4	---	0.067	---	< 0.005	< 0.02	0.070	---	n/a	3.1	6.0
	1.25_1.5			5.1	L	2.7	H	M	---	---	---	---	---	---	---	---	---	---	---
	1.5_1.75			4.4	M	2.6	M	M	---	---	---	---	---	---	---	---	---	---	---
	1.75_2.0			5.1	L	2.7	H	M	---	---	---	---	---	---	---	---	---	---	---
BH146	0.0_0.25	Silty SAND		5.0	L	2.2	H	M	---	---	---	---	---	---	---	---	---	---	---
	0.25_0.5	SAND		5.3	L	3.9	L	L	---	---	---	---	---	---	---	---	---	---	---
	0.5_0.75			4.6	M	3.1	L	L	---	---	---	---	---	---	---	---	---	---	---
	0.75_1.0			5.1	L	2.8	H	L	5.1	---	0.008	---	< 0.005	n/a	< 0.02	---	n/a	< 1	1.0
	1.0_1.25			4.9	M	3.0	M	L	---	---	---	---	---	---	---	---	---	---	---
	1.25_1.5			5.1	L	3.0	H	L	---	---	---	---	---	---	---	---	---	---	---
	1.5_1.75			5.0	M	2.7	H	L	4.3	---	0.095	---	< 0.005	< 0.02	0.090	---	n/a	4.4	8.0
	1.75_2.0			5.1	L	3.1	M	L	---	---	---	---	---	---	---	---	---	---	---
BH147	0.0_0.25	Silty SAND, dark grey		5.4	L	2.6	H	L	5.1	---	0.010	---	< 0.005	n/a	< 0.02	---	n/a	< 1	1.0
	0.25_0.5	SAND, grey		5.4	L	3.4	M	L	---	---	---	---	---	---	---	---	---	---	---
	0.5_0.75			5.2	L	3.0	M	L	---	---	---	---	---	---	---	---	---	---	---
	0.75_1.0			5.3	L	3.2	M	L	---	---	---	---	---	---	---	---	---	---	---
	1.0_1.25			5.2	L	3.0	H	L	5.2	---	0.012	---	< 0.005	n/a	< 0.02	---	n/a	< 1	1.0
	1.25_1.5			5.3	L	2.9	H	L	---	---	---	---	---	---	---	---	---	---	---
	1.5_1.75			5.2	L	3.0	M	L	---	---	---	---	---	---	---	---	---	---	---
	1.75_2.0			5.4	L	3.2	M	L	---	---	---	---	---	---	---	---	---	---	---
BH148	0.0_0.25	Silty SAND, dark grey		4.0	H	2.4	M	M	---	---	---	---	---	---	---	---	---	---	---
	0.25_0.5	SAND, grey		4.4	M	2.1	H	L	5.5	---	<0.003	---	< 0.005	n/a	< 0.02	---	n/a	< 1	1.0
	0.5_0.75			4.2	M	2.5	M	L	---	---	---	---	---	---	---	---	---	---	---
	0.75_1.0			5.3	L	3.0	M	L	---	---	---	---	---	---	---	---	---	---	---
	1.0_1.25			5.2	L	3.0	M	L	---	---	---	---	---	---	---	---	---	---	---
	1.25_1.5			5.2	L	3.0	H	L	---	---	---	---	---	---	---	---	---	---	---
	1.5_1.75			5.4	L	3.0	M	L	4.4	---	0.117	---	< 0.005	< 0.02	0.120	---	n/a	5.5	10.0
	1.75_2.0			5.4	L	3.1	M	L	---	---	---	---	---	---	---	---	---	---	---
BH149	0.0_0.25	Silty SAND, dark grey		3.6	H	2.3	M	L	---	---	---	---	---	---	---	---	---	---	---
	0.25_0.5	SAND, grey		4.3	M	2.9	M	L	---	---	---	---	---	---	---	---	---	---	---
	0.5_0.75			4.7	M	3.0	M	L	---	---	---	---	---	---	---	---	---	---	---
	0.75_1.0			4.0	M	2.4	M	L	5.6	---	<0.003	---	< 0.005	n/a	< 0.02	---	n/a	< 1	1.0
	1.0_1.25			5.2	L	3.3	L	L	---	---	---	---	---	---	---	---	---	---	---
	1.25_1.5			5.0	M	3.4	L	L	---	---	---	---	---	---	---	---	---	---	---
	1.5_1.75	Becoming dark grey		5.1	L	3.5	L	L	---	---	---	---	---	---	---	---	---	---	---
	1.75_2.0	SAND, dark grey		5.2	L	3.6	L	L	4.4	---	0.088	---	< 0.005	< 0.02	0.090	---	n/a	4.1	7.0

REPORT OF BOREHOLE: BH 51

CLIENT: Sunshine Coast Council
 PROJECT: Sunshine Coast Airport - Expansion
 LOCATION: David Low Way
 JOB NO: J000030

EAST: 509008.2 m
 NORTH: 7057981.4 m
 SURFACE RL: 1.50 m
 CONTRACTOR: Contract Drilling
 DRILL RIG: Edson CP1
 INCLINATION: -90° HOLE DIA. 100 mm

SHEET 1 OF 1
 LOGGED: SR
 LOGGED DATE: 04/05/17
 CHECKED: CK
 CHECKED DATE: 25/08/17

Drilling					Sampling		Field Material Description				
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADT			0.0	1.50	0.00 m ASS samples taken at 0.25 m intervals to 2 m depth		SM	SILTY SAND (TOPSOIL): fine to medium grained, dark grey, with some rootlets	M		
			0.20	1.30			SP	SAND (ALLUVIUM): fine to medium grained, grey, trace silt			
			0.5								
			1.0								
			1.10	0.40				Becoming indurated			
			1.30	0.20			SP	SAND (COFFEE ROCK): fine to medium grained, dark grey, trace silt	W		
			1.5								
			2.0								
			2.5	2.50				END OF BOREHOLE @ 2.50 m TARGET DEPTH BACKFILLED			

This report must be read in conjunction with accompanying notes and abbreviations. It has been prepared for environmental purposes only, without attempt to consider geotechnical properties or the geotechnical significance of the materials encountered. As such it should not be relied upon for geotechnical purposes.

REPORT OF BOREHOLE: BH 52

CLIENT: Sunshine Coast Council
 PROJECT: Sunshine Coast Airport - Expansion
 LOCATION: David Low Way
 JOB NO: J000030

EAST: 509047.1 m
 NORTH: 7057963.6 m
 SURFACE RL: 1.50 m
 CONTRACTOR: Contract Drilling
 DRILL RIG: Edson CP1
 INCLINATION: -90° HOLE DIA. 100 mm

SHEET 1 OF 1
 LOGGED: SR
 LOGGED DATE: 04/05/17
 CHECKED: CK
 CHECKED DATE: 25/08/17

Drilling					Sampling		Field Material Description						
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY	DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADT			0.0	1.50	0.00 m ASS samples taken at 0.25 m intervals to 2 m depth			SM	SILTY SAND (TOPSOIL): fine to medium grained, dark grey, with some rootlets	M			
			0.30	1.20				SP	SAND (ALLUVIUM): fine to medium grained, grey, trace silt				
			0.5										
			1.0										
			1.30	0.20					Dark grey and becoming indurated				
			1.40	0.10				SP	SAND (COFFEE ROCK): fine to medium grained, dark grey, trace silt	W			
			1.5										
			2.0										
			2.5	2.50					END OF BOREHOLE @ 2.50 m TARGET DEPTH BACKFILLED				
			3.0										

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REPORT OF BOREHOLE: BH 53

CLIENT: Sunshine Coast Council
 PROJECT: Sunshine Coast Airport - Expansion
 LOCATION: David Low Way
 JOB NO: J000030

EAST: 509093.2 m
 NORTH: 7057952.1 m
 SURFACE RL: 1.50 m
 CONTRACTOR: Contract Drilling
 DRILL RIG: Edson CP1
 INCLINATION: -90° HOLE DIA. 100 mm

SHEET 1 OF 1
 LOGGED: SR
 LOGGED DATE: 04/05/17
 CHECKED: CK
 CHECKED DATE: 25/08/17

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADT			0.0	1.50	0.00 m ASS samples taken at 0.25 m intervals to 2 m depth			SM	SILTY SAND (TOPSOIL): fine to medium grained, dark grey, with some rootlets	M		
			0.20	1.30				SP	SAND (ALLUVIUM): fine to medium grained, grey, trace silt			
			0.5									
			1.0									
			1.20	0.30				Becoming indurated	M - W			
			1.30	0.20				SP	SAND (COFFEE ROCK): fine to medium grained, dark grey, trace silt	W		
1.5												
			2.0									
			2.5	2.50					END OF BOREHOLE @ 2.50 m TARGET DEPTH BACKFILLED			

This report must be read in conjunction with accompanying notes and abbreviations. It has been prepared for environmental purposes only, without attempt to consider geotechnical properties or the geotechnical significance of the materials encountered. As such it should not be relied upon for geotechnical purposes.

REPORT OF BOREHOLE: BH 54

CLIENT: Sunshine Coast Council
PROJECT: Sunshine Coast Airport - Expansion
LOCATION: David Low Way
JOB NO: J000030

EAST: 509139.5 m
NORTH: 7057940.4 m
SURFACE RL: 1.50 m
CONTRACTOR: Contract Drilling
DRILL RIG: Edson CP1
INCLINATION: -90° HOLE DIA. 100 mm

SHEET 1 OF 1
LOGGED: SR
LOGGED DATE: 04/05/17
CHECKED: CK
CHECKED DATE: 25/08/17

Drilling					Sampling		Field Material Description				
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADT			0.0	1.50	0.00 m ASS samples taken at 0.25 m intervals to 2 m depth		SM	SILTY SAND (TOPSOIL): fine to medium grained, grey, with some rootlets			
			0.30	1.20			SP	SAND (ALLUVIUM): fine to medium grained, pale grey			
			0.5						M		
			0.90	0.60				Dark grey and becoming indurated	M - W		
			1.40	0.10			SP	SAND (COFFEE ROCK): fine to medium grained, dark grey, trace silt	W		
			2.5	2.50				END OF BOREHOLE @ 2.50 m TARGET DEPTH BACKFILLED			

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REPORT OF BOREHOLE: BH 55

CLIENT: Sunshine Coast Council
 PROJECT: Sunshine Coast Airport - Expansion
 LOCATION: David Low Way
 JOB NO: J000030

EAST: 509003.3 m
 NORTH: 7057842.7 m
 SURFACE RL: 1.50 m
 CONTRACTOR: Contract Drilling
 DRILL RIG: Edson CP1
 INCLINATION: -90° HOLE DIA. 100 mm

SHEET 1 OF 1
 LOGGED: SR
 LOGGED DATE: 04/05/17
 CHECKED: CK
 CHECKED DATE: 25/08/17

Drilling					Sampling		Field Material Description				
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADT			0.0	1.50	0.00 m ASS samples taken at 0.25 m intervals to 2 m depth		SM	SILTY SAND (TOPSOIL): fine to medium grained, grey, with some rootlets			
			0.30	1.20			SP	SAND (ALLUVIUM): fine to medium grained, grey and pale grey, trace silt			
			0.5							M	
			1.0								
			1.10	0.40				Becoming indurated	M - W		
1.30	0.20			SP	SAND (COFFEE ROCK): fine to medium grained, dark grey, trace silt		W				
			2.0	2.00				END OF BOREHOLE @ 2.00 m TARGET DEPTH BACKFILLED			
			2.5								

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REPORT OF BOREHOLE: BH 56

CLIENT: Sunshine Coast Council
 PROJECT: Sunshine Coast Airport - Expansion
 LOCATION: David Low Way
 JOB NO: J000030

EAST: 508974.8 m
 NORTH: 7057881.4 m
 SURFACE RL: 1.50 m
 CONTRACTOR: Contract Drilling
 DRILL RIG: Edson CP1
 INCLINATION: -90° HOLE DIA. 100 mm

SHEET 1 OF 1
 LOGGED: SR
 LOGGED DATE: 04/05/17
 CHECKED: CK
 CHECKED DATE: 25/08/17

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADT		Water inflow at 1.2 m depth	0.0	1.50	0.00 m ASS samples taken at 0.25 m intervals to 2 m depth			SM	SILTY SAND (TOPSOIL): fine to medium grained, dark grey, with some rootlets	M		
			0.20	1.30			SP	SAND (ALLUVIUM): fine to medium grained, grey, trace silt				
			0.5									
			1.0	1.00		0.50		Dark grey and becoming indurated	M - W			
			1.20	0.30			SP	SAND (COFFEE ROCK): fine to medium grained, dark grey, trace silt	W			
			2.0	2.00				END OF BOREHOLE @ 2.00 m TARGET DEPTH BACKFILLED				
			2.5									
			3.0									

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REPORT OF BOREHOLE: BH 57

CLIENT: Sunshine Coast Council
 PROJECT: Sunshine Coast Airport - Expansion
 LOCATION: David Low Way
 JOB NO: J000030

EAST: 508943.8 m
 NORTH: 7057921.3 m
 SURFACE RL: 1.50 m
 CONTRACTOR: Contract Drilling
 DRILL RIG: Edson CP1
 INCLINATION: -90° HOLE DIA. 100 mm

SHEET 1 OF 1
 LOGGED: SR
 LOGGED DATE: 04/05/17
 CHECKED: CK
 CHECKED DATE: 25/08/17

Drilling					Sampling		Field Material Description							
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY	DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS	
ADT		Water inflow at 1.1 m depth 	0.0	1.50	0.00 m ASS samples taken at 0.25 m intervals to 2 m depth			SM	SILTY SAND (TOPSOIL): fine to medium grained, dark grey, with some rootlets	M				
			0.30	1.20				SP	SAND (ALLUVIUM): fine to medium grained, grey, trace silt					
			0.5											
			0.90	0.60					Becoming indurated					M - W
			1.10	0.40				SP	SAND (COFFEE ROCK): fine to medium grained, dark grey, trace silt					W
			1.5											
			2.0	2.00					END OF BOREHOLE @ 2.00 m TARGET DEPTH BACKFILLED					
			2.5											
			3.0											

This report must be read in conjunction with accompanying notes and abbreviations. It has been prepared for environmental purposes only, without attempt to consider geotechnical properties or the geotechnical significance of the materials encountered. As such it should not be relied upon for geotechnical purposes.

REPORT OF BOREHOLE: BH 58

CLIENT: Sunshine Coast Council
 PROJECT: Sunshine Coast Airport - Expansion
 LOCATION: David Low Way
 JOB NO: J000030

EAST: 508914.9 m
 NORTH: 7057960.9 m
 SURFACE RL: 1.50 m
 CONTRACTOR: Contract Drilling
 DRILL RIG: Edson CP1
 INCLINATION: -90° HOLE DIA. 100 mm

SHEET 1 OF 1
 LOGGED: SR
 LOGGED DATE: 04/05/17
 CHECKED: CK
 CHECKED DATE: 25/08/17

Drilling					Sampling		Field Material Description								
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY	DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS		
ADT		Water inflow at 0.9 m depth	0.0	1.50	0.00 m ASS samples taken at 0.25 m intervals to 2 m depth			SM	SILTY SAND (TOPSOIL): fine to medium grained, dark grey, with some rootlets		M				
			0.30	1.20				SP	SAND (ALLUVIUM): fine to medium grained, grey, trace silt						
			0.5												
			0.90	0.60						Becoming indurated				M - W	
			1.10	0.40				SP	SAND (COFFEE ROCK): fine to medium grained, dark grey, trace silt		W				
			2.0	2.00					END OF BOREHOLE @ 2.00 m TARGET DEPTH BACKFILLED						
			2.5												

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REPORT OF BOREHOLE: BH 145

CLIENT: Sunshine Coast Council
PROJECT: Sunshine Coast Airport - Expansion
LOCATION: David Low Way
JOB NO: J000030

EAST: 508877.6 m
NORTH: 7057841.7 m
SURFACE RL: 1.50 m
CONTRACTOR: Contract Drilling
DRILL RIG: Edson CP1
INCLINATION: -90° HOLE DIA. 100 mm

SHEET 1 OF 1
LOGGED: SR
LOGGED DATE: 05/05/16
CHECKED: CK
CHECKED DATE: 25/08/17

Drilling					Sampling		Field Material Description				
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADT			0.0	1.50	0.00 m ASS samples taken at 0.25 m intervals to 2 m depth		SM	SILTY SAND (TOPSOIL): fine to medium grained, dark grey, with some rootlets	M		
			0.30	1.20			SP	SAND (ALLUVIUM): fine to medium grained, grey, trace silt			
			0.5								
			1.0								
			1.10	0.40				Becoming indurated			
			1.20	0.30			SP	SAND (COFFEE ROCK): fine to medium grained, dark grey, trace silt	W		
			1.5								
			2.0	2.00				END OF BOREHOLE @ 2.00 m TARGET DEPTH BACKFILLED			
			2.5								
			3.0								

This report must be read in conjunction with accompanying notes and abbreviations. It has been prepared for environmental purposes only, without attempt to consider geotechnical properties or the geotechnical significance of the materials encountered. As such it should not be relied upon for geotechnical purposes.

REPORT OF BOREHOLE: BH 146

CLIENT: Sunshine Coast Council
 PROJECT: Sunshine Coast Airport - Expansion
 LOCATION: David Low Way
 JOB NO: J000030

EAST: 508908.9 m
 NORTH: 7057801.6 m
 SURFACE RL: 1.50 m
 CONTRACTOR: Contract Drilling
 DRILL RIG: Edson CP1
 INCLINATION: -90° HOLE DIA. 100 mm

SHEET 1 OF 1
 LOGGED: SR
 LOGGED DATE: 05/05/17
 CHECKED: CK
 CHECKED DATE: 25/08/17

Drilling					Sampling		Field Material Description						
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS	
ADT		Water inflow at 1.2 m depth	0.0	1.50	0.00 m ASS samples taken at 0.25 m intervals to 2 m depth			SM	SILTY SAND (TOPSOIL): fine to medium grained, dark grey, with some rootlets		MD		
			0.30	1.20				SP	SAND (ALLUVIUM): fine to medium grained, grey, trace silt		M		
			0.5							MD			
			1.0										
			1.10	0.40				Becoming indurated	M - W	MD			
			1.20	0.30				SP	SAND (COFFEE ROCK): fine to medium grained, dark grey, trace silt		W		MD
			1.5										
			2.0	2.00						END OF BOREHOLE @ 2.00 m TARGET DEPTH BACKFILLED			
			2.5										
			3.0										

This report must be read in conjunction with accompanying notes and abbreviations. It has been prepared for environmental purposes only, without attempt to consider geotechnical properties or the geotechnical significance of the materials encountered. As such it should not be relied upon for geotechnical purposes.

REPORT OF BOREHOLE: BH 147

CLIENT: Sunshine Coast Council
 PROJECT: Sunshine Coast Airport - Expansion
 LOCATION: David Low Way
 JOB NO: J000030

EAST: 508938.1 m
 NORTH: 7057763.4 m
 SURFACE RL: 1.50 m
 CONTRACTOR: Contract Drilling
 DRILL RIG: Edson CP1
 INCLINATION: -90° HOLE DIA. 100 mm

SHEET 1 OF 1
 LOGGED: SR
 LOGGED DATE: 05/05/17
 CHECKED: CK
 CHECKED DATE: 25/08/17

Drilling					Sampling		Field Material Description						
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY	DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADT		Water inflow at 1.1 m depth	0.0	1.50	0.00 m ASS samples taken at 0.25 m intervals to 2 m depth			SM	SILTY SAND (TOPSOIL): fine to medium grained, dark grey, trace rootlets	M			
			0.30	1.20				SP	SAND (ALLUVIUM): fine to medium grained, grey, trace silt				
			0.5										
			1.0										
			1.30	0.20				SP	SAND (COFFEE ROCK): fine to medium grained, dark grey, trace silt	W			
			2.0	2.00					END OF BOREHOLE @ 2.00 m TARGET DEPTH BACKFILLED				
			2.5										

This report must be read in conjunction with accompanying notes and abbreviations. It has been prepared for environmental purposes only, without attempt to consider geotechnical properties or the geotechnical significance of the materials encountered. As such it should not be relied upon for geotechnical purposes.

REPORT OF BOREHOLE: BH 148

CLIENT: Sunshine Coast Council
 PROJECT: Sunshine Coast Airport - Expansion
 LOCATION: David Low Way
 JOB NO: J000030

EAST: 508967.7 m
 NORTH: 7057723.6 m
 SURFACE RL: 1.50 m
 CONTRACTOR: Contract Drilling
 DRILL RIG: Edson CP1
 INCLINATION: -90° HOLE DIA. 100 mm

SHEET 1 OF 1
 LOGGED: SR
 LOGGED DATE: 05/05/17
 CHECKED: CK
 CHECKED DATE: 25/08/17

Drilling				Sampling		Field Material Description							
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY	DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADT		Water inflow at 1.0 m depth ▽	0.0	1.50	0.00 m ASS samples taken at 0.25 m intervals to 2 m depth			SM	SILTY SAND (TOPSOIL): fine to medium grained, dark grey, trace rootlets	M			
			0.20	1.30				SP	SAND (ALLUVIUM): fine to medium grained, grey, trace silt				
			0.60	0.90					Becoming indurated	M - W			
			1.00	0.50				SP	SAND (COFFEE ROCK): fine to medium grained, dark grey, trace silt	W			
			2.0	2.00					END OF BOREHOLE @ 2.00 m TARGET DEPTH BACKFILLED				
			2.5										
			3.0										

This report must be read in conjunction with accompanying notes and abbreviations. It has been prepared for environmental purposes only, without attempt to consider geotechnical properties or the geotechnical significance of the materials encountered. As such it should not be relied upon for geotechnical purposes.

REPORT OF BOREHOLE: BH 149

CLIENT: Sunshine Coast Council
 PROJECT: Sunshine Coast Airport - Expansion
 LOCATION: David Low Way
 JOB NO: J000030

EAST: 508999.6 m
 NORTH: 7057684.2 m
 SURFACE RL: 1.50 m
 CONTRACTOR: Contract Drilling
 DRILL RIG: Edson CP1
 INCLINATION: -90° HOLE DIA. 100 mm

SHEET 1 OF 1
 LOGGED: SR
 LOGGED DATE: 05/05/17
 CHECKED: CK
 CHECKED DATE: 25/08/17

Drilling					Sampling		Field Material Description				
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADT		Water inflow at 1.3 m depth 	0.0	1.50	0.00 m ASS samples taken at 0.25 m intervals to 2 m depth		SM	SILTY SAND (TOPSOIL): fine to medium grained, dark grey, trace rootlets		M	
			0.30	1.20			SP	SAND (ALLUVIUM): fine to medium grained, grey, trace silt			
			0.5								
			1.0	1.10		0.40		Becoming indurated	M - W		
			1.30	0.20			SP	SAND (COFFEE ROCK): fine to medium grained, dark grey	W		
			2.0	2.00				END OF BOREHOLE @ 2.00 m TARGET DEPTH BACKFILLED			
			2.5								

This report must be read in conjunction with accompanying notes and abbreviations. It has been prepared for environmental purposes only, without attempt to consider geotechnical properties or the geotechnical significance of the materials encountered. As such it should not be relied upon for geotechnical purposes.

Appendix F: PFAS Management Plan

PFAS MANAGEMENT PLAN

Sunshine Coast Airport, Qld



Version 1.0
Ref: AU213013968.001
14th June 2024

REPORT

Document status

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1.0	Final	M. Le Riche	M. Norman	R. Hanly	14/06/2024

Approval for issue

Ruairi Hanly

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1 INTRODUCTION

Sunshine Coast Airport (SCA) is located in Marcoola, Queensland on the Sunshine Coast. The current airport is adjacent to areas of remnant vegetation, rivers/creeks, residential development and coastal areas. The airport currently services a number of airlines that travel across Australia and internationally to New Zealand. Current tenants include a range of private and public industries.

The SCA land is owned by the Sunshine Coast Council (SCC). The airport was operated as an internal department within SCC until 2017. In 2017, SCC entered into a 99-year lease arrangement with Sunshine Coast Airport Pty Ltd (SACPL), a company fully-owned by Palisade Investment Partners Pty Ltd. SCAPL operates and manages Sunshine Coast Airport (SCA), including the airside, terminal and landside precincts.

1.1 What is PFAS?

PFAS is an abbreviation for per- and poly-fluoroalkyl substances. These are manufactured chemicals that have been used for more than 50 years across a range of applications. PFAS makes products non-stick, water repellent, as well as fire, weather, and stain resistant. PFAS have been used in a range of consumer products, such as carpets, clothes, paper, and have also been used in firefighting foams, pesticides, stain repellents and water repellents. PFAS are not found in the environment from natural sources, only from anthropogenic sources.

PFAS has many qualities that combine to present particular challenges for the management of PFAS contamination:

- Water is the prime method of PFAS contamination transferring from a source to a receptor - a person, animal, plant, eco-system, property or a waterbody.
- PFAS is highly soluble and mobile and can rapidly leach through soils or disperse in waterways, travelling long distances. This may sometimes reduce the level of contamination of the original source material.
- Porous surfaces including concrete and other building materials are susceptible to becoming contaminated if in contact with liquids containing PFAS for example, storage tanks and fire station hardstand areas.
- PFAS is very chemically and biologically stable and has a low vapour pressure, so it is resistant to breakdown and evaporation. However, some longer chain PFAS do break down in the environment, and are precursors to forming PFOS, PFHxS or PFOA.
- PFAS resist physical, chemical and biological degradation, and are very stable, can bioaccumulate and biomagnify. Molecules of PFAS are made up of a chain of carbon atoms flanked by fluorine atoms, with a hydrophilic group at their head. Their high solubility in water means that PFAS readily leach from soil to waters (surface and groundwater) and into the food chain, being transferred from organism to organism including plants.

There are a large number (thousands) of PFAS compounds, currently Australian environmental and human health guideline values are reported for only the following three compounds: PFOS, PFOA & PFHxS. This is due to:

- Many of the other PFAS compounds break down into one or more of these three compounds.
- These three PFAS are extremely difficult to break down any further and so are persistent.
- These three PFAS are found in the highest concentrations in the environment (water, soil, and sediment).
- These three PFAS are known to be bioaccumulative, with PFOS usually of most concern from a bioaccumulation perspective.

1.2 Purpose

Establish the current PFAS conditions on site and detail requirements for the assessment and management of Per- and Poly-Fluoroalkyl Substances (PFAS) contamination at SCA.

1.3 Scope

This Plan applies to all activities including operational, maintenance and construction activities at SCA that interact with soil or water impacted by PFAS. This includes material generated from activities such as demolition waste from infrastructure that is potentially contaminated with PFAS due to interactions with impacted soil / water.

SCA was declared a Priority Development Area (PDA) under the *Economic Development Act 2012* by the Minister for Economic Development in July 2023. An overarching requirement for this PDA includes that developments must protect human health and the environment by appropriately managing contaminated land, groundwater and surface

water. Accordingly, all development that occurs at SCA, that is associated with the PDA, are to be managed in accordance with this Plan.

The Plan has been based on PFAS site investigation and monitoring data to the end of 2023. References of all site investigation and monitoring reports associated with this Plan is provided in **References** section of this Plan.

1.4 Objectives

The objectives of this Plan are to:

1. Document the current sources, pathways and known extent of PFAS contamination at the Airport.
2. Protect human health and the environment by managing contaminated land, groundwater and surface water in the PDA in accordance with:
 - PFAS National Environmental Management Plan (NEMP) (v2.0)
 - *Environment Protection Act 1994* (EP Act)
3. Ensures airport operational, development and maintenance activities:
 - Avoids, to the greatest extent practicable, then minimises and mitigates adverse impacts on people, property and the environment from contaminated land,
 - Manages contaminated land to ensure all land is suitable for its proposed future use,
 - Ensures that best practice management measures are implemented to prevent contamination spreading beyond its existing extent due to development activities,
 - No impact on water quality, particularly waterways adjoining the PDA
 - Where on contaminated land under the Environmental Protection Act 1994 must be in accordance with a site management plan under chapter 7 part 8 of the Environmental Protection Act 1994 and
 - Removal of contaminated soil from contaminated land under the Environmental Protection Act 1994 must be in accordance with a site disposal permit under the Environmental Protection Act 1994.
 - Emissions (including air, water and soil pollutants) are in accordance with the Environmental Protection Act 1994 for management of prescribed water contaminants.
4. The siting, design, construction, and operation gives appropriate consideration to development constraints by avoiding, to the greatest extent practicable, then minimising and mitigating emissions so that there is no negative impact on natural environment or public health.
5. Reviewed and endorsed by a Department of Environment, Science and Innovation (DESI) certified Contaminated Land Auditor (CLA).

1.5 Management Approach

1.5.1 Adaptive management process overview

Adaptive management aims to provide a robust framework for sound management and decision-making for flexible project environments (refer **Table 1**). It is a carefully planned and structured, iterative approach that facilitates improved management and decision making over time in response to evolving knowledge and changing circumstances. Fundamentally, it involves implementing evidence-based management actions, monitoring and evaluating the outcomes of these actions, and systematically adapting those actions according to what is learned.

Table 1 Adaptive management process overview

Management Element	Description	Source / Process
Objectives	Defines clear objectives to guide decisions that are specific, measurable, achievable, results-oriented and time-based (SMART)	• PDA development requirements that relate to site contamination and environmental protection (includes EP Act requirements).
Process Model	Defines the management problem by analysing the environment and establishing	• Baseline environmental values, threats and impacts. Use of extensive reporting & data set for SCA.

Management Element	Description	Source / Process
	baseline conditions and an understanding of how these may be impacted by airport construction and maintenance activities. Describe the threats and process that influence the objectives. Describe how management actions are expected to meet objectives Define the management problem	• PFAS management regulatory obligations and guidance for protection of environmental and human health values. • Integrate PFAS management process into SCAPL's business management systems; e.g. EMS, Project management system • Develop Conceptual Site Models (CSMs) for each PDA development precinct • Hypothesis testing using statistical analysis of minimum 4 years monitoring data • Describe environmental outcomes
Plan	Plan how management actions will be implemented for operational, construction and maintenance activities. Plan monitoring of management effectiveness.	• Select actions based on outcomes of CSM and hypothesis testing. • Actions to comply with PFAS NEMP (v2.0), EP Act to prevent environmental harm, PDA development requirements. • Assign roles and responsibilities for actions. • Establish Plan performance indicators. • Develop ambient monitoring program.
Implementation Feedback / Review	Carry out the implementation of monitoring program. Annual reporting of PFAS Plan performance to EDQ, DESI, SCC.	• Analyse and evaluate monitoring data and Plan's performance. • Update CSM and use the information to adjust management actions. • DESI accredited Contaminated Land Auditor to review and endorse Annual reporting that includes monitoring results.

2 BACKGROUND

2.1 Site Setting

SCA is located at Marcoola on the Sunshine Coast, QLD. It is situated approximately 5 km north of the regional centre of Maroochy and 110 km north of Brisbane. Please see Table 2 below detailing the site details:

Table 2 Site Details

Item	Description
Address	Friendship Ave, Marcoola QLD 4564
Legal Owner	Sunshine Coast Regional Council (also referred to as Sunshine Coast Council) formally known as Council of the Shire of Maroochy/ Maroochy Shire Council
Lot and Plan	Lot 699 on SP296245 (former Lot 699 on SP261024) Lot 898 on CG4782, Lot 101 on SP286017, Lot 98 on SP176239, Lot 99 on SP176239, Lot 857 on CG4403, Lot 101 on CP883235, Lot 53 on SP298053, Lot 54 on SP298053, Lot 1105 on SP206553, Lot 1106 on SP206556, Lot 51 on SP298053, Lot 52 on SP298053, Lot 1 on SP269581
Zoning	Community Facilities Zone (Air Services)
SCA Property Area	Approximately 460 hectares (ha)
Surrounding Land Use	<u>North</u> Mt Coolum National Park, residential land use, with some agricultural land use. <u>South</u> Airport infrastructure followed by David Low Way then open sports fields. <u>East</u> Residential dwellings, with the Pacific Ocean farther east. <u>West</u> Mt Coolum National Park, followed by agricultural land use, then Maroochy River.

2.2 Future Proposed Development

The Airport is identified in the South East Queensland (SEQ) Regional Plan 2023 (State Development and Infrastructure) as major enabling infrastructure to support the northern gateway regional economic cluster and contributes to the continued economic growth of the Sunshine Coast.

2.2.1 Sunshine Coast Airport Master Plan

SCC approved SCAPL's Master 2040 Plan in October 2017. The development objectives include:

- Strive to operate sustainably and minimise the Airport's environmental footprint.
- Minimise the impact of Airport operations on neighbouring communities.

REPORT

- Engage effectively on economic and environmental issues as a principal community partner.

The 2040 Master Plan was produced to fulfil a requirement of the airport lease agreement between SCC and SCAPL. The Master Plan is not a legally-binding planning document and all development decisions will be subject to the Sunshine Coast Airport PDA development scheme requirements.

The Airport Master Plan is SCAPL's planning document that sets out how the airport will be developed over time to accommodate the future needs of the airport and the community as they grow over the next 20 years and beyond. Under the Airport Master Plan, the site is divided into five precincts for the purpose of future development opportunities as described in the Table 3 below.

Table 3 SCAPL Airport Master Plan Overview

Name	Description	Development Opportunities and Activities
Aviation Precinct	The Aviation Precinct provides the core aviation and airside infrastructure to enable a safe, compliant and effective airport. Development within the aviation Precinct will be reserved specifically for air services. This precinct includes the Wallum Heath Management Area (WHMA) and the Vegetation Management Area (VMA) biodiversity areas.	This precinct is mostly developed as part of the SCAEP. There may be some future movement of services but new development is expected to be minimal.
Gateway Precinct	The Gateway Precinct (including the Terminal Precinct) is the focal point of the airport and will be the primary public access point. The precinct provides space for the terminal, associated car parking and a range of commercial uses aligned to enhance the activities that take place in the Aviation Precinct. The Gateway Precinct will be used for a mix of aviation and ancillary purposes.	The main new development opportunities for the precinct are in the north and the south and would require some clearing (northern section) and filling (both sections) with associated drainage management. These new areas will support a range of commercial and aviation support uses. This area may also be supported by development of a new road access to David Low Way to the south and an associated internal road network.
Aerospace Precinct	The Aerospace Precinct will accommodate fixed-wing and helicopter operations at the airport, with improved infrastructure and airside access to provide greater opportunity for general aviation business to grow and prosper. General aviation activities will be consolidated in a single area while also providing for separation between fixed-wing and helicopter operations.	This precinct is mostly developed, with the most significant development activity being the consolidation of helicopter operations. There may be some future change in particular aviation activities but new development is expected to be minimal.
Airport North Precinct	The Airport North Precinct will be a completely new precinct, focusing on high-quality public domain areas, retail and food and beverage outlets near Marcoola Beach consistent with existing and proposed tourism development in the immediate locality.	This precinct represents one of the two major development areas under the Master Plan. The key development activity expected for this area is the development of a new road access to David Low Way and the associated internal road network for the precinct. Additionally, commercial development opportunities may require drainage works.
Airport West Precinct	The Airport West Precinct provides capacity to provide numerous aviation, commercial and logistics support opportunities, subject to	This precinct represents one of the two major development areas under the Master Plan but is presently significantly constrained by flooding risks. Development of the area, therefore, would require significant works to

Name	Description	Development Opportunities and Activities
	resolution of existing flooding challenges. This precinct includes the Mount Emu she-oak retained and translocated populations and biodiversity areas and the conservation corridor.	provide appropriate flood immunity without offsite impacts. An internal road network would be required, connected to Finland Road. This network may also include a new access to Finland Road directly from the Sunshine Motorway.

Additional to these development opportunities, the Master Plan also notes the possibility of developing a light rail access to the SCA from Maroochydore. The rail would follow the alignment of the Sunshine Motorway until the North Shore Connection Road from where it would travel east to link to the SCA Gateway Precinct.

2.2.2 Priority Development Area

The Minister for Economic Development Queensland declared Sunshine Coast Airport a Priority Development Area (PDA) on 28 July 2023 under the *Economic Development Act 2012* (EDA). Refer Figure 1 for map of PDA.

The PDA will provide for the will provide for the implementation of a streamlined land use planning and development assessment framework to apply over the site and deliver the outcomes of the South East Queensland Regional Plan 2017. Development in the SCA PDA will include the protection of human health and the environment by appropriately managing contaminated land, groundwater and surface water in the PDA.

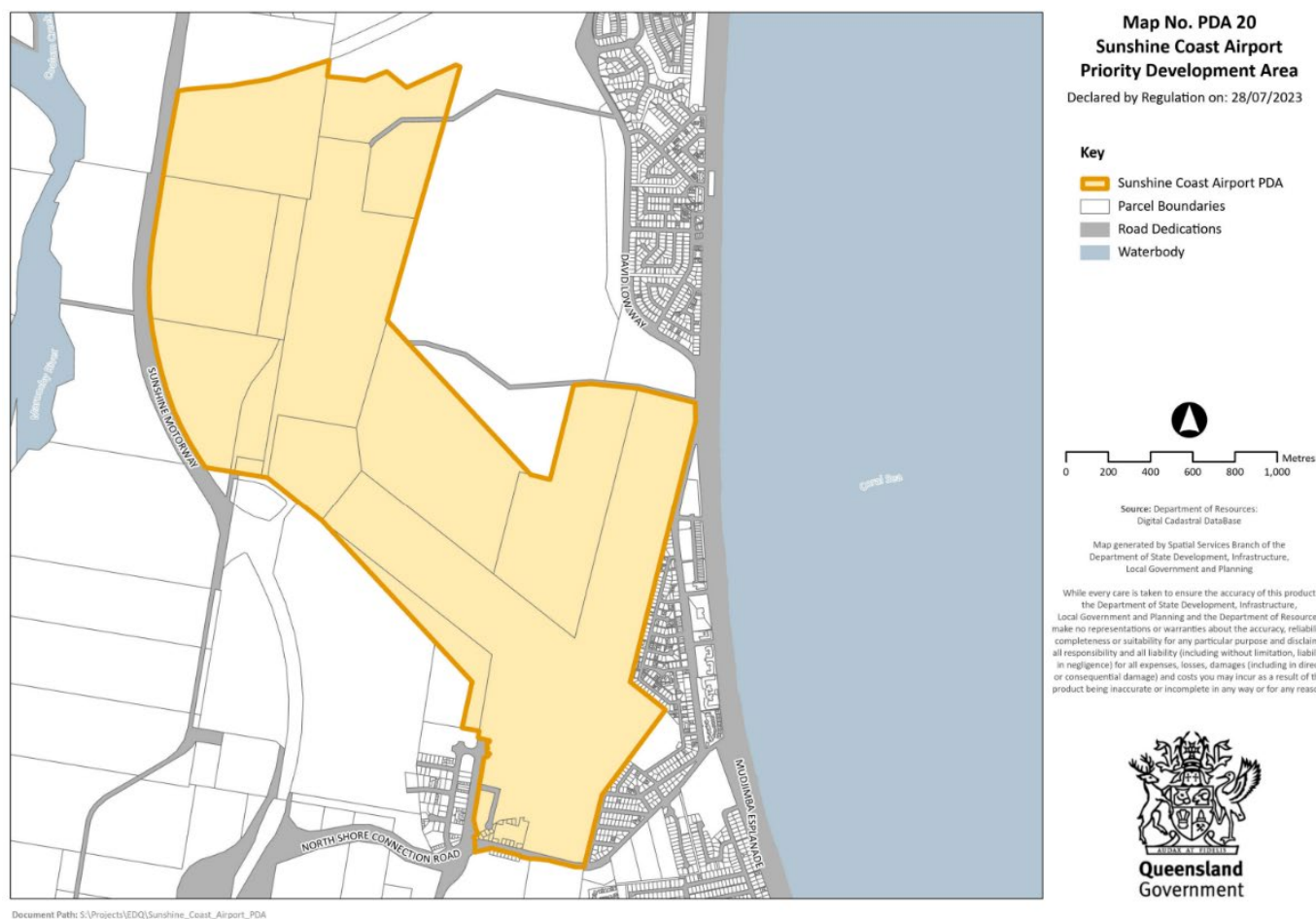


Figure 1 Map of Sunshine Coast Airport PDA

2.3 Current Operational Activities

The operational activities occurring at SCA are listed in Table 4 below (SCA EMP 2023).

Table 4 Airport operational activities

Area	Operational Activities
Airfield	• Air operations • Air traffic control • Aviation rescue firefighting services • Ground services/handling • Airport/airfield security • Drain maintenance
Terminal and associated uses	• Road access • Carparking • Car rental bays, storage and wash down areas • Retail • Short term accommodation • Airport fuel infrastructure • Freight and logistics • Airline catering and food preparation • Motor vehicle and equipment sales yards
Aerospace industries	• General aviation fixed-wing operations • General aviation helicopter operations • Aircraft maintenance/hangarage • Workshops/ Laboratories • Aviation-related business/support • Warehousing • General aviation fuelling • Medical evacuation/rescue • Car parking • Commercial

SCAPL are responsible for air service operations and the maintenance of the SCA site including greenspace, waterways/drainage and infrastructure. The remaining operations typically occur within tenanted areas including aviation businesses, shops and cafes. Aviation businesses include mechanical works such as servicing and repairs and ancillary support services. Most shops and cafes are located within the airport terminal.

Contractors are engaged periodically by SCAPL and/or tenants to undertake work on the SCA. The scope of work for contractors will typically fall within one of the operational activities mentioned above (SCA EMP 2023).

3 APPLICATION

3.1 Who will use the Plan?

This Plan applies to:

All Airport infrastructure, operational and maintenance works including:

- Carrying out construction and maintenance works across the Airport site;
- Identification and implementation of required assessment and remediation works;
- Ongoing management and monitoring of PFAS at the Airport;
- Environmental approvals associated with relevant work; and
- All employees, contractors, operators and / or tenants within SCA and their associated works.

This PFAS Management Plan should be provided as a compliance requirement for all managers, developers, and deliverers of such works.

3.2 Roles and Responsibilities

PFAS management will align with general environmental management responsibilities associated with the relevant SCA management level and role. The PFAS management responsibilities are consistent with the roles and responsibilities outlined in the SCA's Environmental Management Plan (2023).

SCAPL currently has an Environmental Management System (EMS) framework in place which is consistent with the requirements of ISO14001. This framework enables SCA to employ organisational capabilities and resources in an efficient and effective manner to improve the quality of environmental management within the business.

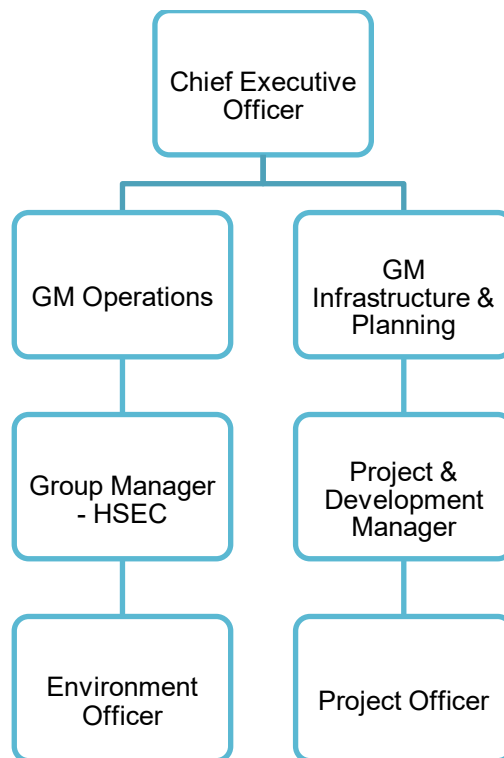
Table 5 (Roles and Responsibilities) and Figure 2 (SCA Org-structure) summarise the roles, responsibilities and reporting structure that apply in connection with the implementation of this Plan.

Table 5 Roles and Responsibilities

Roles	PFAS Management Responsibilities
CEO	• Approves the objectives and targets of SCA's Environmental Management Plan (EMP) and the PFAS Management Plan • Ensuring the appropriate resources are available to fulfil the commitments of the EMP • Ensuring a commitment from staff and management to meet the objectives of the PFAS Management Plan
General Manager - Operations	• Accountable for maintaining and implementing the PFAS Management Plan • Reviewing the objectives and targets of the EMP and associated PFAS management activities • Monitoring the implementation of the PFAS Management Plan via regular meetings with the Airfield Development Manager and Environmental Officer
Group Manager - HSEC	• Responsible for maintaining and implementing the PFAS Management Plan • Reviewing the objectives and targets of the EMP and associated PFAS management activities • Monitoring the implementation of the SCA PFAS Management Plan via regular meetings with the Airfield Manager and Environment Officer
Airfield Manager	• Reviewing the objectives and targets of the EMP and associated PFAS management activities • Monitoring implementation of SCA EMP via regular meetings with the Environment Officer • Ensuring development guidelines are in alignment with the PFAS Management Plan
Project and Development Manager / Project Officer	• Developing capital project scopes • Managing capital projects from conceptual design to completion • Evaluating capital project tenders

Roles	PFAS Management Responsibilities
	Ensuring project budget has considered cost for managing PFAS potential impacts'
Environment Officer	- Responsible for maintaining and implementing the PFAS Management Plan - Approving PFAS sampling plans and Construction Environmental Management Plans (CEMPs) - Data management and record keeping - Communicating the Plan to internal and external stakeholders - Seeking advice from regulators - Commissioning of Suitably Qualified Persons (SQPs) to undertake works in accordance with statutory requirements
DESI Certified Contaminated Land Auditor	- Liaise with EDQ and DESI regarding their requirements for the Plan - Review and endorse PFAS Management Plan, including: - PFAS monitoring program associated with the Plan - Annual reporting of the Plan

Figure 2 SCA organisational structure for the PFAS Management Plan



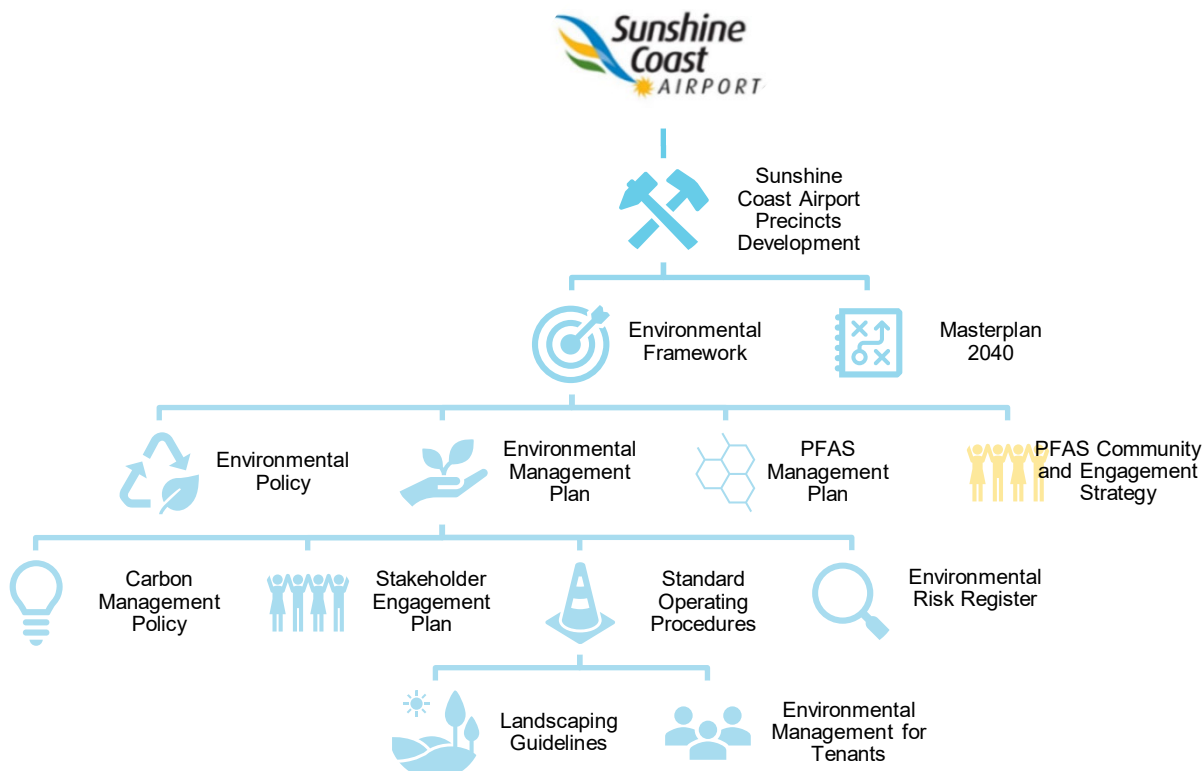
The Plan contains requirements for a Suitably Qualified Person (SQP) to prepare risk assessments and sampling plans. Following is the SCA process for approving such activities:



3.3 Integration with the SCA Environmental Management System

SCA has an environmental management system that is aligned to the requirements of ISO14001. The PFAS Management Plan falls under the Environmental Framework, within this system, as shown in Figure 3 below:

Figure 3 SCA Environmental Framework



The key elements of the EMS include:

- **Standard Operation Procedures;** these provide guidance relating to environmental management and monitoring at the SCA. They focus on activities that present a high risk to the environment and complement the implementation of this EMP. SOPs relevant to PFAS management are:
 - ENV-CL-001 Planning Due Diligence Checklist
 - Works that involve reconfiguring a lot on plan, requires the identification of planning and environmental requirements, their incorporation into design, consultation with DESI on approval requirements.
 - Works that require or lead to the disturbance of PFAS, undertake PFAS contamination testing and prepare a relevant management strategy in accordance with the PFAS NEMP and/or National Environment Protection (Assessment of Site Contamination) Measure 1999, as relevant; liaise with DESI regarding requirements.
 - Works that involve the movement of soil from an EMR-listed lot to a non-listed lot requires consultation with DESI on requirements for a Soil Disposal Permit.
 - Works that involve the movement of soil containing PFAS or other contaminants to an area with a lower level of PFAS contamination (whether on the same lot or not); requires the preparation and implementation a management framework in accordance with the PFAS NEMP; consult with DESI regarding approval and management requirements.
 - ENV-CL-002 Environmental Compliance Checklist
 - Audit checklist for Activity-specific (e.g. Drain Management) and Issue-specific (e.g. Soil handling and contamination) SCA environmental elements for management.
- **SCA Risk Register;** primary objective of supporting the Company achieve its strategic objectives by providing a structured and consistent approach to identifying, rating, mitigating, managing and monitoring risks. The Airport's Risk Management and Compliance Program; is Board approved, based upon the risk management standard AS/NZS ISO 31000:2009, with quarterly Board reporting.

- **Environmental Risk Register and Action Plan;** a risk register, including associated mitigation and management measures, has been developed for ground services and cargo handling operations. The register identifies environmental risks including hydrocarbon spills, unauthorised clearing, incorrect waste disposal and discharge of contaminated waste. The Environmental Action Plan sets out daily or routine actions to be undertaken to minimise the risk of environmental harm as a result of an event.
- **Environmental Management Plan;** aims to mitigate, manage and minimise environmental impacts that are within or adjacent to the SCA by providing obligations for managing environmental risks from Airport activities that include:
 - Management of new developments;
 - Protection of significant fauna;
 - Management of stormwater;
 - Contamination and management of spills;
 - Management of hazardous materials;
 - Ground-based noise;
 - Compliance to lease conditions; and
 - Storage of dangerous goods.

The EMP's management elements that support integration with this PFAS Management Plan should be referenced during construction and maintenance. These include the following with relevant PFAS performance criteria.

Table 6 EMP management elements & performance criteria

EMP Management Element	Performance Criteria
2.0 - Drain Management	All PFAS material is contained and treated
4.0 – Tenants and Contractors	No environmental harm as a result of tenant/contractor activity
5.0 – Waste	No environmental harm associated with the generation, management and disposal of wastes on site
6.0 – Hazardous Materials and Spill Responses	No unauthorised release of hazardous or dangerous substances from site
10.0 - Biodiversity Areas	No impact to flora and fauna values on site
11.0 – Stormwater and Groundwater Management	Minimise potential impacts on water quality of adjacent waterways and surface waters
12.0 – Soil Handling and Contamination	No movement of contaminated material without appropriate licensing and management

- **PFAS Community & Engagement Strategy**

The PFAS Community and Engagement Strategy will feed into the Airport's existing engagement program and information-sharing tools and mechanisms.

3.4 Work Health and Safety

3.4.1 SCA Safety Management Plan

This Plan relates to the management of materials that may be contaminated with PFAS and considered to be low risk based on previous risk assessments. Any advice contained within this Plan is specific to PFAS and does not account for any potential human health or ecological risks from other contaminants.

All works undertaken at Sunshine Coast Airport must comply with:

- SCA safety systems and operating procedures
- Directions given by the SCA Safety Manager

Extensive testing for PFAS has been undertaken at Sunshine Coast Airport. While some groundwater samples have exceeded the health-based guideline values for drinking water and recreational use, groundwater is not used at

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Sunshine Coast Airport for either of these purposes. Health advice in Australia notes that the primary human exposure pathway for PFAS is through ingestion and that PFAS do not easily pass through the skin, therefore as a group, the volatility is generally low. As such, any additional workplace precautions, or PPE (Personal Protective Equipment) outside of the standard Work, Health and Safety (WHS) procedures for construction activities at Sunshine Coast Airport are not required.

- **Duties and Responsibilities**

The General Manager-Operations and Assets (GMOA) has appointed the Safety Manager and Airfield Manager to be the SMS Safety Officers (SO) for their respective business areas within Sunshine Coast Airport. The SMS SO has an open line of communication to the GMOA for all safety related matters. The GMOA has an open line of communication to the SCA Pty Ltd CEO for all safety related matters.

The Safety Manager will be responsible for PFAS WHS management policy that includes:

- Work Health & Safety Compliance
- Record management
- Incident and Hazard Reporting
- Risk assessments
- Safety Bulletins

- **Consultation and Collaboration**

The Safety Manager will ensure that third parties have completed SMS induction training that may include PFAS WHS where applicable and Contractors SWMS (Safety Work Method Statements) have addressed PFAS WHS issues where applicable.

Communication of PFAS safety hazards, risks & incidents are to be reported and managed through the Sunshine Coast Airport incident reporting system or via the Airport hard copy Hazard and Incident Reporting Form.

- **Safe work practices / PPE**

The risk of exposure to PFAS must be minimised in the workplace wherever possible. Where elimination is not possible, the risk of exposure must be assessed and managed in accordance with the hierarchy of exposure controls and have regard for safe work procedures.

The primary exposure pathways in the workplace are inhalation of spray mist and dust contaminated with PFAS. Use of best-practice construction methods to prevent spray mist during dewatering activities and dust generation during earthworks are to be employed onsite.

Workers and staff undertaking soil excavation related activities should wear the appropriate personal protective equipment (PPE) as outlined in relevant sections of the SWMS.

- **Audit Process / Record-keeping policy**

Risk management process to be reviewed annually or as required, (e.g. new advice issued by Federal or Qld health authorities), to determine whether the risk treatments/controls are effective.

Records of the process for communication of PFAS WHS issues (including training records) will be kept for at least 3 years and made available for inspection or audit by third parties.

SWMS for construction and maintenance activities that involve interaction with PFAS contamination soil or water are to be provided to the Safety Manager for input into the annual review and reporting of this PFAS Management Plan.

4 PFAS OBLIGATIONS AND REQUIREMENTS

4.1 Airport Lease Agreement

The lease agreement for the SCA establishes duties of SCAPL towards the SCC related to environmental obligations and approvals. Through this agreement, SCC has a role in overseeing SCAPL compliance with environmental regulation and approvals, especially the approvals from the Sunshine Coast Airport Expansion Project (SCAEP) that have ongoing effect at the SCA noting that most of these approvals will continue to be held by SCC.

The approvals that relate to PFAS management are:

Environmental Authority BRID0035

SCC is the holder of the above Environmental Authority (EA) for environmentally relevant activity (ERA) 16; Extraction and screening adjacent to Lot 36/NPW662. The EA took effect on 3rd May 2019, the dredging activity has been completed for SCAEP but the EA remains open.

The EA contains seven conditions relating to PFAS. An extract of the conditions are provided at **Appendix A**. Following is a summary:

P1 – A PFAS investigative report must be completed.

P2 – The PFAS report must include the details of a site investigation to determine the source, cause and extent of PFAS contamination at the airport, that includes:

- Analysis of potentially affected media, including soil, surface water and groundwater
- Identify PFAS contamination, pathways and impacts upon human health and environmental receptors on an off-site.
- Provide an assessment of risk of environmental harm to human or environmental receptors.
- Management actions to mitigate impacts but not limited to monitoring of surface water and groundwater.

P3 – PFAS groundwater monitoring system to provide results from at least the uppermost aquifer to detect changes in PFAS groundwater contamination from the site and in adjacent areas.

P4 – PFAS surface water monitoring system to monitor the PFAS impacts upon water quality and detect any changes in PFAS distribution from the site.

P5 – Analysis of groundwater and surface water samples occur at detection levels to enable comparison with thresholds for relevant water quality criteria.

P6 – Conduct PFAS sediment and soil testing prior to excavations.

P7 – Implement management measures for disposal or reuse of soil and groundwater that minimises PFAS migration and ensures no additional PFAS contamination beyond the airport. Measures to include:

- Tracking and reporting of all soil movement
- Notification to DESI where contamination found on a Lot that is not listed on the EMR.
- Soil disposal permit obtained for the movement of contaminated soil from a lot on the EMR to another place.

4.2 National

4.2.1 PFAS National Environmental Management Plan, Version 2.0 (2020)

The PFAS National Environmental Management Plan (NEMP (v2.0)) provides nationally agreed guidance on the management of PFAS contamination in the environment, including prevention of the spread of contamination. The PFAS NEMP (v2.0) sets out actions to assist the responsible person or organisation to demonstrate compliance with their general environmental obligations and duties for the management of PFAS, including but not limited to:

- Understanding the presence of PFAS contamination, for example, by determining the concentrations of PFAS present and/or the nature and location of PFAS sources.
- Understanding the environmental values that may be impacted by the contamination, both on- and off-Airport, such as:
 - Determining the surface water and groundwater environments.
 - Determining what the water is used for.

- Considering important issues including any off-Airport movement, PFAS transformations, and exposure pathways to receptors.
- Effectively storing and/or remediating PFAS wastes and contaminated materials.
- Undertaking appropriate monitoring to check the effectiveness of management measures implemented and to assess the extent and impacts of any contamination.
- Characterising and disposing of PFAS-contaminated waste appropriately, for example, by sending it to a facility licensed to accept it, noting dilution is not acceptable for example in soil, air, compost or other wastes or products.
- Appropriately managing PFAS-contaminated materials for reuse, including reused waste, to prevent harm to land use, human health, and the environment.
- Promptly advising environmental regulators and any persons or organisations likely to be adversely affected by any releases of any incidents and contamination.

The PFAS NEMP (v2.0) recognises the need for sound regulation of PFAS by each jurisdiction in a way that can adapt to local circumstances and emerging priorities.

4.2.2 Department of Health – PFAS enHealth Guidance Statement (2024)

Developed guidance statements on key health issues to support jurisdictional responses to incidents of environmental PFAS contamination. PFAS health guidance takes into account completed research into the human health effects of PFAS and exposure in Australia. Relevant studies include the [Australian National University \(ANU\) PFAS Health Study](#) and the [27th Australian Total Diet Study](#) undertaken by Food Standards Australia New Zealand (FSANZ).

4.2.3 National Environment Protection (Assessment of Site Contamination) Measure (2013)

Establishes a nationally consistent approach to the assessment of site contamination to ensure sound environmental management practices by the community which includes regulators, site assessors, environmental auditors, landowners, developers and industry.

National framework that contains principles, processes and practices for investigation, assessment and management of site contamination for the protection of human health and the environment. Relevant schedules are:

Schedule A - Recommended general process for assessment of site contamination

Schedule B1 - Guideline on Investigation Levels For Soil and Groundwater

Schedule B2 - Guideline on Site Characterisation

Schedule B3 - Guideline on Laboratory Analysis of Potentially Contaminated Soils

Schedule B5a - Guideline on Ecological Risk Assessment

Schedule B6 - Guideline on the Framework for Risk-Based Assessment of Groundwater Contamination

4.2.4 Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

The EPBC Act protects certain nationally significant (protected) animals, plants, habitats or places – known as Matters of National Environmental Significance (MNES). The Act also protects the whole environment (e.g. not just MNES) where actions are taken by Commonwealth agencies; such as Airservices Australia, a Government Business Enterprise (GBE) whose sole shareholder is the Commonwealth Government. Proposed actions that may have a significant impact on MNES or environment (for Cth Agency) must be referred to Cth Environment Minister to determine whether approval is required under the Act.

4.3 Queensland

4.3.1 Environment Protection Act 1994 (EP Act)

The policy objective of this Act is to protect Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends.

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The Act establishes a general environmental duty to take reasonable and practicable measures to avoid environmental impacts, as well as an approvals and management hierarchy associated with pollution prevention and environmentally relevant activities. Key obligations as they relate to PFAS management, include:

- A general environmental duty (s. 319)
 - *A person must not carry out any activity that causes, or is likely to cause, environmental harm unless the person takes all reasonable and practicable measures to prevent or minimise the harm (the general environmental duty)*
- Duty to notify environmental harm (s. 320-320G)
- Not depositing a prescribed water contaminant (which includes PFAS) in waters, stormwater drainage, or at another place, and in a way, so that the contaminant could reasonably be expected to wash, blow, fall or otherwise move to State waters (refer to section 440ZG), except in circumstances where the operator of the undertaking has the required approval.
- Offence of causing serious or material environmental harm (s.437-439)
- Offence to place contaminant where environmental harm or nuisance may be caused (s. 443)
- Requirement for a soil disposal permit to dispose of soil from a lot on the Environmental Management Register (EMR) or Contaminated Land Register (CLR).
- Waste tracking obligations for any transport or disposal of PFAS wastes off and on-airport

The Department of Environment & Science (DESI) management of contaminated land is achieved through actions that includes:

- Administering the land registers; the EMR and the CLR.
- Assessing contaminated land investigation documents (CLIDs) that include:
 - Site investigation report
 - Validation report
 - Site management plan
- Assessing disposal permit applications for contaminated soil.

Overview of site contamination management under EP Act

The EP Act is the primary legislation governing the decision making process on land contamination in Queensland.

Contaminated land registers

Contaminated land in Queensland is administered by land registers (Environmental Management Register (EMR) and the Contaminated Land Register (CLR)) managed by DESI. Land that has been used or is being used for a notifiable activity and for which that information is provided to the department is recorded on the EMR. Most of the EMR listed sites pose a 'low risk' to human health and/or the environment under their current land use. Entry on the EMR does not necessarily mean that the land must be cleaned up or that the current land use must stop.

The CLR includes sites classified as confirmed in the contaminated site register and those with proven contamination characterised as causing or potentially causing serious environmental harm or public health risk. SCA does not contain lot listed on the CLR.

Contaminated land investigation documents

Removing land from the EMR/CLR or obtaining a site suitability statement with a site management plan (SMP) for land on the EMR requires reconfiguring or removing land on the EMR/CLR. This requires the owner of the land to be aware of the nature and extent of contamination present and any risks that it may pose to human health or the environment. This is achieved through the preparation of contaminated land investigation document (CLID) that is any, or a combination of the following:

- site investigation document
- validation report
- draft site management plan

A contaminated land investigation document must be prepared by a Suitably Qualified Person (SQP) and then certified by a DESI accredited contaminated land auditor. The outcome of the site investigation will determine whether the land is contaminated land and, if so, whether:

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- the contamination needs to be remediated, in which case a validation report must be prepared following remediation to confirm that the remediation process was successful; and/or
- the contamination is best managed under the conditions of site management plan, in which case a draft site management plan must be prepared and submitted for approval.

Queensland auditor handbook for contaminated land (DESI 2023)

This handbook is the primary guideline for auditors and contains modules that describe the functions of auditor (Module 5) and the content requirements for CLIDs, certifications and audit reports (Module 6)

An SQP is the person who is a current member of a professional organisation prescribed under sch 8 of the Environmental Protection Regulation 2008 (the EP Regulation) and has qualifications and experience relevant to performing the regulatory functions. A detailed description of SQPs is provided in the Guideline Assessing a Suitably Qualified Person in accordance with s 564 of the EP Act (DEHP, 2013).

Site Management Plans

In accordance with Queensland government management of contaminated sites, SMP approved by DESI under the EP Act are used to ensure management activities can be undertaken without causing environmental harm given the presence of hazardous contaminants affecting the land (i.e. primarily, PFAS for SCA).

Section 389(3)(d) of the EP Act requires a draft site management plan to include a reference to, and a copy of, the site investigation report or validation report that relates to the plan.

The draft site management plan must take account of, and address, the following matters:

- a) the nature and extent of contamination
- b) expected risks to public safety and amenity, human health, environmental values of waters and ecological values associated with any residual contamination of the land after site management measures are implemented
- c) appropriate standards that will: protect public safety and amenity, human health, environmental values of waters and ecological values; support the suitability of the land for its intended use and associated activities; and avoid environmental harm to other land and the surrounding environment
- d) associated risks to environmental values that could arise from actions taken to manage contamination
- e) the mitigation strategy that will be applied to specified parts of the land to reduce and manage risks
- f) ongoing monitoring of the effectiveness of the adopted measures, environmental quality and residual risks
- g) whether the objectives, methods and measures proposed in the plan are appropriate
- h) measurable, achievable and auditable conditions that would apply the objectives, methods and measures.

Submission of CLID for DESI approval

Any person, such as the landowner, occupier or suitably qualified person, can submit a contaminated land investigation document, however:

- If the contaminated land investigation document is being prepared in order to comply with a DESI notice, the person issued the notice to must submit the document.
- Any draft site management plan (or amended plan) not prepared by the landowner must include a statement by the landowner agreeing to the draft plan. Note, as SCAPL is not the landowner, SCC's agreement will be required.
- If a corporation is submitting the documents, an executive officer of the corporation is taken to be the 'relevant person' submitting the documents.

The submission must be accompanied by a contaminated land auditor's certification.

Environmental Protection (Water and Wetland Biodiversity) Policy 2019

This policy established under the EP Act, identifies local environmental values (EVs), management goals and water quality objectives (WQOs) for Queensland's tidal and non-tidal waters protects the state's water environment whilst allowing for development that is ecologically sustainable.

The policy describes the approach to manage wastewater discharge and to evaluate the following options for wastewater or contaminants in the order in which they are listed:

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- a) Appropriate treatment and release to a waste facility or sewer; appropriate treatment and release to land; appropriate treatment and release to surface waters or groundwaters.
- i. Appropriate treatment, of wastewater or contaminants, means – for release to a sewerage service provider's waste facility or sewer—treatment that meets the service provider's requirements for the release to the waste facility or sewer; or
 - ii. for release to land—treatment that ensures the release to land is ecologically sustainable; or
 - iii. for release to surface waters or groundwaters – treatment that ensures, or the taking of other steps to ensure, that the release:
 1. will not affect the environmental values for the waters; or
 2. is offset by undertaking an activity to counterbalance the impacts of releasing wastewater or contaminants to waters, other than an offset to which the *Environmental Offsets Act 2014* (Qld) applies.

Compliance and Enforcement under EP Act

The *Guideline, Compliance and Enforcement, EP Act 1994 (ESR/2016/2514 v3.00)* provides an overview of compliance and enforcement by DESI under the EP Act 1994. The statutory tools relevant to PFAS management and site contamination include the following.

- **Notice requiring relevant information;** DESI can issue a notice to a person and require them to give information that is relevant to the administration or enforcement of the Act if it suspects on reasonable grounds that the person:
 - has knowledge of a relevant matter; or
 - is in possession or control of a document that is relevant to the matter.
- **Requirement to answer questions;** if DESI suspects on reasonable grounds that:
 - an offence against the Act has happened; and
 - a person may be able to give information about the offence.
- **Direction notice;** A direction notice may be issued for a contravention of any of the following provisions of the Act that include:
 - s.426 – offence of carrying out an ERA without an environmental authority (EA);
 - s.440 – offence of causing environmental nuisance;
 - s.440ZG – depositing prescribed water contaminants in water and related matters.

The notice may require the person to remedy the contravention within a specified timeframe.

- **Environmental protection orders (EPOs);** can be used where it is necessary to require an entity to undertake or stop an activity. DESI may issue EPOs when certain actions occur that includes:
 - if the person was required to conduct or commission and environmental evaluation, and they have not complied;
 - if the person is contravening or has contravened any of the following:
 - Direction notices (s.363E)
 - Depositing prescribed water contaminants in waters (s44ZG)
- **Environmental Evaluation;** An environmental evaluation is a compliance tool designed to evaluate an activity or event, or contamination of land, in order to facilitate a solution to the problem. Environmental evaluation is either an environmental audit or environmental investigation.

Under section 326BA of the Act, the DESI may issue an investigation notice for land that is recorded in the environmental management register (EMR) or contaminated land register (CLR), if DESI is:

- satisfied or suspects on reasonable grounds that the hazardous contaminant contaminating the land has the potential to cause serious or material environmental harm, and
- satisfied that a person, animal or another part of the environment may be exposed to the hazardous contaminant, whether or not it is on the land, then the department may issue an investigation notice. The notice will require person to:
 - conduct or commission an investigation about the contamination or potential contamination of the land; and
 - provide DESI a site investigation report prepared in accordance with the contaminated land investigation document (CLID) requirements in Chapter 7, Part 8, Division 3 of the Act.
 - the site investigation report must be submitted to DESI using the Contaminated land investigation document – approved form (ESR/2023/63398).

4.3.2 Planning Act 2016

This establishes an approvals regime for development activities and includes triggers associated with particular environmental matters established under other legislation and policies.

Prior to SCA being declared a PDA under the ED Act, any material change of use (MCU) or operational works involving clearing, earthworks or engineering works will likely trigger the need for assessment and approval under the Planning Scheme or any applicable planning laws, with SCC acting as the Assessment Manager. In this role, SCC will apply the environmental and planning requirements of the Planning Scheme (and any relevant State Agencies) to activities at the SCA. This function has now been transferred to Minister for Economic Development Queensland (EDQ).

4.3.3 Planning Regulation 2017

The Planning Regulation 2017 supports the operation of the Planning Act 2016 by categorising development and establishing an approvals regime for development activities, including triggers associated with particular environmental matters (includes contaminated land registers) established under other legislation and policies.

The objective of *Part 4 – Contaminated land* of the Regulation is to ensure that site remediation is not required before a development application for a Material Change of Use (MCU) for development assessable under a planning scheme can be made to a local government.

Applicants may seek to have either the CLR or the EMR state that the premises are suitable for the proposed use or have the site removed from the register rather than make an application to the state. Once the CLR or EMR states that the premises are suitable for the proposed use in accordance with a site suitability statement for the premises, the use becomes accepted development and an application is not required.¹

4.3.4 Nature Conservation Act 1992

The Nature Conservation Act 1992 provides the legislative basis for the conservation of nature through the dedication, declaration and management of protected areas and the protection of native wildlife and its habitat. The regulations associated with the Act describe the proposed management intent for listed threatened species that includes to monitor and review environmental impact procedures to ensure they:

- (i) accurately assess the extent of the impact, on the threatened species, of the activities to which the procedures relate;
- (ii) provide effective measures to mitigate any adverse impact of the activities on the threatened species; and
- (iii) if there is an adverse impact of the activities on an area in which the threatened species normally lives, provide for the enhancement of other areas where the species normally lives.

Refer to Section 6 – Existing Environment; for a description of listed threatened species on and within vicinity of the Airport that have potential for exposure to PFAS.

4.3.5 Economic Development Act 2012

Declaration of Priority Development Area

The main purpose of the ED Act is to facilitate economic development and development for community purposes.

The Sunshine Coast Airport was declared a PDA by Minister for Economic Development Queensland (MEDQ) on 28 July 2023. The PDA development scheme is likely to commence in the third quarter of 2024 and will be the regulatory document to assist in planning and co-ordinating the development of the airport. The development scheme is finalised and approved by the MEDQ following consultation with other State Agencies interests in the PDA and public consultation.

Following the declaration of the SCA as a PDA under the Economic Development Act 2012, the assessment manager for development activities will be Economic Development Queensland.

Development Requirements

The PDA development requirements that apply to PFAS management are:

¹ Planning (Contaminated Land) Amendment Regulation 2017 - Explanatory Notes for SL 2017 No.201 made under the Planning Act 2016

- Protection of human health and the environment by appropriately managing contaminated land, groundwater and surface water (section 2.2 – Vision)
- Stormwater discharges achieve water quality objectives prescribed in the Environmental Protection (Water and Wetland Biodiversity) Policy 2019 and management of prescribed water contaminants under section 440ZG of the Environmental Protection Act (section 4.1.4, item 3.)
- Development is located, designed, constructed and operated to enhance environmental outcomes and to avoid, or where avoidance is not reasonably possible, minimise and mitigate adverse impacts on (section 4.1.4, item 6):
 - a. the environmental values of receiving waters
- Development preserves environmental quality and community safety by ensuring (section 4.1.5, item 1.):
 - emissions (including air, water and soil pollutants, noise, vibration, heat, light, radioactivity and electromagnetic radiation) and hazards are in accordance with the Environmental Protection Act 1994 for management of prescribed water contaminants.
- Development: (section 4.1.4, item 9.)
 - a. avoids, to the greatest extent practicable, then minimises and mitigates adverse impacts on people, property and the environment from contaminated land,
 - b. manages contaminated land to ensure all land is suitable for its proposed future use,
 - c. ensures that best practice management measures are implemented to prevent contamination spreading beyond its existing extent due to development activities, and
 - d. Where on contaminated land under the Environmental Protection Act 1994 must be in accordance with a site management plan under chapter 7 part 8 of the Environmental Protection Act 1994 and removal of contaminated soil from contaminated land under the Environmental Protection Act 1994 must be in accordance with a site disposal permit under the Environmental Protection Act 1994.

4.4 Airport Environmental Management Framework

SCA has an Environmental Management System (EMS) framework in place which is consistent with the requirements of ISO14001. The key element of the EMS include the following:

- SCA Environmental Policy – SCAPL Board and Executive Management is committed to regulatory compliance, pollution prevention, and continuous improvement (refer **Appendix B**).
- Standard Operation Procedures – these provide guidance relating to environmental management and monitoring at the SCA. They focus on activities that present a high risk to the environment and complement the implementation of SCA's EMP.
- Environmental Risk Register and Action Plan – a risk register, including associated mitigation and management measures, has been developed for ground services and cargo handling operations. The register identifies environmental risks including hydrocarbon spills, unauthorised clearing, incorrect waste disposal and discharge of contaminated waste. The Environmental Action Plan sets out daily or routine actions to be undertaken to minimise the risk of environmental harm as a result of an event.
- General Emergency Response Plan – this captures the emergency response procedures for managing incidents and events that present a high risk of environmental harm, and include responses to environmental events as well as evacuation procedures, roles and responsibilities and incident reporting requirements.

5 PFAS CONTAMINATED LAND

5.1 Historical use of PFAS at Sunshine Coast Airport

The use of Aqueous Film Forming Foam (AFFF) containing PFAS at Sunshine Coast Airport was historically used for aviation rescue and firefighting services (ARFFS) but ceased in 2011. SCA does not have a fire training facility, where regional training is undertaken at Brisbane Airport instead. Residual contamination is associated with incident response and a limited number of releases from fire truck performance testing, cleaning, and foam spills (refer Table 7).

Table 7 Historic Source Areas at SCA (Core PFAS Baseline Report 2021)

Activity	Date	Details	LOT
Aviation Rescue and Firefighting	1 Nov 2005	Hawker Hunter aircraft crash and skid along former Runway 18/36, final destination at end of runway. No fire observed but precautionary foam blankets applied beneath aircraft (~800 L water plus 50 L foam).	699 SP296245
Aviation Rescue and Firefighting	6 May 2006	Moonie M20F aircraft crash into a grass strip near northern end of the former Runway 12/30. No fire observed but precautionary foam blankets applied beneath aircraft (~300 L water plus 60 L foam).	699 SP296245
Fire station discharge	Late 2010	Unintentional discharge from the current fire station resulting from an overflow from a concrete pad which flowed into the Eastern Perimeter Drain and off-site. Unclear whether foam was Ansulite or a fluorine-free foam (Solberg RF6).	699 SP296245
Firefighting truck performance testing	Unknown	Firefighting truck performance testing on grassed areas near Gate 16 and outside the former fire station, which included wash down of trucks and equipment on concrete. Washdown waters flowed overland onto the grass area near the general aviation apron and taxiway.	699 SP296245
Runoff zone at old fire station	Unknown	Area identified downgradient from old fire station.	699 SP296245
Relocated drain sediment	Ongoing	Open drains are routinely cleaned of sediment and this material was deposited to a designated sediment relocation area.	898 CG4782

PFAS is transported via surface water flows and also deposits into sediments, where it has been detected in the stormwater drains in the airport. Over time, relocation of sediment from drain maintenance to a centralised sediment relocation site resulted in a secondary source. The locations of historic PFAS source areas are shown in **Figure 4**.



5.2 Contaminated land listings

SCA comprises 14 land parcels covering about 460 ha (**Figure 5**). Nine lots are listed on the EMR (**Table 8**). None of the lots are listed on the CLR. Large areas of the Airport are listed on the EMR for PFAS contaminated groundwater due to potential threat to ecological receptors associated with freshwater and wetland environments. The EMR lists land which a notifiable activity is being or has been carried out as well as land confirmed as contaminated land.²

Figure 5 Current SCA boundary and associated Lots



² EP Act – Schedule 3

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Table 8 Existing SCA land parcels and EMR listings

Land Parcel	DESI EMR Listing
Lot 699 on SP261024	The site has been subject to the following Notifiable Activity or Hazardous Contaminant. PETROLEUM PRODUCT OR OIL STORAGE - storing petroleum products or oil HAZARDOUS CONTAMINANT - This site has been subject to a hazardous contaminant. Concentrations BTEX compounds and TPH in groundwater above screen levels referring to groundwater. Monitoring Report Shell Maroochydore Airport, July 2011. PFOS Soil Max 0.0125mg/kg, Groundwater Max 0.224ug/L, Surface Water 0.06ug/L. PFHxS Soil Max 0.0125mg/kg
Lot 898 on CG4782	The site has been subject to contamination from a hazardous contaminant as follows: HAZARDOUS CONTAMINANT - This site has been subject to a hazardous contaminant. Soil: PFHxS and PFOS maximum: 0.142mg/kg Groundwater: PFOS maximum: 0.006ug/L
Lot 101 on SP286017	Not Listed DESI has advised that this lot which is at the northern end former runway is considered contaminated and yet to be listed as DESI are still waiting for the subdivision plan to be registered and process to be completed. ³
Lot 98 on SP176239	The site has been subject to the following Notifiable Activity or Hazardous Contaminant. HAZARDOUS CONTAMINANT - This site has been subject to a hazardous contaminant. Max PFAS 0.14 ug/L Max PFOS 0.069 ug/L
Lot 99 on SP176239	Not Listed
Lot 857 on CG4403	The site has been subject to the following Notifiable Activity or Hazardous Contaminant. HAZARDOUS CONTAMINANT - This site has been subject to a hazardous contaminant. Total PFAS 0.04 ug/L Total PFOS 0.02 ug/L
Lot 101 on CP883235	The site has been subject to the following Notifiable Activity or Hazardous Contaminant. HAZARDOUS CONTAMINANT - This site has been subject to a hazardous contaminant. Total PFAS 0.04 ug/L Total PFOS 0.02 ug/L
Lot 53 on SP298053	The site has been subject to the following Notifiable Activity or Hazardous Contaminant. HAZARDOUS CONTAMINANT - This site has been subject to a hazardous contaminant. Total PFAS 0.04 ug/L Total PFOS 0.02 ug/L
Lot 54 on SP298053	Not Listed
Lot 1105 on SP206553	Not Listed
Lot 1106 on SP206556	The site has been subject to the following Notifiable Activity or Hazardous Contaminant. HAZARDOUS CONTAMINANT - This site has been subject to a hazardous contaminant. Total PFAS 0.042 ug/L Total PFOS 0.024 ug/L
Lot 51 on SP298053	The site has been subject to the following Notifiable Activity or Hazardous Contaminant. HAZARDOUS CONTAMINANT - This site has been subject to a hazardous contaminant. Max PFAS 0.042 ug/L Max PFOS 0.024 ug/L
Lot 52 on SP298053	The site has been subject to the following Notifiable Activity or Hazardous Contaminant. HAZARDOUS CONTAMINANT - This site has been subject to a hazardous contaminant. Total PFAS 0.04 ug/L Total PFOS 0.021 ug/L
Lot 1 on SP269581	Not Listed

³ State Agency comments – SCA Proposed PDA – Collated State Agency interests (Sept. 2023)

5.3 Process for contaminated land management

To meet the PDA and EP Act requirements for site contamination management, the following process will be implemented.

- (i) The PDA Development Scheme is anticipated to commence in the third quarter of 2024.
- (ii) PDA is to be subdivided from the existing 14 Lots into the five proposed development lots (these will be new Lot on Plans) – Aerospace Precinct, Gateway Precinct, Airport North Precinct, Aviation Precinct and Airport West Precinct (refer **Figure 6**).
- (iii) SCA site to be managed under the existing SCAPL Environmental Management Plan (EMP) with appropriate subplans, one of which will be this PFAS Management Plan.
- (iv) This PFAS MP will:
 - Encompass the entire site
 - Reviewed by a DESI accredited Contaminated Land Auditor (CLA).
 - Prepared by using previously collected data from the SCAEP (e.g., Core Baseline Report 2021) and continued surface water and groundwater data collected on and off-site. Plus, additional investigations that are currently underway by Airservices Australia.
 - Detail required monitoring programs (i.e., on and off-site surface water, groundwater, etc.
 - Produce an annual report prepared by a SQP based on the monitoring requirements of the PFAS MP. The annual report will be reviewed by the CLA and a copy provided to DESI and EDQ each year.

The PFAS MP will provide appropriate management of the SCA site while SCAPL progressively prepares CLIDs and draft SMPs for each proposed future development area (Lot on Plan).

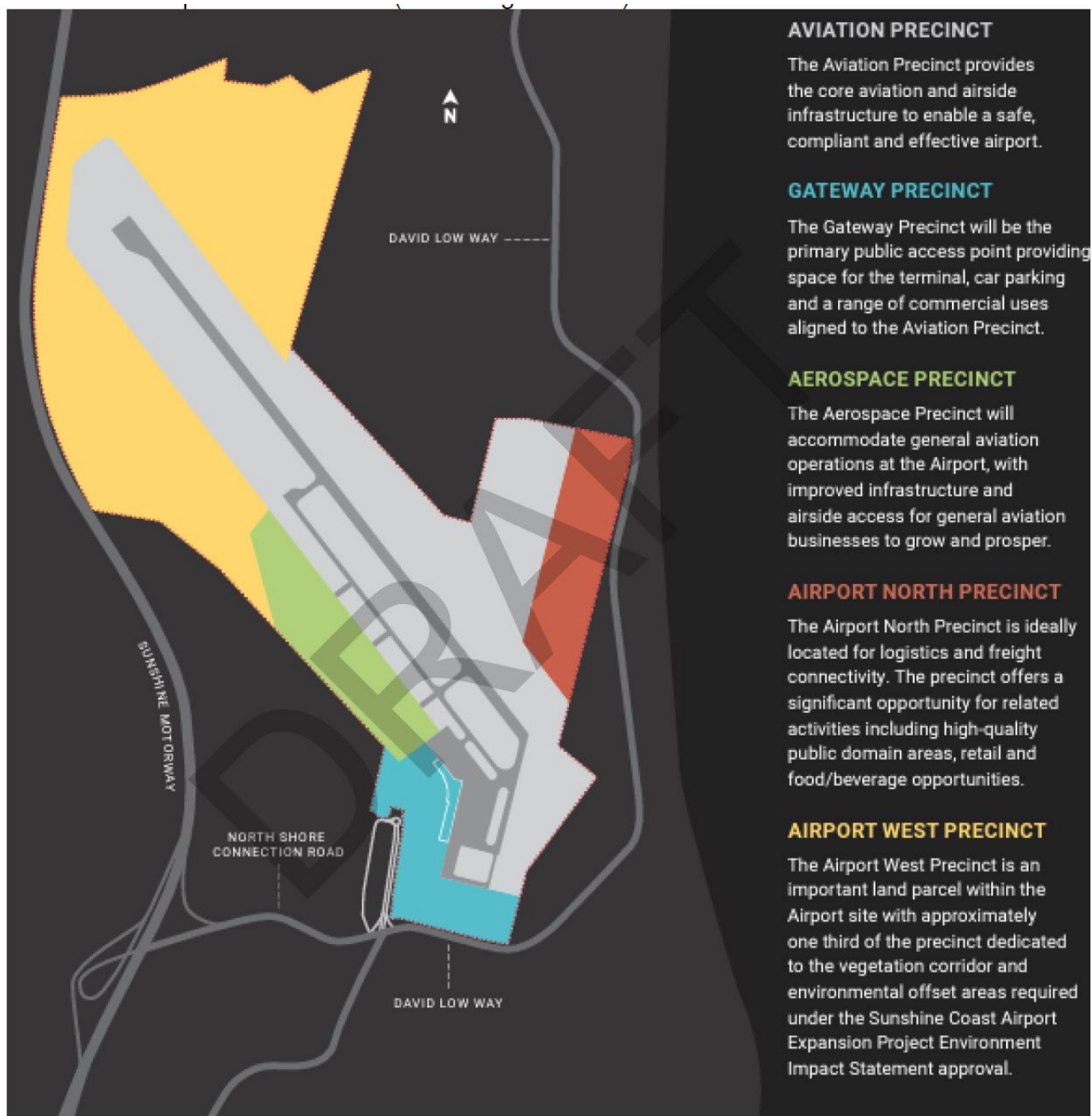
The CLIDs will use existing data and new site data to be collected for each proposed development area (Lot on Plan). New site data will include all contaminants of potential concern (CoPCs) (i.e., hydrocarbons, heavy metals, PFAS etc).

The CLIDs and draft SMPs will be based on proposed future land uses.

CLIDs and draft SMPs will be prepared sequentially based on SCAPL proposed timeline.

CLIDs and draft SMPS will be reviewed and certified by a DESI certified Contaminated Land Auditor.

Figure 6 Proposed SCA PDA Development Lots



6 EXISTING ENVIRONMENT

Understanding the environmental values that may be impacted by contamination, both on-and off- Airport will enable operators on SCA to understand the potential for environmental impacts from interacting with PFAS contaminated soil and water. Environmentally significant areas on and adjacent to SCA, along with the major drainage lines are shown in **Figure 7**.

6.1 Landscape context

The SCA site is within the coastal zone of South East Queensland (SEQ). SCA predominantly lies on a large coastal plain of sand and mud.

Vegetation within and adjacent to the SCA site has been cleared since European settlement for agriculture and urban development, however large areas of contiguous remnant vegetation remain on the airport such as the Wallum Health Management Area and along the Maroochy River as well as north and south of the airport. A large part of this vegetation has been conserved within the Mount Coolum National Park, with the two sections at Marcoola to the north and south of the SCA site.

The Marcoola sections of the National Park also form part of Coolum Creek and Lower Maroochy River Wetlands, which are listed as nationally important wetlands. In the south and west of the study area, Maroochy River Conservation Park and Maroochy Wetlands Conservation Park also forms part of the Lower Maroochy River Wetlands. Coolum Creek Conservation Park also exists in the north-east of the study area.

Areas of native remnant vegetation in the project area are directly connected with both the northern and southern sections of Mount Coolum National Park. Connectivity to Coolum Creek Conservation Park and Maroochy Wetlands Conservation Park is severed by the Sunshine Motorway and cropping land. In the south, connectivity to the Maroochy River Conservation Park is also severed by airport infrastructure and urban development.

Surface water at the Airport drains to the Maroochy River via following major drainage networks (SCA EMP 2023):

- The Eastern Perimeter Drain (EPD) runs north-south along the eastern perimeter of the SCA
- The Southern Perimeter Drain (SPD) runs east-west along the southern perimeter of the SCA
- The Northern Perimeter Drain (NPD) runs east-west along the northern perimeter of the SCA

Another minor drain, the Western Perimeter Drain (WPD) runs north-south along the western perimeter of the SCA, also discharges to the Maroochy River.

Further description of the above drainage networks is provided in the discussion on section 12.2.1.2 Surface water transport and discharge, along with a figure showing the alignment and flow of the above drains.

Groundwater levels across the site range from approximately 0.25 to 2.25 metres below ground level (mbgl), indicating a shallow aquifer. The water table is closer to the ground surface in the west, adjacent to the Maroochy River. Generally, groundwater on the north east of the Airport flows toward the ocean, while groundwater on the north western portion flows toward Marcoola Drain and Maroochy River. Groundwater flows from the area south of the existing runway is toward the Twin Water tidal canal system. Tidal fluctuations from the coastline to the east and Maroochy River to the west propagate into the groundwater system.

6.2 Aquatic Ecology

The freshwater environments within the SCA site are highly modified and relatively homogenous. These environments are comprised of permanent drains, drainage channels and semi-permanent wetlands. Macroinvertebrate abundance and diversity was found to be generally low. All sites showed significantly reduced to severely impaired macroinvertebrate biodiversity, and stream condition was poor. Results are likely to be attributable to loss of normal stream habitat and poor water quality (SCC, 2014). Field investigations undertaken as part of the EIS for the Sunshine Coast Airport Expansion Project (SCAEP) did not find any freshwater fish species of conservation significance (SCC, 2014).

The reach of the Maroochy River adjacent to the SCA site is broad (70-200m wide), fringed by mangrove forests. Small areas of saltmarsh are also present adjacent to the SCA. Large tidal flats, and seagrass beds are not known to occur in this area of the Maroochy River. The mangroves, saltmarsh and tidal channels found in these nearshore environments and creek surroundings provide important fisheries habitat and foraging areas. A wide range of estuarine species are found in this reach of the Maroochy River including recreational and commercially significant

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fish species (bream, flathead, mullet, catfish) small, bodied fish (glassfish, herring, pilchard) and crustaceans (prawns, mud crabs).

The lower reach of Marcoola Drain (near the NPD site discharge) exhibits similar ecological characteristics to the Maroochy River stretch adjacent to the SCA with similar aquatic biota are present within this waterway.

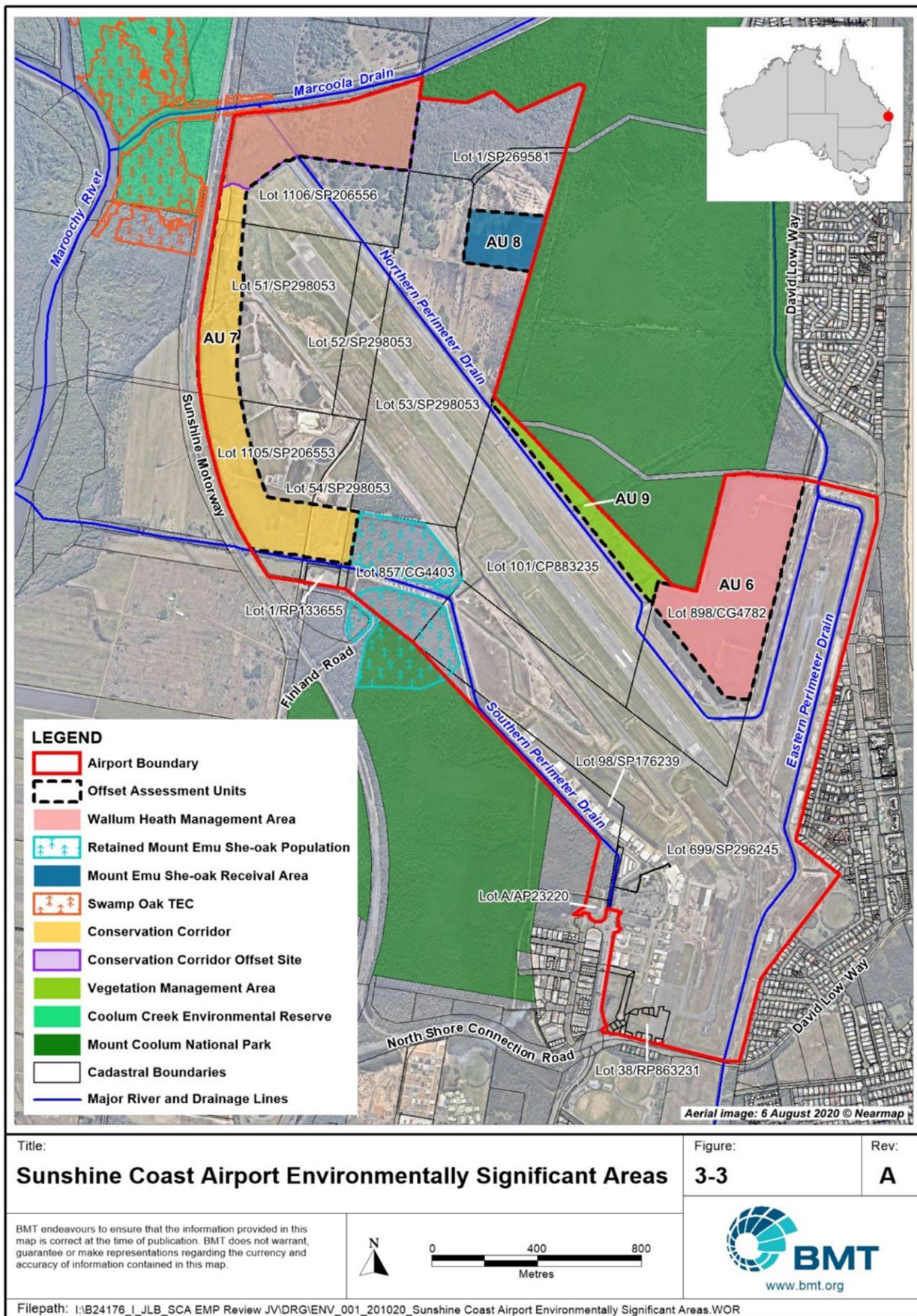
The SPD channel and upper reach of Marcoola Drain have an estuarine to freshwater character, varying along a longitudinal gradient and in response to variations to rainfall and tidal influxes. Both channels have large *Melaleuca* wetland/open forest adjoining the upstream reaches. The littoral zone of both channels has a dense sedge cover, and lily pads are abundant in open water areas. These environments provide habitat for a range of invertebrate and small-bodied fish species (typically small-bodied non-commercial species) and crustaceans (including prawns and non-commercial crab species) of indirect and direct fisheries value. Due to absence of deep waters, the freshwater environments do not provide high quality habitat for larger-bodied fish (SCA EMP 2023).

Marine Ecology

There is no marine habitat located within the SCA site itself, however surface water from the SCA site drains to Marcoola drain and the South Maroochy River which have brackish to saline waters and support a marine ecological community. Marcoola drain supports a narrow mangrove community due to the presence of unsealed access roads that run parallel and close to the drain. The exception to this is the area near the drain's confluence with the Maroochy River (west of the Sunshine Motorway), where vegetation clearing is negligible, and a wider more intact mangrove community is present.

There is a general gradient of richer macroinvertebrate communities located at the downstream saline extent of Marcoola Drain, near its confluence with the Maroochy River, and generally poorer macroinvertebrate communities at the upstream freshwater extent of Marcoola Drain. The fish habitat values of Marcoola Drain are limited due to the modified nature of this waterway, particularly when compared with the more intact and extensive fish habitat available downstream in the Maroochy River. (SMEC, 2017).

Figure 7 Sunshine Coast Airport Environmentally Significant Areas



6.3 Terrestrial Ecology

The SCA operational area has been extensively cleared however there are areas to the north-west and south-west boundary that support significant flora species. Forty hectares of wallum heath vegetation holds high biodiversity values, providing habitat for many threatened fauna species. The SCA is also bound by conservation areas which are periodically impacted by localised bushfire events.

Terrestrial vegetation communities that are classified as remnant under the Vegetation Management Act 1999 are mapped within the SCAEP area. Additionally, the SCA and SCAEP operations collectively drain west into a brackish environment which provides support for mangrove and swamp oak communities, including the Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland ecological community ('Coastal Swamp Oak TEC').

6.3.1 Habitat Offsets

The SCAEP caused the loss of habitat for a range of federally and state listed threatened wildlife. Additionally, the Project cleared an area of vegetation connecting the northern and southern Marcoola sections of the Mount Coolool National Park.

In response to these impacts, SCAEP approvals included the requirement to provide for species management and biodiversity offsets. Management and offset areas, known as offset Assessment Units (AUs), have been established across the SCA and will be managed in perpetuity.

Table 9 Summary of Offset AUs (SCA EMP 2014)

Name	Management & offset requirements	Development Precinct
AU6 Wallum Heath Management Area (WHMA)	Creation of new breeding and non-breeding habitat for acid frog species. Includes construction of acid frog breeding ponds and regular slashing to maintain a heath-sedge mosaic. Registered offset for <i>L. olongburensis</i> , <i>L. freycineti</i> and <i>C. tinnula</i> .	Aviation Precinct
AU7 Connectivity Corridor	Creation of a wildlife corridor between northern and southern blocks of the Mount Coolool National Park, including non-breeding habitat for acid frogs. Northern area is registered offset for <i>L. freycineti</i> and <i>C. tinnula</i>	Airport West Precinct
AU8 Mount Emu She-oak Receival Area	Primary receival of impacted population of <i>A. emuina</i> and maintenance to achieve 2.6 times gain by 2046. Registered offset for <i>L. freycineti</i> and <i>C. tinnula</i> .	Airport West Precinct
AU9 Vegetation Management Area (VMA)	Creation of new breeding and non-breeding habitat for acid frog species. Includes construction of acid frog breeding ponds and regular slashing to maintain a heath-sedge mosaic. Includes secondary receival of impacted population of <i>A. emuina</i> and maintenance to achieve 2.6 times gain by 2046. Registered offset for <i>L. freycineti</i> , <i>C. tinnula</i> and <i>P. wallicus</i>	Aviation Precinct
Mount Emu She-oak retained population	Management of retained population of <i>A. emuina</i> .	Airport West Precinct

6.4 Flora Species

The SCA site is known to support two significant flora species, namely, *Allocasuarina emuina* (Mount Emu she-oak) and *Phaius australis* (lesser swamp orchid). Mount Emu she-oak is listed as endangered under both the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the *Nature Conservation Act 1992* (NC Act).

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Lesser swamp orchid is listed as endangered under both the EPBC Act and the NC Act. A population of lesser swamp orchid (*Phaius australis*) has been recorded within the reserve land to the north of runway 18/30 (Lot 101 CG6395) (SMEC 2017).

A Wallum Health Management Area has been established to protect breeding habitats for protected wallum acid frogs (various species) and eastern ground parrot (*Pezoporus wallicus*).

6.5 Fauna Species

SCA site and surrounds provides habitats for protected fauna as indicated in the table below.

Table 10 Protected fauna recorded on or surrounding SCA (SMEC Environmental Baseline Report 2017)

Scientific name	Common Name	Status		Likelihood of Occurring
		EPBC	NCA	
<i>Crinia tinnula</i>	wallum froglet		V	Known
<i>Litoria freycineti</i>	wallum rocketfrog		V	Known
<i>Litoria longgburensis</i>	wallum sedgefrog	V	V	Known
<i>Phippiorhynchus asiaticus</i>	black-necked stork		NT	Known
<i>Accipiter novaehollandiae</i>	grey goshawk		NT	Known
<i>Lewinia pectoralis</i>	Lewin's rail		NT	Known
<i>Numenius madagascariensis</i>	eastern curlew	M	NT	Known (downstream)
<i>Pezoporus wallicus</i>	ground parrot		V	Known
<i>Phascolarctos cinereus</i>	koala	V	V	Possible
<i>Pteropus poliocephalus</i>	grey-headed flying-fox	V	LC	Known
<i>Xeromys myoides</i>	water mouse	V	V	Known (downstream)

Field surveys completed as part of the SCAEP EIS recorded threatened frog species primarily from within the remnant wet heath/sedgeland and regrowth wet heath adjacent to RWY 18/36 and helicopter training area.

Surveys completed as part of the SCAEP EIS have estimated that the SCA site contains a population of between thirteen and sixteen ground parrot individuals.

There has been a reported presence of vulnerable (EPBC Act) water mouse *Xeromys myoides* population immediately downstream of the airport's western section in inter tidal areas. Water mice are particularly sensitive to PFAS contamination due to a very large food intake relative to their body size, the high bioaccumulation rates into their food (crustaceans, annelids and molluscs) and their behaviour of carrying sediment around in their mouths to build mud nests. Any PFAS discharge west of the Sunshine Motorway would be a potential threat to water mouse e.g., releases via the southern perimeter drain.⁴

6.6 Waterways Environmental Values

The *Environmental Protection (Water and Wetland Biodiversity) Policy 2019* is the principle legislative basis for water quality management in Queensland. The EPP (Water) provides a framework for identifying environmental values of waterways and establishing corresponding water quality objectives (WQOs) to enhance or protect identified environmental values. Environmental values and WQOs have been established for the Maroochy River catchment (Basin No. 141 (part), including all tributaries of the Maroochy River). The site lies within the Lower Maroochy Estuary sub-catchment and the following environmental values have been identified:

- Aquatic ecosystems.

⁴ DESI comments; EDQ Proposed Sunshine Coast Airport PDA Review – State Agency Interests (Sept 2023)

- Seagrass.
- Aquaculture.
- Human consumer.
- Oystering.
- Primary and secondary recreation.
- Visual recreation.
- Cultural and spiritual values.

6.7 PFAS Ambient Environment

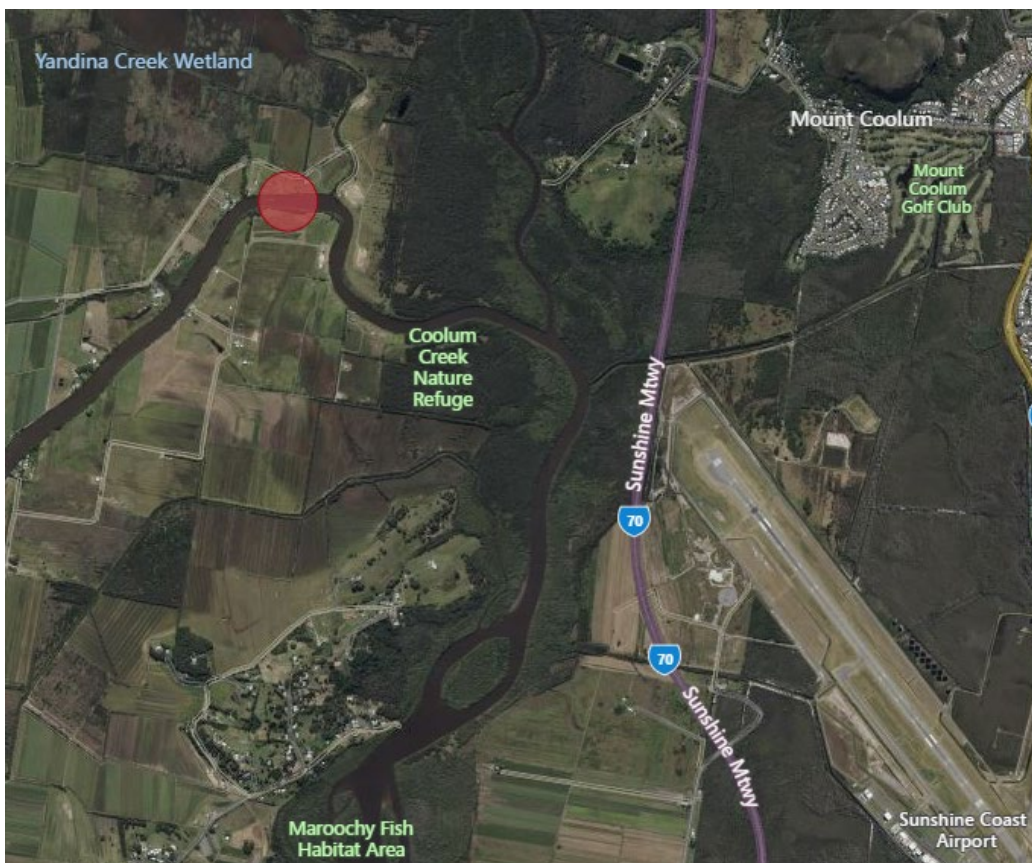
The Queensland Government's PFAS Ambient Monitoring Program 2019-2020, conducted a state-wide sampling program between May 2019 and March 2020, with water samples collected every two months at 55 sites covering the coast from the Wet Tropics to South East Queensland.

Of the 55 sites, six samples were collected in the Maroochy River. Of the regulated PFAS analytes only PFOS exceeded the 99% species protection - high conservation value systems threshold (PFAS NEMP v2.0). A summary of the PFOS results follow:

- Median – 0.005 ug/L
- Range – <LOR – 0.0013 ug/L
- Laboratory Limit of Reporting (LOR) for PFOS was 0.0001 µg/L

It is noted that the data on ambient PFAS concentrations is very limited and does not address any variability that may be relevant to PFAS in waterways in the area. Ambient sampling location indicated by red dot in figure below⁵.

Figure 8 PFAS Ambient sampling location



⁵ PFAS data portal - Ambient surface water;
<https://www.qld.gov.au/environment/management/environmental/incidents/pfas/monitoring-program-report>

7 HUMAN HEALTH AND ECOLOGICAL GUIDELINE VALUES

The PFAS NEMP (v2.0) provides guideline values for soil and water in different human health and ecological exposure scenarios. Relevant guideline values are presented in tables below. Although there are several thousand different PFAS, laboratories typically test for 28 or more and there are only published guideline values in Australia for PFOS, PFHxS and PFOA.

The *Environmental Protection Act 1994* defines all PFAS as prescribed contaminants for the purpose of contaminating natural waterways. Guideline values for PFAS are subject to change. Projects should ensure the current values are referenced for assessing risks and determining management actions.

The purpose of the guideline values is to act as a trigger for further investigation, including site-specific or area-specific risk assessment, and/or environmental management. The guidelines are not intended to be used as clean-up criteria or an authorisation to pollute up to these values.

7.1 Human Health

SCA is an operating airport, which is consistent with the commercial/industrial land use setting of the NEPM and NEMP (v2.0). In addition, drinking water is supplied as reticulated town water. Surface water and groundwater are not used as potable water on or off the Airport site. Water on SCA is not used for recreational purposes.

Table 11 Human health guideline values

Exposure scenario	PFOS+PFHxS	PFOA	Relevance for SCA
Tolerable Daily Intake (TDI)			
All exposures and land uses	0.02 ug/kg.bw/day	0.16 ug/kg.bw/day	
Soil			
Residential with garden/accessible soil (HIL A)	0.01 mg/kg	0.1 mg/kg	Not relevant
Residential with minimal opportunities for soil access (HIL B)	2 mg/kg	20 mg/kg	Not relevant
Public open space (HIL C)	1 mg/kg	10 mg/kg	Relevant for workers/visitors to conservation areas on SCA
Industrial/ commercial (HIL D)	20 mg/kg	50 mg/kg	Relevant
Water			
Drinking water	0.07 µg/L	0.56 µg/L	For potable water supplies. Not directly relevant for SCA and surrounding areas as they are on reticulated water.
Recreational water	2 µg/L	10 µg/L	Applicable for off-Airport waterways. May be considered for incidental on-site water contact (i.e. contact with water during maintenance or construction works)

*bw – body weight

Food Standards Australia and New Zealand (FSANZ) have developed 'trigger point' in food to assist authorities analysing PFAS in foods in identifying when further investigation and management be required. The following table from Appendix 4 - FSANZ PFAS Dietary Exposure Assessment report (2017).

Table 12 Food guideline values

Food	Food Classification	Trigger points for investigation (ug/kg)	
		PFOS, PFOS+PFHxS	PFOA
Fish & Seafood	Crustaceans	65	520
	Finfish (all)	5.2	41
	Fish liver	280	2240
Animal Products	Meat mammalian	3.5	28
	Milk (cattle)	0.4 or LOD if higher	2.8
	Honey	33	264
	Offal mammalian	96	765
	Poultry eggs	11	85
Fruits & Vegetables	Fruit (all)	0.6 or LOD if higher	5.1
	Vegetables (all)	1.1 or LOD if higher	8.8

LOD = Limit of detection

7.2 Ecological

The NEMP (v2.0) sets out ecological guideline values used as triggers for investigations and to assess potential risks to aquatic and terrestrial ecosystems. The ecological guideline values are not intended to be generic site remediation criteria.

Table 13 Ecological guideline values

Exposure scenario	PFOS	PFOA	Landuse or scenario	SCA Relevance
Soil				
Ecological direct exposure	1 mg/kg	10 mg/kg	All landuses	Applicable to terrestrial environments. Not applicable beneath buildings and paved areas.
Ecological indirect exposure (secondary consumers present)	0.01 mg/kg	N/a	All landuses	Applicable for areas where secondary consumers present (e.g. birds, marsupials etc). Indirect exposures may be assessed directly on the basis of biota samples. Not applicable where minimal potential for indirect exposure (no secondary consumers) – consider guideline below.
Ecological indirect exposure (secondary consumers not present)	0.14 mg/kg	N/a	Developed areas.eg. >80% covered by hard surfaces, per hectare.	Applicable to very small areas and developed areas where no secondary consumers present, and minimal potential for indirect contact. Not applicable if area is in close proximity to waterways, drainage networks or groundwater. Not applicable beneath buildings and paved areas.
Water				
Freshwater and Marine	0.00023* ug/L	19 ug/L	99% species protection - high conservation value systems	The level of protection adopted for waterways should be consistent with the water quality objectives. For bioaccumulative contaminants, which includes many PFAS, the Water Quality Guideline framework 26 advises that the 99% species protection DGV should be used for: ▪ Assessing toxicity and bioaccumulation in high conservation value ecosystems ▪ Assessing bioaccumulation in slightly to moderately disturbed ecosystems.
	0.13 ug/L	220 ug/L	95% species protection – slightly to moderately disturbed systems	

*Note – new default guideline values for aquatic ecosystem protection of PFOS in for freshwater are currently under consideration by Australian (inc. State & Territory) and New Zealand Governments (ANZG) based upon a Technical

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Brief issued in May 2023⁶. As the draft DGVs are above the current guidelines, their effect will not increase the impacts and risks observed in this report. PFOS 0.0019 ug/L 99% species protection and PFOS 0.48 ug/L 95% species protection.

Biota

Interim biota guideline value provided in the NEMP (v2.0) are shown below.

Table 14 Biota guideline values

Exposure scenario	PFOS + PFHxS	PFOA	Description	Relevance for SCA
Ecological direct exposure for wildlife diet	4.6 µg/kg	n/a	Mammalian diet - consumption of biota as wet weight food	This guideline value is to be used on sampled biota tissue for assessing risk to mammal and avian receptors based on their diet.
	8.2 µg/kg	n/a	Avian diet - consumption of biota as wet weight food	The avian diet value may not be protective of migratory wading birds that have a high food intake due to the need to gain weight rapidly. These diet values may also not be protective of reptiles and amphibians.
Ecological exposure protective of birds	0.2 µg/g	n/a	Whole bird egg as wet weight	This guideline value is to be used on sampled bird eggs to assess risk to sensitive avian ecological receptors.

⁶ ANZG 2023, Toxicant default guideline values for aquatic ecosystem protection: Perfluorooctane sulfonate (PFOS) in freshwater. Australian and New Zealand Guidelines for Fresh and Marine Water Quality

8 NATURE AND EXTENT OF PFAS CONTAMINATION

Since 2016 numerous PFAS investigations and assessments have been undertaken at Sunshine Coast Airport. The data has been consolidated in a baseline assessment for PFAS contamination at Sunshine Coast Airport (Core PFAS Baseline Report 2021). Over 4,500 samples have been collected to characterise PFAS contamination at the site and in the surrounding aquatic environments between 2016 - 2020 (**Table 15**).

Table 15 Extent of PFAS testing at SCA (Core PFAS Baseline Report 2021)

	Soil	Groundwater	Surface Water	Concrete	Aquatic Biota
Samples Collected	2,866	901	455	197	100

Tables below indicate PFAS concentrations expected to be detected in the five precincts identified in the Sunshine Coast Airport Master Plan 2040. The below values are for reference only, and for any disturbances in the project areas, the project teams are to refer to the original data sources during planning.

A systematic PFAS surface water and groundwater monitoring program has been underway at the Airport since 2018. Refer to Section 9 – Current PFAS Monitoring Program for further details and **Appendix K** for trend graphs of results for surface water and groundwater monitoring.

Following completion of the statistical analysis of the surface water and groundwater monitoring data as described in Section 11 – Statistical Assessment, the nature and extent of PFAS contamination will be updated.

8.1 Surface Water

PFOS concentrations ranged between <0.0001 µg/L to 0.15 µg/L across the site, with the highest concentrations detected within the Southern Perimeter Drain (SPD). Surface water across the site, Maroochy River and upstream locations detected PFOS concentrations that exceed the 99% species protection criteria (PFAS NEMP v2.0). Exceedance of the 95% species protection was also reported within SPD on at least one occasion.

PFOA concentrations ranged between 0.0008 µg/L to 0.23 µg/L across the site, with the highest concentrations reported within the National Park. All concentrations were reported below the adopted human health or ecological criteria.

The sum of PFHxS and PFOS concentrations ranged between <0.001 µg/L to 0.16 µg/L across the site, with the highest detected concentrations reported within the Southern Perimeter Drain.

PFAS Total Oxidizable Precursor Assay (TOPA) results indicated limited presence of PFAS precursors in the surface water samples that the conventional PFAS analysis did not detect (Core 2021 PFAS Baseline Report).

8.2 Soil

Table 16 Soil PFAS ranges for proposed Airport development precincts

Precinct	PFOS+PFHxS (mg / kg)	PFOS (mg / kg)
Aerospace Precinct	0.0001 - 0.0125	0.0001 - 0.0125
Airport North Precinct	0.0001 - 0.0025	0.0001 - 0.0025
Airport West precinct	0.0001 - 0.0005	0.0001 - 0.0005
Aviation Precinct	0.0001 - 0.0025	0.0001 - 0.0025
Gateway Precinct	0.0001 - 0.0025	0.0001 - 0.0025

Soil PFAS Heat maps adopted from Core PFAS Baseline Report (2021) are contained in **Appendices C – E**.

Sum of PFOS+PFHxS do not exceed any health investigations levels (HILs) for land use; HIL-A residential with garden/accessible soil (0.01 mg/kg) to HIL-D Industrial/Commercial (20 mg/kg).

The Aerospace Precinct has recorded exceedances of PFOS ecological indirect exposure of 0.01 mg/kg. The remaining Precincts have no exceedances of ecological guidelines values for ecological direct and indirect exposure.

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The indirect exposure soil guideline value accounts for the various pathways through which organisms can be exposed whether or not they are in direct contact with PFAS contaminated soil (eg exposure through the food chain). This guideline value provides a default value to manage the potential exposure for wildlife feeding on organism that have been exposed. For example, in an open space area, if plants and soil dwelling animals are present, it is likely that birds, small animals and/or reptiles present consuming these plants and animals (PFAS NEMP v2.0). Accordingly, the indirect exposure soil guideline value is applicable to Airport West precinct that contains large vegetated open spaces and the Aerospace precinct that contains designated conservation areas; Vegetation offset area and Wallum Health conservation area.

Soil Leachate (Australian Standard Leaching Procedure, ASLP) results across SCA

- PFOS; <0.001 ug/L to 1.1 ug/L
- PFOA; <0.001 ug/L to 0.18 ug/L
- PFOS+PFHxS; <0.001 ug/L to 1.134 ug/L

PFOS leachate results exceed the 95% species protection for slightly to moderately aquatic ecosystems of 0.013 ug/L and 99% species protection for high conservation value aquatic ecosystems of 0.00023 ug/L (PFAS NEMP v2.0).

PFOA leachate results do not exceed ecological water quality guideline values.

PFOS leachate results exceed human health guidelines values for drinking water (0.07 ug/L).

Soil and Sediment TOPA

The results of TOPA analysis undertaken indicate:

- Limited presence of PFAS precursors in the soil/sediment samples that the conventional PFAS analysis does not detect, or
- Limited potential for additional perfluorinated alkyl acids (PFAA) releases (noting the difference in the achievable LORs between TOPA and standard non-TOPA PFAS analysis).

8.3 Groundwater

Table 17 Ground Water PFAS ranges for proposed Airport development precincts

Precinct	PFOS+PFHxS µg/L	PFOS µg/L
Aerospace Precinct	0.001 - 0.1	0.007 - 0.1
Airport North Precinct	0.04 - 0.1	0.004 - 0.01
Airport West Precinct	0.001 - 0.004	0.000 - 0.001
Aviation Precinct	0.001 - 0.1	0.001 - 0.1
Gateway Precinct	0.001 - 0.1	0.004 - 0.1

The results of groundwater analysis across the Airport have reported concentrations of PFOS above the adopted ecological guidelines 99% species protection of 0.00023 ug/L (PFAS NEMP v2.0).

PFOA results do not exceed ecological water quality guideline values.

PFOS results exceed human health guidelines values for drinking water (0.07 ug/L); noting that groundwater is not a source for drinking water onsite.

Four plumes have been identified, located adjacent to the existing terminal building, Gate 16 (former AFFF performance testing area) and the areas near the old fire station.

Groundwater PFAS Heat maps adopted from Core Baseline report are at **Appendices F - H**.

8.4 Sediment

Sediment samples have been collected from surface drains on the following lots with their maximum results for PFOS and PFOS + PFHxS provided below.

Table 18 Drain Sediment sample maximum PFOS concentrations

Lot	PFOS + PFHxS (mg/kg)	PFOS (mg/kg)
Lot 98 SP176239	0.0042	0.0040
Lot 699 SP296245	0.0007	0.0007
Lot 857 CG4403	<0.0002	<0.0002
Lot 1105 SP206553	0.0015	0.0001

The PFAS NEMP v2.0 does not contain human health or ecological guidelines values for sediment.

8.5 Aquatic Biota

Two sampling events for Aquatic Biota have been conducted comprising (Core PFAS Baseline Report 2021):

- Sampling event conducted by Qld DESI during April 2019; fish in the lower reaches of Marcoola Drain on the western side of Sunshine Motorway and upper reaches of the Marcoola Drain on the eastern side of David Low Way, and
- Sampling event conducted by an environmental consultant (BMT) during 2019; aquatic biota (fish, crustacean, plants) within the Marcoola Drain, SPD and Maroochy River.

The table below shows that (Core PFAS Baseline Report 2021):

- The sum PFOS + PFHxS concentrations for the edible portions of fish (n = 50), prawns (n = 15) and mud crab (n = 3) were less than the laboratory reporting limit or below the FSANZ (2017) guidelines for human health for the consumption of seafood.
- Concentrations of PFAS in the whole-body samples of key species groups across the sampling locations were typically below the mammalian and avian diet screening criteria or <LOR. The exceptions were:
 - Three fish samples (from n = 21), consisting of two guppies (6-7 µg/kg) and one glassfish (5 µg/kg) in the Marcoola Drain that had sum PFOS + PFHxS concentrations marginally greater than the mammalian diet screening criteria (4.6 µg/kg). Two mammal species known to exist in the Maroochy River estuary area feed on aquatic food resources. These are the water mouse (*Xeromys myoides*) and water rat (*Hydromys chrysogaster*). The former is a listed threatened species. The key prey of the water mouse are crabs (fish is not eaten by this species), which contained sum PFOS + PFHxS concentrations that were < LOR (1 µg/kg) in all samples (n = 6). The water rat is a non-threatened species.
 - Two southern herring sample (from n = 12) obtained from the Maroochy River that had a sum PFOS + PFHxS concentration (5 µg/kg) marginally greater than the mammalian diet screening criteria (4.6 µg/kg). However, the average sum PFOS + PFHxS concentration in southern herring (1.8 µg/kg, n = 12) was less than the mammalian diet screening criteria.
 - One empire gudgeon (17 µg/kg), three striped gudgeon (9-10 µg/kg), five glassfish (12-30 µg/kg) and one bullrout (10 µg/kg) collected within the SPD contained sum PFOS + PFHxS concentrations that exceeded the avian (8.2 µg/kg) and mammalian (4.6 µg/kg) diet screening criteria. Three of the seven *Macrobrachium* prawn samples (5-8 µg/kg) exceeded the mammalian diet screening criteria; however, the average concentration measured in *Macrobrachium* sp. was 4.4 µg/kg (n = 7) which is below the screening criteria.
- The combined sampling results for biota samples suggests that although PFAS can bioaccumulate in aquatic species, particularly in freshwater environments of the SPD, it is not widely observed to occur across fish and invertebrates at levels that exceed the relevant screening criteria.
- None of the fish, prawns and mud crabs analysed exceeded the human health guidelines for the consumption of seafood.

Table 19 Summary of PFAS results from biota samples

Biota sampled	PFOA (ug/kg)	Sum PFOS+PFHxS (µg/kg)
Marcoola Drain		
<i>Edible Portions</i>		
Fish (Yellow-finned bream (n=2), sea mullet (n=10), blue catfish (n=1) and bony bream (n=1); total n =14)	<1	<1
<i>Whole Body</i>		
Fish (Empire gudgeon (n=1), Guppy (n=2), Striped gudgeon (n=1), pony fish (n=1), dusky flathead (n=1), glassfish (n=7), sea mullet (n=2), banded toadfish (n=1), yellow-finned bream (n=1), silver biddy (n=4); total n =21)	<1	<1 - 7 (Guppy 6-7 µg/kg; n = 2) (glassfish 5 µg/kg; n = 1)
Invertebrates (Semaphore crab (n=2), mud crab (n=1), furry-clawed crab (n=3), benthic invertebrates/detritus (n=3); total n =9)	<1	<1 - 1
Aquatic plants/detritus (<i>Phragmites australis</i> , leaf litter, mangrove pneumatophores; n =10)	<1	<1
Southern Perimeter Drain		
<i>Edible Portions</i>		
Sea mullet (n =2), blue catfish (n =2)	<1	<1 - 1
<i>Macrobrachium</i> Prawn (n=5)	<1	<1 - 8
<i>Whole Body</i>		
Fish (Empire gudgeon (n=2), stripped gudgeon (n=2), pony fish (n=1), sea mullet (n=5), glassfish (n=6), bullrout (n=3); total n=19)	<1	<1 - 30 (Empire gudgeon 17 µg/kg, n =1) (Stripped gudgeon 9-10 µg/kg, n=3) (Glassfish 12-30 µg/kg, n=5) (Bullrout 10 µg/kg, n=1)
Invertebrates (<i>Macrobrachium</i> prawn (n=7))	<1	<i>M. prawn</i> 5-8 µg/kg, n=3
Aquatic plants/detritus (leaf litter/invertebrates, sedges, mangrove pneumatophores, total n=10)	<1	<1
Maroochy River		
<i>Edible Portions</i>		
Fish (sea mullet (n=27), blue catfish (n=1), bony bream (n=1), yellow-finned bream (n=3); total n=32)	<1	<1
<i>Whole Body</i>		
Fish (ponyfish (n=4), banded toadfish (n=1), silver biddy (n=14), yellow-finned bream (n=6), glassfish (n=6), giant tRevBily (n=2), blue catfish (n=4), dusky flathead (n=1), southern herring (n=12); total n=50)	<1	<1 -5 (Southern herring 5 µg/kg, n=2)
Invertebrates (school prawns (n=3), furry-clawed crab (n=3), mud crab (n=2), orange-clawed fiddler crab (n=1); benthic invertebrates/detritus (n=7), total n=16)	<1	<1-2
Aquatic plants/detritus (mangrove leaf litter, mangrove pneumatophores, leaf litter, filamentous algae, n=17)	<1	<1

9 CURRENT PFAS MONITORING PROGRAM

PFAS surface water and groundwater monitoring program has occurred on the Airport since 2018.

- SMEC; July 2018 - May 2019; contamination monitoring event to establish current contamination impacts at SCA
- Core; Nov 2019 – present; biannual monitoring events.

SMEC was commissioned by Sunshine Coast Council (SCC) to prepare a water quality monitoring program (WQMP) for the Sunshine Coast Airport Expansion Project (SCAEP) at Marcoola in response to the Environmental Authority (EA) BRID0035 in relation to the PFAS conditions P3 – P5.

Prior to commencement of the PFAS monitoring program, the following previous monitoring events had occurred:

- Two surface and ground water monitoring events were undertaken for PFAS at the SCA in 2017 by environmental consultants; GHD and SMEC (SMEC PSI Report 2018)
- PFAS monitoring was also undertaken by SMEC over December 2017 to January 2018 in wells onsite as well as in the surrounding area. Subsequently, new wells within the site and wells immediately north of the (runway) RWY 18/36 were monitored for PFAS in May 2018.

9.1 Program design

This monitoring program is based on the conceptual site model developed for the PFAS preliminary site investigation conducted by SMEC (SMEC PSI Report 2018) and involves repeat sample collection at static locations within the site and surrounding area.

Locations were selected to provide coverage of:

- all major drainage lines engaged by the approved works
- modelled PFAS plumes
- waters hydraulically up gradient of the approved works, including those reported to be not impacted by PFAS
- waters hydraulically down gradient of the approved works.

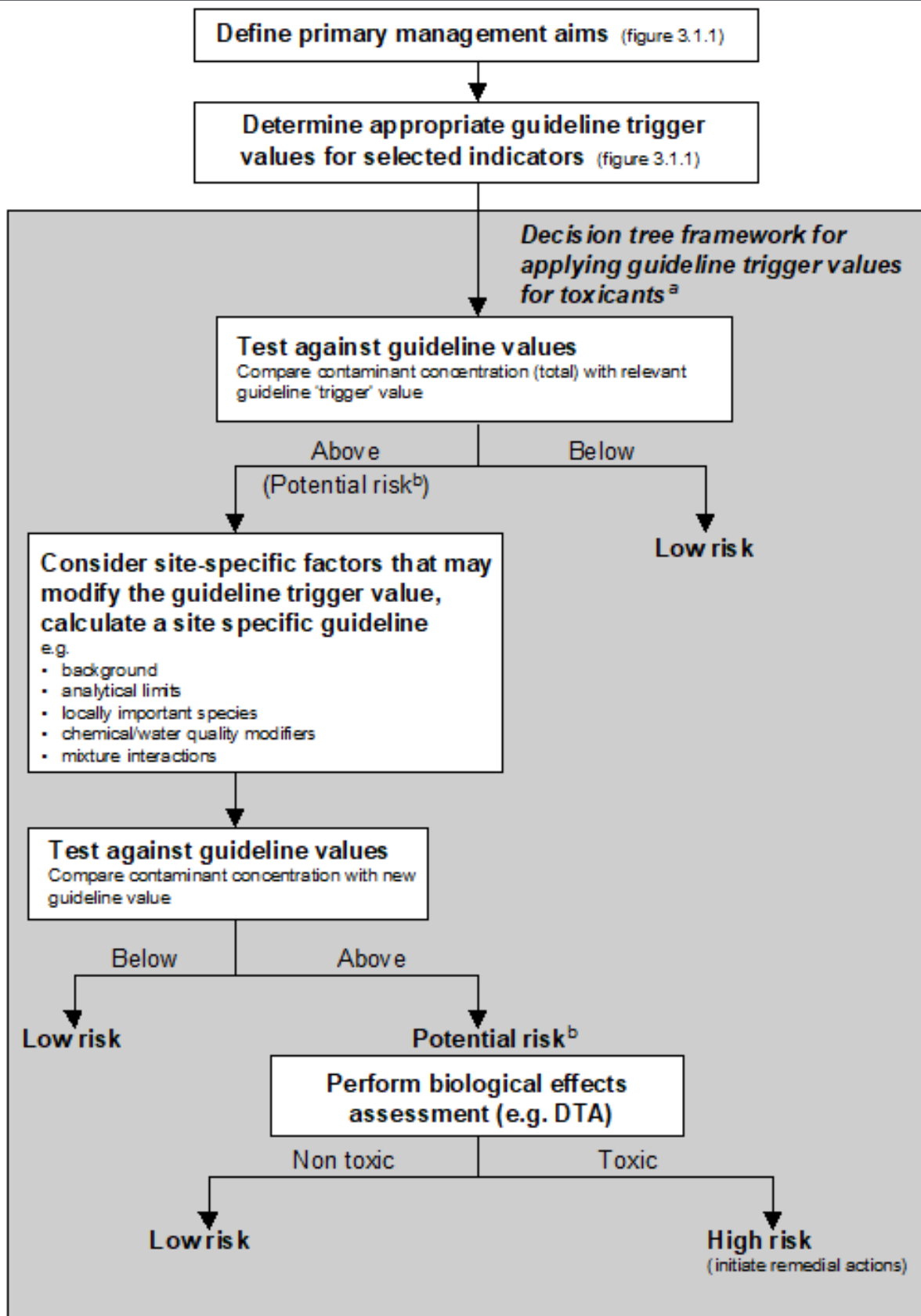
9.2 Assessment Procedure

The procedure for assessing monitoring data was replicated from the Australian and New Zealand Guidelines (ANZG, 2018) for Fresh and Marine Water Quality (based on the Australian and New Zealand Environment and Conservation Council Guidelines, 2000) as per **Figure 10** below.

Table below provides surface and groundwater sampling events occurrences.

Table 20 Surface & groundwater sampling events

Consultant	Event Date
SMEC	July 2018
SMEC	March 2019
Core Consulting	November 2019
Core Consulting	July 2020
Core Consulting	March 2021
Core Consulting	September 2021
Core Consulting	April 2022
Core Consulting	September 2022
Core Consulting	March 2023
Core Consulting	September 2023



^a Local biological effects data not required in the decision trees (see section 3.1.5)

^b Further investigations are not mandatory; users may opt to proceed to management/remedial action.

Data-assessment-flow-chart-(ANZECC-and-ARMCANZ-2000)[¶]

Figure 9 Monitoring program data assessment flowchart

9.3 Sampling Parameters

Biannual monitoring of surface water and groundwater are currently conducted at SCA for the following:

- Collection of field parameters: temperature, pH, electrical conductivity (EC), oxidation-reduction potential (ORP)/redox and dissolved oxygen (DO).

Samples were analysed by a laboratory with National Association of Testing Authorities (NATA) accreditation for the analytical methods for:

- Per-and poly-fluoroalkyl substances (PFAS).
- Total Oxidisable Precursor Analysis (TOPA) at selected locations.
- Benzene, Toluene, Ethylbenzene and Xylene (BTEX).
- Total Recoverable Hydrocarbons (TRHs).
- Dissolved/filtered heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc).
- Turbidity (surface water locations only).

Mapping of Surface and groundwater locations are at **Appendix I**.

Surface and groundwater monitoring locations are detailed in the following Tables 21 and 22.

Table 21 Surface water monitoring locations (Core Monitoring Report Sept 2023)

Surface Water Monitoring Locations		Easting	Northing
SW01	Up-Gradient location within the northern boundary of the SCA. Sample collected from within the drain running north to south.	509368	7058781
SW02	Located within the north-south drain at the northern extent of the fire station.	509158	7057139
SW03	Down gradient location within the north-south drain, approximately 130 m to the south of the fire station.	509098	7056920
SW04*	Located at the southern boundary of SCA, within the north-south drain, location sampled at discharge point of the drain prior to going offsite.	509020	7056610
SW05*	Offsite downstream location, drainage channel to the south and down gradient of SCA's north-south drain. Adjacent to an access road to North Shore Community Centre, upstream side of bridge.	508706	7056257
SW06	Located to the south of Friendship Avenue in the Southern Perimeter Drain (SPD). Drain discharges into Maroochy River.	508517	7057469
SW09	Located within the east-west drainage line, immediately down gradient of the former fire station.	508733	7057611
D1	Located adjacent to the Northern Perimeter Drain (NPD) and bordering the Coolum National Park (CNP), drain discharges to the NPD.	508212	7059081
MD3	Located downgradient of the airport, within the Maroola drain bordering the north-western flank of the airport. Location is tidally connected to the Maroochy River.	507102	7060259
SPD3	Located downgradient of the airport, within the SPD. Drain discharges into the Maroochy river	507279	7058548

Table 22 Groundwater monitoring locations (Core Monitoring Report Sept 2023)

Groundwater Monitoring Locations		Easting	Northing
GW01	Located to the east, adjacent to the fire station. Proximity to residential dwellings in Marcoola.	509206	7057021
GW02	Located between the north-south drain and the eastern SCA boundary within the northern extent of SCA. Proximate to residential dwellings in Marcoola.	509455	7058204
GW03*	Proximate to the northern extent of the runway, within the area of a historic plane crash (occurred in 2005).	509293	7058599
GW04	Located along the southern boundary of SCA and down gradient of the fuel farm.	508823	7056698
GW05	Along the south-west boundary of SCA. Adjacent to SPD and CNP South.	508077	7058023
GW06*	Adjacent to the Aerospace Precinct, opposite the former fire station.	508667	7057504
GW7-B	Located on the north-west boundary of the site adjacent to the Western Perimeter Drain (WPD).	507136	7059858
GW10-A	Located within the central south-west portion of the site.	507415	7058786
GW11-A	Located within the central north-western portion of the site bordering the NPD (shallow groundwater impacts)	507788	7059728
GW11-B	Located within the central north-western portion of the site bordering the NPD (deep groundwater impacts)	507788	7059728
GW25	Up gradient of site to the north-east between CNP and residential area	509290	7059225
GW26	Within Keith Royal Park and surrounded by residential land use. Approximately 140 m east of the site.	509508	7057157
GW27	Within SCC access land at the end of Warana Way, between Salerno on the Beach and Ramada apartments. Approximately 240 m east of the site.	509632	7057859
GW28	In parkland along North Beach Place, surrounded by residential dwellings. Approximately 530 m east of the site.	509664	7056750

Notes * Denotes locations selected for TOPA analysis, for selected locations which potentially discharge from the SCA boundary.

9.4 Quality Assurance & Quality Control Procedures

9.4.1 Field QA/QC

The QA/QC protocols used during fieldworks are described in table below.

Table 23 Fieldworks QA/QCs (Core Consultants Surface and Groundwater Monitoring Reports)

Protocol	Description
Sampling team	Field work was completed by environmental scientists experienced in undertaking surface water and groundwater sampling programs under the supervision of a Suitably Qualified Person (SQP).
Chain of custody	All samples were logged and transferred under appropriately completed COC forms.
Preservation	All samples were received by the laboratory in appropriately preserved containers, with preservation including packing samples with ice in eskies
Bling field duplicates	Duplicate samples were collected in accordance with procedures in the Australian Standard AS4482.1-2005. The accepted RPD for surface water and groundwater is 20%. Review of QA/QC processes and results relative to recommended legislative criteria.
Field blanks / Trip blanks	A field blank was collected during the sampling event.
Cross-contamination prevention	Comprehensive decontamination of all sampling equipment was undertaken after each sample and a fresh pair of disposable nitrile gloves were used for collecting each sample to prevent cross-hole contamination. A rinsate sample was collected by rinsing the surface of the dipper with deionised water and collecting the rinsate into appropriate sample bottles.

9.4.2 Laboratory QA/QC

Primary and secondary laboratories were used to undertake analysis of field samples and QA/QCs. Both laboratories are NATA accredited laboratories and their QA/QCs are tabled below (**Core Surface and Groundwater Monitoring Reports**).

Table 24 Laboratory QA/QCs

Protocol	Description
Holding times	Holding times are the maximum permissible elapsed time in days from the collection of the samples to its extraction and/or analysis.
Reagent blanks	The reagent blank sample is a laboratory prepared sample containing the reagents used to prepare the sample for final analysis. The purpose of this procedure is to identify contamination in the reagent materials and assess potential bias in the sample analysis due to contaminated reagents. The QC criteria are no detectable contamination in the reagents. Each analytical procedure was subject to a reagent blank analysis.
Laboratory duplicates	Laboratory duplicates are field samples that are split in the laboratory and subsequently analysed a few times in the same batch. These sub-samples are selected by the laboratory to assess the accuracy and precision of the analytical method. Primary and Sec undertake QA/QC procedures such as calibration standards, laboratory control samples, surrogates, reference materials, sample duplicates and matrix spikes. The adopted laboratory duplicate acceptance criterion is generally 30% RPD.
Surrogate spikes	Duplicate samples were collected in accordance with procedures in the Australian Standard AS4482.1-2005. The accepted RPD for surface water and groundwater is 20%. Review of QA/QC processes and results relative to recommended legislative criteria.

9.5 Reporting

Reporting occurs following each monitoring round and is based on the following requirements:

- deviations from the objectives, sampling regime, locations, methods of sampling and analysis as set out in this WQMP
- presentation of field and lab results
- interpretation and discussion of the results, including analysis against criteria
- recommendations for the monitoring program during and following the works
- field sheets, including weather conditions
- laboratory reports.

Reports are currently prepared by a suitably qualified person (SQP) in accordance with DESI requirements⁷. SQPs are persons that have the necessary qualifications and experience to perform regulatory functions to ensure human health and environmental risks are managed appropriately, for the benefit of the community with regard to land that is contaminated. A SQP must have:

- current membership in a professional organisation prescribed under the EP Reg – Schedule 14.
- qualifications and experience relevant to the regulatory function undertaken on a particular site.

During the SCAEP, reports were provided directly to SCC (SCAEP staff). Reports are currently provided to SCAPL.

9.6 Data Management

SCAPL does not have a data management system for the sampling, recording and interpretation of results from the Airport's PFAS monitoring program.

Data is currently held by the consultants that have conducted the sampling events.

SCAPL has inherited and collected airport PFAS data in hard-copy reports from multiple disparate sources over large areas and time. This information is not readily accessible (or interrogatable) to support PFAS contamination risk assessments, inform management actions and timely business decisions.

Organisations that use data for regulatory purposes, including those submitting data to the Queensland Government, are encouraged to have a structured data management system that provides reliable and secure consistent storage, access and reporting.⁸

The proposed approach for this management system gap is described in **Section 22** - PFAS Ongoing Monitoring Program.

9.7 Results

Results from the September 2023 event are within **Appendix J**.

Trend graphs of results from 2019 to 2023 are provided at **Appendix K**.

Following completion of the statistical analysis of monitoring results datasets (refer **Section 11**), the Plan will be updated with a full discussion of PFAS results for surface water and groundwater. Following is a summary of results for surface water and groundwater.

9.7.1 Surface Water

PFAS detected at all surface water monitoring locations.

⁷ DESI Guideline EP Act 1994 (v3.02 2023) – Assessing a suitably qualified person

⁸ DESI. 2018. Monitoring and Sampling Manual: Environmental Protection (Water) Policy. Brisbane: Dept of Environment & Science Government.

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PFOS concentrations below 95% aquatic species protection level at all locations.

PFOS concentration exceed 99% aquatic species protection level at all locations (range <0.001 ug/L to 0.066 ug/L).

PFOS+PFHxS concentrations below recreational water guideline value of 2 ug/L.

The majority of surface water locations remain consistent with historical ranges. SW01 (up-gradient location within northern boundary of SCA) has been observed to return to historical concentrations following a spike that occurred during the September 2022 monitoring event.

The PFAS surface water monitoring results are similar to the range of results described in section 8.1 – Surface Water as they both exceed the PFOS 99% aquatic species protection level. Further comparison of the monitoring results dataset with the historical site investigation results dataset will occur during the statistical assessment as described in section 11.

9.7.2 Groundwater

PFAS detected at all groundwater monitoring locations.

PFOS concentrations above the 99% protection level, but below the 95% level were recorded at all 13 groundwater locations.

The majority of groundwater locations remain below the adopted assessment criteria and within historical ranges. GW06 (opposite former fire station, Aerospace Precinct) continues to exceed a number of guidelines, however overall, GW06 appears to be within historical ranges.

The PFOS ground water monitoring results are similar to the range of results described in section 8.3 – Groundwater, as they both exceed the PFOS 99% aquatic species protection level. Further comparison of the monitoring results dataset with the historical site investigation results dataset will occur during the statistical assessment as described in section 11.

10 PFAS SAMPLING AND ANALYSIS

PFAS sampling shall be undertaken in accordance with the requirements detailed in Section 18 (PFAS Sampling) of the PFAS NEMP (v2.0).

PFAS analysis be undertaken in accordance with the requirements detailed in Section 19 (PFAS Analysis) of the PFAS NEMP (v2.0).

The NSW EPA Sampling design guidelines for contaminated land (2022), Part 1 - Application and 2 – Interpretation; should also be consulted for guidance.

The DESI Monitoring and Sampling Manual 2018 provides the common techniques, methods and standards for sample collection, handling, quality assurance and control, custodianship and data management. Where monitoring is required under legislation to be done under a protocol, the Monitoring and Sampling Manual 2018 is the principal document to decide the protocols. This manual is also intended to be used by persons and organisations involved in the monitoring of the condition and trend of Queensland waters.

PFAS sampling shall be conducted by a SQP in accordance with DESI requirements⁹.

PFAS analysis shall be undertaken by laboratories with NATA accreditation for the PFAS analysis.

10.1 Use of Existing Data

Significant data has been collected since 2016 either as part of early investigations on the extent of PFAS contamination at the site or during site assessments for the runway expansion project (SCAEP). This being the case, an efficient sampling plan can be made for construction works using existing data and addressing any potential data gaps.

Due to the recent focus on PFAS contamination and the development works anticipated within the Sunshine Coast Airport precincts, significant sampling and analysis has been undertaken to assess the risks and inform project management and property development decisions. PFAS test results are available across much of the Airport site and this existing information should be used to support contamination assessments and prior to undertaking additional sampling. The SCA Environment Officer should be engaged early to establish the quantity and quality of existing data for a particular precinct or work site.

In Australia, the standard PFAS suite currently includes approximately 30 forms of PFAS. When testing for PFAS at Sunshine Coast Airport, a laboratory must be selected that is accredited by the National Association of Testing Authorities (NATA) for the analysis and that has the capacity to report at a minimum the 28 compounds listed in **Appendix L**.

10.2 PFAS Soil Sampling

10.2.1 Sampling for On-Airport Soil Reuse

The NSW EPA Sampling design guidelines for contaminated land (2022), provides guidance on the number of samples per area needed to detect a hotspot of a given diameter on a contaminated site with sufficient confidence. However, where material is proposed to be reused on the Airport and in situations where sufficient data are available from previous site assessments, there is scope to take a risk-based approach and propose a more efficient sampling regime based on a representative number of samples. In these cases, significantly fewer samples may need to be collected to confirm the characterisation.

Sampling plans to fill any data gaps prior to the development of management options for excess soils should ensure that the density of sampling is appropriate. Where practicable, reuse previous data where possible, and if not suitable, in-situ soil sampling should be undertaken prior to earthworks commencing so that soil can be categorised, and appropriate soil management controls can be determined. Sampling densities and distribution should be sufficient to characterise the range, distribution, and average concentrations of PFAS in the soil areas under consideration.

All proposals for in-situ and ex-situ sampling should be compiled into a sampling plan and require approval by the SCA Environment Officer or a suitably qualified person (SQP) according to section 564 of the *Environmental Protection Act 1994*. All laboratory results and reports are to be provided to the SCA Environment Officer with relevant location and spatial data including GPS coordinates.

⁹ DESI Guideline EP Act 1994 (v3.02 2023) – Assessing a suitably qualified person

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All sampling and analysis should be undertaken by an SQP. If suitably qualified environmental professionals have been engaged for a project, they may make management recommendations outside this PFAS Management Plan based on their experience and expertise. Any deviation should:

- Comply with relevant national and jurisdictional guidelines, including the PFAS NEMP (v2.0);
- Provide assessments that are data-driven and evidence-based;
- Provide recommendations for efficient and effective management options;
- Generally, follow the principles within this Plan, documenting any deviation; and
- Apply an appropriate risk tolerance.

10.3 Leachate Assessment

Due to the high solubility of PFAS in water, means that PFAS will likely leach from soil to surface water and groundwater, which needs to be considered for both human health and ecological risk assessments. PFAS leaching analysis has taken place onsite, and where possible existing data is to be used to assess potential leaching risks. Should existing data be considered an unviable option, additional samples are to be collected, by a suitably experienced environmental professional.

Leachate analysis will be required for offsite disposal of soil / sediment, where analysis is to be carried out in accordance with the Disposal Permit process under s. 424 (as continued under s. 739) of the Environmental Protection Act 1994. Laboratory analysis should be conducted according to the ASC NEPM (2013a) and the PFAS NEMP (v2.0).

10.4 Groundwater and Surface Water Sampling

Where water samples are to be collected and analysed for PFAS, it is important to obtain samples that represent PFAS concentrations in the water or aquifer from which they are collected. Conventional sample handling and processing practices for trace level contaminants can generally be applied for PFAS in water samples, with particular care being taken to avoid cross contamination. Samples are to be collected by a SQP that meets DESI requirements. Laboratory analysis should be conducted according to the ASC NEPM (2013a) and the PFAS NEMP v2.0.

10.5 Limits of Reporting

Continual improvement and innovation within testing laboratories are leading to lower detection limits or limits of reporting (LOR). Historic sampling at the Airport has demonstrated the widespread presence of PFAS contamination at extremely low concentrations, largely due to the use of trace level LORs, sometimes also referred to as 'super-trace', or 'ultra-trace'. The appropriate LOR for PFAS testing should be selected to facilitate decision-making in the context of the situation. For example, wherever possible the LOR should be lower than a guideline value for the most sensitive relevant value to be protected. In the context of Sunshine Coast Airport, ultra-trace level testing is appropriate since the risk is to the aquatic environment.

10.5.1 Soil, Construction and Demolition Waste

Standard laboratory LOR should be the default option for soil and construction & demolition waste; where the material is considered potentially contaminated.

10.5.2 Groundwater, Surface Water and Leachate

Using ultra-trace LOR for water samples at Sunshine Coast Airport is justified where there is potential exposure in aquatic ecosystems. Specifically, ultra-trace LOR is supported (including reference / background locations) when the following conditions are both met:

- The consultant advises that an aquatic ecosystem is present – in this case the Maroochy River.
- The consultant advises that the relevant guideline value is the aquatic 99% species protection criteria (despite the receiving environment being moderately disturbed, PFAS bioaccumulates, therefore the 99% species protection level applies).

Standard practice is to analyse at an LOR below the relevant guideline, and in the case of the aquatic 99% species protection guideline (0.00023 µg/L), ultra-trace LOR is the closest commercially available. Results from ultra-trace analysis in some circumstances support a recommendation for aquatic biota sampling to inform risk assessment, which has been conducted at Sunshine Coast Airport (Core 2021).

10.6 Use of Total Oxidisable Precursor Assay

PFAS as a group includes several thousand different compounds, some of which (precursors) can break down in the environment to persistent PFAS such as PFOS. The PFAS NEMP (v2.0) requires precursors to be appropriately considered when investigating PFAS contamination. If precursors are identified, further investigation is warranted. If precursors are not identified, no further Total Oxidisable Precursor (TOP) assay should be carried out. Currently the TOP assay is the most common approach to estimating the amount of otherwise unquantifiable precursors that are present.

Note, before disposing PFAS contaminated soil to landfill, the landfill operator should be contacted for their Environmental Authority requirements for waste soil analysis as some landfill operators may be using soil bioreactors to manage waste soil and may require TCLP conducted for PFAS TOPA before they will accept the waste.

10.7 Aquatic Biota Sampling

DESI Sampling and Monitoring Manual should be consulted for aquatic biota sampling procedures and permit requirements. Permits and approvals may be required to conduct activities involving animals, plants and/or in protected areas (for example National Park/Regional Park, State Forest or State Marine Park). A General Fisheries Permit, Scientific user registration and animal ethics approval are required to collect live fish samples. If fish are sick or dying (i.e. during a fish kill event), the collection of fish for initial diagnosis does not require animal ethics approval. However, any further surveys outside of the initial fish kill event, such as sampling at control sites or for structured surveillance, will require animal ethics approval. Crustaceans (e.g. crabs, prawns, crayfish and lobsters) are considered fish under the Fisheries Act 1994 and therefore relevant permits and approvals need to be sought before sampling commences (DESI Sampling Manual 2018).

Once a permit or approval has been granted, it is often necessary to contact the authorising department to notify the district staff of the date and time of your visit. This is done prior to entering the protected area and/or commencing the approved activity (DESI Sampling Manual 2018).

Requirements for biota sampling should be carefully considered, in consultation with the environmental regulator and relevant experts. The issues requiring consideration may include representativeness, statistical significance, sample compositing or pooling, protection of biodiversity and compliance with ethical standards. There are currently no guidelines for sampling potentially PFAS-contaminated biota.

If analysis is intended to inform human health assessment, edible portions should be sampled (e.g. for seafood skin on fillets, or de-headed and de-veined prawns). Samples of the same species should be bulked/composited to allow larger sample numbers. For assessment of ecological risk, sampling of the whole organisms, fillets and organs (especially liver) is recommended and samples generally should not be composited or bulked, although compositing may be useful in some instances, such as for small sediment-living organisms when assessing risks to wading birds (PFAS NEMP v2.0).

10.8 Dust Sampling

PFAS adsorbed to dust deposited on smooth surfaces can be sampled using a swab (or wipe) technique. The technique is most effective on smooth surfaces such as glass, metal (including pipes), painted surfaces and smooth vegetation surfaces such as leaves. Swab sampling is less effective on surfaces that are rough and/or porous (e.g. timber and concrete). The following link to DESI swab sampling technique should be consulted;

https://environment.des.qld.gov.au/_data/assets/pdf_file/0020/90515/physical-and-chemical-assessment-swab-sampling.pdf

10.9 Concrete & Asphalt Sampling

There are currently no guidelines for sampling potentially PFAS-contaminated concrete and asphalt.

PFAS present in concrete and asphalt at airports are often a result of migration from other sources, usually historical use of AFFF. However, it should also be recognised that PFAS are used in numerous types of building products including concrete and asphalt (for weatherproofing, corrosion prevention, and stain resistance) and source of material used for manufacturing of asphalt and concrete may have been contaminated with PFAS.

Sampling methods either by chip or core samples depending on the structure being sampled and whether material is in-situ (eg concrete pad) or ex-situ (eg stockpile).

- In-situ samples collected by drilling cores. Collection of cores from concrete pads and asphalt surfaces should penetrate the entire thickness of the pad/surface to enable an investigation of the potential PFAS profile along the entire depth of the pad/surface (PK Thai et.al).
- Ex-situ samples collected by combination of grab samples and breaking/chipping off segments via a hammer (Core PFAS Baseline Report 2021).

PFAS screening criteria specific to concrete and asphalt do not exist.

NATA accredited PFAS standard and leaching analytical methods specific to concrete and asphalt do not exist.

Eurofins Laboratory (Brisbane), has advised the laboratory analysis method applied to PFAS in concrete and leaching will use the same in-house soil methodology, and have referenced the United States Office of Water Environmental Protection Agency (4303) – Draft Procedure for Analysis of Perfluorinated Carboxylic Acids and Sulfonic Acids in Sewage Sludge and Biosolids by HPLC/MS/MS, December 2011 (USEPA Method). This method specifically accounts for Single-phase solid samples and multi-phase samples – in which the main phase is not aqueous – applicable to concrete products.

11 STATISTICAL ASSESSMENT

SCAPL will be undertaking a statistical analysis of the available PFAS data set in the first quarter of FY2024/25 to determine:

1. The magnitude and extent of PFAS impact across the site as represented by the available groundwater, surface water and soil data.
2. Trends in groundwater / surface water PFAS concentrations over the monitoring period.
3. Whether ongoing TOPA analysis is required to understand trends in plume concentrations.

Statistical analysis will be conducted on the following datasets:

- PFAS monitoring of surface water and groundwater at the Sunshine Coast Airport undertaken between 2018 – 2024, resulting in approximately 379 ESdat files.
- PFAS focused investigations conducted for SCA undertaken between 2016 – 2024, resulting in an additional 276 ESdat files.

11.1 Methodology

An initial review of the data-sets has yet to be performed to determine the best form of assessment. However, for ease of interpretation, data will be assessed using the following methodologies.

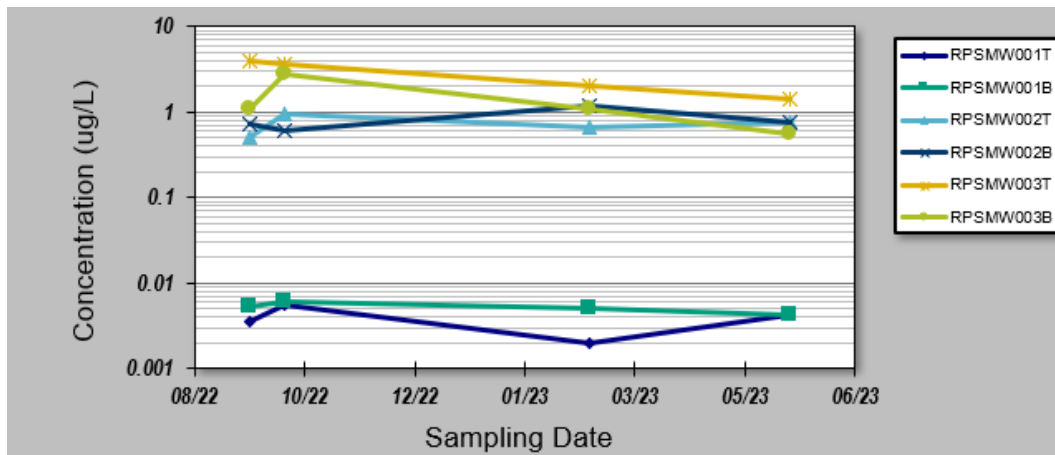
11.1.1 Trend analysis

'Mann Kendall' analysis will be undertaken for all groundwater and where appropriate surface water data. Mann-Kendall analysis is a statistical assessment of trends in concentration to determine plume stability. The analysis will be used to assess whether concentrations at individual locations have increased, decreased or remained stable over the period for which data is available.

The trend analysis will be undertaken using the GSI Environmental Mann Kendall toolkit. A minimum of four results per monitoring location are required to calculate the trend, statistically valid trend analysis by this method is not possible with less than four data points.

Assessment will be undertaken on PFOS, PFOA and sum of PFOS & PFHxS concentrations for each location. A graph for each location and a summary table for all locations indicating increasing, stable or decreasing trend will be prepared.

Figure 10 Example Mann-Kendall analysis graph



11.2 Heat Maps

Assessment of plume will be conducted utilising heat maps to visually represent the plume extent and magnitude. This method of assessment allows for plume extent and potential source zones to be easily identified subject to the quality of the data available to generate the maps.

Assessment will be undertaken on PFOS, PFOA and sum of PFOS and PFHxS concentrations for soil, groundwater and surface water.

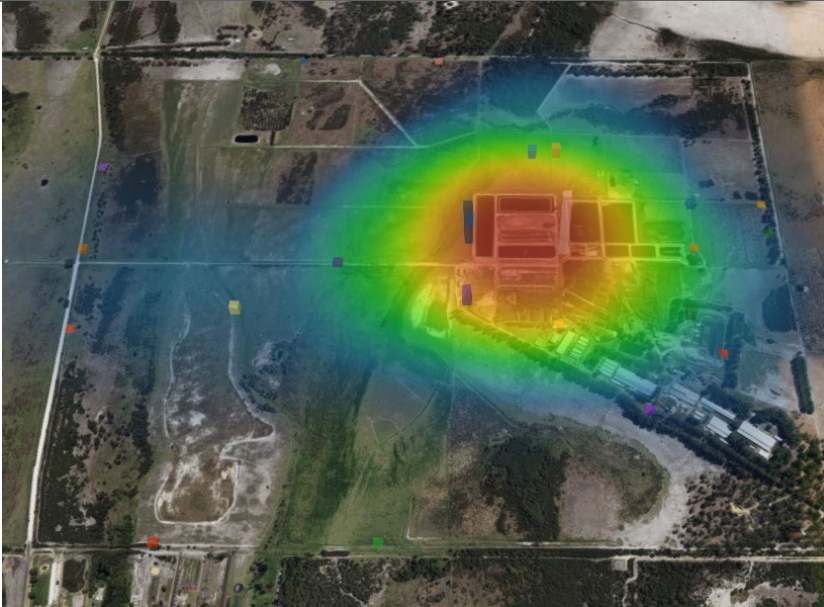


Figure 11 Example PFAS Heat map

11.3 Comparison of TOPA and total concentrations

TOPA is used to aide in the identification of PFAS precursor compounds by oxidising samples to see whether they develop into regulated PFAS compounds i.e. standard suite of 28 compounds. However, there is a significant cost burden associated with this form of analysis typically a least double the cost of a standard PFAS analysis. It is therefore important to determine whether TOPA is adding value to the understanding of plume movement and composition. To assess this a comparison of the primary analysis and TOPA results is required. Where no major increase in concentration is identified over the monitoring period it is reasonable to conclude that precursor compounds are not present and therefore TOPA is no longer necessary.

11.4 Reporting

A factual report will be prepared as the output from this statistical assessment. The report will:

- Identify trends in concentrations in surface water and groundwater based on Mann-Kendall analysis,
- Identify the magnitude and extent of PFAS impact across the site based on the prepared heatmaps, and
- Provide a recommendation for the continuation / discontinuation of TOPA as part the ongoing monitoring program at the site.

The outcomes of the report will inform the development of management and monitoring requirements for the PFAS Plan that includes:

- Development of quantitative conceptual site models for each development precinct
- Risk assessment of PFAS impacts upon human health and ecological receptors.
- PFAS ongoing monitoring program.
- Requirements for remediation to minimise risks to human health and ecological receptors.

12 CONCEPTUAL SITE MODELS

A CSM has been developed to inform PFAS risks and management on the Airport. A CSM represents the characteristics of a site in a diagrammatic or written form that shows the possible relationships between contaminants, pathways, and receptors. In this context the following definitions apply:

- A “contaminant source” – a substance that is in, on or under the land and has the potential to cause harm to human health or the environment, or cause pollution of controlled waters.
- A “pathway” – a route or means by which a receptor can be exposed to, or affected by, a contaminant.
- A “receptor” – in general terms, something that could be adversely affected by a contaminant, such as people, an ecological system, property, or a water body.

Each of these elements can exist independently, however they create a risk only in instances where a plausible linkage exists, such that a contaminant may affect a particular receptor through a particular pathway. This kind of linked combination of source–pathway–receptor is described as a pollutant linkage or SPR linkage. Complete SPR linkages do not mean that there is an unacceptable risk. Risks are discussed further in following sections for SPR linkages considered to be complete based on the available information.

CSMs have been developed for each development precinct. The CSMs have been developed from the preliminary CSM in the Core Consultants, PFAS Contamination Baseline Assessment, Sunshine Coast Airport (Core Baseline Report 2021)

12.1 Sources of PFAS Contamination

Aircraft fire fighting activities using Class B AFFF that contained PFAS has resulted in contamination from operations and training. From investigations carried out on site, five primary sources of PFAS contamination has been identified on the Airport.

Table 25 Location of PFAS primary sources within development precincts

Precinct	Primary Source
Gateway	None
Aerospace	Runoff zone at old fire station Location of former PFAS performance testing
Airport West	None
Aviation	Sediment relocation area Accidental discharge at new fire station
Airport North	Historical plane crash area

Secondary impact areas on the airport are due to:

- Part of the migration pathway for PFAS from a source area
- Areas downgradient of the primary source area including drainage lines and areas subject to overflow flow
- Imported fill of unknown origin
- Movement of PFAS impacted soil from construction and maintenance activities
- Relocation of drain sediments from maintenance activities to unknown locations

12.2 Transport Pathways

Earthworks during the construction phase can disturb in-situ soil containing PFAS. Both groundwater and surface water contain some levels of PFAS. PFAS are often transported via surface water pathways or leaching to groundwater due to its water solubility. Other plausible pathways include potential movement and reuse of excavated soil impacted by PFAS within the project footprint, off-site disposal of PFAS impacted soil materials, and transportation of PFAS impacted dust particles in the air column.

Once released to the environment, PFAS can leach from the soil to water as water migrates downward through the topsoil layer (or fill if present) and natural loose to dense sand, with varying silt and/or clay content, overlying dense to very dense layer of indurated sand (coffee rock) and resulting in the contamination of the perched or semi-confined groundwater resource. Where coffee rock is present in the underlying local geology, infiltration would directly recharge the aquifer and dissipate horizontally to low lying ground and drainage lines. Groundwater eventually discharges to the network of land drains, to the Maroochy River or the sea.

The groundwater may flow from the water table above the coffee rock to the aquifer below where local discontinuities occur within the coffee rock layer but generally the coffee layer is considered to act as a semi-confining layer limiting the vertical migration of PFAS into deeper groundwater resources. Further reduction in vertical migration of PFAS is also likely to occur due to the underlying sequence of low permeability stiff to hard silty and/or sandy clay (below the coffee rock layer). The groundwater eventually discharges to the network of land drains and, ultimately, into the Maroochy River (and the sea).

PFAS can be transported in the air within suspended dust particles and deposited far away from the original source. This contaminant transport mechanism is likely to be most significant during construction phase activities that have the highest dust generation potential such as during the clearing and grubbing of vegetation, and bulk excavation and soil movement works with the worst-case conditions for dust emissions to be on hot, dry windy days. As dust presents a safety hazard to airport operations, dust suppression measures are implemented during construction activities to prevent dust generation.

12.2.1 On-Airport Transport Pathways

12.2.1.1 Leaching to Surface Water and Groundwater

Leachability data show that PFAS in soil leaches to water. PFAS have been found in surface water and groundwater on the Airport., which confirms that the leaching of PFAS to surface water and groundwater occurs.

12.2.1.2 Surface Water Transport and Discharge

Soil PFAS leached to surface water on the Airport are discharged off-Airport through the surface water drainage network.

Surface water at the SCA drains to the Maroochy River via four drainage networks (SCA EMP 2023):

- The Eastern Perimeter Drain (EPD) runs north-south along the eastern perimeter of the SCA, collecting water from the northern Marcoola section of the Mount Coolum National Park and the area of the former RWY18/36 and discharging under David Low Way to a Council-controlled drain and then into the Twin Waters canal estate. Water in this estate eventually discharges to the Maroochy River via tidal mixing and flushing processes.
- The Southern Perimeter Drain (SPD) runs east-west along the southern perimeter of the SCA and includes drainage from the southern Marcoola section of the Mount Coolum National Park as well as from a southern flank drain of RWY13/31. The drain discharges via culverts under the Sunshine Motorway to a drain on freehold land before discharging to the Maroochy River. This drain is tidal up to near the connection with the southern flank drain of RWY13/36.
- The Northern Perimeter Drain (NPD) runs east-west along the northern perimeter of the SCA, collecting water from the northern flank of RWY13/31 as well as flows out of the northern Marcoola section of the Mount Coolum National Park. The drain discharges to the Marcoola Drain which discharges to the Maroochy River near the Sunshine Motorway bridge. A tidal flap was installed along the NPD near the connection with the Marcoola Drain to restrict tidal ingress to salt-sensitive communities upstream.
- The Western Perimeter Drain (WPD) runs north-south along the western perimeter of the SCA, with two outlets under the Sunshine Motorway to the Maroochy River. The northern section of these outlets is fitted with tidal flaps to reduce tidal ingress to the SCA site while the southern section flows through freehold land.

The WPD collects water from the western end of RWY13/31 and connects to both the NPD and SPD networks.

Refer to **Figure 12** for surface water drainage channels and flows.

12.2.1.3 Groundwater Characteristics

PFAS in soil and sediment leaches to groundwater and PFAS in surface water infiltrates to groundwater. PFAS is present in groundwater throughout the Airport.

Shallow depth to groundwater provides opportunity for groundwater and drains interaction due to either unlined drainage channels or cracks in concrete lined channels.

The groundwater table across the SCA ranging from 0.2 m to 3.4 m below ground level. Groundwater is generally fresher than brackish in both the perched and subsurface aquifer with more saline groundwater found in monitoring wells closer to the Maroochy River. This is influenced by local geology, which includes a layer of dense indurated sand known as 'coffee rock'. This is overlain by permeable sandy soil.

Core Baseline Report (2021) reported:

- The shallow perched water table above the 'coffee rock' appears to be heavily dependent on rainfall, with some wells being dry.
- Groundwater pH ranges from 3.67 to 7.19.
- Groundwater is fresh water with electrical conductivity (EC) readings generally below 1 mS/cm.
- Groundwater wells were installed to target groundwater below 'coffee rock' strata, at deeper depths (about 10 mbgl) compared to about 3 m bgl or shallower. Samples from the deeper wells did not report detections of PFAS compounds. This indicates that contamination of PFAS is more prevalent in the shallow groundwater.¹⁰

12.2.1.4 Groundwater Flow

Groundwater typically follows the natural contours of the land, flowing west away from the former RWY18/36 towards the Maroochy River. RWY13/31 also causes lateral displacement of groundwater to the north and south. Where groundwater is shallow, it intercepts the surface drains although most groundwater occurs at deeper than these drains. Along the north-western end of the NPD a bentonite cut-off wall has been installed to a depth of 2.1 m below ground level to intercept any saline groundwater from the SCAEP construction. Any water reaching this wall likely moves northwest through to the Marcoola Drain.

Refer to **Figure 13** for groundwater contours and flows.

Groundwater modelling (SMEC SCAEP PSI Report 2018)

A groundwater modelling report, 'Sunshine Coast Airport Expansion Project, Groundwater Modelling Report' was prepared by SMEC on behalf of SCC referred in their SCAEP PSI Report of 2018. This report undertook numerical flow and transport modelling for a groundwater impact assessment of the SCAEP caused by the proposed fill program. Modelling incorporated the proposed design of the airport expansion and proposed site drainage (as of April 2018). It also used PFAS results from previous groundwater monitoring undertaken at the SCA to be incorporated into a sub-regional scale model. The report identified the following:

- The location where the runways intercept at the airport acts as a regional high point for groundwater, which disperses outwards.
- There is low vertical permeability and high horizontal permeability.
- Shallow groundwater through the region, combined with the high horizontal permeability indicates a strong interaction and co-dependency between surface waters (i.e. wetlands, creeks, drainage lines) and groundwater.
- A slight groundwater ridge appears to be present along Marcoola Beach and Mudjimba Beach acting as a groundwater divide, likely attributed to elevations caused by the foredunes. Groundwater west of this divide appears to flow towards Marcoola Drain and Maroochy River

¹⁰ PSI, SCAEP, May 2018, Sunshine Coast Council [SMEC report No. 30031855]

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- Elevated concentrations of PFAS compounds in groundwater are currently located to the west of the new runway site, likely originating from the former fire station and moving to the west.
- A smaller numerically estimated PFAS plume currently south-west of the new runway is modelled to move towards the south-east.
- Surface water drains would intercept groundwater flows where they extend below the permanent or seasonally/temporarily elevated groundwater level, but this may not be an effective measure to manage the source to receptor linkages.

Sunshine Coast Council (SCC) has developed an updated groundwater flow model for SCAEP assessment purposes. This model will be utilised in the:

- Statistical assessment discussed in **Section 11**.
- Development of the ongoing monitoring program discussed in **Section 23**
- CSM risk assessment process discussed in **Section 12.5**

Figure 12 Major airport drains and flow directions (adapted from SCA EMP 2023)

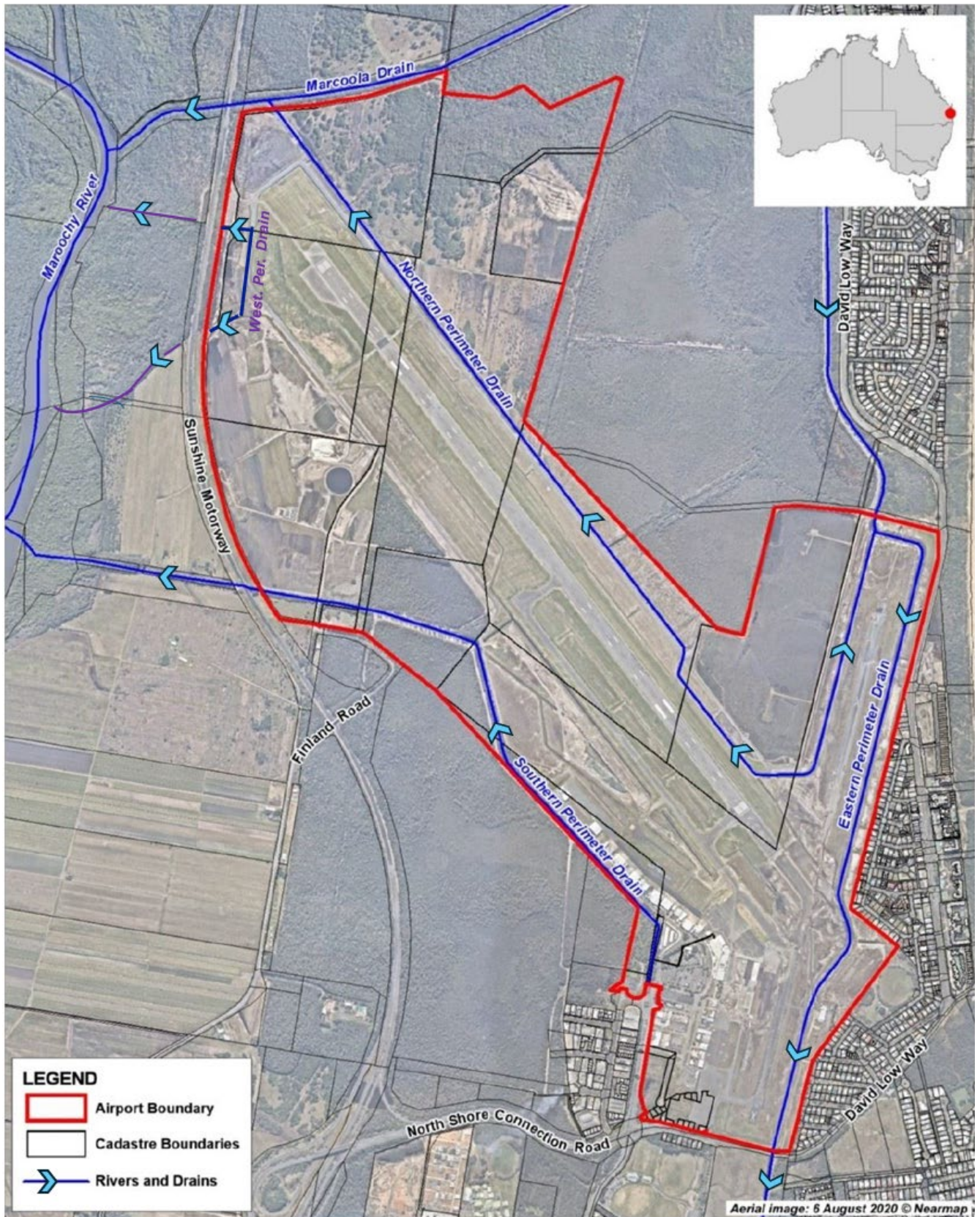
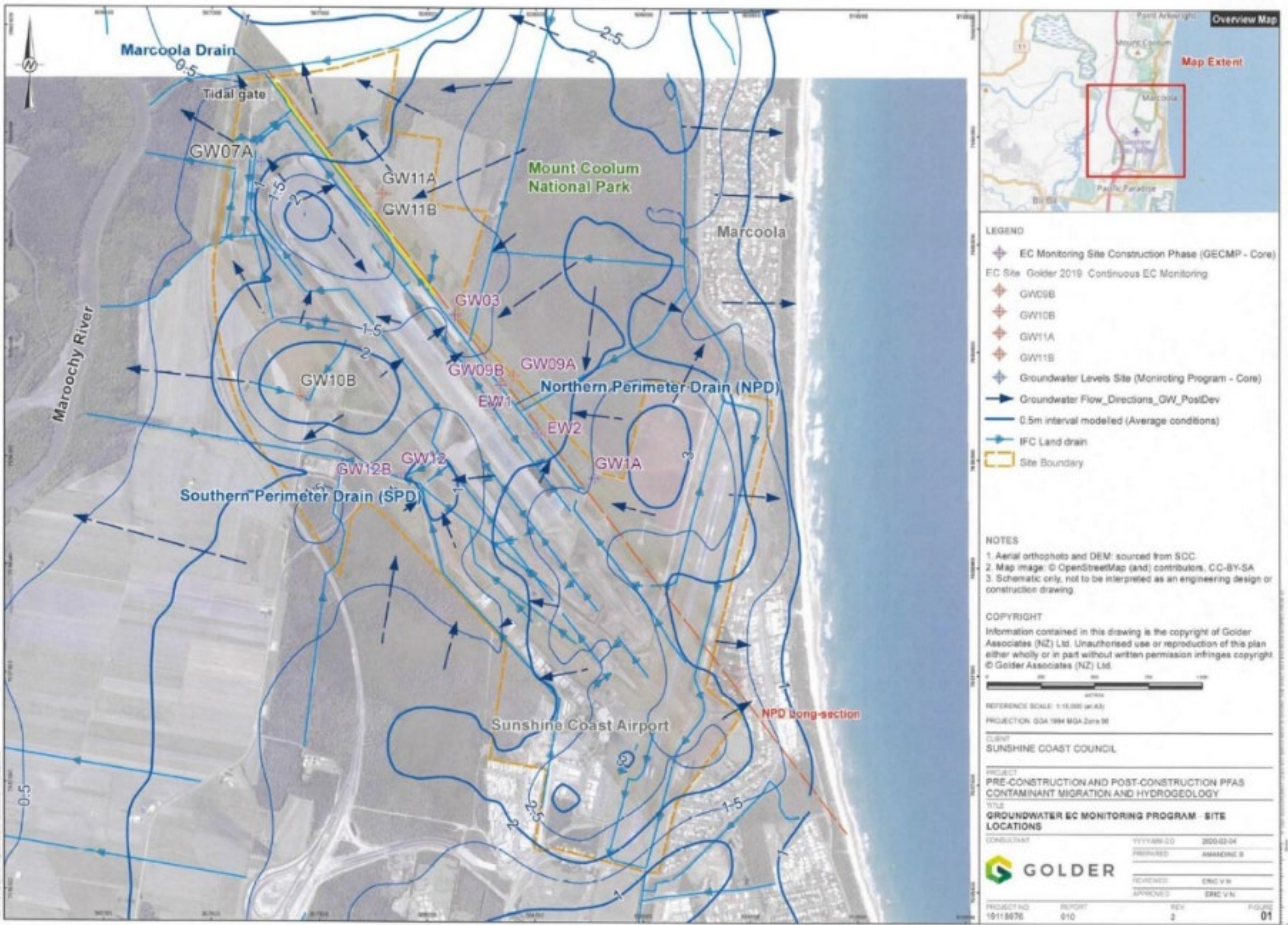


Figure 13 Groundwater Flow directions (SCA EMP 2023)



12.2.2 Exposure Pathways and Receptors

12.2.2.1 On-Airport

On-base exposure pathways and receptors are summarised in tables below.

Table 26 On-Airport Exposure Pathways for Human Receptors

Exposure Pathway	Receptor
Incidental ingestion of soil, sediment, surface water or groundwater.	Construction workers Maintenance workers
Dermal contact with soil, sediment, surface water or groundwater.	
Inhalation of dust particles	

Table 27 On-Airport Exposure Pathways for Ecological Receptors

Exposure Pathway	Receptors
Direct contact	Listed NC Act or EPBC Act species
Indirect contact	- Wallum sedgefrog - Wallum rocketfrog - Wallum froglet
Ingestion	- Eastern ground parrot - Mount Emu she-oak
Bioaccumulation / Biomagnification	- Lesser Swamp Orchid - Grey goshawk - Black-necked stork - Grey-headed flying fox
	Biodiversity offset areas
	Other aquatic & terrestrial biota
	Surface drains
	Groundwater

Surface water and groundwater is not consumed on the Airport. No fishing occurs on the Airport. As such, consumption is not a relevant exposure pathway for Airport workers.

Of the exposure pathways present, those considered to be the most important for Airport workers who have minimal exposure to PFAS in the environment and/or with negligible occupational exposure to PFAS (e.g. personnel working mainly in an office environment, workers involved in maintenance of aircraft, airside staff) is the incidental ingestion of soil particles. This is because these types of workers will have minimal exposure to PFAS in other media types such as surface water, groundwater and sediment.

Airport workers with frequent exposure to PFAS in the environment at the Airport (e.g. workers involved in routine maintenance of drainage lines, groundskeeper or construction worker) will be exposed to PFAS in a range of different media including soil, surface water, sediment and groundwater, and exposure pathways including incidental ingestion, dermal contact and inhalation. Notwithstanding incidental ingestion will be the most relevant exposure pathway for these workers.

12.2.2.2 Off-Airport

On-base exposure pathways and receptors are summarised in tables below. An evaluation of the source-pathway-receptor linkages is provided in the section below.

Table 28 Off-Airport Exposure Pathways for Human Receptors

Exposure Pathway	Known Receptor
Incidental ingestion of soil, sediment, surface water or groundwater.	Urban residents Rural residents
Dermal contact with soil, sediment, surface water or groundwater.	Agricultural workers
Consumption of rain water	Construction and maintenance workers
Consumption of biota	Nearby residents (to the east) using potential spear pumps.
Consumption of home grown produce	Consumers of PFAS impacted seafood from the down gradient surface water receiving environment of the surrounding marine ecosystems including residential canals (e.g., Twin Waters) and Wallum Heath. Recreational users of the adjacent marine environment that may ingest contaminants or have dermal exposure to contaminants.

Table 29 Off-Airport Exposure Pathways for Ecological Receptors

Exposure Pathway	Known Receptors
Direct contact	Listed NC Act or EPBC Act species; as above plus; - Water mouse
Indirect contact	- Eastern curlew
Ingestion	Other Aquatic & terrestrial biota
Bioaccumulation / Biomagnification	Twin Waters Canal Mount Coolum National Park, north & south of the Airport Maroochy River Conservation Park Ocean to the east of the Airport Groundwater

12.3 Potential Receptors and Risk Screening Results

Where a linkage between the source-pathway-receptor exists, the exposure pathway is considered 'complete', and therefore poses a potential risk which requires further consideration – e.g., management action.

Conversely where a linkage does not exist, the exposure pathway is considered 'incomplete' and no further action may be required.

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Where there is insufficient information to confirm whether a source-pathway-receptor linkage is complete or incomplete, further data may be required to assess the linkage.

The following notations have been used to define whether source-pathway-receptor linkage is complete, incomplete, or requires further data to confirm the linkage.

- Yes Pathway complete
- Unconfirmed Pathway requires further investigation to determine if it is complete or incomplete
- No Pathway is incomplete

Based on the available data and the investigation levels (refer **Section 10**), the following screening criteria has been applied where a pathway is complete.

Table 30 Application of Investigation Levels

[1]	Concentrations in Media, relevant to the exposure pathways, above Investigation Level
[2]	Concentrations in Media, relevant to the exposure pathways, below Investigation Level
[3]	Investigation Level is not available for the receptor and/or media

The risk screening assessments are presented in the CSMs for each development precinct in the tables within **section 12.5**.

12.4 Synopsis of CSMs

The Conceptual Site Models for each precinct (**Tables 31 - 40**) show there are complete exposure pathways to human health and ecological receptors on and off airport. Following is a summary the CSMs outcomes.

- Soil PFAS levels are below exposure levels for human health and ecological investigation levels. Hence, risks are considered low and acceptable for construction workers and biota exposed to soil.
- PFAS has been detected in surface water and groundwater on the airport that are at concentrations above the human health exposure levels for drinking and recreational purposes. However, as surface water and groundwater are not used for drinking or recreational purposes, there are no exposure pathways and no identified risk.
- Concentrations of PFAS in the Maroochy River are below exposure level for human health recreational exposures. The risk associated with swimming in the Maroochy River is therefore considered low and acceptable.
- PFAS concentrations in fish and prawns are below human health levels for consumption of seafood. Hence, risks for consumption of seafood from Maroochy River are considered low and acceptable.
- PFAS levels in water on the airport and in the Maroochy river are below the 95% aquatic species protection level but above the 99% species protection level of 0.00023ug/L associated with bioaccumulative contaminants. However, testing of whole-body fish samples, invertebrates and plants indicates that bioaccumulation is not observed to occur at levels that exceed the 99% screening criteria. Hence, risks to aquatic biota are considered low and acceptable and there is no identified risk to human health on the Airport or beyond the Airport boundary in neighbouring communities based on these results. Ecological risk from direct exposure to PFAS is low and acceptable, and the risk from bioaccumulation in aquatic food chains is also low and acceptable.
- PFOS ambient levels in the Maroochy River (upstream of the Airport) exceed the 99% aquatic species PFOS protection level of 0.00023 ug/L but not the 95% aquatic species PFOS protection level of 0.13 ug/L. The PFOS concentrations in surface water, leachate and groundwater samples on the Airport exceed the 99% PFOS threshold but not the 95% threshold. Water samples in the downstream environments of the Airport also record the same outcomes. Accordingly, there is currently no measurable change to the PFAS contamination risk emanating from the airport when compared to the PFAS ambient levels or downstream environments. The risk is the same.

12.5 Tabular Conceptual Site Models for Development Precincts

This section presents refined Conceptual Site Models (CSMs) for each SCA development precincts based on the Core Baseline report’s collation of site investigation data and preliminary CSM, with the latest round of PFAS Ambient monitoring results. The risk outcomes identified in the CSMs will inform the PFAS management plan actions.

Each precinct has a separate human health and ecological risk assessment.

Table 31 Gateway Precinct CSM - Human Health Receptors

Source areas	Transport Mechanism	Secondary Sources Media	PFAS Media ¹¹ Concentrations	PFAS Ambient Monitoring Results [Sept 23] ¹²	Transport Mechanism	Point of Exposure	Route of Exposure	Receptor	Complete Pathway & Screening Level Risk Outcomes
Primary: - None Secondary: - Potentially imported fill of unknown origins used during historical earthwork activities - Movement of PFAS impacted soil across airport site from earthworks	PFAS eroded as sediment or leached by rainwater or flood water and migrate to groundwater, or dissolve in surface water runoff and travel to affect other media/locations.	Soil	- PFOS 0.0005 mg/kg - PFOS+PFHxS 0.001 mg/kg - PFOA 0.0004 mg/kg	NA	- Earthworks - Waste soil disposal - Wind erosion of impacted soils - Soil erosion by wind	- Construction or outdoor worksite - Nearby residential area	- Incidental ingestion - Dermal contact - Inhalation of dust - Inhalation of dust	- Construction & maintenance workers - Residents	Yes [2] Acceptable. No exceedances of screening values for PFOA (10 mg/kg) and sum of PFOS +PFHxS (1 mg/kg)for soil under public open space exposure scenario Yes [2] Acceptable; dust only likely generated during construction activities. Dust suppression measures are implemented during construction activities to prevent dust generation as dust presents a safety hazard to airport operations.
		Sediment	- PFOS 0.004 mg/kg¹³ - PFOS + PFHxS 0.0042 mg/kg - PFOA 0.0005 mg/kg	NA	Stormwater runoff to drains	Drains	- Dermal contact - Incidental ingestion	Construction & maintenance workers	Yes [2] Acceptable. No exceedances of screening values for PFOA (10 mg/kg) and sum of PFOS +PFHxS (1 mg/kg)for soil under public open space exposure scenario
		Groundwater	- PFOS 0.4 ug/L - PFOS+PFHxS 0.1 ug/L - PFOA 0.01 ug/L		- Horizontal migration - Discharging to drains - Dewatering activities during construction	Construction or outdoor worksite	- Dermal contact - Incidental ingestion	Construction & maintenance workers	Yes [2] Acceptable. No exceedances of PFAS guideline values for recreational water use; PFOS+PFHxS 2ug/L and PFOA 10ug/L.
					Discharging to Maroochy River & coastal waters		- Dermal contact - Incidental ingestion	Recreational Users	Yes Acceptable. No exceedances of PFAS guideline values for recreational water use; PFOS+PFHxS 2ug/L and PFOA 10ug/L.
					Irrigation for crops and poultry	Adjoining residential areas or rural landuses	- Dermal contact - Incidental ingestion - Consumption of home grown produce and eggs	Residents	Unconfirmed [3] Nearby residents (to the east) may be using potential spear pumps. Dermal contact and incidental ingestion exposure is acceptable risk as PFAS levels below recreational guidelines. Groundwater is unlikely to be sole source for irrigation as urban residents on mains water. Plus, consumption of home grown produce is unlikely to be their sole source of food. Consumers occur in residential areas with access to other sources of food.
		Surface water		SW04 PFOS+PFHxS 0.023 ug/L; boundary offsite discharge point;	Overland flow to airport drains	Construction or outdoor worksite	- Dermal contact - Incidental ingestion	Construction & maintenance workers	Yes [2]

¹¹ PFAS soil, groundwater and sediment concentrations are max results from PFAS site investigations (Core Baseline Report 2021).

¹² Sept 2023 PFAS Ambient monitoring report (Core 2023)

¹³ Sediment results based on max results recorded across all drains (Core Baseline Report 2021)

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Source areas	Transport Mechanism	Secondary Sources Media	PFAS Media ¹¹ Concentrations	PFAS Ambient Monitoring Results [Sept 23] ¹²	Transport Mechanism	Point of Exposure	Route of Exposure	Receptor	Complete Pathway & Screening Level Risk Outcomes
				catchment is Gateway and Airport North Precincts • PFOS 0.4 ug/L • PFOS+PFHxS 0.1 ug/L • PFOA 0.01 ug/L					Acceptable. No exceedances of PFAS guideline values for recreational water use; PFOS+PFHxS 2ug/L and PFOA 10ug/L.
					• Airport drainage offsite	Maroochy River Coastal Waters	• Dermal contact • Incidental ingestion	Recreational users	Yes [2] Acceptable. No exceedances of PFAS guideline values for recreational water use; PFOS+PFHxS 2 ug/L and PFOA 10 ug/L.
		Aquatic Biota			• Harvesting	Maroochy River Coastal waters	Ingestion	Consumers of seafood	Yes. Acceptable. Biota sampling detected PFAS in edible portions of fish. Prawns, and mud crabs were less than the limit of reporting or below the FSANZ (2017) guidelines for human health consumption of seafood. ¹⁴

¹⁴ GHD preparing Target Site Investigation (TSI) report for Airservices Australia to understand human health and ecological impacts south of Airport. TSI report expected to be finalised 2024 – yet to be sighted.

Table 32 Gateway Precinct CSM - Ecological Receptors

Source Areas	Transport Mechanism	Secondary Sources Media	PFAS Media Concentrations	PFAS Ambient Monitoring Results [Sept 23]	Transport Mechanism	Points of Exposure	Route of Exposure	Receptor	Complete Pathway & Screening Level Risk Outcomes
Primary: • None identified Secondary: • Potentially imported fill of unknown origins used during historical earthwork activities	PFAS eroded as sediment or leached by rainwater or flood water and migrate to groundwater, or dissolve in surface water runoff and travel to affect other media/locations.	Soil	• PFOS 0.0005 mg/kg • PFOS+PFHxS 0.001 mg/kg • PFOA 0.0004 mg/kg		Vertical and lateral migration through soil profile	• Terrestrial habitats	Direct contact and uptake of soil	Terrestrial biota	Yes Acceptable. No exceedances of PFAS guidelines for ecological direct exposure; PFOS 1 mg/kg and PFOA 10 mg/kg.
			•				Indirect contact and uptake of soil	Terrestrial biota	Yes Acceptable. No exceedances of PFAS guidelines for ecological indirect direct exposure; PFOS 0.01 mg/kg.
		Sediment	• PFOS 0.004 mg/kg ¹⁵ • PFOS + PFHxS 0.0042 mg/kg • PFOA 0.0005 mg/kg		• Overland flow to drains	• Drains	Direct and Indirect contact and uptake of sediment	Terrestrial biota	Yes Acceptable. No exceedances of PFAS guidelines for ecological direct exposure; PFOS 1 mg/kg and PFOA 10 mg/kg. No exceedances of PFAS guidelines for ecological indirect exposure; PFOS 0.01 mg/kg.
		Groundwater	• PFOS 0.4 ug/L • PFOS+PFHxS 0.1 ug/L • PFOA 0.01 ug/L	GW04 • PFOS 0.0032 ug/L	• Infiltration into airport drains • Dewatering activities during construction	• Drains • Maroochy River • Wetlands	• Direct contact • Indirect contact • Ingestion • Bioaccumulation	Aquatic biota	Yes [1] Potential impact. Exceedances of PFOS 99% species protection level for bioaccumulation impacts. Although PFAS can bioaccumulate in aquatic species, particularly in freshwater environments (e.g. SPD), testing of whole body biota samples (fish, invertebrates and aquatic plants) in the Marcoola Drain and Maroochy River suggests that bioaccumulation based on sum PFOS+PFHxS is not widely observed to occur at levels that exceed the relevant screening criteria. ¹⁶ Note, no exceedances of PFOS and PFOA 95% species protection level for direct toxicity.
					• Lateral movement expression & discharge at surface	• Wetlands • Mt Coolum National Park (south) • Twins Water Canal Estate • Maroochy River • Coastal waters	• Direct contact • Indirect contact • Ingestion • Bioaccumulation	Aquatic biota Terrestrial biota (e.g. amphibians)	Yes [1] Potential impact. Exceedances of PFOS 99% species protection level for bioaccumulation impacts as per previous. Although PFAS can bioaccumulate in aquatic species, particularly in freshwater environments (e.g. SPD), testing of whole body biota samples (fish, invertebrates and aquatic plants) in the Marcoola Drain and Maroochy River suggests that bioaccumulation based on sum PFOS+PFHxS is not widely observed to occur at levels that exceed the relevant screening criteria. Note, no exceedances of PFOS and PFOA 95% species protection level for direct toxicity.

¹⁵ Sediment results based on max results recorded across all drains¹⁶ Core PFAS Baseline Assessment Report, Plate 5, pg 89.

Source Areas	Transport Mechanism	Secondary Sources Media	PFAS Media Concentrations	PFAS Ambient Monitoring Results [Sept 23]	Transport Mechanism	Points of Exposure	Route of Exposure	Receptor	Complete Pathway & Screening Level Risk Outcomes
		Surface water		SW04 boundary offsite discharge point; catchment is Gateway and Airport North Precincts • PFOS 0.015 ug/L; SW05 offsite location south of SCA • PFOS 0.0088 ug/L;	• Overland flow to airport drains	• Wetlands • Mt Coolum National Park (south) • Twins Water Canal Estate • Maroochy River • Coastal waters	• Direct contact • Indirect contact • Ingestion • Bioaccumulation	Aquatic biota	Yes [1] Potential impact. Exceedances of PFOS 99% species protection level for bioaccumulation impacts. Although PFAS can bioaccumulate in aquatic species, particularly in freshwater environments (e.g. SPD), testing of whole body biota samples (fish, invertebrates and aquatic plants) in the Marcoola Drain and Maroochy River suggests that bioaccumulation based on sum PFOS+PFHxS is not widely observed to occur at levels that exceed the relevant screening criteria. Note, no exceedances of PFOS and PFOA 95% species protection level for direct toxicity.
		Aquatic biota			• Uptake	• Twins Water Canal Estate • Maroochy River • Coastal waters	• Ingestion • Biomagnification	Aquatic biota	Yes [1] Potential impact. Exceedances of PFOS 99% species protection level for bioaccumulation impacts. Although PFAS can bioaccumulate in aquatic species, particularly in freshwater environments (e.g. SPD), testing of whole body biota samples (fish, invertebrates and aquatic plants) in the Marcoola Drain and Maroochy River suggests that bioaccumulation based on sum PFOS+PFHxS is not widely observed to occur at levels that exceed the relevant screening criteria. Note, no exceedances of PFOS and PFOA 95% species protection level for direct toxicity.

Table 33 Aerospace Precinct CSM – Human Health Receptors

Primary Source areas	Transport Mechanism	Secondary Sources Media	PFAS media concentrations	PFAS Ambient Monitoring Results [Sept 23]	Transport Mechanism	Point of Exposure	Route of Exposure	Receptor	Complete Pathway & Screening Level Risk Outcomes
• Location of former PFAS performance testing	PFAS eroded as sediment or leached by rainwater or flood water and migrate to groundwater, or dissolve in surface water runoff and travel to affect other media/locations.	Soil	• PFOS 0.001 mg/kg • PFOS+PFHxS 0.001 mg/kg • PFOA 0.0005 mg/kg		• Earthworks • Waste soil disposal • Wind erosion of impacted soils	Construction or outdoor worksite	• Incidental ingestion • Dermal contact • Inhalation of dust	Construction & maintenance workers	Yes [2] Acceptable. No exceedances of screening values for PFOA (10 mg/kg) and sum of PFOS +PFHxS (1 mg/kg)for soil under public open space exposure scenario.
• Runoff zone of Old Fire Station					• Soil erosion by wind	Nearby residential area	• Inhalation of dust	Residents	Yes [2] Acceptable; dust only likely generated during construction activities. Dust suppression measures are implemented during construction activities to prevent dust generation as dust presents a safety hazard to airport operations.
		Sediment			• Discharging to drains	Construction or outdoor worksite	• Dermal contact • Incidental ingestion	Construction & maintenance workers	Yes [2] Acceptable. No exceedances of screening values for PFOA (10 mg/kg) and sum of PFOS +PFHxS (1 mg/kg)for soil under public open space exposure scenario
		Surface water			• Overland flow to airport drains; SPD	Construction or outdoor worksite	• Dermal contact • Incidental ingestion	Construction & maintenance workers	Yes Acceptable. No exceedances of PFAS guideline values for recreational water use; PFOS+PFHxS 2ug/L and PFOA 10ug/L.
					• Airport drainage offsite	Maroochy River Coastal Waters	• Dermal contact • Incidental ingestion	Recreational users	Yes Acceptable. No exceedances of PFAS guideline values for recreational water use; PFOS+PFHxS 2ug/L and PFOA 10ug/L.
		Groundwater	• PFOS 0.4 ug/L • PFOS+PFHxS 0.4 ug/L • PFOA 0.1 ug/L	GW05; adj. to SPD • PFOS <0.001 ug/L • PFOS+PFHxS <0.001 ug/L • PFOA 0.001 ug/L GW06 (opp. old fire station) • PFOS 0.028 ug/L • PFOS+PFHxS 0.034 ug/L • PFOA 0.04 ug/L	• Discharging to drains • Dewatering activities during construction	Construction or outdoor worksite	• Dermal contact • Incidental ingestion	Construction & maintenance workers	Yes Acceptable. No exceedances of PFAS guideline values for recreational water use; PFOS+PFHxS 2ug/L and PFOA 10ug/L
					• Discharging to Maroochy River or Sea	Maroochy River Coastal waters	• Dermal contact • Incidental ingestion	Recreational users	Yes Acceptable. No exceedances of PFAS guideline values for recreational water use; PFOS+PFHxS 2ug/L and PFOA 10ug/L
					• Groundwater irrigation for crops and poultry	Adjoining residential and rural landuses	• Dermal contact • Incidental ingestion • Consumption of home grown produce and eggs	Residents	Unconfirmed [3] Nearby residents (to the east) may be using potential spear pumps. Dermal contact and incidental ingestion exposure is acceptable risk as PFAS levels below recreational guidelines. Groundwater is unlikely to be sole source for irrigation as urban residents on mains water. Plus, consumption of home grown produce is unlikely to be their sole source of food.

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									Consumers occur in residential areas with access to other sources of food.
		Aquatic biota			• Harvesting	• Maroochy River • Coastal waters	Ingestion	Consumers of seafood	Yes. Acceptable. Biota sampling detected PFAS in edible portions of fish. Prawns, and mud crabs were less than the limit of reporting or below the FSANZ (2017) guidelines for human health consumption of seafood.

Table 34 Aerospace Precinct CSM – Ecological Receptors

Source Areas	Transport Mechanism	Secondary Sources Media	PFAS media concentrations	PFAS Ambient Monitoring Results [Sept 23]	Transport Mechanism	Point of Exposure	Route of Exposure	Receptor	Complete Pathway & Screening Level Risk Outcomes
Primary: • Location of former PFAS performance testing • Runoff zone of old fire station Secondary: • Potentially imported fill of unknown origins used during historical earthwork activities • Movement of PFAS impacted soil across airport site from earthworks • Unknown sediment relocation from drains maintenance	PFAS eroded as sediment or leached by rainwater or flood water and migrate to groundwater, or dissolve in surface water runoff and travel to affect other media/locations.	Soil	• PFOS 0.0005 mg/kg • PFOS+PFHxS 0.001 mg/kg • PFOA 0.0004 mg/kg		Vertical and lateral migration through soil profile	• Terrestrial habitats	• Direct contact and uptake of soil	Terrestrial biota	Yes Acceptable. No exceedances of PFAS guidelines for ecological direct exposure; PFOS 1 mg/kg and PFOA 10 mg/kg.
			• Indirect contact and uptake of soil				Terrestrial biota	Yes Acceptable. No exceedances of PFAS guidelines for ecological indirect direct exposure; PFOS 0.01 mg/kg.	
		Sediment			Overland flow to drains	• Drains	• Dermal contact • Incidental ingestion	Terrestrial biota	Yes Acceptable. No exceedances of PFAS guidelines for ecological direct exposure; PFOS 1 mg/kg and PFOA 10 mg/kg. No exceedances of PFAS guidelines for ecological indirect exposure; PFOS 0.01 mg/kg.
		Surface water			Overland flow to airport drains	• Drains • Maroochy River • Swamp areas		Aquatic biota Terrestrial biota	Yes [1] Potential impact. Exceedances of PFOS 99% species protection level for bioaccumulation impacts. Although PFAS can bioaccumulate in aquatic species, particularly in freshwater environments (e.g. SPD), testing of whole body biota samples (fish, invertebrates and aquatic plants) in the Marcoola Drain and Maroochy River suggests that bioaccumulation based on sum PFOS+PFHxS is not widely observed to occur at levels that exceed the relevant screening criteria. Note, no exceedances of PFOS and PFOA 95% species protection level for direct toxicity.
		Groundwater	• PFOS 0.4 ug/L • PFOS+PFHxS 0.1 ug/L • PFOA 0.01 ug/L •	GW05; adj. to SPD • PFOS <0.001 ug/L • PFOS+PFHxS <0.001 ug/L • PFOA 0.001 ug/L GW06 (opp. old fire station) • PFOS 0.028 ug/L • PFOS+PFHxS 0.034 ug/L • PFOA 0.04 ug/L	• Infiltration into airport drains • Dewatering activities during construction •	• Drains • Maroochy River • Surface water bodies		Aquatic biota	Yes [1] Potential impact. Exceedances of PFOS 99% species protection level for bioaccumulation impacts. Although PFAS can bioaccumulate in aquatic species, particularly in freshwater environments (e.g. SPD), testing of whole body biota samples (fish, invertebrates and aquatic plants) in the Marcoola Drain and Maroochy River suggests that bioaccumulation based on sum PFOS+PFHxS is not widely observed to occur at levels that exceed the relevant screening criteria.

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Source Areas	Transport Mechanism	Secondary Sources Media	PFAS media concentrations	PFAS Ambient Monitoring Results [Sept 23]	Transport Mechanism	Point of Exposure	Route of Exposure	Receptor	Complete Pathway & Screening Level Risk Outcomes
									Note, no exceedances of PFOS and PFOA 95% species protection level for direct toxicity.
		Aquatic biota			• Uptake	• Wetlands • Mt Coolum National Park (south) • Maroochy River • Coastal waters	• Bioaccumulation	Aquatic biota	Yes [1] Potential impact. Exceedances of PFOS 99% species protection level for bioaccumulation impacts. Although PFAS can bioaccumulate in aquatic species, particularly in freshwater environments (e.g. SPD), testing of whole body biota samples (fish, invertebrates and aquatic plants) in the Marcoola Drain and Maroochy River suggests that bioaccumulation based on sum PFOS+PFHxS is not widely observed to occur at levels that exceed the relevant screening criteria. Note, no exceedances of PFOS and PFOA 95% species protection level for direct toxicity.
					• Uptake	• Wetlands • Mt Coolum National Park (south) • Maroochy River • Coastal waters	• Biomagnification	Food chain consumers	Yes [1] Potential impact. Exceedances of PFOS 99% species protection level for bioaccumulation impacts. Although PFAS can bioaccumulate in aquatic species, particularly in freshwater environments (e.g. SPD), testing of whole body biota samples (fish, invertebrates and aquatic plants) in the Marcoola Drain and Maroochy River suggests that bioaccumulation based on sum PFOS+PFHxS is not widely observed to occur at levels that exceed the relevant screening criteria. Note, no exceedances of PFOS and PFOA 95% species protection level for direct toxicity.

Table 35 Airport West Precinct CSM – Human Health Receptors

Source areas	Transport Mechanism	Secondary Sources Media	PFAS Media Concentrations	PFAS Ambient Monitoring Results [Sept 2023]	Transport Mechanism	Point of Exposure	Route of Exposure	Receptor	Complete Pathway & Screening Level Risk Outcomes
Primary: - None Secondary: - Potentially imported fill of unknown origins used during historical earthwork activities - Movement of PFAS impacted soil across airport site from earthworks - Potential sediment relocation from drains.	PFAS eroded as sediment or leached by rainwater or flood water and migrate to groundwater, or dissolve in surface water runoff and travel to affect other media/locations.	Soil	- PFOS 0.0004 mg/kg - PFOS+PFHxS 0.0004 mg/kg - PFOA 0.0004 mg/kg		- Earthworks - Waste soil disposal - Wind erosion of impacted soils	Construction or outdoor worksite	- Incidental ingestion - Dermal contact - Inhalation of dust	Construction & maintenance workers	Yes [2] Acceptable. No exceedances of screening values for PFOA (10 mg/kg) and sum of PFOS +PFHxS (1 mg/kg) for soil under public open space exposure scenario.
					Soil erosion by wind	Nearby residential area	Inhalation of dust	Residents	Yes [2] Acceptable; dust only likely generated during construction activities. Dust suppression measures are implemented during construction activities to prevent dust generation as dust presents a safety hazard to airport operations.
		Sediment			- Discharging to drains	Construction or outdoor worksite	- Dermal contact - Incidental ingestion	Construction & maintenance workers	Yes [2] Acceptable. No exceedances of screening values for PFOA (10 mg/kg) and sum of PFOS +PFHxS (1 mg/kg)for soil under public open space exposure scenario
		Surface water			Overland flow to airport drains; SPD	Construction or outdoor worksite	- Dermal contact - Incidental ingestion	Construction & maintenance workers	Yes [2] Acceptable. No exceedances of PFAS guideline values for recreational water use; PFOS+PFHxS 2 ug/L and PFOA 10 ug/L.
					Airport drainage offsite	Maroochy River Coastal Waters	- Dermal contact - Incidental ingestion	Recreational users	Yes Acceptable. No exceedances of PFAS guideline values for recreational water use; PFOS+PFHxS 2 ug/L and PFOA 10 ug/L.
		Groundwater	- PFOS 0.004 ug/L - PFOS+PFHxS 0.007 ug/L - PFOA 0.001 ug/L	GW10-A - PFOS <0.001 ug/L - PFOS+PFHxS <0.001 ug/L - PFOA <0.001 ug/L GW11-B - PFOS <0.001 ug/L - PFOS+PFHxS <0.001 ug/L - PFOA <0.001 ug/L	- Discharging to drains - Dewatering activities during construction	Construction or outdoor worksite	- Dermal contact - Incidental ingestion	Construction & maintenance workers	Yes Acceptable. No exceedances of PFAS guideline values for recreational water use; PFOS+PFHxS 2 ug/L and PFOA 10 ug/L
					Discharging to Maroochy River or Sea	Maroochy River Coastal waters	- Dermal contact - Incidental ingestion	Recreational users	Yes Acceptable. No exceedances of PFAS guideline values for recreational water use; PFOS+PFHxS 2ug/L and PFOA 10ug/L
					Groundwater irrigation for crops and poultry	Adjoining residential and rural landuses	- Dermal contact - Incidental ingestion Consumption of home grown produce and eggs	Residents	Unconfirmed [3] Nearby residents (to the east) may be using potential spear pumps. Dermal contact and incidental ingestion exposure is acceptable risk as PFAS levels below recreational guidelines. Groundwater is unlikely to be sole source for irrigation as urban residents on mains water. Plus, consumption of home grown produce is unlikely to be their sole source of food. Consumers occur in residential areas with access to other sources of food.
		Aquatic biota			Harvesting	Maroochy River Coastal waters	Ingestion	Consumers of seafood	Yes. Acceptable. Biota sampling detected PFAS in edible portions of fish. Prawns, and mud crabs were less than the limit of reporting or below the FSANZ (2017) guidelines for human health consumption of seafood.

Table 36 Airport West Precinct CSM – Ecological Receptors

Source Areas	Transport Mechanism	Secondary Sources Media	PFAS Site Investigations Max PFAS results	PFAS Ambient Water Monitoring Results (Sept 2023)	Transport Mechanism	Point of Exposure	Route of Exposure	Receptor	Complete Pathway & Screening Level Risk Outcomes
Primary: - None Secondary: - Potentially imported fill of unknown origins used during historical earthwork activities - Cleaning drains of sediment and relocating material to other areas of airport.	PFAS eroded as sediment or leached by rainwater or flood water and migrate to groundwater, or dissolve in surface water runoff and travel to affect other media/locations.	Soil	PFOS 0.0005 mg/kg PFOS+PFHxS 0.001 mg/kg PFOA 0.0004 mg/kg		Vertical and lateral migration through soil profile	Terrestrial habitats	Direct contact and uptake of soil	Terrestrial biota	Yes Acceptable. No exceedances of PFAS guidelines for ecological direct exposure; PFOS 1 mg/kg and PFOA 10 mg/kg.
							Indirect contact and uptake of soil	Terrestrial biota	Yes Acceptable. No exceedances of PFAS guidelines for ecological indirect direct exposure; PFOS 0.01 mg/kg.
		Sediment	•	•	• Overland flow to drains	• Drains	Dermal contact Incidental ingestion	Terrestrial biota	Yes Acceptable. No exceedances of PFAS guidelines for ecological direct exposure; PFOS 1 mg/kg and PFOA 10 mg/kg. No exceedances of PFAS guidelines for ecological indirect exposure; PFOS 0.01 mg/kg.
		Surface water	•	•	Overland flow to airport drains	Drains Maroochy River Swamp areas		Aquatic biota Terrestrial biota	Yes [1] Potential impact. Exceedances of PFOS 99% species protection level for bioaccumulation impacts. Although PFAS can bioaccumulate in aquatic species, particularly in freshwater environments (e.g. SPD), testing of whole body biota samples (fish, invertebrates and aquatic plants) in the Marcoola Drain and Maroochy River suggests that bioaccumulation based on sum PFOS+PFHxS is not widely observed to occur at levels that exceed the relevant screening criteria. Note, no exceedances of PFOS and PFOA 95% species protection level for direct toxicity
		Groundwater	PFOS 0.4 ug/L PFOS+PFHxS 0.1 ug/L PFOA 0.01 ug/L	GW05 PFOS <0.001 ug/L PFOS+PFHxS <0.001 ug/L PFOA 0.001 ug/L	Infiltration into airport drains Dewatering activities during construction	Wetlands Mt Coolum National Park (north & south) Maroochy River Coastal waters		Aquatic biota	Yes [1] Potential impact. Exceedances of PFOS 99% species protection level for bioaccumulation impacts. Although PFAS can bioaccumulate in aquatic species, particularly in freshwater environments (e.g. SPD), testing of whole body biota samples (fish, invertebrates and aquatic plants) in the Marcoola Drain and Maroochy River suggests that bioaccumulation based on sum PFOS+PFHxS is not widely observed to occur at levels that exceed the relevant screening criteria. Note, no exceedances of PFOS and PFOA 95% species protection level for direct toxicity
		Aquatic biota	•	•	• Uptake	Wetlands Mt Coolum National Park (north & south) Twins Water Canal Estate Maroochy River Coastal waters	Bioaccumulation Biomagnification	Aquatic biota	Yes [1] Potential impact. Exceedances of PFOS 99% species protection level for bioaccumulation impacts. Although PFAS can bioaccumulate in aquatic species, particularly in freshwater environments (e.g. SPD), testing of whole body biota samples (fish, invertebrates and aquatic plants) in the Marcoola Drain and Maroochy River suggests that bioaccumulation based on sum PFOS+PFHxS is not widely observed to occur at levels that exceed the relevant screening criteria. Note, no exceedances of PFOS and PFOA 95% species protection level for direct toxicity

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Source Areas	Transport Mechanism	Secondary Sources Media	PFAS Site Investigations Max PFAS results	PFAS Ambient Water Monitoring Results (Sept 2023)	Transport Mechanism	Point of Exposure	Route of Exposure	Receptor	Complete Pathway & Screening Level Risk Outcomes
			•	•	•	Wetlands Mt Coolum National Park (north & south) Twins Water Canal Estate Maroochy River Coastal waters	Biomagnification	Food chain consumers	Yes [1] Potential impact. Exceedances of PFOS 99% species protection level for bioaccumulation impacts. Although PFAS can bioaccumulate in aquatic species, particularly in freshwater environments (e.g. SPD), testing of whole body biota samples (fish, invertebrates and aquatic plants) in the Marcoola Drain and Maroochy River suggests that bioaccumulation based on sum PFOS+PFHxS is not widely observed to occur at levels that exceed the relevant screening criteria. Note, no exceedances of PFOS and PFOA 95% species protection level for direct toxicity

Table 37 Aviation Precinct CSM– Human Health Receptors

Source areas	Transport Mechanism	Secondary Sources Media	PFAS site investigations max concentrations	PFAS Ambient Water Monitoring Results (Sept 2023)	Transport Mechanism	Point of Exposure	Route of Exposure	Receptor	Complete Pathway & Screening Level Risk Outcomes
Primary: - Sediment relocation area - Accidental discharge area at new fire station Secondary: - Potential imported fill of unknown origins used during historical earthwork activities - Potential relocation of PFAS impacted soil across airport site from historical earthworks	PFAS eroded as sediment or leached by rainwater or flood water and migrate to groundwater, or dissolve in surface water runoff and travel to affect other media/locations.	Soil	- PFOS 0.001 mg/kg - PFOS+PFHxS 0.001 mg/kg - PFOA 0.0004 mg/kg	N/A	- Earthworks - Waste soil disposal - Wind erosion of impacted soils	Outdoor worksite	- Incidental ingestion - Dermal contact - Inhalation of dust	Construction & maintenance workers	Yes [2] Acceptable. No exceedances of screening values for PFOA (10 mg/kg) and sum of PFOS +PFHxS (1 mg/kg) for soil under public open space exposure scenario.
			•	•	• Soil erosion by wind	Nearby residential area	Inhalation of dust	Residents	Yes [2] Acceptable; dust only likely generated during construction activities. Dust suppression measures are implemented during construction activities to prevent dust generation as dust presents a safety hazard to airport operations.
		Sediment	•	N/A	• Discharge to drains	Outdoor worksite	- Dermal contact - Incidental ingestion	Construction & maintenance workers	Yes [2] Acceptable. No exceedances of screening values for PFOA (10 mg/kg) and sum of PFOS +PFHxS (1 mg/kg) for soil under public open space exposure scenario
		Surface water	•	SW02 (Drain N of fire stn) - PFOS 0.012 ug/L - PFOS+PFHxS 0.012 ug/L - PFOA 0.01 ug/L SW03 (Drain S of fire stn) - PFOS 0.018 ug/L - PFOS+PFHxS 0.02 ug/L - PFOA 0.013 ug/L D1 (NPD) - PFOS < 0.001 ug/L - PFOS+PFHxS < 0.001 ug/L - PFOA < 0.001 ug/L SW09 (SPD) - PFOS 0.029 ug/L - PFOS+PFHxS 0.032 ug/L - PFOA 0.018 ug/L	• Overland flow to airport drains; SPD	Outdoor worksite	- Dermal contact - Incidental ingestion	Construction & maintenance workers	Yes [2] Acceptable. No exceedances of PFAS guideline values for recreational water use; PFOS+PFHxS 2ug/L and PFOA 10 ug/L.
			•	•	• Airport drainage offsite	Maroochy River Coastal waters	- Dermal contact - Incidental ingestion	Recreational users	Yes Acceptable. No exceedances of PFAS guideline values for recreational water use; PFOS+PFHxS 2 ug/L and PFOA 10 ug/L
		Groundwater	- PFOS 0.4 ug/L - PFOS+PFHxS 0.1 ug/L - PFOA 0.1 ug/L	GW01 (adj. current fire station) - PFOS 0.027 ug/L - PFOS+PFHxS 0.028 ug/L - PFOA 0.006 ug/L	- Discharge to drains - Construction dewatering activities	Outdoor worksite	- Dermal contact - Incidental ingestion	Construction & maintenance workers	Yes Acceptable. No exceedances of PFAS guideline values for recreational water use; PFOS+PFHxS 2 ug/L and PFOA 10 ug/L

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Source areas	Transport Mechanism	Secondary Sources Media	PFAS site investigations max concentrations	PFAS Ambient Water Monitoring Results (Sept 2023)	Transport Mechanism	Point of Exposure	Route of Exposure	Receptor	Complete Pathway & Screening Level Risk Outcomes
				GW7-B (adj. WPD) • PFOS <0.001 ug/L • PFOS+PFHxS <0.001 ug/L • PFOA <0.001 ug/L					
			•		• Groundwater irrigation for crops and poultry	Adjoining residential and rural landuses	• Dermal contact • Incidental ingestion • Consumption of home grown produce and eggs	Residents	Unconfirmed [3] Nearby residents (to the east) may be using potential spear pumps. Rural residents west of airport may be using potential spear pumps. Dermal contact and incidental ingestion exposure is acceptable risk as PFAS levels below recreational guidelines. Groundwater is unlikely to be sole source for irrigation as urban residents on mains water. Plus, consumption of home grown produce is unlikely to be their sole source of food. Consumers occur in residential areas with access to other sources of food.

Table 38 Aviation Precinct CSM – Ecological Receptors

Source Areas	Transport Mechanism	Secondary Sources Media	PFAS Site Investigations Max PFAS results	PFAS Ambient Water Monitoring Results (Sept 2023)	Transport Mechanism	Point of Exposure	Route of Exposure	Receptor	Complete Pathway & Screening Level Risk Outcomes
Primary: - Sediment relocation area - Accidental discharge area at new fire station Secondary: - Potential imported fill of unknown origins used during historical earthwork activities - Potential relocation of PFAS impacted soil across airport site from historical earthworks	PFAS eroded as sediment or leached by rainwater or flood water and migrate to groundwater, or dissolve in surface water runoff and travel to affect other media/locations.	Soil	PFOS 0.001 mg/kg PFOS+PFHxS 0.001 mg/kg PFOA 0.0004 mg/kg	•	• Vertical and lateral migration through soil profile	• Terrestrial habitats	• Direct contact and uptake of soil	Terrestrial biota	Yes Acceptable. No exceedances of PFAS guidelines for ecological direct exposure; PFOS 1 mg/kg and PFOA 10 mg/kg.
			•	•		Terrestrial habitats	Indirect contact and uptake of soil	Terrestrial biota	Yes Acceptable. No exceedances of PFAS guidelines for ecological indirect direct exposure; PFOS 0.01 mg/kg.
		Sediment	•	•	Overland flow to drains	Drains	Dermal contact Incidental ingestion	Terrestrial biota	Yes Acceptable. No exceedances of PFAS guidelines for ecological direct exposure; PFOS 1 mg/kg and PFOA 10 mg/kg. No exceedances of PFAS guidelines for ecological indirect exposure; PFOS 0.01 mg/kg.
		Surface water	•	SW02 (Drain N of fire stn) • PFOS 0.012 ug/L • PFOS+PFHxS 0.012 ug/L • PFOA 0.01 ug/L SW03 (Drain S of fire stn) • PFOS 0.018 ug/L • PFOS+PFHxS 0.02 ug/L • PFOA 0.013 ug/L D1 (NPD) • PFOS < 0.001 ug/L • PFOS+PFHxS < 0.001 ug/L • PFOA < 0.001 ug/L SW09 (SPD) • PFOS 0.029 ug/L • PFOS+PFHxS 0.032 ug/L • PFOA 0.018 ug/L	Overland flow to airport drains	Drains Maroochy River Swamp areas	Dermal contact ingestion	Aquatic biota Terrestrial biota	Yes [1] Potential impact. Exceedances of PFOS 99% species protection level for bioaccumulation impacts. Although PFAS can bioaccumulate in aquatic species, particularly in freshwater environments (e.g. SPD), testing of whole body biota samples (fish, invertebrates and aquatic plants) in the Marcoola Drain and Maroochy River suggests that bioaccumulation based on sum PFOS+PFHxS is not widely observed to occur at levels that exceed the relevant screening criteria. Note, no exceedances of PFOS and PFOA 95% species protection level for direct toxicity.
		Groundwater	PFOS 0.4 ug/L PFOS+PFHxS 0.1 ug/L PFOA 0.1 ug/L	GW01 (adj. current fire station) • PFOS 0.027 ug/L • PFOS+PFHxS 0.028 ug/L • PFOA 0.006 ug/L GW06 (opp. old fire station) • PFOS 0.028 ug/L • PFOS+PFHxS 0.034 ug/L • PFOA 0.04 ug/L GW7-B (adj. WPD) • PFOS < 0.001 ug/L • PFOS+PFHxS < 0.001 ug/L	Infiltration into airport drains Dewatering activities during construction	Drains Maroochy River Surface water bodies	Dermal contact Incidental ingestion	Aquatic biota	Yes [1] Potential impact. Exceedances of PFOS 99% species protection level for bioaccumulation impacts. Although PFAS can bioaccumulate in aquatic species, particularly in freshwater environments (e.g. SPD), testing of whole body biota samples (fish, invertebrates and aquatic plants) in the Marcoola Drain and Maroochy River suggests that bioaccumulation based on sum PFOS+PFHxS is not widely observed to occur at levels that exceed the relevant screening criteria. Note, no exceedances of PFOS and PFOA 95% species protection level for direct toxicity.

Source Areas	Transport Mechanism	Secondary Sources Media	PFAS Site Investigations Max PFAS results	PFAS Ambient Water Monitoring Results (Sept 2023)	Transport Mechanism	Point of Exposure	Route of Exposure	Receptor	Complete Pathway & Screening Level Risk Outcomes
				• PFOA <0.001 ug/L					
		Aquatic biota	•	•	• Uptake	Maroochy River Coastal waters	Bioaccumulation	Aquatic biota	Yes [1] Potential impact. Exceedances of PFOS 99% species protection level for bioaccumulation impacts. Although PFAS can bioaccumulate in aquatic species, particularly in freshwater environments (e.g. SPD), testing of whole body biota samples (fish, invertebrates and aquatic plants) in the Marcoola Drain and Maroochy River suggests that bioaccumulation based on sum PFOS+PFHxS is not widely observed to occur at levels that exceed the relevant screening criteria. Note, no exceedances of PFOS and PFOA 95% species protection level for direct toxicity.
			•	•	• Uptake	Maroochy River Coastal waters	Biomagnification	Food chain consumers	Yes [1] Potential impact. Exceedances of PFOS 99% species protection level for bioaccumulation impacts. Although PFAS can bioaccumulate in aquatic species, particularly in freshwater environments (e.g. SPD), testing of whole body biota samples (fish, invertebrates and aquatic plants) in the Marcoola Drain and Maroochy River suggests that bioaccumulation based on sum PFOS+PFHxS is not widely observed to occur at levels that exceed the relevant screening criteria. Note, no exceedances of PFOS and PFOA 95% species protection level for direct toxicity.

Table 39 Airport North Precinct CSM – Human Health Receptors

Source areas	Transport Mechanism	Secondary Sources Media	PFAS site investigations max concentrations	PFAS Ambient Water Monitoring Results (Sept 2023)	Transport Mechanism	Point of Exposure	Route of Exposure	Receptor	Complete Pathway & Screening Level Risk Outcomes
Primary: - Historic plane crash area Secondary: - Potential imported fill of unknown origins used during historical earthwork activities - Potential relocation of PFAS impacted soil across airport site from historical earthworks	PFAS eroded as sediment or leached by rainwater or flood water and migrate to groundwater, or dissolve in surface water runoff and travel to affect other media/locations	Soil	- PFOS 0.001 mg/kg - PFOS+PFHxS 0.001 mg/kg - PFOA 0.0004 mg/kg	N/A	- Earthworks - Waste soil disposal - Wind erosion of impacted soils	Outdoor worksite	- Incidental ingestion - Dermal contact - Inhalation of dust	Construction & maintenance workers	Yes [2] Acceptable. No exceedances of screening values for PFOA (10 mg/kg) and sum of PFOS +PFHxS (1 mg/kg) for soil under public open space exposure scenario.
			•	•	• Soil erosion by wind	Nearby residential area	Inhalation of dust	Residents	Yes [2] Acceptable; dust only likely generated during construction activities. Dust suppression measures are implemented during construction activities to prevent dust generation as dust presents a safety hazard to airport operations.
		Sediment	•	N/A	• Discharge to drains	Outdoor worksite	- Dermal contact - Incidental ingestion	Construction & maintenance workers	Yes [2] Acceptable. No exceedances of screening values for PFOA (10 mg/kg) and sum of PFOS +PFHxS (1 mg/kg)for soil under public open space exposure scenario
		Surface water	•	SW01 (EPD) - PFOS 0.066 ug/L - PFOS+PFHxS 0.068 ug/L - PFOA 0.005 ug/L	• Overland flow to airport drains; SPD	Outdoor worksite	- Dermal contact - Incidental ingestion	Construction & maintenance workers	Yes [2] Acceptable. No exceedances of PFAS guideline values for recreational water use; PFOS+PFHxS 2 ug/L and PFOA 10 ug/L.
					• Airport drainage offsite	- Maroochy River - Coastal waters	- Dermal contact - Incidental ingestion	Recreational users	Yes [2] Acceptable. No exceedances of PFAS guideline values for recreational water use; PFOS+PFHxS 2 ug/L and PFOA 10 ug/L.
		Groundwater	- PFOS 0.01 ug/L - PFOS+PFHxS 0.07 ug/L - PFOA 0.01 ug/L	GW02 (adj. current fire station) - PFOS <0.001 ug/L - PFOS+PFHxS 0.001 ug/L - PFOA 0.005 ug/L GW03 (plane crash area) - PFOS <0.001 ug/L - PFOS+PFHxS <0.001 ug/L - PFOA <0.001 ug/L GW25 (upgradient SCA) - PFOS 0.0042 ug/L - PFOS+PFHxS 0.0042 ug/L - PFOA <0.001 ug/L	- Discharge to drains - Construction dewatering activities	Outdoor worksite	- Dermal contact - Incidental ingestion	Construction & maintenance workers	Yes [2] Acceptable. No exceedances of PFAS guideline values for recreational water use; PFOS+PFHxS 2 ug/L and PFOA 10 ug/L.
					Discharging to Maroochy River or Sea	Maroochy River Coastal waters	- Dermal contact - Incidental ingestion	Recreational users	Yes [2] Acceptable. No exceedances of PFAS guideline values for recreational water use; PFOS+PFHxS 2 ug/L and PFOA 10 ug/L
					Groundwater irrigation for crops and poultry	Adjoining residential and rural landuses	- Dermal contact - Incidental ingestion - Consumption of home grown produce & eggs	Residents	Unconfirmed [3] Nearby residents (to the east) may be using potential spear pumps. Rural residents west of airport may be using potential spear pumps. Dermal contact and incidental ingestion exposure is acceptable risk as PFAS levels below recreational guidelines. Groundwater is unlikely to be sole source for irrigation as urban residents on mains water. Plus, consumption of home grown produce is unlikely to be their sole source of food.

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Source areas	Transport Mechanism	Secondary Sources Media	PFAS site investigations max concentrations	PFAS Ambient Water Monitoring Results (Sept 2023)	Transport Mechanism	Point of Exposure	Route of Exposure	Receptor	Complete Pathway & Screening Level Risk Outcomes
									Consumers occur in residential areas with access to other sources of food.
		Aquatic biota			Harvesting	Maroochy River Coastal waters	Ingestion	Consumers of seafood	Yes. Acceptable. Biota sampling detected PFAS in edible portions of fish. Prawns, and mud crabs were less than the limit of reporting or below the FSANZ (2017) guidelines for human health consumption of seafood.

Table 40 Airport North Precinct CSM – Ecological Receptors

Primary Source / Areas of Concern	Transport Mechanism	Secondary Sources Media	PFAS Site Investigations Max PFAS results	PFAS Ambient Water Monitoring Results (Sept 2023)	Transport Mechanism	Point of Exposure	Route of Exposure	Receptor	Complete Pathway & Screening Level Risk Outcomes
Primary: Historic plane crash area Secondary: • Potential imported fill of unknown origins used during historical earthwork activities Potential relocation of PFAS impacted soil across airport site from historical earthworks	PFAS eroded as sediment or leached by rainwater or flood water and migrate to groundwater, or dissolve in surface water runoff and travel to affect other media/locations.	Soil	PFOS 0.0005 mg/kg PFOS+PFHxS 0.001 mg/kg PFOA 0.0004 mg/kg		Vertical and lateral migration through soil profile	Terrestrial habitats	Direct contact and uptake of soil	Terrestrial biota	Yes Acceptable. No exceedances of PFAS guidelines for ecological direct exposure; PFOS 1 mg/kg and PFOA 10 mg/kg.
							Indirect contact and uptake of soil	Terrestrial biota	Yes Acceptable. No exceedances of PFAS guidelines for ecological indirect direct exposure; PFOS 0.01 mg/kg.
		Sediment	[sediment results?]		Overland flow to drains	Drains	Dermal contact Incidental ingestion	Terrestrial biota	Yes Acceptable. No exceedances of PFAS guidelines for ecological direct exposure; PFOS 1 mg/kg and PFOA 10 mg/kg. No exceedances of PFAS guidelines for ecological indirect exposure; PFOS 0.01 mg/kg.
		Surface water		SW01 (EPD) PFOS 0.066 ug/L PFOS+PFHxS 0.068 ug/L PFOA 0.005 ug/L	Overland flow to airport drains	Drains Maroochy River Swamp areas		Aquatic biota Terrestrial biota	Yes [1] Potential impact. Exceedances of PFOS 99% species protection level for bioaccumulation impacts. Although PFAS can bioaccumulate in aquatic species, particularly in freshwater environments (eg SPD), testing of whole body biota samples (fish, invertebrates and aquatic plants) in the Marcoola Drain and Maroochy River suggests that bioaccumulation based on sum PFOS+PFHxS is not widely observed to occur at levels that exceed the relevant screening criteria. Note, no exceedances of PFOS and PFOA 95% species protection level for direct toxicity
		Groundwater	PFOS 0.4 ug/L PFOS+PFHxS 0.1 ug/L PFOA 0.01 ug/L		Infiltration into airport drains Dewatering activities during construction	Wetlands Mt Coolum National Park (north & south) Maroochy River Coastal waters	Dermal contact Incidental ingestion	Aquatic biota	Yes [1] Potential impact. Exceedances of PFOS 99% species protection level for bioaccumulation impacts. Although PFAS can bioaccumulate in aquatic species, particularly in freshwater environments (e.g. SPD), testing of whole body biota samples (fish, invertebrates and aquatic plants) in the Marcoola Drain and Maroochy River suggests that bioaccumulation based on sum PFOS+PFHxS is not widely observed to occur at levels that exceed the relevant screening criteria. Note, no exceedances of PFOS and PFOA 95% species protection level for direct toxicity
		Aquatic biota			Uptake	Wetlands Mt Coolum National Park (north & south) Twins Water Canal Estate	Bioaccumulation	Aquatic biota	Yes [1] Potential impact. Exceedances of PFOS 99% species protection level for bioaccumulation impacts.

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Primary Source / Areas of Concern	Transport Mechanism	Secondary Sources Media	PFAS Site Investigations Max PFAS results	PFAS Ambient Water Monitoring Results (Sept 2023)	Transport Mechanism	Point of Exposure	Route of Exposure	Receptor	Complete Pathway & Screening Level Risk Outcomes
						Maroochy River Coastal waters			Although PFAS can bioaccumulate in aquatic species, particularly in freshwater environments (e.g. SPD), testing of whole body biota samples (fish, invertebrates and aquatic plants) in the Marcoola Drain and Maroochy River suggests that bioaccumulation based on sum PFOS+PFHxS is not widely observed to occur at levels that exceed the relevant screening criteria. Note, no exceedances of PFOS and PFOA 95% species protection level for direct toxicity
						Wetlands Mt Coolum National Park (north & south) Twins Water Canal Estate Maroochy River Coastal waters	Biomagnification	Food chain consumers	Yes [1] Potential impact. Exceedances of PFOS 99% species protection level for bioaccumulation impacts. Although PFAS can bioaccumulate in aquatic species, particularly in freshwater environments (e.g. SPD), testing of whole body biota samples (fish, invertebrates and aquatic plants) in the Marcoola Drain and Maroochy River suggests that bioaccumulation based on sum PFOS+PFHxS is not widely observed to occur at levels that exceed the relevant screening criteria. Note, no exceedances of PFOS and PFOA 95% species protection level for direct toxicity

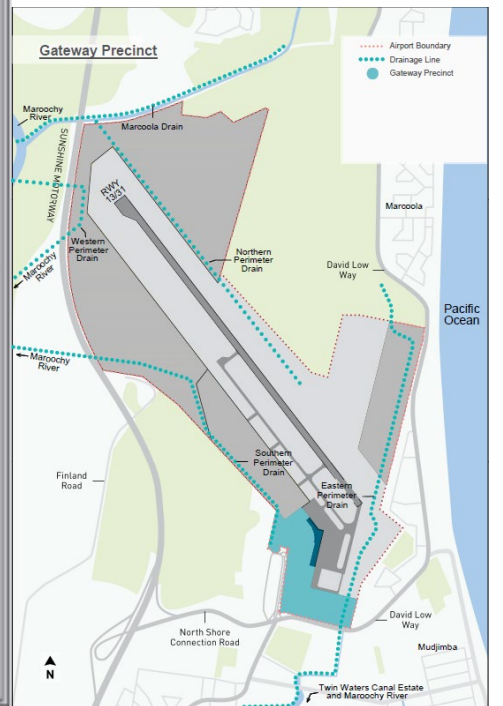
12.6 Pictorial Conceptual Site Models for Development Precincts

The following conceptual site models (CSMs) provide pictorial forms of the PFAS source-pathway-receptor linkages within and outside the development precincts on a simplified physical setting based upon **Figure 14** below. These pictorial forms are a qualitative tool useful for communication purposes to aid in the understanding and discussion of PFAS exposure pathways to receptors on and off the Airport. They are a generalised representation of PFAS exposure pathways within the existing environment. They are a precursor to semi-quantitative CSMs that will be prepared for each development precinct following the PFAS statistical assessment (refer **section 11**) and updated as required with input from the PFAS ongoing monitoring program (**section 23**). CSMs development is an iterative process that will be refined with the implementation of the PFAS Management Plan.

Figure 14 Context maps for conceptual site models

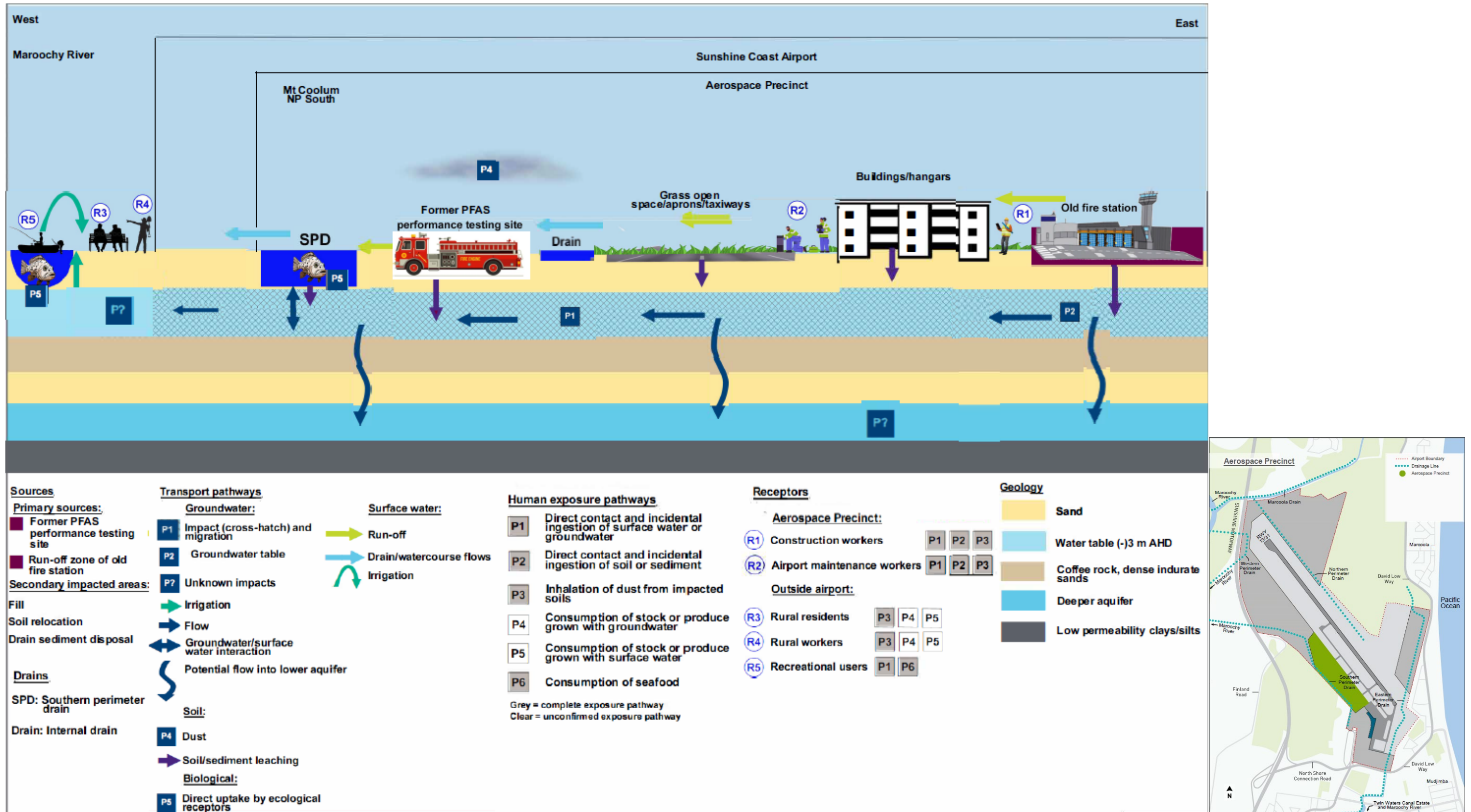


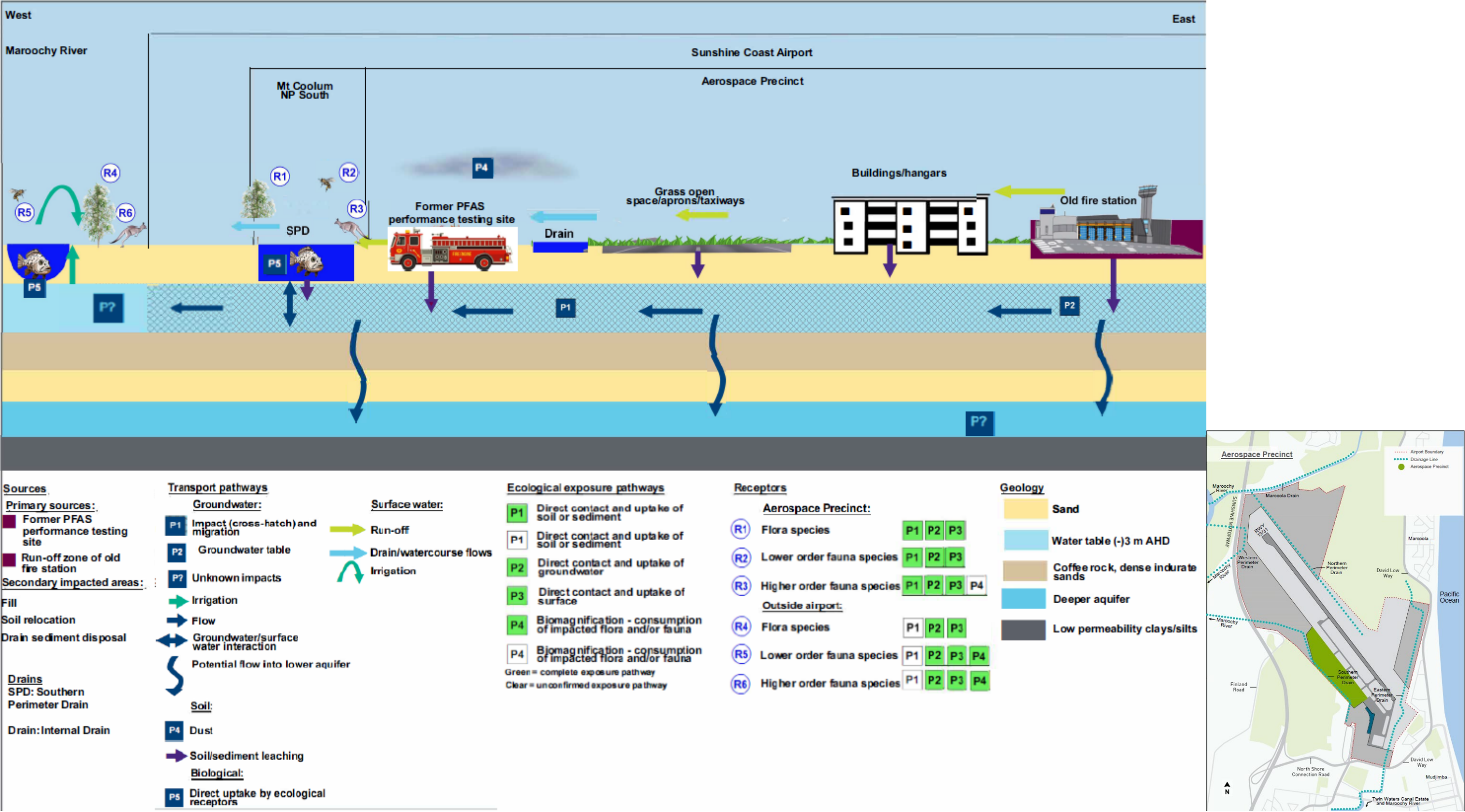


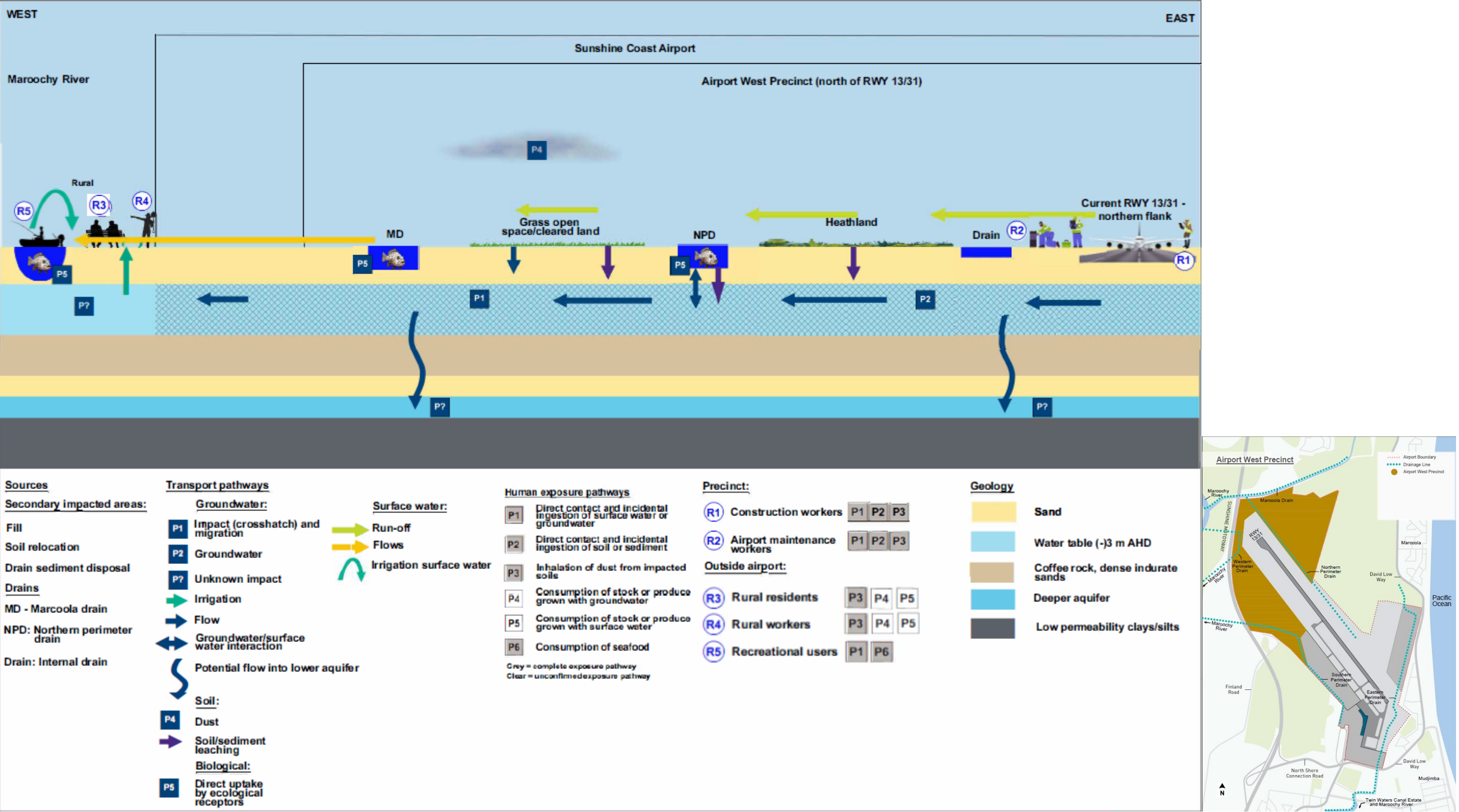


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Figure 17 Aerospace Precinct CSM – Human Health







North and south division of Precinct based on interpretation of Figure 13 Groundwater flow directions

Figure 20 Airport West Precinct CSM – Ecological – north of RWY 13/31 centreline

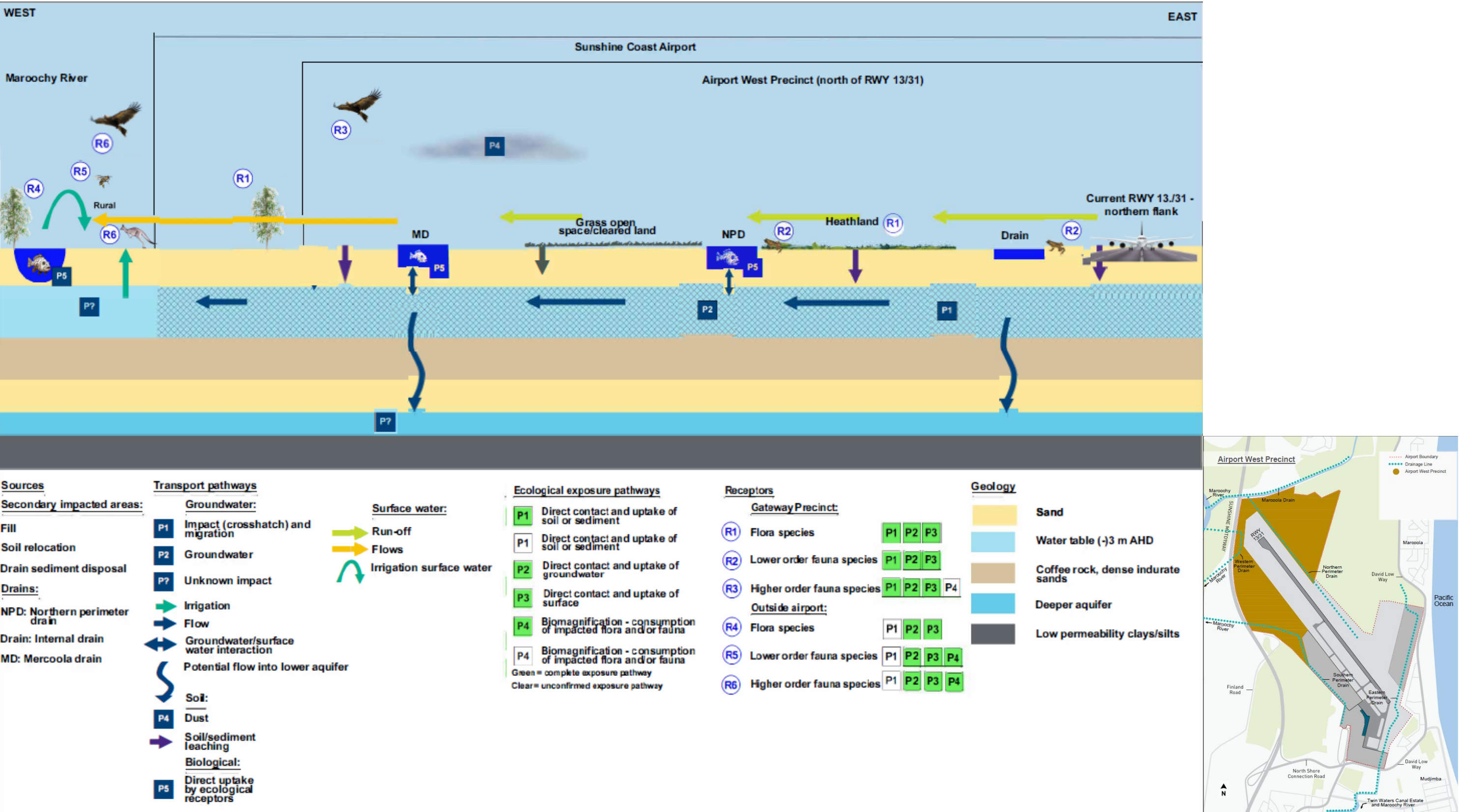


Figure 21 Airport West Precinct CSM – Human Health – south of RWY 13/31 centreline

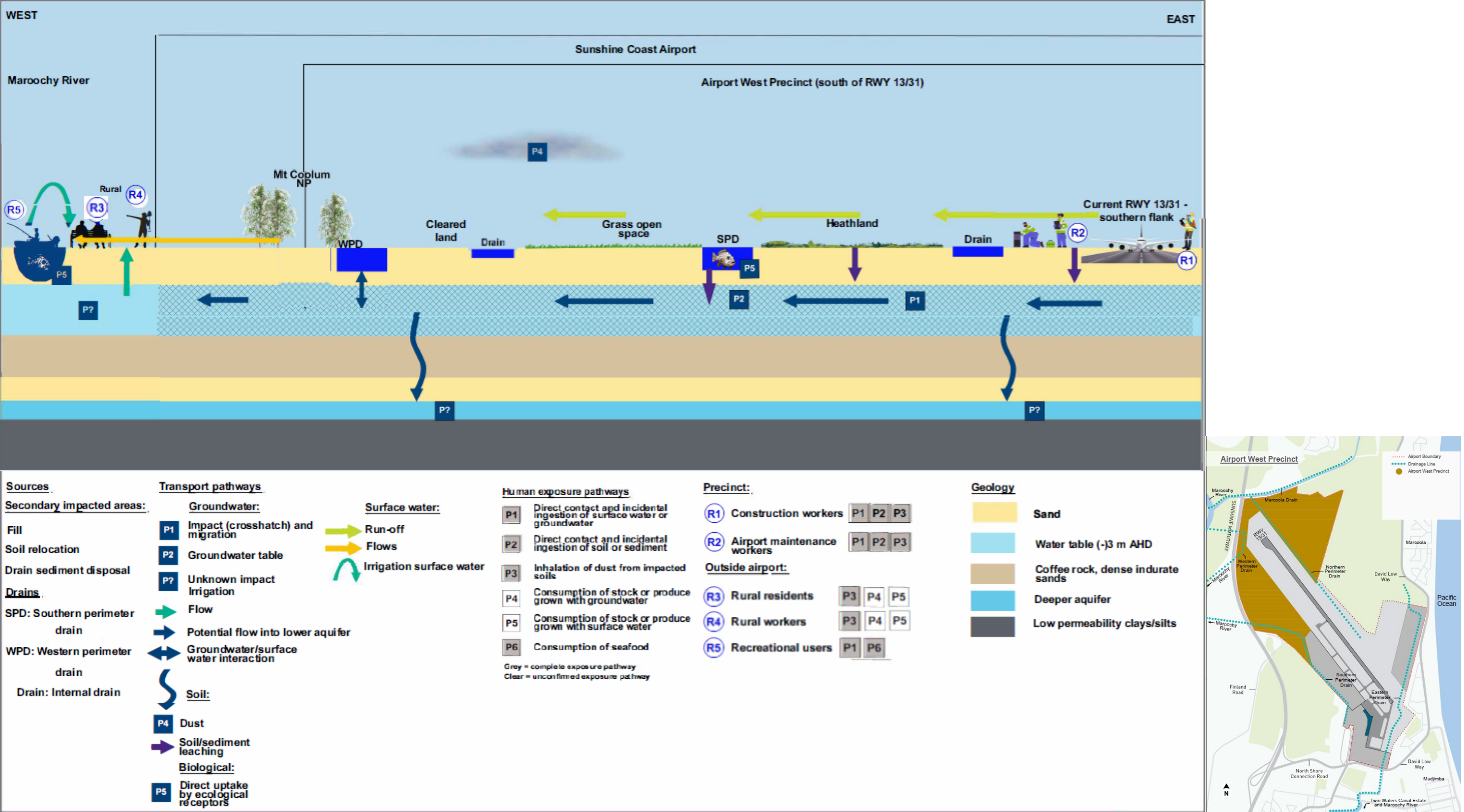


Figure 22 Airport West Precinct CSM – Ecological – south of RWY 13/31 centreline

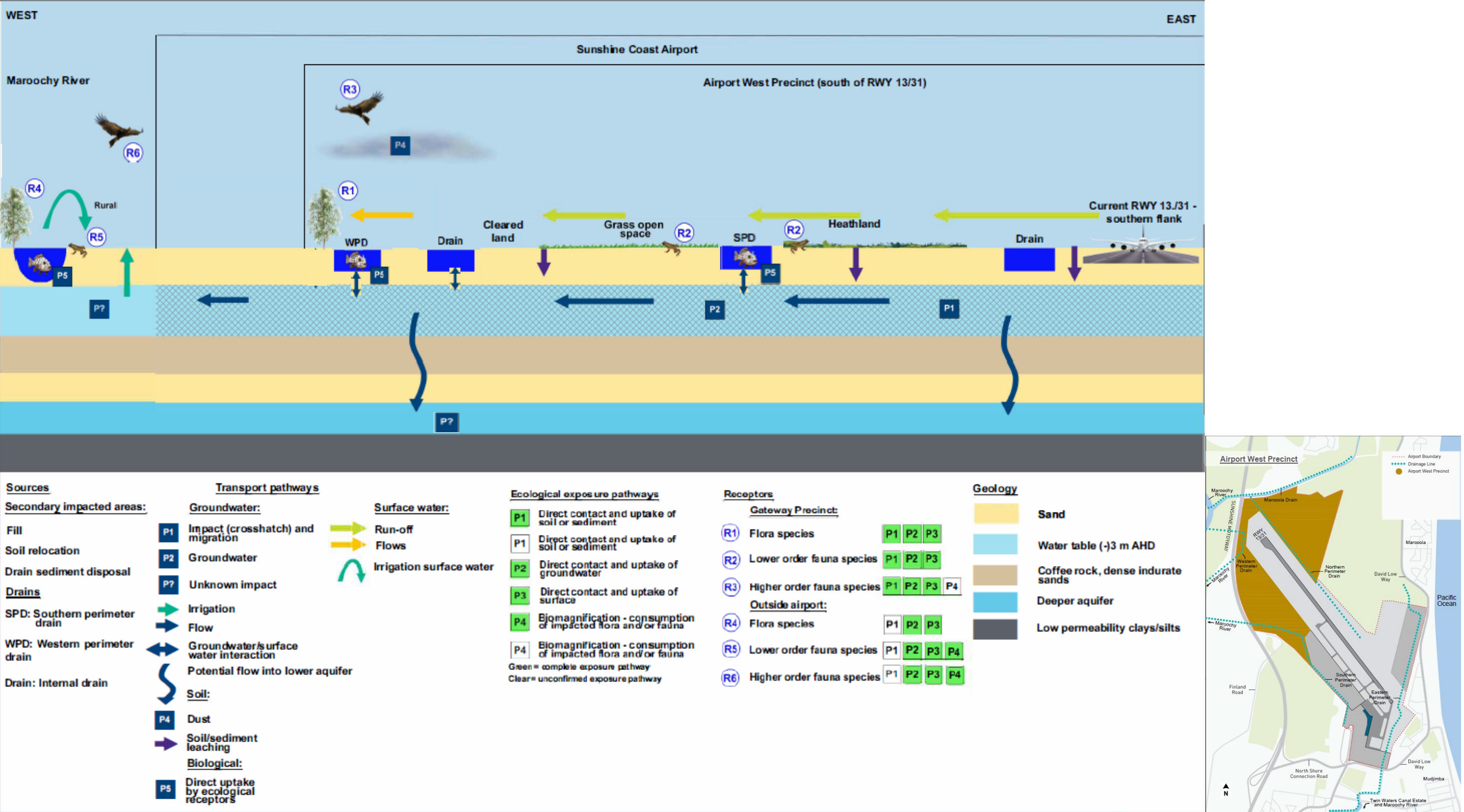
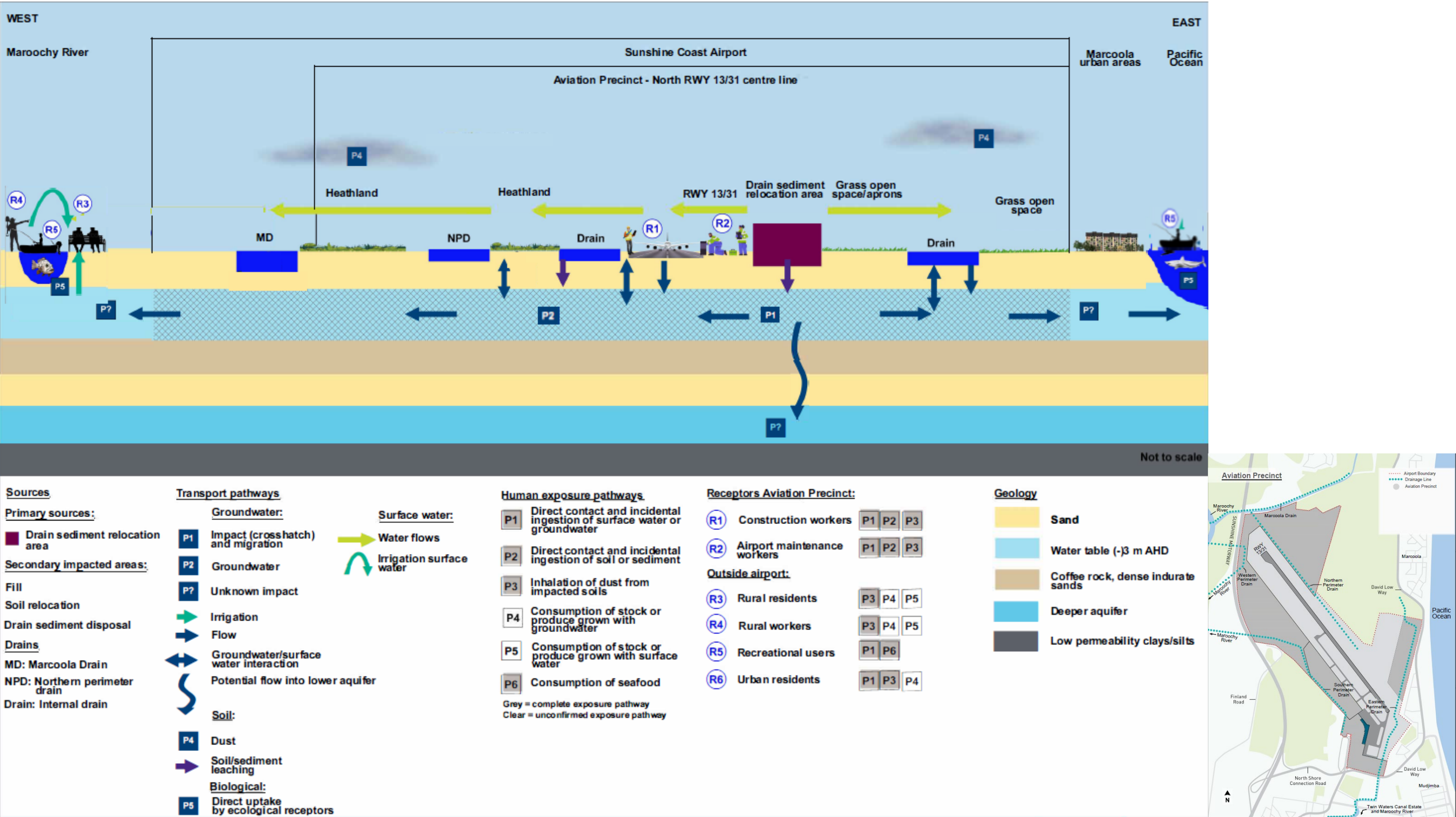


Figure 23 Aviation Precinct CSM – Human Health – north of RWY 13/31 centreline



North and south division of Precinct based on interpretation of Figure 13 Groundwater flow directions.

Figure 24 Aviation Precinct CSM – Ecological –north of RWY 13/31 centreline

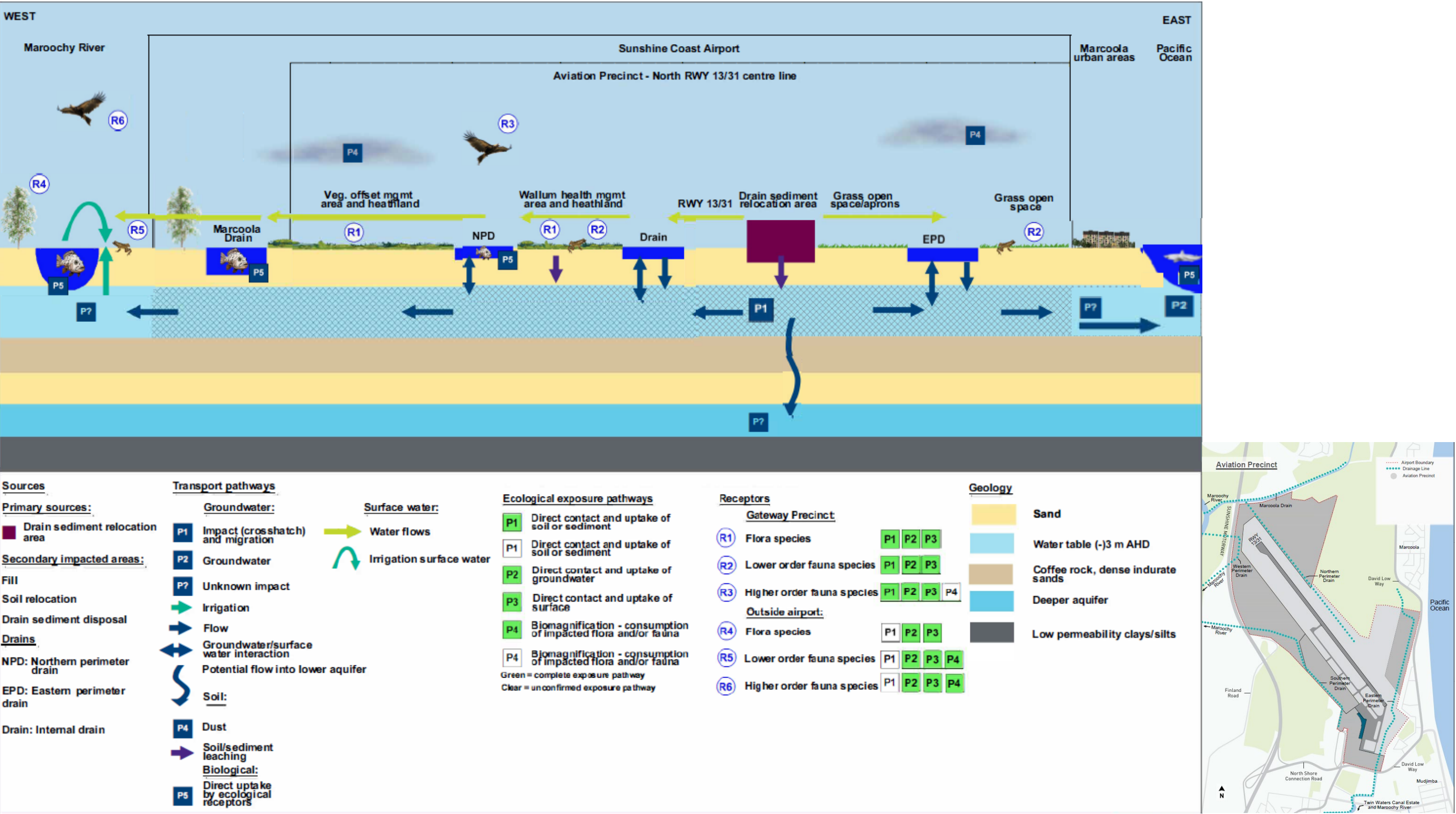
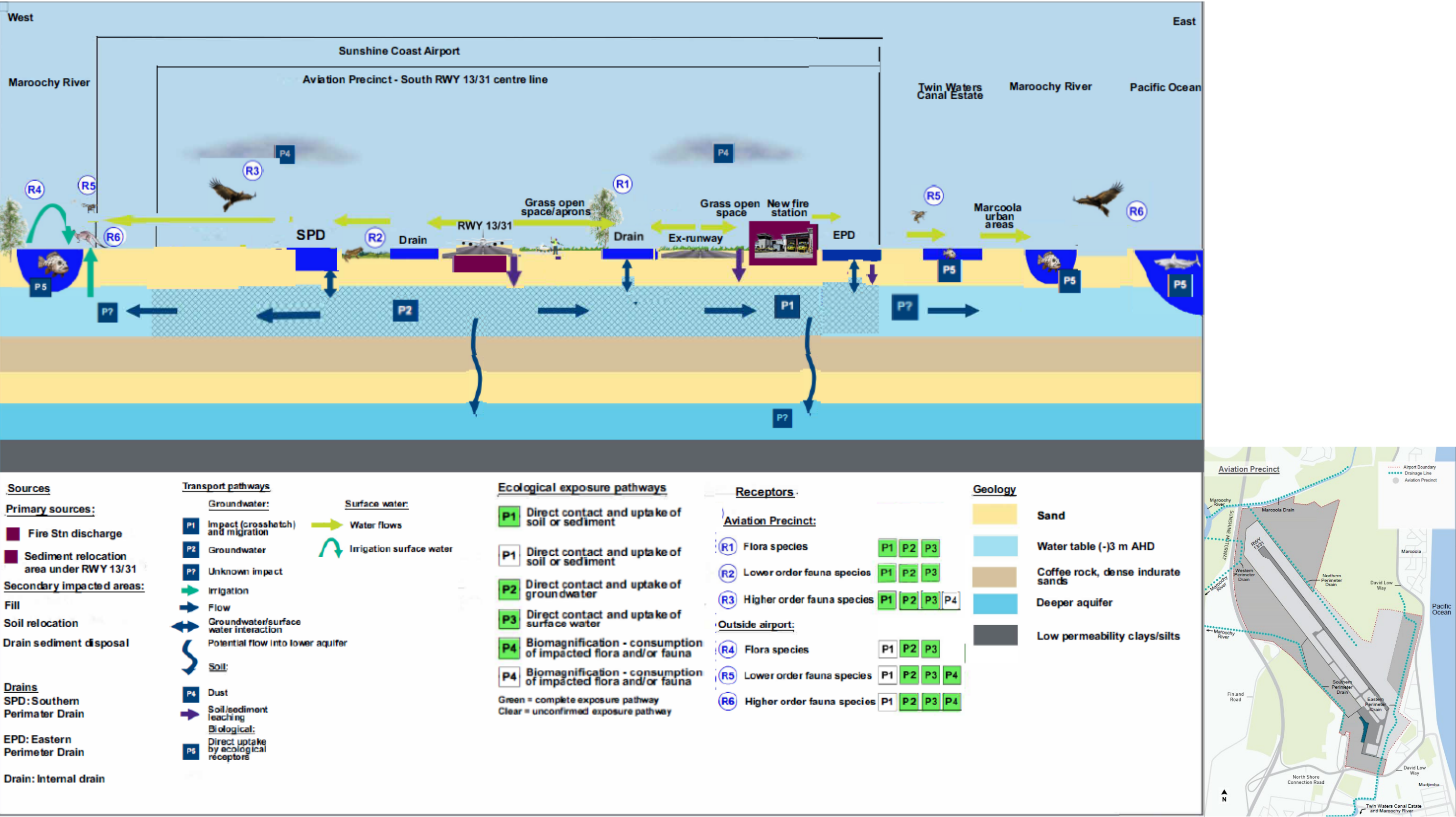
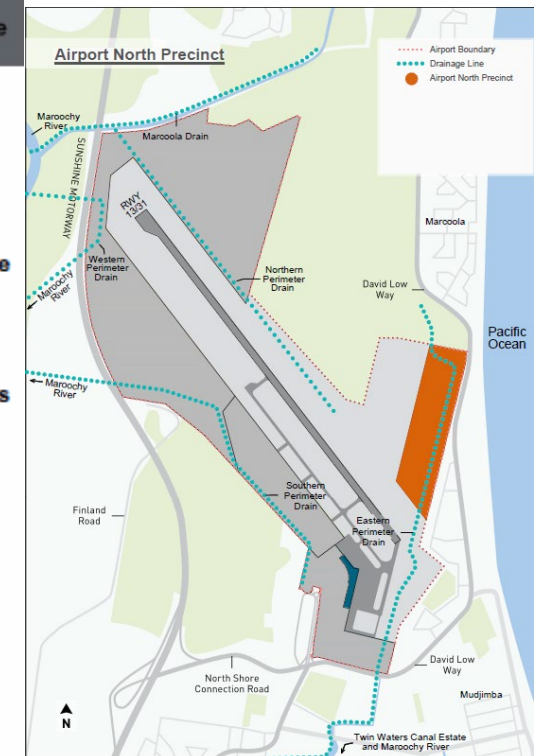
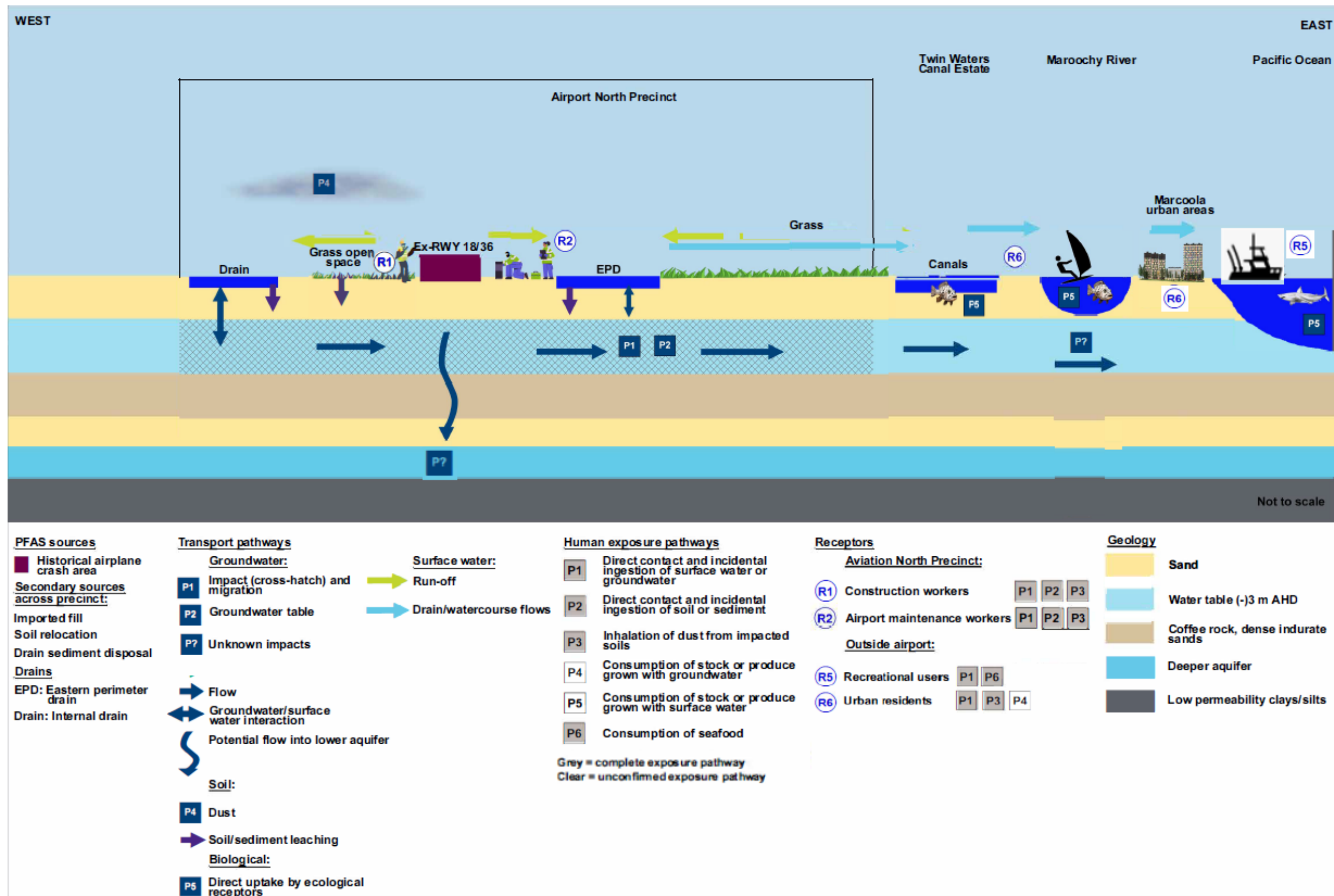
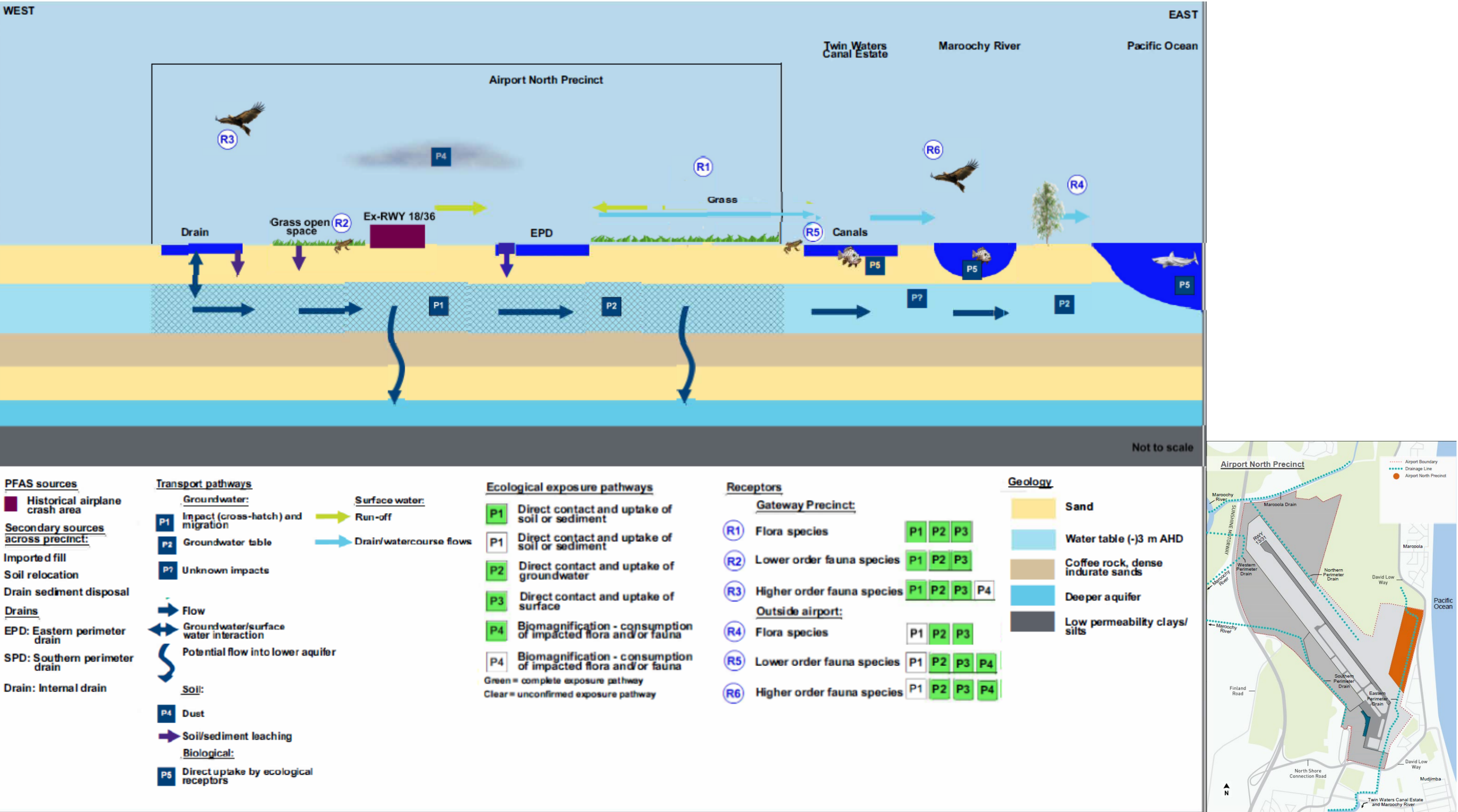




Figure 26 Aviation Precinct CSM – Ecological – south of RWY 13/31 centreline







13 CSM RISK SCREENING MANAGEMENT REQUIREMENTS

The CSM risk screening process identified that:

- PFAS contaminated soil is unlikely to have an impact upon ecological or human receptors.
- PFAS contaminated water is unlikely to have an impact upon human receptors.
- PFAS contaminated water has potential to impact upon aquatic ecological receptors.
- Precincts with primary source areas presented no increased ecological or human risks to receptors compared to precincts without primary source areas.
- PFAS is predominantly present as secondary source in soil across the development precincts. Construction and maintenance activities should not act a transport pathway that results in the concentration of PFAS soil mass that creates a PFAS primary source area.

Accordingly, the following requirements apply to the subsequent PFAS management sections.

1. Disposal or reuse of soil, sediment, surface water and groundwater ensures no additional PFAS contamination beyond the airport site.
 - a. PFAS contamination means levels of PFAS that exceed the guidelines set out in the PFAS NEMP (v2.0), with regard to the aquatic ecosystem values of the receiving environment¹⁷.
 - b. The ambient PFOS concentration in the receiving environment (Maroochy River) exceeds 99% aquatic species protection level of 0.00023 ug/L but is below the 95% aquatic species protection level of 0.13 ug/L
 - c. The PFOS 95% aquatic species protection level is the threshold criteria that represents the limit of acceptable impact beyond which there is an increased potential for adverse effects in the aquatic environment. With consideration of the 99% aquatic species protection level to account for potential bioaccumulation risks, where appropriate.
 - d. A trigger criteria will be set at a level to forewarn of the approach of the threshold criteria and trigger response actions. The trigger criteria will be set at a conservative level to ensure trigger level actions are implemented well in advance of the threshold criteria to avoid non-compliance and to avoid comprising the environmental outcomes.
 - i. The trigger criteria will be informed by the statistical analysis of the Airport's PFAS data set that will be completed by end of September 2024.
 - ii. Collection of additional data on PFAS ambient levels
2. Tracking and reporting of soil movement within the airport from construction and maintenance works.
3. Tracking and reporting of relocation of sediment from drain maintenance works.
4. Tracking and reporting of soil and sediment disposal off the airport
5. Movement of contaminated soil from an allotment that is listed on the EMR to another place is carried out under a regulatory soil disposal permit.
 - a. Another place includes place outside the Airport
6. Given the limitations with the DESI ambient data referenced, the Future PFAS Monitoring Program will collect additional data to better understand the relevant PFAS ambient levels.
7. The CSM risk screening assessment did not identify any requirements for any immediate remediation management measures to address potential risks.

¹⁷ Definition from QLD Permit EA BRID0035

8. All construction and maintenance activities will be required to prepare a PFAS Environmental Work Method Statement (EWMS) for the approval of Group Manager HSEC, that details step-by-step, the tasks required to complete the work activity in accordance with:
 - a. This Plan's management actions to prevent or minimise environmental harm from the disturbance of PFAS contaminated soil, water, sediment, plant material and construction and demolition waste materials.
 - b. SCAPL's EMP requirements in relation to:
 - Monitoring and reporting
 - Corrective actions
 - Contingency and emergency response

14 SOIL MANAGEMENT

Soil from construction and maintenance works should be managed in accordance with this section to ensure that any PFAS-impacted material is managed appropriately and with consideration given to the existing environment, areas of environmental significance and future land use.

Objective: To prevent or minimise the potential for environmental harm associated with the handling and exposure of PFAS contaminated soils.

Performance Criteria

1. No increase in ecological or human health risks from the reuse of PFAS contaminated soil on the Airport.
2. Disposal or reuse of soil ensures no additional PFAS contamination beyond the airport site.
3. All PFAS contaminated soil movement and reuse within the airport from construction and maintenance works shall be tracked and reported.
4. Tracking and reporting of soil disposal off the airport
5. Movement of contaminated soil from an allotment that is listed on the EMR to another place is carried out under a regulatory soil disposal permit.
 - a. Another place includes place outside the Airport
6. Zero regulatory non-compliant disposal of PFAS contaminated soil on or offsite the Airport.

14.1 Regulatory and Policy Guidance

Sunshine Coast Airport is owned by Sunshine Coast Council and its operation leased to SCA Pty Ltd. Accordingly, State environmental protection and planning legislation and policies applies to activities on the airport. Proposed actions that are likely to have impacts upon matters of national environmental significance are required to examine their obligations under the *Environment Protection & Biodiversity Conservation Act 1999* (Cth).

Sunshine Coast Airport is not listed as a 'core regulated airport' under the *Airports Act 1996* (Cth) and as such is not subject to its conditions or regulations, inclusive of the *Airports (Environment Protection) Regulations 1997* (Cth).

All construction and development works should aim to minimise waste and adhere to the waste and resource management hierarchy (Table 41 below) in accordance with the National Waste Policy (2018). Under this hierarchy, avoiding waste generation is the most preferred option and disposal of waste is the least preferred.

The *Environmental Protection Act 1994 and Environmental Protection Regulation 2019* (Qld) provides guidance on the management of regulated wastes such as PFAS.

- Everyone who generates, stores, treats, transports, receives, recycles, or disposes of wastes has a responsibility to ensure they do not cause, or risk causing, environmental harm.
- PFAS is a regulated waste and the movement of waste that contains PFAS off the airport must obtain a DESI soil disposal permit and tracked in accordance with DESI requirements.
- Movement of PFAS contaminated soil from lots on the EMR to other lots on the airport requires DESI soil disposal permit.

Ideally, excavated material should be beneficially reused as far as practicable across Airport development sites, provided reuse does not increase risk or pose an unacceptable risk to the environment. Any assessment for beneficial reuse should consider future land uses and Airport development.

When assessing appropriate reuse options for PFAS-impacted soil, it is important to consider the primary exposure pathways that may pose a risk to human health and the environment. For Sunshine Coast Airport, these are:

- Transport of PFAS to surface water and groundwater through leaching from PFAS-contaminated material; and

- Bioaccumulation of PFAS in plants and animals, particularly those consumed by humans and animals.

Extensive PFAS sampling / analysis at Sunshine Coast Airport and subsequent risk assessment suggests the only potential risks are those arising from the pathway to the aquatic environment (Maroochy River) where bioaccumulation may occur.

Terms used throughout this section are defined as follows:

On works site refers to areas within the specific construction project boundary.

On-Airport refers to all land under SCA operational control.

Off-Airport refers to all land outside SCA operational control.

Beneficial reuse refers to reuse where the land application of the material is a genuine, fit for purpose reuse of the soil rather than another path to waste disposal. Acceptable beneficial reuse options could include construction of acoustic and visual mounds where there is a benefit to sensitive receivers, engineered fill or improvements to flood prone land.

Table 41 Waste Hierarchy

Most Preferable	AVOID	excavating PFAS contaminated soils where possible
	REDUCE	amount of PFAS contaminated soil is excavated to the minimum required
	REUSE	excavated PFAS contaminated soil where possible, in order of preference: • On-work site (within same Lot) • Off-work site (different Lot) • Temporary stockpile of contaminated soils (< 12 months) for planned future reuse
Least Preferable	TREAT	waste before disposal, including reducing the hazardous nature of waste
	DISPOSE	to landfill only if there is no viable alternative

14.2 Management Requirements

14.2.1 Desktop Assessment

The SCA Environment Officer must be informed prior to any excavation works to provide any relevant reports and data relating to PFAS contamination. The SCA Environment Officer should also be consulted prior to conducting additional sampling. This PFAS Management Plan should be included in tender packages for major development works to ensure contractors are aware of previous assessments and the risk profile of the Airport.

Fill material is defined as any soil, rubble and / or bulk materials imported from off-Airport sources to be used on a Sunshine Coast Airport works site. There is a need for fill material to be imported for a project when:

- There is a deficit in the cut and fill balance for bulk earthworks, or
- When in-situ material is unsuitable for reuse due to its geotechnical properties, or

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- Because contamination levels have been assessed as an unacceptable risk to the off-Airport aquatic environment.

Where a need to import fill has been identified, the specific project manager must obtain approval from the SCA Environment Officer. Imported fill material should be verified as free of prescribed contaminants prior to acceptance by SCA. Records of imported fill including quantities received, nature of the fill, its source details of the supplier, and its destination on the airport, should be kept on the Project's file management system and recorded on an Imported Fill Register that is maintained by the Airport.

14.2.2 Excavation Permit

For ground penetration works including excavation and trenching >30 cm depth, projects are required to submit a completed Permit to Commence Work (PERCOW). For large projects and major development works, the checklist attached in **Appendix M** of this document should also be completed in consultation with the Environment Officer. The completed form should be saved as a record in the SCA management system.

14.3 Management Actions

14.3.1 Managing very small volumes of contaminated soil

When the total volume of soil being managed for the project/works is less than 10 m³, it will usually be appropriate and acceptable to reinstate the soil at the work site without testing. This is because responses to PFAS contamination should be proportionate to the risk where disturbing small volumes of soil is unlikely to have a material or measurable impact on the overall contamination on the Airport. There are significant cost, time and practicability limitations on testing in every scenario.

The volume threshold would not apply in the following scenarios:

- Areas of significant contamination (e.g., Primary sources/ Areas of Concern), such as former have been extensively investigated and identified across the SCA. If work is being conducted within these areas, the volume threshold would not apply.
- When the works are adjacent to a water course, or an area potentially connected with groundwater, or are in a hardstand area.

14.3.2 Soil Reuse Categorisation

SCA takes a risk-based approach to assessing and managing soils for reuse in accordance with guidance from the PFAS NEMP (v2.0). Multiple lines of evidence should be considered to support a decision on reuse. This includes consideration of the net environmental benefit with regard to the risk being managed, including whether the measures to address an environmental risk have the potential to cause more harm than the risk being managed. Other chemicals of concern should also be considered when making reuse decisions.

PFAS-containing soils disturbed during construction or maintenance work will fall into one of four 'Management Levels', where Level 1 is of least concern. Note that leachability testing is not required for assigning a Management Level to soil. Management Levels are assigned against PFOS values since it is only the risk to ecological receptors that is of concern. While leachability testing is not required for initially assigning a Management Level to soil it may be required to confirm reuse suitability if there is a potential risk to sensitive receptors. Please see table below for Soil Management Levels.

Table 42 Soil Management Levels

Management Level	PFOS mg / kg	Reuse Opportunity
Level 1	Below 0.01	On-Airport reuse – any area but subject to an assessment of risk in high sensitivity areas – see PFAS NEMP (v2.0)
Level 2	0.01 < 0.14	On-Airport reuse – developed precincts, subject to assessment of ecological risk
Level 3	0.14 – 1	On works site reuse or off Airport disposal as regulated waste
Level 4	>1	Off-Airport disposal as regulated waste

The Table below explains how each of the Management Levels were established and how they should be applied at Sunshine Coast Airport. Levels and reuse Opportunity are based on the PFAS concentrations found on the Airport from previous extensive sampling.

Table 43 Soil Management Levels Reuse Applications

Management Level	PFOS soil characterisation	Reuse
Level 1	These soils are below the guideline value for ecological indirect exposure (0.01 mg / kg PFOS) for all land uses which is the lowest soil guideline value relevant to Sunshine Coast Airport.	Level 1 material can be beneficially reused anywhere within the Airport boundary, preferably within areas of similar soil characteristics. For locations where there is an identified pathway to sensitive receptors, the risk of reusing material at the proposed location should be assessed to account for any impacts due to the overall load of PFAS at the receiving location.
Level 2	These soils have contamination levels between the ecological indirect exposure value for all land uses and the value specific to intensively developed sites. The value for intensively developed sites is applied where the area of exposed soil is too small to have any material impact on secondary consumers via food chains. Developed precincts at Sunshine Coast Airport justify the use of the higher value 0.14 mg / kg (PFOS) when assessing risk.	Level 2 material can be beneficially reused on the works site or within the development precinct subject to an assessment of ecological risk. Assessment of ecological risks for the reuse of soil should include consideration of the leachability of the material as this relates to migration to aquatic environments.
Level 3	These soils have contamination levels below the ecological direct exposure guideline value of 1 mg / kg PFOS.	Level 3 material should be beneficially reused on the works site or, if this is not possible and other options for reuse on the Airport are exhausted, disposed to landfill as regulated waste.

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Management Level	PFOS soil characterisation	Reuse
	This guideline value is intended to be protective of organisms living in or in close contact with soil, such as earthworms and plants. Very few samples have so far tested in this range.	Assessment of ecological risks for the reuse of soil should include consideration of the leachability of the material as this relates to migration to aquatic environments.
Level 4	These soils have contamination levels above the ecological direct exposure guideline value of 1 mg / kg PFOS. No soil samples at Sunshine Coast Airport have detected PFAS at these concentrations, even in the known source areas.	Level 4 material should be disposed to landfill as regulated waste.

If there is a high level of variability in contamination concentrations, material with differing concentrations should be segregated and managed according to the contamination levels. This approach will allow for efficient management of soil by allowing low-level contaminated soil to be managed separately to concentrations with higher risk

From the data presented in the PFAS Contamination Baseline Assessment (Core 2021) and applying the corresponding Management Levels as described above, table below shows how this might apply to the proposed development precincts at Sunshine Coast Airport.

Table 44 Management Level Application for Precincts

Precinct	PFOS	Management Level
Aerospace Precinct	0.0001-0.0125 mg / kg	Level 1 or Level 2
Airport North Precinct	0.0001-0.0025 mg / kg	Level 1
Airport West Precinct	0.0001-0.0005 mg / kg	Level 1
Aviation Precinct	0.0001-0.0025 mg / kg	Level 1
Gateway Precinct	0.0001-0.0025 mg / kg	Level 1

Note that the highest PFAS soil concentrations reported at Sunshine Coast Airport were:

- 0.025 mg / kg PFOS+PFHxS – Lot 699 (EMR Site ID 124728)
- 0.142 mg / kg PFOS+PFHxS – Lot 898 (EMR Site ID 195894)

Material associated with these two EMR listed lots has since been taken offsite and disposed to landfill.

14.3.3 Tracking Soil Reuse

Records associated with the movement and reuse of soil should be maintained in the SCA record management system; Soil Importation & Movement Register.

14.3.4 Green Waste

Wherever possible green waste should be mulched and reused on site, otherwise disposed to landfill. Green waste from PFAS contaminated soil or sediment are to be treated as PFAS waste as PFAS may have been taken up into the plants.

14.4 Decision Process for Soil Reuse Assessment

The reuse of solid materials should be guided by the following principles:

- The levels of PFAS must be sufficiently low that they will not pose an increased or unacceptable risk to any receptor or to the environmental values of waters (i.e. not increase the extent of PFAS contamination or risk posed by the contamination). Thus, to be suitable for reuse, materials must meet the relevant guidelines for both total concentration and leachable concentration. The resulting PFAS concentrations at the reuse site should be sufficiently low (i.e. below relevant guidelines) to be protective of terrestrial flora and fauna (where applicable) and human health.
 - Leachate criteria should be protective of (i.e. not impact on) groundwater and surface water quality and aquatic ecosystems both at the site of reuse and anywhere there is a reasonable possibility that transported PFAS from that site may impact sensitive receptors and environmental values.
 - Off-Airport reuse of PFAS-contaminated materials is not appropriate.
1. **Proposed reuse site** – From previous site contamination reports and using the most recent data available, characterise the PFAS soil concentrations, surface, and groundwater concentrations at the proposed reuse site. If no reports exist or reports contain critical data gaps, then PFAS sampling at the proposed site may be required. Any proposal to conduct additional sampling requires consultation with the SCA Environment Officer.
 2. **Source / excavation site** – Characterise the PFAS concentrations in the source site soils using existing site contamination assessments or sampling reports. If no such reports exist or reports contain data gaps, testing of soil may be required including leachate analysis (ASLP). The sampling plan will require approval from the SCA Environment Officer.
 3. **Assign a Management Level** to the soil as per section 6.4.1 above.
 4. Where the proposed reuse is consistent with any of the options below, **conduct a risk assessment** to determine the potential for PFAS to move off site:
 - a. Reuse as fill or burial less than 2.0 metres above the seasonal maximum groundwater level.
 - b. Reuse within 200 metres of a surface water body or wetland area.
 - c. Reuse in locations potentially affected by potential future rises in sea level or near stormwater drains.
 - d. Reuse in, or able to be transported to, areas which are identified as conservation areas or habitats that contain protected flora, fauna or ecological communities.
 5. Assess whether the soil reuse is likely to result in a measurable change to the quality of the environment onsite, the receiving waters and downstream environments and whether such a change may result in an unacceptable risk.

Should the reuse of soil not be a low and acceptable risk on- or off-site, management actions must be implemented to reduce the risk to a low and acceptable level. Any risk assessment should be:

- Prepared by a suitably qualified person
- Approved by the SCA Environment Officer, Project Manager, or delegate

Figure 29 – Process for managing PFAS contaminated soil, identifies the process when assessing risk relating to soil management. The NEMP (v2.0) provides a decision tree to assist in the risk assessment application of the above – refer to **Figure 30 – Decision Tree for Soil Reuse**.

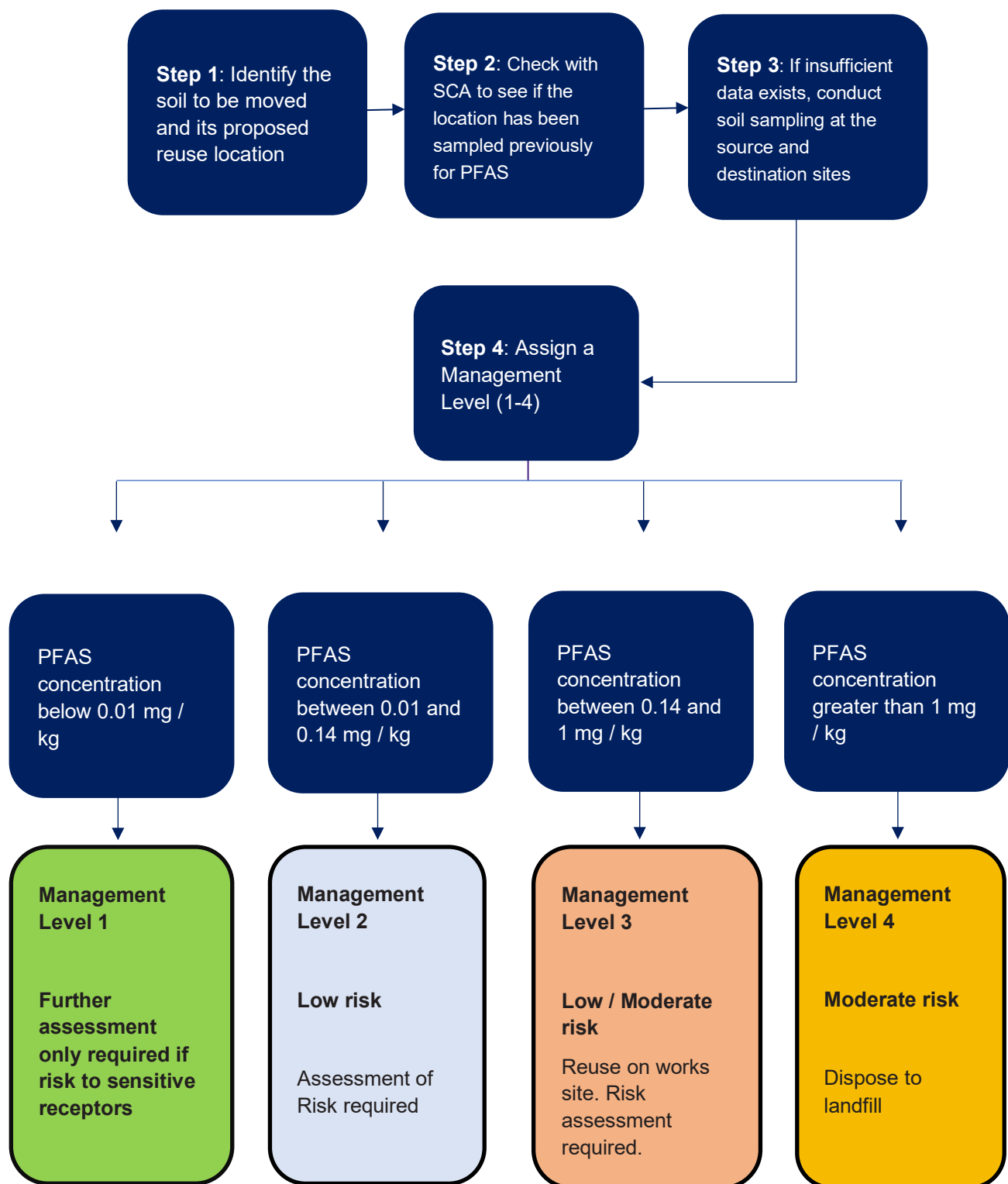


Figure 29 Process for managing PFAS contaminated soil

Decision Tree for Reuse of Soil

to be applied consistent with PFAS NEMP provisions and local regulatory requirements

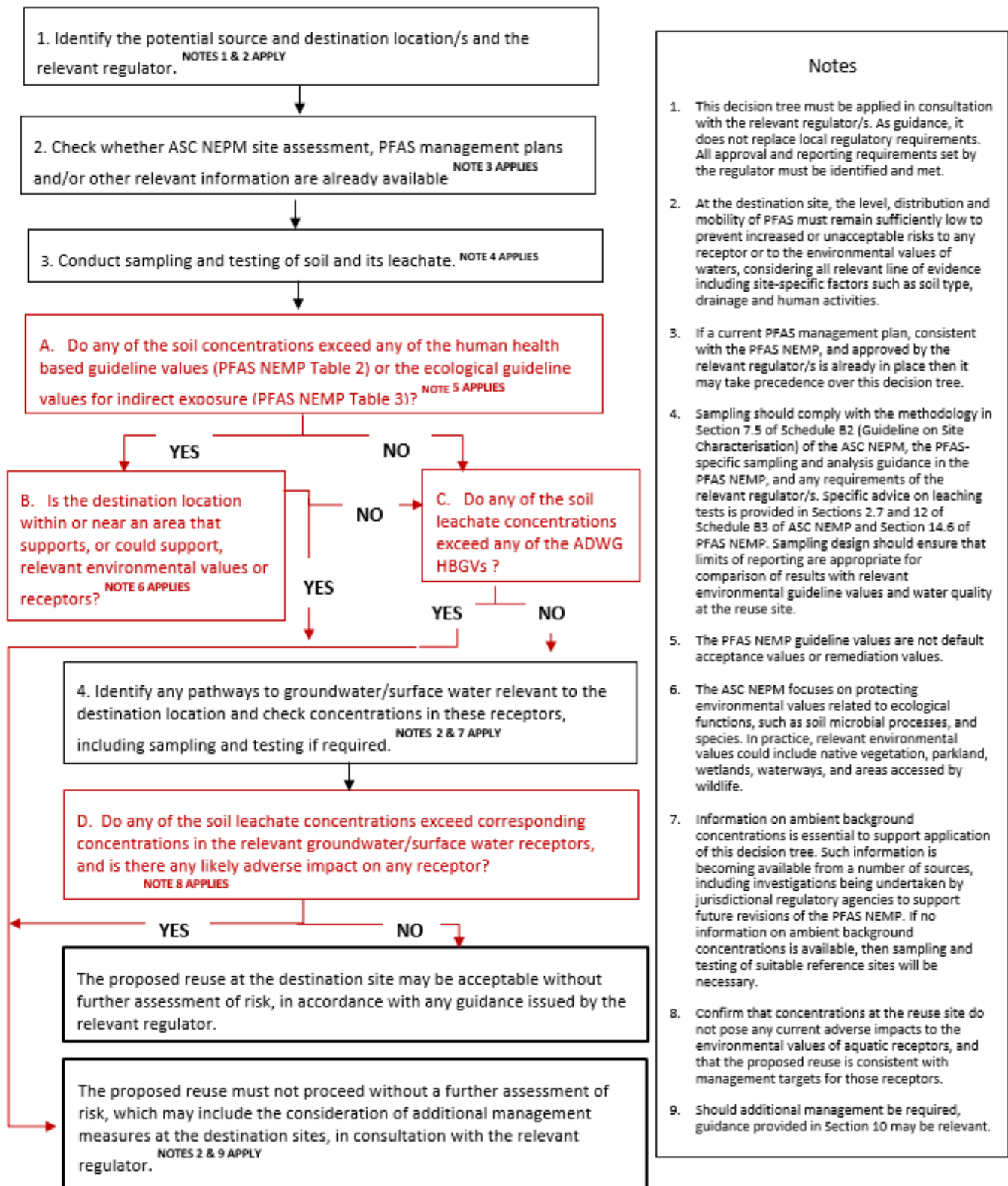


Figure 30 Decision Tree for Soil Reuse

14.5 Reporting Requirements

All construction and maintenance activities will be required to prepare a PFAS Environmental Work Method Statement (EWMS). The EWMS requires approval of SCA's Group Manager HSEC, before works can commence on-site.

The PFAS EWMS must provide details step-by-step, the tasks required to complete the work activity to achieve and demonstrate compliance with the objective and performance criteria, and implementation of the actions in this section, relevant to the proposed activity. SCA's EMP Management Element requirements should also be consulted in relation to:

- Monitoring and reporting
- Corrective actions
- Contingency and emergency response

The PFAS EWMS are to be collated as a suite of documents for review by DESI accredited Contaminated Land Auditor to inform the PFAS Annual Review and PFAS Annual Reporting.

15 WATER MANAGEMENT

The PFAS NEMP (v2.0) requires that any proposed reuse of water containing PFAS must not result in an unacceptable or increased risk to human health or the environment.

DESI implementation of the EP Act requires that prescribed contaminants such as PFAS must not be discharged to water or placed in a manner that would allow movement to a water environment, without their prior approval.

Objective: To prevent or minimise the potential for environmental harm from the disturbance or management of PFAS contaminated water.

Performance Criteria

- 1. No increase in ecological or human health risks from the reuse of PFAS contaminated water on or off the Airport.
- 2. Disposal or reuse of water ensures no additional PFAS contamination beyond the airport site.
- 3. Zero non-compliant discharges of water from the Airport

15.1 Regulatory and Policy Guidance

Regulatory and policy guidance for the management of PFAS in water is complex and subject to ongoing change. At its core is the requirement to not cause environmental harm or nuisance. All PFAS are prescribed contaminants under Queensland legislation, and it is therefore an offence to cause or allow water containing PFAS to enter State waters unless all reasonable and practicable measures have been taken to prevent or minimise the harm, and regulatory approval has been provided.

Water quality guidelines for PFAS are presented in Table below. In most contexts at Sunshine Coast Airport, the appropriate guideline is the 99% species protection guideline for PFOS of 0.00023 µg / L. This guideline is below the ability of most commercial testing laboratories to detect. The decision process for water management is described in **figure 32**.

Table 45 Water quality guidelines from the PFAS NEMP (v2.0)

Exposure Scenario	PFOS	PFOA	Comment
Ecological receptors – freshwater & marine	0.00023 µg/L	19 µg / L	99% species protection – high conservation value ecosystems. Relevant guideline for bioaccumulative chemicals such as PFOS in slightly to moderately impacted systems.

15.2 Management Requirements

15.2.1 Regulatory

Any discharge or reuse of water containing PFAS must comply with the:

1. *Environmental Protection Act – s.440ZG*; not to allow release or escape of any PFAS compounds into any stormwater drain, groundwater or surface water (including wetlands).
2. *Environment Protection Act – Environmental Protection (Water and Wetland Biodiversity) Policy 2019* requirements: The Policy describes the approach to manage wastewater discharge and to evaluate the following options for wastewater or contaminants in the order in which they are listed:
 - a. Appropriate treatment and release to a waste facility or sewer. Appropriate treatment in this context means treatment that meets the service provider's requirements for the release to the waste facility or sewer.
 - b. Appropriate treatment and release to land. Appropriate treatment in this context means treatment that ensures the release to land is ecologically sustainable.
 - c. Appropriate treatment and release to surface waters or groundwaters. Appropriate treatment in this context means treatment that ensures that the release will not affect the environmental values for the waters.

In relation to item 1: Approval from DESI will be required to ensure an offence under the Act does not occur.

In relation to item 2a: The utility provider must be consulted for discharge limits and approved changes to trade waste agreements on the Airport. The trade waste provider for Sunshine Coast Airport is Unity Water.

Unity Water does not have a PFAS trade waste acceptance criteria in their Trade Waste Management Plan. Instead trade waste that contains POPs are considered high risk and require to undergo a detailed risk assessment process before acceptance. Where a risk is deemed unacceptably high, Unity Water will not issue the applicant with a trade waste approval.

Consultation with Unity Water for an acceptable threshold should consider the Queensland Urban Utilities (QUU) Trade Waste Acceptance Criteria, Schedule 2, that sets the maximum discharge limit for PFAS substances at 0.0002 mg/L (0.2 ug/L). QUU is the trade waste provider for Brisbane Airport.

In relation to items 2b and c: Based on current practices in Queensland, appropriate treatment will be to achieve PFOS < LOR or 0.00023 ug/L.

15.2.2 PFAS NEMP (v2.0) Guidance

The PFAS NEMP (v2.0) requires that the proposed discharge or reuse must not result in an unacceptable or increased risk to human health and / or the environment. Reuse of PFAS-contaminated water must be beneficial and undertaken following consultation with the relevant regulators, as reuse activities may require specific approval. In the context of Sunshine Coast Airport, reuse options may include:

- dust suppression,
- re-infiltration, or
- construction water.

Where dewatering involves the discharge of PFAS-contaminated water to land, the assessment of risk should not only consider the potential for PFAS transport to offsite sensitive receptors, but also the potential for long-term build-up of the total PFAS mass in the receiving soils, groundwater and plants.

Reuse must be for a clearly demonstrated beneficial purpose; otherwise applying large volumes of PFAS-contaminated water to land in the absence of a clearly demonstrated beneficial purpose may be considered waste disposal rather than reuse.

Reuse must meet DESI requirements to use all reasonable and practicable measures to prevent or minimise harm for prescribe contaminants discharge into the environment. Any proposed reuse will require DESI approval so as not to contravene s440ZG of the EP Act; not

to allow release or escape of any PFAS compounds into any stormwater drain, groundwater or surface water, including wetlands.

15.3 Management Actions

During construction, water may arise from excavation below groundwater level, trenching or rain events. It is advisable to excavate during dry periods and to reduce excavation depth wherever possible.

Discharges of wastewater from construction sites that will enter State waters require an assessment of environmental risk prepared by a suitably qualified person, unless the concentration of PFAS in the water to be discharged is below relevant guidelines, in this case 0.00023 µg / L.

Water management decisions should consider whether discharge of the water may increase risk to the environment or human health. This includes consideration of any potential measurable difference to PFAS concentrations in the receiving environment, including surface water, groundwater, soils, or biota if discharge was to occur through release of non-treated water.

The following options should be considered prior to any discharge of water:

- Irrigation and infiltration, with or without treatment to reduce PFAS;
- Discharge to creek or stormwater, with or without treatment to reduce PFAS; and
- Offsite disposal to a licensed facility.

15.3.1 Irrigation and Infiltration

Irrigation refers to the controlled supply of water for dust suppression, watering of other vegetation (gardens, bushes, trees) or for landscaping (e.g. establishing turf). Irrigation is an example of beneficial reuse of water, provided that the receiving environment requires water.

Infiltration refers to the process by which water on the ground surface enters the soil. The infiltration rate decreases as the soil becomes saturated. If the application rate exceeds the infiltration rate, runoff will usually occur. Infiltration is generally not beneficial reuse and is only acceptable within proximity to the work area where groundwater dewatering has occurred.

Irrigation and infiltration should be conducted in a controlled manner to *prevent*:

- contamination of non-contaminated areas,
- irrigation run-off beyond the irrigation area,
- the creation of hydraulic gradients that could result in migration of impacted groundwater into surface water bodies, and
- run-off of irrigation water back to its origin or otherwise creating a water 'loop' that may mobilise additional PFAS contamination from soils unless the loop is part of a treatment system.

Irrigation or infiltration activities for large volumes of water should be assessed by the project and approved by the SCA Environment Officer once the dewatering volumes and site conditions have been assessed. Suitable storage capacity may need to be provided to allow controlled irrigation, including consideration of precipitation which presents a risk of affecting volumes if stored in an open manner, such as holding dams or evaporation ponds. Management measures depend on the volume of extracted water to be irrigated.

15.3.2 Discharge to Creek or Stormwater

Stormwater is surface water that originates from rain. Stormwater can take up PFAS from exposed soils and transport the contamination to downstream environments. To avoid this, stormwater should be diverted around site excavations to the extent possible and managed in line with relevant stormwater practices for the site (SCA EMP Management Element 11: Stormwater and Groundwater Management).

Release of contaminated water via creeks or stormwater drains at Sunshine Coast Airport will result in an exposure pathway to ecological receptors. A risk-based decision-making process should be applied. Prior to release to surface water, it must be demonstrated that release is a more appropriate management method than other options in accordance with the Queensland Environmental Protection Policy (Water and Wetland Biodiversity) hierarchy. Specifically, it needs to be considered against the criteria of whether the release will cause:

- serious or material environmental harm or environmental nuisance off the site; or
- a measurable change to the environmental values of the receiving waters.

Release via creeks or stormwater drains may only take place with approval from the Department of Environment and Science:

- where PFAS concentrations are less than relevant guideline values; or
- where the assessment of risk has shown that such a release would be unlikely to cause a measurable change to the environmental values of the receiving water. This may be done by showing that the level of contamination in the water to be released is equivalent to or lower than the level of contamination in the receiving environment.

Water treatment plants are commercially available for removing PFAS contamination from environmental water. Several different technologies have been successfully implemented around Australia. Mobile plants are available for project work and short-term needs. Where water treatment is proposed, the treatment specification should be developed in consultation with the SCA Environment Officer who will need to gain approval from DESI. The default treatment standard is to be below the relevant PFAS NEMP (v2.0) screening criteria or below LOR.

15.4 Decision Process for Managing PFAS Contaminated Water

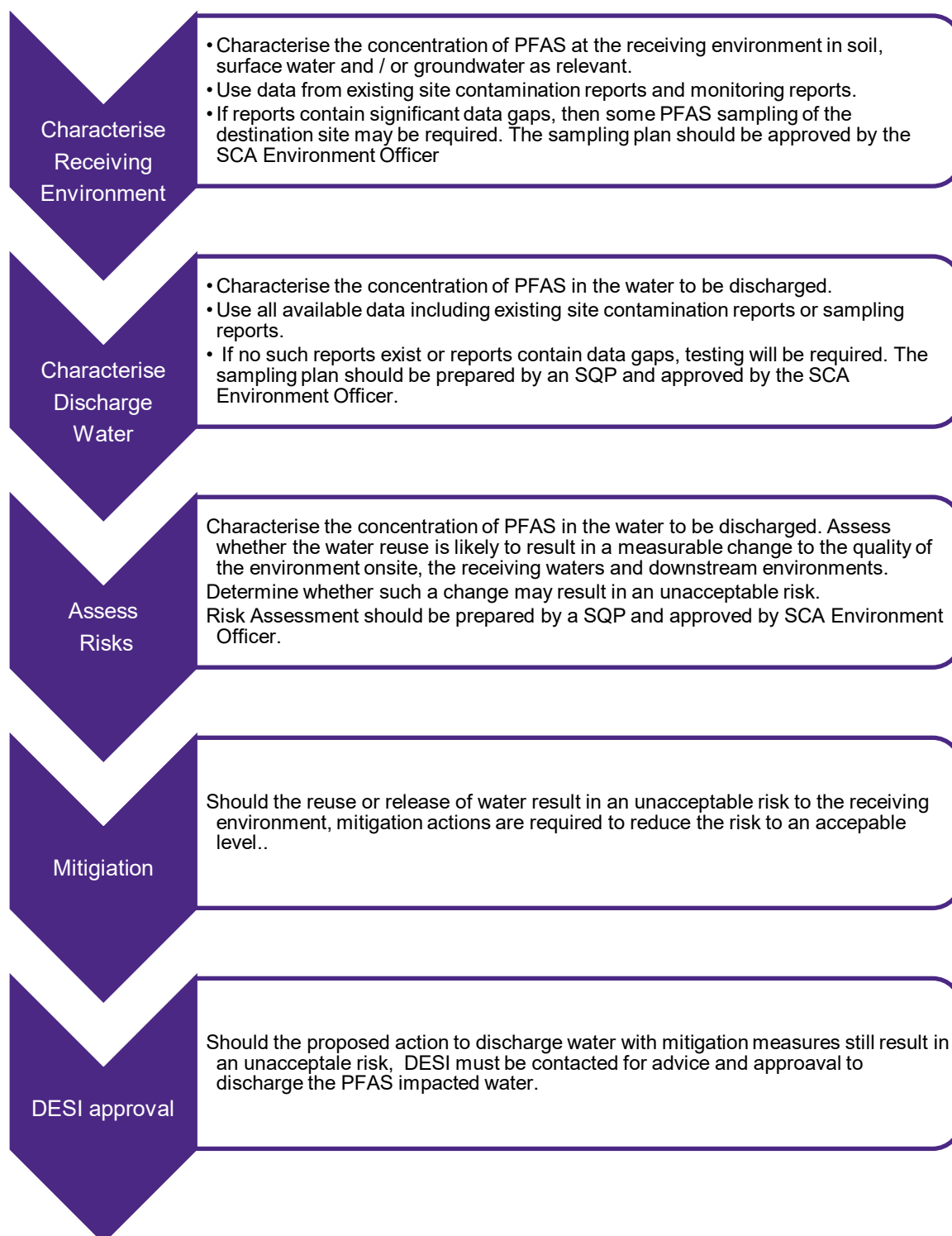


Figure 31 Decision process for managing PFAS contaminated water

15.5 Reporting Requirements

All construction and maintenance activities will be required to prepare a PFAS Environmental Work Method Statement (EWMS). The EWMS requires approval of SCA's Group Manager HSEC, before works can commence on-site.

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The PFAS EWMS must provide details step-by-step, the tasks required to complete the work activity to achieve and demonstrate compliance with the objective and performance criteria, and implementation of the actions in this section, relevant to the proposed activity. SCA's EMP Management Element requirements should also be consulted in relation to:

- Monitoring and reporting
- Corrective actions
- Contingency and emergency response

The PFAS EWMS are to be collated as a suite of documents for review by DESI accredited Contaminated Land Auditor to inform the PFAS Annual Review and PFAS Annual Reporting.

16 STOCKPILE MANAGEMENT

This section covers the on-site stockpiling, storage, and containment of PFAS contaminated material, at locations that are not intended to be for permanent storage or disposal.

At SCA the characteristic types of PFAS-containing materials and products that require management are:

- PFAS-contaminated solid material (e.g. soil, surcharge materials, sediment, slurry, timber, rock, concrete, rubble, asphalt, road base, and tarmac).
- PFAS-contaminated liquids (e.g. firewater, leachate, water generated via flushing, wastewater, and construction water including groundwater and surface water runoff).

Objective: To prevent or minimise the potential for environmental harm from the stockpiling of PFAS contaminated soil or material.

Performance criteria

1. No increase in ecological or human health risks from the stockpiling of PFAS impacted material on the Airport.
2. Stockpiling of PFAS impacted material ensures no additional PFAS contamination beyond the airport site.

16.1 Design Considerations

Section 10.1.1 of the NEMP (v2.0) states that the full range of recommended design criteria and engineering requirements may not be needed for managing PFAS-contaminated material where:

- The volume of material is minimal (for example, less than 10m³ taken together or in aggregate), and
- The proposed storage is transient (less than 48 hours), and
- Rain is not predicted during the 48 hours.

In this scenario it may not be necessary to implement the full range of recommended design criteria and engineering requirements, in order to meet the key design criterion of reducing or eliminating pathways for migration of PFAS contamination. However, the stockpile or storage area must maintain compliance with the general environmental duty under EP Act and s440 ZG – not placing a prescribed contaminant that may enter aquatic environments.

Timeframes and risks are important considerations in planning stockpiling, storage and containment infrastructure. The design should be proportionate to the level of assessed risk. For example, the design of stockpiles, engineered containment facilities, and liquid waste containment vessels should consider:

- Type of material.
- PFAS concentration.
- Leachability of the material
- How long the PFAS-contaminated waste will be stored for.
- The likelihood of rain.
- Minimising the potential to release PFAS into the environment.

16.2 Functional Requirements

Stockpiling, storage, and containment facilities should be designed to ensure they do not spread PFAS contamination or create any pathways for environmental or human health exposure. The development of a sound conceptual site model (CSM) can help to identify the functional requirements for the site and thereby inform the design process. Accordingly, facilities for the stockpiling, storage and containment of PFAS-contaminated material should be designed with a whole-of-life approach to construction, operation and decommissioning to meet the following essential functional requirements:

- avoid or minimise to the greatest practicable extent infiltration into the PFAS-contaminated materials by precipitation, surface water, and/or groundwater
- detect, monitor, and collect any PFAS-contaminated liquid (leachate) generated during storage, to be extracted from the sumps for separate treatment or destruction
- ensure that the migration of leachate from sumps and other collection systems does not occur
- prevent seepage of leachate into groundwater or surface water
- avoid the release of PFAS-contaminated sediment as a result of erosion
- avoid the release of PFASs to the atmosphere¹⁸
- mitigate dust generation
- enable future recovery of stored materials
- account for local climatic, fire, flood, geotechnical, and groundwater conditions applicable to the site, property, area and region
- comply with the EP Act 1994, section ZZ440G requirement that a person must not unlawfully deposit a prescribed water contaminant at another place so that the contaminant could be expected to wash, blow, fall or otherwise move into waters, a roadside gutter or stormwater drainage.

16.3 Design Requirements

Design of stockpile, storage and containment shall follow requirements tabled below.

Table 46 Stockpile Design Requirements

Description	Timeframe	Storage infrastructure for solid wastes and contaminated equipment	Storage infrastructure for liquid wastes
Transient	Less than 48 hours with no rain predicted	Covered stockpile or storage area on impervious bottom liner (e.g. tarp, plastic sheeting, membrane, etc.)	Packaged liquid containers or self-bunded containment vessels on impervious bottom liner (e.g. tarp, plastic sheeting, membrane, etc.)
Temporary	From 48 hours to 6 months	Managed stockpile, covered, on impervious, bunded hardstand, with effective stormwater controls (e.g. diversion drains, banks, etc.)	Self-bunded containment vessels covered, with lockable access, on impervious, bunded hardstand, with effective stormwater controls (e.g. diversion drains, banks, etc.)
Short-term	From 6 months to 2 years	Constructed stockpile with robust anchored covers, impervious bottom liner, and effective stormwater controls to ensure that rainwater and sheet flow do not contact impacted solids	Packaged, double-walled containment vessels or self-bunded containment vessels, covered, with lockable access, on impervious constructed storage area with effective stormwater controls to ensure that rainwater and sheet flow do not contact contaminated liquids
Medium-term	From 2 to 5 years	Engineered containment facility, with effective stormwater controls	Packaged, double-walled containment vessels or self-bunded containment vessels, resistant to UV degradation, in engineered containment facility, with effective stormwater controls
Long-term	More than 5 years	Engineered containment facility, with effective stormwater controls	Packaged, double-walled containment vessels or self-bunded containment vessels, resistant to UV degradation, in

¹⁸ Depending on the specific PFAS present, this may require measures to capture and manage potential emissions of PFAS to air. Misting, steaming, evaporative, and other similar processes should also be avoided as PFAS is likely to be transferred via the water vapour into the atmosphere, unless the PFAS content is removed prior to emission.

engineered containment facility, with effective stormwater controls

Notes:

PFAS-contaminated equipment should be stored under cover on a sturdy impermeable, bunded surface that captures any seepage from equipment and any contaminated stormwater. Equipment, when demonstrated by monitoring to be clean following flushing or rinsing, is not subject to the requirement).

PFAS-contaminated liquids should be stored undercover within a secondary containment system so that any leakage due to spills, ruptures, crushing, or mishandling is effectively contained, preventing any release to soil, groundwater, or surface waters.

A “first flush” stormwater management system should not be used in conjunction with PFAS storage infrastructure.

A site-specific risk assessment is to be prepared by an SQP for consideration and approval for any design of stockpiling, storage or containment infrastructure that differs from what is described in above Table.

16.4 Management Requirements

SCA should assess the cut / fill balance across the development precinct projects and if required, stockpile material at a dedicated site for future beneficial reuse or disposal. Beneficial reuse is where the land application of the material is a genuine, fit-for-purpose reuse rather than a form of waste disposal.

- Stockpiles are temporary storages of soil and natural material without an immediate beneficial use pending future beneficial reuse or disposal. Emplacement of surcharge material is not stockpiling.
- Storage of stockpiled soils should be temporary (no more than 12 months) and for a specific purpose. If the stockpile cannot be beneficially reused within 12 months due to development constraints, SQP risk assessment and monitoring plan required.

Materials shall be managed to prevent harm to the environment and human health.

- PFAS-contaminated materials, particularly liquids, should be stored above ground in appropriately bunded storage areas or in containment vessels such as covered intermediate bulk containers (IBCs) and isotainers in bunded areas. The bunds or bunded tanks must be of low permeability and of a sufficient size to retain a major spill, including capacity for stormwater runoff. The essential criterion is to ensure all PFAS remains completely contained.
- Storage and stockpiling of PFAS-contaminated materials, including liquids, should be undertaken in such a way that PFAS cannot migrate into the surrounding soil or water and all runoff should be monitored for PFAS. This can often mean storage or stockpiling within a sealed and bunded area, where the material is in a suitable container or appropriately covered to minimise rainfall penetration and prevent runoff into waterways as per EP Act s440ZG – depositing prescribed water contaminants.

Stockpiles are to be monitored weekly at a minimum to ensure that all PFAS-specific controls and erosion and sediment controls are performing as designed. Inspections should occur prior to and following forecast rain events and any damaged controls/mitigation measures should be reinstated or repaired as required. Prior to forecast significant storm / weather events, stockpiles must be checked to ensure that coverings are functioning correctly, properly installed and secure.

Along with ongoing monitoring, the condition of storage containers, stockpiles, covers and liners, on-site drainage systems, and the bunded area need to be monitored. Cracks or leaks in materials such as concrete may be difficult to detect and the integrity of bunding should never be assumed. If leaks are detected, further monitoring, assessment and action should be taken.

- Works should be planned to avoid double-handling of materials and minimise the need for stockpiling wherever possible.
- Material of different categories should be segregated and identifiable.

A Stockpile Register should be maintained by the SCA to record the location, origin, characteristics, volume, and responsibility (ownership) of all stockpiles that are established on the Airport.

16.5 Reporting Requirements

All construction and maintenance activities will be required to prepare a PFAS Environmental Work Method Statement (EWMS). The EWMS requires approval of SCA's Group Manager HSEC, before works can commence on-site.

The PFAS EWMS must provide details step-by-step, the tasks required to complete the work activity to achieve and demonstrate compliance with the objective and performance criteria, and implementation of the actions in this section, relevant to the proposed activity. SCA's EMP Management Element requirements should also be consulted in relation to:

- Monitoring and reporting
- Corrective actions
- Contingency and emergency response

The PFAS EWMS are to be collated as a suite of documents for review by DESI accredited Contaminated Land Auditor to inform the PFAS Annual Review and PFAS Annual Reporting.

17 CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT

For the purposes of this Plan, Construction and Demolition (C&D) waste refers to materials of the built or natural environment that are neither 'soil' nor 'water'. It includes materials that are commonly recycled such as concrete, bricks, asphalt, tiles and metals; materials that are commonly reused or reprocessed such as timber, vegetation, stone and rock; and materials that are commonly disposed to landfill such as cladding, fittings and fixtures.

Objective: To prevent or minimise the potential for environmental harm associated with the handling and exposure of PFAS contaminated and demolition waste.

Performance criteria

1. No increase in ecological or human health risks from the management of PFAS contaminated construction and demolition waste.
2. Disposal or reuse of construction and demolition waste on the airport ensure no additional PFAS contamination beyond the airport site.
3. All PFAS contaminated construction and demolition waste movement and reuse within the airport from construction and maintenance works shall be tracked and reported.
4. Tracking and reporting of contaminated construction and demolition waste disposal off the airport
5. Zero regulatory non-compliant disposal of PFAS contaminated construction and demolition waste on or offsite the Airport.

17.1 Regulatory and Policy Guidance

As there is insufficient scientific literature and regulatory guidance available to provide definitive criteria for management options of C&D waste, a risk-based approach to management should be adopted.

Where there is a high degree of certainty that C&D waste has come into contact with PFAS-containing substances, the waste should be tested to determine contamination levels and managed accordingly.

The extent to which construction materials, plant and equipment may become contaminated with PFAS will depend on several factors including:

- **Contact** with PFAS-impacted soil or groundwater; for example, a building slab located in a PFAS-impacted area is more likely to be PFAS-contaminated than the building walls sitting on the slab.
- **The type of material** and its porosity will influence the ability and rate at which PFAS contamination in surrounding soil or water can absorb into the material. For example, asphalt and concrete are likely to become contaminated with PFAS if they have been in contact with PFAS-containing liquids. Porous materials will absorb PFAS more easily than non-porous materials such as steel.
- **Exposure concentration** – The higher the concentration of PFAS in surrounding soil or water, the higher the potential concentration of PFAS absorbed into the construction materials, particularly if exposure has occurred over a long period of time.
- **Exposure duration** – The longer the construction materials have been in contact with PFAS-contaminated soil or water, the more PFAS can be absorbed.

Where the risk of contamination is deemed to be low, testing of C&D waste is not required. **Table 47** in the section below should be used as a guide to establish whether testing of C&D waste is required.

17.2 Management Requirements

17.2.1 When is testing required?

The table below indicates when environmental testing is and is not warranted for C&D waste.

Table 47 Categorisation of C&D Waste to determine need for testing

LIKELY to be contaminated by PFAS – Environmental testing is required	NOT likely to be contaminated by PFAS – Environmental testing is not required
- Building materials in direct contact with AFFF concentrate; - The application of AFFF foams; - Trade waste treatment plants or sewage treatment plants	Building materials in contact with environmental concentrations of PFAS (<1mg / kg in soils or <10µg / L in waters)
Slurry or saturated sediment that has originated from known PFAS source areas through hydro vac operations, and / or migrated along pathway and drainage lines	Non-porous construction materials, typically including metal and plastic objects (e.g. steel / plastic fencing, pipes, and sheet piles), plant and equipment (e.g. water tanks, plastic or metal pipes, pumps, water carts, mobile plant, and equipment)
Porous building materials in contact with elevated concentrations of PFAS. Typical building materials that are considered porous include masonry, concrete, and timber	Vegetation in areas that did not receive applications of AFFF foam
Tanks and pipes used for AFFF concentrate	Other tanks and pipes
Areas where AFFF was used for incident response	Other concrete or asphalt roads and pavements
	Car parks

17.2.2 Sampling and testing requirements

Where PFAS testing of C&D waste is necessary, sampling requirements are as follows:

- the PFAS suite should include the standard laboratory suite as per **Appendix J**; and
- the analysis must include other identified contaminants of potential concern.

17.3 Management Actions

17.3.1 Beneficial reuse of Construction and demolition waste

C&D waste should only be reused at Sunshine Coast Airport where that use is beneficial and in accordance with relevant guidelines and policies. If the material would not normally be reused, then the presence or absence of PFAS contamination should not alter that. Reuse applications could include road base from milled asphalt, crushed concrete or use of wood chips for landscaping purposes.

For cases where C&D waste can be beneficially reused on the Airport, analysis and evaluation of the selected site on Airport is required to ensure that the receiving environment has the same or higher risk profile and that new pathways to sensitive environmental receptors are not created. Reuse should not increase the level of environmental risk posed by PFAS-impacted materials in their current pre-work state.

17.3.2 Disposal to landfill

For C&D waste requiring disposal to landfill, documentation with reference to **Appendix M** must be completed to determine whether PFAS contamination needs to be considered. This can be undertaken by a suitably trained staff member and all records should be retained. Offsite disposal should be undertaken in accordance with Section 18 of this plan.

For C&D waste that has been classified as likely to contain PFAS, testing is required. If PFAS is confirmed, materials must be disposed of as Category 1 regulated waste as defined under the *Environmental Protection Regulation 2019* (Qld). All PFAS-containing waste must be disposed of at a licenced waste facility. An approved Record of Tested Waste form must accompany all tested waste as per sections 52 and 53 of the *Environmental Protection Regulation 2019* (Qld).

17.4 Reporting Requirements

All construction and maintenance activities will be required to prepare a PFAS Environmental Work Method Statement (EWMS). The EWMS requires approval of SCA's Group Manager HSEC, before works can commence on-site.

The PFAS EWMS must provide details step-by-step, the tasks required to complete the work activity to achieve and demonstrate compliance with the objective and performance criteria, and implementation of the actions in this section, relevant to the proposed activity. SCA's EMP Management Element requirements should also be consulted in relation to:

- Monitoring and reporting
- Corrective actions
- Contingency and emergency response

The PFAS EWMS are to be collated as a suite of documents for review by DESI accredited Contaminated Land Auditor to inform the PFAS Annual Review and PFAS Annual Reporting.

18 OFFSITE DISPOSAL OF PFAS CONTAMINATED MATERIALS

At SCA, PFAS-contaminated material permitted to be transported off-Airport includes:

- Soil and excavated material.
- Construction and demolition waste such as building rubble, road base, asphalt, tarmac, and concrete.
- Liquid waste generated by non-destructive drilling investigative works, drain maintenance activities and any other PFAS-contaminated liquid waste.
- Trade waste
- PFAS-containing materials that are waste (including contaminated containers).

Objective: To prevent or minimise the potential for environmental harm associated with the offsite disposal of PFAS contaminated materials.

Performance criteria

1. Tracking and reporting of disposal of PFAS contaminated materials on and off-airport
2. Zero regulatory non-compliant disposal of PFAS contaminated material.

18.1 Soil Disposal from Lots on the EMR

In accordance with the EP Act, a disposal permit application will need to be made with DESI to remove, and treat or dispose of, contaminated soil from land that is listed on the Environmental Management Register (EMR) or Contaminated Land Register (CLR).

The Qld Government's Guideline, *Disposal permit to remove, treat and dispose of contaminated soil*, provides information about how to apply for a disposal permit to remove, and treat or dispose of contaminated soil.

Disposal is not the preferred option. DESI actively supports the national targets for reduction in waste going to landfill. If disposal is the only viable option for some contaminated soil, you should make every effort to reduce the volume of soil requiring disposal.

Issues to be aware re valid Permit application include:

- **Landowners consent** is required for disposal of contaminated soil. As SCAPL is the lessee or occupier of the land, or you are acting on behalf of the landowner (Sunshine Coast Council), you must provide written consent from the landowner to the proposed removal and treatment or disposal of the soil. Their written consent must accompany your application for a disposal permit. Note, DESI does not accept e-mail response from landowners. Written consent must be signed letter from the landowner.
- **Landfill operator's consent** is required for acceptance of contaminated soil. The landfill acceptance letter must include the following information:
 - address and lot on plan details of the site from which the soil will be removed
 - address and lot on plan details of the site to which the soil will be taken for disposal
 - identification details of the environmental authority that regulates the disposal landfill
 - compliance statement from the landfill operator confirming they are meeting the conditions of their environmental authority
 - total volume of the soil to be received at the landfill
 - disposal method(s) (e.g. in lined or unlined landfill)
 - laboratory testing results that explain why a lined and/or unlined disposal area will be used for all or portions of the soil.

- **Volume of soil specified for removal**

Permit authorises the removal of a specific, maximum volume of soil from a particular parcel of land. Should the actual forecast volume of soil from construction works exceed the actual volume for disposal, the permit is no longer valid.

- **Laboratory analysis**

Laboratory must be NATA certified for the PFAS analysis methods.

Standard suite of PFAS (n=30) including sulfonates PFBS, PFHxS, PFOS, PFOSA and PFDcS

Leachate analysis required; ASLP and TCLP methods.

TOPA required on soil and their leachates (ALSP & TCLP).

18.2 Regulated waste requirements

Under Part 2, Schedule 9 of the *Environmental Protection Regulation 2019* (Qld), solid waste containing PFAS at any concentration above zero mg / kg (or <Limit of Reporting for trace level of analysis) is classified as a Category 1 regulated waste and must be managed in accordance with Category 1 requirements. This includes payment of a waste levy under the *Waste Reduction and Recycling Act 2011* (Qld) for Category 1 regulated waste.

When transporting PFAS-contaminated waste, all loads must be tracked under the Queensland waste tracking system using the code M270 – per- and poly-fluoroalkyl substances. This is a nationally recognised code that has been adopted by state regulators for clear identification.

Where multiple waste codes apply, the waste must be reported using the following description (per NEMP (v2.0) Section 11):

- 'Per- and poly-fluoroalkyl substances (PFAS) contaminated materials, including PFAS-containing waste products and contaminated containers'.
- Consider PFAS-contaminated materials, including waste PFAS-containing products, as Dangerous Goods Class 9.

PFAS-containing waste shall only be disposed to a licenced landfill facility or treated where it can be demonstrated that it is the most appropriate management option available. This applies to solid or liquid waste that is unable to be beneficially reused on the Airport site due to levels of contamination, geotechnical properties or are otherwise surplus to needs.

18.3 Management Requirements

Prior to disposal, all PFAS-contaminated waste materials must be sampled by a suitably qualified person to determine the PFAS concentration.

18.4 Requirements for Offsite Disposal of all PFAS Contaminated Waste

In accordance with the *Environmental Protection Regulation 2019* (Qld), SCA will comply with waste tracking obligations¹⁹.

As the waste generator, SCA must:

- Record the prescribed information about the waste by completing Part 1 of the paper or electronic Waste Transport Certificate (WTC) or provide the data in an alternative way;
- Give the prescribed information to an authorised waste contractor;

¹⁹ https://environment.des.qld.gov.au/_data/assets/pdf_file/0024/87324/waste-tracking-obligations-pfas-qld.pdf

- Give the prescribed information to DESI within seven days (pink copy of the WTC with Parts 1 and 2 completed); and
- Keep records of the waste transaction for five years (green copy of the WTC with Parts 1 and 2 completed).

All waste sent offsite for disposal should be pre-classified and taken to a waste disposal facility licensed to accept the waste type.

18.5 Requirements for Construction and Demolition Waste containing PFAS

Where it is considered likely that the waste is contaminated with PFAS sampling should be undertaken by a suitably qualified person. For material that does not meet the requirement for PFAS testing, the Disposal Form for C&D provided in **Appendix M** should be completed and approved by the SCA Environment Officer prior to the waste being taken offsite for disposal.

18.6 Requirements for Liquid Waste containing PFAS

Liquid waste contaminated with PFAS can be stored in appropriately bunded storage tanks collected by a waste contractor licensed to transport PFAS-contaminated waste. All tanks should be maintained in an appropriately sized bunded area with appropriate covers in place.

For PFAS-contaminated liquid waste generated by non-destructive drilling works, vacuum trucks can be sent directly to the waste facility for liquid waste processing, provided they are licensed to transport regulated waste.

18.7 Licensed waste facility

The nearest waste facility licenced by DESI to manage PFAS, including its destruction is the Cleanaway facility located approximately 80 kilometres south of the airport.

*Cleanaway Narangba Regulated Waste and Hazardous Liquid Waste Facility
8-12 Krypton Street, Narangba QLD 4504
Lot 111 on Plan CP909626
07 3385 2300*

This facility is licenced to receive, store and treat regulated waste or contaminated soil at all concentrations to render the waste or soil non-hazardous or less hazardous under Permit EPPR00461413 issued by the Department of Environment and Heritage Protection as per Chapter 5 of the *Environmental Protection Act 1994* (Qld).

18.8 Reporting Requirements

All construction and maintenance activities will be required to prepare a PFAS Environmental Work Method Statement (EWMS). The EWMS requires approval of SCA's Group Manager HSEC, before works can commence on-site.

The PFAS EWMS must provide details step-by-step, the tasks required to complete the work activity to achieve and demonstrate compliance with the objective and environmental outcomes, and implementation of the actions in this section, relevant to the proposed activity. SCA's EMP Management Element requirements should also be consulted in relation to:

- Monitoring and reporting
- Corrective actions
- Contingency and emergency response

The PFAS EWMS are to be collated as a suite of documents for review by DESI accredited Contaminated Land Auditor to inform the PFAS Annual Review and PFAS Annual Reporting.

19 DRAIN MANAGEMENT

Drain maintenance is periodically conducted at the Airport to maintain flow and reduce build-up of sediments and subsequent colonisation by weedy vegetation.

PFAS has been detected in sediment of the Airport's drains. The nature of drains means they act as secondary sources of PFAS due to the collection of sediments.

Drain maintenance activities are undertaken in accordance with the SCA EMP Element 2.0: Drain Management to ensure that all waste is appropriately managed, stored and treated to avoid PFAS impacts to the environment. The following additional requirements are to be implemented to support the above standard operating procedure for drain management.

Objective: To prevent or minimise the potential for environmental harm associated drain management.

Performance criteria

1. No increase in ecological or human health risks from the management of airport drains.
2. Drain management activities ensures no additional PFAS contamination beyond the airport site.
3. No increase in sediment in downstream waters from drain management activities.
4. Zero regulatory non-compliant disposal or reuse of PFAS contaminated material (eg sediment, water, plant material)

19.1 Management Actions

PFAS testing

Sediment must be tested for PFAS prior to the maintenance works commencing to understand potential impacts and inform management options in relation to sediment management – reuse within lot, reuse on another lot on the airport, or disposed to a licensed facility.

Drain water reuse

Should drain maintenance activities propose to use water from the drains for dust suppression, the 'Decision process for managing PFAS contamination water' in 'Water Management' section must be used.

Drain sediment reuse

Sediment can be reused on Airport land provided:

- it remains on the same Lot, and
- it is placed in an area where background PFAS levels present a similar or higher contamination risk profile, providing that the volume of contaminant in the soil to be added is substantially less than the total mass of the contamination already present in that area, and
- not placed adjacent to waterways.

If the sediment from the drain is to be reused (following ASS treatment) on Airport land and contains detectable concentrations of PFAS; the material must be characterised for reuse in accordance with Soil Management section of this Plan.

The material can only be reused as fill material in areas where background PFAS levels present a similar or higher contamination risk profile, providing that the volume of contaminant in the soil to be added is substantially less than the total mass of the contamination already present in that area, consistent with this Plan.

Leachate Management

SCA EMP Element 2.0: Drain Management contains requirements for ASS management. Where the ASS management procedure requires testing of leachate for pH, the leachate shall also be tested for PFAS before it's discharge to the land.

The leachate shall only be discharged to land provided that PFAS levels in the leachate present a similar or lower contamination risk profile than background groundwater PFAS levels at the discharge location, consistent with the PFAS water and soil management requirements of this Plan.

Biodiversity Management

SCA EMP Element 2.0: Drain Management contains requirements for biodiversity management in relation to PFAS. Prior to commencement of major projects, excavated material that is to be stored greater than 100 m from the area of excavation, data must be obtained on the potential sensitive receptors downstream and the material must be tested for PFAS.

Equipment

Plant and equipment that comes into contact with sediment is to be thoroughly cleaned to remove sediment after each work location within a designated, bunded and lined wash-down area to remove sediment.

19.2 Reporting Requirements

All construction and maintenance activities will be required to prepare a PFAS Environmental Work Method Statement (EWMS). The EWMS requires approval of SCA's Group Manager HSEC, before works can commence on-site.

The PFAS EWMS must provide details step-by-step, the tasks required to complete the work activity to achieve and demonstrate compliance with the objective and performance criteria, and implementation of the actions in this section, relevant to the proposed activity. SCA's EMP Management Element requirements should also be consulted in relation to:

- Monitoring and reporting
- Corrective actions
- Contingency and emergency response

The PFAS EWMS are to be collated as a suite of documents for review by DESI accredited Contaminated Land Auditor to inform the PFAS Annual Review and PFAS Annual Reporting.

20 SLURRY MANAGEMENT

During construction and maintenance works, slurry is often generated during non-destructive drilling and from drilling muds. This generally consists of a mix of water and soil in a liquid/non spadable form. Slurry wastes are generally disposed offsite as the volumes are typically low and not suitable for reuse due to high water content and limited geotechnical properties.

Objective: To prevent or minimise the potential for environmental harm associated with management of slurry.

Performance criteria

1. No increase in ecological or human health risks from the management of slurry on the airport.
2. Slurry management activities ensures no additional PFAS contamination beyond the airport site.
3. Zero regulatory non-compliant disposal or reuse of PFAS contaminated slurry.

20.1 Management actions

Where larger volumes of slurry are expected to be generated, the slurry can be separated into liquid and spadable soil (e.g. drying beds/ponds) and managed using the soil and wastewater management requirements of this Plan.

The separated sediment and water component of the slurry requires PFAS testing and managed in accordance with the Soil and Water Management section of this Plan.

Where PFAS classification allows, the excavated material where geotechnical suitable should be returned into areas where it was backfilled.

Any on-site treatment of slurry will require approval from SCA Environment Team before proceeding and must demonstrate that the appropriate levels of control are in place to manage risks in line with this PFAS Management Plan for the managements of PFAS impacted soil and water.

20.2 Reporting Requirements

All construction and maintenance activities will be required to prepare a PFAS Environmental Work Method Statement (EWMS). The EWMS requires approval of SCA's Group Manager HSEC, before works can commence on-site.

The PFAS EWMS must provide details step-by-step, the tasks required to complete the work activity to achieve and demonstrate compliance with the objective and performance criteria, and implementation of the actions in this section, relevant to the proposed activity. SCA's EMP Management Element requirements should also be consulted in relation to:

- Monitoring and reporting
- Corrective actions
- Contingency and emergency response

The PFAS EWMS are to be collated as a suite of documents for review by DESI accredited Contaminated Land Auditor to inform the PFAS Annual Review and PFAS Annual Reporting.

21 PFAS INVENTORY

The purpose of the Inventory will be to collect information to quantify and characterise PFAS-containing products and PFAS- contaminated materials.

The following process will be used to create the Inventory:

1. Identification of the activities listed in Table B1 and B2 of the NEMP that are, or have been, undertaken at Sunshine Coast Airport.
2. PFAS-containing products: Identification of PFAS-containing products that are, or have been, used or stored at the Airport.
3. PFAS-contaminated materials: Identification of PFAS-contaminated materials that are, or have been, used or stored at the Sunshine Coast Airport.
4. PFAS-contaminated sites: Identification of sites at Sunshine Coast Airport where PFAS contamination has been identified by a site contamination investigation.
5. Classification of PFAS sources: Information obtained in steps 1 to 4 above will be used to classify the sources of PFAS contamination at and around Sunshine Coast Airport.
6. Management practices: Identification of historic and current management practices employed at Sunshine Coast Airport.

All available information about the type and location of PFAS sources and PFAS-contaminated sites will be presented in the PFAS Inventory.

The PFAS Inventory will be used to prioritise sites for action (investigation, management and/or remediation).

The PFAS Inventory will be modified/refined in the future as further information about PFAS at Sunshine Coast Airport becomes available.

SCAPL's commercial lease agreement contain standard terms regarding compliance with legislation, risk management and incident reporting. To assist tenants comply with their environmental responsibilities, SCAPL has produced an *Environmental Guideline for Tenants (2023)* that includes reference to the SCA's EMS, EMP and PFAS Management Plan that SCAPL uses to demonstrate and achieve environmental protection and sustainability. SCAPL's Airport EMP contains a requirement to develop a PFAS inventory as per the PFAS NEMP. The progress of the PFAS Inventory falls within the Audit requirements of the SCA EMS.

As a requirement of this Plan, the development of the PFAS Inventory shall be documented in the Annual reporting process.

22 PFAS TREATMENT AND REMEDIATION

Treatment and remediation of PFAS-contaminated materials (whether solids and liquids) encountered at SCA can include destroying the PFAS, immobilising the PFAS, and/or removing the PFAS contaminated materials off-Airport. The screening risk assessment results (**Section 13**) has not identified requirements for remediation management actions.

Note that the highest PFAS soil concentrations reported at SCA were:

- 0.025 mg/kg PFOS+PFHxS Lot 699 (EMR Site Id 124728)
- 0.142 mg/kg PFOS+PFHxS Lot 898 (EMR Site Id 195894)

Material associated with these two EMRs has since been disposed of to landfill. The soil material was from and in the vicinity of the historical Sediment Relocation Area, which were disposed to Veolia's Ti Tree Bioenergy landfill facility, located in Willowbank, Queensland. The removal of relatively more PFAS contaminated material from the historical Sediment Relocation Area has resulted in an average 77% reduction in PFAS concentrations in soils within this area and, subsequently, has reduced the PFAS mass inventory across the broader airport (Core PFAS Baseline Report 2021).

The preferred hierarchy of treatment and remediation options presented in Section 13 of the NEMP (v2.0) are as follows:

1. Separation, treatment, and destruction - This involves treatment of the PFAS-contaminated material (whether on-Airport or off-Airport) so that it is destroyed, removed, or the associated risk is reduced to an acceptable level.
2. On-Airport encapsulation in constructed stockpiles or engineered storage and containment facilities, with or without chemical immobilisation. If the location is hydrogeologically appropriate, on-site encapsulation may acceptably manage on- and off-Airport risks to direct and indirect beneficial uses and environmental values of soils, surface water, groundwater, and biota.
3. Off-Airport removal to a specific landfill cell. This may or may not include immobilisation prior to landfill disposal, noting that the conditions in the landfill may reverse or diminish the immobilisation chemistry in ways that are difficult to predict. Immobilisation prior to landfill disposal may require environmental regulatory approval. Leachate should be captured and treated to remove PFAS and the removed PFAS should be destroyed.

The preferred option is to treat the PFAS-contaminated materials to destroy, remove or reduce the level of PFAS. Treatment facilities and technology options are commercially available in Australia to destroy and/or remove PFAS from contaminated materials. Queensland has a number of facilities licensed to manage PFAS, including its destruction.

Where treatment options are not currently available, the PFAS-contaminated materials may be able to be reused or require interim (i.e. non-permanent) on-Airport stockpiling, storage, or containment.

The final, and least preferred option is to dispose of the PFAS-contaminated materials to landfill. In some circumstances this will be a necessary and appropriate action to address the risks.

Persons handling PFAS-contaminated materials must be appropriately trained. Mechanisms should be in place to check and review performance to ensure the treatment or remediation approach is effective (i.e. designed to do what it is meant to achieve).

The NEMP (v2.0) forecasts that a wider range of treatment facilities and technology options may become commercially available in Australia to destroy and/or remove PFAS from contaminated materials.

High temperature destruction is available in a small number of facilities in Australia. Appendix C of the NEMP (v2.0) lists treatment technologies that are available in Australia commercially and/or are undergoing trials, and this information should be included in any treatment and remediation options assessment.

Before choosing a remediation or treatment option, the following should also be considered:

- Proportionate to risks - The selection of an option should be proportionate to the risks being managed.
- Sustainability of option - When deciding which option to choose, the sustainability (environmental, economic, and social) of each option should be considered in terms of achieving an appropriate balance between the benefits and effects.
- Views of affected communities and jurisdictional regulators - Stakeholder views will contribute to a comprehensive understanding of the context and the potential impacts of options.
- Availability of the best treatment or remediation technologies - While 'best practice' criteria are not yet available, as remediation and treatment technologies are developed, best practice technologies should be the preferred solution, where practicable.
- Site specific issues - The appropriateness of any specific option will vary depending on a range of local factors. The choice of a specific option or mix of options is therefore a matter for the site manager in consultation with, or as directed by, the environmental regulator.
- Effectiveness of technology as demonstrated by destruction efficiency or the reduction in PFAS concentration - This should be considered when choosing an option in combination with appropriate remediation/treatment criteria. As most of the methods available in Australia are in the research and development stage, this information may not be published. If information is unavailable, the technology provider must provide specifications and validation of the effectiveness of the technology to reduce the PFAS concentration and the destruction efficiency. Noting that some treatments will result in the transformation of PFAS, thus changing the PFAS present in the treated materials.
- Treatment strategy - The selection of an approach should consider the preferred hierarchy for treatment and remediation in combination with other contaminants that may be present (e.g. mixed contamination) and the availability of on-site land to accommodate in-situ treatment options. If information regarding a particular approach is unavailable, seek details from the technology provider including the efficiency and effectiveness of the process and which other contaminants the process will treat. Some technologies are more effective at treating longer carbon chain length compounds from water-borne contamination. It may be important to consider a multistage treatment (also referred to as a treatment train), depending upon composition of the waste and the nature of the contamination.
- Validation - Consideration must be given to independent validation of the treatment or remediation outcomes to determine whether the measures of success (including remediation objectives) have been achieved.
- Understanding PFAS precursors - Studies of site remediation have emphasised the need to monitor and understand the presence of precursors. Some treatment processes transform precursors creating an apparent increase in PFAS following remediation. Understanding of the range of potential PFAS present, including precursors, is also necessary to identify all contaminants of potential concern.

22.1 Onsite Management

The purpose of this section is to identify high-level considerations that need to be taken into account when identifying whether an onsite management strategy is appropriate for the management of PFAS-contaminated sites.

Onsite management of PFAS-contaminated sites can be undertaken if the site assessment indicates that:

- Remediation would have no net environmental benefit either at the local site, or within the broader catchment.
- Remediation would have a net adverse environmental effect (e.g. determined via a site-specific risk assessment) or
- Management of exposure pathways (rather than treating at source) would be acceptable, particularly as an interim measure while other options are considered.

The NEMP (v2.0) states that an onsite management strategy would be appropriate provided that:

- Unacceptable risks (as identified by a risk assessment) to off-Airport ecosystems and/or human health exposure, such as by surface water or groundwater migration, are not occurring or are managed. If unacceptable risks to offsite ecosystems are present, action must be taken immediately to address those risks.
- The landowner agrees and has sufficient expertise and financial capacity to implement and maintain the management measures. The Polluter should monitor and report on the efficacy of the measures for the duration of the activity.
- For Sunshine Coast Airport, the 'landowner' is the SCC. What this means in practice is that through the lease agreement for SCA, SCC has a role in overseeing SCAPL's compliance with environmental regulations and approvals.

Regardless of what management strategy is chosen, the overarching requirement is to take reasonable and practicable action to address the risks that PFAS poses to human health and/or the environment.

22.2 Mandated Documentation

It is a requirement under this Plan that the options assessment and suitability of any onsite management strategy proposed are documented and provided to SCAPL prior to selecting a final option.

If on-Airport or off-Airport treatment of PFAS-contaminated materials from PFAS-contaminated sites at SCA are proposed, a 'PFAS Treatment and Remediation Plan' must be prepared by a SQP for review and endorsement by DESI CLA and approved by SCA's Group Manager HSEC.

23 PFAS ONGOING MONITORING PROGRAM

SCAPL will establish a new PFAS ongoing monitoring program (OMP) that forms an important part of the PFAS Management Plan for the Airport. The Plan will involve the periodic sampling of groundwater, surface water and sediment across the Airport and selected locations outside the Airport, including locations that represent PFAS ambient conditions.

The objective of the OMP is to set out a program monitoring to continue to assess the changes in the nature and extent of PFAS within the environment, where historical use of legacy aqueous film forming foam (AFFF) has led to a potentially elevated risk to a receptor, or potential future risk to a receptor. Assessing changes in the distribution, concentration, and transport (pathways and flow rates) of the contaminants against appropriate guideline values provides:

- An evidence base for targeted and effective risk management decision making to protect human health and environmental receptors.
- An early warning that additional management of PFAS contamination may be warranted.

The sampling will look at any changes where PFAS has been found, and at what concentrations. This will assist SCAPL, external stakeholders and the community understand whether the actions being undertaken by the Plan are effective or identify whether more might need to be done.

An OMP annual interpretive report will be produced that:

- Presents the data for the completed monitoring dry season (October) and wet season (April) monitoring events
- Commentary on observed trends
- Noteworthy changes in PFAS concentrations
- Any other observations that have been made with respect to the behaviour and movement of PFAS on the Airport, downstream of the airport and upstream of the Airport (ambient levels).

Following are the steps to produce the OMP to enable monitoring to occur at the end of the dry season in October 2024.

1. Completion of statistical analysis of existing PFAS site investigations and monitoring data sets to inform the Data Quality Objectives (DQOs) and Sampling & Analysis Quality Plan (SAQP) for the OMP.
2. Develop the DQOs and SAQP in accordance with:
 - a. DESI, Monitoring and Sampling Manual (2018)
 - b. ANZG, Guidelines for Fresh & Marine Water Quality
 - c. National Environment Protection Site Contamination Measure (NEPM) 1999
3. Provide draft DQOs and SAQP to EDQ, DESI, SCC and Contaminated Land Auditor for review.
4. Contaminated Land Auditor endorses DQO and SAQP.

To support the OMP, a data management system will be developed in a staged approach to:

- Achieve centralized data storage.
- Assess field and laboratory results.
- Identify exceedances.
- Conduct trend analysis.
- Allows querying and reporting capabilities.

24 PFAS MANAGEMENT ANNUAL REVIEW

SCA will undertake formal and informal reviews of this Framework to assess whether any updates are necessary and ensure that the Framework remains consistent with the NEMP (v2.0). The NEMP (v2.0) identifies that further and additional guidance may be provided in many areas, including the following which would have direct relevance to the Airport:

- Methods for sampling unusual matrices, including those found in construction waste.
- Analytical methods for additional PFAS (i.e. other than PFOS, PFOA and PFHxS).
- Precursor assessment.
- The influence of soil chemistry.
- Potential criteria for reuse of soil.
- Implementation of new Australian standards for managing PFOS, PFOA and potentially PFHxS.

The GM Operations is accountable for coordinating the Review of this Plan, reporting performance to the Board and CEO, and presenting any changes to the Board and CEO.

24.1 Formal Review

SCA's formal document review process is outlined in Table below.

Table 48 Review and updates

Review Trigger	Description
Periodic	Annual review to confirm no material changes required to maintain alignment with the SCA EMS and current practices.
In response to the following triggers	Where a change in legislation or key guidance document occurs (e.g. release of an updated version of the PFAS NEMP (v2.0)). Where a significant data gap is identified as part of document implementation that increases the risk rating applied to construction and maintenance activities in the SCA Environmental Risk Register (as part of the SCA EMS)

A Department of Environment, Science and Innovation (DESI) certified Contaminated Land Auditor (CLA) shall undertake a formal review of the Plan's performance and provide a report to the Group Manager, HSEC. The review shall include evaluation of the following:

- PFAS EWMS for construction and maintenance activities
- PFAS monitoring data
- Development of the PFAS Inventory.
- Discussions with relevant Airport HSE, operational and maintenance staff, regarding implementation of the PFAS Management Plan.

The review shall include recommendations for continual improvement of the PFAS Management Plan.

The Auditor's review shall inform the PFAS Management Plan Annual Report.

24.2 Informal Review

SCA will undertake informal reviews of this Framework on a continuous basis to ensure and opportunities for improvement are captured to inform the formal review process. Any significant amendments or updates that arise in between formal reviews will be communicated to relevant stakeholders.

24.3 Annual Reporting

An Annual Report shall be prepared to report on the performance of the PFAS Management Plan to meet the requirements of SCA's:

- Environmental policy that requires reporting of environmental performance to the Board of Directors,
- ESG requirement for compliance with the SCA PFAS Management Framework

Following approval of the Plan, an Interim Annual Report will be prepared to assess the efficacy and auditability of performance measures nominated in the Plan and any required updates arising will be made in a revision of the Plan

Thereafter, Annual Reports will be prepared at the end of each calendar year.

The General Manager - Operations will be accountable for the Report.

The Group Manager – HSEC will be responsible for the Report.

The Annual Report will include:

- Report on the progress and status of achieving the Plan's objectives, environmental outcomes and management actions.
- Reporting of non-conformances with the management actions of the Plan
- Reporting of exceedances of regulatory requirements
- Reporting of monitoring results and trends
- Reporting on the PFAS Inventory.
- Recommend adjustment to management measures and monitoring to meet the objectives of the Plan, based on what is learned from:
 - Outcomes of monitoring data
 - Outcomes of PFAS EWMS for construction and maintenance activities
 - Increased understanding of source-pathway-receptor model onsite
 - Re-evaluation of risk assessment
 - Changes to the operation of the PDA
 - Changes arising from the reconfiguration of lots within the PDA
 - Changes to PFAS National Environmental Management Plan
 - Changes to SCA's EMS requirements

A DESI accredited Contaminated Land Auditor shall review and endorse the Annual Report.

The Annual Report shall be provided to the following stakeholders:

- CEO of Sunshine Coast Airport
- Board of Directors of Sunshine Coast Airport
- Sunshine Coast Council
- Economic Development Queensland
- Department of Environment, Science and Innovation

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26 GLOSSARY

Aquifer	A permeable underground geological layer or formation saturated with water.
Beneficial reuse	Reuse where the land application of the material is a genuine, fit for purpose reuse of the soil rather than another path to waste disposal. Acceptable beneficial reuse options could include construction of acoustic and visual mounds where there is a benefit to sensitive receivers, engineered fill or improvements to flood prone land.
Bore	A drilled hole in the ground to intersect groundwater for extractive use, for monitoring, or for investigation. Can also be referred to as a well.
Catchment	An area which discharges water to a common point.
Contamination	The Environmental Protection Act 1994 (Qld) defines contamination as the release (whether by act or omission) of a contaminant into the environment
Dissolved Solids	Soluble compounds such as salts in aqueous solution (water).
Ecosystem	A system made up of the community of living things (animals, plants, and microorganisms) which are interrelated to each other and the physical and chemical environment in which they live.
EOF (Extractable Organic Fluorine)	An analytical procedure to estimate the presence of all organic fluorine in a sample (can include some organic fluorine that is not PFAS). EOF is a variant of the total organic fluorine (TOF) assay.
Formation	A geological structure such as a rock mass or layer.
Groundwater	The water contained in an aquifer.
Off-airport	All land outside SCA operational control.
On-airport	All land under SCA operational control
On works site	Areas within the specific construction project boundary.
Permeability	The ability to transmit fluids readily.
pH	A measure of the acidity or alkalinity of a solution.
Pore water	Pore water refers to water held within a soil in gaps between particles, i.e. in the pore space.
Precursor PFAS	More complex PFAS chemicals that may degrade in the environment to simpler and indefinitely persistent PFAS such as PFOS and PFOA.
Recharge	A process through which water enters an aquifer from the surface.
Runoff	Rainwater that flows across the land surface and may enter a drainage or stream system.

Sediment	Unconsolidated material deposited through the action of water.
Standing Water Level	The depth below natural ground surface to the water level in a well or bore.
TOP (total oxidisable precursor) assay	An analytical procedure to estimate the presence of precursor PFAS not measurable by the conventional analytical technique.
Water table	The top of the saturated zone in an unconfined aquifer.
Well	A hole drilled into a groundwater resource (aquifer), commonly constructed with a casing and screen or similar.

27 ABBREVIATIONS

AFFF	Aqueous Film Forming Foam
AHD	Australian Height Datum
ANZG	Australian and New Zealand Governments
ARFFS	Aviation Rescue Fire Fighting Services
ASLP	Australian Standard Leaching Procedure
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
m bgl	Metres below ground level
C&D	Construction & Demolition
CEMP	Construction Environmental Management Plan
CLA	Contaminated Land Auditor
CLID	Contaminated Land Information Document
CLR	Contaminated Land Register
COPC	Contaminants of Potential Concern
CSM	Conceptual Site Model
DESI	Department of Environment, Science and Innovation (Queensland)
DGV	Draft Guideline Value
DO	Dissolved Oxygen
DQO	Data Quality Objective
DSI	Detailed Site Investigation
EC	Electrical Conductivity
EDA	Economic Development Act 2012
EDQ	Economic Development Queensland
EA	Environmental Authority
EMP	Environmental Management Plan
EMR	Environmental Management Register
EMS	Environmental Management System
EP Act	Environmental Protection Act 1994
EPBC Act	Environment Protection & Biodiversity Conservation Act 1999
EPD	Eastern Perimeter Drain
EPP	Environment Protection Policy
ERA	Environmentally Relevant Activity
ESdat	Environmental Scientific data
EOF	Extractable Organic Fluorine
EV	Environmental Value

EWMS	Environmental Work Method Statement
FSANZ	Food Standards Australia New Zealand
GMOA	General Manager Operations and Assets
HSEC	Health, Safety, Environment & Community
LOR	Limit of Reporting
MCU	Material Change of Use
MD	Marcoola Drain
µg/L	micrograms per litre
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
MW	Monitoring Well
NATA	National Association of Testing Authorities
NC Act	Nature Conservation Act 1992
NEMP (v2.0)	National Environmental Management Plan
NEPM	National Environmental Protection Measure
NPD	Northern Perimeter Drain
PDA	Priority Development Area
PFAS	Per- and polyfluoroalkyl substances
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctane sulfonate
PFHxS	Perfluorohexane sulfonate
PPE	Personal Protective Equipment
PSI	Preliminary Site Investigation
QA	Quality Assurance
QC	Quality Control
RPD	Relative Percent Difference
RWY	Runway
SO	Safety Officer
SAQP	Sampling and Analysis Quality Plan
SCA	Sunshine Coast Airport
SCAEP	Sunshine Coast Airport Expansion Project
SCAPL	Sunshine Coast Airport Pty Ltd
SCC	Sunshine Coast Council
SMART	Specific, Measurable, Achievable, Realistic, Targeted
SMP	Site Management Plan

REPORT

SOP	Standard Operating Procedure
SPD	Southern Perimeter Drain
SQP	Suitably Qualified Person
SWL	Standing Water Level
SWMS	Safety Work Method Statement
TCLP	Toxicity Characteristic Leaching Procedure
TDS	Total Dissolved Solid
TEC	Threatened Ecological Community
TOP assay	Total Oxidisable Precursor assay
TPH	Total Petroleum Hydrocarbons
TRH	Total Recoverable Hydrocarbons
VMA	Vegetation Management Area
WHMA	Wallum Heath Management Area
WTC	Waste Transport Certificate
WHS	Workplace, Health and Safety
WPD	Western Perimeter Drain
WQO	Water Quality Objective

Appendix A - Env. Authority BRUD0035 Extract

Permit

Environmental Protection Act 1994

Environmental authority BRID0035

This environmental authority is issued by the administering authority under Chapter 5 of the Environmental Protection Act 1994.

Environmental authority number: BRID0035

Environmental authority takes effect on 03 May 2019

Environmental authority holder(s)

Name(s)	Registered address
Sunshine Coast Regional Council	Corner Currie and Bury Streets NAMBOUR QLD 4560

Environmentally relevant activity and location details

Environmentally relevant activity/activities	Location(s)
Prescribed ERA, ERA 16 - Extraction and Screening, 1: Dredging, in a year, the following quantity of material, (d) more than 1,000,000t	Adjacent to Lot 36/NPW662

Additional information for applicants

Environmentally relevant activities

The description of any environmentally relevant activity (ERA) for which an environmental authority (EA) is issued is a restatement of the ERA as defined by legislation at the time the EA is issued. Where there is any inconsistency between that description of an ERA and the conditions stated by an EA as to the scale, intensity or manner of carrying out an ERA, the conditions prevail to the extent of the inconsistency.

An EA authorises the carrying out of an ERA and does not authorise any environmental harm unless a condition stated by the EA specifically authorises environmental harm.

A person carrying out an ERA must also be a registered suitable operator under the Environmental Protection Act 1994 (EP Act).

Contaminated land

It is a requirement of the EP Act that an owner or occupier of contaminated land give written notice to the administering authority if they become aware of the following:

- the happening of an event involving a hazardous contaminant on the contaminated land (notice must be given within 24 hours); or
- a change in the condition of the contaminated land (notice must be given within 24 hours); or
- a notifiable activity (as defined in Schedule 3) having been carried out, or is being carried out, on the contaminated land (notice must be given within 20 business days);

B6	If, after the agreed delivery arrangement is made, the authority holder proposes to change the way a prescribed environmental matter listed in Table 7.10—Significant Residual Impacts to Prescribed Environmental Matters is to be impacted, the authority holder must notify the administering authority of the changes and request an amended agreed delivery arrangement .
B7	Prior to the commencement of the activity, submit a georeferenced plan showing the final location and extent of any proponent-driven offset areas for prescribed environmental matters listed in Table 7.10—Significant Residual Impacts to Prescribed Environmental Matters to palm@des.qld.gov.au or mail to: Department of Environment and Science Permit and License Management Implementation and Support Unit GPO Box 2454 Brisbane Qld 4001
B8	Submit final “as constructed plans” showing the georeferenced location and extent of the proponent-driven offsets to palm@des.qld.gov.au or mail to: Department of Environment and Science Permit and License Management Implementation and Support Unit GPO Box 2454 Brisbane Qld 4001 Within two (2) weeks of the completion of the on-ground works for the proponent driven offsets.
Agency Interest: Perfluoroalkyl and Polyfluoroalkyl Substances	
Condition number	Condition
P1	A PFAS investigative report must be completed by an appropriately qualified person and submitted to the administering authority at least 40 business days prior to the commencement of approved works .
P2	The PFAS investigative report must: a) Include details of a site investigation to determine the source, cause and extent of PFAS contamination at the airport. The site investigation must: i. Be conducted in accordance with the National Environmental Protection (Assessment of Site Contamination) Measure 1999 (NEPM) and must consider best practice for PFAS investigation and management. ii. Include an analysis of potentially affected media including soil, sediment, surface water and groundwater sufficient to characterise and delineate the extent of any existing PFAS contamination on airport land or any groundwater or surface

	waters that could be affected by PFAS contamination from the airport. a. <i>Note: In accordance with the EHP Environmental Management of Firefighting Foam Policy, analysis of media should include the suite of 20 to 28 standard fluorinated organic compounds by liquid chromatography-mass spectrometry (LC/MS/MS) and total oxidisable precursor (TOP) assay, reported as the analyses for the resulting perfluorinated carboxylates for C4 to C14 carbon chain length (TOP C4-C14).</i> iii. Identify any potentially impacted environmental values and potential pathways to human or environmental receptors from existing PFAS contamination, not limited to the site. iv. Provide an assessment of the risk of environmental harm to human or environmental receptors. b) Provide an assessment of any potential impact the approved works will have on environmental values as a result of PFAS including, but not limited to: i. Information on how activities associated with the approved works may affect existing PFAS contamination; ii. A description of the environmental values likely to be affected; iii. A description of the risk and likely degree of impact on the environmental values; iv. A recommendation of whether the approved works should proceed; v. If the recommendation is to proceed, details of the management practices to be implemented to prevent or minimise adverse impacts from the on-site disturbance of PFAS contaminated soil or water on environmental values, including but not limited to monitoring of: 1. Groundwater as outlined in Condition P3; and 2. Surface water as outlined in Condition P4.
P3	If recommended as part of Condition P2, a PFAS groundwater monitoring system that complies with the following requirements must be implemented: a) Be designed and installed by an appropriately qualified person(s) with experience and qualifications in hydrology and groundwater monitoring. b) Include a sufficient number of bores installed at locations and depths which yield representative groundwater samples from at least the uppermost aquifer so as to detect any changes in the extent of PFAS in groundwater from the site and in adjacent areas as a result of the approved works. Include monitoring of background groundwater quality, with both hydraulically up-gradient bore(s) or background bore(s) that have not been affected by any release of contaminants to groundwater from the activity and hydraulically down gradient bore(s) of the activity.
P4	If recommended as part of Condition P2, a PFAS surface water monitoring program that complies with the following requirements must be implemented: a) be designed and implemented by an appropriately qualified person(s);

	b) monitor the effects of the activity on the quality of surface water in relation to PFAS ; c) include a sufficient number of locations so as to detect any changes in the extent of PFAS in surface water from the site.
P5	All determinations of the quality of the groundwater or surface water must employ analytical practical quantification limits sufficiently low enough to enable comparisons to be made against water quality objectives/limits/criteria relevant to the particular water quality characteristic.
P6	Prior to excavation of sediments and soils for the approved works , carry out sediment and soil testing for PFAS . Associated requirements: a) Sampling should be conducted in reference to NEMP, NEPM and other applicable standards and guidelines. b) Analysis should be to an appropriate Limit of Reporting that allows comparison to applicable criteria. c) Analysis should incorporate Total Oxidizable Precursor Assay (TOPA). Note: It is acceptable to analyse a subset of samples for TOPA
P7	Based on the sampling results, develop and implement management measures for disposal or reuse of soil and groundwater that minimises migration of PFAS impacted materials and ensures no additional PFAS contamination beyond the airport site. Note: Management measures should include: (a) Tracking and reporting of all soil movement. (b) Notification to the administering authority where contamination is found on an allotment that is not currently listed on the administering authority's Environmental Management Register. This also relates to allotments that become contaminated through the activity. (c) Ensuring that movement of contaminated soil from an allotment that is listed on the Environmental Management Register to another place is carried out under an appropriate soil disposal permit.

Definitions

Key terms and/or phrases used in this document are defined in this section. Where a term is not defined, the definition in the *Environmental Protection Act 1994*, its regulations or environmental protection policies must be used. If a word remains undefined it has its ordinary meaning.

24 hour storm event with an average recurrence interval (ARI) of 1 in 5 years means the maximum rainfall depth from a 24 hour duration precipitation event with an average recurrence interval of once in 5 years. For example, an Intensity-Frequency-Duration table for a 24 hour duration event with an average recurrence interval of 1 in 5 years, identifies a rainfall intensity of 7.09mm/hour. The rainfall depth for this event is therefore 24 hour x 7.09mm/hour = 170.16mm.

Activity means the environmentally relevant activities, whether resource activities or prescribed activities, to which the environmental authority relates.

Administering authority means the Department of Environment and Heritage Protection or its successor or predecessors.

Agreed delivery arrangement has the same meaning as section 19(4) of the *Environmental Offsets Act 2014*

Appendix B - SCA Environmental Policy

Environmental Policy ES001

Endorsed by	Board	24 February 2022
Accountable Officer	Chief Executive Officer	
Responsible Officer	General Manager Operations	

Purpose

This policy establishes the approach to environmental management at Sunshine Coast Airport ("SCA") and outlines the guiding principles and the framework by which Sunshine Coast Airport Pty Ltd ("SCA Pty Ltd") fulfils its social and corporate governance responsibilities relating to environmental management and compliance.

Scope

This policy applies to SCA's Board, Management and all staff and contractors.

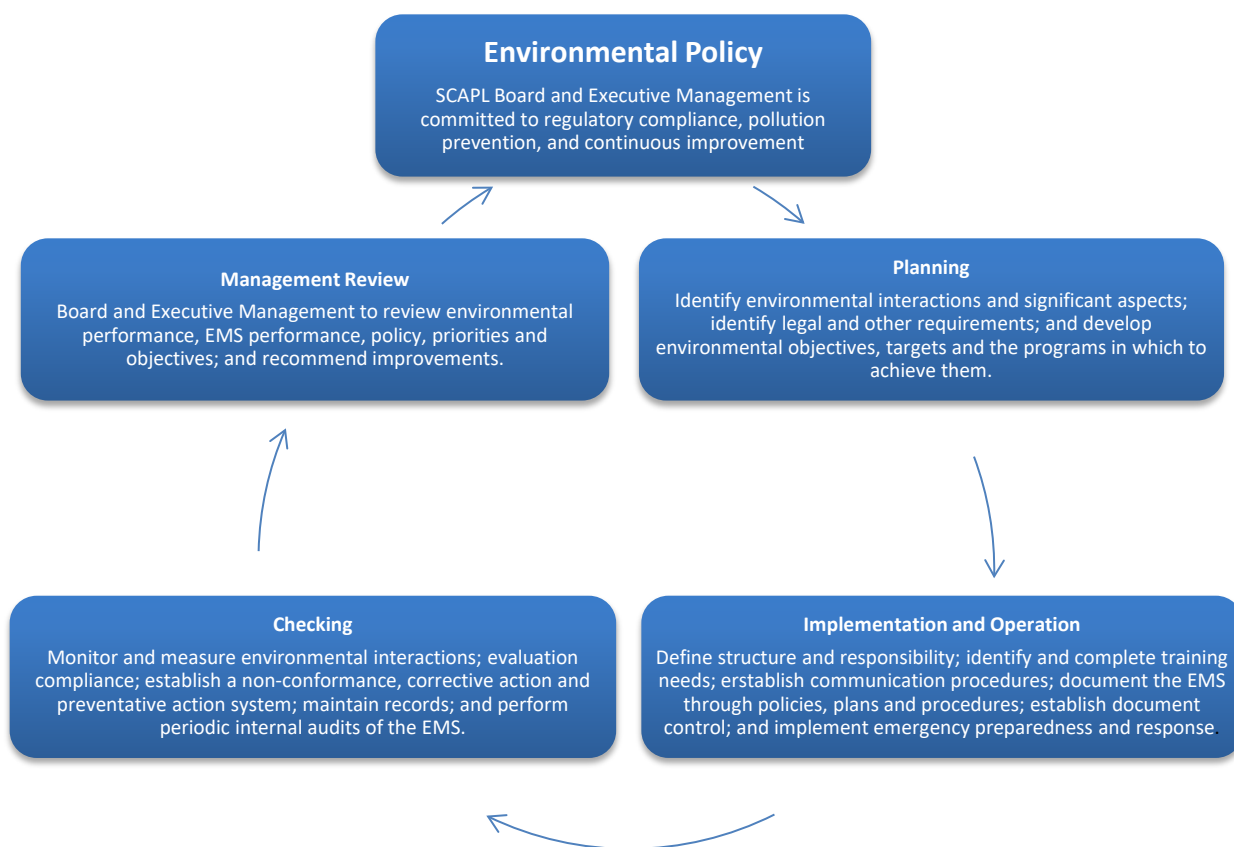
Guiding Principles

As the operator of the SCA, a large regional airport servicing the rapidly growing Sunshine Coast Region, the Board of Directors and Management have a responsibility to establish a culture where all aspects of contemporary environmental management are a part of everyday decision making at all corporate and business unit/project levels throughout the organisation.

A key part of our success and responsibility to Investors, the community and regulators is how we manage and commit to protecting the environment. We achieve this by implementing a business-wide Environmental Management System ("EMS") in accordance with the principles of ISO 14001.

We have a responsibility to continuously review our performance in order to manage and minimise adverse impacts resulting from Airport activities, products and services including:

- Complying with applicable legal requirements and other requirements to which the Airport subscribes;
- Taking a pro-active approach and continually improving how we manage and mitigate the environmental impacts of the airport operation such as reducing carbon emissions;
- Understand life cycle impacts of our activities in order to reduce waste, minimise the consumption of resources and prevent pollution at the Airport;
- Establishing environmental objectives and targets and monitor and report to the Board of Directors our performance;
- Strengthening our understanding through consideration of wider environmental topics such as sustainable resource use, climate change mitigation and adaptation, in all business strategies and initiatives;
- Seeking to influence our business partners to have similar standards relating to sustainability and environmental management performance; and
- Protecting and enhancing biodiversity on the Airport's landholdings whilst making use of designated conservation areas.



The objective of the EMS is to provide a formal process to assist SCA Pty Ltd in:

- Establishing a culture of environmental sustainability, including defining and documenting responsibilities and processes required to integrate environmental sustainability into all facets of the business; and
- Linking environmental management to other regulatory compliance reporting.

Review

The Board and the Chief Executive Officer is responsible for approving this Environment Policy. This policy will be reviewed every two (2) years and revised by management as required.

The General Manager Operations is responsible for coordinating the review of this policy and presenting any changes to the Board and CEO.

Version control:

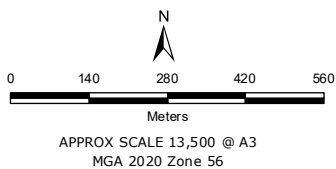
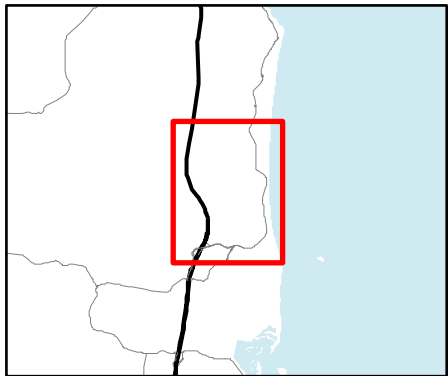
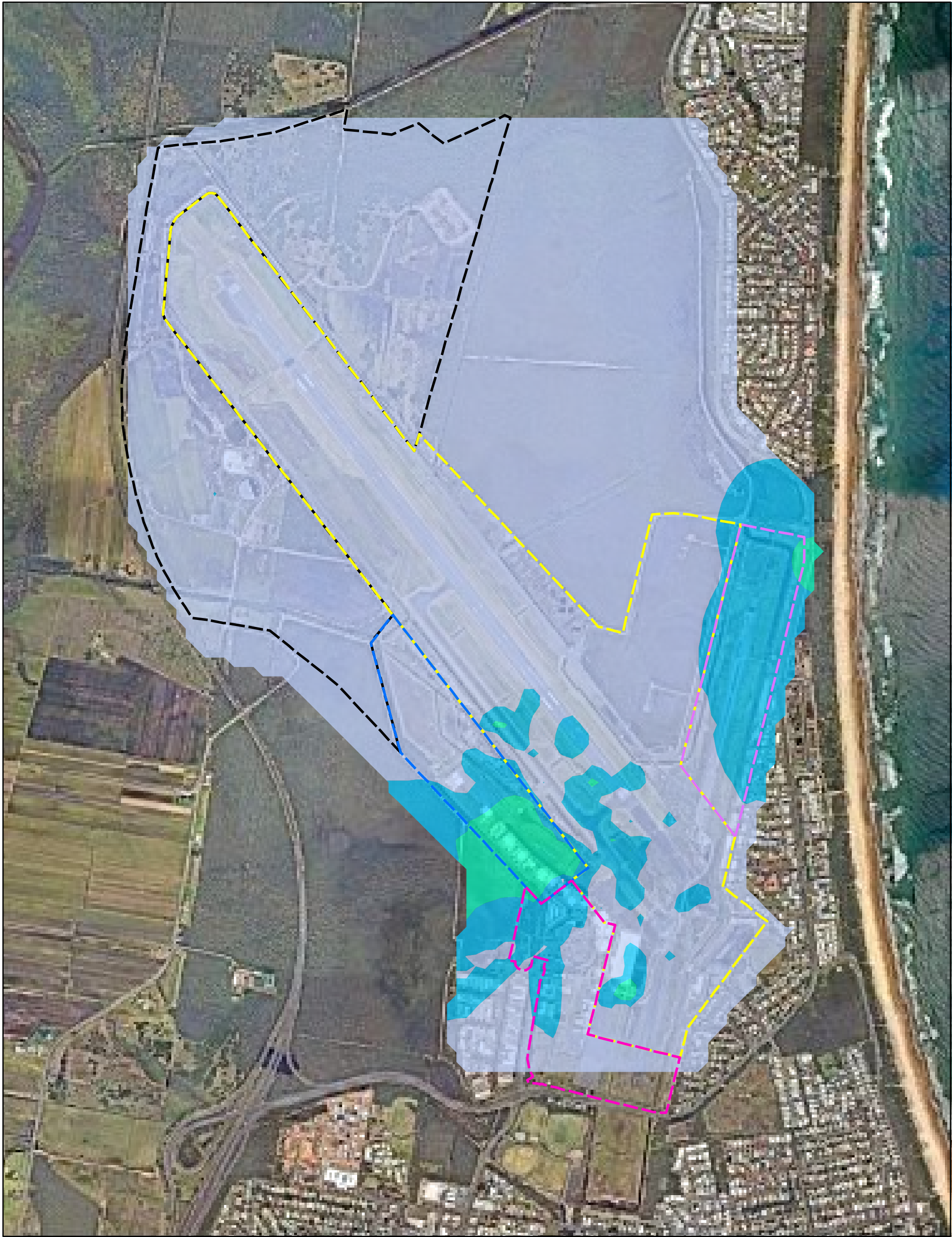
Version	Reason/ Trigger	Change (Y/N)	Endorsed/ Reviewed by	Date
1.0	Policy Inception	N	Board	23/05/2019
2.0	2-yearly Review	N	Board	24/02/2022

Sunshine Coast Airport Pty Ltd as trustee for Sunshine Coast Airport Manager Trust.

Appendix C - Soil PFAS Heat Maps

Appendix D - Soil PFAS Heat Maps

Appendix E - Soil PFAS Heat Maps

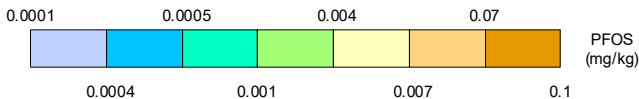


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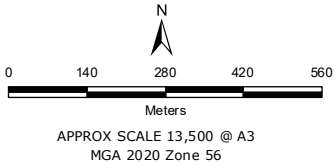
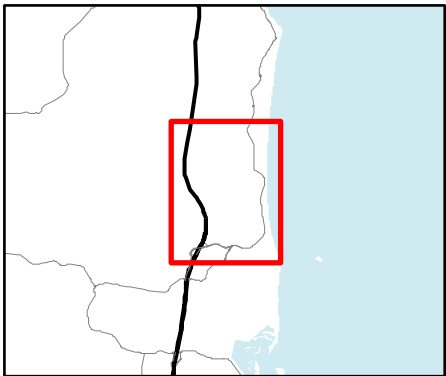
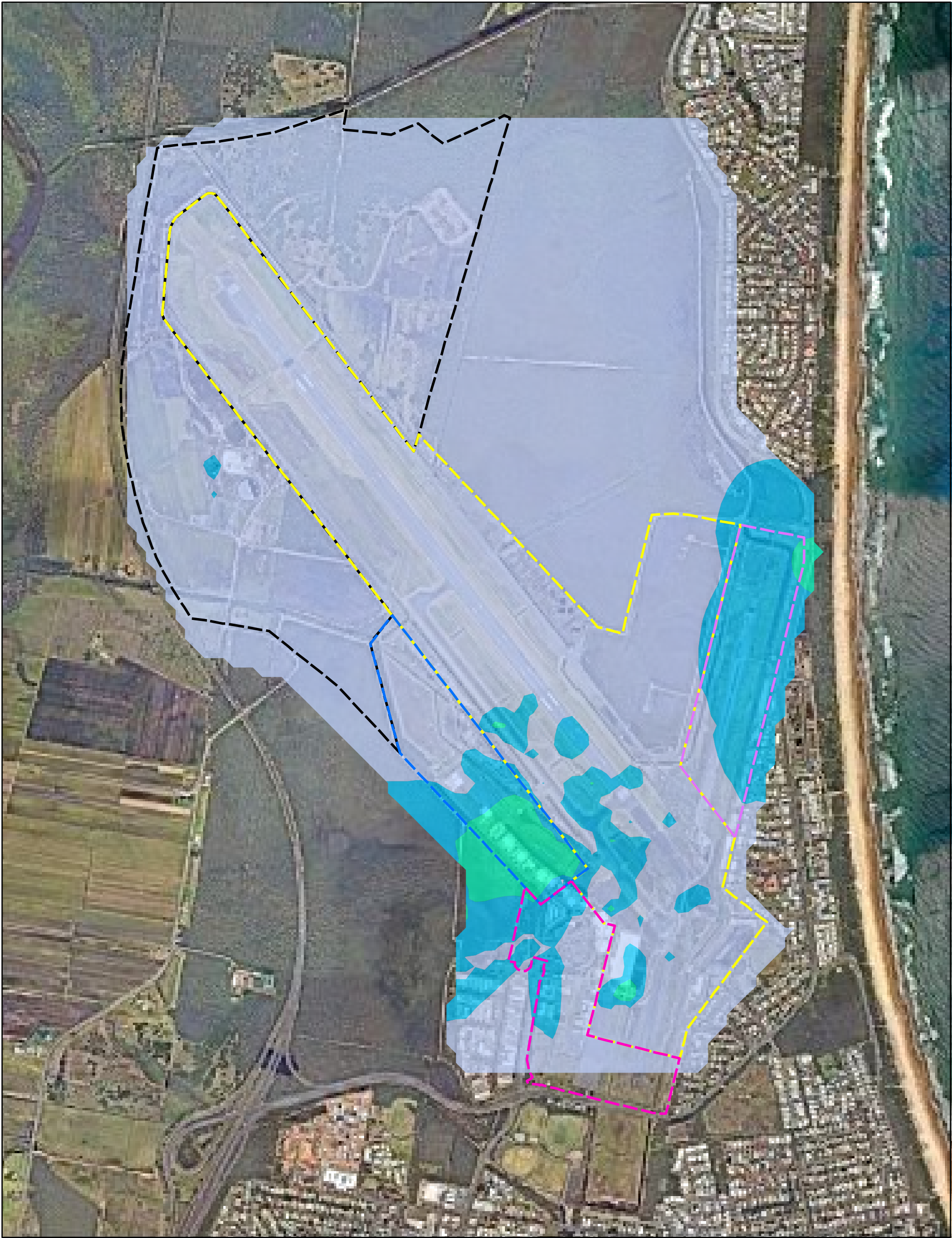
DATA SOURCES
PFAS Data: Tetrakis Environmental Services and Core Consultants Pty Ltd, PFAS Contamination Baseline Assessment Sunshine Coast Airport, 2021
Imagery provided by Nearmap

LEGEND

- Aviation Precinct
- Gateway Precinct
- Aerospace Precinct
- Airport North Precinct
- Airport West Precinct



Soil PFOS
concentrations - Current

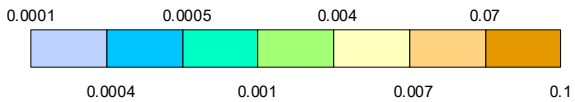


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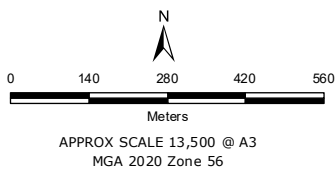
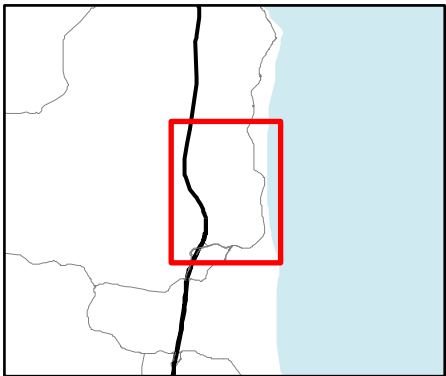
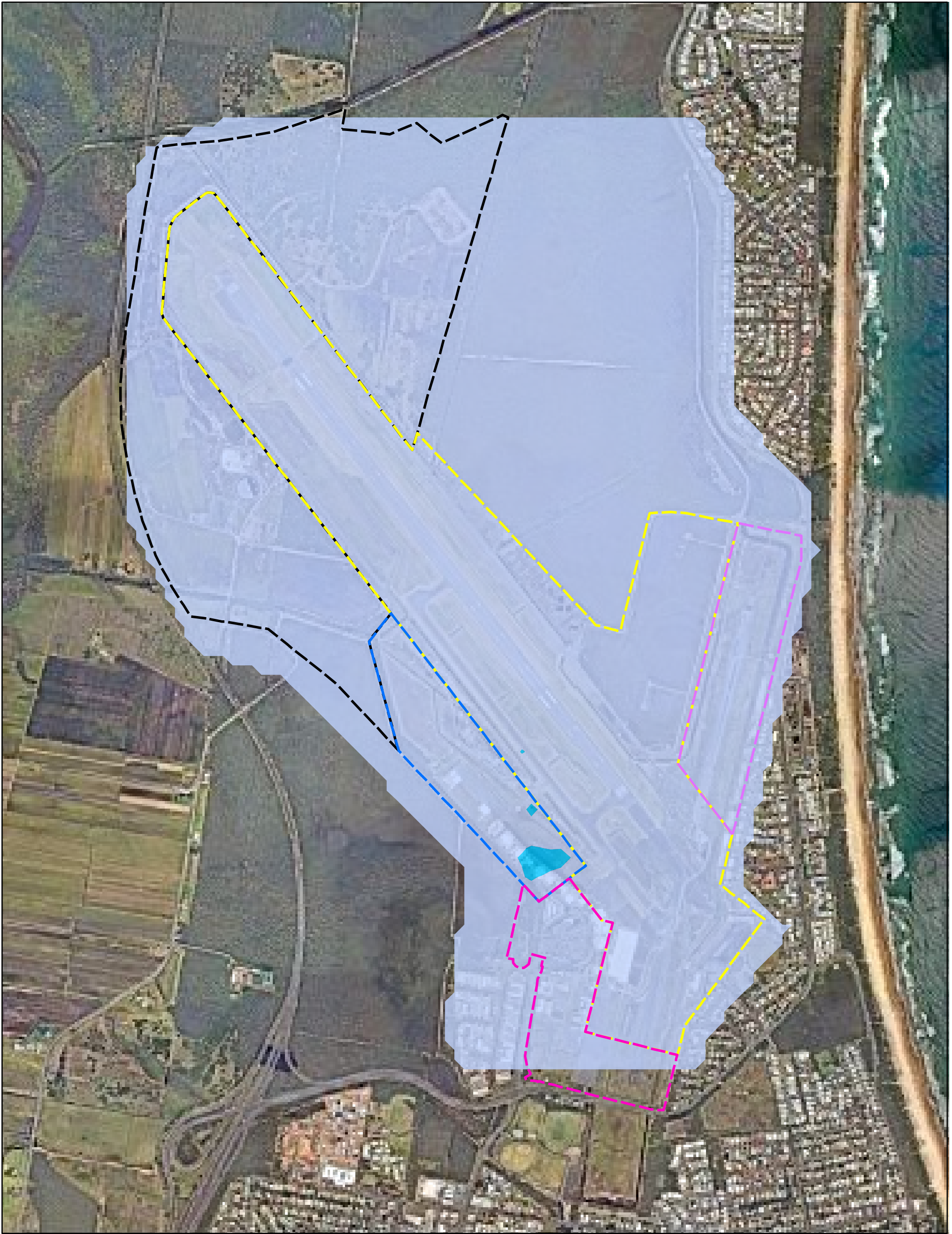
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- Airport West Precinct



PFOS + PFHxS
(mg/kg)



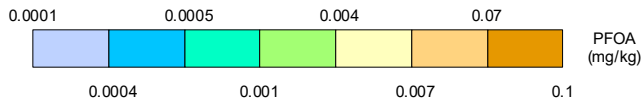
Soil PFOS+PFHxS
concentrations - Current



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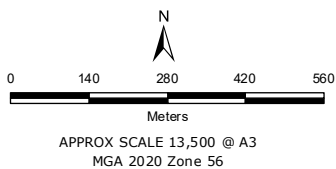
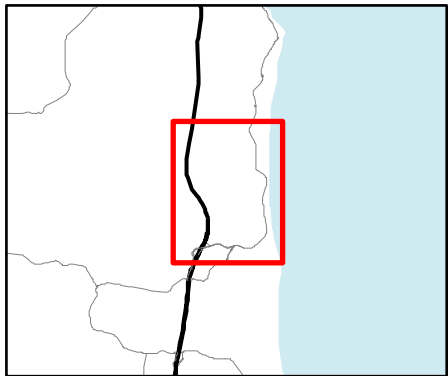
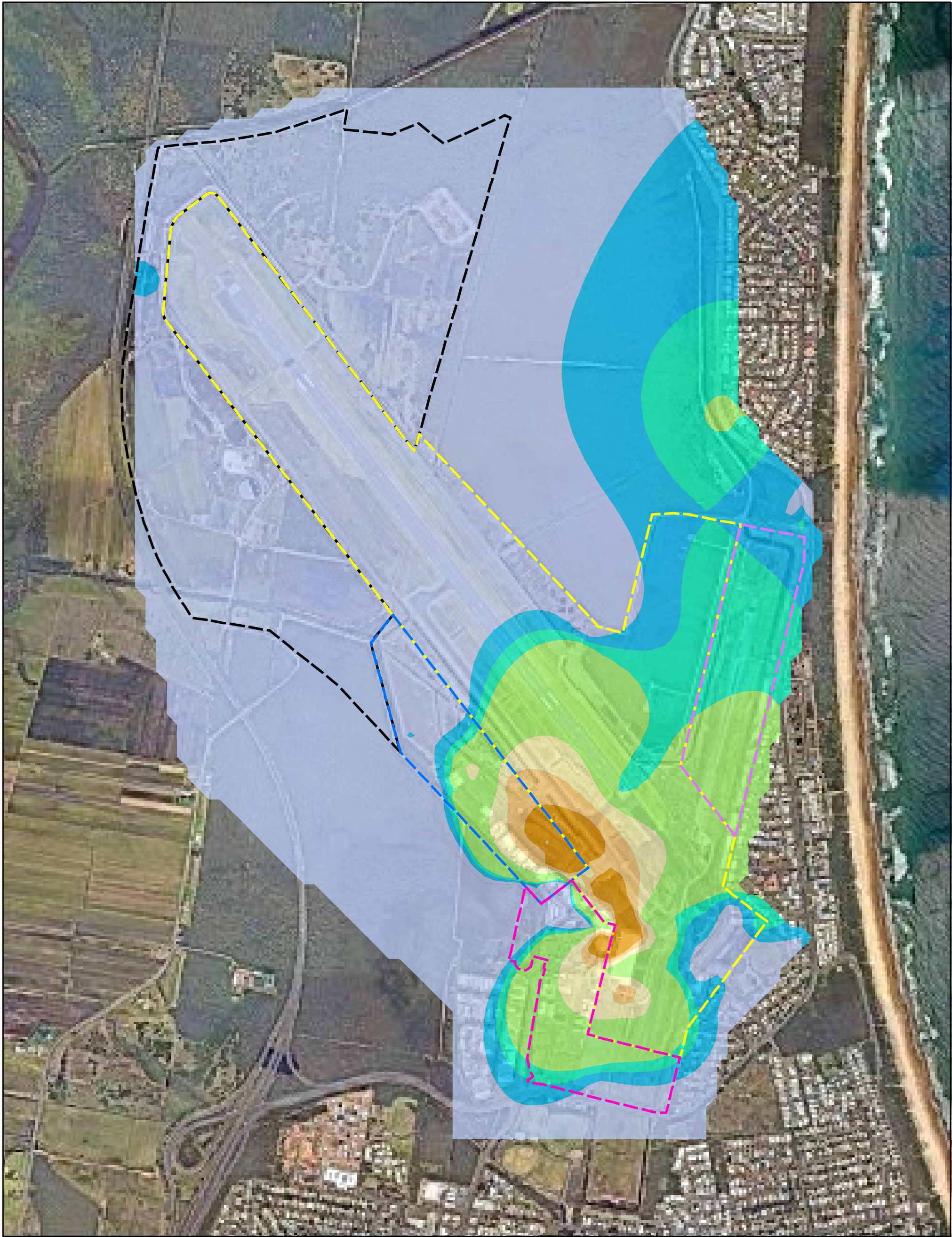


Soil PFOA
concentrations – current

Appendix F - Groundwater PFAS Heat Maps

Appendix G - Groundwater PFAS Heat Maps

Appendix H - Groundwater PFAS Heat Maps

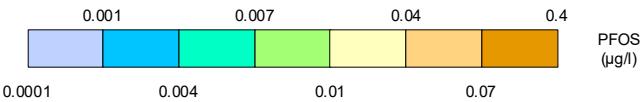


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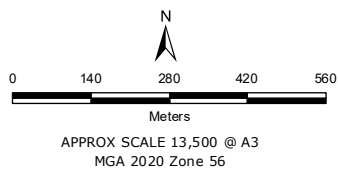
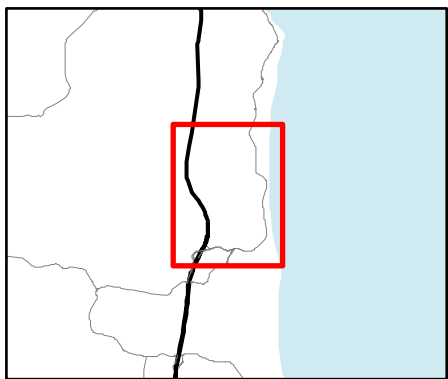
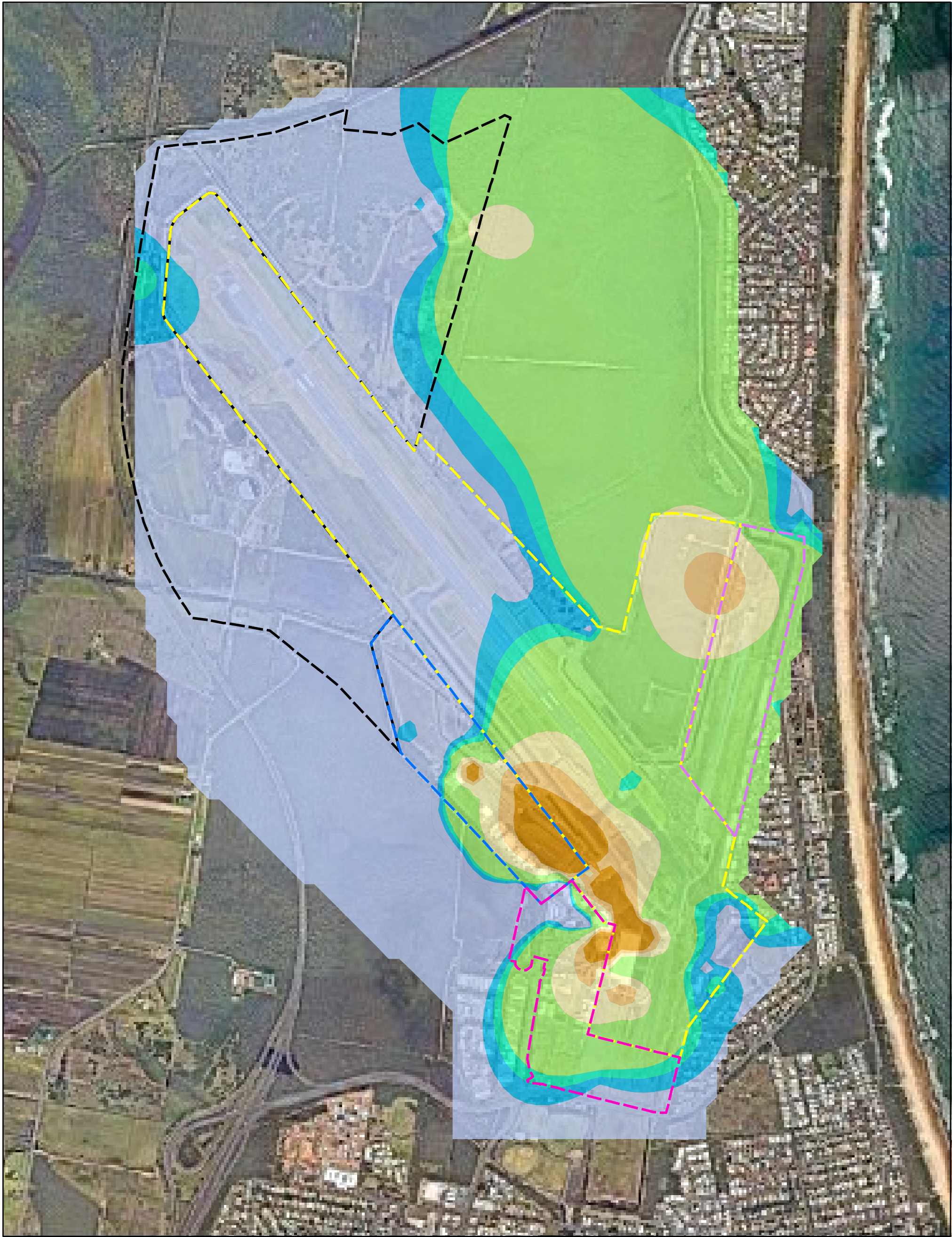
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PFAS Data: Tetrakis Environmental Services and Core Consultants Pty Ltd, PFAS Contamination Baseline Assessment Sunshine Coast Airport, 2021
Imagery provided by Nearmap

LEGEND

- Aviation Precinct
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- Airport North Precinct
- Airport West Precinct



Groundwater PFOS
concentrations – Dec 2020

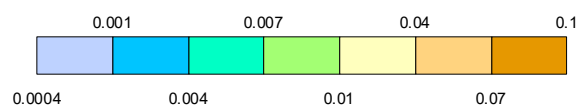


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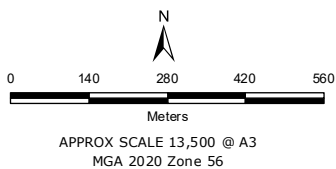
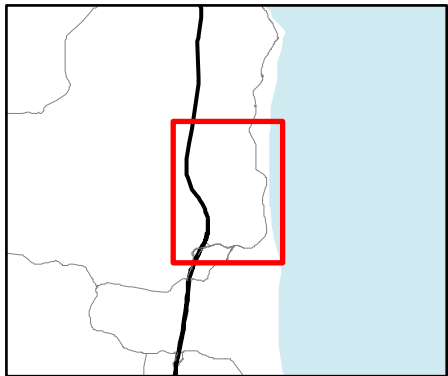
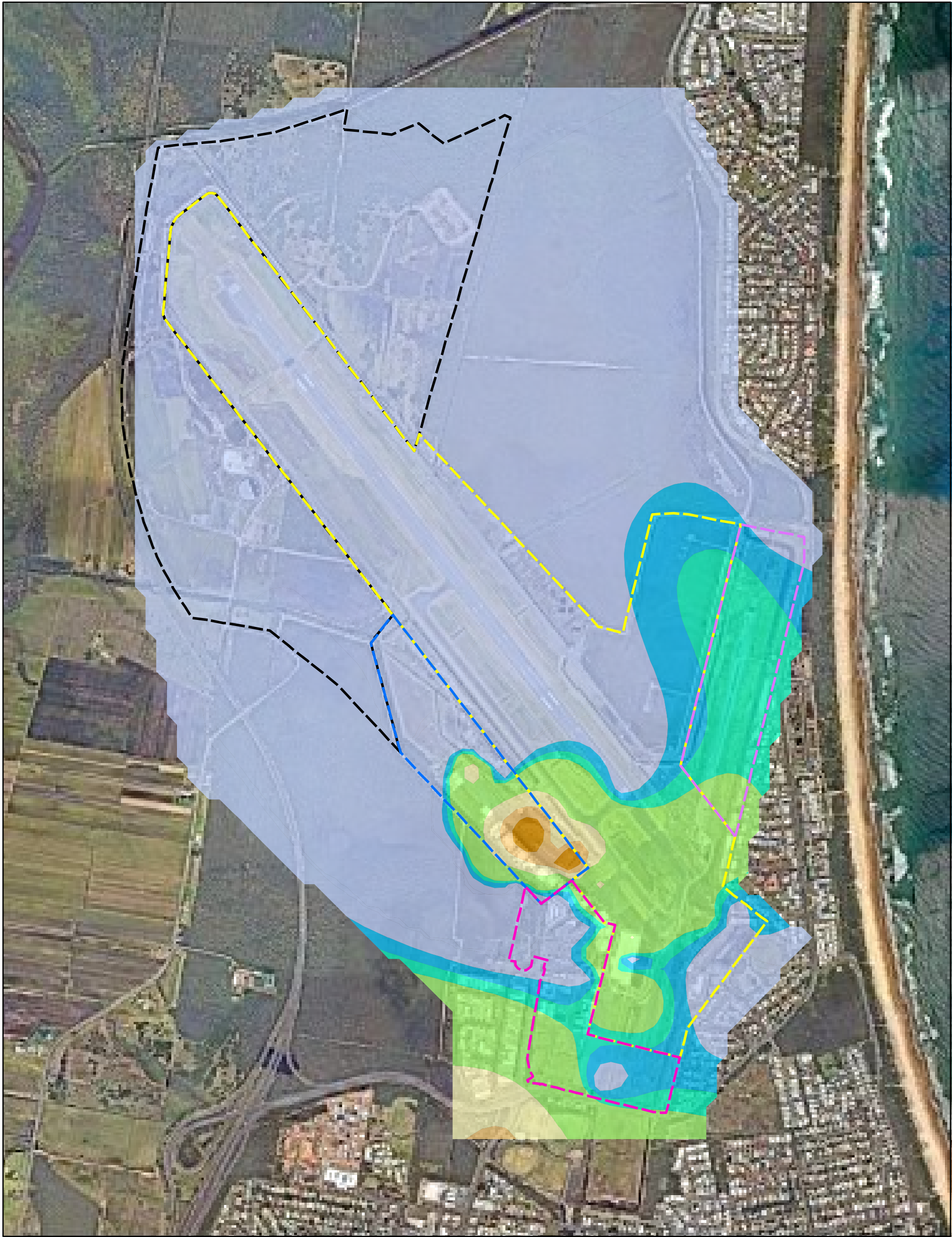
DATA SOURCES
PFAS Data: Tetrakis Environmental Services and Core Consultants Pty Ltd, PFAS Contamination Baseline Assessment Sunshine Coast Airport, 2021
Imagery provided by Nearmap

LEGEND

- Aviation Precinct
- Gateway Precinct
- Aerospace Precinct
- Airport North Precinct
- Airport West Precinct



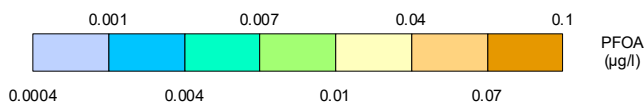
rps
Groundwater PFOS+PFHxS
concentrations – Dec 2020



Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use. Development Footprint area for indicative purposes only.

DATA SOURCES
PFAS Data: Tetrakis Environmental Services and Core Consultants Pty Ltd, PFAS Contamination Baseline Assessment Sunshine Coast Airport, 2021
Imagery provided by Nearmap

- Aviation Precinct
- Gateway Precinct
- Aerospace Precinct
- Airport North Precinct
- Airport West Precinct



Groundwater PFOA
concentrations – Dec 2020

Appendix I – Map of PFAS Monitoring Program Locations



Plot Date: 2 November 2021 Time: 11:01:15 AM By: Justine Zoljan Path: J:\2019 - J822 - \J000996 - SCA-SC Airport-David Low Way\PHASE 7000 - September WQ Monitoring\Figures Drawings - File Name: J000996-007-R-Rev0-Fig001-SW & GW Locations.dwg

- LEGEND**
-  **GW**
Approximate Groundwater Monitoring Locations
 -  **SW**
Approximate Surface Water Monitoring Locations



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CLIENT SUNSHINE COAST COUNCIL	
DRAWN BY JZ	DATE 2/11/2021
CHECKED BY JM	DATE 3/11/2021
SCALE 1:20,000	SHEET SIZE A3

PROJECT SUNSHINE COAST AIRPORT EXPANSION PROJECT (SCAEP)	
DRAWING TITLE SURFACE WATER AND GROUNDWATER MONITORING LOCATIONS	

PROJECT No J000996	DOC No 007	DOC TYPE R	FIGURE No 001	REVISION 0	Sheet 1 of 1
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Appendix J - Sept 2023 PFAS Monitoring Results

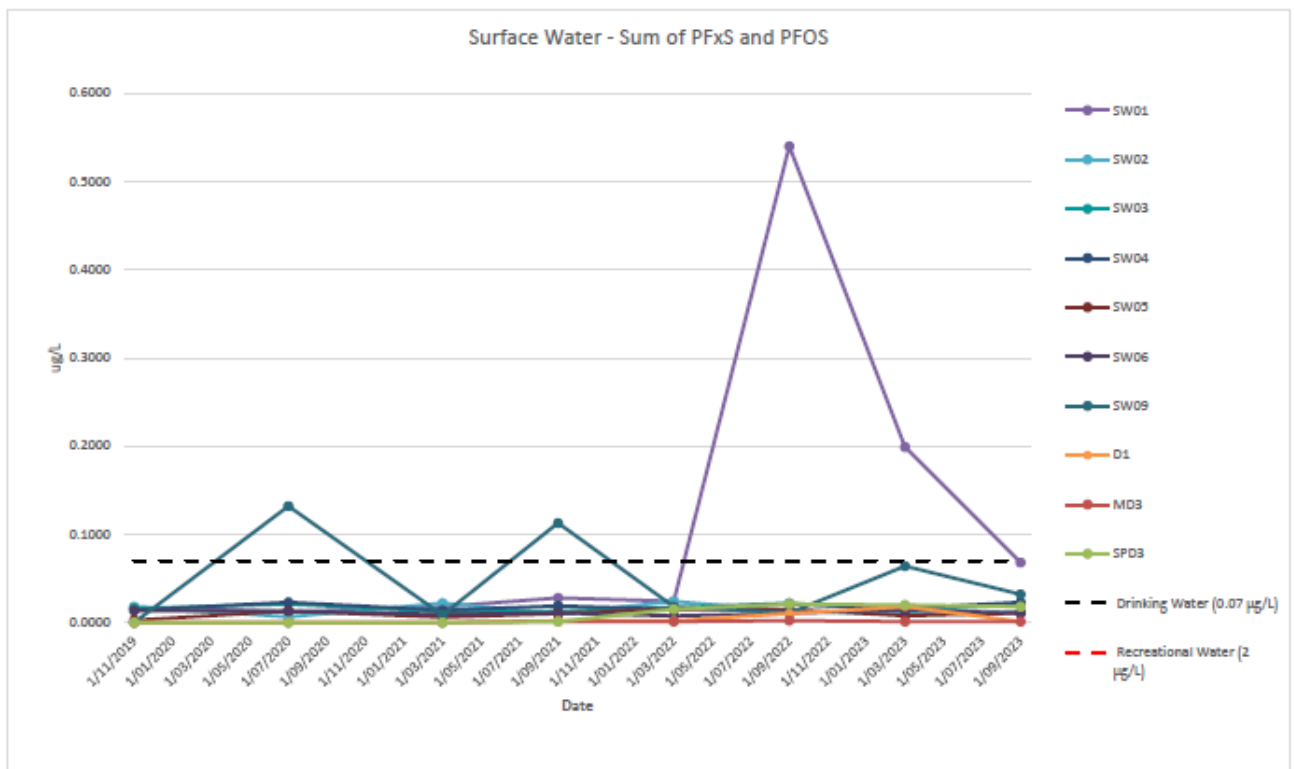
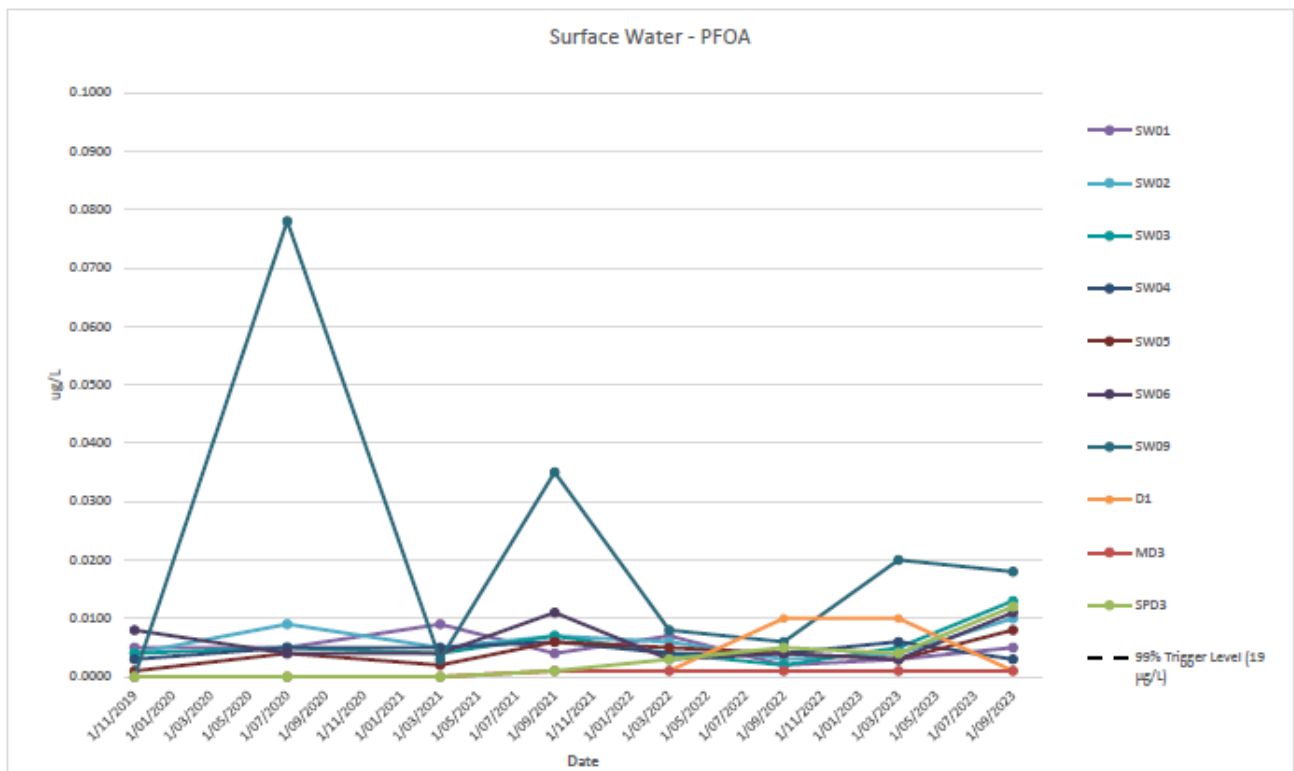
Location	Precinct / Location	PFOS (ug/L)	PFOA (ug/L)	PFOS+PFHxS (ug/L)
Surface Water Results				
SW01	Airport North; upgradient location within EPD (Eastern Perimeter Drain) running north to south	0.066	0.005	0.068
SW02	Aviation; Drain at nthn extent of fire station	0.012	0.01	0.012
SW03	Aviation; Drain 130m S of fire station	0.018	0.013	0.02
SW04	Gateway; Drain at discharge point offsite	0.015	0.003	0.023
SW05	Offsite; Drainage channel	0.0088	0.008	0.0108
SW06	Offsite; Within SPD that discharges into Maroochy River	0.0088	0.011	0.0108
SW09	Aviation; Within SPD	0.029	0.018	0.032
D1	Aviation; Within drain discharges to NPD (Northern Perimeter Drain) bordering CNP.	<0.001	<0.001	<0.001
MD3	Offsite; Downgradient of SCA	<0.001	<0.001	<0.001
SPD3	Offsite; Downgradient of SCA, discharge Maroochy River	0.013	0.012	0.018
Groundwater Results				
GW01	Aviation; adjacent to fire station	0.027	0.006	0.028
GW02	Airport North;	<0.001	0.005	0.001
GW03	Airport North; within area of historic plane crash [2005]	<0.001	<0.001	<0.001
GW04	Gateway; downgradient of fuel farm	0.0032	<0.001	0.0032
GW05	Aerospace; adjacent to SPD and Coolool National Park [CNP] South	<0.001	0.001	<0.001
GW06	Aviation; opposite former fire station	0.028	0.04	0.034
GW7-B	Aviation; adjacent to Western Perimeter Drain (WPD)	<0.001	<0.001	<0.001
GW10-A	Airport West	<0.001	<0.001	<0.001

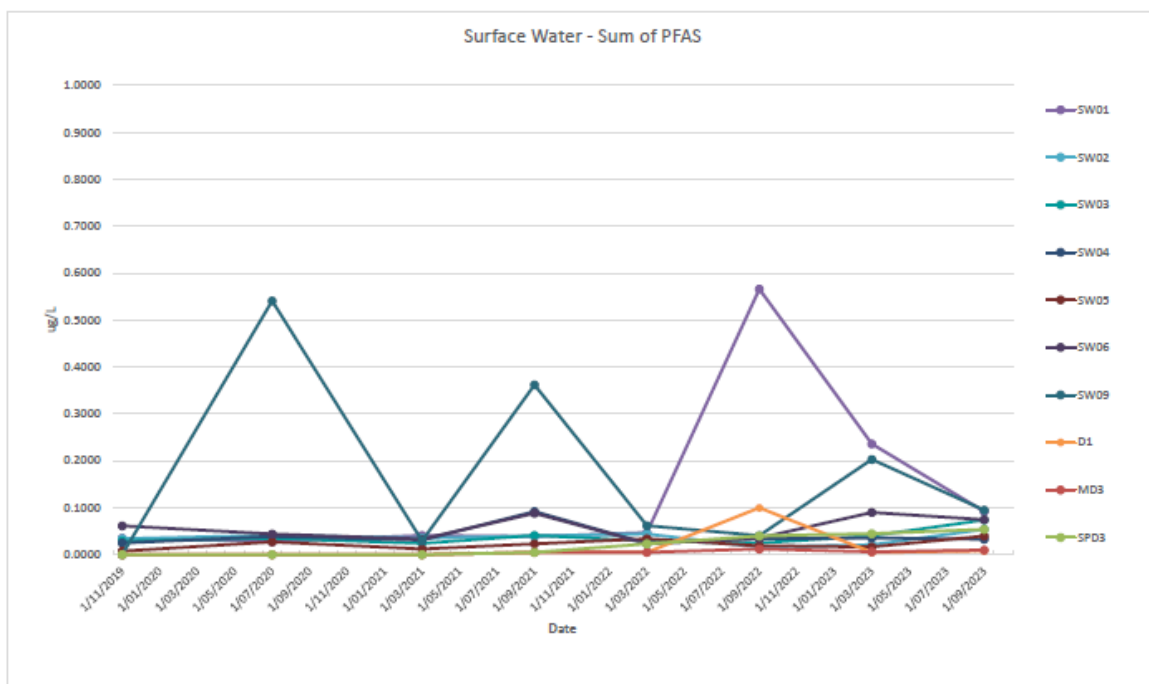
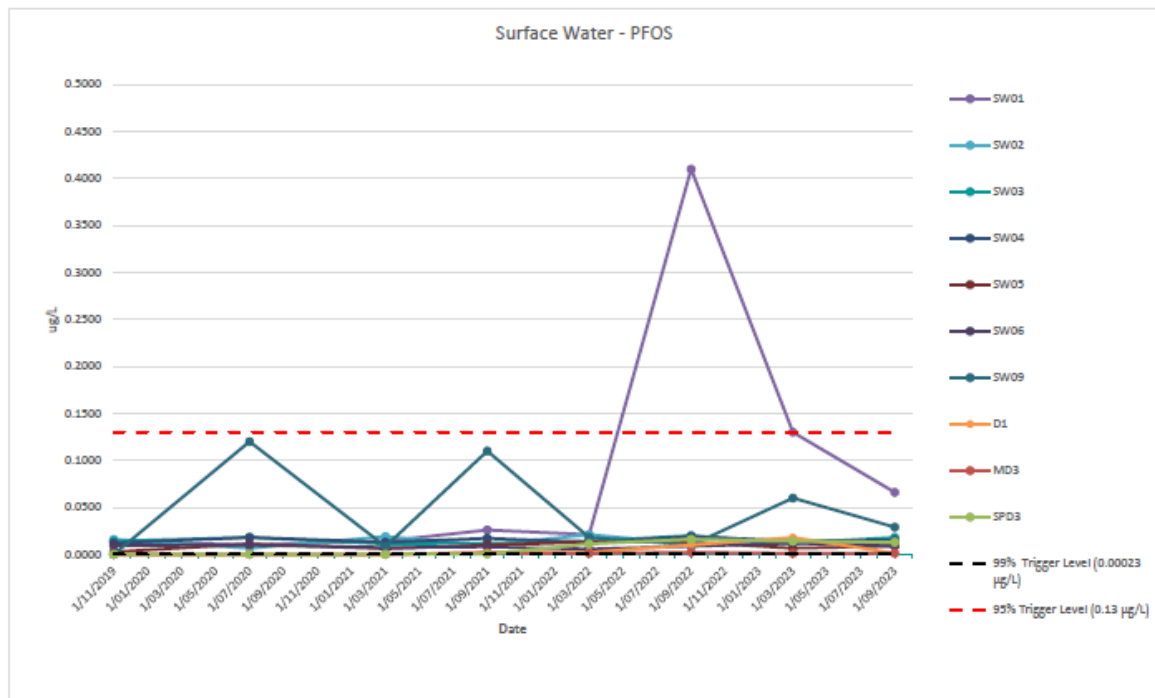
REPORT

Location	Precinct / Location	PFOS (ug/L)	PFOA (ug/L)	PFOS+PFHxS (ug/L)
GW-11B	Airport West; deep GW impacts; bordering NPD	<0.001	<0.001	<0.001
GW25	Airport North; Upgradient of SCA, b/n CNP & residential area	0.0042	<0.001	0.0042
GW26	Offsite; Residential area 140m east SCA	0.0024	<0.001	0.0024
GW27	Offsite; Residential area 240m east SCA	0.0042	0.003	0.0042
GW28	Offsite; Residential area 530m east SCA	<0.001	0.009	<0.009

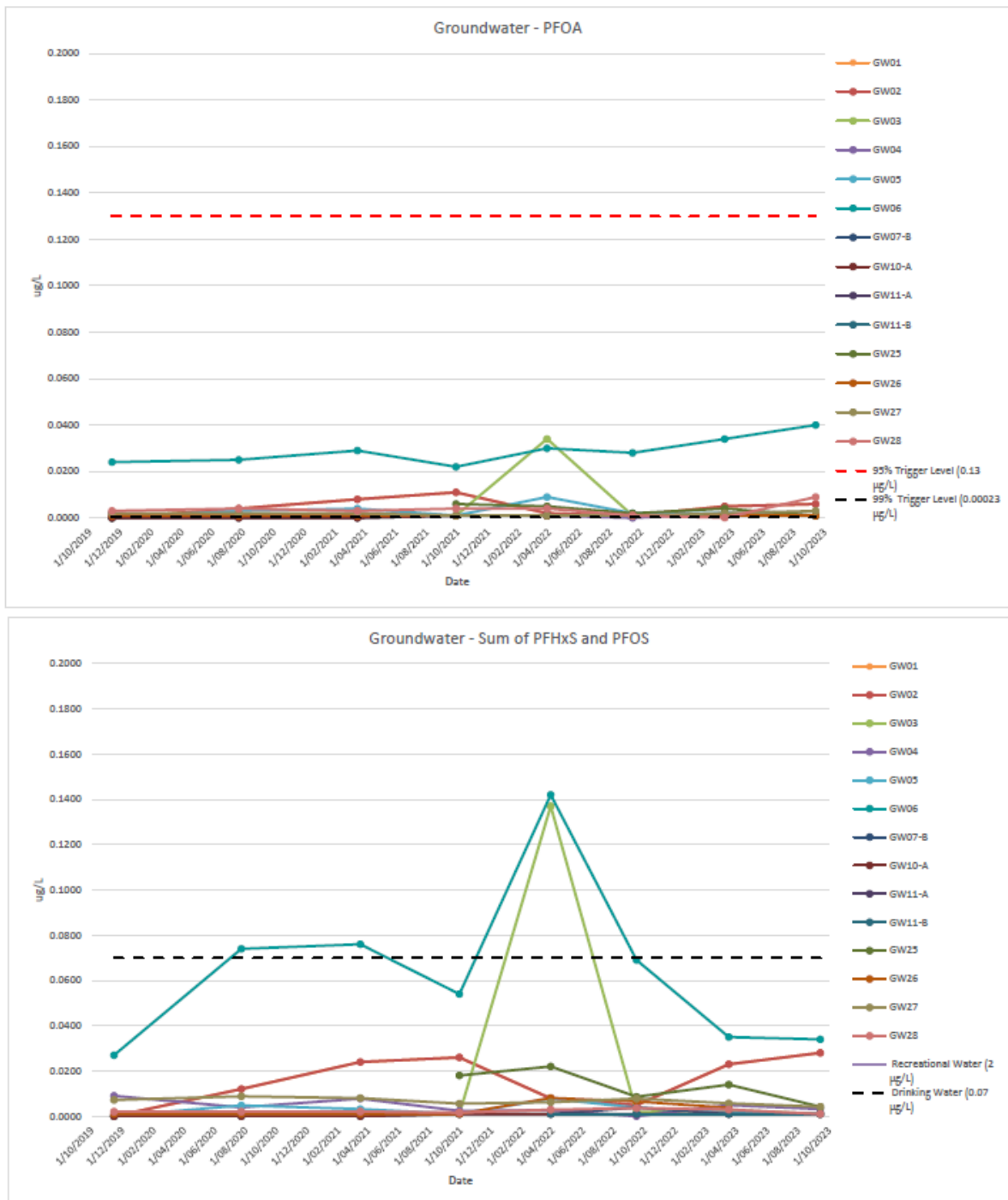
Appendix K – Surface Water & Groundwater Trend Graphs

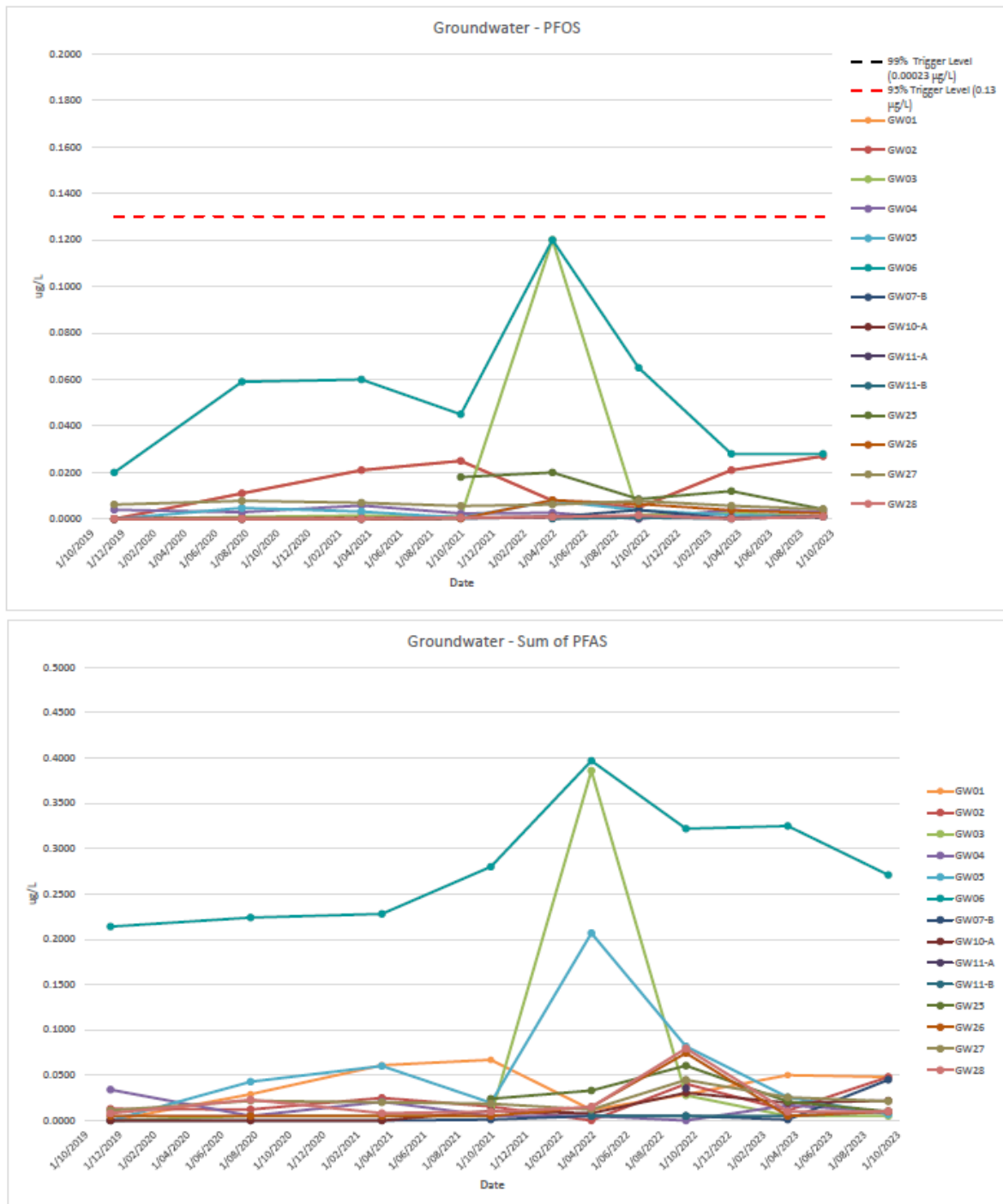
Surface Water Graphs





Groundwater Graphs





Appendix L – PFAS Standard Laboratory Suite

Group	Acronym	Chemical Compound	CAS No
Perfluoroalkane Sulfonic Acids	PFBS	Perfluorobutane sulfonic acid	375-73-5
	PFPeS	Perfluoropentane sulfonic acid	2706-91-4
	PFHxS	Perfluorohexane sulfonic acid	355-46-4
	PFHpS	Perfluoroheptane sulfonic acid	375-92-8
	PFOS	Perfluorooctane sulfonic acid	1763-23-1
	PFDS	Perfluorodecane sulfonic acid	335-77-3
Perfluoroalkane Carboxylic Acids	PFBA	Perfluorobutanoic acid	375-22-4
	PFPeA	Perfluoropentanoic acid	2706-90-3
	PFHxA	Perfluorohexanoic acid	307-24-4
	PFHpA	Perfluoroheptanoic acid	375-85-9
	PFOA	Perfluorooctanoic acid	335-67-1
	PFNA	Perfluorononanoic acid	375-95-1
	PFDA	Perfluorodecanoic acid	335-76-2
	PFUnDA	Perfluoroundecanoic acid	2058-94-8
	PFDoDA	Perfluorododecanoic acid	307-55-1
	PFTTrDA	Perfluorotridecanoic acid	72629-94-8
	PFTeDA	Perfluorotradecanoic acid	376-06-7
Perfluoroalkyl Sulfonamides	FOSA	Perfluorooctane sulfonamide	754-91-6
	MeFOSA	N-Methyl perfluorooctane sulfonamide	31506-32-8
	EtFOSA	N-Ethyl perfluorooctane sulfonamide	4151-50-2
	MeFOSE	N-methyl perfluorooctane sulfonamidoethanol	24448-09-7
	EtFOSE	N-Ethyl perfluorooctane sulfonamidoethanol	1691-99-2
	MeFOSAA	N-methyl perfluorooctane sulfonamidoacetic acid	2355-31-9
	EtFOSAA	N-ethyl perfluorooctane sulfonamidoacetic acid	2991-50-6
(n:2) Fluorotelomer Sulfonic Acids	4:2 FTS	4:2 Fluorotelomer sulfonic acid	757124-72-4
	6:2 FTS	6:2 Fluorotelomer sulfonic acid	27619-97-2
	8:2 FTS	8:2 Fluorotelomer sulfonic acid	39108-34-4
	10:2 FTS	10:2 Fluorotelomer sulfonic acid	120226-60-0

Appendix M – Forms and Checklists for PFAS Management

A1. Assessment for soil reuse suitability

Factors to be considered when assessing PFAS-contaminated soils for reuse:			Response:	
Soil Classification:				
1	Soils have been tested for PFAS and soil contamination level (PFOS) has been determined	Yes	No	
2	Volume of soil to be reused: <i>Note:</i> If volume is <10m ³ , soil can be reinstated at the work site without any testing	m ³		
3	Number of samples taken:			
4	Soil Sample Laboratory IDs:			
5	Average PFAS concentration at proposed reuse site (PFOS):			
6	Soil Management Level (1-3)	Please tick		
Level 1	Below 0.01mg/kg PFOS	No management required - unless risk to sensitive receptor Retain this checklist to document that soil meets Level 1 requirements		
Level 2	0.01 – 0.14mg/kg PFOS	Notify SCA Environment Officer an assessment of risk is required		
Level 3	>0.14mg/kg – 1mg/kg PFOS	Notify SCA Environment Officer an assessment of risk is required		
Soil volume is <10 m ³ and will be reinstated at the work site		No testing is required Retain this checklist for site records		
Site specific Environmental Factors:				
7	Category is compatible with current and future land use plans	Yes	No	
8	Soil will not be reused in areas of ecological or heritage significance	Yes	No	
9	Soil will not be reused in areas where PFAS background concentrations are lower than those in the material to be reused.	Yes	No	
10	Items to be considered when preparing an assessment of risk for soil reuse: – site characteristics – existing PFAS contamination – immediate and surrounding environmental context – soil reuse options – relevant environmental guidelines			
Note: An Assessment of Risk is required for the reuse of all Category 2 and 3 soils. This is to be completed by a Suitably Qualified Person. SCA Environment Officer is to approve all assessments of risk prior to soil reuse works commencing.				

A2. Checklist for Reuse of Stockpiled soil within Airport

SCA Assessment Checklist for Reuse of Stockpiled soil within Airport: NOTE: An assessment be carried out by a SQP prior to soil being reused on site.			
Stockpile identification:			
Stockpile Name / ID			
Location of Stockpile			
Origin of the material (GPS coordinates)			
Composition			
Volume (m ³)			
Proposed site for reuse within Airport:			
Location: Provide a description including current and future land use, landscape features, existing vegetation, and drainage elements. NB. A diagram depicting the reuse location must be provided with this checklist.			
The site is located away from waterways, drainage networks and groundwater recharge areas	Note: As this will always be NO at SCA, an SQP will be required to undertake a Risk Assessment to identify suitable locations for reuse.	HOLD POINT	
SCA Environment Approval of Assessment: NOTE: The Assessment must be attached to this checklist and be available onsite while stockpile reuse works are being undertaken. Any conditions of approval must be communicated to the Officer undertaking the works.			
Conditions of Approval:			
Signature:			
		Position:	
Date:			

REPORT

A3. Documented checklist for Disposal of C&D Waste where PFAS testing is not required.

SCA Documented Checklist for Disposal of C&D waste where testing is not required:

NOTE: This documentation must be provided to the SCA Environment Officer for their records prior to C&D waste being sent offsite for disposal.

Location where waste originated		
Main types of waste present		
Volume (m ³)		
Items to consider:	Please circle:	Additional Information:
Has the underlying soil where the waste originated been tested for PFAS?	YES	NO
List of relevant soil sample IDs		
Historic Land Use including details of any firefighting foam discharge events		
Details regarding potential past/present exposure to PFAS containing substances		
SCA Environment Approval:		
Conditions of Approval:		
Signature: Position: Date:		

Appendix G: ARUP Traffic Impact Assessment

Project title	Sunshine Coast Airport: Airport North Precinct Traffic Impact Assessment
Job number	307887
File reference	
cc	
Prepared by	Kevin Kong and Madison Taylor (reviewed by John Bennett)
Date	13 May 2026
Subject	Transport Modelling Methodology

Level 26 123 Albert Street Brisbane, QLD 4000 Australia
 t +61 7 3023 6000
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1. Introduction

Arup has been engaged by Sunshine Coast Airport (SCA) to prepare a Traffic Impact Assessment (TIA) to inform the next phase of planning for the Sunshine Coast Airport North Precinct Master Plan (PMP) – specifically for the proposed Airport North precinct. As part of the assessment, transport modelling will be undertaken to estimate the potential traffic impacts associated with the proposed development.

This technical note outlines the proposed traffic modelling methodology that will be used to support the TIA including the overall modelling framework, model extents, key assumptions, scenario definition, and modelling methodology. The approach detailed in this note is intended to guide the development of the traffic model and confirm the assessment methodology, prior to commencing modelling work. The methodology proposed is substantially similar to the approach adopted for the Gateway Precinct TIA, which was produced by Arup in 2024.

2. Overall modelling framework

The overall modelling framework shown in Figure 2-1 outlines the modelling hierarchy, interactions between models, and key outputs relevant to this project. It comprises the following:

- Sunshine Coast Integrated Multi-Model Model (SCIMMM) – a four-step strategic transport model developed by Sunshine Coast Council (SCC) that forecasts regional travel demand. This model provides the base travel demand matrices used as inputs to the subsequent modelling stages.
- Regional Assignment Model – a mesoscopic VISUM model developed by SCC which uses trip matrices from the SCIMMM to develop sub-area models that support planning and transport assessments across the region. The use of sub-area models allows for detailed analysis while reducing model variability and run times.
- Airport SBA Model – a Simulation Based Assignment (SBA) Visum model derived from the Regional Assignment Model. This subnetwork model was developed by SCC to support detailed

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transport planning within the airport precinct and the wider study area and was used to support the 2024 Gateway Precinct TIA. This latest version of this model will be used to estimate the traffic impacts of the proposed development and provide volumes for further assessment in SIDRA where required.

- SIDRA – intersection models developed to assess the operational performance of individual and networked intersections, test mitigation measures, and optimise signal operations. These models will provide detailed operational assessment for key intersections near the airport.

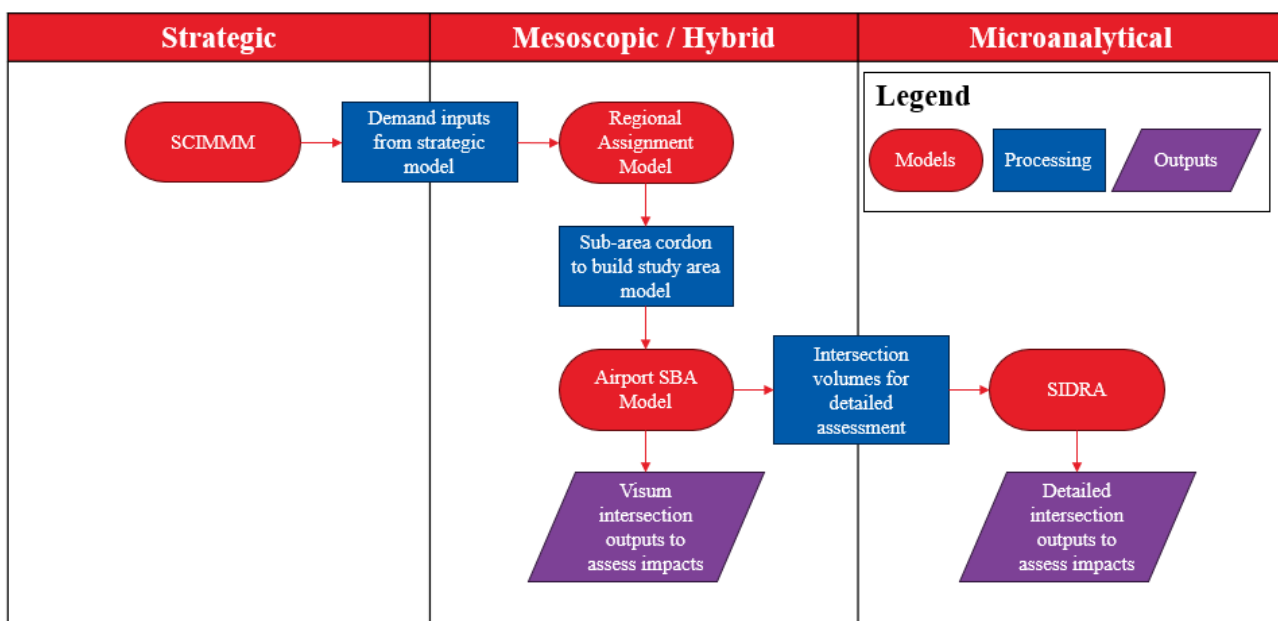


Figure 2-1: Proposed modelling framework

2.1 Airport SBA model extents

The Airport SBA model road network extent is shown in Figure 2-2. It includes the Sunshine Coast Airport precinct and surrounding road network, generally bounded Maroochy River to the south, Yandina Coolum Road to the north, and the Sunshine Motorway to the West.

SIDRA intersection models will be developed for key intersections within the study area, including the primary site access intersections and other nearby intersections identified to warrant more detailed assessment by the Airport SBA model. These intersections are expected to include:

- North Shore Connection Road / David Low Way / Airport Drive
- David Low Way / Gateway Precinct Access (new intersection)
- David Low Way / Green Turtle Place / Airport North Access (new leg to existing intersection)

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307887

Date

13 May 2026

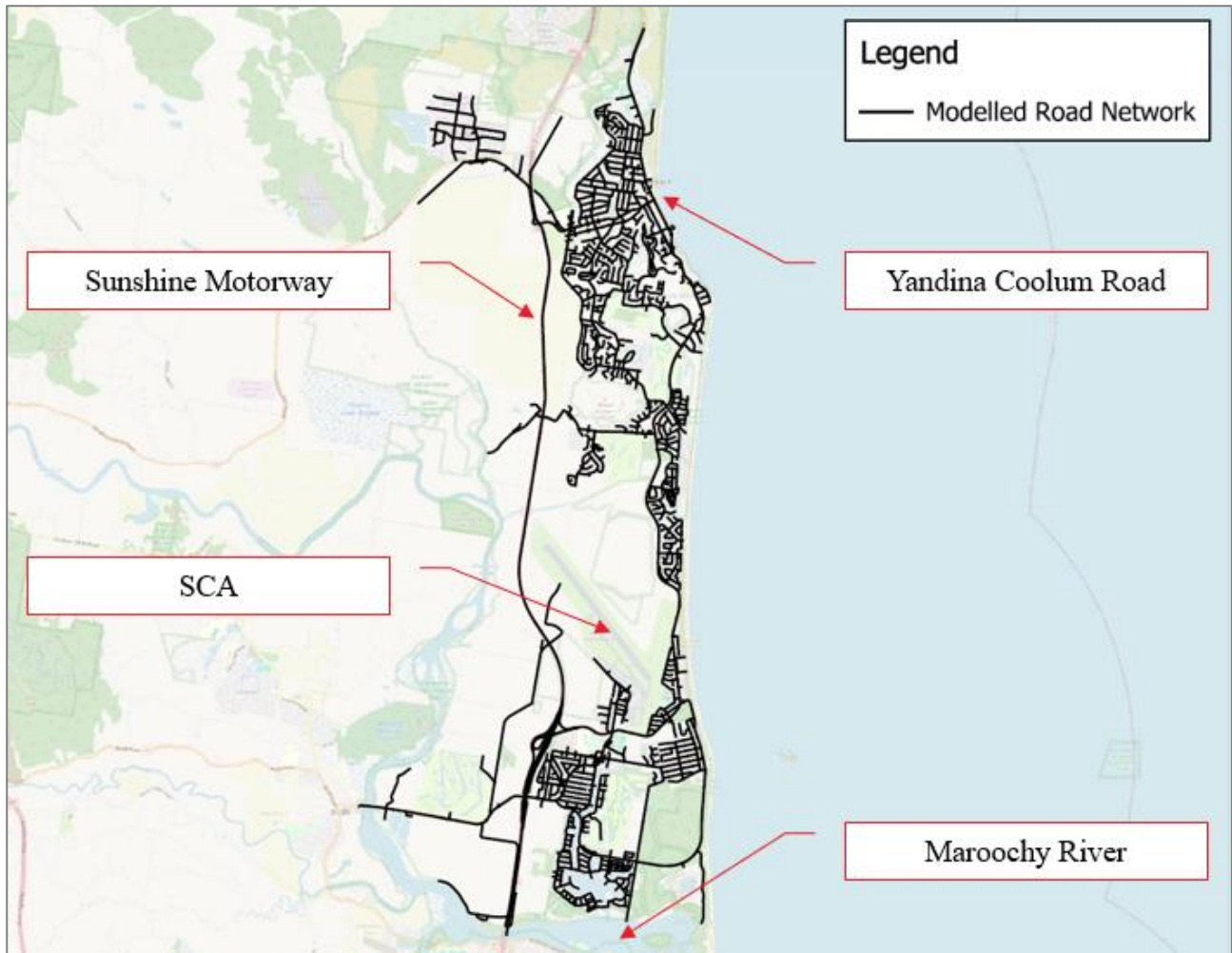


Figure 2-2: Airport SBA Model extents

2.2 Scenario definition

To support the traffic impact analysis, six scenarios will be modelled using the Airport SBA model as shown in Table 2-1. All scenarios are inclusive of weekday AM and PM peak hours.

Table 2-1: Modelled scenarios

Scenario	2034	2043
Do Nothing (DN)	Future 2034 'base case' demands with only committed or planned network changes (as per adopted for the Gateway precinct TIA).	Future 2043 'base case' demands with only committed or planned network changes (as per adopted for the Gateway precinct TIA).
Gateway and Aerospace Precincts (GAP)	Future 2034 DN, plus precinct development demands and associated road network changes.	Future 2043 DN, plus precinct development demands and associated road network changes..

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Scenario	2034	2043
Full Masterplan (MP)	Future 2034 DN, plus full masterplan demands, including Airport North, and associated road network changes.	Future 2043 DN, plus full masterplan demands, including Airport North, and associated road network changes.

2.3 Modelling methodology

The proposed modelling methodology is outlined below:

- Receive latest Airport SBA model from SCC based on the extents of the previous Airport SBA model used for the used for the Gateway precinct TIA.
- Develop GAP and MP scenarios within the received models based on updated yields, trip generation rates, and road network assumptions.
- Review 2025 TomTom Origin-Destination (OD) data to determine existing trip distributions for land uses within the study area. The land uses analysed will align with the proposed development and include the following: airport terminal, industrial park (around Runway Drive), supermarket, fast food, aviation businesses (around Friendship Avenue), community services (childcare and medical centre), and North Shore Community Centre.
- Review future year demographic data provided by TMR to determine future growth areas in 2031 and 2041.
- Review Airport SBA model future year trip distributions for different land uses against the observed TomTom data and future demographics growth. Present findings to SCA and EDQ to agree whether any changes are required to the existing Airport SBA model trip distributions.
- Update the trip generation for the proposed airport development precinct to align with the latest proposed development yields. Further details on trip generation rates are provided in Section 2.4.
- Update the Airport SBA model trip distribution and rerun scenarios to identify impacted intersections. Specifically, identify those where turn flows increase by more than 5% between scenarios. This is based on TMR's Guide to Traffic Impact Assessment (GTIA) which uses a threshold of >5% to indicate significant worsening because of the development.
- Apply a high-level filter to focus the extents of the impacts and assessment as there is expected to be a significant number of minor intersections with small amounts of turning volumes where a single vehicle may trigger the 5% threshold. The high-level filtering exercise is outlined below, which was adopted for the Gateway precinct TIA:
 - Exclude if the Do-Nothing Case has less than 100 vehicles, and difference between Masterplan is less than 10 vehicles.
 - Exclude if the intersection is not on a state-controlled road network.

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- Determine critical intersections to be assessed using SIDRA based on the 5% threshold analysis. Extract volumes for the SIDRA assessment from the Airport SBA model and apply any post volume processing where required. This may include processing related to undiverted trips. SIDRAs developed for the Gateway precinct TIA will be used as a starting point.
- Assess network delay impacts based on the combined SIDRA and Visum outputs from the identified intersections.
- Identify and implement targeted mitigations strategies for the critical locations within the network. These mitigations will be tested through interactive simulations using SIDRA, with the objective of reducing the overall percentage increase in network delays to less than 5%.

2.4 Key assumptions

The key assumptions that will be adopted for the traffic modelling are outlined below:

- The latest Airport SBA models provided by SCC are considered suitable as the basis for this assessment. These models will be updated and refined to reflect the latest development yields and scenario assumptions. A previous version of this model was used by Arup for the previous Gateway Precinct TIA (*Sunshine Coast Airport – Traffic Impact Assessment, November 2025*).
- The future year models provided by SCC represent 2031 and 2041 travel demand forecast. Background traffic demands for scenario years between 2031 and 2041 will be calculated assuming linear interpolation. Scenario years beyond 2041 will use linear extrapolation based on the 2031 to 2041 growth.
- Airport background growth will be based on a compound annual growth rate (CAGR) of 4.3%. This aligns with the expected future aviation passenger growth from 2024 to 2043 as provided by SCA to support the Gateway precinct TIA. Within the traffic model, this will be applied to adjust trips related to the terminal and airport parking zones such that the number of AM and PM peak hour trips along Airport Drive north of David Low Way within the 2034 and 2043 do nothing scenarios align with the trips calculated in Table 2-2.

The 2024 existing volumes shown in the table are sourced from the traffic survey at North Shore Connection Road / David Low Way / Airport Drive surveyed on 20 February 2024.

Table 2-2: Airport background trip at Airport Drive north of David Low Way

Airport trips	2024 Existing	2034 Estimated	2043 Estimated	CAGR
AM Airport In	406	619	903	4.3%
AM Airport Out	235	358	523	4.3%
PM Airport In	372	567	828	4.3%
PM Airport Out	436	664	970	4.3%

- Trip generation rates for most of the proposed land uses across the airport precinct will be the same as those adopted for the Gateway TIA. The rates proposed to be updated for some land

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uses are shown in Table 2-3. These have been calculated using TMR's Trip Generation Data. The rates are proposed to be revised for these land uses due to the following:

- The daily rates used in the Gateway Precinct TIA for these land uses were referenced from published sources rather than calculated, including sources not local to Queensland. Calculating them based on TMR's Trip Generation Data is higher up within the GTIA's preferred hierarchy of data sources for traffic generation rates and is more relevant for Sunshine Coast Airport. The proposed daily rates have been calculated on 6:00am-7:00pm data, consistent with most published daily rates.
- The Gateway Precinct TIA rates were mostly based on individual land use peak hours rather than the (more critical for TIA purposes) road network peak hours, which created a misalignment for analysis within the Airport SBA network peak traffic model.
- Trip rates for other proposed land uses are not covered by TMR's guidance, so they can remain as per the Gateway precinct TIA.
- The updates reflect learnings from the Gateway Precinct TIA process / outcomes and improved analysis for the Airport North Precinct TIA.

Table 2-3: Proposed revised trip generation rates

Use	Previous AM Peak Rate	Revised AM Peak Rate	Previous PM Peak Rate	Revised PM Peak Rate	Previous Daily Rate	Revised Daily Rate
Childcare Centre	0.65/child	0.56/child	0.48/child	0.35/child	2.27/child	2.49/child
Fast food (major)	15.2/100m ² GFA	13.21/100m ² GFA	40.94/100m ² GFA	17.85/100m ² GFA	1,272 trips	217.93/100m ² GFA
Health Care	5.62/100m ² GFA	4.26/100m ² GFA	5.61/100m ² GFA	4.68/100m ² GFA	40.47/100m ² GFA	35.29/100m ² GFA
Light Industry	0.9/100m ² GFA	0.47/100m ² GFA	0.9/100m ² GFA	0.48/100m ² GFA	9/100m ² GFA	5.06/100m ² GFA
Service Station	30.75/100m ² GFA	22.36/100m ² GFA	19.78/100m ² GFA	22.85/100m ² GFA	700/100m ² GFA	278.99/100m ² GFA
Supermarket (limited line)	14.53/100m ² GFA	3.40/100m ² GFA	14.17/100m ² GFA	12.45/100m ² GFA	0.695/1m ² GFA + 1,327	104.31/100m ² GFA

- Traffic demands for the proposed Airport precincts will be estimated by applying the proposed land use yields and assumed trip generation rates to the agreed trip distributions within the model. The daily trip generation rates will be used initially as the Airport SBA model is a full day simulation.
- The model includes multiple time slices, allowing the network peak period traffic demands to be calculated based on the modelled temporal distributions. Daily profiling of the proposed

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development trips will be undertaken with reference to existing zones in the model with similar land uses.

- The resulting network peak hour development trip totals will be reviewed against the proposed peak hour trip rates (for the land uses with updated trip rates). The network peak hour development trip totals for each land use with an updated trip rate will be adjusted to align the network peak hour trip rates, if necessary. Any difference in trips following adjustment will be spread proportionally across the off-peak model hours, to maintain the daily trip totals.
- TMR's GTIA states that the traffic generation of certain sites may be less than suggested standard trip generation rates due to high levels of trip internalisation within the site. Given the mix of land uses within the SCA PDA, it can be expected that there would be a number of trips between uses within the site (e.g. trips between employment uses and supermarket and fast food).

As such a reduction factor of 15% is proposed to be applied to the retail, supermarket (limited line), fast food, food and drink, child care centre uses, indoor recreation and health care uses across the SCA PDA to account for internal trips. This is in accordance with guidance in the New South Wales Roads and Traffic Authority (RTA) *Guide to Traffic Generating Developments* (2002) and is consistent with the approach adopted for the Gateway precinct TIA.

- "The Wave" will provide BRT services to SCA at a higher frequency (and improved reliability, comfort) than current public transport infrastructure. As such, a reduction factor for increased public transport travel to SCA can be reasonably applied to car trip generation. The SCC ITS highlights a region wide mode share target of 10% for public transport trips by 2041, an increase from 3% of current trips. Therefore, a reduction factor of 7% is proposed to be adopted and applied across most land uses within the Gateway Precinct.
- Undiverted and diverted trips (drop-in trips that are considered to already be a part of the existing flows on the road network that would have previously passed the development site) will not be explicitly modelled within the Airport SBA model due to the complexity associated with representing these movements within the large network. Instead, the effect of these trips will be accounted within the SIDRA intersection models through post-processing of turning movement volumes extracted from the Airport SBA model. The factors of undiverted and diverted trips are based on rates within Austroads *Guide to Traffic Management Part 12: Integrated Transport Assessment for Developments* (2020) (AGTM Part 12) and are outlined below:
 - 35% for fast food land uses. This has been sourced from Table C8.2 in AGTM Part 12 which indicates that 35% of trips generated can be considered drop-in trips.
 - 18% for shopping centres with GFA 3,000m² – 20,000m². This has been sourced from Table C8.2 in AGTM Part 12 which states a factor of 28% can be applied. The proposed precinct has two retail areas, in the Gateway Precinct and the Airport North precinct, each with GFA less than 3,000m² but a total GFA greater than 3,000m². Given there are no internal link roads between the two precincts, the 18% factor has been applied to both areas rather than a combined 28%.

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- While no specific rates are outlined for undiverted drop-in trips to a service station, it could be assumed that up 90% of trips generated by the service station could be undiverted drop-in trips. This is considered reasonable given the location of the service station along the key road of David Low Way. It is unlikely that the service station would generate many trips where it is the primary destination in the peak hours.
- These assumptions are consistent with the assumptions adopted for the Gateway precinct TIA.
- The traffic impact analysis will be undertaken for the weekday network AM and PM peak one-hour periods.
- The Airport SBA model provides traffic volumes in passenger car units (pcu). To convert from pcu to vehicles (for the purposes of SIDRA analysis), a heavy vehicle proportion of 3% will be adopted. This percentage was adopted for the Gateway precinct TIA and was based on the peak hour heavy vehicle proportion shown in traffic count data completed on 20 February 2024 at North Shore Connection Road / David Low Way / Airport Drive.
- Future infrastructure upgrades in place within the Airport SBA model by 2031 (as adopted for the Gateway precinct TIA) will include:
 - New south facing ramps connecting West Coolum Road with the Sunshine Motorway. These are a TMR / SCC commitment and proposed to be operational by 2028.
 - A new grade separated interchange at Sunshine Motorway / Yandina Coolum Road. This is a TMR project with the business case currently underway. There is no current commitment on timing, but this is included in the base 2031 model provided by SCC.
 - A new road network for the Twin Waters West development, which will be accessed through additional intersection legs at David Low Way / Ocean Drive and Stillwater Drive / Esperance Drive. These intersection and road network upgrades will be implemented by Stockland and the development is estimated to be completed in 2026-2027.
 - A new road near North Shore Multisports connecting David Low Way and Mudjimba Beach Road. This is a SCC led connection in the Local Government Infrastructure Plan and there is no current commitment on timing of provision.
- For the analysis to determine critical intersections and 5% volume increases due to development traffic, there is an allowance to check up to 80 intersections. It is assumed up to eight intersections may need to be assessed for traffic impacts using isolated SIDRA intersection models. This is expected to be sufficient as per the Gateway precinct TIA.

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3. Summary

The modelling approach outlined in this technical note is intended to guide the development of the traffic models and facilitate discussions with SCA, SCC, and TMR to confirm the methodology prior to commencing work. The proposed approach utilises the latest version of the Airport SBA and previous SIDRA models developed by Arup to evaluate three different land use scenarios (Do Nothing, Gateway and Aerospace, and Full Masterplan) and assess their network impacts during the 2034 and 2043 AM and PM peak hours. These models will be refined based on the finalised road networks, development yields, trip generation rates, and trip distributions.