SUNSHINE COAST AIRPORT EXPANSION PROJECT (SCAEP) – MANAGEMENT OF PONDED SITE WATER.

File No: **SCAEP - Alternative Release Methods for Ponded Site Water**

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PURPOSE

This report outlines the issues associated with the management of ponded surface water on the Sunshine Coast Airport Expansion Project site, provides the background that led to the current situation, details the various options considered to remove the water, the advantages and disadvantages of those options and the reaffirmation of Councils endorsed decision to support the release to the ocean, coupled with the installation of an on-site treatment plant.

EXECUTIVE SUMMARY

In the approval of the Environmental Impact Statement (EIS) for the Sunshine Coast Airport Expansion Project, the Coordinator-General outlined a range of approvals, permits and authorities (23 in all) to be obtained from the relevant Government departments and detailed certain conditions that were required to be included in those approvals, permits and authorities.

The most significant of these was the Environmental Authority for the dredging of sand from the Spitfire Re-alignment Channel and the hydraulic placement of that dredged material on the project site.

Environmental Authority (EA) BRID0035 for this activity was subsequently approved by the Department of Environment and Science (DES) on 29 September 2017 to enable the project to proceed.

As a condition of that EA, the site had to be fully bunded to prevent salt water accompanying the dredged sand from running off the site and into the National Park, which bounds the new runway on both sides.

This containment system meant that, when the project site and the region experienced above average rainfall levels in October (2018) and again in March, April and June (2019), along with the normal rain levels over this seven-month period, the rainwater was largely contained on the site, leading to inundation.

This led to a minor Per- and Poly- Fluoroalkyl Substances (PFAS) contamination from groundwater interaction with ponded water on the site. Without the containment system, (i.e. the bunds surrounding the project), the rainfall would normally have run off the site and there would have been no contamination or requirement to treat.

In order to satisfy the requirements of the EA (which had been amended on 26 June 2018 to call up the guidelines contained in the PFAS National Environmental Management Plan (NEMP)), the project team undertook comprehensive investigations into the levels of contamination of groundwater beneath the site, surface water and soils both on and off the site and biota in the downstream environment.

Working closely with DES, the project team explored a range of options - firstly to prevent uncontrolled releases and secondly, to treat and manage the situation caused by the conditions imposed on the project.

All releases of water from the site to date have been managed in accordance with a site-specific High Level PFAS Management Plan, the details of which were agreed with DES prior to implementation.

DES was specifically concerned about continued releases into the Maroochy River system (in particular, any unplanned, large scale release if the bunding over-topped or failed) and has advocated strongly for the option of an ocean release to be considered.

As time progressed, Marcoola Drain releases were barely keeping ahead of rainfall.

Whilst continuing to manage the water on site and the impacts on the project, a wide variety of options were explored and evaluated. During this process, a range of expert professional organisations in addition to government departments (in particular DES) were engaged to assist in the determination of the best solution.

Consideration of this range of options (see Table 1 below for summary) and subsequent discussions with DES identified that direct release of the surface water to the ocean represented the most reasonable and practical course of action, in terms of both cost and environmental stewardship.

Table 1: Summary of Options Considered

Option	Environmental Impact	Time Efficiency	Cost	Viability
Release to Marcoola Drain				
Water treatment plant				
Treat In-situ				
Batch plant during release				
Alternative water treatment				
On-site combustion				
In drain treatment				
Pump to Maroochy River main channel				
Truck to Treatment Plant				
Temporary off-site storage				
Beneficial re-use on site				
Truck to waste receiving facility				
Release to ocean				
Pump or truck to alternative site				
Truck to distant sites				
Place construction on hold				

This report outlines the options considered over a period of time, the background to the review and the evaluation criteria used in evaluating and determining the preferred solution.

Not all of the options considered proved to be viable.

It should be noted that this process is ongoing, and some of these options were identified subsequent to the recommendation to Council in relation to the ocean release. However,

those options have not provided a superior outcome in terms of the evaluation criteria. They are presented in this report as a matter of record.

Based on the information available, it is clear that a release to the ocean was the best solution on the basis of the evaluation criteria. This option was presented to Council and endorsed at the Special Meeting of 22 August 2019.

RECOMMENDATION

That the report titled "Sunshine Coast Airport Expansion Project - Management of Ponded Site Water" be noted.

FINANCE AND RESOURCING

All costs associated with the management of ponded surface water on site will be funded from within Council's budget for the Sunshine Coast Airport Expansion Project.

The costs associated with the management of surface water on the site constitutes a discrete project cost and are not forecast to extend beyond the life of the project.

The existing project borrowings from the Queensland Treasury Corporation will provide the funding for the solution for the release of the ponded water from the site. These loan funds will be repaid from the proceeds which are received from Palisade Investment Partners under the terms of the commercial management agreement for the Sunshine Coast Airport.

CORPORATE PLAN

Corporate Plan Goal:	***A smart economy***
Outcome:	3.3 - Investment and growth in high-value industries
Operational Activity:	3.3.1 - Manage the Sunshine Coast Airport Expansion Project, ensuring compliance with state and federal agency regulatory requirements.

CONSULTATION

Councillor Consultation

In accordance with the Project's Governance Framework, this matter has been discussed at project oversight sessions.

All Councillors, with the exception of the Mayor, were invited to two confidential briefings on the matter - 25 July 2019 and 15 August 2019.

Internal Consultation

- Chief Executive Officer
- Group Executive, Built Infrastructure
- Group Executive Economic and Community Development
- Chief of Staff, Office of the Mayor and CEO
- Chief Financial Officer, Finance
- Coordinator Media, Office of the Mayor and CEO
- Communication Officer - SCAEP, Office of the Mayor and CEO.

External Consultation

- Executive Director - Investigations, Development & Southeast Queensland Compliance, Department of Environment and Science
- Design and Construct Contractor and sub-contractors

- Environmental Consultants engaged by SCRC.

Community Engagement

A media release and media briefings have been delivered, together with a list of anticipated questions and answers associated with this proposal and in accordance with the Sunshine Coast Airport Expansion Project Communications Plan. Council representatives also participated in a community meeting attended by approximately 180 people at the Maroochydore RSL on 10 September 2019.

The Executive Director - Investigations Development and South East Queensland Compliance, Department of Environment and Science also presented at this community event. His presentation included evidence that supported their decision to promote an ocean release. In addition, the presentation identified the much higher concentrations of PFAS at a significant number of locations elsewhere across Australia.

PROPOSAL

Background

Environmental Approvals

In the approval of the EIS for the Sunshine Coast Airport Expansion Project, the Coordinator-General required that a range of approvals, permits and authorities (23 in all) be obtained from relevant Government Departments and detailed certain conditions that were required to be included in those approvals, permits and authorities.

The Department of Environment and Science (DES) approved an Environmental Authority, (EA) BRID0035, on 29 September 2017 with a subsequent amendment approved on 26 June 2018, for the dredging of sand from the Spitfire Re-alignment Channel in Moreton Bay, transport of sand to Marcoola and hydraulic placement of the sand on the project site.

A condition of the original EA was that the dredged sand reclamation site be fully bunded to prevent the sea water (used to fluidize the sand for pumping to the runway alignment) from running off the site and into the adjacent National Park.

The bunds were required to remain in place until their removal was approved by DES. This process involved the demonstration of compliance with certain groundwater and surface water quality conditions. The requisite conditions have subsequently been met and bunds have progressively been removed since July 2019 as ponded water volumes have diminished.

Airservices Australia (AA) currently provides Aerodrome Rescue and Fire Fighting Services at Sunshine Coast Airport and has done so since 2004. During that time, Aqueous Film Forming Foam containing PFAS was used by AA in their fire-fighting activities. It is understood that this product was deployed on two occasions on the site between 2005 and 2006. This has resulted in a low-level legacy PFAS contamination in some soils and in the groundwater.

Associated with the EA amendment approved on 26 June 2018, DES applied new conditions in relation to sediment and soil testing of the site for potential PFAS contamination and, depending on the results of that testing, the development and implementation of management measures.

Site Assessment and Department of Environment and Science Site Requirements

Following receipt of the EA approval, consultants with the relevant expertise were engaged to undertake the sampling, testing and evaluation of results required for a comprehensive classification of the project site. Following that investigation, the Consultants advised that the level of PFAS contamination was minor and in line with the land-use for the airport, being Commercial/Industrial. They further advised that the movement of PFAS through the site and off-site is unlikely to be discernibly affected by the construction process and in the long term. They predicted no significant impact on the spread of PFAS in groundwater nor an increase of concentrations of PFAS in surface water, including the Marcoola Drain and the Maroochy River.

Notwithstanding this expert advice, during a site visit in December 2018, DES representatives advised that water is to be tested before being released in accordance with guidelines contained in the newly published PFAS National Environmental Management Plan (January 2018) (NEMP). The amended EA dated 26 June 2018 was the first instance when the NEMP was included in that document.

Allowable PFAS Levels and History of Guidelines

There are many types of PFAS. The NEMP specifically identifies and sets screening values for the following:

- perfluorooctane sulfonate, also known as “PFOS”
- perfluorohexane sulfonate, also known as “PFHxS”; and
- perfluorooctanoic acid, also known as “PFOA”.

Until recently, PFOS and PFOA were added to some types of fire-fighting foam to improve the foam’s ability to smother fires.

Prior to 2015, there were no PFAS regulatory criteria in Australia (Some reference had been made to overseas criteria used by United States Environmental Protection Agencies, or in Canadian regulations).

In late 2016, draft Australian and New Zealand Environmental and Conservation Council (ANZECC) guidelines were prepared for PFOS and PFOA for freshwater ecological guidance only – no marine water guidance was provided. Ultimately, in the NEMP, the freshwater guidelines were extended to include marine waters at the same screening levels.

These guidelines are shown in Table 2 below.

Table 2 – ANZECC Guidelines for freshwater ecological risk (Sept 2015)

	PFOS	PFOA
99% Species Protection (µg/L)	0.00023*	19
95% Species Protection (µg/L)	0.13	220
90% Species Protection (µg/L)	2.0	632
80% Species Protection (µg/L)	31	1824

**At that time, it was not possible to detect PFAS concentrations to Super Ultra Trace Levels in Australia. This first became available in March 2019 at the ALS laboratory in Sydney.*

In June 2016, enHealth published guidelines for human consumption based on Total Daily Intake (TDI) values established by the European Food Standards Agency.

In April 2017, Food Standards Australia and New Zealand (FSANZ) published updated guidelines based on revised TDI’s and also including PFHxS as shown in Table 3 below.

Table 3: FSANZ Human Health Screening Levels

	PFOS + PFHxS	PFOA
Tolerable Daily Intake (µg/kg/d)	0.02	0.16
Drinking Water Guideline (µg/L)	0.07	0.56
Recreational Water Guideline (µg/L)	0.7	5.6

In August 2017, the Heads of Environmental Protection Agencies endorsed the release of a draft PFAS National Environmental Management Plan (NEMP) which included the parameters in Tables 2 and 3 above.

This document was consulted with industry and finally released in January 2018 (first available in February 2018).

The document has not been elevated to legally binding status as it has not been referenced in legislation or regulations. At this point in time, it remains a guideline.

In respect of the SCAEP project however, DES has included a reference to the document in the amended EA BRID0035 approved on 26 June 2018 and thereby attached a higher level of relevance in terms of compliance with the NEMP. It is understood that this level of compliance has not been required of other major Airport sites across Australia.

The original NEMP has recently been revised and has been through a public consultation process in recent months. It is likely that NEMP 2.0 will be released in late 2019 or early 2020.

Associated with this review, CSIRO scientists - who are involved in a panel which propose the ANZECC guidelines for such matters - have identified that the scientific analysis used to determine the screening levels contained in the NEMP is subject to question. They have recommended that the guidelines be amended and this is also under review. A decision may allow the new levels to be included in the impending release of NEMP 2.0.

The CSIRO scientists have recommended that the 99% species protection limit should be raised from the current 0.00023 µg/L to 0.051 µg/L based on their most recent research.

It should be noted that other airport sites across Australia, such as Sydney Airport and a number of Defence Force Airports that have been featured in recent media coverage, have significantly greater concentrations of PFAS contamination than those that exist at the Sunshine Coast Airport. Concentrations reported at these locations range from 10,000 to 1,000,000 times more than the concentrations on the SCAEP site. Unlike the case at the Sunshine Coast Airport where the impact is very localised and confined to a small portion of the airport site, the impacts at the other locations extend well beyond the airport boundaries.

Rainfall Impacts

Significant and higher than average rainfall totals were received on the site during October 2018 and again during March, April and June 2019. As a result of complying with the DES conditions and advice, this rainfall was contained across the site, particularly within the bunded area. The volume of water contained on the site at one point reached a peak of approximately 325 ML.

The graph in Figure 1 shows the actual rainfall received for each calendar month for the years 2018 and 2019 plotted against the average rainfall calculated over all of the years that records have been taken.

The months during which higher than average totals were received are clearly identified.

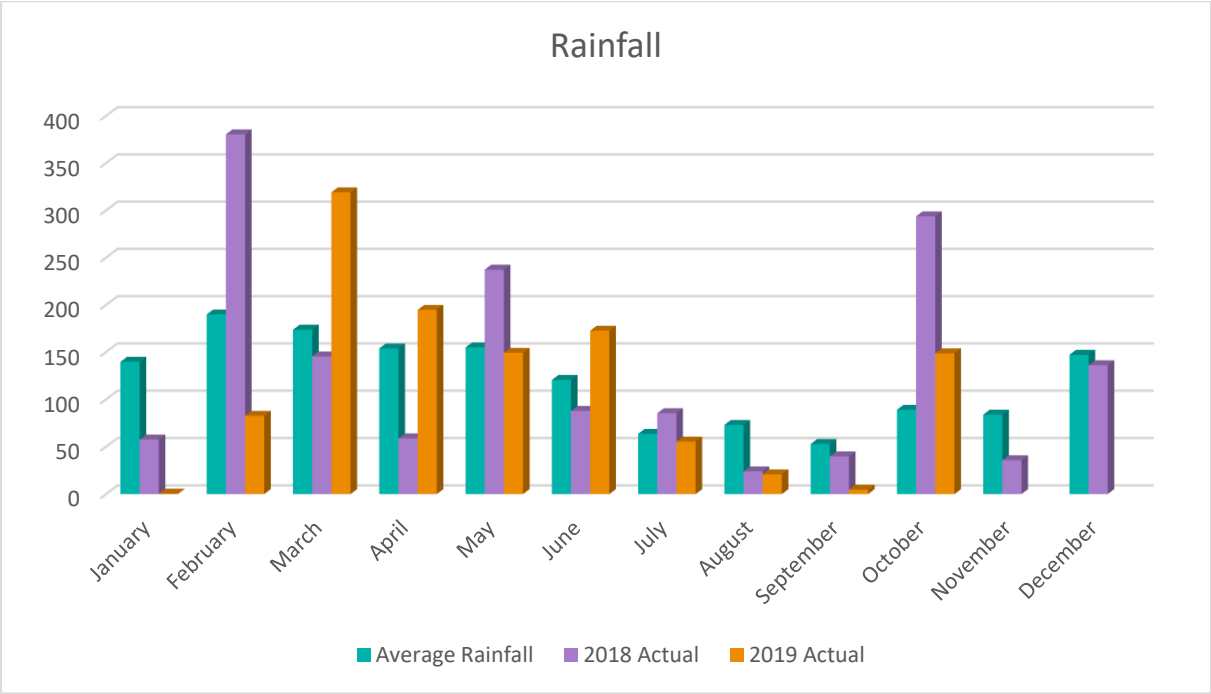

Figure 1: Actual rainfall for 2018 and 2019 plotted against long term average.

Due to the SCAEP site being inundated by water, the Contractor wound back activity on the site in the first week of May 2019.

At that time, the Contractor had also been requested to provide costings for the procurement of a water treatment plant to be installed on the site to treat any water that might have been extracted from the excavations associated with drainage lines prior to its re-use on site or release from the site.

With the significant rainfall, the groundwater level on the site also rose and eventually interacted with the ponded surface water, thereby allowing the minor PFAS presence in the groundwater to be migrated into the surface water. It is this factor that led to the requirement for a specific ponded water management plan.

Site Water Management

Following investigations and numerous discussions with the compliance team and the PFAS Task Force at DES, it was agreed that water with a contamination level no greater than the background level in the water in the Maroochy River could be released from the site to ameliorate the threat that the bunding on the site would be overtopped and fail. If the bunding on the site were to overtop or fail, an uncontrolled, significant volume of fresh water would have been released into the low salinity upper estuarine reaches of the Maroochy River.

Prior to this decision being reached, both DES and Council undertook near-field and far-field sampling of water, sediment and biota to determine whether or not there were detectable levels of PFAS already in existence in the receiving environment (i.e. Maroochy River) as a result of groundwater leaving the site over the time period that PFAS was used on the site and/or from sources elsewhere.

This testing did not identify PFAS at levels that posed a threat to human health.

DES nominated acceptable levels of PFAS concentrations in the ponded site water that could be released into the Marcoola Drain (which discharges into the Maroochy River) at 0.003 µg/L for the sum of PFOS and PFHxS and 0.007 µg/L for the total sum of all PFAS compounds.

The Contractor began releasing water from the site into the Marcoola Drain on that basis on 28 May 2019.

The rate of release of the water was limited to less than 3 ML per day on the outgoing tide, as agreed with DES.

By the beginning of July 2019, sufficient water had been released to enable the Contractor to resume work including movement of sand to establish the final design profile on the runway flanks to enable the site to shed water in future rainfall events.

By late July 2019, it was apparent that the Contractor could again be delayed if water could not be removed from the site more expeditiously. The volume of water that satisfied the criteria for release to the Marcoola Drain as agreed with DES had also significantly diminished. At the beginning of August 2019, 125 ML of water remained on the site, which would require more than 40 days to be pumped off site to provide access for the Contractor to critical work areas.

Following consideration of other possible alternatives and discussions with DES representatives, they suggested that the most responsible means of removing water from the site would be to release the water direct to the ocean. In the opinion of DES, this represented the least risk to the environment because of the reduced availability of PFAS in the marine environment, and the avoidance of releasing large volumes of fresh water into the upper estuarine environment of the Maroochy River, where salinity was already lower. It also quickly removed the significant risk of overtopping of the temporary bunds, which conceivably would have caused their failure and the uncontrolled release of all of the ponded water into the river system, which both Council and DES considered to be a far worse outcome.

A range of other alternatives were also considered. Explanations and details associated with the principal alternatives are contained below. These options are not presented in any order of significance.

Current Position

Since this issue was first considered in July 2019, rainfall on the site has been well below average with the exception of the current month of October 2019.

This has enabled the Contractor to remove water from the site, to transfer water to less critical areas of the site and to further progress the final design profile to the extent that 80% of the site is now free draining.

The amount of ponded water had been reduced from the 125 ML that had collected in July to approximately 60 ML by 30 September 2019.

Since the 30 September 2019, approximately 40 ML of rain water has fallen on the north western end of the site. Of that volume, some 30 ML was contained in the bunded area and approximately 10 ML of that has since been re-used on the site. That leaves approximately 80 ML remaining on site as at 21 October 2019.

Re-use on the site for dust suppression and irrigation of landscaping will remove approximately 0.5 ML per day on average.

The commissioning of a water treatment plant was finalised on 18 October 2019 and the plant has now commenced treating water for reuse. This will allow the treated water to also be used in the sand compaction process for the duration of that activity. While that activity is underway, all of the treated water, amounting to 0.86 ML per day, will be used. However, the sand compaction activity will only continue for approximately 30 working days until late-November 2019.

During that time a total of 1.36 ML per day or approximately 40 ML in total will be utilised on the site.

This will be offset by the amount of groundwater extracted to allow the continuing installation of drainage elements. Taking this into account, the overall reduction through treatment and reuse is likely to be just less than 30 ML.

Given forecast favourable weather conditions over the next two weeks, it is likely that the Contractor will be able to reduce the bunded containment area of the polishing pond (DES approval to remove the bunds has been obtained previously.) At that stage, the potential to retain water will diminish to the extent that the risk of overtopping is minimal and the water can be removed from the site over time without impacting the Contractor's critical path activities.

Any further rainfall however, increases the volume of water contained on site while any bunds remain in place. As a result, the overall risk of uncontrolled releases remains. The need to remove water from the site to avoid this outcome therefore still exists. The preferred option, and one which has been endorsed by Council and DES, remains an ocean release, coupled with a water treatment solution. Clearly, not all of the options considered below would be available should an uncontrolled release become likely.

Alternative Options Assessed

As the ponding of water on the site continued to increase, the project team conducted literature searches and sought advice from technical experts with experience in the field in an effort to identify viable options for managing the issue associated with the PFAS contamination.

The full range of the options that are discussed in this report did not come to light immediately. As each option was identified, it was assessed against the potential environmental impact (positive or negative), the timeliness of delivery of the outcome, the costs involved and the viability of the option in terms of the ability to provide a solution to remove all ponded water from the site.

Some of the options are untried or had only previously been trialed at a benchtop level. Some of the options, whilst potentially offering less costly outcomes, required significant lead time to establish, such that further Contractor delays also had to be factored into the cost assessment.

Council has an endorsed position supporting the release of water to the ocean and the preparatory work for this activity is now well advanced in the project team and with the contractor.

The following is an explanation of the options that have been considered to date for the management of site water, in no particular order.

Option 1

Release of Water to the Marcoola Drain

In accordance with the High Level PFAS Management Plan agreed with DES.

Constraints

- Must comply with release criteria negotiated and agreed with DES in relation to acceptable concentrations. These concentrations to be based on identified background concentrations and are not to increase base load of PFAS in the receiving environment.
- Significant testing required in the entire river system to understand background PFAS levels.
- Must be supported by risk-based assessment including investigation of receiving environment waters, sediments and biota.
- Must be monitored on ongoing basis during period of release.

Advantages

- Readily available option with minimal set-up time and reasonable cost.
- The majority of water on site satisfied the agreed release criteria and therefore could be released to the Marcoola Drain (This release commenced on 28 May 2019 and has

proceeded intermittently since that date. There have been brief periods where the release has ceased until current test results became available after rain or transfer of water on the site).

Disadvantages

- Limited volume of release per day means extended timeframe before all ponded water could be removed from the site.
- Constrained by Maroochy River background PFAS concentration levels. Not all water can be released via this option.
- Impact of large volumes of fresh water being released into the relatively smaller tidal volume of the Marcoola Drain means that salinity would be decreased in the immediate vicinity of the discharge
- Significant concerns raised and little support from DES due to potential damage to the natural water system.

Cost

- Estimated at approximately $5,000 per ML, for the water that can be released within the agreed release parameters (This option on its own cannot be applied to all water ponded on the site and the discharge rate is limited due to the environmental impact of large volumes of fresh water on a small water body).

Option 2

Water Treatment Plant

Install a water treatment plant on site to treat all water prior to reuse or release.

Constraints

- Have to rely on Contractor undertaking competitive tender process for supply.
- Requires at least two potential sub-contractors with demonstrated performance in other current locations.
- Need to identify set-up location to suit requirements for the duration of the project. May require compromises in relation to pumping distances.
- Waste needs to be transported to a regulated waste facility.

Advantages

- Can treat water with any concentration of PFAS.
- Produces pure water which can be used anywhere with few limitations.
- Minimises the use of potable water drawn from reticulated supply.
- This option can be used in conjunction with other options.

Disadvantages

- Slow throughput at 0.8 ML per day. May not remove enough ponded water prior to the summer wet season if rainfall exceeds expectations.
- Disposal of waste product is costly due to requirement to transport to regulated waste facility west of Ipswich.
- Increased transport levels.

Cost

- Estimated cost approximately $50,000 per ML.

Option 3

Treat in-situ prior to release

Flocculation of water in storage ponds prior to release with proprietary process and product marketed by a private sector company.

Constraints

- Storage ponds need to be sampled and tested prior to treatment to ensure consistency.
- Need to be able to gain access for equipment used in treatment process.

Advantages

- Avoids significant set-up costs.
- Portable option that could be moved around site.

Disadvantages

- Does not treat to pure water standard, albeit better than 95% species protection limit.
- Will leave contaminated waste at bottom of storage ponds.
- Considerable volume of flocculent required.
- Risk of uncontrolled releases remains high if significant rainfall occurs.
- Unproven technology.
- Concern remains of environment harm caused through residual effects of the chosen flocculent.

Cost

- Extremely expensive at $200,000 per ML or four times the cost of proposed water treatment plant.

Option 4

Batch plant treatment during release

Ponded water passes through a treatment train of equipment and containment vessels and is then released directly to the receiving environment via drains or to ponds for reuse.

Constraints

- Must be able to capture and test treated water before release.
- Must be able to locate equipment close to ponded source.

Advantages

- Use of small-scale treatment batch plant in release train - utilising proprietary process and product marketed by a private company sector company.
- Mobile equipment that can be relocated on site as required.

Disadvantages

- Does not treat to pure water standard, but better than 95% species protection limit.
- Supplier only prepared to hire out plant and operator – not price per ML treated.
- Very slow throughput at 0.1 ML per day

Cost

- Much more costly than full scale water treatment plant. Based on advice from supplier this option is likely to be above $100,000 per ML.

Option 5

Alternative water treatment prior to release

Newly available proprietary treatment process using minimal power and producing minimal waste**.**

Constraints

- Use of patented proprietary process marketed by a private sector company to treat water prior to release or re-use.

Advantages

- Produces pure water which can be used anywhere.
- Minimises the use of potable water drawn from reticulated supply.
- Low power consumption - could be powered by solar generated electricity.
- Produces low level of waste during process.

Disadvantages

- Slow throughput at less than 0.8 ML per day.
- Must be supported by risk-based assessment including investigation of receiving environment waters, sediments and biota.
- Supplier not confident of capability of plant with other water quality parameters that exist on the site.
- Supplier has responded advising that they would prefer to trial a wetland treatment approach. However, this is not appropriate for a location adjacent to an airport because of wildlife hazards.
- DES not supportive of using unproven methodologies so release criteria not known or agreed

Cost

- Costs yet to be determined but estimated to be slightly less than full water treatment plant based on initial advice from Supplier (if viable).

Option 6

On site destruction of waste by combustion

Pass water through a proprietary combustion plant that will destroy the PFAS compounds and evaporate the water.

Constraints

- Utilisation of onsite industrial combustion waste disposal process involving heating to > 1100 ^{0}C to destroy PFAS.

Advantages

- No waste generated.
- PFAS destroyed.

Disadvantages

- Requires reasonable gas supply to fuel combustion process. Such supply is not available on the site and would require transportable vessels.
- Mobile plants are not readily available.
- Permitting requirements are not certain.
- Larger permanent installations require Environmental Authority to establish.

Costs

- Costs are yet to be determined but are expected to be significantly more than the cost of treatment through a water treatment plant, given the requirement for a gas supply.

Option 7

In drain treatment

Use of a proprietary product in wire gabions to filter PFAS from the water flow by absorption to the filter medium.

Constraints

- Filter material must have adequate exposure to the water flow.
- Filter material must be capable of being removed and replaced as it becomes saturated with PFAS

Advantages

- Relatively simple set-up in an appropriate location at the release point of the site drainage network.

Disadvantages

- Filter medium has limited life.
- No capability of containing water prior to release for testing - this is a flow through process in an open drain.
- Process is untried and effectiveness is unknown.
- Not known if this process could treat all water on site including higher contamination levels.
- Would require considerable volume of product - supply in Australia is limited.
- Must be supported by risk-based assessment including investigation of receiving environment waters, sediments and biota.

Costs

- Costs to be determined, but likely to be in the vicinity of $40,000 to $50,000 per ML if viable.
- Would also require concrete lining of a section of the drain to facilitate repeated installation and removal of the filter material and a weir structure to direct flow through the filter gabion. Cost of concrete structure and weir arrangement would add an extra $200,000 per installation for at least two locations and repeated reinstatement of the filter material would result in additional cost.

Option 8

Pump to Maroochy River main channel

Set up pump line into the main channel of the Maroochy River at the mouth of Marcoola Drain.

Constraints

- Must comply with release criteria negotiated and agreed with DES in relation to acceptable concentrations. These concentrations to be based on identified background concentrations and not to increase base load of PFAS in the receiving environment.
- Must be supported by risk-based assessment including investigation of receiving environment waters, sediments and biota.
- Must be monitored on ongoing basis during period of release.

Advantages

- Discharge ponded water into the main river channel to access higher flow rate as tidal prism volume is significantly higher in Maroochy River than in Marcoola Drain.

Disadvantages

- Limited volume of release per day means extended timeframe before all ponded water could be removed from the site.
- Constrained by Maroochy River background PFAS concentration levels. Not all water can be released via this option.
- Must be supported by risk-based assessment including investigation of receiving environment waters, sediments and biota.
- Requires environmental assessment and additional permits.
- Could constitute a hazard to navigation.
- Would impact marine vegetation on the bank of the Marcoola Drain.
- Requires larger pump with a booster to pump water all the way to the river.

Cost

- Cost of pipeline and anchor in Maroochy River and additional booster pump would be approximately $2M to $2.5M.
- Pumping cost would be approximately $6,000 per day for 8 ML per day.
- Overall cost for volume that could be released using this option (approximately 50ML) is approximately $50,000 per ML.

Option 9

Trucking to Unitywater facilities

Engage a fleet of trucks to cart water to Fisherman's Road Treatment Plant.

Constraints

- Unitywater would have to be prepared to accept the water.
- Requires trucks capable of carrying large volumes in legal loads.

Advantages

- Relatively easy to establish, provided advice received from suppliers that B-Double fuel tankers could be used to transport the water is valid.
- Depending on fleet size, could move the water relatively quickly.

Disadvantages

- Uncertainty around the suitability of the use of fuel tankers to transport water - can they be returned to fuel transport without significant clean out costs?
- Not viable as Unitywater Treatment Plant is not capable of treating water to remove PFAS.
- Unitywater does not hold relevant Environmental Authority.
- Significant impact on local traffic network.

Cost

- Dependent on number of trucks available, but could be approximately $5,000 per ML. However, the requirement for Unitywater to obtain an Environmental Authority renders the option unviable.

Option 10

Send Water to temporary off-site storage facility.

Pump or truck to decommissioned Unitywater Treatment Plant on Finland Road, Pacific Paradise.

Constraints

- Potentially for temporary storage only prior to treatment.
- Facility is currently de-commissioned and would need to be partially re-commissioned.

Advantages

- Site has previously held sewerage.
- Site is within approximately 3.5 kilometres of storage ponds.

Disadvantages

- Finland Road treatment plant is completely decommissioned and not capable of accepting the volumes involved without considerable work.
- Capacity is limited to less than 5 ML. The remaining 75 ML would have to be managed by another option.
- Cannot accommodate sufficient water to justify the expense of the pipeline.
- Is purely a temporary measure and not a permanent solution.
- Significant, albeit short, timeframe impact on local traffic network.

Cost

- Conservatively estimated at $2.5M for pipeline and pumps, but noting that the old treatment plant can only accommodate 5 ML of the 80 ML on site.
- Trucking costs likely to be approximately $5,000 per ML each way for only 5 ML.
- Cost of subsequent treatment of the 5 ML would be approximately $250,000. Treatment of the other 75 ML would be in addition to this and has not been costed.

Option 11

Beneficial reuse on site

Use ponded water for dust suppression, irrigation of vegetated areas and compaction (This option is currently being applied on site where appropriate).

Constraints

- Water for irrigation has to be filtered to prevent blockages of sprinkler system.
- Water has to have ambient salt content.
- Water for use in compaction has to be free of suspended solids, turbidity and organic matter.
- Can only be used in designated zones to ensure that released water does not enter drainage systems.

Advantages

- Water used replaces the potable water drawn from the reticulation system.
- Water is reused close to the ponded areas minimising pumping costs.

Disadvantages

- Can only be used in small quantities - around 0.5 ML per day in irrigation and dust suppression.

- Needs to be treated to some extent to be able to be used for compaction purposes.

Cost

- For use as irrigation and dust suppression, the cost would amount to approximately $10,000 per ML.
- To treat the water to enable its use as compaction water would add approx. $36,000 per ML for a total of $46,000 per ML.

Option 12

Truck to off-site waste receiving facility

Truck waste water to approved waste receiving sites west of Ipswich or to Narangba site.

Constraints

- Precise PFAS concentration level of each tanker load would have to be determined and advised to the receiving site prior to delivery.
- These sites are limited in their capacity to receive contaminated water.

Advantages

- Water is not released into the environment.

Disadvantages

- Haul distance to receiving sites west of Ipswich would allow only one trip per day per vehicle.
- Waste facility at Narangba only capable of handling 10,000 litres per day.

Cost

- Trucking to Veolia or Remondis sites west of Ipswich is very expensive at 2 to 5 times cost depending on truck size (B-Double or standard water truck) and time consuming at 9 to 15 times duration.
- Cartage cost estimated at $47,000 per ML for B-Doubles and $127,000 per ML for body trucks.
- Receival/Treatment Fee and Regulated Waste Levy would add $100,000 per ML.

Option 13

Release to ocean

Install a Horizontal Direction Drill (HDD) pipeline under David Low Way, under the sand dunes and the beach and continue 400 metres out to sea.

Constraints

- Needs Owners Consent from Department of Transport and Main Roads (DTMR) and Department of Natural Resources Mining and Energy, Road Corridor Permit from DTMR and a Tidal Works Permit from Department of State Development Infrastructure and Planning (through SARA).

Advantages

- Meets the requirements of the PFAS National Environmental Management Plan by a significant multiple - nearly 200 times less than the allowable limit.
- Can be achieved in the shortest timeframe.
- Does not disrupt traffic volumes on the road network.
- Removes the risk of uncontrolled releases.

- Has DES support as advised publicly.

Disadvantages

- Public perception of releasing ponded water to the ocean.
- Tannin stain may be visible for a very short period following discharge.

Cost

- Installation of the HDD pipeline and supply and installation of the above ground pipeline would cost approx. $2.5M.
- Pumping costs would amount to approximately $6,000 per day.
- Cost per ML would be approx. $40,000 per ML

Option 14

Pump or truck to alternative site – e.g. Maroochy River Golf Course

Would need to find a suitable site within a 10 kilometer radius to control cartage costs.

Constraints

- Contravenes EA conditions unless a full Detailed Site Investigation of the receiving site identified similar low levels of PFAS contamination already in existence.

Advantages

- Land based option making use of a valuable commodity for irrigation purposes.

Disadvantages

- Would require lengthy and costly site investigation work and would only be acceptable if the site was already contaminated to a similar extent.
- Approvals process unlikely to be supported by authorities
- Could re-enter the Maroochy River network.
- Significant impact on local traffic network.

Cost

- Costs associated with a Detailed Site Investigation would be at least $1M.
- Costing for treatment not established on the basis that DES have advised that no approval for this option would be available without significant investigation.

Option 15

Truck off-site to areas in need of water – e.g. Stanthorpe

Would need to identify suitable receiving site and appropriate fleet of trucks.

Constraints

- Contravenes conditions in EA unless a full Detailed Site Investigation of the receiving site identified similar low levels of PFAS contamination already in existence.

Advantages

- Land based option making use of a valuable commodity for irrigation purposes.

Disadvantages

- Would require lengthy and costly site investigation work and would only be acceptable if the site was already contaminated to a similar extent.

Cost

- Cartage cost estimated at $47,000 per ML for B-Doubles and $127,000 per ML for body trucks.
- Costs associated with a Detailed Site Investigation would be at least $1M.

Option 16

Place construction contract on hold

Stand the Contractor down and pay delay costs until water can be removed from the site.

Constraints

- Council would be exposed to significant contractor delay costs.
- Contract conditions could expose Council to frustration costs above and beyond delay costs.
- Would significantly delay the airport opening.

Advantages

- Provides more time to address the water management issue.

Disadvantages

- Significant additional cost that cannot be justified when other options are available.
- Increases the likelihood of overtopping and failure of the containment bunds if Contractor is not on site to manage water and monitor the bunds.
- Delay in opening of the new runway.

Cost

- Exorbitant costs associated with Contractor delays and frustration costs could be significant. A minimum six months delay to the Contractor would incur attendant costs of up to $15M.
- Frustration costs could be considerably higher.

Table 1 (Repeated): Summary of Options Considered

Option	Environmental Impact	Time Efficiency	Cost	Viability
Release to Marcoola Drain				
Water treatment plant				
Treat In-situ				
Batch plant during release				
Alternative water treatment				
On-site combustion				
In drain treatment				
Pump to Maroochy River main channel				
Truck to Treatment Plant				
Temporary off-site storage				
Beneficial re-use on site				
Truck to waste receiving facility				
Release to ocean				
Pump or truck to alternative site				
Truck to distant sites				
Place construction on hold				

After eliminating all options that were deemed unacceptably high (shown red in Table 1) in terms of environmental impact and/or cost, or were not viable at the time of assessment, that list of options can be reduced to the following list of more achievable and acceptable solutions.

Table 4: Short List of Acceptable Options

Option	Environmental Impact	Time Efficiency	Cost	Viability
Release to Marcoola Drain				
Water treatment plant				
Pump to Maroochy River main channel				
Beneficial re-use on site				
Release to ocean				

Beneficial reuse on site was not eliminated because it represented a very low cost alternative and had a desirable environmental outcome even though the time efficiency was very poor. Basically, this option was not going to provide the solution in isolation, but it could be adopted with any other alternative to improve the overall outcome.

Whilst pumping to the Maroochy River main channel was identified as a viable option with a reasonable cost profile, it was determined that the time taken to obtain the necessary permits and then to establish the required equipment would mean that the volume of water that remained on site and was acceptable for release via this method would have been so low as to not warrant the necessary expenditure. This assessment was predicated on the fact that the same water quality release criteria would apply for this option as those that applied for the release to Marcoola Drain option. The only advantage of the release to the Maroochy River main channel - i.e. the additional daily volume of release - would by then have diminished significantly.

Finally, it was clear from groundwater test results that it was highly likely that groundwater would eventually be encountered that would require treatment before it could be released from the site under any option. Clearly, this meant that the water treatment plant would be required at some stage no matter what option or combination of options were to be adopted.

Summary

The key imperative is to remove ponded water from the Sunshine Coast Airport Expansion Project site as quickly as possible, but in an environmentally safe and responsible manner. It should be noted that the principle reason for this statement is the concern of environmental damage through uncontrolled releases.

Failure to remove the water elevates the risk of potentially serious environmental harm if higher than anticipated rainfall occurs and the site bunds overtop and/or fail, resulting in an unplanned significant release of ponded water into the Maroochy River system. It also impacts on the Contractor's ability to proceed with the project unimpeded. This will expose Council and ratepayers to significant Contractor delay costs and potentially, claims for frustration of contract arrangements with the Sunshine Coast Airport Pty Ltd.

To date, the approach has been to utilise a number of viable options, albeit each with limitations in relation to achieving the ultimate solution.

At the current point in time, water is being treated and reused on site until the ocean release option is available. In the past, water that satisfies the agreed release criteria has been released from the site.

The time required to obtain the necessary permits and the availability of the sub-contractor for an immediate start, combined with the rainfall received over the intervening time period will all have to be considered in arriving at the finally adopted management strategy.

It is highly likely that the ultimate solution will involve several of the above management options, noting that some are already in place. As indicated above and presented at the Community event, Council, after undertaking a comprehensive review and analysis of options, with discussion and then support for the solution being received by DES, has an endorsed position to release to the ocean.

Legal

This is not a proposal to undertake works or implement an option.

Policy

- Sunshine Coast Airport Master Plan 2007

Risk

The risk and opportunities register is reviewed and updated on a monthly basis, or more frequently as new risks are identified.

The various options outlined in this report have been considered as potential risk mitigation options for managing the impacts associated with PFAS contamination of ponded water on the project site.

The option involving the direct release of the surface water to the ocean represents the lowest level of overall risk when compared with the other options considered, satisfies the requirements of the NEMP and is potentially the most time and cost-efficient solution that complies with environmental management requirements.

The preferred option may change with the passage of time, as the outcome is influenced by the amount of rainfall likely to be received on the SCAEP site in coming weeks.

Previous Council Resolution

This report provides background details associated with the management of water ponded on the project site.

This issue has been previously considered by Council as follows:

Special Meeting (Region Making Projects) 22 August 2019 (SM19/18)

That Council endorse the application for approvals to release ponded water from the Sunshine Coast Airport Expansion Project direct to the sea, via a bored underground pipeline from the western side of David Low Way at the northern end of the Airport site, to a point approximately 400 metres seawards of the Lowest Astronomical Tide level.

Critical Dates

Ideally, all water is required to be removed from the site as soon as is practicably possible to avoid uncontrolled releases of contaminated water into the Maroochy River system and to avert potential delays to the Contractor.

Whilst critical path activities on the runway, taxiway and aprons have recommenced, the need to construct the Runway End Safety Area at the north-western end of the runway as soon as possible to mitigate the potential to capture water, is becoming an urgent priority.

In addition, this work is to be undertaken in the lowest part of the site.

This work ideally needs to be completed before the higher probability wet weather period commences.

If this construction is delayed significantly beyond the end of November 2019, wet weather is more likely to disrupt this work, with a flow-on effect to the proposed runway transition.

Finally, approximately 80% of the available tank storage capacity on the site is currently being utilised.

Some of this capacity will be required to ensure that groundwater extracted from the apron area to facilitate installation of drainage elements can be stored to allow for testing prior to reuse or release.

It is desirable that the volume of water on the site be reduced to less than 30 ML by the end of November 2019 to allow for average rainfall during the following period.

Implementation

To facilitate the installation and commissioning of a HDD pipeline to allow direct release to the ocean, a final design has been completed, applications for supporting permits have been submitted and a Tidal Works Permit application has been drafted, ready for submission as soon as all supporting permits have been received.

Currently, Council has received the Owner's Consent from the Department of Natural Resources, Mines and Energy and is awaiting approval of the Tidal Works Permit.

It is anticipated that the installation and commissioning will take approximately four weeks after the Tidal Works permit is received.