

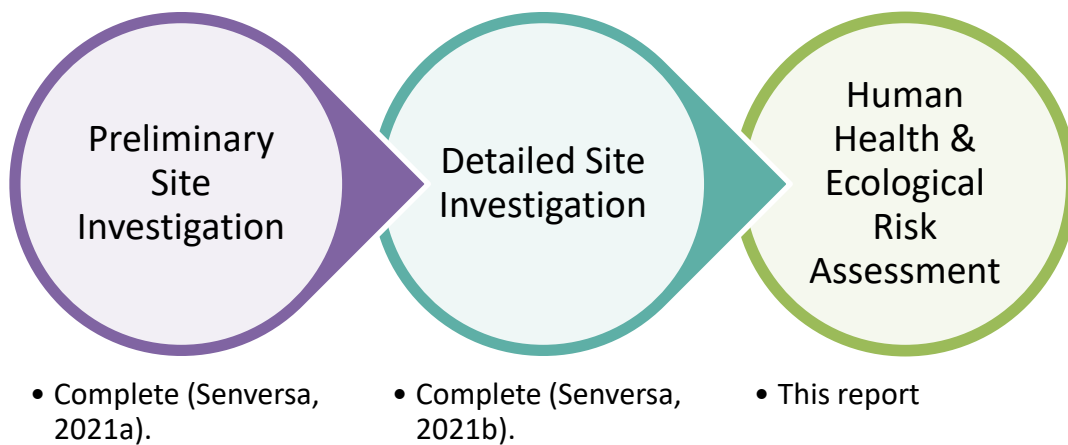


## Executive Summary - Human Health and Ecological Risk Assessment (HHERA)

### Background to the Human Health and Ecological Risk Assessment

Senversa was engaged by the Department of Infrastructure, Transport, Cities and Regional Development (DITCRD) now the Department for Infrastructure, Transport, Regional Development and Communications (DITRDC) to prepare a Detailed Environmental Investigation of per- and poly-fluoroalkyl substances (PFAS) site conditions at Norfolk Island Airport (the site) and surrounding catchments.

The PFAS detailed environmental investigation process consists of three main steps:



The Preliminary Site Investigation (PSI) and Detailed Site Investigation (DSI) identified PFAS sources, contaminant transport pathways and receptors potentially exposed to PFAS, and presented the findings of the initial, targeted investigation into the nature and extent of PFAS at the Norfolk Island Airport and surrounding catchments.

Based on the results of the PSI and DSI, It was determined that:

- Risks are low and acceptable for many of the ways in which people might be exposed to PFAS in the environment. This includes drinking water; drinking water is often (on other sites) the most significant PFAS exposure pathway, but on Norfolk Island, concentrations of PFAS in the water people currently drink has been shown to be below the HBGV, and the risks are therefore assessed to be low.
- There were a number of pathways for which the risks were assessed to be low and acceptable in the DSI because management measures have been put in place. Further assessment of currently managed pathways is outside of the scope of the HHERA; however, ongoing management of these pathways is required. A PFAS Management Plan will be prepared, which will detail the ongoing management which is required for each identified source area, and for identified potential exposure pathways (including pathways which are currently managed).



- A small number of pathways were identified for which further assessment is required to better assess potential risks. This included pathways where conservative screening levels were exceeded, or where no relevant screening levels were identified. Senversa recommended that a Human Health and Ecological Risk Assessment (HHERA) be completed to assess the risks associated with these pathways.

## Scope of the Human Health and Ecological Risk Assessment

The scope of the risk assessment is to assess the potential risks associated with those pathways for which risks were not excluded in the DSI. These pathways are as follows:

### Consumers of livestock products

- Consumption of cattle products (potentially including beef, tallow, offal and bones) from cattle watered with water containing PFAS, or fed grass containing PFAS.
- The risks to other livestock and livestock health will also be assessed.

### Consumers of produce (fruit and vegetables)

- Consumption of fruit and vegetables irrigated with water containing PFAS.
- It is noted that PFAS was not detected in sampled fruit and vegetables watered with PFAS impacted water, so risks are likely to be low, but will be further assessed on additional properties where concentrations in irrigation water were lower, but where produce was not sampled.

### Consumers of chicken eggs

- Consumers of chicken eggs where chickens are watered with water containing PFAS.
- It is noted that PFAS concentrations in a sampled chicken egg were measured to be below the acceptable levels (FSANZ tigger), however data is limited and the uncertainties associated with this limited data will be further assessed in the HHERA.
- There is only one known property where PFAS impacted water is used to raise chickens; risks will therefore be assessed for this property.

### Firefighters

- Exposure to PFAS impacted water during systems testing, training and firefighting.

### On-airport workers (intrusive workers and airport workers)

- Exposure to PFAS in soils and dust.
- Concentrations in soil are below the screening level for commercial/industrial workers (HIL-D), but this pathway will be further assessed in the HHERA as the HIL-D is not directly applicable to intrusive workers or workers who work most of the day outdoors.

### Off-site residents (e.g. farmers) or recreational users of creeks

- Incidental contact with surface water in creeks during work or recreation.

### Terrestrial ecological receptors

- Exposure to PFAS impacted soil, groundwater and sediments (while creeks are dry), or via bioaccumulation of PFAS through the food web.

### Freshwater aquatic ecological receptors

- Exposure to PFAS impacted surface water and sediments in on-island creeks, or via bioaccumulation of PFAS through the food web from these creeks.
- Risks to the marine environment (both direct and indirect exposure) are assessed to be negligible in accordance with the conclusions of the DSI.



This HHERA has been prepared to assess current potential risks posed by detected PFAS that are the result of the historical use of legacy AFFF (aqueous film-forming foams, which contained PFAS) on Norfolk Island Airport. The HHERA considers the current concentrations of PFAS in the environment, and the current ways in which exposure occurs to assess whether there are potential risks to people and the environment. The results of the HHERA will be used to determine whether further investigation, management and/or remediation is required, to be undertaken as part of the PFAS Management Plan.

## Outcomes of the Human Health and Ecological Risk Assessment

### Pathways assessed to pose negligible risk

For the following pathways, risks are assessed to be negligible, and further assessment is not required:

#### Livestock

- Home consumption or public consumption of livestock products where livestock drink water sourced from outside Mission Creek catchment.
- Home consumption or public consumption of cattle products, where cattle are fed with grass cut from the airport.
- Livestock health (across the island).

#### Consumers of produce (fruit and vegetables)

- Consumption of home produce (fruit/vegetables) grown within the Mission Creek catchment (at the one property where this currently occurs).
- Consumption of home produce (fruit/vegetables) grown outside the Mission Creek catchment.

#### Consumers of chicken eggs

- Consumption of chicken eggs where chickens drink water sourced from outside Mission Creek catchment.

#### Firefighters

- Systems testing, training and firefighting activities completed by firefighters using water sourced from the Airport Bore.

#### On-airport workers

- Incidental soil and dust exposure by intrusive workers.
- Incidental soil and dust exposure by airport workers.

#### Off-site residents (e.g. farmers) or recreational users of creeks

- Incidental contact with surface water in creeks during work or recreation.

#### Terrestrial ecological receptors

- Exposure to PFAS impacted soil, groundwater and sediments (while creeks are dry), or via bioaccumulation of PFAS through the food web.

#### Aquatic ecological receptors

- Direct exposure of aquatic species to water in creeks other than Mission Creek.
- Risks to the marine environment (both direct and indirect exposure) are also assessed to be negligible (in accordance with the conclusions of the DSI).



## Pathways for which further assessment or management required

### Livestock

- Home consumption or public consumption of cattle products where cattle drink water sourced from Mission Creek.
  - Risks to public consumers are assessed to be generally **low and acceptable**. Nonetheless, there are a number of uncertainties in the assessment, and therefore further assessment and/or management is recommended.
  - It is emphasised that there are no regulatory restrictions with respect to PFAS in livestock products (including cattle products) and that, currently, there are no regulated maximum limits for PFAS in any foods in Australia or overseas but research is ongoing.

### Consumers of chicken eggs

- Consumption of chicken eggs where chickens drink water sourced from Mission Creek.
  - Risks are low and acceptable based on the limited available data. Given the uncertainties associated with the limited data set, further assessment and/or management is recommended.

### Aquatic ecological receptors

- Direct exposure of aquatic species to water in Mission Creek.
- Indirect exposure to birds which may consume aquatic species as part of their diet (both in Mission Creek and other creeks) .

A strategy for managing the risks associated with the identified PFAS impacts on the airport and across the island, including specific strategies for further assessment and/or management for the pathways detailed above, should be developed. These strategies should be detailed within the PFAS Management Plan.

### Data Gaps

The HHERA has identified a number of areas where risks are unlikely to be elevated, but additional data is required to confirm potential risks:

#### ***Grass concentrations in Mission Creek***

While the risks to consumers of produce where the cattle have access to grass within Mission Creek are assessed to be low and acceptable, it is acknowledged that the available data regarding PFAS in grass within the Mission Creek bed is very limited, and that further sampling would therefore support the assessment.

The requirement for further assessment/management of this pathway will be further assessed as part of the PFAS Management Plan.



### ***Assessment of risk to consumers of pork products***

There is limited literature data on which to estimate screening levels for pigs. On this basis, when coupled with the limited information regarding where pigs might be kept and stock watering sources for these animals, further assessment has not been undertaken at this stage. The following are noted:

- Water and Land use surveys have not provided any indication that pigs are kept in the Mission Creek catchment. This pathway is assessed as inactive.
- Risks from consumption of livestock products where livestock drink water sourced from outside Mission Creek catchment are assessed to be low and acceptable (based on comparison to screening levels which assume high consumption rates). As noted in the HHERA, the keeping of pigs is limited on island and consumption rates are likely to be generally lower than other livestock product types (e.g. cattle). On this basis, it is unlikely that elevated risks would be associated with the consumption of pork and other pig products where pigs drink water sourced from outside Mission Creek catchment. Notwithstanding this, risks cannot be fully excluded without additional information and/or assessment.

This is noted as a data gap; the requirement for further assessment/management of this pathway should be assessed as part of the PFAS Management Plan.

### ***Future changes in conditions***

The HHERA assesses the current risks associated with the currently identified concentrations of PFAS in the environment; and the current ways in which exposure occurs.

There is insufficient data to fully establish trends in water concentrations. Further monitoring should be conducted as part of the PFAS Management Plan to determine the long-term trend in water concentrations. The PFAS Management Plan should also detail the strategy for assessing ongoing monitoring results, noting that changes in concentration could result in changes to the risk profile presented in this HHERA.

In addition, it is noted that the HHERA is based on the current land uses at the time of the PSI and DSI completed by Senversa. If land uses were to change in the future, it is noted that the risk profile may change. The PFAS Management Plan should therefore also detail the strategy for assessing changes to the risk profile in the event of future land use changes.