Rural & Regional Affairs and Transport Legislation Committee
ANSWERS TO QUESTIONS ON NOTICE
Supplementary Budget Estimates 2016 - 2017
Infrastructure and Regional Development

Question no.: 145

Program: N/a
Division/Agency: Airservices Australia
Topic: Accelerate Program
Proof Hansard Page: 90 (17 October 2016)

Senator Sterle, Glenn asked:

Senator STERLE: I will stay focused and get back onto the question I just want to ask you here first. What is the number of proposed changes to job classification level?
Mr Harfield: We can provide that on notice—all the specifics. We can provide all that.

Answer:

Airservices is implementing the Accelerate Program to reposition the business to become a more efficient service provider that is agile and responsive to the changing needs of customers.

A staged process is being undertaken, including a process to redesign each work unit which has involved:
- defining the unit's objectives and the outcomes and services it is expected to deliver to customers or the business
- defining the tasks and functions that the unit is to perform
- identifying the skills and capabilities that are required to execute these tasks and functions.

As part of this work, 102 proposed changes to job classification levels have been identified as at 14 October 2016. Further detail is provided at Attachment 1.

These proposed changes have not yet been finalised as they are still subject to staff consultation and may vary as Accelerate Program initiatives progress over coming months. Safety remains the highest priority during this transition period. No rostered air traffic control or aviation rescue firefighting staff have been affected and risk assessments have been undertaken to ensure operational service delivery is not impacted.

Attachment
1. Proposed changes to job classification levels

Rural & Regional Affairs and Transport Legislation Committee

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Infrastructure and Regional Development

Attachment 1: Proposed changes to job classification levels

Proposed changes to job classification levels

Current structure as at 14 October 2016		Proposed structure at 30 June 2017		Variance
Classification	Count	Classification	Count	Count
ATC	53	ATS Instructor	32	-21
ACADEMY	85	ACADEMY	158	73
ADT	8	-	0	-8
APPR <21	2	-	0	-2
APPR-ADU	2	-	0	-2
ASA 1	4	ASA 1	4	0
ASA 2	3	ASA 2	2	-1
ASA 3	27	ASA 3	27	0
ASA 4	115	ASA 4	70	-45
ASA 5	71	ASA 5	75	4
ASA 6	128	ASA 6	165	37
ASA 7	222	ASA 7	204	-18
ASA 8	79	ASA 8	38	-41
ASA 9	17	ASA 9	12	-5
ATC_LM	4	-	0	-4
BAND 1	7	BAND 1	19	12
BAND 2	37	BAND 2	27	-10
BAND 3	130	BAND 3	121	-9
BAND 4	140	BAND 4	131	-9
BAND 5	60	BAND 5	68	8
BAND 6	32	BAND 6	21	-11
BAND 7	4	BAND 7	4	0
CADET	1	-	0	-1
CSS / SS	6	CSS / SS	6	0
EXEC MGR	7	EXEC MGR	1	-6
External	21	-	0	-21
FC	2	-	0	-2
FIELD	28	-	0	-28
INSTRUCT	8	INSTRUCT	18	10
NO SCALE	1	-	0	-1
NOC TRNE	2	-	0	-2
NOS	11	-	0	-11
SM AVS	1	-	0	-1
SO	1	-	0	-1
SSO	32	SSO	74	42
SSO 5	37	-	0	-37
SSO 6	7	-	0	-7
SSO 8	7	-	0	-7
SSO ARFF	3	-	0	-3
SSO SPVR	9	SSO SPVR	7	-2
SYD TTCU	1	-	0	-1
TEC TRNE	23	-	0	-23
TFL 1	16	-	0	-16
TMO 1	5	-	0	-5
TMO 2	4	-	0	-4
TMO 3	6	-	0	-6
TMO 4	5	-	0	-5
TMO 5	4	TMO 5	38	34
TMO 6	8	-	0	-8
TP BD 1	19	TP 1	24	5
TP BD 2A	23	TP 2	71	48
TP BD 2B	40	-	0	-40
TP BD 3A	23	TP 3	87	64
TP BD 3B	53	-	0	-53
TP BD 3C	21	-	0	-21
TP BD 4	1	TP 4	2	1
UTS	1	-	0	-1
MANAGER	139	MANAGER	198	59
Grand Total	1806	Grand Total	1704	-102

Rural & Regional Affairs and Transport Legislation Committee

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Infrastructure and Regional Development

Question no.: 146

Program: N/A
Division/Agency: Airservices Australia
Topic: Accelerate Program
Proof Hansard Page: 90 (27 October 2016)

Senator Sterle, Glenn asked:

Senator STERLE: That is great. Just give it straight to the secretariat. Thank you. Could you tell us then also the number of proposed jobs that will move to individual contracts?
Mr Harfield: No. I can provide that exact information; however, I think what that question relates to is a process that we are currently undertaking. As of the start of last week we announced what we call the team structures—the structures for staff at what I will call frontline areas; I will call it below the management level, in consultation with the previous management level. With the release of that information there are a number of positions that we have deemed to be leadership positions in the new structure, and they are currently being offered at this particular stage as contract management positions. We are currently going through a merit selection process and at the end of that process there will be a discussion with the successful individual. So I cannot tell you how many are converting at this particular stage, but I can show you what we have consulted on and what we have published.

Answer:

Under the Accelerate Program a number of new roles have been established under individual agreements that are commensurate with the change in capability requirements for each of these roles. These changes include:

- Greater single-points of accountability at all levels in the organisation;
- Recognition of the people management accountabilities of all leadership roles; and
- Recognition of the equivalent leadership importance of skills and expertise of technical specialists within the business.

Currently, we are undertaking a staged process in sourcing/redeploying capability for newly established individual roles.

Since the commencement of the Accelerate Program, fifty-five staff on an enterprise agreement have been or will be offered a role covered by an individual agreement. A list of these by work area is at Attachment 1.

This number excludes staff who have applied for and won a role at a more senior level via a merit selection process where their selection would see the staff member moving into a management role covered under an individual agreement.

Attachment

1. Individual agreement roles by work area

Rural & Regional Affairs and Transport Legislation Committee

ANSWERS TO QUESTIONS ON NOTICE

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Attachment 1- Individual agreement roles by work area

Previous role	Previous employment agreement/level	Work area	Offered role under an individual agreement	Years of service	Actual/expected date of transition
AIS Editorial Team Coordinator	Corporate Agreement/ASA7	ATM Network Services	Innovation Manager	8.45	01 December 2016
Analyst Team – Team Leader	Corporate Agreement/ASA7	Service Design & Delivery	C&BT Team Leader	7.65	01 December 2016
ATM Program Manager	Corporate Agreement/ASA8	ATM Network Services	ATM Technology Program Manager	13.11	01 December 2016
ATM System Manager	Corporate Agreement/TP3C	Engineering Services	Service Support Engineering Manager (ATM)	4.06	01 July 2016
Check and Standardisation Supervisor	Corporate Agreement/NOC CSS	ATM Network Services	Network Operations Line Manager	12.96	01 December 2016
Chief Technology Officer	Corporate Agreement/ASA 8	Chief Architect	Tech Portfolio Management Services Manager	2.68	01 December 2016
Data Change Controller	Corporate Agreement/ASA7	ATM Network Services	Quality & Service Improvement Manager	7.64	01 December 2016
Engineering Navigation & Surveillance Manager	Corporate Agreement/TP3C	Engineering Services	Service Domain Engineering Manager (CNSI)	7.47	01 July 2016
ICT Business Management & Communications Manager	Corporate Agreement/ASA8	Service Integration	ITSM Lead	11.17	01 December 2016
IFP Manager, Chief Designer	Corporate Agreement/ASA9	ATM Network Services	Flight Paths Design Manager	3.58	01 December 2016
Investigations Team Leader	Corporate Agreement/ASA9	Safety Assurance	ATSB Secondment	13.72	01 December 2016
National Operations Supervisor	Corporate Agreement/NOS	ATM Network Services	AIP Service Delivery Manager	6.25	01 December 2016
National Operations Supervisor	Corporate Agreement/NOS	ATM Network Services	Network Operations Line Manager	5.81	01 December 2016
National Operations Supervisor	Corporate Agreement/NOS	ATM Network Services	Network Operations Line Manager	5.42	01 December 2016

National Operations Supervisor	Corporate Agreement/NOS	ATM Network Services	Network Operations Line Manager	5.42	01 December 2016
National Operations Supervisor	Corporate Agreement/NOS	ATM Network Services	Network Operations Line Manager	4.82	01 December 2016
Navigation & Surveillance Projects Manager	Corporate Agreement/ASA8	ANS Customer Value & Business Performance	Comm/Nav/Surv Portfolio Delivery Manager	19.80	01 July 2016
Operational Safety Assurance Team Leader	Corporate Agreement/ASA9	Safety Assurance	Systemic Review & Investigations Lead	28.10	01 December 2016
Principal Strategic Human Factors Advisor	Corporate Agreement/ASA9	Standards & Systems	Human Factors Lead	5.67	01 December 2016
Project Manager	Corporate Agreement/ASA8	Service Design & Delivery	Enterprise Network Program Manager	5.35	01 December 2016
Project Manager	Corporate Agreement/ASA8	ANS Customer Value & Business Performance	Program Management Office Manager	1.95	01 July 2016
Projects & Scheduling Analyst	Corporate Agreement/ASA8	Enterprise Portfolio Management Office	Benefits & Governance Framework Manager	3.66	01 December 2016
Regulatory Compliance Specialist	Corporate Agreement/ASA8	ARFFS Customer Value & Business Performance	Environment (PFAS) Program Manager	4.02	01 December 2016
Regulatory Compliance Specialist	Corporate Agreement/ASA8	Safety Assurance	Aviation Regulatory Performance Leading Specialist	2.78	01 December 2016
Safety Programs Advisor	Corporate Agreement/ASA9	Safety Assurance	Senior ATM Safety Performance Lead	6.70	01 December 2016
Senior Case Management Advisor	Corporate Agreement/ASA 7	Transactional Services	Corporate People Services Advisor	5.27	01 December 2016
Senior Cost Benefit Analyst	Corporate Agreement/ASA8	Enterprise Portfolio Management Office	Investment Analyst	4.81	01 December 2016
Senior Human Factors Specialist	Corporate Agreement/ASA8	Office of Chief Air Traffic Controller	Operational Risk Specialist (Human Factors & Change Management)	2.70	01 December 2016
Senior Human Factors Specialist	Corporate Agreement/ASA8	Office of Chief Air Traffic Controller	Operational Risk Specialist (Human Factors & Change Management)	2.17	01 December 2016
Senior Insurance Specialist	Corporate Agreement/ASA8	Finance Strategy & Planning	Insurance Lead	11.79	01 December 2016
Senior Organisational Capability Advisor	Corporate Agreement/ASA 7	People Policy & Development	People Transformation Manager	3.97	01 July 2016

Senior Procurement Specialist	Corporate Agreement/ASA7	Procurement & Supplier Relationship Services	Senior Procurement & Contracting Strategist	6.32	01 December 2016
Senior Project Manager	Corporate Agreement/ASA9	Customer Value & Business Performance	Program Manager	6.25	01 December 2016
Senior Project Safety Specialist	Corporate Agreement/ASA8	Office of Chief Air Traffic Controller	SMS Operation and Change Assurance Senior Specialist	3.30	01 December 2016
Senior Project Safety Specialist	Corporate Agreement/ASA8	Office of Chief Air Traffic Controller	Operational Risk Specialist (Human Factors & Change Management)	6.0	01 December 2016
Senior Project Safety Specialist	Corporate Agreement/ASA8	Office of Chief Air Traffic Controller	Operational Risk Specialist (Human Factors & Change Management)	11.42	01 December 2016
Senior Safety Programs Specialist	Corporate Agreement/ASA9	Safety Assurance	Senior ATM Safety Performance Lead	16.18	01 December 2016
Senior Safety Specialist - Human Factors	Corporate Agreement/ASA8	Safety Assurance	SMS Operational and Change Assurance Senior Specialist	6.38	01 December 2016
Senior Security Services Advisor	Corporate Agreement/ASA 8	Security Services	Security Governance Manager	6.80	01 December 2016
Senor Resilience & Administration Advisor	Corporate Agreement/ASA 6	Governance Risk & Compliance	Resilience Manager	9.35	01 December 2016
Storage & Capacity Team Leader	Corporate Agreement/ASA8	Service Design & Delivery	Data Management Team Leader	4.58	01 December 2016
Taxation Manager	Corporate Agreement/ASA 7	Finance Operations & Analysis	Tax Manager	21.81	01 December 2016
Team Coordinator	Corporate Agreement/ASA7	People Capability	Workforce Deployment Rostering Manager	4.52	01 December 2016
Team Leader – Accounts Payable	Corporate Agreement/ASA7	AP/AR Finance	Payroll Manager	6.17	01 July 2016
Team Leader - ATM Services	Corporate Agreement/TP3C	Engineering Services	Service Domain Engineering Manager (Systems)	3.30	01 July 2016
Team Leader – IT Security Operations	Corporate Agreement/ASA7	Service Integration	Information Security Services Manager	8.62	01 July 2016
Technical Team Leader	Corporate Agreement/TO6	Technical Services	Technical Manager	33.29	01 December 2016
Technical Team Leader	Corporate Agreement/TO6	Technical Services	Technical Manager	0.80	01 December 2016

Technical Team Leader	Corporate Agreement/TO6	Technical Services	Technical Manager	12.74	01 December 2016
Technical Team Leader	Corporate Agreement/TO6	Technical Services	Technical Manager	0.38	01 December 2016
Technical Team Leader	Corporate Agreement/TO6	Technical Services	Technical Manager	8.95	01 December 2016
Technical Team Leader	Corporate Agreement/TO6	Technical Services	Technical Manager	0.79	01 December 2016
Technical Team Leader	Corporate Agreement/TO6	Technical Services	Technical Manager	27.75	01 December 2016
Technical Team Leader	Corporate Agreement/TO6	Technical Services	Technical Manager	26.74	01 December 2016
Traffic Management Officer	Corporate Agreement/TMO1	ATM Network Services	Data Integrity Manager	2.34	01 December 2016

Rural & Regional Affairs and Transport Legislation Committee
ANSWERS TO QUESTIONS ON NOTICE
Supplementary Budget Estimates 2016 - 2017
Infrastructure and Regional Development

Question no.: 147

Program: N/A
Division/Agency: Airservices Australia
Topic: Accelerate Program
Proof Hansard Page: 90-91 (27 October 2016)

Senator Sterle, Glenn asked:

Senator STERLE: If you could provide that, that would be good. Is there a target that you want to achieve?
Mr Harfield: No
Senator STERLE: So it is just a case of putting it to them and seeing who wants to work—
Mr Harfield: The process that has been gone through is that earlier this year we published what the design principles were for the new organisational model, which were addressing some of the issues that the organisation had gone through. One of those issues that we put there—what we call technical leadership—was being devalued from what we would call people leadership, in the sense of management versus someone who is a head technical specialist: the head finance person or the head engineering type person that were being devalued in the structure. Under this new structure we are saying that a technical leadership position and somebody who manages people are just the same, and they are just as important. In doing that, some positions that were considered lower in the organisation were actually boosting up and, as a result, we are offering them a contract, but we can provide you with those numbers.
Senator STERLE: Okay, that is good—and at what level.
Mr Harfield: Absolutely.
Senator STERLE: That is good. Could you give us a list by area of the work-level descriptors for the changed roles?
Mr Harfield: What they are? We can provide that. That might take a little bit longer than tomorrow. As a result we are still in the middle of the process and finalising those over the next two weeks. So we can provide them after 24 October, if that is okay.
Senator STERLE: That is fine. And work functions that will be ceased or done differently?
Mr Harfield: That have changed? We can provide that.
Senator STERLE: All right. Can you provide the total number of staff who have been moved from enterprise agreements to individual contracts over the last 24 months?
Mr Harfield: Yes, we can provide that.
Senator STERLE: There are the ones you are talking about now—and if there are any further ones planned for the next 24 months.
Mr Harfield: If I can just clarify so I get this correct: we were not talking about people who have applied for roles before this change who have then—
Senator STERLE: No, I am aware we have not.
Mr Harfield: So it is in regard to the change—on the areas that we have proposed. We can do that. We chose the same answer to the previous questions you have just asked.
Senator STERLE: Okay, so that will alleviate my concerns—
Mr Harfield: The information you have already asked for will cover that.
Senator STERLE: Okay, and perhaps you could include their position title, years of service and date of transmission of industrial agreements and on to contracts for us.
Mr Harfield: We can do that.

Answer:

Airservices does not maintain work level descriptors for management roles.

The Accelerate Program is Airservices' transformation agenda to build a business that is agile and efficient. A core pillar under the Accelerate Program is the *Target Operating Model*, which aims to position the business to meet customer needs, and adapt to market conditions with an operating model with less bureaucracy and more

accountability. As part of the *Target Operating Model*, a number of work tasks will be ceased or performed differently.

The degree of change to work functions vary between areas and have been determined through extensive organisational design work, staff consultation, and change risk assessments, considering that:

- Any safety critical activities are not impacted;
- There are no changes to frontline operationally-rostered air traffic controller or Aviation Rescue Fire Fighter roles;
- A rigorous selection process is undertaken, and appropriate mitigation strategies are in place to manage vacancies as staff depart the organisation.

The Accelerate Program is ongoing and further changes are expected, in particular within the Project/Asset Management and Technology areas.

Detail regarding positions that may transition from an enterprise agreement to an individual contract is provided in response to question 146.

Rural & Regional Affairs and Transport Legislation Committee
ANSWERS TO QUESTIONS ON NOTICE
Supplementary Budget Estimates 2016 - 2017
Infrastructure and Regional Development

Question no.: 148

Program: N/A
Division/Agency: Airservices Australia
Topic: Recommendations made by Mr Greg Cavanagh SM in the 2013 Coronial inquest into the death of Kevin Taylor, Lena Yali and Gregory McNamara 011 [2013] NTMC 1
Proof Hansard Page: 92-93 (17 October 2016)

Senator McCarthy, Malrndirri asked:

Senator McCARTHY: Could I take you to some policies in relation to the firefighting area. You may recall in 2011 an accident in Darwin in the Northern Territory—
Mr Harfield: Correct.
Senator McCARTHY: and recommendations made by Coroner Greg Cavanagh in terms of the policies and procedures for Airservices Australia. I would like to ask you a few questions around that. The coroner identified that there were major shortcomings in the policies and the operating procedures and training protocols of Airservices Australia and that staff were ill-equipped to drive the ultra-large fire vehicle in emergency conditions and at speed with lights and sirens on a public road. Has Airservices Australia made attempts for those recommendations to be addressed?
Mr Harfield: Yes, we have, and I will ask Ms Bennetts, Executive General Manager, Aviation Rescue Fire Fighting, to give you the detail and assurance around that.
Ms Bennetts: Yes, in relation to training, at the time of the coroner's report we took a good look around the country and internationally at what other services do—state services as well as other emergency services providers—in relation to training their people and what policies and procedures they have in relation to driving under emergency conditions. Then we formulated a new policy framework around that and set about training our people in accordance with that policy framework.
Senator McCARTHY: What is the training that you provide?
Ms Bennetts: I would have to take the detail on notice, but it is things such as the rules around when they are approaching intersections, for example, and at what speed they can go through the intersection, and that they must stop before they proceed—those sorts of things. Then we would train them in those procedures. But if you are after more detail that that, I can certainly provide that on notice.
Senator McCARTHY: I guess what I would like to know is, given the tragedy in this particular situation and the recognition that the driver thought that everyone knew that he could drive through the lights—and there was certainly no mention that the driver was responsible in this case—that training that is required for all your staff who are driving these vehicles: is that something that you are doing nationally?
Ms Bennetts: Yes. We implemented a driver training program nationally. The first round of training all of our operational personnel was run out of Brisbane, and they all went, from memory, for a two-day course where they essentially drove the vehicles under emergency conditions where they could do it safely and they could be trained on that basis. That, from memory, was in 2010 to 2012. Our whole operational workforce of 900 went through that training. The training has now been revised for the second round of it, and I can provide you with that detail on notice.

Answer:

Airservices has delivered an extensive driver training program to all firefighting staff across all of its 26 locations.

Shortly after the accident, an external specialist organisation (Driving Management Australia - DMA) was engaged to design and deliver a focused training program. The program was designed in the following three stages:

1. A training pool of staff (representing each location) to become Emergency Vehicle Driving Instructors.

2. Instructors delivered a training package (developed by DMA) to all staff at their respective locations which focused on the basic operation of our firefighting vehicles.

3. All staff (in groups of approximately 12 at a time) attended a two day training course delivered by DMA at a dedicated driver training facility located at Brisbane or Perth. This program focused on the more advanced elements of driving vehicles under emergency response conditions (when using “lights and sirens”) and situational awareness.

An additional ongoing requirement has also been introduced that requires all staff to undertake refresher training and evaluation every 90 days in relation to off-airport driving.

Any new firefighters entering service are also required to undertake the program as described above.

Rural & Regional Affairs and Transport Legislation Committee
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Supplementary Budget Estimates 2016 - 2017
Infrastructure and Regional Development

Question no.: 149

Program: N/A
Division/Agency: Airservices Australia
Topic: Accelerate Program
Proof Hansard Page: 94 (17 October 2016)

Senator Sterle, Glenn asked:

Senator STERLE: The questions we were putting to CASA were that the committee wanted to make sure that CASA are absolutely across where all these redundancies are going—you would have heard the lines of questioning, Mr Harfield, so that would be no surprise to you—and to make absolutely sure that air safety would not be compromised by the 900 odd redundancies. So, you have made that very clear that the only redundancies at the core, at the front-line services, are VRs and they are people that for whatever reason have lost their—what did you call it?
Mr Harfield: As you recall, we have refocused the organisation around what we do so those jobs are no longer required, or they could be released. What I can do is provide the committee with the list of documentation and consultation that we had with CASA, all of that so that we can show all the processes we have undertaken to ensure that that is the case.

Answer:

Please refer to answer provided to Question on Notice SQ16-000368 for key documents provided to CASA.

In addition to regular informal engagement with CASA, which commenced with an email providing a copy of internal staff communications regarding Accelerate on 18 May 2016, formal briefings about the Accelerate Program and associated safety assurance activities were held with CASA on:

- 1 July 2016 (Airservices CEO and CASA Director of Aviation Safety)
- 2 August 2016
- 17 August 2016
- 1 September 2016
- 28 September 2016

Regular engagement with CASA has continued since 17 October 2016.

Rural & Regional Affairs and Transport Legislation Committee

ANSWERS TO QUESTIONS ON NOTICE

Supplementary Budget Estimates 2016 - 2017

Infrastructure and Regional Development

Question no.: 150
Program: N/A
Division/Agency: Airservices Australia
Topic: Accelerate Program
Proof Hansard Page: 95 (27 October 2016)

Senator Xenophon, Nick asked:

Senator XENOPHON: Right, so presumably—given the magnitude of these changes, that I think you have acknowledged—the same processes, protocols and thoroughness that the safety committee would look at these matters with would have been undertaken by the whole board. Is that right—the board as a whole?
Mr Harfield: That is correct.
Senator XENOPHON: And are you able to provide to this committee details of any memoranda relating to the deliberations of the committee? In a sense, the entire board acted as the safety committee, rather than it being delegated to the safety committee.
Mr Harfield: Considering that these are risks to the organisation, I can provide you the information that was provided to the board to provide them with the assurance that we were undertaking the safety processes. In the governance of an organisation, the board is there to oversee and ensure that management are adhering to the policies and the processes of the organisation. So, considering the board decision to go ahead with the Accelerate Program, I put forward the risk assessment and the processes we were undertaking to ensure that we would maintain aviation safety. One of those was excluding aviation rescue and firefighting, and air traffic control from the active frontline operation of the program. Then they would continue to monitor those processes, to ensure that that is the case.
Senator XENOPHON: So is there an email trail, or a paper trail, of the level of the forensic look that the board took to assess the risks—
Mr Harfield: The board's oversight is all auditable and there is a trail on what information has been provided to the board so that they could make their judgement and ask the question—
Senator XENOPHON: Right. Can you provide those documents to the committee, please?
Mr Harfield: I can provide those documents.
Senator XENOPHON: And that includes all the source material that related to the decisions made—
Mr Harfield: For example, with regard to the question you put to CASA about all the safety work, information and consultation going back between CASA and Airservices—absolutely, I can provide you with that.

Answer:

In its role of providing oversight of objectives, strategies and policies, the Airservices Board is being provided with regular briefing by the Chief Executive Officer (CEO) and executive management on all aspects of the Accelerate Program, including safety work.

The Airservices Accelerate Program Transition Plan at Attachment A, provided to the Board in February 2016, outlined the rational and objectives of the Program, including the risks. Examples of information provided to the Board by the CEO outlining staff changes and the associated safety statements and determinations are at Attachment B, C, D and E.

Attachments

- Attachment A: Airservices Accelerate Program Transition Plan, February 2016
- Attachment B: Memo: Voluntary Redundancy Program Approval, 21 July 2016
- Attachment C: Excerpt from CEO Report – September 2016
- Attachment D: Memo: Target Operating Model Team Design Implementation, October 2016
- Attachment E: Excerpt from CEO Report – December 2016

COMMERCIAL IN CONFIDENCE

Airservices Accelerate Program

Transition Plan

18 February, 2016

© Airservices Australia 2016

1 TRANSITION PLAN OVERVIEW

1.1 Context for the Accelerate Program

Airservices performs a critical role in the Australian aviation industry by providing air traffic management and aviation rescue and firefighting services. Each year, Airservices manages over four million aircraft movements carrying ~100 million passengers, and provide air navigation services across 11 per cent of the world's airspace. We operate two air traffic services centres, four terminal control units, 29 control towers and 26 aviation fire stations. In FY15, Airservices generated revenue of $1.012B and had costs of $1.006B.

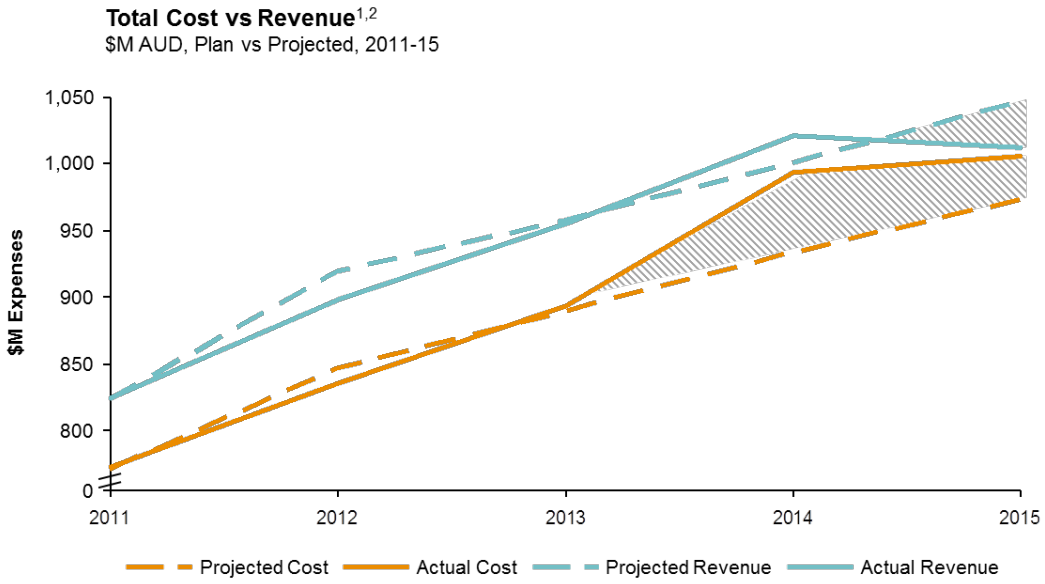
However, our industry is evolving. New technologies are emerging, airline competition has increased, and there is a heightened focus on safety and efficiency. Our customers are responding to this, and so are we. We are undertaking a major asset refresh, including the flagship OneSKY program, creating the future state enterprise architecture, investing in our leadership capability and we are on a cultural transformation journey.

Recent declining financial and project delivery performance however puts at risk our ability to deliver against our transformation agenda. As a result, the CEO commissioned a business diagnostic in November 2015.

This diagnostic identified a number of issues to be addressed:

- While it is acknowledged that technology disruption is on the horizon and that we need to transform our information management capability, we don't have a clear strategy or plan to execute;
- Project performance has degraded and our RoA is low when compared to peers and like industries. This under-delivery is leading to a large backlog of unfunded projects; and
- Costs have grown faster than revenue and we are now forecasting an ~$8M loss in 2016. This is driven by factors including poor controls and rising costs for non-operational staff that cannot be explained by market or regulation driven changes.

Figure 1: Airservices Revenue and Cost vs Revenue (FY2011-2015)



The diagnostic noted that if we are to be in a position to deliver on our transformation agenda, we must:

- Align on our strategic objectives and value proposition to customers;
- Resolve inefficiencies in our operating model and performance management framework;
- Enhance decision making; and
- Build a culture that supports efficiency, effectiveness and agility.

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To address of the outcomes and recommendations of the business diagnostic, the Accelerate Program has been established to rapidly drive the required changes to ensure Airservices continues in its vital role connecting the Australian aviation industry.

1.2 Objectives of the Accelerate Program

The Accelerate Program is designed to establish a platform that will enable Airservices to deliver the broader transformation, and in doing so, ensure customers continue to value the services that we provide.

At the conclusion of the Accelerate program, we will have:

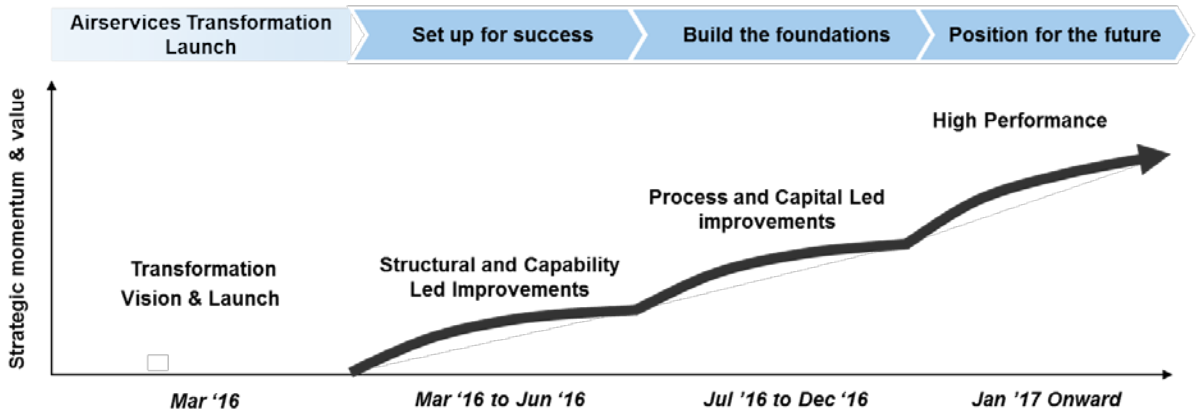
- New and improved ways of working;
- Greater focus on strategic outcomes and customer needs;
- Increased management capability and commerciality;
- A performance based culture with clear accountabilities and responsibilities;
- Improved collaboration at all levels;
- Optimised asset management and performance; and
- Preparedness for digitisation and automation.

In order to ensure the success of the broader transformation, the Accelerate Program will need to deliver the required improvements by June 30, 2017.

1.3 Accelerate Program Roadmap

The Airservices Accelerate Program will have three waves of change from March 2016 through to June 2017.

Figure 2: Accelerate Program Roadmap



Within this, we have developed a set of integrated activities across three pillars.

1. Transition to New Operating Model

- Redesign the operating model by simplifying management layers, improving spans of control, consolidating functions and eliminating duplication;
- Empower ARFF with financial responsibility to operate the group to commercial benchmarks;

- Develop capability in key strategic procurement areas to ensure sustainable benefits and subject to contestability, outsource defined non-core activities;
- Align workforce planning to the new operating model and resourcing levels, and improve roster efficiency based on best commercial rostering practices in Australia;
- Establish a program for future EA reform including remuneration and conditions to align with modern commercial and aviation industry standards and practices; and
- Build information management capability to enable future growth, including data strategy, governance, architecture, access, security, and use, and examine the potential to use strategic partners to manage and store data .

2. Assets & Projects Refocus

- Create an effective asset management framework across Airservices;
- Utilise a Portfolio, Program and Project Management approach to ensure portfolio outcomes are met and projects are delivered efficiently and effectively; and
- Develop a plan to strategically manage the property portfolio with a commercial focus.

3. Technology Enablement

- Simplify and standardise the corporate technology platform environment to automate workflow, reduce manual activity, improve timeliness of service delivery and enable transition to the new operating model.

1.4 Financial Benefits & Required Investment

Figure 3: Phasing, Benefits and Investment

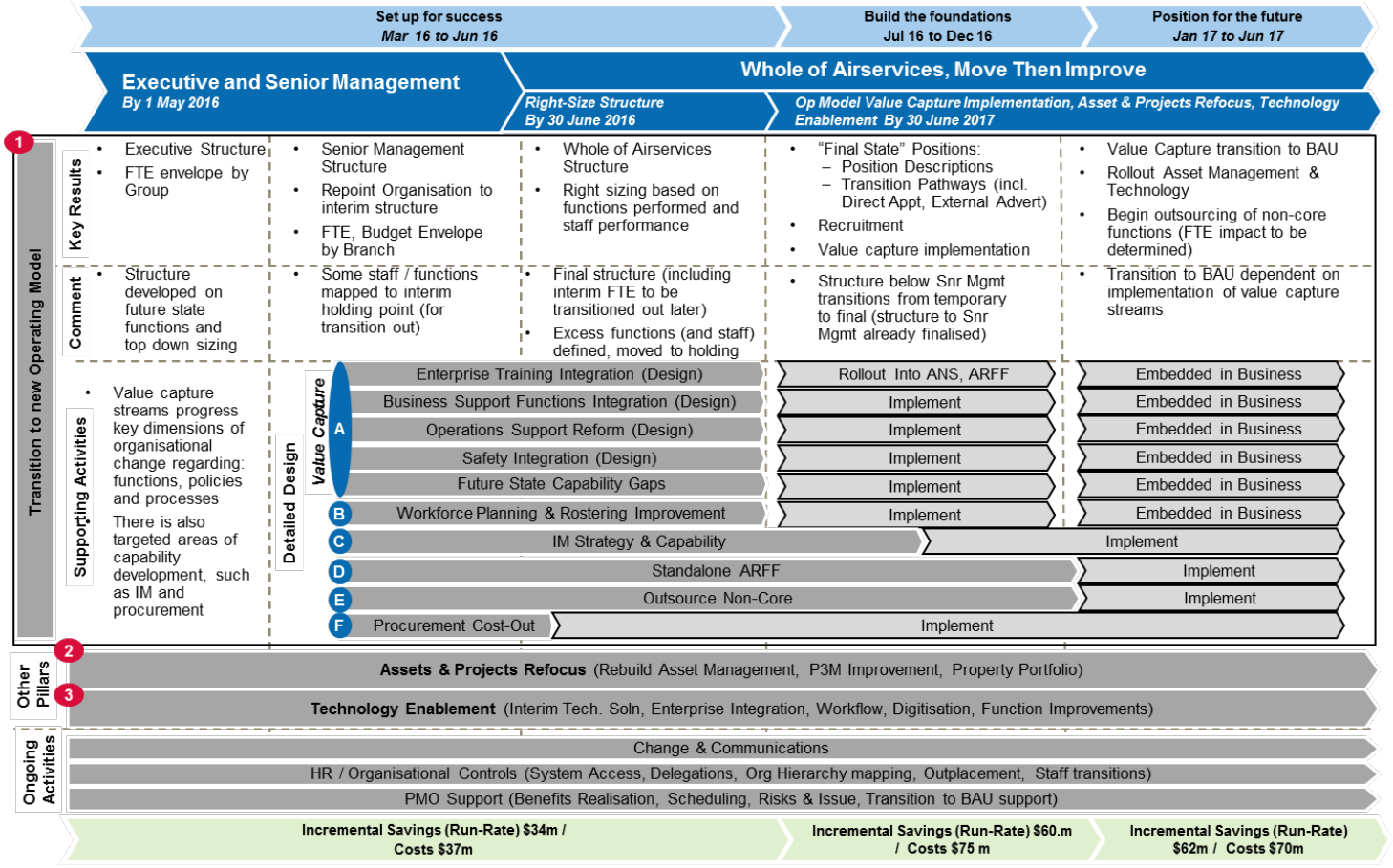
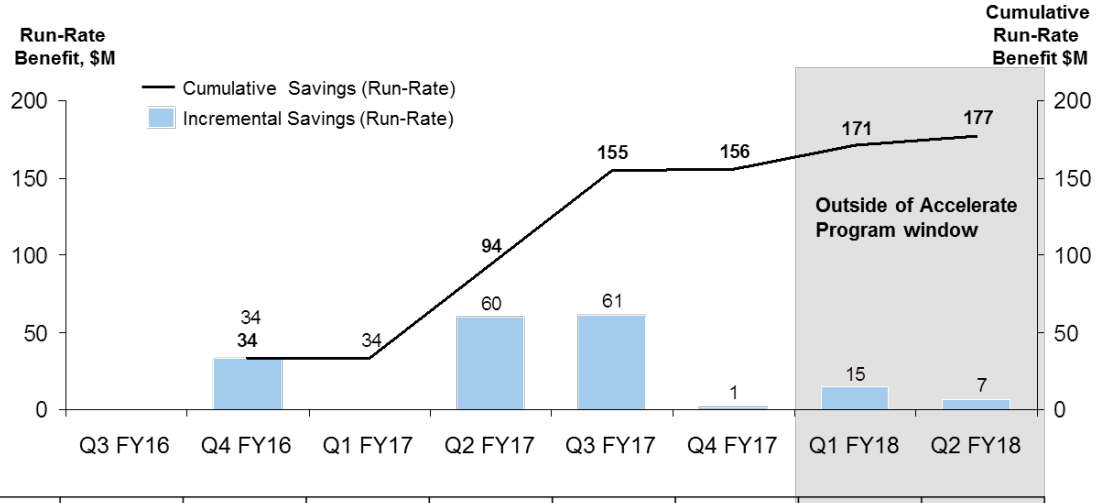


Figure 4: Accelerate Program Benefits and Investment by Quarter



Cost	**3.7**	**32.6**	**17.2**	**58**	**55.8**	**14.7**	**12**	**1.3**
Cumulative Cost	**3.7**	**36.3**	**53.5**	**111.5**	**167.2**	**182**	**194**	**195.3**

In achieving the benefits, we have proposed a rapid move to the target state organisation. This will be followed by an intensive period of improvement to achieve the end state Operating Model.

1.5 Building Future State Capabilities

For a change program of this nature to be successful it will require:

- Strong and active leadership;
- Swift evidence-based decision making;
- Dedicated quality resources particularly with respect to program management; and
- Focus on risk and inter-dependency management.

This requires building, and in some cases, sourcing new capability to fill existing capability gaps at all levels in the organisation. As a result, a range of people and process capability building initiatives have been included within the program plan. Examples include:

- Performance management to reinforce new behaviours and accountabilities;
- Up-skilling on management and business acumen;
- Leveraging external experts in non-core activities as required;
- Continued refresh of management talent;

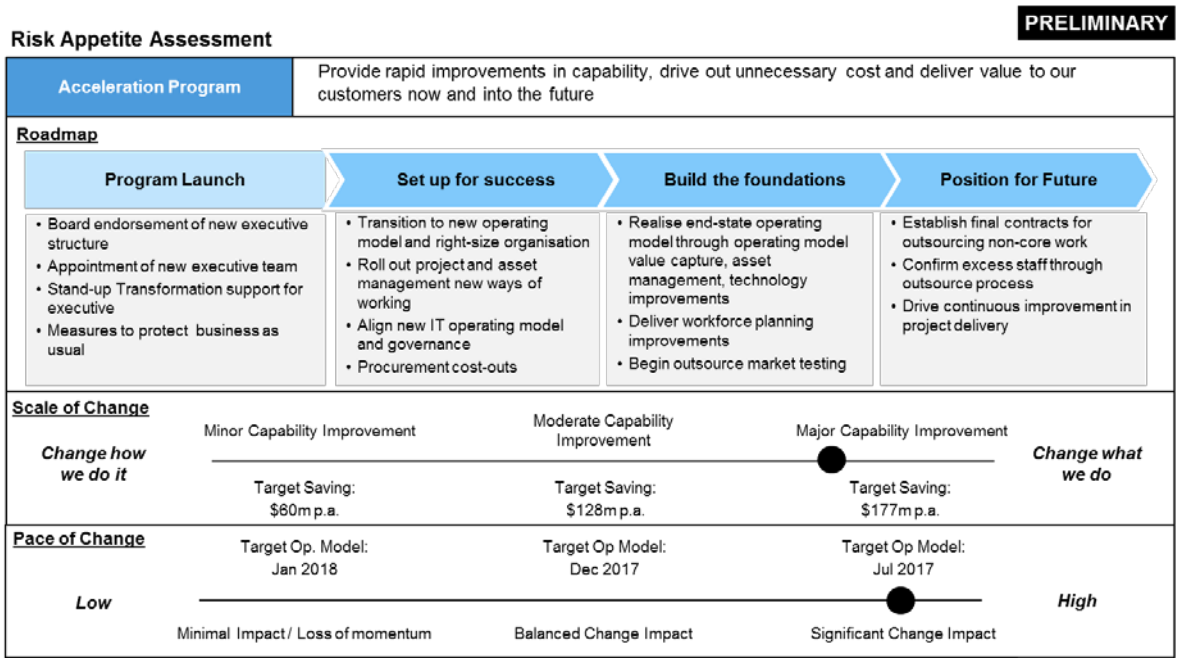
- Aligning functional capabilities to deliver business outcomes; and
- Developing an integrated workplace relations strategy and appropriate industrial agreements.

A number of asset and technology related capabilities will be required to support and enable customer service and efficiency targets.

1.6 Risk Appetite

The Accelerate Program is targeting significant and rapid improvements in focus, efficiency and capability improvements. As a result, an aggressive program has been developed in relation to both the scale and pace of change.

Figure 5: Program Risk Assessment



This assessment is based on the cumulative assessment of the targeted scale of change and pace of change for each initiative. As per the figure below, while the scale and pace of change is between medium and high for each of the initiatives investigated in Phase 2, the outcome is high overall given the weighting given to the operating model changes. Any reduction in the scale or pace is likely to result in a reduction in benefits.

Figure 6: Implementation Risk Assessment Framework

PRELIMINARY

Risk Appetite Assessment

		Scale of Change		Pace of Change		Comments
		Low	High	Low	High	
1 Transition to New Operating Model	Transition & Resize and Realise End-State	Minor Improvement ~$56m p.a.	Major Improvement ~$161m p.a.	Small Change Jul 18	Major Change Jul 17	*Target saving for whole organisation expect outsourcing*
	Workforce Planning and Rostering	Minor Process Change	Significant Process Change	BAU Implementation	Expedited Implementation	*Targeting centralised planning and rostering within groups*
	Info. Mgmt. Strategy & Capability	No Change	Full IM Organisation & Capability	Incremental Capability Build	Rapid Capability Build	*Foundation IM org targeted by Oct 16; $11m in capability development*
	Stand-alone ARFF	Central Control	Autonomous Service Delivery	Full PGPA Compliance – 5 Years	Full PGPA Compliance 18 months	*3 years targeted for full PGPA compliance*
	Outsourcing Non-Core	Limited Potential ~$27m	Full Potential ~$34m	Minor Impact Jul 18 onwards	Major Impact Jan 17 onwards	*Subject to market testing and cost of outsource; No benefit assumed*
	Procurement Cost-Out	Wave 1 Only ~$2M	All Waves (1-4) Up to $3.5M	Jun 16, T&M fee structure	Immediate; at risk fee start	*Establish capability through external support with fees at risk*
2 Projects & Assets Refocus	Rebuild Asset Mgmt	Change Mtce Practices	End-to-End Change	~$2m invest Mar 17	~$4m invest Oct '16	*End-to-end change includes P&E restructure; Targeting Dec 16*
	P3M Improvements	Review Project Gates	Redesign and rebuild P3M	~$2m invest Mar 17	~$4m invest Jul '16	*Full rebuild of P3M across Airservices; Targeting 1st Oct 16*
	Property Portfolio	1-3 Properties Impacted	6-12 Properties Impacted	Start Demo. Mar 17	Start Demo. Oct 17	*Estimated ~$850K in demolition costs ; HQ benefits not included*
3 Technology Enablement	Corporate & Bus. Tech	Fix Few Core Processes	Fix Many Core Processes	Minimal Impact Jan 18	Significant Impact Jul 17	*Up to ~$40m in IT core process investment flagged*

2 IMPLEMENTATION

2.1 Implementation Principles

1. Maintain service continuity: Ensure core ATC and ARFF services are not impacted and risk and safety requirements are maintained;
2. Ownership: Leader-led implementation of changes to drive acceptance and adaption across the business;
3. Timeliness: Capture financial and non-financial benefits early, without compromising benefit size and build momentum across the program;
4. Consistency: Consistent approach applied to implementation through direction from program leadership; and
5. Sustainability: Build and embed implementation capability to enable new model to be sustained – focus toward outcomes, not only milestones.

2.2 Implementation Plan

Figure 7: High Level Implementation Plan

	Set up for success *Mar '16 to Jul '16*	Fix the foundations Jul '16 to Dec '16	Transform Ways of Working *Jan '17 Onward*
1 **Transition to New Operating Model**	• Transition to the new operating model– including moving to the new structure, leadership capabilities, new governance mechanisms and performance management systems • Right-size organisation by stopping unnecessary work, simplifying core processes and improving productivity • Align new IT operating model and governance • Establish new framework for rostering management • Undertake detailed scenario modelling on future EA, REM, and conditions	• Implement operating model improvements for future state training, business support functions, capability gaps, operations support and safety • Determine outsource arrangements for non-core functions • Work with customers to identify opportunities to improve AFFF service delivery • Commence information management strategy and capability build • Implement new procurement governance • Embed consistent workforce planning and rostering approach	• Establish final contracts for outsourcing non-core work • Confirm excess staff through outsource process • Continue to drive operational and organisational efficiencies • Enable full P&L accountability for ARFF • Operationalise data management processes and capabilities • Deliver workforce planning and rostering efficiencies in both AFFF and ATC • Deliver new/improved core Enterprise Data Warehouse components (e.g. reporting tools) to support IM
2 **Assets & Projects Refocus**	• Rollout project and asset management ways of working to enable business units to make commercial based capex and opex decisions • Continue cost out / cost avoidance in third party spend and in-flight capital projects	• Complete P3M rollout and implementation • Evaluate and rationalise property footprint in line with strategic objectives • Initiate asset remediation program linked to new asset strategy	• Drive continuous improvement in CAPEX and OPEX delivery
3 **Technology Enablement**	• Identify and mobilise partners for corporate and business technology improvements • Develop interim technology solution for transition	• Begin development of corporate and business technology improvements to support the new operating model	• Continue roll-out of corporate and business technology

2.3 Key Events

Table 1: Key Program Events

Date	Event
1 March 2016	• **Announce Accelerate Program kick-off to SLT / Staff**
	• Form Executive Steering Committee • Appoint Accelerate Program Manager • Establish Accelerate Program team and governance arrangements • Commence consultation with staff, unions
24 March 2016	• **Executive agree leadership expectations and new ways of working (collaboration)**
	• Executive roadshows • Complete senior management structure and define required capabilities • Commence behaviour change / talent development program • Appoint senior management
2 May 2016	• **Announce Executive and Senior Management structure**
3 May 2016	• **Transition to interim structure (Executive, Senior Management, Branch / Function / repoint)**
	• Complete middle management / lower level structure and define required capabilities • Identify initial phase of surplus staff and develop detailed transition plan
1 July 2016	• **Finalise first wave of organisation right-sizing**
	• Commence Op Model Value Capture Implementation, Asset & Projects Refocus, Technology Enablement • Deliver ongoing improvement
30 June 2017	• **Complete Accelerate Program**

2.4 Implementation Governance

The Program is large and complex, requiring the delivery of multiple initiatives and producing a new operating model across two lines of business. Delivery of program outcomes will be dependent on and interface to multiple external stakeholders. This necessitates a strong focus on implementation governance.

Figure 8: Governance Bodies & Processes

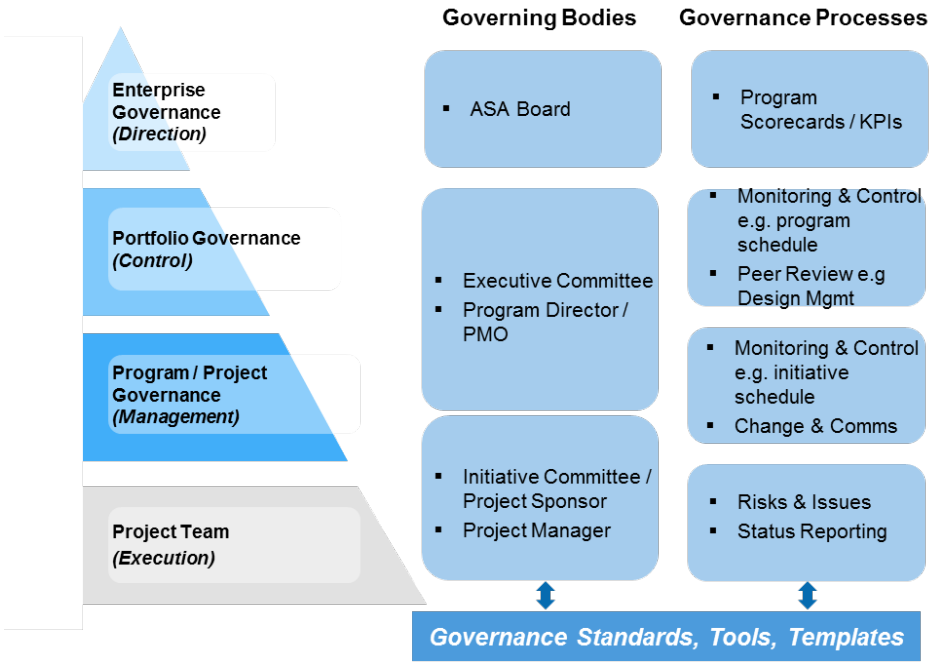


Table 2: Key Governance Activities

Body	Responsibilities
Airservices Board	• Approve the rationale and objectives of the program and significant investments • Oversee delivery of Program to meet intended objectives
CEO & Executive Committee	• Endorse Program financial and non-financial objectives and overall operating model design • Decide on major program design choices, risks, and issues and monitor alignment and interdependencies across initiatives • Assess achievement of program milestones, accept major deliverables and ensure benefits of initiatives are realised • Authorise initiation of large initiatives, decide on major program variances as required, and monitor overall expenditure • Endorse Program support requirements and capabilities e.g. out-placement, industrial relations, change, and communications • Ensure implementation is in line Board's risk appetite and within Safety Management System and organisational risk frameworks.
Program Director **Appointed by CEO**	• Responsible for meeting time, cost, quality deadlines • Ownership of schedules, monitor and track progress; ensure coordination across teams • Manage key interfaces to program stakeholders • Ensure effective governance of all initiatives • Manage specialist support to initiatives via PMO

Body	Responsibilities
Initiative Steering Committee OR Bus. Sponsor	• Develop and deliver specific initiatives within the broader Accelerate Program • Oversee initiative-specific design decisions, risks and issues • Provide recommendations to Executive
Initiative Lead	• Responsible for meeting time, cost, quality deadlines for specific initiatives Risk and Issues management • Ownership of initiative schedules, monitor and track progress • Support implementation and handover to BAU • Maintain relationship with key business stakeholders

2.5 Making the Change Happen

A deliberately staged and rigorously managed change strategy will be required to enable Airservices to achieve its goals, this includes:

- Maintaining maximum pace and unwavering focus on delivering outcomes;
- Ensuring early actions are carefully planned to signal intent;
- Building in flexibility to adapt and respond as required, acknowledging the volatility of the IR environment and the non-linear nature of change; and
- Building momentum and buy-in over time across key internal and external stakeholders.

2.6 Communication

2.6.1 Approach and Style

- Communication is the responsibility of the entire leadership team;
- The strong case for change and the vision for the future will be regularly reinforced, along with the opportunity to shape the “how”;
- Key program dates and milestones will be shared and featured in regular updates;
- Change will be demonstrated by the way leaders work together to implement the program including the way information is communicated;
- Key messages will come directly from the CEO but will be aligned through the organisation to the frontline through the executive and senior management; and
- Messages and approaches will be tailored for different audiences.

2.6.2 Communications Success factors

Our success will be determined by outcomes with our people, not on communications outputs, this includes:

- Readiness for change – the communication and change approach should lay the ground-work for acceptance and readiness for change;
- Engagement and participation levels – staff and stakeholders will be engaged in conversation and will actively and constructively participate in forums/workshops; and
- Complaints / disruption to services will be minimal – where there are issues, they will be responded to respectfully and in a timely manner.

2.7 Program Risks

Our Program is ambitious and does not come without risk and our ability to mitigate these risks will ultimately determine how successful the Accelerate Program is.

Table 3: Program Risks

Risk	Description	Mitigation
Leadership misalignment	• Lack of leadership alignment on the pace and scale of change • Misalignment between executives and managers throughout the organisation	• Compelling change narrative • Clear plan and milestones • Aligned leadership expectations and behaviours
Ineffectual leadership capability across the organisation to manage the change	• Executive and senior managers unable to drive the required change in the organisation	• Build internal leadership capability Implementation and alignment of talent management and performance management systems
Inadequate skills and capability within the program to deliver the benefits	• Insufficient skills and capabilities in-house to deliver the benefits of Accelerate Program within required timeframes • Limited internal experience with large transformation programs	• Build internal capability in core areas • Enlist external support in targeted skills and capabilities for non-core aspects • Provide support via Program Office

Risk	Description	Mitigation
Lack of stakeholder awareness	• Unable to align and manage stakeholder and customer expectations – including employees, customers, suppliers, CASA, Minister, Unions and other government bodies • Stakeholder unwillingness to support major changes	• Proactive external communications strategy • Early identification and management of stakeholder needs
Loss of focus on core service delivery	• Failure to manage current active issues – incl. safety, environmental, WHS and security (IT & cyber) during transition	• Strong Program governance and monitoring key BAU and Program KPIs • Continued enterprise risk management

A set of indicators focussed on program milestones and benefits realisation will be developed to ensure we actively manage the program risks. Where possible, we will build targets into leadership KPIs and have a process in place to ensure these are tracked and lead to interventions if necessary.

2.8 Conditions for Program success

Strong leadership will be critical to deliver the Accelerate Program and requires our people to think and act in the new paradigm. Airservices needs to embrace single point accountability and shared responsibility.

A planned and controlled ~15 month implementation program is essential for the Program to succeed and it will require dedicated resources and commitment from the Executive and Senior management team.

3 INITIATIVES

airservices

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Memo

To: CEO Direct Reports

CC: Andrew Boyd, People Transition Manager

Date: Thursday, 21 July 2016

Subject: Voluntary Redundancy Program Approval

This memo provides my formal approval for the release of the VR offers.

I note that:

- There were 661 applications made for VRs; 107 staff were determined as ineligible for a VR. This was primarily due to staff being on an operational roster, or in some cases the staff member had already advised the organisation of their intention to retire or had left the business; and a further 31 staff were also determined as ineligible due to the continued or future requirement for their role or capability in Airservices, or they withdrew their expression of interest.
- A process was undertaken to ensure that offers would not affect our ability to deliver our services, now or in the future, and that a detailed and rigorous assessment was conducted that had every VR application assessed individually to determine any potential impact the safety of our air traffic control or aviation rescue fire fighting operations.
- The process identified actions that need to be completed prior to individuals departing the business while in some instances VR applications were declined where risks were identified. In other cases, required actions may take some time so departure dates will be later following the successful completion of actions to mitigate any risks.
- Formal approval of this process has been made by the individual EGMs or delegate as well as overall by the acting EGM Safety & Assurance
- From the assessment process we will be making VR offers to 523 staff. These staff will have two weeks to consider the offer and advise whether they accept. Once accepted, a departure date will be determined, taking into account any necessary risk mitigation actions as mentioned previously.
- Formal VR letter offers and redundancy calculations will be provided to staff from today through to the end of next week (29 July). Staff determined as ineligible for a VR will be advised by their manager.

In providing my approval I require that the releasing manager provide a final signoff at the staff clearance stage that any identified mitigating actions are completed before the staff member is released. This signoff must form part of the staff clearance process.

Jason Harfield
Chief Executive Officer

Attachment C: Excerpt from Chief Executive Officer (CEO) Report to the Board

September 2016

On 1 July 2016 we transitioned to our new operating model and leadership structure. This was a significant logistical exercise that went very smoothly. In a six week period commencing on 17 May, we announced the new operating model; rationalised the entire management structure to the frontline layer; and repointed all staff under that structure.

A new management delegations framework was implemented in line with our new operating model. This framework simplifies our delegation structure and ensures a single point accountability for decision making.

Our Voluntary Redundancy (VR) Program saw a total of 544 offers made to staff (from 661 applications) in the week commencing 18 July.

Overall, in the period 1 January to 31 August, 486 staff have left the business, with another 150 phased to leave under the VR program by February 2017.

The phasing of the departure dates for these 150 staff members is a result of a safety/risk process that was conducted for all VR applications.

As well as quarantining operational and rostered air traffic controllers and aviation rescue fire fighters from the VR program, the safety/risk process was also undertaken to ensure that the VR offers would not affect our ability to deliver our services, now or in the future, and that a detailed and rigorous assessment was conducted that required every VR application to be assessed individually to determine any potential impact in the safety of our air traffic control or aviation rescue fire fighting operations.

The safety/risk process identified any actions that would need to be completed prior to any individual departing the organisation or the situation where an application was declined. In a number of cases, departure dates were phased to ensure appropriate mitigation was in place prior to departure.

Also during the period the detailed design work of the capability and structure below frontline management was conducted. The work was conducted in three stages with Executive sign off at the completion of each stage and prior to the commencement of the next stage. The three stages were:

- **Stage 1**: Define the organisational unit by key objective, outcomes to be delivered; functions and tasks;

- **Stage 2:** Identify the existing or new skills and capabilities required to execute the functions and tasks; and

- **Stage 3:** Define the proposed organisational unit and structure.

Stage 3 was approved by the Executive on 30 August 2016 and consultation on the structure and capabilities will commence in the first week of September. These revised structure and capabilities are scheduled to be implemented in late October 2016.

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Memo

To: CEO Direct Reports
Sean Butler, People Policy and Development Manager

Subject: Target Operating Model Team Design Implementation

This memo provides my formal approval for the implementation of finalised team designs and outcomes of the recent merit-based selection process, and my requirements for the implementation.

Considerations

In providing my approval I note:

- The Target Operating Model team designs have been developed through a process that has included staff consultation and approval by the accountable managers.
- The merit-based selection process has been undertaken by accountable managers in each business group, and proposed outcomes were agreed at the Executive Steering Group meeting on 20 October 2016.
- Each Executive General Manager has considered and accepted the risks of change, satisfied themselves of the rigour of the selection process undertaken, and has appropriate mitigation strategies to manage vacancies as staff depart the organisation.
- Airservices Safety Management System has been applied during the process, including production of a Safety Case Assessment and Reporting Determination (SCARD) on 30 August 2016 and Safety Statement on 21 October 2016.
- There are no changes to frontline operationally-rostered air traffic controller or Aviation Rescue Fire Fighter roles, and that each accountable manager has explicitly considered and ensured that any safety critical activities would not be impacted.
- Approximately 200 staff will be declared potentially surplus and approximately 200 vacant positions will be advertised as a result of these changes, some of which will also be available to external applicants.
- There is a whole of enterprise management of staff identified as potentially surplus.
- There are appropriate arrangements in place for transition support for those staff seeking redeployment or leaving the organisation either voluntarily or involuntarily.

- That managers across the business have been provided with training and guidance materials to effectively and empathetically discuss the impact with staff members as well as techniques for managing self-resilience.
- That managers have been provided with additional support material on the Employee Assistance Program, including arrangements for rapid response counselling if a manager anticipates or encounters a significant reaction from a staff member requiring professional support.
- That staff will be provided with information on options (if applicable) and available support.

Requirements

During the implementation of the team designs and staff changes, I require:

- The continued prioritisation of safe, secure and efficient service delivery.
- That the releasing manager provide a final signoff that any identified risk mitigating actions have been completed before a staff member is released.
- The outcomes of the IM&T Potentially Surplus Personnel Review is provided to me by no later than 6 November 2016.

Jason Harfield
Chief Executive Officer

24 October 2016

CHIEF EXECUTIVE OFFICER'S REPORT
DECEMBER 2016

1.1 **Accelerate Program:** I approved the implementation of new team designs as the final stage of the transition to the new Operating Model on 24 October 2016. This followed an enterprise-wide merit-based selection process supported by comprehensive risk assurance activities in accordance with our Safety Management System.

A summary of the key assurance activities of managing any potential operational impact of staff departures during the Accelerate program is at **Attachment 2**.

Attachment 2: Management assurance of the operational impact of Accelerate staff departures

The following is an overview of the process that was applied by management to the Accelerate Program for Voluntary Redundancy (VR) and the Involuntary Redundancy (IVR) Process.

Voluntary Redundancy Process:

- Operational and rostered air traffic controllers and aviation rescue fire fighters from the VR program were specifically excluded from the outset.
- Airservices has rigorously followed its Safety Management System with an initial safety risk assessment (Safety Case Assessment and Reporting Determination) approved on 29 June 2016 considered potential hazards to operational services and systems of the VR program and assessed the overall operational safety impact as minor.
- All VR applications were individually assessed by the accountable managers to evaluate the potential impact of departures and develop mitigation strategies and transition plans (where required). The aggregate impact of the proposed departures was also considered. In some cases VR applications were declined (of the 661 applications; 107 were determined as ineligible primarily due to being on an operational roster or capability was required) and in a number of cases, departure dates were phased to ensure appropriate management strategies were in place prior to departure
- Final recommendations of proposed offers, made by Executive General Managers (EGM) to the Chief Executive Officer (CEO), included assurances that service delivery would not be impacted, and that the safety accountabilities would continue to be acquitted appropriately. Furthermore, measures would be established to monitor service performance to ensure adjustments to risk controls were made if necessary.
- The EGM Safety & Assurance provided an overall assurance statement to the CEO that managers had followed the appropriate process to consider risks within their areas of accountability.
- The CEO approved the release of VR offers on 21 July 2016, which included final clearance requirements to be met by releasing managers to ensure identified mitigation actions were completed prior to the exit of employees from the business. The CEO's 21 July 2016 approval memo supporting the decision is available in the **BoardPad Reading Room** "*Management memos re Accelerate – July and October 2016*" (posted 2 November 2016).
- At CEO request, a safety assurance review was conducted in October 2016 to provide assurance that assessment and clearance processes were being appropriately applied to employees from areas deemed as safety-critical. The review sampled 25 employees who had accepted VR offers and confirmed that:
    - assessments were adequately completed
    - identified risks were acknowledged and accepted by the accountable managers
    - appropriate actions were being undertaken to manage the identified risks
    - clearance actions were being undertaken by the accountable managers before employee releases, including the explicit declaration of conditional approvals where relevant.

Involuntary Redundancy Process

- On 24 October the CEO approved the final transition to the new operating model with the finalised team designs based on the outcomes of a merit selection exercise. The associated approval memo,

setting out the assurance upon which this is based, is available in the **BoardPad Reading Room** "*Management memos re Accelerate – July and October 2016*" (posted 2 November 2016).

- Airservices Safety Management System was applied during the process, including production of a Safety Case Assessment and Reporting Determination (SCARD) on 30 August 2016 and Safety Statement on 21 October 2016.

- The new Operating Model team designs were developed through a process that included staff consultation and were approved by the accountable manager.

- A merit-based selection process was undertaken by the accountable managers in each business group, and proposed outcomes were agreed at the Executive Steering Group meeting on 20 October 2016.

- Each EGM considered and any accepted the risks of change, satisfied themselves of the rigour of the selection process undertaken, and has appropriate mitigation strategies to manage vacancies as staff depart the organisation.

- There are no changes to frontline operationally-rostered air traffic controller or Aviation Rescue Fire Fighter roles, and that each accountable manager has explicitly considered and ensured that any other safety critical activities would not be impacted.

- Approximately 200 staff were declared potentially surplus and approximately 200 vacant positions advertised for the revised capability required by the organisation.

Documentation supporting all of the above steps, for both the VR and IVR process, can be made available on request.

Attachment 3: PwC Performance Agreement October – December 2016 (Progress Update as at 11 November 2016)

PwC Performance Agreement October – December 2016 (Progress Update 11 November 2016)	
Objective	**Progress**
1. Support Airservices Leaders to embed the target operating model and transition to new ways of working, including: • Identification of additional target savings in Q2 FY17, as defined by the Executive Steering Group in Q1 (between $6m and 12m). • Provide ongoing analysis of progress, and advice on prioritisation of initiatives to achieve targeted program outcomes. • Delivery of strategy through to execution of initiatives to defined scope, quality and cost; • Executive mentoring throughout the transformation; and • Supporting the joint-operation of the transformation PMO in maintaining governance, operating cadence, issue resolution and reporting.	▪ PwC has supported the broader team to identify and quantify opportunities. The program has now identified approximately $9M of additional savings to be achieved in Q2 FY17, producing a cumulative annualised saving of approximately $106M (approximately $12M ahead of the original cumulative target). ▪ PwC have provided regular updates to the senior leadership on progress to date, how this compares to the original target, and where additional opportunities are. ▪ PwC has provided ongoing support to the Program Director. This includes analytical support for Executive Steering Group meetings and the stand-up of the Enterprise wide initiatives. This is now the focus of the program following finalisation of the organisation structure. Specifically, PwC drafted new initiative charters for workshop reviews and subsequent endorsement, held sessions with initiative leads, supported preparation of materials and shared insights on how to approach the work. ▪ PwC has introduced SMEs to complement the work of the Airservices team in Corporate / Shared Services and procurement / rapid cost out activity.
2. Support the progression of the *Project and Asset Refocus* pillar to realise benefits in accordance with the baseline program schedule: • Development of a P3M detailed model, underlying processes and artefacts and rationalise/prioritise/phase projects; • Supporting Airservices to work in concert with strategic partner to develop/implement an asset management framework, strategy and Total Value of Ownership Model; • Development of a plan to consolidate and strategically manage the property portfolio with a commercial focus. • Advising on the design of functional business cases for market testing, procurement approaches and contract evaluation/negotiation; and • Development of a shared services business support model.	▪ Following the appointment of the strategic partner (EY) for the projects and assets refocus work, PwC's role is to ensure the output is consistent with the broader Accelerate program and the efficiency targets ▪ PwC, The Program Director, the Initiative Sponsor (CFO) and the Initiative Lead have met and agreed PwC's role in relation to oversight of the Asset Management initiative deliverables. PwC have also held introductory meetings with the EY project lead and has commenced collaborating to ensure Airservices objectives are met ▪ Consistent with the objectives of the Projects and Assets Refocus pillar and the Market Test initiative, PwC supported the ARFFS review of HV maintenance. This review provided an overview of various maintenance strategies and rated Airservices ARFFS against this. In addition, developed a series of case studies on like industries to help inform future sourcing model (market test). ▪ The initiative "market test non-differentiated capabilities" has kicked off. ▪ The "rapid cost initiative" has kicked off. PwC has held a meeting with the Initiative Lead to share insights and lessons learned on the the 2015 diagnostic, Accelerate targets, and the approach PwC used for developing contract evaluation and negotiation strategies for key contracts (B&K, Aeropol). ▪ Airservices has stood up an internal team to work on the property portfolio and PwC has offered assistance as required. ▪ The shared services business support model fits under the target op model initiative.

PwC Performance Agreement October – December 2016 (Progress Update 11 November 2016)	
Objective	**Progress**
3. Support the progression of the *Technology* pillar to realise benefits in accordance with the baseline program schedule: • Development of a technology roadmap/improvement plan, specification of integration business requirements and supporting the sourcing of workflow automation solutions; and • Support the implementation of the IM Strategy and Capability initiative by assisting with the sourcing of additional capability to progress the development of an IM Strategy and design, implementation of best-practice data management capabilities.	▪ PwC have driven the collaboration between the Business Support Services (BSS) and Corporate & Business Technology (CBT) initiatives in the development of a joint approach for the new business support model. This includes leading a workshop to brainstorm an approach to developing the new macro business processes - this was supported by a PwC SME in shared services design and implementation. ▪ PwC have provided materials that outline a blueprint and approach for developing the CBT target state. These materials will be used for the joint BSS-CBT initiative presentation to ESG on Friday 11th Nov. ▪ PwC have supported a session that reviewed leading technology solutions for standardised corporate functions (HR, Procurement, and Travel & Expense Management). These solutions will be taken to the business for demonstration commencing Thursday 17th Nov. ▪ PwC have contributed to the development of RFP materials to seek the services or a procurement specialist to lead the market engagement activities for the IM Strategy & Capability initiative. ▪ PwC have supported the on-boarding of the newly appointed Information Management Strategy Manager. This included a brief on the Accelerate Program to date, and a detailed overview of the initiative objectives and outcomes. ▪ PwC have developed analysis that describes the functional change in the transition to the new IT operating model. This analysis addresses on a function-by-function basis where efficiencies were realised, where uplift was made, and where functions were eliminated or moved to another area of the business.
4. Support the implementation of further *Target Operating Model* efficiencies, including: • Establishment of enterprise procurement governance and a strategic partnership framework; • Advising on best-practice workforce planning and rostering methodologies and performance for operations-focused improvement initiatives • Supporting the identification of capability and gaps and actions for remediation; • Workforce rostering productivity assessment and preliminary design of centralized rostering functions; and • Support the implementation of the Stand-alone ARFFS initiative in capability assessment, gap analysis and transition planning.	▪ The initiatives have been structured so that Workforce Rostering is standalone from Workforce Planning. Further, Workforce Planning and the Capability Gaps initiative have merged and are now considered BAU under the head of People & Policy in Corporate Services. ▪ PwC drafted and refined the Rostering Charter. PwC then supported refinement of the business case development for the rostering tool integration. Through this, the joint team discovered cheaper alternatives that leveraged functionality already available. With this, the business case was redrafted and analysis indicates a NPV of $35-50M ▪ PwC led two standalone ARFFS workshops to agree the roadmap for standalone ARFFS. Team worked with Initiative Lead to draft the 5 year standalone independent strategy. This is currently with the EGM for review

PwC Performance Agreement October – December 2016 (Progress Update 11 November 2016)	
Objective	**Progress**
5. Continue to provide change communications advice and support in alignment to Accelerate Program objectives, specifically: • Supporting the development of CEO communications (e.g. speeches, internal publications etc.); and • Ongoing development of Airservices communications capability and program communications material.	▪ PwC developed new Azimuth Concept Option for internal communications – streamlining the magazine into a smaller / more compact A3 version and lowering cost. This is consistent with shifting to a more efficient, streamlined and strategy-focussed business ▪ PwC are currently supporting preparation for the next Leadership Forum, to be held on 28 November. This includes showcasing / celebrating changing behaviours ”

Attachment 4: Accelerate Program Proposed Performance Agreement Objectives for PwC January – March 2017

Objective	Measure
1. Support Airservices Leaders to deliver targeted Accelerate Program outcomes	• Benefits Realisation - Realisation of further annualised cost savings between $20m and $25m in Q3 FY17, producing a cumulative realised saving between $126m and $131m of the $155.8m program target. - Identification of options to realise the remaining target by 30 June 2017; - Development of implementation plans for options approved by the ESG to the agreed scope, benefit, cost and risk; - Provide advice on prioritisation of initiatives to achieve targeted program outcomes; • Program Support - Provide ongoing analysis of progress of initiatives against plans;; - Executive mentoring throughout the transformation; and - Support the joint-operation of the PMO in program and change management, specifically in maintaining governance, operating cadence, issue resolution and reporting.
2. Support the delivery of the Project and Asset Refocus pillar to realise benefits in accordance with the baseline program schedule	• Rebuild Asset Management – implementing a holistic, strategy-led asset management system: - Provide assurance to senior leadership that the recommendations from the initiative team and external contractor align with Accelerate Program objectives, design principles, targets and timeframes; - Provide advice to senior leadership on overall change management approach • Implement top-down portfolio, program and project management (P3M) to support delivery of the capital works programs - Support establishment of scalable and fit-for-purpose governance frameworks and forums to enable effective portfolio, program and project delivery; and - Support development of artefacts, tools, processes and practices as part of the P3M model that are aligned to new ways of working.
3. Support the delivery of the Technology pillar to achieve the targeted objectives	• Supporting Airservices to work in concert with a strategic partner to deliver the target state Information Management (IM) capability through - Development of an IM business case; - Development of IM governance framework; - Beginning the design, build and implementation and deployment of IM technology components aligned to the strategy and roadmap; Commence implementation and enhancement of data management capabilities to ensure data is effectively defined, catalogued, sourced and used to support Airservices decision making • Deployment of CBT foundation capabilities: - Assist with the sourcing of additional capability to drive the design and implementation of CBT;

Objective	Measure
	- Development of a technology roadmap for the roll-out of technology capabilities; and - Support prioritised implementation of capabilities in data exchange, workflow automation and form digitisation to realise program benefits
4. Support the delivery of the Target Op Model pillar to ensure enterprise wide efficiencies and new ways of working are embedded and sustained	• Transition planning and implementation of endorsed opportunities under the Business Support Services, Operations Support Services and Enterprise Training Integration initiatives • Identification, assessment and execution of market-testing exercises for nominated services
5. Continue to provide change communications advice and support in alignment to support Accelerate Program objectives	• Leadership communications (e.g. Leadership Forum, Internal Comms & Key Messaging) • Building internal Airservices communications capability.

Rural & Regional Affairs and Transport Legislation Committee

ANSWERS TO QUESTIONS ON NOTICE

Supplementary Budget Estimates 2016 - 2017

Infrastructure and Regional Development

Question no.: 151

Program: N/A
Division/Agency: Airservices Australia
Topic: Accelerate Program
Proof Hansard Page: 95-96 (02 November 2016)

Senator Xenophon, Nick asked:

Senator XENOPHON: Is Airservices required to provide a risk assessment to CASA resulting from organisational change?
Mr Harfield: It depends on what level of change and where it affects our operating certificates that are overseen by CASA. For example, if I change something in our finance department for payroll, I do not have to consult CASA on that.
Senator XENOPHON: Unless you stop paying people! But that is not—
Mr Harfield: If I stop paying people then I have a problem in the air traffic control environment, for example. So it depends on where it affects those certificates.
Senator XENOPHON: Sure. But in this case, given the magnitude of the change and given the potential implications—given that you say that the entire board considered the issue of safety, because the safety committee was not enough, in a sense, that is not a criticism, for the entire board to look at this—did Airservices provide a risk assessment to CASA arising out of the organisational change?
Mr Harfield: We provided CASA with the requirements under our safety register, which was that beginning notification on 17 May, when we did the high-level structure of the organisation. This involved working through a number of documents which make up an overall risk assessment. It is continually updated as we go through this process. We can provide that.

Answer:

Please refer to answers provided to Questions on Notice 152 and 149.

Rural & Regional Affairs and Transport Legislation Committee
ANSWERS TO QUESTIONS ON NOTICE
Supplementary Budget Estimates 2016 - 2017
Infrastructure and Regional Development

Question no.: 152

Program: N/A
Division/Agency: Airservices Australia
Topic: Accelerate Program
Proof Hansard Page: 96 (17 October 2016)

Senator Xenophon, Nick asked:

Senator XENOPHON: Right. Would it not therefore be logical, or reasonable, that given the magnitude of the change there would be a risk assessment provided to CASA arising out of the organisational change?
Mr Harfield: A risk assessment associated with the areas that CASA are interested in. There is not a risk assessment handed to CASA for all of the risks associated with the entire organisation—
Senator XENOPHON: So what areas are CASA interested in?
Mr Harfield: The effects on our air traffic services; our engineering and aerotechnical area, our air traffic services training area, our procedures design area and our aeronautical information management, as well as aviation risk and flight—
Senator XENOPHON: I just want to race through this. Thank you for that. If there is any—
Mr Harfield: We can provide this information—
Senator XENOPHON: Get me a list. But I want to understand what triggers a risk assessment, because I am concerned about the information I have—that the risk assessment was not carried out to CASA as some considered it ought to have been. In other words: who determines whether there should be a risk assessment, given the magnitude of these changes? Is it your call, or does CASA tell you what they want?
Mr Harfield: No, we have a safety management system that determines it. For each particular change, we make a determination through what we call a safety case determination. We go through that to determine what the magnitude of the change is for the area affected, as well as what the significance is. That will then tell us what level of safety work is to be done. We have also completed what is called a safety plan, which details all the safety work that has to be undertaken through a particular change. We can provide that to you.
Senator XENOPHON: If you could provide all those documents to the committee, that would be useful. My understanding was that CASA had some difficulty getting this information. Was any concern expressed to Airservices by CASA about any difficulties in getting this information—a risk assessment of these organisational changes?
Mr Harfield: I am aware of a couple of instances where certain requests were made and there had to be a discussion about what exact information was required, but there has been no withholding of information or cases of information not provided.
Senator XENOPHON: Could you provide copies of those documents or that interchange? That might put in context the concerns that have been expressed to me. My understanding is that, in the first round of redundancies, there were 240 redundancies in ANS—could you help me with the acronyms?

Answer:

Copies of the key safety documents shared with CASA up until 17 October 2016 are included as attachments.

In accordance with the agreed Safety Plan, additional safety assessments (safety case determinations) and any resulting safety programs are continuing to be provided for further components of the Accelerate Program.

Rural & Regional Affairs and Transport Legislation Committee

ANSWERS TO QUESTIONS ON NOTICE

Supplementary Budget Estimates 2016 - 2017

Infrastructure and Regional Development

Attachments

- Attachment A: Correspondence from Airservices to CASA about the Accelerate Program (23 June 2016) including:
    i. Transmittal letter from Acting Executive General Manager Safety & Assurance.
    ii. Airservices new operating model, including the leadership structure.
    iii. Accelerate Program Safety Plan and Accelerate Program Safety Case Assessment and Reporting Determination (SCARD).

- Attachment B: Correspondence from CASA to Airservices (20 July 2016) accepting the Accelerate Program Safety Plan and requesting additional information.

- Attachment C: Airservices response to CASA (22 July 2016) indicating that material is being collated and a briefing scheduled.

- Attachment D: Additional information provided to CASA at the briefing on 2 August 2016 including:

    i. Re-issued Safety Management Accountabilities effective 1 July 2016.
    ii. Safety Statement - Transition to new Operating Model and Senior Leadership Structure effective 30 June 2016 and Safety Case Assessment and Reporting Determination (SCARD).
    iii. Voluntary Redundancy Safety Case Assessment and Reporting Determination (SCARD.)
    iv. Safety Statement Accountability Status 1 August 2016.

airservices

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Mr Andrew Tiede
Acting Executive Manager
Airspace and Aerodrome Regulation
Civil Aviation Safety Authority
GPO Box 2005
Canberra ACT 2601

Dear Andrew

Update on Airservices Accelerate Program

As you are aware, Airservices has embarked on an organisational change program (the 'Accelerate Program') to rapidly improve the organisation's capability to support our strategic priorities and deliver value for our customers.

A new operating model with the associated senior leadership structure has been finalised and will come into effect on 1 July 2016. The details are provided in Attachment 1.

The new model has little impact on the operational service delivery under the various Civil Aviation Safety Regulations and does not affect any Airservices Provider Certificates. The significant changes are focussed on the corporate centre, and mainly relate to realigning management accountabilities and responsibilities, and people and procedures in non-operational areas.

Two operational groups, Aviation Rescue Fire Fighting Services and Air Navigation Services, will remain our core service delivery areas, with end-to-end accountability for their financial and operational performance. The training and assessment functions previously provided by the Learning Academy will be integrated into these two operational groups. Four smaller corporate groups will support these operational areas.

Airservices has prepared a Safety Plan (Attachment 2) which details the overall safety management activities in support of the implementation of the Accelerate Program. Building on the lessons learned from previous organisational change, the Safety Plan will ensure a consistent, program-wide approach to managing the safety impact and interdependencies of changes arising from the Accelerate Program.

Airservices will provide regular updates to CASA on the progress of the Accelerate Program and ongoing assurance that the safety impact of the resulting changes is assessed and managed appropriately.

If you have any questions or require further information, please contact me on (02) 6268 5122.

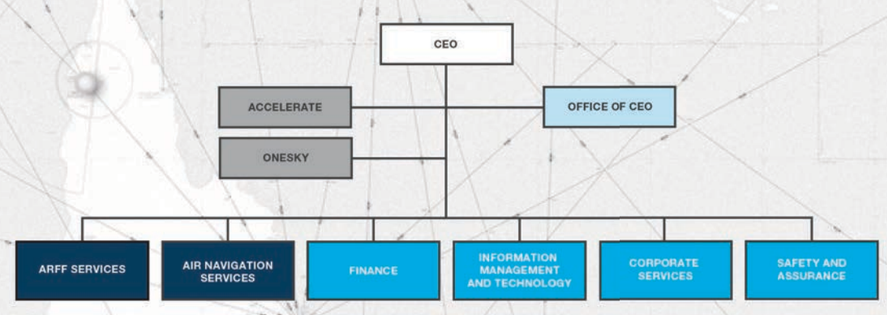
Yours sincerely

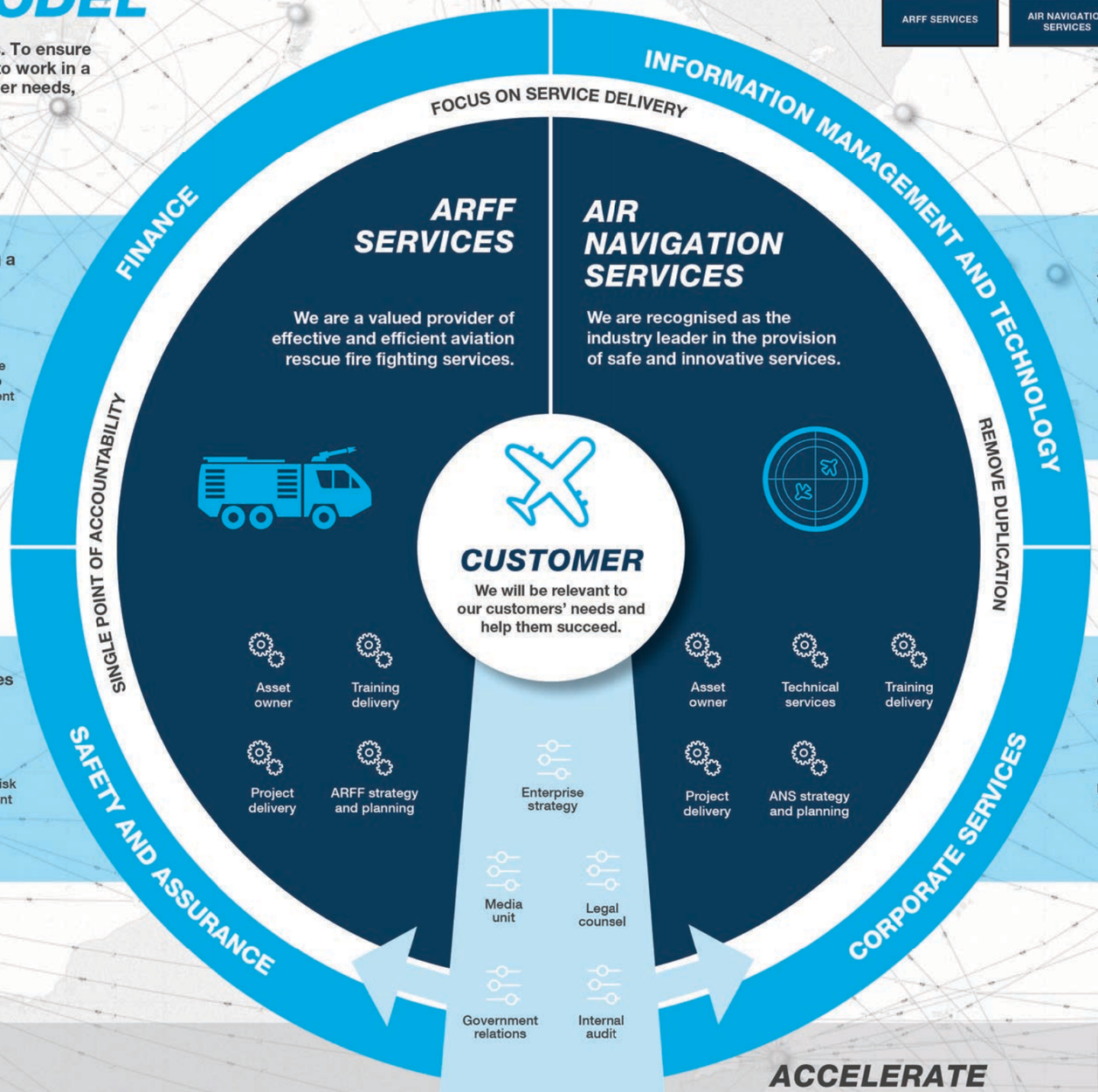
Nat Nagy
Acting Executive General Manager
Safety, Environment and Assurance

23 June 2016

OUR NEW OPERATING MODEL

The future we face means we need to be a different Airservices. To ensure we are relevant to our customers we are organising ourselves to work in a different way, with a simpler operating model based on customer needs, with less bureaucracy and more accountability.





Finance will support enterprise efficiency through driving a commercial focus into decision making.

- Finance and investment
- Procurement and contract management frameworks
- Corporate financial planning
- Asset management system
- Enterprise portfolio management office

Information Management and Technology will manage the Airservices information environment and provide effective and efficient services across the organisation.

- Information technology/ operational technology
- Information management
- Communications/ network/ architecture

Safety and Assurance will provide efficient support services to drive strong operational performance and outcomes.

- Safety management system
- Environment management system
- Enterprise compliance system
- Regulatory standards
- Enterprise risk management system

Corporate Services will provide customer focused, efficient and effective corporate support services.

- Maintenance of enterprise policy frameworks
- Leadership development framework
- Corporate HR & IR frameworks
- Corporate reporting
- Management of shared services provision

ONESKY

Our OneSKY program will lead the delivery of a joint civil and military air traffic management system and co-ordinate all dependent projects.

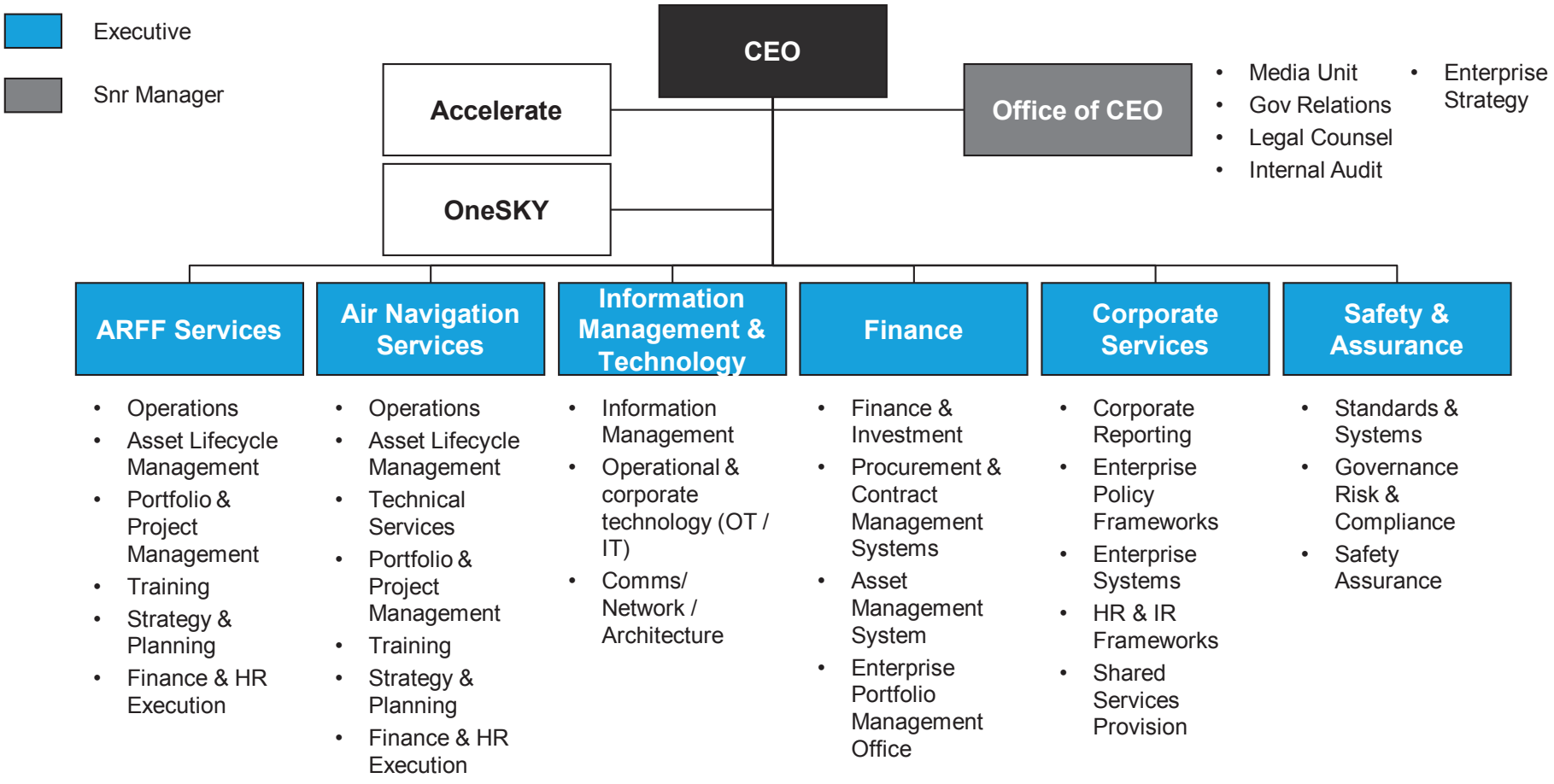
ACCELERATE

Our Accelerate program will get us match-fit and better at change to create a stronger, more efficient and agile organisation.

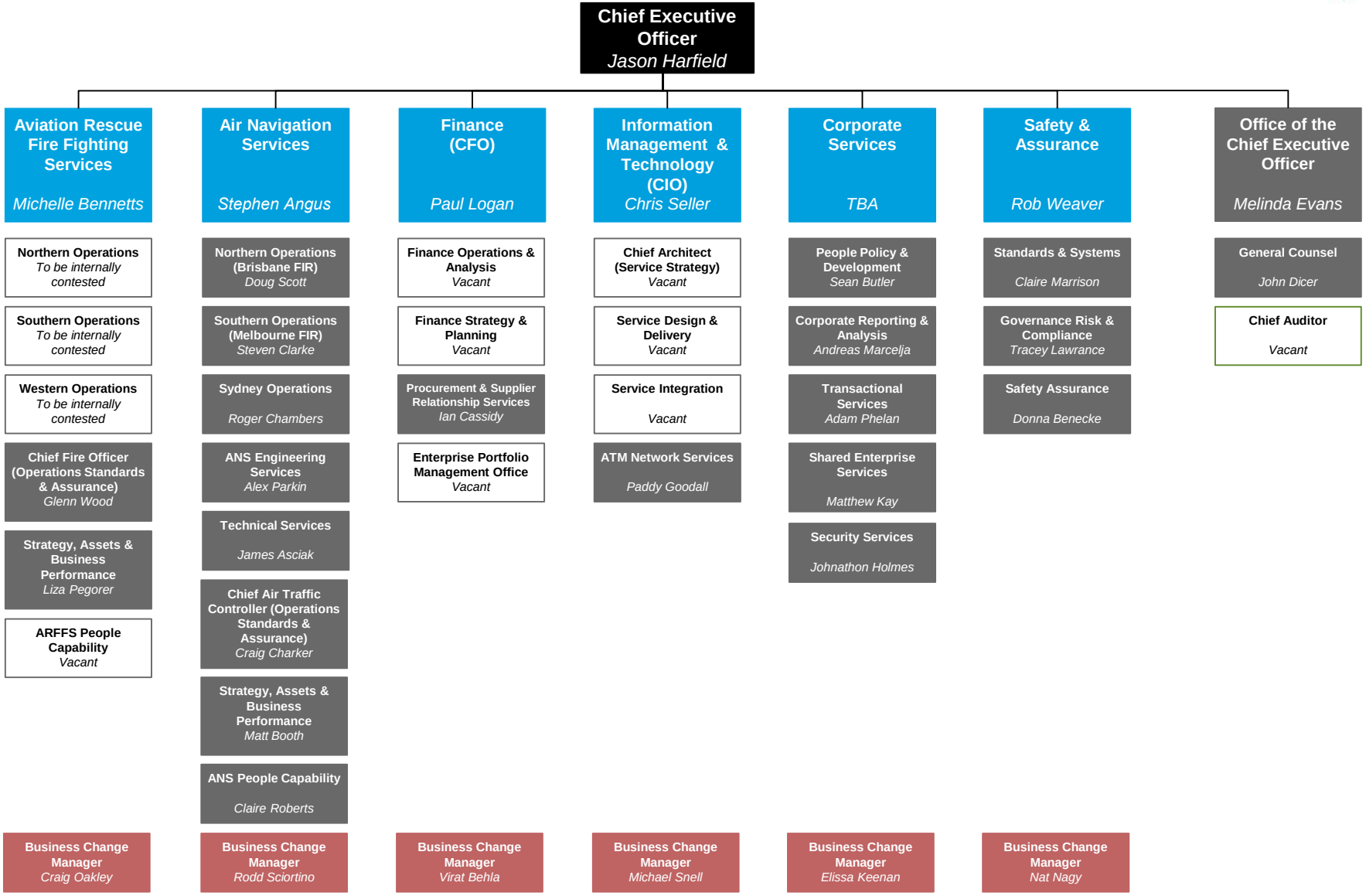
**Due to value and risk profiles of the programs, OneSKY and Accelerate report directly to the CEO.*

airservices

High level organisational structure from 1 July 2016



Direct Reports to Executive from 1 July 2016



Airservices Accelerate Program

Safety Plan

SAF-SP-16022

Version 1.0

Effective 15 June 2016

Prepared: Donna Benecke
Manager, SE&A Project & Business Support

Donna Benecke

Digitally signed by Donna Benecke
DN: cn=Donna Benecke, o=Airservices Australia, ou=SE&A Project & Business Support, email=donna.benecke@airservicesaustralia.com, c=AU
Date: 2016.06.15 15:22:28 +10'00'

I declare that this Safety Plan:

- has been prepared in accordance with the requirements of Airservices Safety Management System that are necessary to manage the Operational-Safety aspects of the change
- presents a Safety Program sufficient for the development of a robust case for the Operational Safety of the change

---

Endorsed: Robert Weaver
Executive General Manager
Safety, Environment & Assurance

15/6/16

I am satisfied that, following review of this Safety Plan, that the Safety Program described herein meets the requirements of the Safety Management System necessary to manage the Operational-Safety aspects of the change

---

Accepted: Nick King
Program Director
Accelerate Program

15/6/16

I am satisfied, following review of this Safety Plan, that the Operational Safety Program described herein will:

- enable the lifecycle management of Operational Safety risks
- provide a basis for the development of a robust case for the Operational Safety of the change

I declare that the Operational Safety Program described within this Safety Plan:

- will be incorporated within the change schedule, resource and budget planning
- will be enacted as described, with any variations from the plan agreed and documented

---

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Document Review Record

Those listed below have reviewed this document in the context of their area of expertise and in accordance with their area of accountability. All issues raised from the reviews have been addressed to the satisfaction of all reviewers.

Name	Role / Position	Date	Version
Matthew Booth	Business Diagnostic Lead	3.02.16	0.1
Nick King	Accelerate Program Director	18.05.16	0.2
Rob Weaver	EGM Safety, Environment & Assurance	1.06.16	0.3
Nick King	Accelerate Program Director	1.06.16	0.3
Melinda Evans	Manager Safety Assurance	7.06.16	0.4

Change summary

Version	Date	Change description
1		Initial Release

This document was created using the Safety Plan template AA-TEMP-SAF-0010 Version 8

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Document Storage Locations:

Safety Plan	Location
Electronic copy	Diagnostic Review Secure Corporate Shared Drive

1 Purpose

The purpose of this Safety Plan is to outline the program level safety management activities to be undertaken to ensure that the implementation of the Accelerate Program is managed in a way that assures operational safety is considered throughout the life of the change program and that risks are identified and managed to As Low As Reasonably Practicable (ALARP).

2 Background

Over the past few years, Airservices has embarked on a major transformation, undertaking a major asset refresh, including the flagship OneSKY program, creating the future state enterprise architecture, investing in leadership capability and commencing a cultural transformation journey.

As a result of declining financial and project delivery performance the Chief Executive Officer (CEO) commissioned a business diagnostic and efficiency review in November 2015.

This review identified a number of issues to be addressed:

- Costs have grown faster than revenue and we are now forecasting an ~$8M loss in 2016. This is driven by factors including poor controls and rising costs for non-operational staff that cannot be explained by market or regulation driven changes
- CAPEX performance has degraded and RoA is low when compared to peers and like industries. The under-delivery of the CAPEX program leading to a large backlog of unfunded projects
- While it is acknowledged that technology disruption is on the horizon and that we need to transform our information management capability, we don't have a clear strategy or plan to execute.

The review also noted that if Airservices is to be in a position to deliver on its transformation agenda, it must align on its strategic objectives and value proposition to customers, resolve inefficiencies in its structure and performance management framework, and build a culture that supports efficiency, effectiveness and agility.

As a result of the outcomes and recommendations of the business diagnostic, the Accelerate Program has been established within the broader transformation agenda to rapidly drive the required changes that will ensure Airservices continues in its vital role connecting the Australian aviation industry.

2.1 Objectives of the Accelerate Program

The Accelerate program is designed to rapidly improve capability, eliminate unnecessary cost and deliver value to our customers now and into the future.

The specific issues that will be addressed as part of the Accelerate program are:

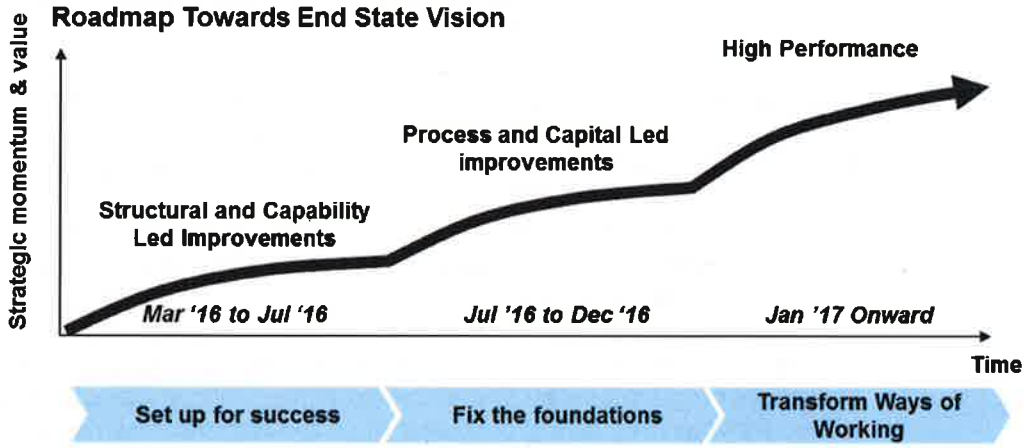
- Lack of focus on strategic outcomes and customer needs
- Complex accountabilities and ineffective functional structures
- Low levels of collaboration and performance culture
- Sub-optimal asset management & performance
- Lack of preparedness for digitalisation and automation.

In order to ensure the success of the broader transformation program through the establishment of a solid base, the Accelerate Program will need to deliver the

required improvements in three waves of change from March 2016 through to June 2017:

1. Set up for success
2. Fix the foundations
3. Transform ways of working

Figure 1: Accelerate Program Roadmap



A new simpler operating model and Executive structure were announced on 17 May 2016 (see **Appendix 1**) and a Senior Leadership Level structure was announced on 31 May 2016 (see **Appendix 2**).

Planning work is commencing to repoint the organisation to the new senior leadership structure from 1 July.

In the week commencing 20 June, it is anticipated that a detailed map will be released to show where existing functions and teams will sit within the new operating model and which role they will report to in the new structure.

2.2 Program Safety Assessment and Reporting Determination (SCARD)

A program level SCARD was conducted (see **Attachment 1**) to consider the impact of the high level scope of the Accelerate Program as understood at the completion of the Business diagnostic.

The SCARD determined that the size of the change was at the high end of the Medium range, and the Operational Safety impact was Minimal. The Operational Safety impact was influenced mainly by the fact that the scope of the change has little direct impact on Air Traffic Control (ATC) and Aviation Rescue and Fire Fighting (ARFF) operations and services. This assessment resulted in a determination that the overall Operational Safety Magnitude was Minor and that a Safety Statement was required.

The following potential operational safety risks were identified in the Program SCARD initial hazard identification:

- Failure to manage staff health and wellbeing
- Failure to manage security of Airservices people, systems and property during the transition process
- Distraction resulting in disruption to service performance, loss of focus on BAU activities or failure to manage current active issues
- Safety accountabilities and responsibilities not appropriately discharged
- Change in delivery model/outsourcing of non-core functions (now referred to as non-differentiated functions)

Due to the functional breadth and diversity of the Accelerate Program, and the staged implementation over a long duration, as well as the fact that not all initiatives are inter-related from an operational safety perspective, it is proposed that:

- a Safety Plan be developed in lieu of a Safety Statement to document how oprational safety will be considered during the life of the Accelerate Program across multiple initiatives.
- individual SCARDs will be conducted for each Program Initiative. This will allow accountable managers to assess and manage the safety impact of each discreet program of work in the context of the function being affected. It will also allow tailored safety programs to be run with their own supporting activities and evidence, to provide meaningful assurance that operational safety has been duly considered in defining, planning, developing, implementing and executing each initiative.

The Accelerate Program Safety Plan will be updated periodically as required to ensure it reflects the current safety approach at program level.

3 Scope

3.1 Description of Change

The Transition Program encompasses a whole of organisation redesign to improve efficiency and effectiveness.

3.2 In Scope

The Accelerate Program will address five improvement themes via a number of identified improvement opportunity areas:

1. **Organisation Purpose**
   - Align on the organisation's strategic objectives and value proposition to customers
   - Ensure the transformation is shaped around the organisation's strategic objectives and value proposition
   - Ensure the business is focussed on core activities
2. **Structure & Accountability**
   - Restructure the organisation and service delivery model to efficiently deliver on its strategic objectives

- Embed an appropriate governance and performance management framework
- Establish clear accountabilities at all levels in the organisation
- Align pay with performance
- Eliminate duplication of functions and activities

3. **Behaviours & Culture**
   - Encourage behaviours that support our safety, customer and efficiency priorities
   - Ensure leadership drives a culture of accountability and high performance
   - Break silo mentality
4. **Asset Performance & Project Delivery**
   - Clarify roles, responsibilities and decision rights to improve asset management outcomes
   - Focus business on service outcomes over engineering excellence
   - Create incentives to improve cost efficiency of asset delivery and operation
   - Enhance commercial acumen applied to capital works program
   - Improve project delivery capability
5. **Digitisation & Automation**
   - Agree the digital agenda for the organisation and role of technology in the future service delivery model
   - Enable the organisation's ability to adapt market driven technological advancements
   - Enhance data and information management, and analytics systems and capability
   - Use automation to improve front and back office productivity

The above improvement themes are grouped into three Accelerate program Pillars:

A New Operating Model - Organising ourselves to work in a different way, with a simpler operating model based on customer needs, with less bureaucracy and more accountability

Assets & Projects Refocus - Managing our assets and projects with more discipline to ensure we apply commercial standards

Technology - Making better use of our systems so people can get things done more easily and clearly see who's accountable for what.

A number of discrete initiatives will deliver the required changes.

3.3 Out of Scope

The OneSKY Program is out of scope of the Accelerate Program although the Strategic Initiatives that form the Accelerate program will support and align with its delivery.

3.4 Operational Safety Impact

The assessment of Operational Safety Impact below was based on the scope of the Accelerate Program as understood at the completion of the Business Diagnostic.

3.4.1 Service Provision under CASR Provider Certificates

No changes have been identified that require a change to any Airservices Provider Certificate or Schedules at this time (Level 1 change).

No changes have been identified that will result in the decommissioning of a service or facility, or a significant reduction to the level of service (Level 2 change).

There may be some changes proposed that require relocation of a facility (Level 3 change) and also a number of changes to Airservices' Operations Manuals resulting from changes to responsibilities and accountabilities, Organisational structure and functions.

3.4.2 Systems, Facilities and Equipment (inc design, operation and maintenance, includes data and network aspects of systems)

No changes have been identified that result in changes in design or operation of regulated systems, facilities or equipment.

Some potential changes have been identified relating to the maintenance of systems and further changes may be identified as a result of the outcomes of initiatives to market test non-differentiated capabilities.

The development of a future state enterprise architecture and integration of information technology may also result in changes to existing business information systems.

3.4.3 Business Groups, Service Delivery Lines, Business Branches and Units

Significant changes have been identified to business groups, branches and units in relation to management accountabilities and responsibilities and mapping of organisational structure to functions, however operational service delivery lines within ARFF and ATC are largely unaffected.

3.4.4 People and Procedures

Minimal changes have been identified that impact people and procedures directly related to the provision of operational services. In these cases the impact is anticipated to relate to changes in senior management of frontline staff.

Significant changes have been identified to people and procedures in non-operational areas across the organisation, particularly related to management, corporate and shared services functions, as a result of the restructure of the organisation to realign key accountabilities and functions.

Some significant changes related to people and procedures in the areas of Engineering support and maintenance and also as a result of the rebuild of asset management have been identified.

4 Assumptions, constraints and dependencies

The following outlines the Assumptions, Constraints and Dependencies that could influence the safety outcome of the change. They will be validated at the end of detailed planning of each initiative.

If individual Initiatives identify assumptions, constraints or dependencies specific to their scope of change, they will be documented in their tailored safety program's safety plan.

The Accelerate Program Office will review these to determine if they are also relevance to the broader Accelerate Program and confirm if there are any interdependencies that will require ongoing management across multiple initiatives.

4.1 Assumptions

There will be a phased approach to implementation of any Strategic Initiatives that form the Accelerate Program. As such, there will be different implementation timeframes for each Strategic Initiative that will need to be supported by individual safety assessments (SCARDs) and tailored safety programs that allow work streams to progress independent of each other.

The Accelerate Program Office will maintain an Accelerate Program Safety Plan (this document) throughout the life of the program to ensure that there is a consistent program wide approach to managing the safety impact and interdependencies of changes across all Initiatives.

4.2 Constraints

Once detailed planning of each Initiative is complete, the Accelerate Program schedule may be constrained by safety reporting and consultation requirements associated with any identified regulatory impact. At this time none have been identified.

4.3 Dependencies

Nil.

5 Responsibilities

The following table outlines the key roles and responsibilities contributing to safety management of the Accelerate Program:

Title and name	Primary responsibilities
Airservices Board	• Endorse the rationale and objectives of the program and significant investments • Oversee delivery of Program to meet intended objectives
Executive Steering Group – **CEO** – **Accelerate Program Director** – **Accelerate Transition Director** – **Exec ANS** – **Exec ARFF** – **CFO** – **CIO** – **Exec Corporate Services** – **Exec Safety &**	• Endorse Program financial and non-financial objectives and overall operating model design • Decide on major program design choices, risks, and issues and monitors alignment and interdependencies across initiatives • Assess achievement of program milestones, accepts major deliverables, and ensures benefits of initiatives are realised • Authorise initiation of large initiatives, decides on major program variances as required, and monitors overall expenditure • Endorse Program support requirements and capabilities e.g. out-placement, industrial relations, change, and communications

Assurance	
Accelerate Program Director	• Meet time, cost, quality deadlines • Ownership of schedules, monitor and track progress; ensure coordination across teams • Manage key interfaces to program stakeholders • Ensure effective governance of all initiatives • Program integration management • Transition Management • Manage specialist support to initiatives via PMO
Accelerate Program Transition Director	• Manage HR aspects of transition to new Operating Model and execution of Accelerate Program Initiatives
Accelerate Program Manager	• Program coordination • Benefits tracking • Program Level Safety and Risk Management • Change Management
Accelerate Program Reporting Lead	• Program reporting to support governance of the program
Business Change Managers	• Assist the leadership team in embedding the Accelerate Program initiatives into everyday business operations and: o Identify, define and track benefits and outcomes for the allocated suite of workstream initiatives o Prepare and maintain work stream plan as outlined in Accelerate Program planning document o Define the resources required (internal and external) to deliver the benefits, initiating corrective action where necessary and within the tolerances set by the PMO o Ensure timely and accurate reporting to support program governance o Identify change issues and risks, maintain change control and develop contingency plans as required o Ensure Conduct end of initiative evaluation to assess

	outcomes and prepare any closing recommendations/documentation • Support Program communications as a change agent
Initiative Steering Committee OR Bus. Sponsor	• Develop and deliver specific initiatives within the broader Acceleration Program • Oversee initiative-specific design decisions, risks and issues • Provide recommendations to Program Steering committee
Initiative Lead	• Design Initiative consistent with the intent and in line with the recommendations of the Accelerate Program • Develop implementation approach • Drive implementation while ensuring business continuity is maintained. • Ensure application of the SMS and execution of any associated tailored safety program to support the scope of change for each Initiative • Meet time, cost, quality deadlines for specific initiatives • Own initiative schedules, monitor and track progress • Support implementation and handover to BAU • Maintain relationship with key business stakeholders • Provide Initiative updates and escalating risks where required, to PMO
Initiative SMEs	• Provide SME input into design and implementation of change • Develop documentation and procedural changes where required • Develop and deliver of training/education where required • Participate in Risk Workshops • Identify operational safety hazards and development of controls and safety requirements • Develop plans for and implementation of any agreed technical change proposals
Change and Communications Lead	• Develop and implement of Change and Communications Strategy and detailed Plan
Initiative Safety Lead (if required)	• Facilitate SCARD workshop/s and preparation of associated Safety Plan(s) and Safety Report(s) as required for each Initiative • Facilitate Risk Workshops • Maintain Hazard Log Registers • Facilitate Risk Acceptance

6 Consultation and communication

An extensive program of consultation and communications activities has been developed to ensure that all impacted stakeholders (internal and external) are aware of any changes proposed as part of the Accelerate Program and its strategic initiatives.

Oversight of Program communications will be provided by the Accelerate Program Director.

Key objectives of the Change and Communications program are to:

- ensure Work Health & Safety (WHS) obligations to consult with workers are appropriately satisfied and staff are well informed and have an opportunity to provide feedback on the impact of changes being proposed.
- ensure requirements of Enterprise Agreement conditions for timely and effective consultation are embedded in the change program
- minimise distractions and disruption to operations through careful planning and communication
- build organisational readiness for change and minimise change risks through targeted interventions
- familiarise stakeholders with the impact of the Accelerate Program and seek SME input into the safety program to ensure early identification, assessment and mitigation of foreseeable safety risks to ALARP throughout the life of the program.

7 Safety management activities and resources

Based on the preliminary hazard assessment conducted during the SCARD workshop, the following high level program hazards must be managed:

7.1 Program Level Safety Activities

The following safety activities have been conducted at a Program level to ensure an appropriate understanding of the scope and impact of the change is understood and planned for:

Activity 1	**Conduct review of past restructures / Organisation-wide changes**
Description/ Objective	Desktop review of previous SCARDs, Hazlogs, Safety Plans and Safety Reports associated with changes to organisational restructures to review previously identified risks, controls and lessons learned that may have relevance to the Accelerate Program
Responsibility	Safety Specialist
Input	Hazlogs, controlled Airservices Documentation Search, Regulatory Services SCARD repository
Tool	Avnet, Documentation Search, Corporate Shared Drives
Resources	Safety Specialist
Outputs/Evidence	Draft SCARD Preliminary Hazard List
Comments/Links	This activity was conducted in Jan-Feb 16. The key operational safety risks of past restructures were consistently shown to relate to safety accountabilities (ensuring accurate mapping from old roles and structure to new, appropriately discharging safety accountabilities during and after restructure) and WHS risks affecting staff health, wellbeing and performance.
Activity 2	**Conduct initial desktop Program level Regulatory impact review**
Description/ Objective	Review scope of change of Accelerate Program and 10 Strategic Initiatives to identify any potential impact on Airservices Provider Certificates and Operations Manuals (139H, 143, 171, 172, 173, 175) to inform the Program level Safety Case Assessment and Reporting Determination (SCARD) and provide an early indication of likely reporting requirements at Program and Strategic Initiative level.
Responsibility	Safety Specialist
Input	Airservices SMS, Airservices' Provider Certificates and Operations Manuals
Tool	Nil
Resources	Safety Specialist Accelerate Program SMEs Operational Assurance & Regulatory Services Manager Safety Assurance
Outputs	Regulatory Impact Review summary
Comments/Links	This activity was conducted using information available on each Strategic Initiatives as developed in the Business Diagnostic. The

	assessment is be indicative only and may change as more detailed planning occurs within each Initiative. A further Regulatory impact assessment will be conducted via individual SCARDs for each Initiative as outlined under Section 7.2.
Activity 3	**Conduct Program level Preliminary Human Factors Assessment (PHFA)**
Description/ Objective	A program level PHFA has been conducted to identify, at the earliest opportunity, the broad Human Factors impact of the scope of change being proposed by the Accelerate Program
Responsibility	Safety Specialist
Input	SLT Briefing Packs on Business Diagnostic & Efficiency Review
Tool	PHFA template AA-FORM-SAF-0023
Resources	Safety Specialist
Outputs	Accelerate Program PHFA
Comments/Links	The PHFA was used as an input into the Program SCARD.
Activity 4	**Conduct Program level WHS HazID**
Description/ Objective	A program level WHS HazID has been conducted to identify, at the earliest opportunity, the broad WHS impacts of the scope of change being proposed by the Accelerate Program
Responsibility	Safety Specialist
Input	SLT Briefing Packs on Business Diagnostic & Efficiency Review
Tool	WHS HazID Template AA-TEMP-SAF-0020
Resources	Safety Specialist
Outputs	Accelerate Program WHS HazID
Comments/Links	The WHS HazID was used as an input into the Program SCARD.
Activity 5	**Conduct Program level SCARD**
Description/ Objective	A program level SCARD has been conducted to identify, at the earliest opportunity, the broad impact of the scope of change being proposed across the program level size of the Accelerate Program
Responsibility	Safety Specialist
Input	SLT Briefing Packs on Business Diagnostic & Efficiency Review, PHFA, Regulatory Impact Review, Initial WHS HazID Part A and B, Preliminary Hazard List
Tool	SCARD template AA-TEMP-SAF-0042
Resources	Safety Specialist
Outputs	Accelerate Program SCARD
Comments/Links	The size of the change was assessed as (the high end of) Medium and the Operational Safety impact was assessed as Minimal, giving an overall Operational Safety Magnitude of Minor. It was agreed that a Safety Plan (this document) would be produced in lieu of a separate Safety Statement and that individual SCARDs will be conducted for each Program Initiative.

Activity 6	**Develop Program Safety Plan**
Description/ Objective	Describe the safety approach and activities to be conducted to ensure consistent application of the SMS across all Initiatives in the Accelerate Program and establish a requirement for program level monitoring and management of identified operational safety risk.
Responsibility	Accelerate Program Manager & Safety Specialist
Input	Program SCARD, PHFA
Tool	Safety Plan template AA-TEMP-SAF-0010 Version 8
Resources	Safety Specialist
Outputs/Evidence	Program Safety Plan
Comments/Links	
Activity 7	**Establish Program HAZLOG**
Description/ Objective	Establish Program HAZLOG to ensure that all program safety hazards are captured, tracked and managed throughout the programme. Update throughout life of programme as new data becomes available.
Responsibility	Accelerate Program Manager
Input	SCARD Preliminary Hazard List
Tool	HAZLOG
Resources	Accelerate Program Manager, Initiative Leads, Initiative SMEs
Outputs/Evidence	HAZLOG Register Report
Comments/Links	
Activity 8	**Establish Program Safety Risk Monitoring Regime**
Description/ Objective	Establish a program wide safety risk monitoring regime to ensure consistency in approach in the application of the SMS will be achieved across all Initiatives and how interdependencies and aggregation of risk will be managed at a program level.
Responsibility	Accelerate Program Manager & Initiative Leads
Input	Accelerate Program and individual Initiative scope information
Tool	Nil
Resources	Accelerate Program Manager & Safety Specialist
Outputs/Evidence	Documented Accelerate Program Risk Monitoring Regime
Comments/Links	
Activity 9	**Conduct Executive & Senior Leadership Level Safety Accountabilities SCARD and Risk Assessment Workshop**
Description/ Objective	Conduct SCARD and operational safety risk assessment of proposed changes to safety accountabilities and 1 July 2006 repoint of the organisation to transition to the new operating model, Executive Management and Senior Leadership Level reporting structure. This will ensure appropriate mitigations are able to be put in place and impact of changes to safety accountabilities are well understood so that any potential risk to operational safety is managed to ALARP.

Responsibility	Accelerate Program Manager & Safety Specialist
Input	Accelerate Program SCARD, Operating Model, Executive Role Descriptions and functions, AA-GOV-SAF-0007
Tool	Hazlog
Resources	Representatives from the direct reports to the Executives and Business Change Managers, Accelerate Program Director, Safety Specialist.
Outputs/Evidence	Repoint SCARD, Updated Hazlog with identified controls
Comments/Links	

7.2 Initiative Specific or Standalone Enabling Change Safety Activities

The following safety activities are proposed to be conducted for each individual Program Initiative and standalone enabling activities which will result in changes to service levels, procedures or equipment that may affect the performance, functional or technical specification of a system or service, or safety accountabilities:

Activity 1	**Conduct SCARD**
Description/ Objective	Conduct SCARD for each Initiative to identify and assess the operational safety and regulatory impact of the defined scope of change being proposed.
Responsibility	Initiative Lead / Safety Specialist
Input	Initiative scope
Tool	SCARD template AA-TEMP-SAF-0042
Resources	Safety Specialist
Outputs/Evidence	SCARD
Comments/Links	This activity should be completed as early as possible in the planning process once the scope of the change initiative has been defined.
Activity 2	**Develop Safety Plan (if required by reporting determination in SCARD)**
Description/ Objective	Develop a plan to execute a safety program tailored to each individual Initiative in line with the outcome of the Initiative SCARD
Responsibility	Safety Specialist
Input	Initiative PHFA, SCARD, Initiative scope
Tools	Safety Plan template AA-TEMP-SAF-0010 Version 8 HAZLOG Activities, tools and techniques to be used will be tailored to the scope of the change and selected from Airservices Safety Risk Management Tools and Techniques AA-GUIDE-SAF-0105 Meeting room, projector, laptop
Resources	Safety Specialist, Initiative Lead, SMEs.
Outputs/Evidence	Plans, Reports, Workshop minutes, updated HAZLOG
Comments/Links	

Activity 3	Establish Initiative HAZLOG (if required)
Description/ Objective	Establish Initiative HAZLOG to ensure that all identified safety risks are captured, tracked and managed throughout the life of the Initiative. Update throughout life of change.
Responsibility	Safety Specialist
Input	PHFA, WHS HazID, SCARD
Tool	HAZLOG
Resources	Safety Specialist
Outputs/Evidence	HAZLOG Report
Comments/Links	
Activity 4	**Conduct safety activities as per safety plan (as required)**
Description/ Objective	Conduct safety activities as outlined in the safety plan or as required during the life of the change
Responsibility	Initiative Lead / Safety Specialist
Input	Initiative Safety Plan
Tool	As defined in the safety plan
Resources	Initiative Lead, Safety Specialist, Initiative SMEs
Outputs/Evidence	Meeting/Workshop Records of Discussion, Reports, Updates to Hazlog, Risk Acceptance evidence
Comments/Links	
Activity 5	**Develop Safety Report (as required by outcome of Individual SCARD)**
Description/ Objective	Develop safety report tailored to outcome of Initiative SCARD. For some Initiatives where there is no operational safety impact, the SCARD will
Responsibility	Safety Specialist
Input	SCARD Safety Plan HAZLOG, all relevant evidence as described in the Initial GSN Safety Argument Structure in Appendix A.
Tool	Relevant Safety Report template (eg Safety Statement, Safety Assessment Report)
Resources	Safety Specialist, Initiative Lead, Initiative SMEs
Outputs/Evidence	Safety Report
Comments/Links	
Activity 6	**Pre-implementation Risk Assessment (if required)**
Description/ Objective	A pre-implementation risk assessment shall be conducted to confirm that: • all identified safety requirements are met,

	• residual risks have been accepted by the accountable manager in consideration of the impact on their operational risk baselines • from an operational safety perspective, the change can be implemented
Responsibility	Safety Specialist
Input	Hazlog
Tool	Pre-implementation Risk Assessment template, Risk Register
Resources	Safety Specialist, Initiative Lead, Initiative SMEs
Outputs/Evidence	Pre-implementation Risk Assessment Record of Discussion
Comments/Links	
Activity 7	**Post-Implementation Review (if required)**
Description/ Objective	The Safety PIR shall be conducted after the implementation of the change is achieved; with the purpose of reviewing the safety outcomes and ensure there are no unresolved safety issues. The PIR will include: • review of the Risk Register(s) relating to the change • review of the ongoing management of hazards/controls for the system or service that was subject to the change • review of the arrangements for operational safety performance monitoring for the system or service that was subject to the change • details of any new safety issues identified resulting from the change • details of any safety lessons learnt.
Responsibility	Safety Specialist
Input	Safety Report (as determined by SCARD), CIRRIS reports, Risk Register, ORAs
Tool	PIR Template
Resources	Safety Specialist, Initiative SMEs
Outputs/Evidence	PIR Report
Comments/Links	An action to track the conduct of the PIR will be captured in CIRRIS along with associated findings and any actions arising from them in accordance with the Preventative and Corrective Action Management AA-PROC-SAF-0037.

8 Timelines and milestones

The timelines and milestones for the identified safety management activities as well as key Accelerate Program milestones are outlined below.

Note: All dates are estimates at this time and will be updated as more detailed planning is completed for each Strategic Initiative.

Activity	Date
Commence Business Diagnostic	Nov 15
Develop Business Transformation Program	Dec 15– Feb 16
Conduct preliminary Risk Workshop	Jan 16
Conduct initial Regulatory impact assessment	Feb 16
Conduct Program level PHFA and SCARD	Feb 16
SCARD approval	**Feb 16**
Develop Program Safety Plan	Feb 16
SLT Briefing – Launch of Accelerate Program	Mar 16
Design Operating Model & Executive Structure	Mar – May 16
Design Senior Leadership Team Structure	May - Jun 16
Program Safety Plan approval	**Jun 16**
Conduct Executive Safety Accountabilities SCARD & Risk Workshop	Jun 16
Repoint organisation to new structure	1 Jul 16
Conduct Individual Initiative SCARDS as scope of each is defined	**Jul 16 – Jun 17**
Develop tailored safety programs for each initiative in line with SCARD outcome	**Jul 16 – Jun 17**

9 Resources

Section 7 identifies the generic resource requirements for each safety activity.

Further detail of the safety related resource requirement for each Initiative will be identified after individual SCARDs are completed.

For any safety activity, if the required suitably qualified and experienced resources, as identified by the Safety SME, are not available, then that activity must be re-scheduled until such time as appropriate resources are available.

10 Training and education

At this time no impact on existing operational training or education has been identified.

Some training and education may be required as a result of future decisions to implement new non-operational business systems and processes however this will only be assessed after individual strategic initiatives have complete detailed planning.

Any training and education needs identified through the safety assessment Training Needs Analysis (TNA) process as risk mitigations will be recorded and managed in the Program Hazlog Register as controls.

11 Document review

11.1 Service Delivery Line/Business Branch or Unit

This document will be reviewed by the Accelerate Program Director and their nominated reviewers.

All feedback will be reviewed and incorporated where appropriate. Review comments and responses will be stored in the Accelerate Program Corporate shared drive for reference.

11.2 Safety, Environment and Assurance

As this Safety Plan does not relate to a Safety Case there is no SMS requirement for Safety Assurance review.

12 Approvals

12.1 Safety Plan Approval

Endorsement of this Safety Plan will be required by the EGM SE&A

Approval of this Safety Plan will be required by the Accelerate Program Director, who also holds accountability for the overall implementation of the Accelerate Program.

12.2 CASA

At this time, no regulatory impact has been identified that requires CASA notification or approval however CASA will be kept informed of the change program as it develops and shall be provided with a copy of this Safety Plan for their information and any subsequent SCARDs and associated safety reports where a regulatory impact is identified.

13 Attachments

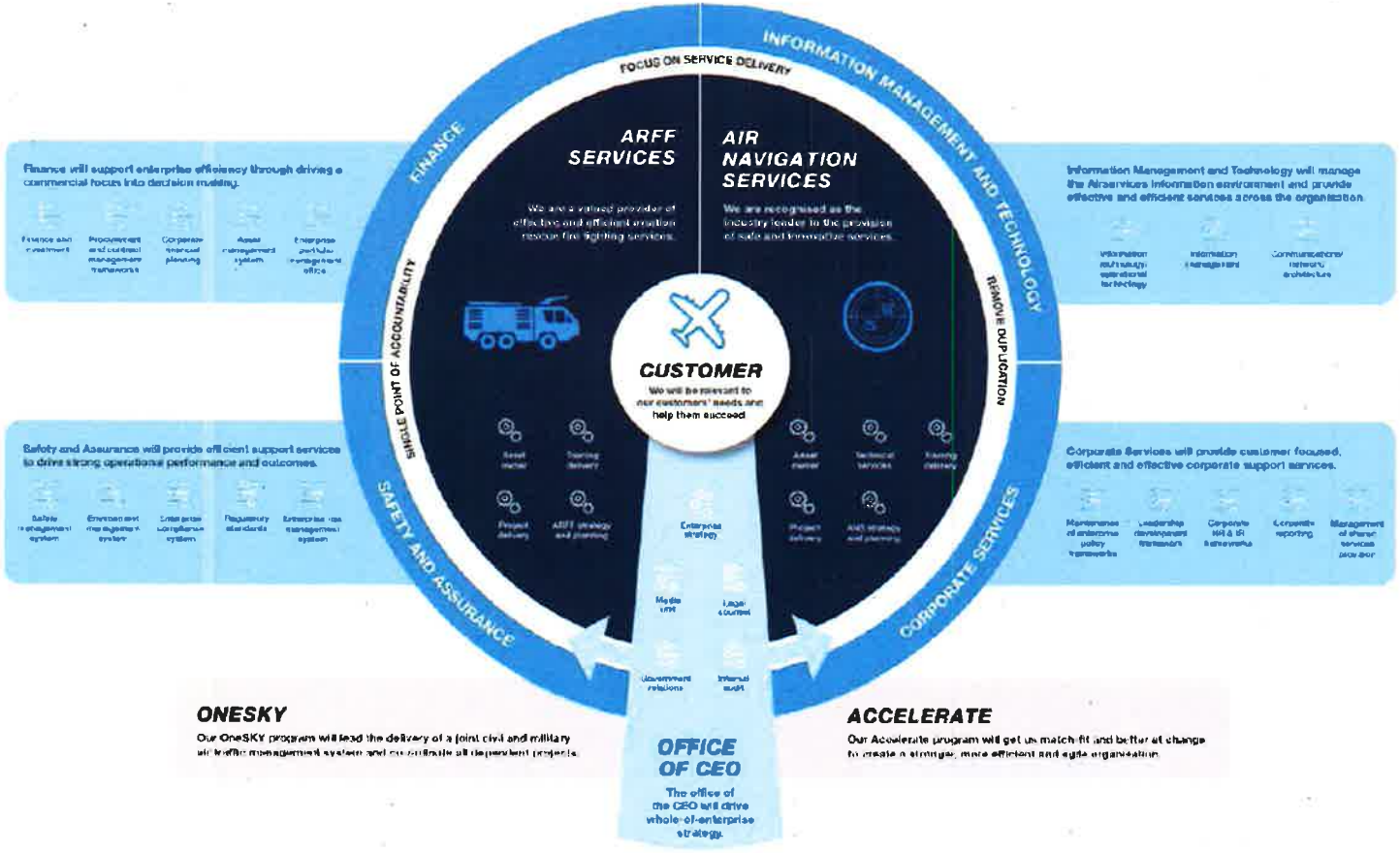
No.	Title	Version
1	Transition Program SCARD	1.0

Appendix A New Operating Model & Executive Structure

3 New Operating Model

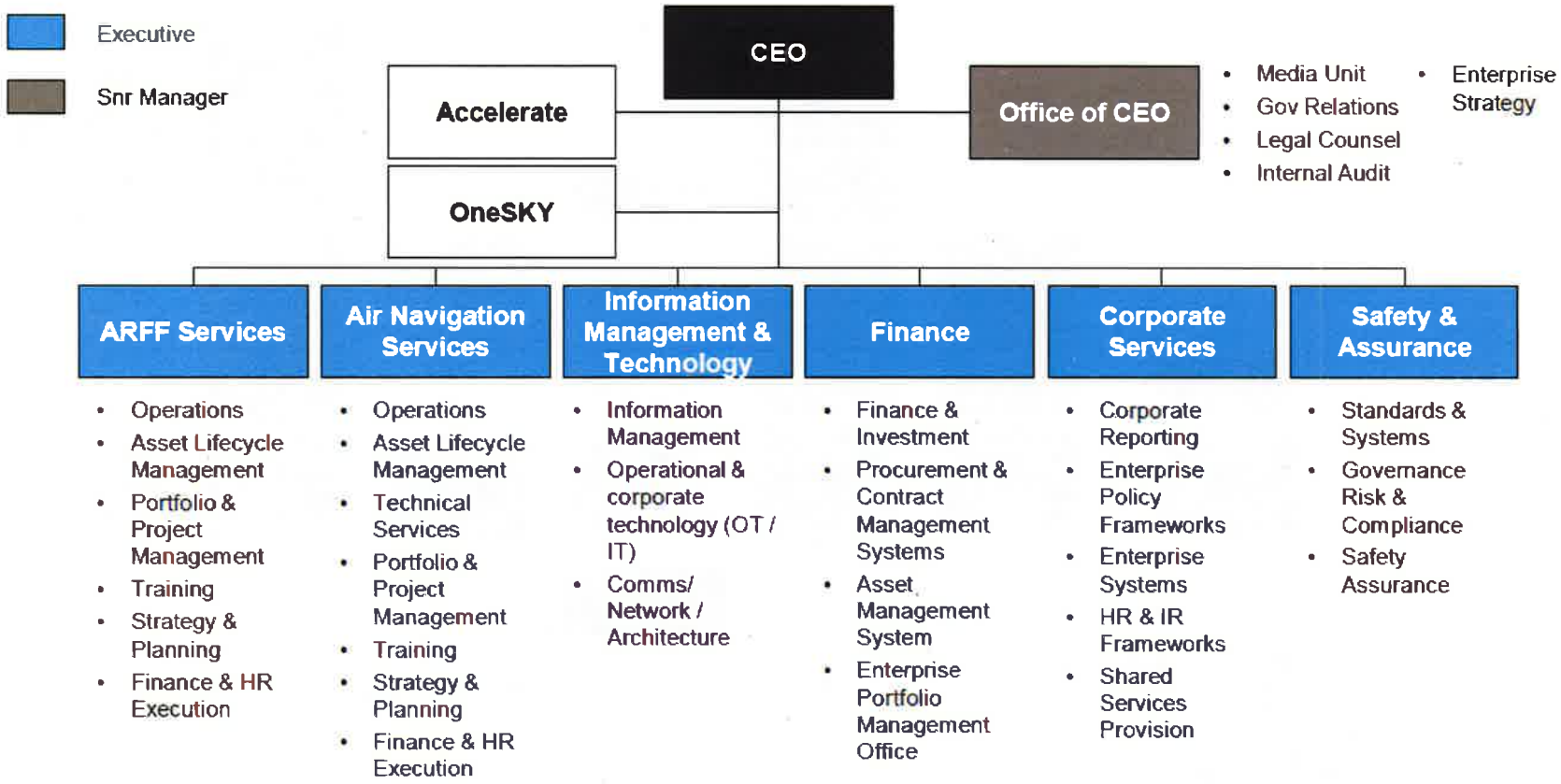
airservices

Our simpler operating model is based on customer needs…



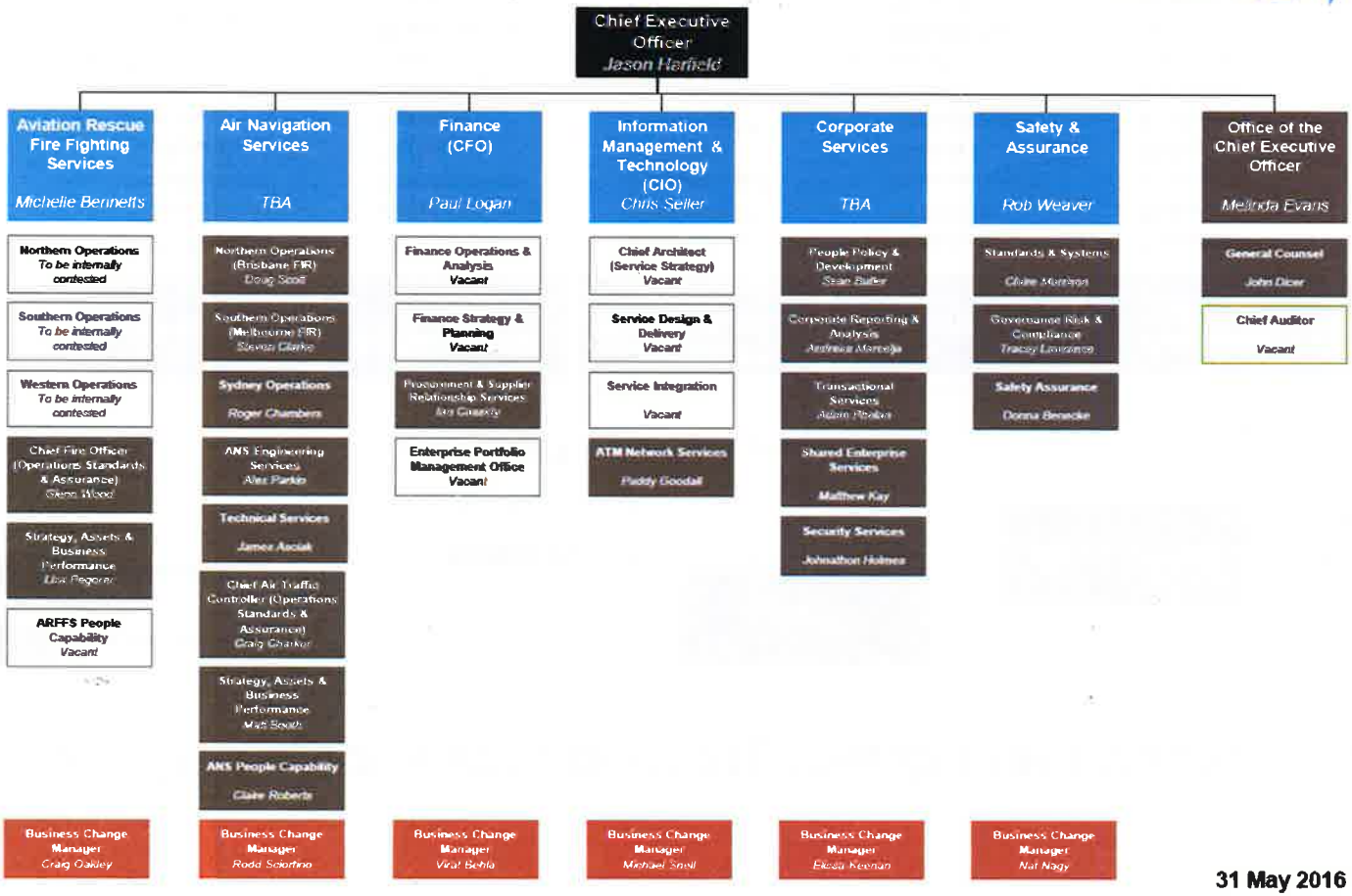
4 Group Structure

...and has a corresponding organisational structure from 1 July 2016



Appendix B Senior Leadership Level Structure

Direct Reports to Executive from 1 July 2016



31 May 2016

Attachment 1

Airservices Accelerate Program
Safety Case Assessment and Reporting Determination (SCARD)
Issue V1.0

NOTE: Due to compatibility issues with the new Standard Operating Environment (SOE), this version of the SCARD template will not automatically calculate the SCARD outcome, guidance has been included to allow the outcome to be manually determined.

Context

As specified by Operational Safety Change Management Requirements (AA-NOS-SAF-0104): A SCARD must be completed for changes to service levels, procedures or equipment that may affect the performance, functional or technical specification of a system or service; and organisational changes affecting safety accountabilities.

The SCARD template is designed to assist users to evaluate the change proposal, in order to determine what type of operational safety assessment and reporting is required.

Step 1: Change Details

Reference Number (Change Proposal/Project Proposal/ Project Number/NRFC/ASID)	N/A	**Services/Systems/ Assets under change**	

Change Description

Over the past few years, Airservices has embarked on a major transformation, undertaking a major asset refresh including the OneSKY program, creating the future state enterprise architecture, investing in our leadership capability and embarking on a cultural program.

However, as a result of declining financial and project delivery performance, the CEO commissioned a business diagnostic in November 2015 which identified a number of issues to be addressed:

- Costs growth driven by factors including poor controls and rising costs for non-operational staff that cannot be explained by market or regulation driven changes
- Degraded CAPEX performance and low RoA compared to peers and like industries and a large backlog of unfunded projects.
- No clear strategy or plan to manage potential technical disruption and transform our information management capability.

It was noted that if Airservices is to be in a position to deliver on its broad transformation agenda, we must align our strategic objectives and value proposition to customers, resolve inefficiencies in our structure and performance management framework, and build a culture that supports efficiency, effectiveness and agility.

As a result of the outcomes and recommendations of the business diagnostic, the Accelerate Program has been established within the broader transformation agenda to rapidly drive the required changes that will ensure Airservices continues in its vital role connecting the Australian aviation industry.

The Accelerate program is designed to rapidly improve capability, drive out unnecessary cost and deliver value to our customers now and into the future.

In order to ensure the success of the broader transformation program through the establishment of

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a solid base, the Accelerate Program will need to deliver the required improvements in three waves of change from March 2016 through to June 2017:

1. Set up for success
2. Fix the foundations
3. Transform ways of working

Within this, a set of integrated activities has been developed across three pillars

1. Transition to New Operating Model
   - Redesign the operating model by simplifying management layers, improving spans of control, consolidating functions and eliminating duplication
   - Empower ARFF with financial responsibility to run the group to commercial benchmarks
   - Develop capability in key strategic procurement areas to ensure sustainable benefits and subject to contestability, outsource defined non-core activities
   - Align workforce planning to the new operating model and resourcing levels, and drive roster efficiency based on best commercial roster practices in Australia
   - Establish a program for future EA reform including remuneration and conditions to align with modern commercial and aviation industry standards and practices
   - Build information management capability to enable future growth, including data strategy, governance, architecture, access, security, and use, and look for strategic partners to manage and maintain data storage

2. Assets & Projects Refocus
   - Rebuild holistic asset management practices across Airservices
   - Utilise a Portfolio, Programme and Project Management approach to ensure program meets portfolio outcomes and projects are delivered in a cost effective and beneficial way
   - Develop a plan to more strategically manage our property portfolio and assess the best commercial locations and construct for administrative and support services

3. Technology Enablement
   - Simplify and standardise the corporate technology platform environment to automate workflow, reduce manual activity, and improve timeliness of service delivery and enable transition to new operating model

This SCARD assesses the impact of the overall scope of these integrated activities at Program level using information available at this point in time in order to provide an early indication of the overall magnitude of the change, the potential operational safety impacts and to identify any regulatory reporting requirements as early as possible.

It is intended that once the scope of each activity is confirmed, each initiative will conduct its own SCARD and will manage any subsequent tailored safety program as required by the determination.

Step 2: SCARD Participants

List the persons participating in the completion of this determination:

Adequate representation from all appropriate areas of the business involved in or potentially affected by the change must be present during completion of the SCARD, for example (but not limited to):

- ATC operational representatives, System Supervisors, Operational Authorities, etc
- ARFF operational representatives, Station Command representatives, etc
- Engineering planning, design and integration representatives, maintenance and system operations representatives, software/hardware/data/infrastructure specialists, Technical and Maintenance Authorities and Chief Engineers, etc
- Training design and delivery representatives,
- Other applicable system owners.

This representation should also include subject matter expertise from any specialist safety disciplines relevant to the change, for example (but not limited to):

- System Safety, Human Factors and regulatory compliance representatives.

Changes potentially impacting external stakeholders must also include representation from these stakeholders as appropriate, for example (but not limited to):

- Airline representatives
- Airport representatives
- Regulatory representatives
- Vendor/Contractor representatives

NOTE: The SCARD may be rejected by the signatories in Step 9 if adequate representation is not included. If guidance is required on appropriate attendees, contact **FG SEA ASSURANCE**

Name	Position	Date
Donna Benecke	Manager Project & Business Support, SE&A	28.01.16
Claire Roberts	Manager, Quality Assurance & Capability, ARFF	02.02.16
Nat Nagy	Manager, Oceanic & Transcontinental Services, ATC	02.02.16
Matthew Booth	Manager, Business & Strategic Services, F&C	02.02.16
Tracey Lawrance	Chief Auditor, SE&A	02.02.16
Sarah Webb	Manager, Technology & Asset Strategic Programs, P&E	02.02.16
Michael Snell	Manager, Oceanic & Transcontinental Services, ATC	02.02.16
Sean Butler	Manager, Talent Acquisition & Retention, P&C	09.02.16
O'Leary Catherina	Internal Communications Manager, C&IA	09.02.16
Matthew Kay	Manager, Organisational Procurement, F&C	09.02.16
Melinda Evans	Manager, Safety Assurance	15.02.16

Step 3: Size of the Change

Complete the following questions to determine the size of the change. For each question, choose a rating from 1 (Low) to 7 (High); and provide justification. Then use the ratings to determine the overall size of the change

1	**Assess the significance of the change within Airservices.** *Consider the work areas affected. Consider the effects on P&E (Engineering disciplines, systems, locations), ATC (Service Delivery Lines, Enroute/TMA/Tower) and ARFF (stations, equipment, service).*	**Initial Rating** **7**
Justification: All business groups will be affected and this will result in changes to functional alignment, roles and assigned safety accountabilities. Significantly, there is no planned changes to reduce the level or type of service delivery. The introduction of change functions, roles and structures (detailed design not yet complete) will result in new process owners and the development of new systems and processes to support more effective and efficient service delivery. This will require changes to update Airservices Operations Manuals accordingly.		

2	**Assess the significance of the change outside Airservices.** *Consider the number and extent of service users and/or stakeholders affected, including the interfaces between these parties.*	**Initial Rating** **3**
Justification: While consultation will occur with a significant number of external stakeholders, the actual impact of the majority of changes will be transparent to those outside of Airservices. Some points of contact for external interfaces may change. No change to core operational service delivery functions within ATC and ARFF have been identified. There may be potential for some impact on current contractor relationships and as a result of staff impact, staff unions will be key stakeholders in the consultation process. A detailed list of stakeholders has been developed, including CASA, ATSB, ASQA, OTS, Depts of Defence, Infrastructure, Finance, and Environment, Centrelink, Avsuper, Comsuper, representative organisations such as ASTRA, BARA, RAAA, Suppliers, Airports, Airlines, Civil Air, CPSU, Professionals Australia, UFU, CEPU.		

3	**Assess the operational impact of the change on the systems, service and users (i.e. operators, maintainers, etc).** *Does the change:* o *enhance existing system functionality, provide different/new/novel functionality, or remove functionality;* o *alter the services provided;* o *affect the users' roles including their required skills and abilities, HMI interaction, work environments, systems and procedures of work, responsibilities, organisation and staffing or teams and communication?*	**Initial Rating** 4	**Weighted Rating** = Initial Rating x 2 **8**
Justification: The scope of the change does not involve altering existing operational system functionality or altering core operational service provision within ATC and ARFF. A number of functions within P&E, SE&A and LA are impacted by the realignment of functions within the business groups, and a revision of core and non-core work, across the organisation which has the potential to impact business systems and procedures of work, responsibilities, staffing and teams. Some changes may be required to Airservices' Operations Manuals.			

4	**Assess the technical impact of the change on the operating system(s).** *Does the change:* o *affect single or multiple systems (e.g. NAIPS/Eurocat/AFTN/MEX/ORS etc.);* o *affect operational or non-operational systems* o *introduce new, or reconfigure, hardware or software affecting operational capability and/or performance* o *affect system interfaces* o *affect redundancy, maintainability, integrity, etc* o *affect operational or business data and/or databases?*	**Initial Rating** 4	**Weighted Rating** = Initial Rating x 2 **8**
Justification: No technical changes are being proposed to operational systems. A number of non-operational systems and databases will be affected. This will potentially require significant changes to and migration of data currently held in systems such as SAP, CIRRIS, Org charts and other off-line management reporting systems to reflect the new Org structure and accountabilities.			

5	**How complex is the implementation of and transition to the new or changed system or service?** *Consider:* o *temporary removal of a system, ghosting/mimicking, operational test and evaluation, control and monitoring, rollback/fallback required, etc* o *resources available, training, documentation, procedures, communication, time lines, approvals, etc*	**Initial Rating** 7	**Weighted Rating** = Initial Rating x 2 **14**
Justification: There is significant (non-operational) complexity in the transition to the new Operating Model due to the wide scale impact on P&E, corporate and shared service functions under a new organisational structure. Additionally, a number of new business frameworks and systems are proposed to be implemented as part of the 10 strategic initiatives. This will require management of interdependencies between the various workstreams to ensure that any associated changes to systems, procedures, processes, documentation and any required education/training is sequenced appropriately to support desired transition timelines.			

6	**How substantial is the education and training associated with the change?** *Consider type of training required and for whom, none, classroom, online or simulation, time line for design/development and roll-out, duration, resources for design/development and delivery, impact on operational resources, currency, recency and licensing requirements, ongoing/refresher requirements, etc.*	**Initial Rating** **3**
Justification: Some training may be required on new business systems and new processes, mostly confined to corporate and shared services. Further detailed assessment of training requirements shall be conducted at the end of Phase 2 to confirm this assessment.		

Total	**43**

Resultant size of the change (Small* - 9 to 25, Medium - 26 to 44, Large - 45 to 63) *** If any single initial rating is greater than 4, a result of Small must be increased to a result of Medium**	**Medium**

Step 4: Operational Safety Impact of the Change

To assess the operational safety impact of the change, conduct an initial hazard identification to determine the potential operational safety hazards that may result from the change and complete the table below. Giving consideration to the number and severity of the potential hazards as well as the criticality of the impacted systems where listed on the System to Service List, complete the safety impact estimations shown below. For assistance completing this identification, refer to AA-GUIDE-SAF-0105C, or contact Safety & Environment Project & Business Support.

Note: *This process must only be used for the determination of the Operational Safety Impact. All Hazards identified through this process that require control and ongoing management, or further assessment must be recorded in HAZLOG and managed in accordance with AA-PROC-SAF-0105.*

Service/System	System Criticality	Potential Hazards	Controls		Effect on	
			Existing	Proposed	Airservices' Operations	Aircraft / Aircrew / 3rd Parties
Program Wide	**N/A**	**Failure to manage staff health and wellbeing** for those affected by Accelerate Program (both separated staff and those who remain within the new organisation) resulting negative impact on service delivery and safety of operations due to: - Perceived failure or incorrect application of P&C processes in execution of changes to Org structure and management positions (role creation/ removal/ amendment) - Ineffective or insufficient communication of change resulting in frustration, uncertainty and stress.	Adherence to P&C procedures and policies, EA conditions, and sound change management practices. Employee Assistance Program	Engagement of Change Management specialists to support the Accelerate Program and provide input into the development of Change and Comms Program. Early consultation and multiple feedback mechanisms available, eg: • Staff Impact Assessment process • Face to face briefings • One on one communication with all staff significantly affected by the proposed changes. • Onsite EAP support at some locations • Discussion Board • Avnet	Minor-significant frustration, anxiety for staff caused by new reporting lines or uncertainty during restructure. For staff significantly affected by change (role removal) potential increase in stress and anxiety.	Nil

		Failure to manage security of Airservices people, systems and property during the transition process.	Current compliance and assurance monitoring activities.	Accelerate Program Change and Comms Plan. Increased focus on security, assurance and governance.	Potential for malicious damage including trusted insider/internal sabotage resulting in damage to systems, data, removal of data, leaking of confidential/restricted/ sensitive information.	
		Accelerate Program causes distraction resulting in disruption to service performance, loss of focus on BAU activities or failure to manage current active issues (Safety, Enviro (inc noise and PFOS), WHS (asbestos), Security (IT and cyber) during and transition to the new structure.	Use of data in existing issues/occurrence tracking systems and mechanisms (eg CIRRIS, ASID). Continued acquittal of existing accountabilities and responsibilities until such time as they are formally amended.	Effective Change and Comms program. Mapping of current issues to new function owner. Thorough HO/TO process for transfer of functions. Application of the SMS to ensure the scope of change is managed appropriately and risk is managed to ALARP. Performance monitoring and supervision.	Potential increase in distraction causing errors or delaying in performing key functions and/or processes. Potential escalation of current risk levels due to delays in implementing identified controls.	Nil

	N/A	**Safety accountabilities and responsibilities not appropriately discharged** during or after transition resulting in adverse impact on service delivery and safety due to: - Safety accountabilities and responsibilities for affected positions not being appropriately mapped from existing roles to new roles - Lack of understanding of new accountabilities and responsibilities associated with each new management position due to lack of appropriate recruitment/, selection or on boarding - Ambiguity regarding roles, accountabilities and responsibilities due to lack of effective communication of the change - Migration of data and organisational controls e.g. role descriptions, accountabilities, delegations, does not occur in parallel with structural changes during the program.	Timely communication and consultation with all areas impacted by the change. Existing Role Descriptions which articulate required safety accountabilities and responsibilities to be maintained until formally amended. Adherence to document/database amendment processes (eg NRFC) when making changes to documented accountabilities/responsibilities.	Conduct mapping exercise of existing RD accountabilities and responsibilities to new RDs to ensure that accountabilities and responsibilities are appropriately transferred. Ensure safety accountabilities are clearly articulated in new and amended role descriptions and any required safety related competencies are adequately considered in selection processes. Ensure appropriate communications and change management arrangements to ensure affected staff are aware of changes to be captured in the following documents: • Transition Program Plan that includes: o Communications o Staff Impact Assessment o Safety o Risk Ensure major amendments to databases and key documents containing affected safety accountabilities, responsibilities and delegations are promulgated to align with the restructure taking effect, and minor document amendments are able to be promulgated via temporary instruction until such time as they can be incorporated.	Potential for safety obligations not being fully met, or delay in meeting them. Potential short term confusion or delay in performing required t functions as affected staff become familiar with new structure and roles. Minor administrative processing delays and confusion amongst staff.	Nil

Non-Core Work		**Change in delivery model/outsourcing of non-core functions** results in delay to or reduction in quality of service delivery with potential flow on effects to operational safety during and after transition.	Adherence to 04.02 Technical Competency Management. Maintenance of Operator Interface Agreements.	The Asset Management system detailed design will incorporate a strong risk/reward maintenance philosophy. Establish SLAs that meet regulatory and safety requirements. Effective monitoring of contract performance against SLAs and clear KPIs. Transition Plans to migrate functions to new provider. Regular staff performance monitoring.	Potential for deterioration in timeliness or quality of service delivery.	Nil

NOTES: 1) For newly developed systems, a System Criticality will need to be determined. The SCARD process will help inform this determination.
2) If any significant effect on external parties are identified, this assessment must be confirmed by the affected parties and must trigger their involvement in the ongoing management and control of the risk.
3) If any aspects of the change uncovered in this step were not considered in Step 3, the step should be re-validated.

1. Based on the identified Operational Safety hazards; Enter the estimated Operational Safety Impact of the change.	**Minimal**	If unsure, the higher of the considered options should be chosen
2a. Are any of the identified Hazards Human Factors related or do they impact human performance?	**Yes**	If yes, please seek Human Factors support via PBSresourcing@airservicesaustralia.com
2b. Are any of the identified Hazards Software related?	**No**	If yes, please seek software assurance support via - PBSresourcing@airservicesaustralia.com (for projects) - _FG_PE_ENG_OPS (for other changes)

Step 5: Regulatory Impact

If unsure in the completion of this step, contact Operational Assurance & Regulatory Services (OARS) for assistance.

5.1 - Does the proposed change require an amendment to a Provider Certificate schedule (including exemptions and instruments)?

e.g. Introduce a new service, or change to an existing service under;

- CASR Part 139H (Aerodrome Rescue and Fire-Fighting Services)
- CASR Part 143 (Air Traffic Services Training)
- CASR Part 171 (Aeronautical Telecommunication and Radionavigation Services)
- CASR Part 172 (Air Traffic Services Provider) or
- CASR Part 173 (Instrument Flight Procedure Design).

NOTE: This includes 171 Operations Manual defined Level 1 Changes (i.e. a new ICAO defined service or a new type of airways system, or the removal of an ICAO defined service or a type of airways system.)

Yes ☐	A Safety Case is required. Use the link below to notify OARS of the requirement to prepare a Safety Case. **Continue onto Step 6**
No ☒	**Continue onto Question 5.2**

5.2 - Does the proposed change otherwise require approval from CASA?

e.g. Commissioning of new ATS facilities pursuant to CASR Part 172; changes to Airservices' Operations Manuals related to changes to the services under the CASR Parts listed above; or commissioning of new ARFFS vehicles or facilities pursuant to CASR Part 139H.

Yes ☐	A Safety Case or Safety Assessment Report may be required. Use the link below to contact OARS to discuss the change's safety reporting requirements. **Continue onto Step 6**
No ☒	**Continue onto Question 5.3**

To notify Operational Assurance & Regulatory Services (OARS) of the requirement for a Safety Case, or to discuss the change's safety reporting requirements, contact: casa_compliance@airservicesaustralia.com

5.3 - Does the proposed change require notification to CASA prior to commissioning / notification to industry?

NOTE: This includes 171 Operations Manual defined Level 2 Changes (i.e. where a facility noticeable to the user is being decommissioned or where there is a significant reduction to the level of service). Refer to paragraph 3.2.1.4 of the CASR Part 171 MOS and paragraph 6.1.2.4 of the CASR Part 172 MOS regarding the regulatory requirements for a safety case.

Yes ☐	A Safety Case or Safety Assessment Report may be required. Use the link below to contact OARS to discuss the change's safety reporting requirements. **Continue onto Step 6**
No ☒	**Continue onto Step 6**

To contact Operational Assurance & Regulatory Services (OARS) to discuss the change's safety reporting requirements contact:
casa_compliance@airservicesaustralia.com

Step 6: Overall Operational Safety Magnitude

The Overall Operational Safety Magnitude is determined through a combination of the size of the change **and** its operational safety impact. Apply the results obtained from Steps 3 and 4 to the matrix below to determine the Overall Operational Safety Magnitude.

Overall Operational Safety Magnitude	Operational Safety Impact		
Size of the change	**Substantial**	**Reasonable**	**Minimal**
Large	☐ **Major**	☐ **Major**	☐ **Moderate**
Medium	☐ **Major**	☐ **Moderate**	☒ **Minor**
Small	☐ **Moderate**	☐ **Minor**	☐ **Minor**

Step 7: Operational Safety Reporting Requirements

Apply the results from Step 5 **or** Step 6 to the matrix below to determine the Operational Safety Reporting Requirements.

Note that a Step 5 requirement for a Safety Case or Safety Assessment Report overrides any lesser outcome from Step 6.

Outcome[1]	To be reported as ...	Required Actions
☐ **5.1 Response YES**	**Safety Case**	1. Establish Safety Program Working Group 2. Prepare Safety Plan 3. Execute Safety Program 4. Prepare Safety Case(s) (Indicate phasing below) ☐ Concept/Design & Impl. Phases ☐ All Phases
☐ **5.2 Response YES** ☐ **5.3 Response YES** ☐ **Major**	**Contact OARS to determine safety reporting and CASA notification or approval requirement.** **Discussion Outcome:**	
☐ **Moderate**	**Safety Assessment Report**	1. Establish Safety Program Working Group 2. Prepare Safety Plan 3. Execute Safety Program 4. Prepare Safety Assessment Report(s) (Indicate phasing below) ☐ Concept/Design & Impl. Phases ☐ All Phases
☒ **Minor**	**Safety Statement**	1. Determine whether this SCARD is sufficient to constitute the Safety Statement and indicate below (see AA-NOS-SAF-0104 Section 4.3) 2. Execute Safety Program, as required 3. Prepare Safety Statement, if required 4. Attach SCARD or Safety Statement to RFC or change process ☐ SCARD Only ☒ Additional Safety Statement

[1] A manager with accountability for the change, or the EGM, SE&A, may impose a higher safety reporting requirement.

Step 8: Additional Information

The outcome of this SCARD identifies that the size of the change is at the high end of the Medium range, and the Operational Safety impact is Minimal, indicating that a Safety Statement is required. The assessment of Operational Safety impact was influenced by the fact that the scope of the Program involves little direct change to frontline Air Traffic Control (ATC) and Aviation Rescue and Fire Fighting (ARFF) operations and services.

In relation to the determination that a Safety Statement is required, consideration has been given to the practicality and value add of creating a Safety Statement at this early stage of a program of work that contains a diverse range of sometimes independent activities which will be delivered across a variety of functions over an extended timeframe.

Therefore, it is proposed that:

1. A Safety Plan will be developed in lieu of a Safety Statement to demonstrate how operational safety shall be duly considered in planning, developing, implementing and executing the changes that form the Accelerate Program. The Safety Plan will document how the SMS will be applied consistency across all of the activities and how interdependencies and aggregation of risk will be considered and managed at a program level.

2. Individual SCARDs will be conducted for each Program initiative. This will allow accountable managers to assess and manage the operational safety impact of each discreet program of work in the context of the function being affected. Tailored safety programs will be developed accourding to each SCARD outcome.

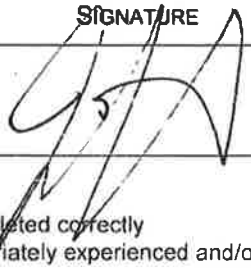
Step 9: Approval

Note that a completed SCARD, once approved below, remains valid for 12 months from the date of its approval on the basis that the change detailed in Step 1 remains as-is in that period. If either a change in scope occurs or the SCARD expires after 12 months, the assessment made herein must be revalidated through either re-assessing and re-approving the SCARD, at a minimum, or completing and approving a new SCARD.

PREPARED BY	PROPOSED BY
Donna Benecke, Manager SE&A Project & Business Support	

The level at which this SCARD can be approved is determined by its Overall Operational Safety Magnitude from Step 6 as shown in the table below, however a higher level of approval can be sought if deemed appropriate. Where the change impacts multiple systems, services or business areas, approval from all relevant authorities, or a higher authority, must be sought.

Major	Branch Manager, Service Delivery Line Manager, Chief Fire Officer, Chief Information Officer
Moderate	Chief Engineer, Chief Technology Officer, Chief OA, Chief UA, ATC Line Manager, ARFF Regional Manager, Other Unit Manager
Minor	TA/MA, OA, UA, ATC Line Manager, ARFF Station Manager, Other Unit Manager

APPROVED BY	SIGNATURE	DATE
Jason Harfield A/Chief Executive Officer		29 Feb 16

By approving this SCARD you acknowledge that:

- You are satisfied that the SCARD process has been completed correctly
- Regarding your area of authority or accountability, appropriately experienced and/or qualified staff participated in the process
- Sufficient and valid information has been included to justify the outcome
- This SCARD has been approved within 30 calendar days of its completion.

Step 10: SCARD Record Management

A copy of the approved SCARD must be sent to Operational Assurance & Regulatory Services and Safety & Environment Project & Business Support at FG_SEA_ASSURANCE. Operational Assurance & Regulatory Services will contact the proponent of the change if there are any outstanding regulatory issues with the completion of the SCARD.

The original signed copy of the approved SCARD must be stored in an organisationally approved document repository by the proponent of the change.

Australian Government
Civil Aviation Safety Authority

AIR NAVIGATION, AIRSPACE AND AERODROMES BRANCH

CASA Ref: D16/253312

20 July 2016

Mr Nat Nagy
Acting Executive General Mananger
Safety, Environment and Assurance
Airservices Australia
GPO Box 367
Canberra ACT 2601

Dear Mr Nagy

Airservices Accelerate Program

Thank you for your letter dated 23rd June describing the Accelerate Program.

While CASA agrees that there should be little impact on operational service delivery, the Management System Model utilised by a provider is the subject of both entry approval and on-going surveillance. This affects all of the Civil Aviation Safety Regulations (1998) administered by my office. These are Part 171, 172, 139H, 143, 173 and 175.

We agree that no changes are required to the Provider Certificates or Schedules, however, the Certificates are approved on the basis of information provided by the Provider, including an Operations Manual or exposition. These documents, therefore, either require CASA approval or are inherently a document that has been given CASA approval and changes to which must be advised.

CASA therefore believes that the SCARD should have been annotated 'YES' in either section 5.1 or Section 5. 2. I am however willing to accept the path that has been prescribed in the Safety Plan. The regulations contained in each part require, expressed here in general terms, that the Operations Manuals and exposition are kept up to date and changes are sent to CASA.

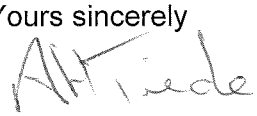
As outlined in Exemption CASA EX106/14; Airservices' ARFFS is required to have amendments to its Operations Manual approved by CASA, including changes to its organisational structure. Operations Manuals and exposition are scrutinised by my officers to ensure that they continue to contain the information required by the Civil Aviation Safety Regulations (CASR). ARFFS have maintained regular contact with the Part 139H Inspector in relation to changes to the ARFFS' structure and a formal meeting to review the changes is currently being arranged.

The Safety Plan provided (SAF-SP-16022) identifies in Section 7.1 Activity 1 (p.13) that "ensuring accurate mapping from old roles and structures to new, appropriately discharging safety accountabilities during and after restructure" has in the past been an issue. Can Airservices therefore check each approval and amend the Safety Statement to indicate how Airservices proposes to meet, in each case, the requirements of the various operations manuals and exposition, and when these changes will become available to CASA.

In addition CASA would also like copies of all of the SCARDS associated with other changes detailed in Activity 9 (p.15) and Section 7.2 Activity 1 (16).

Should there be other activities that CASA wishes to carry out in connection with the Accelerate Program we will advise as the program progresses.

Yours sincerely



Andrew Tiede
A/g Manager
Air Navigation, Airspace and Aerodromes Branch

Attachment C.

Safety & Assurance
GPO Box 367
Canberra ACT 2600

t 02 6268 5508

www.airservicesaustralia.com

ABN 59 698 720 886

Mr Andrew Tiede
A/Manager Air Navigation, Airspace and Aerodromes Branch
Civil Aviation Safety Authority
GPO Box 2005
CANBERRA ACT 2601

Dear Andrew

Re. Letter from CASA dated 20 July 2016 – Airservices Accelerate Program

Thank you for your letter dated 20 July 2016 seeking further information on how Airservices proposes to meet the requirements of its operations manuals and exposition during Airservices Accelerate program, including the delivery of the associated safety documentation to CASA.

Airservices is in the process of providing a detailed response to your queries which will be supplemented with a briefing to you prior to the already proposed briefing to you and your team on 17 August 2016.

Should you require any further information in the interim please contact me on (02) 6268 5508.

Yours sincerely

Nat Nagy
Acting Executive General Manager
Safety & Assurance

22 July 2016

Attachment D. i.

Safety Management Accountabilities

AA-GOV-SAF-0007

Version 24

Effective 1 July 2016

Prepared: Claire Marrison
Standards and Systems

Endorsed: Rob Weaver
Executive General Manager, Safety and Assurance

Authorised: Jason Harfield
Chief Executive Officer

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Change Summary

Version	Effective date	Brief description of change
24	1 July 2016	Changes to reflect revised operating model, and revision of presentation of accountabilities to demonstrate linkages between CEO and EGM accountabilities. NRFC 32620

This document was updated with reference to SMS Document Template C-TEMP0119 Version 4.

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1 Context

Airservices Safety Management System Objectives and Requirements (AA-NOS-SAF-0002) details the safety objective for safety responsibilities, stating:

> Everyone working for or under contract to Airservices understands and acts in a manner consistent with the requirements of the Airservices SMS and their own safety responsibilities.

2 Purpose

The purpose of this document is to detail both operational and work health and safety (WHS) management accountabilities and responsibilities for members of the Airservices Executive.

3 Scope

This document applies to executive activities across all Airservices workplaces and specifically to Airservices Executive.

Safety management accountabilities and responsibilities for other workers are contained within the Safety Management System (SMS) document Safety Accountabilities and Responsibilities (AA-NOS-SAF-0007) and other relevant group documentation.

4 Executive Level Accountabilities

Chief Executive Officer (CEO)	Executive General Manager (EGM), Air Navigation Services (ANS)	Executive General Manager, Aviation Rescue Fire Fighting Services (ARFFS)	Executive General Manager, Information Management and Technology (IM&T)	Chief Financial Officer (CFO)	Executive General Manager, Safety and Assurance (S&A)	Executive General Manager Corporate Services (CS)
CEO's accountabilities transition across the Executive portfolio						
Safety Accountabilities which flow from Acts						
The CEO is accountable to the Board of Directors of Airservices for:	The EGM ANS is accountable to the CEO for:	The EGM ARFFS is accountable to the CEO for:	The EGM IM&T is accountable to the CEO for:	The CFO is accountable to the CEO for:	The EGM S&A is accountable to the CEO for:	The EGM CS is accountable to the CEO for:
The safety, regularity or efficiency of air navigation, whether in or outside Australia[1]	Ensuring the safe delivery of air navigation services which give effect to the Chicago Convention	Ensuring the safe delivery of ARFF services	Ensuring the delivery of specific air traffic management services, including Aeronautical Information Management (AIM) and Instrument Flight Procedure (IFP) services, and telecommunication networks which support the safe delivery of air navigation services	The financial stability of the organisation	Providing independent advice and assurance in relation to the safety of operational service delivery	
					The development and maintenance of the organisation's Safety Management System (SMS)	
	Ensuring the provision and management of resources[2] to assure the safety of air navigation services	Ensuring the provision and management of resources [3]to assure ARFFS compliance with regulated operational response times	Ensuring the provision and management of network services which support the safe delivery of air navigation services			
	Ensuring the adequacy of emergency planning preparedness and response, that is conducive to air navigation services	Ensuring the adequacy of emergency planning preparedness and response, that is conducive to ARFF services	Ensuring the adequacy of emergency planning preparedness and response for Air Traffic Management (ATM) network services and business systems relative to their impact of air navigation service delivery and ARFF services		The development and implementation of business contingency and continuity capability which addresses a broad range of operational and corporate threats	

[1] Air Services Act 1995 8 1 (ii) and (iii)

[2] Human, technical and property

[3] Human, technical and property

	Ensuring effective interfaces with adjoining Air Navigation Service provides in normal and contingency operations	Ensuring effective interfaces with emergency response agencies to assure response to incidents				
Ensuring that in exercising its powers and performing its functions, Airservices regards safety of navigation as the most important consideration[4]	Evolving Air Navigation Services and systems in a manner which secure future safety outcomes	Evolving ARFF services in a manner which secure future operational response requirements	Evolving air traffic management network systems, telecommunication networks and related business systems in a manner which secures future safety outcomes of air navigation services	Assuring sufficient funding is available to support the delivery of safety improvement for operational service delivery.	Providing assurance in relation to extent to which in exercising its powers and performing its functions, Airservices regards safety of navigation as the most important consideration	
	Assuring that changes to air navigation services and technical systems are introduced in a manner in which the fitness for service is declared, accepted in accordance with internal procedures, and delivers appropriate safety assurance	Assuring that changes to ARFFS are introduced in a manner in which the fitness for service is declared, accepted in accordance with internal procedures and delivers appropriate safety assurance	Assuring that changes to delivery or support of AIM and IFP services, network operations, telecommunication networks and business systems are introduced in a manner in which the fitness for purpose and service is declared, accepted in accordance with internal procedures and delivers safety assurance			
	Assuring that organisational systems and process comply with the requirements of Civil Aviation Safety Regulations Part 172, 171,143 and 65	Assuring that organisational systems and process comply with the requirements of Civil Aviation Safety Regulations Part 139H	Assuring that organisational systems and process comply with the requirements of Civil Aviation Safety Regulations Part 173 and 175		Providing of assurance in relation to Airservices' compliance with the CASR Parts for which it has received Provider Certificates	
					Assuring that the Safety Management System complies with relevant parts and CASR 99	
	Facilitating a culture within the organisation which embeds safety of navigation as the most important consideration.	Facilitating a culture within the organisation which embeds safety of ARFF service delivery as the most important consideration.	Facilitating a culture within the organisation which embeds safety of navigation as the most important consideration.	Facilitating a culture within the organisation which embeds safety of navigation as the most important consideration.	Facilitating a culture within the organisation which embeds safety of navigation as the most important consideration	

[4] Air Services Act Section 9.1

Providing a safe and healthy work environment for workers and visitors.[5]	Providing a safe and healthy work environment for ANS workers and visitors.	Providing a safe and healthy work environment for ARFF workers and visitors.	Providing a safe and healthy work environment for IM&T workers and visitors.	Providing a safe and healthy work environment for Finance workers and visitors.	Providing a safe and healthy work environment for S&A workers and visitors; Ensuring that the SMS complies with relevant WHS legislative requirements	Providing a safe and healthy work environment for CS workers and visitors.
Supporting Safety Responsibilities						
In discharging their high level accountabilities, the CEO is responsible for:	In discharging their high level accountabilities, the EGM ANS is responsible for:	In discharging their high level accountabilities, the EGM ARFFS is responsible for:	In discharging their high level accountabilities, the EGM IM&T is responsible for:	In discharging their high level accountabilities, the CFO is responsible for:	In discharging their high level accountabilities, the EGM S&A is responsible for:	In discharging their high level accountabilities, the EGM Corporate Services is responsible for:
Assuring that the Board's risk tolerance in relation to safety are enacted through policies, management systems, performance targets and key risk controls.	Assuring that the ANS group complies with the requirements of the Safety Policy and SMS	Assuring that the ARFFS group complies with the requirements of the Safety Policy and SMS	Assuring that the IM&T group complies with the requirements of the Safety Policy and SMS	Assuring that the Finance group complies with the requirements of the Safety Policy and SMS	Ensuring that the Safety Policy and SMS embodies the Board's risk appetite for service provision and people safety Assuring that the S&A group complies with the requirements of the Safety Policy and SMS Delivery of assurance in relation to group's compliance with SMS requirements	Assuring that the CS group complies with the requirements of the Safety Policy and SMS
	Ensuring that ANS staff are appropriately trained, competent, and when necessary licensed, to conduct their safety obligations	Ensuring that ARFFS staff are appropriately trained, competent, and when necessary licensed, to conduct their safety obligations	Ensuring that IM&T staff are appropriately trained, competent, and when necessary licensed, to conduct their safety obligations	Ensuring that Finance staff are appropriately trained, competent, and when necessary licensed, to conduct their safety obligations	Ensuring that S&A staff are appropriately trained, competent, and when necessary licensed, to conduct their safety obligations	Ensuring that CS staff are appropriately trained, competent, and when necessary licensed, to conduct their safety obligations
	Monitoring relevant safety performance against set targets	Monitoring relevant safety performance against set targets	Monitoring relevant safety performance against set targets	Monitoring relevant safety performance against set targets	Monitoring relevant safety performance against set targets	Monitoring relevant safety performance against set targets
	Implementing preventative and corrective action to address performance deficiencies, elevated risk levels and secure future safety targets	Implementing preventative and corrective action to address performance deficiencies, elevated risk levels and secure future safety targets	Implementing preventative and corrective action to address performance deficiencies, elevated risk levels and secure future safety targets	Implementing preventative and corrective action to address performance deficiencies, elevated risk levels and secure future safety targets	Implementing preventative and corrective action to address performance deficiencies, elevated risk levels and secure future safety targets	Implementing preventative and corrective action to address performance deficiencies, elevated risk levels and secure future safety targets

[5] Intent of the Work Health and Safety Act 2011 (Cth)

	Ensuring that ANS managers and staff are aware of, and are held accountable for, their safety performance	Ensuring that ARFF managers and staff are aware of, and are held accountable for, their safety performance	Ensuring that IM&T managers and staff are aware of, and are held accountable for, their safety performance	Ensuring that Finance managers and staff are aware of, and are held accountable for, their safety performance	Ensuring that S&A managers and staff are aware of, and are held accountable for, their safety performance	Ensuring that CS managers and staff are aware of, and are held accountable for, their safety performance
	Providing regular reports on safety performance to the Board Safety Committee	Providing regular reports on safety performance to the Board Safety Committee	Providing regular reports on safety performance to the Board Safety Committee	Providing regular reports on safety performance to the Board Safety Committee	Providing independent assurance to the Board Safety Committee in relation to the safety performance of service delivery and WHS	Providing regular reports on safety performance to the Board Safety Committee
Other Safety Authorisations						
The CEO has the authority to veto changes to the operational baseline.					The EGM S&A has the authority to veto changes to the operational baseline when he/she has determined that there is compelling evidence that there will be a significant ongoing safety impact[6]	

[6] Any decision to veto shall be confirmed in writing within 48 hours, including an explanation as to the reasons for the veto, to the CEO and the relevant Executive members

5 Related Documents

Title	Number
Safety Management Policy	C-POL: AA 000 7
Safety Management System Objectives and Requirements	AA-NOS-SAF-0002
Safety Accountabilities and Responsibilities	AA-NOS-SAF-0007

6 Definitions

Terms	Explanation
Accountability	A relationship that exists between two people or groups of people, the person or group held accountable and the person to whom they are accountable
Responsibility	The state of ownership resulting from the performance of an activity or action
Accountability versus Responsibility	A worker is responsible for their actions in performing an activity whereas they are accountable to someone for the outcome of the activity being performed
Workplace	Any premises owned or under the control of Airservices, or a place where employees are performing at the direction of Airservices
Worker	Workers under the Work Health and Safety Act 2011 (Cth) include: • employees • independent contractors • sub-contractors • outworkers (e.g. home based) • apprentices • work experience students • trainees • volunteers who work in employment-like setting

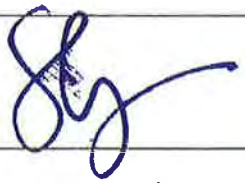
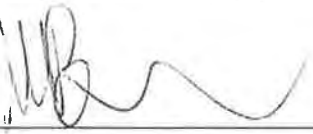
Attachment D. ii.

Accelerate Program – Transition to new Operating Model and Senior Leadership Structure

Safety Statement

SAF-SS-16022 Version 1.0

Effective 30 June 2016

Prepared:	Donna Benecke Manager SE&A Project & Business Support	
Agreed:	Nick King Accelerate Program Director	
Accepted:	Mick Snell A/EGM Air Traffic Control	
	Stephen Angus EGM Air Navigation Services	
	Rodd Sciortino A/EGM Aviation Rescue Fire Fighting	
	Michelle Bennetts EGM Aviation Rescue Fire Fighting Services	

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Accelerate Program – Transition to new Operating Model and Senior Leadership Structure

Safety Statement

SAF-SS-16022 Version 1.0

Effective 30 June 2016

Prepared:	Donna Benecke Manager SE&A Project & Business Support	Donna Benecke Digitally signed by Donna Benecke DN: cn=Donna Benecke, o=Airservices Australia, ou=SE&A Project & Business Support, email=donna.benecke@airservicesaustralia.com, c=AU Date: 2016.06.30 09:14:44 +10'00'
Agreed:	Nick King Accelerate Program Director	
Accepted:	Mick Snell A/EGM Air Traffic Control	Digitally signed by Michael Snell DN: cn=Michael Snell, o=Airservices Australia, ou, email=michael.snell@airservicesaustralia.com, c=AU Date: 2016.06.30 09:20:11 +10'00'
	Stephen Angus EGM Air Navigation Services	
	Rodd Sciortino A/EGM Aviation Rescue Fire Fighting	
	Michelle Bennetts EGM Aviation Rescue Fire Fighting Services	

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Document Review Record

Those listed below have reviewed this document in the context of their area of expertise and in accordance with their area of accountability. All issues raised from the reviews have been addressed to the satisfaction of all reviewers.

Name	Role / Position	Date	Version
Claire Marrison	SE&A Manager Strategy, Systems & Analysis	29.06.16	V0.1
Nat Nagy	S&A Business Change Manager	29.06.16	V0.1
Garth Bartier	PBS CB Manager	29.06.16	V0.1

Change summary

Version	Date	Change Description
1	30.06.17	Initial release.

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Document Storage Locations:

Safety Statement	Location
Electronic copy	Diagnostic Review Secure Corporate Shared Drive

1 Purpose

This Safety Statement has been developed to support the transition to the new Operating Model and senior leadership structure under the Accelerate Program on 1 July, 2016. It provides argument and evidence that the operational safety impact of the change has been assessed and that any operational safety risks identified are being managed to ensure they are reduced to As Low As Reasonably Practicable (ALARP).

2 Background

As part of the Airservices Accelerate Program a new simpler operating model and Executive structure were announced on 17 May 2016 (see **Appendix A**) and the Direct Reports to the Executive (DRE) leadership level structure was announced on 31 May 2016 (see **Appendix B**). A further announcement of the Other Leadership Roles (OLR) structure was made on 23 June, 2016 (**Appendix C**).

Five principles have determined how the Executive has conducted the restructure process for DREs and OLRs:

- Review and 'reset' all roles at each layer based on capability to deliver the business' strategy
- Allocate candidates considered best capability fit for the role regardless of age, gender or ethnicity
- Create succession planning opportunities for high potential people to perform roles in parts of the business to broaden their skill base
- Optimise the overall combination of skills and experience across the business
- Enable new experience, capability and/or opportunity by advertising selected roles

The proposed change was assessed in a Safety Case Assessment and Reporting Determination (SCARD) on announcement on the Executive and Direct Reports to the Executive (DRE) structure, and the assessment finalised on announcement of the Other Leadership Roles (OLR) structure (see **Attachment 1**).

The SCARD identified that no changes are currently being proposed that will result in changes to ARFF, ATC, P&E or Learning Academy (LA) service levels, procedures or equipment that may affect the performance, functional or technical specification of a system or service under CASA Aviation Safety Regulations nor require amendment of any Airservices Provider Certificates.

Frontline staff will continue to perform existing functions and provide existing services, in most cases under the same frontline supervisor, however in some cases under a new Executive and senior leadership structure.

3 Scope

This Safety Statement covers the realignment of existing functions to support the new operating model and the reassignment of staff performing those functions across the organisation to the new senior leadership structure on 1 July 2016 (hereinafter referred to as 'repointing' the organisation to the new operating model and structure).

The repoint will result in the creation of clearer accountabilities for end to end safety and service delivery and system performance in two main service delivery groups

called Air Navigation Services (ANS) and Aviation Rescue Fire Fighting Services (ARFFS).

Responsibility for corporate and operational training will be transitioned from the Learning Academy to ANS, ARFFS and Corporate Services however frontline supervision roles and those who develop, deliver and support training delivery will be largely unaffected other than to be repointed to new senior managers.

Key functions currently in Projects & Engineering (P&E) will be integrated into the ANS and ARFFS groups, although no changes to Engineering delegations or maintenance and support of systems is currently being proposed.

The Chief Information Officer (CIO) of the new Information Management & Technology (IM&T) business group will oversee the development and maintenance of an organisation wide enterprise architecture for operational and administrative data.

Corporate functions, including finance, safety & assurance, will transition away from provision of front line service provision and concentrate on frameworks, systems and standards. Staff who perform frontline service delivery functions will be integrated into ANS and ARFFS.

Some support functions are being consolidated in a new Corporate Services business group.

The operational safety impact of the repointing of the organisation to the new operating model and senior leadership structure is minimised as a result of frontline operational staff within ATC and ARFF and their associated procedures, processes and functions remaining largely unaffected other than potential to require administrative updates to reflect new position titles and business group naming conventions.

4 Responsibilities

The following is a table of key contributors to the safety management of the change:

Title and name	Primary responsibilities
Executive Steering Group – **CEO** – **Accelerate Program Director** – **Accelerate Transition Director** – **Exec ANS** – **Exec ARFFS** – **Chief Finance Officer** – **CIO** – **Exec Corporate Services** – **Exec Safety & Assurance**	• Endorse Program financial and non-financial objectives and overall operating model design • Decide on major program design choices, risks, and issues and monitors alignment and interdependencies across initiatives • Assess achievement of program milestones, accepts major deliverables, and ensures benefits of initiatives are realised • Authorise initiation of large initiatives, decides on major program variances as required, and monitors overall expenditure • Endorse Program support requirements and capabilities e.g. out-placement, industrial relations, change, and communications
Accelerate Program Director	• Meet time, cost, quality deadlines • Ownership of schedules, monitor and track progress; ensure

Title and name	Primary responsibilities
	coordination across teams • Manage key interfaces to program stakeholders • Ensure effective governance of all initiatives • Program integration management • Transition Management • Manage specialist support to initiatives via PMO
Accelerate Program Transition Director	• Manage HR aspects of transition to new Operating Model and execution of Accelerate Program Initiatives
Business Change Managers (BCMs)	• Assist the leadership team in embedding the Accelerate Program initiatives into everyday business operations • Ensure timely and accurate reporting to support program governance • Identify change issues and risks, maintain change control and develop contingency plans as required • Support program communications as a change agent
Outgoing[1] Executive and Senior Leaders (All Business groups)	• Maintenance of current safety accountabilities until formally handed over. • Identification of key information required for the ongoing safety of operations which must be included in handover to new accountable manager • Identification of key information for ongoing Regulatory compliance to be included in handover to new accountable Manager • Contribute to the identification of operational documentation and procedures which require revision as a result of the repoint • Participation in hazard identification and risk assessment workshops • Completion of handover / takeover where required
Incoming[2] Executives and Senior Leaders (All Business Groups)	• Review, acknowledgement and acceptance of key information required for the ongoing safety of operations • Review, acknowledgement and acceptance of key information for ongoing Regulatory compliance. • Contribute to the identification of operational documentation and procedures which require revision as a result of the repoint • Participation in hazard identification and risk assessment workshops. • Completion of handover / takeover where required.
SE&A Manager Strategy, Systems and Analysis (SSA)	• Revision of Safety Accountabilities • Development of Safety Accountabilities statements and Induction Program for Executive, DREs and OLRs with key safety accountabilities

[1] Outgoing Managers refers to managers currently in roles that are impacted by the 1 July transition, either through exiting the organisation, moving out of a current role or transferring accountabilities or functions to another manager.
[2] Incoming Managers refers to managers who are moving into a new role or who are receiving new accountabilities or functions to manage.

Title and name	Primary responsibilities
SE&A Manager Project & Business Support (PBS) and Safety Improvement (SI)	• Facilitation of safety stability assessment • Facilitation of SCARD workshops • Facilitation of Risk Assessments • Facilitation of Risk Acceptance • Preparation of Safety Statement
SE&A Regulatory Services	• Revision of Airservices' Operations Manuals and linked documents • CASA Liaison

5 Implementation Safety Management

5.1 Activities and Consultation

The following activities have been undertaken in applying the Safety Management System to this change. Safety milestones appear in **bold text**. Accelerate Program activities appear in *Italics*.

Activity	Objective
Announcement of Executive and DRE level structure and 1 July Repoint	*To advise the organisation of the new operating model and Executive structure*
Commence revision of Safety Management Accountabilities	Revise AA-GOV-SAF-0007 to ensure accountabilities are appropriately mapped to the new structure and no accountabilities are lost in the reallocation. (See Attachment 2)
Commence development of Executive and DRE Safety Accountabilities Statements	To expand on AA-GOV-SAF-0007 accountabilities tailored to specific EGM roles and to seek evidence of understanding and acceptance of accountabilities and methods of acquitting them.
Manager SSA briefing to Executive Steering Group and BCMs on Safety Accountabilities revisions	To make Executive and BCMs aware of SMS obligations and outline proposal for revising existing safety accountabilities in preparation for transition to new operating model and management structure.
Manager SSA 1 on 1 briefings with Executive and key DREs on Safety Accountabilities revision methodology	To review draft Safety Management Accountabilities AA-GOV-SAF-0007 revisions and seek feedback on proposed development of Safety Accountabilities Statements to facilitate the induction of new staff into roles with key safety accountabilities.
Commence Initial Executive & DRE Safety Stability Assessment	Key assurance mechanism that demonstrates stability of management of key safety areas

Activity	Objective
	referenced in Operations Manuals. Provides a systemised approach to recognising were additional support is required.
Draft Executive and DRE level structure 1 July Repoint SCARD and briefing on Safety Accountabilities revisions	Comply with Operational Safety Change Management Requirements AA-NOS-SAF-0104 and the approved Accelerate Program Safety Plan activities specified for Initiatives and key enabling activities. Conduct briefing for representatives from ARFF, ATC, P&E and the Learning Academy on revised safety accountabilities, proposal to develop individual safety accountabilities statements and obtain signoff after Induction, safety stability assessment process and induction prioritisation.
Revision of Learning Academy Integration initial safety assessment	To review LA assessment and incorporate into 1 July Transition SCARD.
ATSB briefing on Accelerate and new structure	Provide information on the Accelerate Program and progress in relation to the design of the new operating model and senior leadership structure.
Conduct safety induction prioritisation	Based on safety stability assessment prioritise positions in relation to their need to receive safety induction. Priority 1 = highest priority.
Commence revisions of Airservices Operations Manuals	To reflect new role titles and organisational structure.
A/EGM SE&A consultation with CASA	Briefing on Accelerate Program progress and proposed changes to operating model and management structure. Provision of Program SCARD and Program Safety Plan for information.
BCM consultation	Proposal to develop program safety reporting regime. Confirmation of joint understanding of roles of BCMs in identifying program level risks.
Announcement of OLR structure	
Revise 1 July Repoint SCARD to incorporate Learning Academy Integration initial safety and regulatory assessment and OLR	Incorporation of preliminary hazard identification work carried out by the Learning Academy for inclusion in the 1 July repoint

Activity	Objective
structure impact	SCARD. Also to ensure SCARD assesses impact of OLR appointments and structure
Expand Safety Stability Assessment to take into account OLR appointments and structures	To determine whether OLR structure or appointments impacted positively or negatively on the safety stability and to revise assessment accordingly.
Commence development of 1 July Repoint Safety Statement	To meet the SCARD reporting determination and to provide argument and evidence to Airservices management that the business is in a position to proceed on 1 July to move to the new operating model and leadership structure.
1 July Repoint SCARD approved (Attachment 1)	
Executive, DRE and OLR Executive and DRE Safety Accountabilities Statements finalised (Example – Attachment 3)	
Executive, DRE and OLR Stability Assessment complete (Attachment 4)	
Safety Induction Prioritisation finalised (Attachment 5)	
Development of a Transition toolkit for Managers	To provide a standardised approach to handover/takeover to ensure key areas are covered in handovers. To reduce duplication of effort by providing templates including: **Cover Memo – Manager to Manager** A template for a memo from an outgoing manager to an incoming manager. If handover is required for more than one manager, multiple memos will be required **Handover/Takeover checklist** **Assignment of Portfolio Responsibilities**. **Staff Management Pack** (cover page) The handover of staff issues will be kept between managers. The memo provides a template for your evidence, reports, etc. on staff management issues. **Staff List -** The spreadsheet is a template that should be used to list the staff members being transferred as part of the restructure. **Other Lists -** Other relevant lists to assist with handovers to ensure everyone has a clear picture of what they are handing over, or taking over. These lists will include topics such

Activity	Objective
	as documentation, cost centres, projects, etc. These lists will be distributed as they become available.
Risk Acceptance by accountable managers	To obtain confirmation of acknowledgement and acceptance of the residual risk associated with the 1 July repoint.
1 July Repoint Safety Statement approved	

5.2 Implementation hazards

The following potential hazards related to the repointing have been identified:

1. Safety accountabilities and responsibilities not appropriately discharged during or after transition resulting in adverse impact on service delivery and safety due to:
    - Safety accountabilities and responsibilities for affected positions not being appropriately mapped from existing roles to new roles
    - Lack of understanding of new accountabilities and responsibilities associated with each new management position due to lack of appropriate recruitment/selection or on boarding
    - Ambiguity regarding roles, accountabilities and responsibilities due to lack of effective communication of the change
    - Accountabilities not reassigned appropriately resulting in fractured accountabilities that weaken execution of functions.
    - Migration of data and organisational controls e.g. role descriptions, accountabilities, delegations, does not occur in parallel with structural changes during the program.
2. Accelerate Program causes distraction resulting in disruption to service performance, loss of focus on BAU activities or failure to manage current active safety issues during transition to the new structure.
3. Maintenance of insufficient suitably qualified and experienced staff in required roles to support ongoing Supervising Registered Training Organisation (SRTO)/Civil Aviation Safety Regulations (CASR) compliance.
4. Loss of records/ maintenance of records/ inadequate data entry.

5.3 Implementation controls and risk assessment

The hazards, proposed controls and their status are summarised in the table below.

The four identified hazards have been assessed and controls identified in order to reduce the risk to ALARP.

Accelerate BCMs and managers appointed to roles with key safety accountabilities in ARFF, ATC, P&E and the Learning Academy were asked to implement the identified controls as appropriate for their business areas.

The target level of risk after mitigation is anticipated to be Class D as assessed against the Airservices risk matrix contained in Operational Safety Risk Management Procedure AA-PROC-SAF-0105.

Hazard No	Hazard Description	Initial Risk	Proposed Controls	Residual Risk	Yet to be Met / Met / Not Met
1	Safety accountabilities and responsibilities not appropriately discharged during or after transition resulting in adverse impact on service delivery and safety	D	1. Translate current Exec safety management accountabilities and responsibilities to new structure via revised Safety Management accountabilities AA-GOV-SAF-0007	D	Met
			2. Develop Safety Accountabilities Statements for roles with key safety accountabilities		Yet to be Met
			3. Conduct Safety Accountabilities Induction for roles with key safety accountabilities in identified order of priority		Yet to be Met
			4. Where existing role include key safety accountabilities and responsibilities, and that role of that incumbent is changing, the currently held safety accountabilities must continue to be acquitted until formally handed over to a new incumbent or new role		Met
			5. Ensure safety accountabilities are clearly articulated in new and amended role descriptions and safety related competencies will be considered in recruitment. As safety related competencies can be acquired relatively quickly, mentoring and coaching can be used as a control for those who are viewed as not having an ideal level of prerequisite knowledge.		Yet to be Met
			6. Develop appropriate communications and change management arrangements to ensure staff are aware of new points of contact for roles with key safety accountabilities.		Met
2	Accelerate Program causes distraction resulting in disruption to service performance, loss of focus on BAU activities or failure to manage current active safety issues during transition to the new structure	D	1. For roles with key safety accountabilities, ensure thorough HO/TO process to transfer role/function/tasks/activities and active issues from existing to new owners.	D	Met
			2. Provide look-up table of existing key roles/functions to new role/unit/branch/group in the revised organisational structure to ensure broader organisational understanding of change		Yet to be Met
			3. Increased performance monitoring and supervision.		Met
			4. Increased direct communication from managers to business areas significantly affected to ensure opportunity for discussion and resolution of concerns to minimise risk of distraction and impact on BAU activities.		Met
3	Insufficient suitably qualified	C	1. Keep staff informed to minimise risk of premature/unnecessary departure from organisation due uncertainty.	D	Met

	and experienced staff retained in required roles to support ongoing SRTO/CASR compliance		2. Retain and repoint sufficient suitably qualified and experienced staff who can conduct required activities to comply with and maintain relevant SRTO/CASR standards.		Met
			3. Appropriate consideration of essential qualifications and experience when appointing staff in new roles in the new structure.		Met
			4. Transition task list for accountabilities to support handover of functions.		Met
			5. If required, seek external vendor support to cover unplanned staff losses. Will be met if it is identified that the need exists.		Not Met
			6. If required, readjust/review of scheduled training needs (especially during transition) to match capacity for delivery. Will be met if it is identified that the need exists.		Not Met
			7. Continuing accountability of Services groups (ARFFS/ANS) to provide adequate SME coverage to support training development and delivery.		Met
			8. Post transition and bedding down of new structure, conduct RTO audit to provide assurance of ongoing compliance of SRTO. Consider inclusion of additional operational safety assurance activities to test ongoing compliance in areas most affected by the transition to new operating model.		Yet to be Met
4	Loss of records/ maintenance of records/ inadequate data entry	D	1. HO/TO Task List to track transition of accountabilities for records maintenance.	D	Met
			2. Maintain TRIM filing of records in current locations (referenced in Task list.		Met
			3. On initial repoint, maintain existing support staff who are skilled in maintaining records to SRTO/CASR standards.		Met

For additional information regarding these hazards, refer to HAZLOG 1258.

Yet to be Met controls will continue to be tracked by Safety Assurance via CIRRIS actions until implemented.

5.4 Transition to Operations

On 1 July all staff who have been appointed in new roles (permanent appointments and acting appointments) will take up their new positions and associated accountabilities.

Executives in roles with key safety accountabilities shall receive an induction into those accountabilities by the Manager Strategy, Systems and Analysis (from 1 July Head of Standards and Systems) within one week of transition. Inductions will be prioritised based on an assessment of groups and individuals stability which is a combination of consideration of key safety roles, incumbent experience and key safety accountabilities. Acceptance and acknowledgement of safety accountabilities will be recorded by way of signature of the incumbent in a tailored Safety Accountabilities Statement. Direct Reports to the Executive will be inducted in a prioritised program which will be complete by 27 July 2016.

Staff who have not been appointed or requested to act in new roles will be repointed under the new operating model and organisation structure. Repointed staff will continue to carry out the functions of their existing role descriptions albeit with different senior managers.

Where existing roles include key safety accountabilities and responsibilities, and that role or that incumbent is changing, the currently held safety accountabilities must continue to be acquitted until formally handed over to a new incumbent or new role.

For roles with key safety accountabilities a handover/takeover shall be completed to support the continuation of service provision and ongoing requirement to meet regulatory compliance obligations.

Until such time as updates can be made to administrative databases such as SAP and CIRRIS, and revisions made to a significant number of documents and procedures, look tables shall be published which show current key roles and functions mapped to their location in the new organisation structure. This will assist staff in identifying new points of contact as quickly as possible so business may continue as usual.

6 Outstanding Activities

The timelines and milestones for outstanding safety activities required to support the implementation of this change are listed below.

Activity	Status
Prepare and conduct handover/takeovers for roles with key safety accountabilities	27.06.16 – 1.07.16
Conduct High Priority Executive Inductions (EGM ARFFS, ANS, IM&T) and obtain Safety Accountability sign off	6.07.16
Conduct all other EGM induction and signoff	13.07.16
Conduct Priority 1 and 2 DRE safety accountability induction and sign off	20.07.16
Conduct Priority 3 DRE safety accountability induction and sign off	27.07.16
Safety Accountabilities Inductions complete	27.07.16

A number of supporting activities will continue to be executed over the following weeks to complete the transition to the new Operating Model including:

- Update of organisational charts
- Notification to regulatory bodies of changes regarding structure, accountabilities and staff as required to meet SRTO and CASR obligations.
- Administrative database content revisions to reflect new role titles and accountable managers. e.g. SAP, CIRRIS, ASID
- Publication of revised Airservices Operations Manuals and associated linked documents
- Avnet content updates to reflect new organisational structure.

7 Training and Education

No new operational training, or amendments to existing operational training, is required to support the implementation of the new Operating Model or the repointing of the organisation to the new senior leadership structure.

As referenced above, Executives and DRE with key safety accountabilities will be provided with an induction into their new safety accountabilities.

In order to make staff across the organisation aware of where key functions and key accountable managers sit in the new operating model, some general awareness education will be promulgated via a number of different means.

8 Conclusion

The transition to the new operating model and senior leadership structure, while significant from a human resources and administrative nature, focuses mainly on changes to the management structure of Airservices. Frontline operational staff responsible for the day to day delivery of operational ATC and ARFF services are not directly impacted by the change.

The operational safety risks associated with the change on 1 July are well known and understood. These risks have been assessed and appropriate controls identified to ensure risks are reduced to ALARP, resulting in the presentation of four Class D residual risks. These risks have been accepted by the accountable managers in consideration of the impact on their current operational risk baselines).

Safety management accountabilities have been revised in line with the new organisational structure. AA-GOV-SAF-0007 has been approved and published.

Clearly articulated Safety Accountabilities Statements are being developed in order of priority for Executive, DRE and OLR roles with key safety accountabilities.

An induction program has been developed and groups and individuals within groups have been prioritised in relation to their need to receive a safety induction. Evidence of acknowledgement and acceptance of accountabilities will be obtained as part of the induction process which will be facilitated by the SE&A Manager Strategy, Systems and Analysis. An overview of the proposed content includes:

- Appreciation of differing safety accountabilities and the related nature of the accountabilities
- Clarification in relation to boundaries of application of SMS
- ‘One team’ approach to the delivery of safety objectives and performance
- Agreement in relation to support mechanisms to build safety management capability within the team, team.

A stability assessment has been conducted in relation to changes to key personnel and those roles identified in Airservices Operations Manuals. This assessment has provided assurance that key safety portfolios are being managed by a relatively stable group of experienced managers. The matrix also demonstrates that a small number of new managers will require mentoring to excel in role however they are supported by key personnel in their teams, or peer group who represent stability in supporting roles.

Handover checklists, task lists, and lookup tables are being developed to ensure that all key safety accountabilities and regulatory compliance requirements and obligations

are effectively transitioned from current roles and personnel to new roles and personnel in the new structure.

In summary, the operational safety risks associated with this change are well known, understood and accepted. Key controls are in place, and remaining controls are in the process of being implemented as soon as practicable resulting in identified risks being reduced to ALARP. Airservices has retained a stable core of management expertise and competence in key operational service delivery and support areas. Frontline staff will continue to perform current functions and deliver existing services unchanged. While there are still a number of administrative changes required to be made to databases, systems and procedures to reflect the 1 July repoint changes, interim measures are in place to support the business until such time as this work can be completed. It is therefore proposed that the transition to the new operating model on 1 July can proceed as planned.

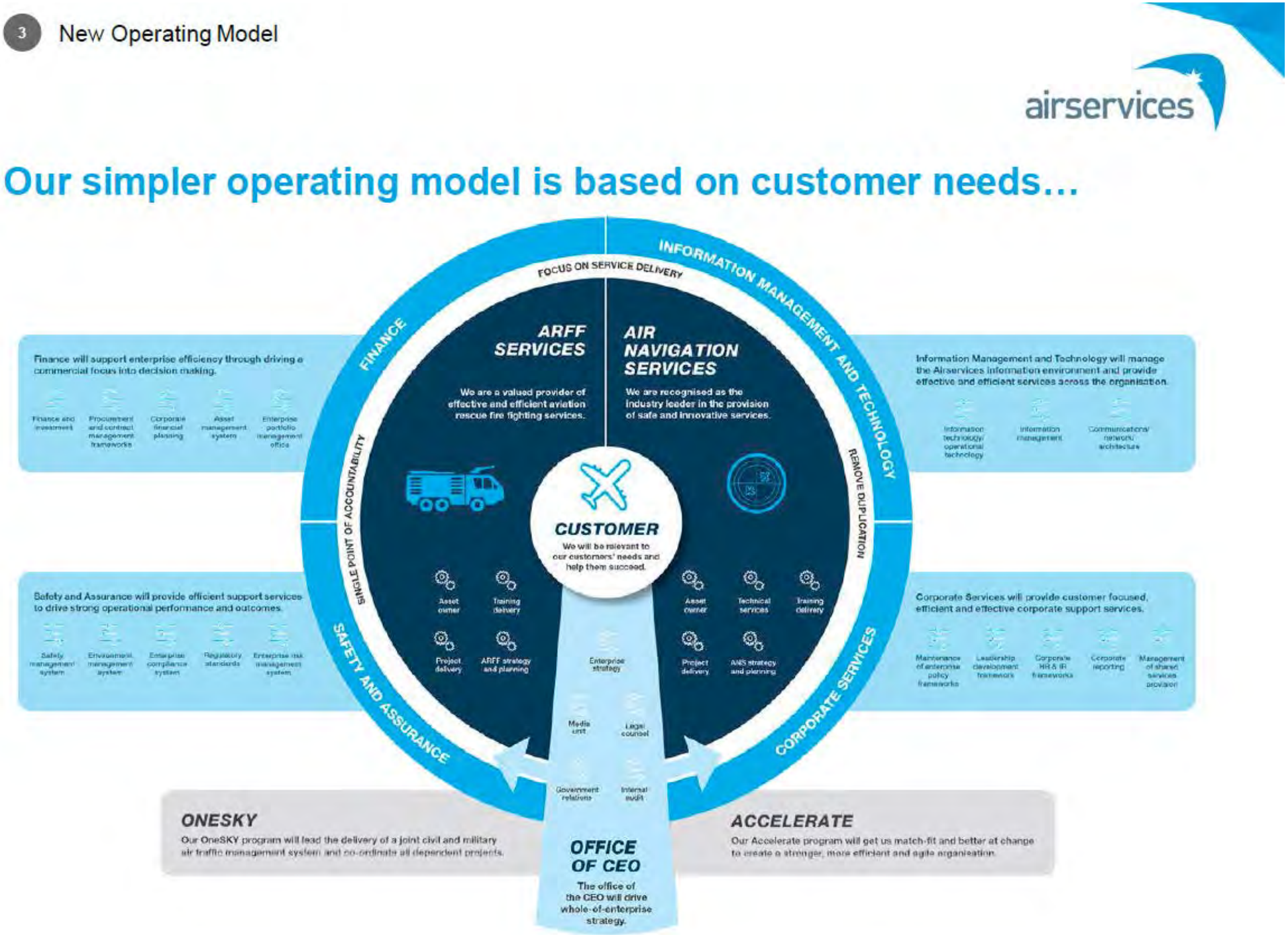
9 Attachments

No.	Title and version
1	1 July Transition to new operating model and senior leadership structure SCARD V1.0
2	Revised Safety Accountabilities AA-GOV-SAF-0007 V24
3	Example Executive General Manager Safety Accountabilities Statement
4	Safety Stability Assessment
5	Safety Induction Priorities

10 References

No.	Title and version	Number/Link
1	Safety Management Accountabilities	AA-GOV-SAF-0007
2	Operational Safety Risk Management Procedure	AA-PROC-SAF-0105

Appendix A New Operating Model & Executive Structure



4 Group Structure

…and has a corresponding organisational structure from 1 July 2016

Executive

Snr Manager

CEO

Accelerate

OneSKY

Office of CEO

- Media Unit
- Gov Relations
- Legal Counsel
- Internal Audit
- Enterprise Strategy

ARFF Services

- Operations
- Asset Lifecycle Management
- Portfolio & Project Management
- Training
- Strategy & Planning
- Finance & HR Execution

Air Navigation Services

- Operations
- Asset Lifecycle Management
- Technical Services
- Portfolio & Project Management
- Training
- Strategy & Planning
- Finance & HR Execution

Information Management & Technology

- Information Management
- Operational & corporate technology (OT / IT)
- Comms/ Network / Architecture

Finance

- Finance & Investment
- Procurement & Contract Management Systems
- Asset Management System
- Enterprise Portfolio Management Office

Corporate Services

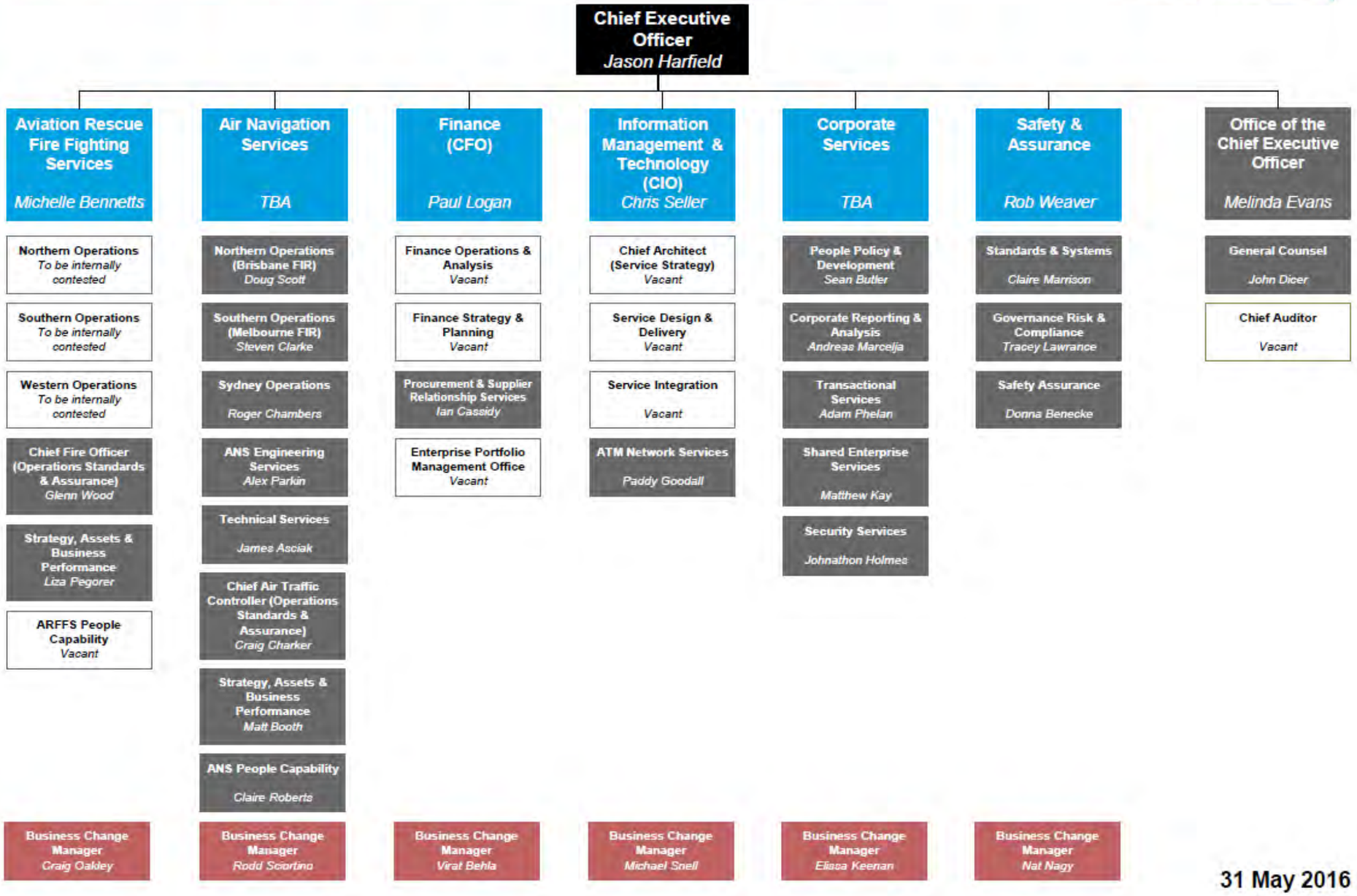
- Corporate Reporting
- Enterprise Policy Frameworks
- Enterprise Systems
- HR & IR Frameworks
- Shared Services Provision

Safety & Assurance

- Standards & Systems
- Governance Risk & Compliance
- Safety Assurance

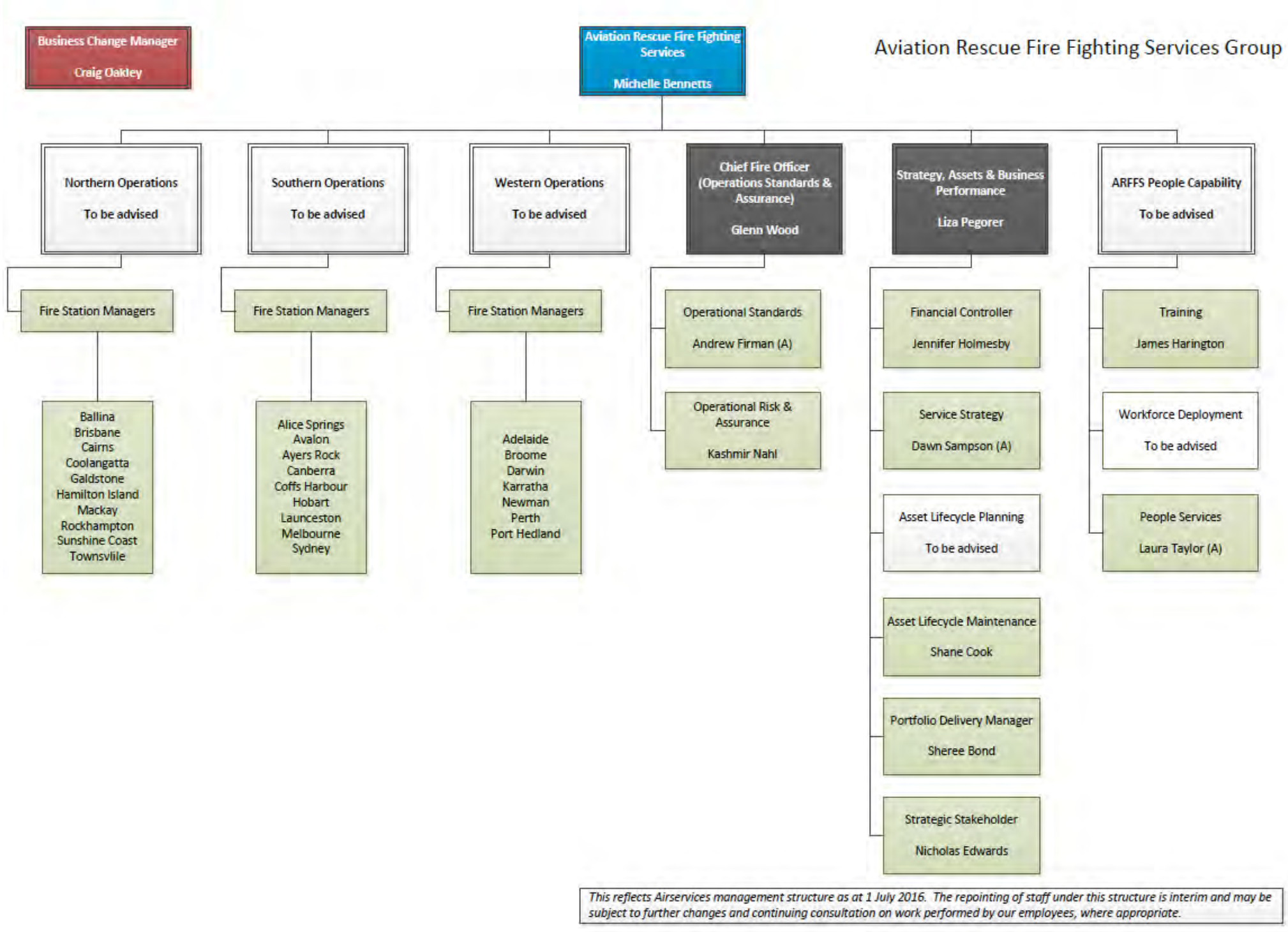
Appendix B Direct Reports to the Executive Leadership Structure

Direct Reports to Executive from 1 July 2016

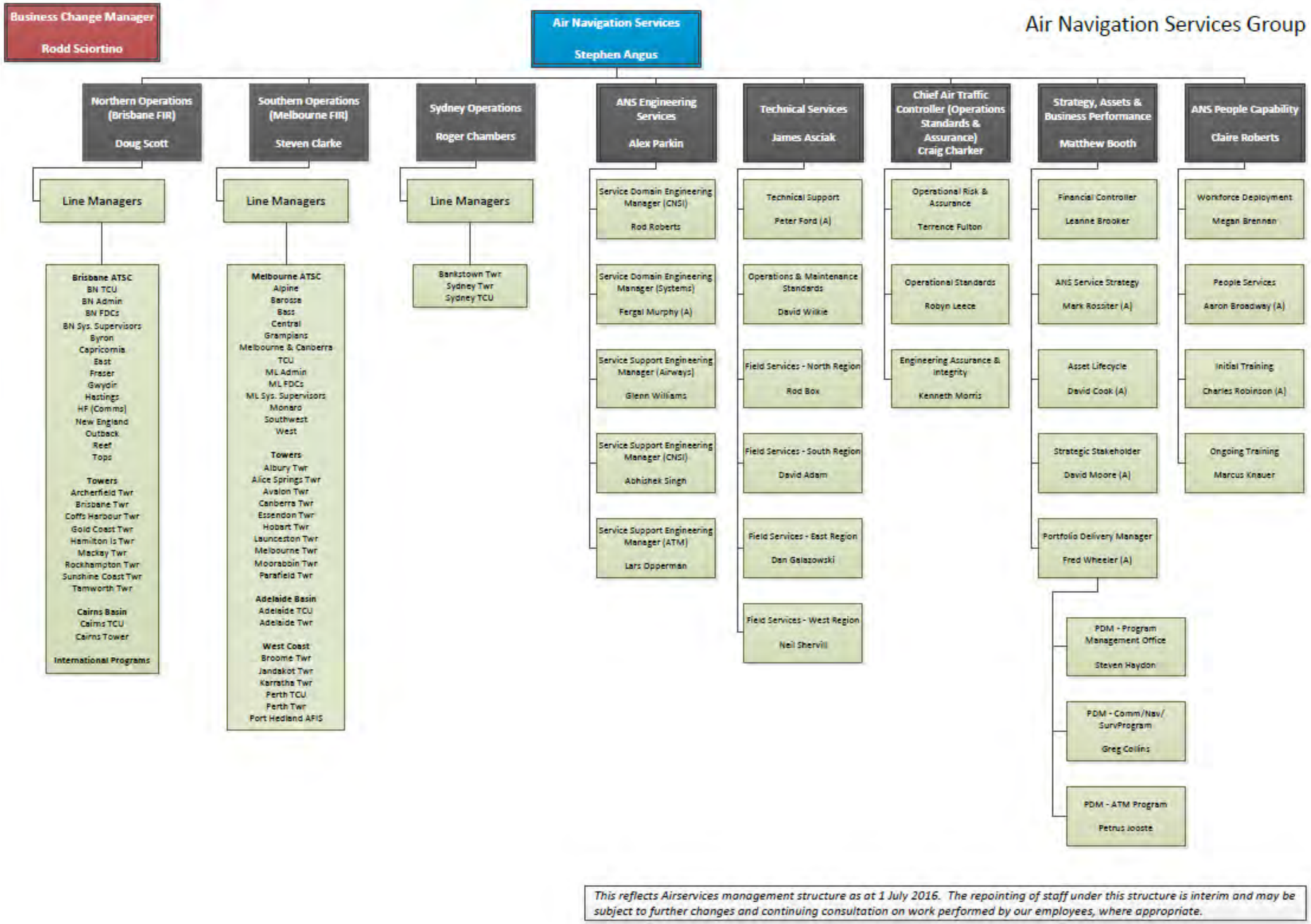


31 May 2016

Appendix C Other Leadership Roles Structure

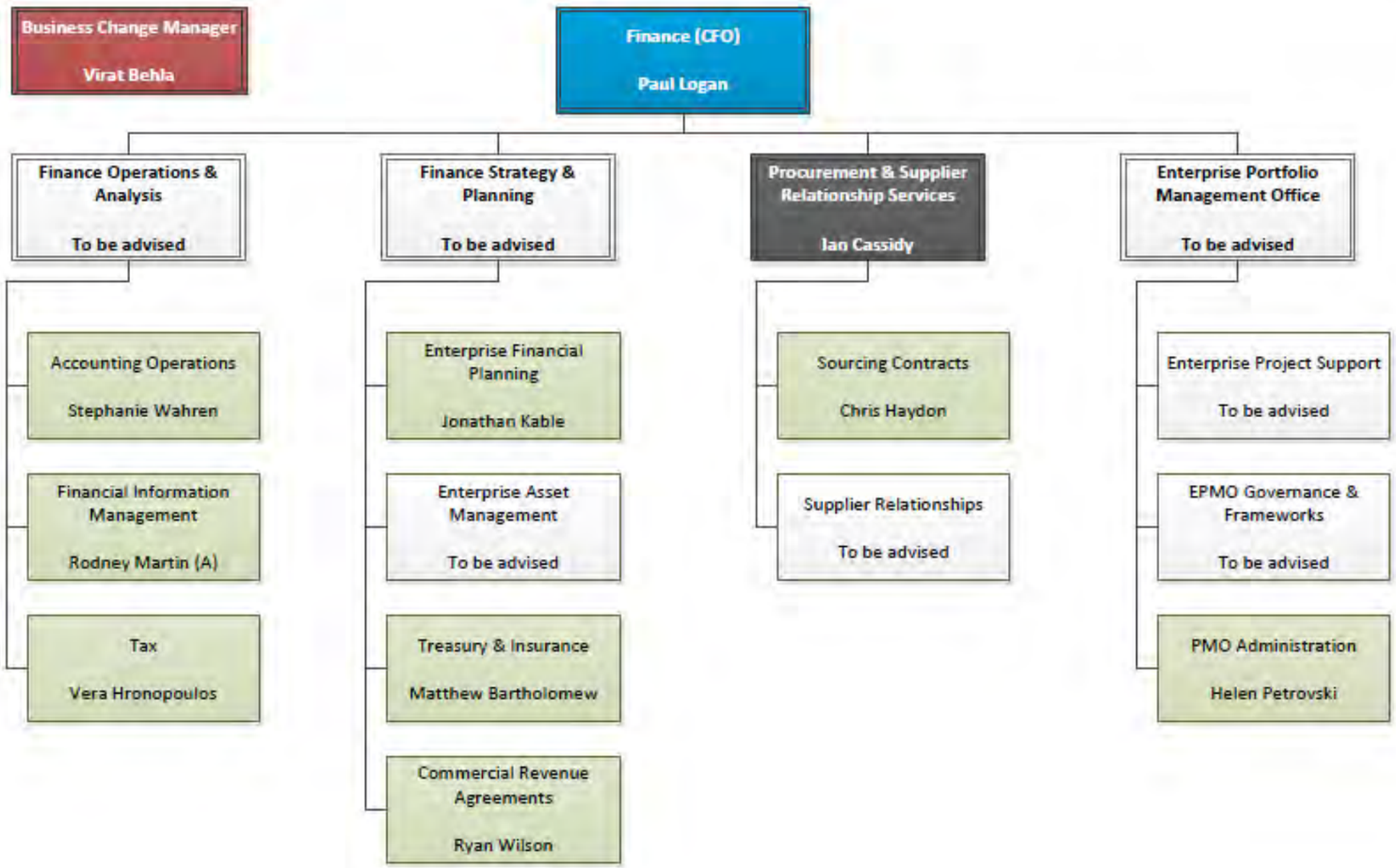


Air Navigation Services Group



This reflects Airservices management structure as at 1 July 2016. The repointing of staff under this structure is interim and may be subject to further changes and continuing consultation on work performed by our employees, where appropriate.

Finance Group



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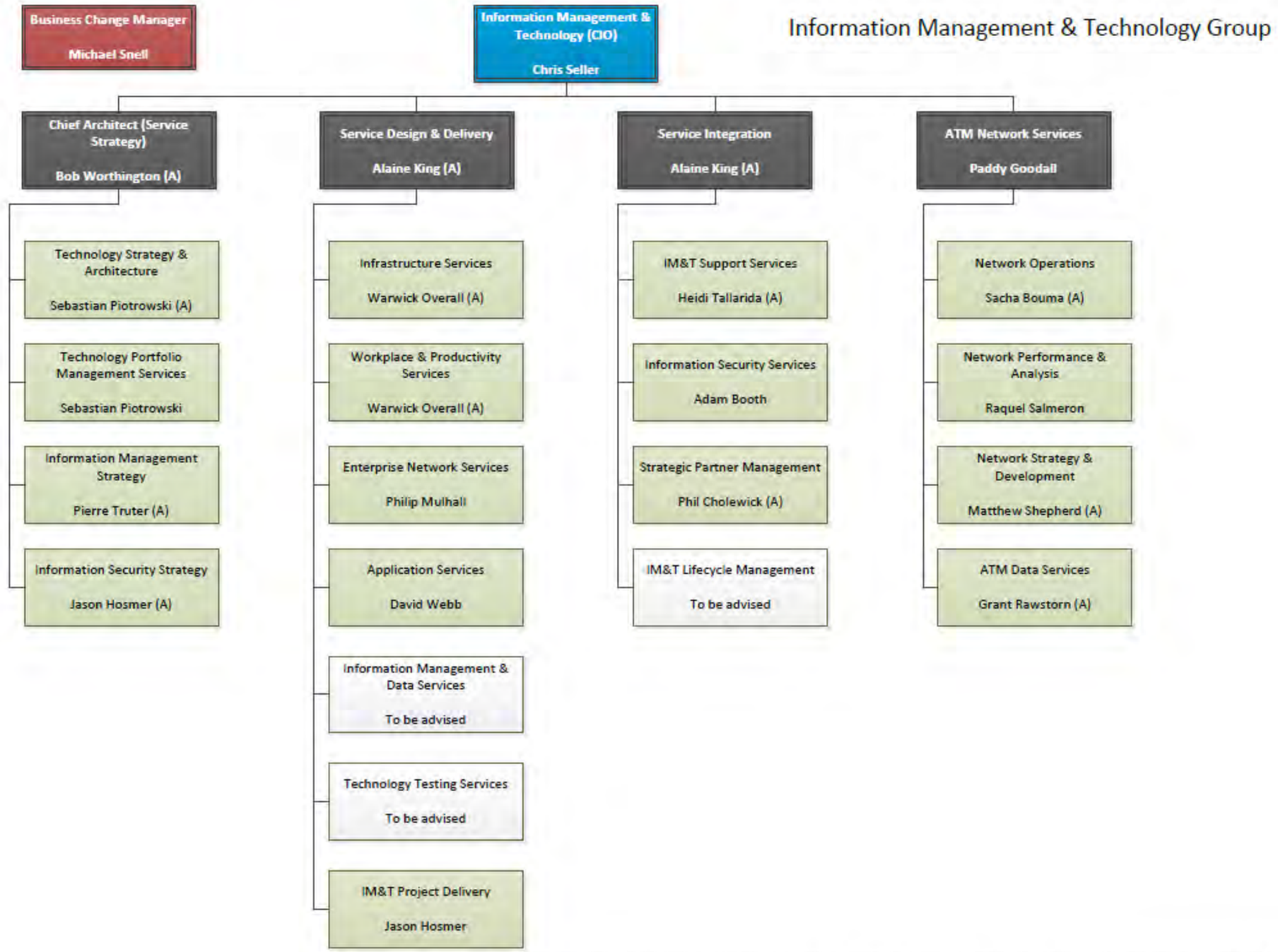
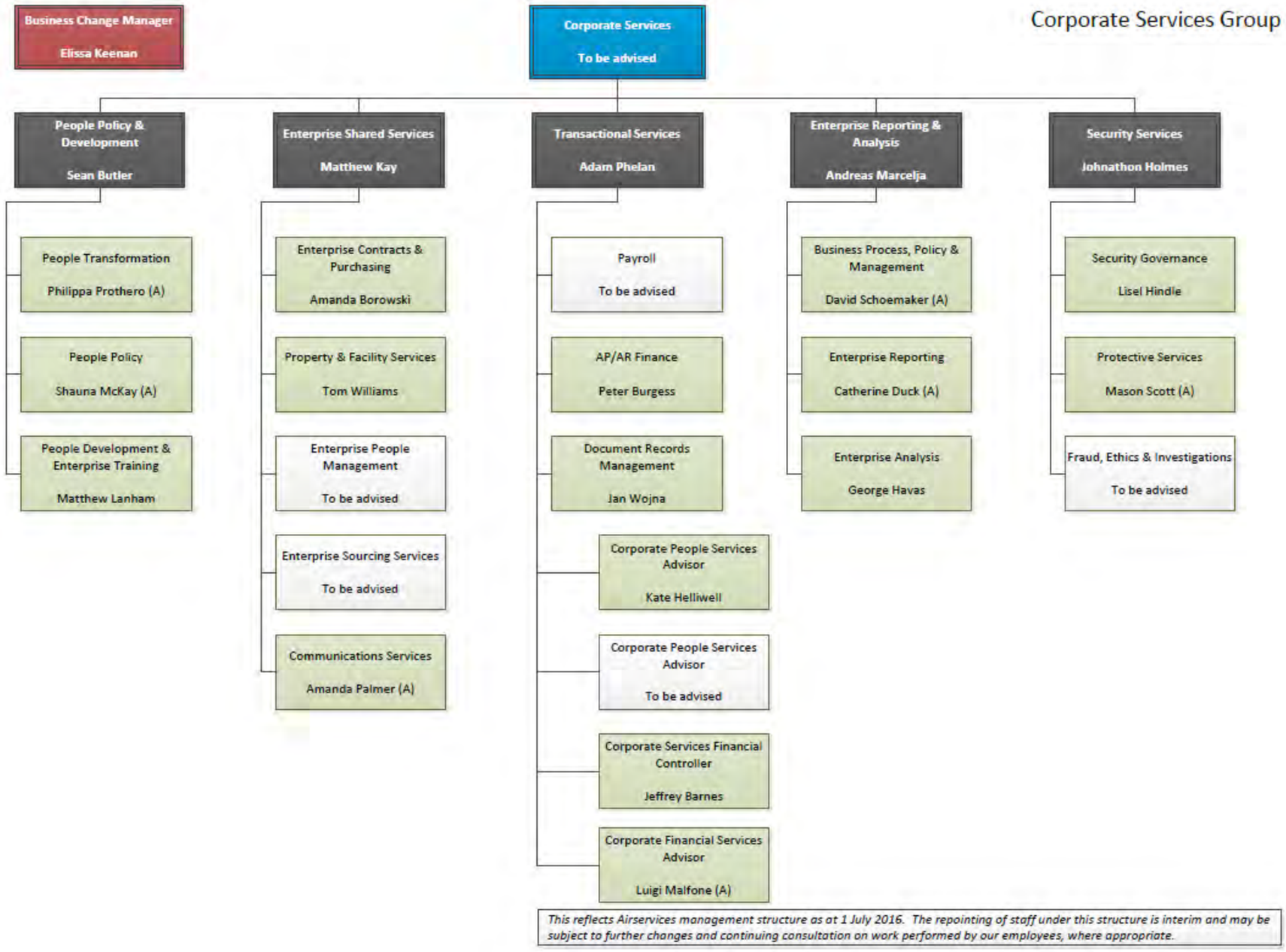
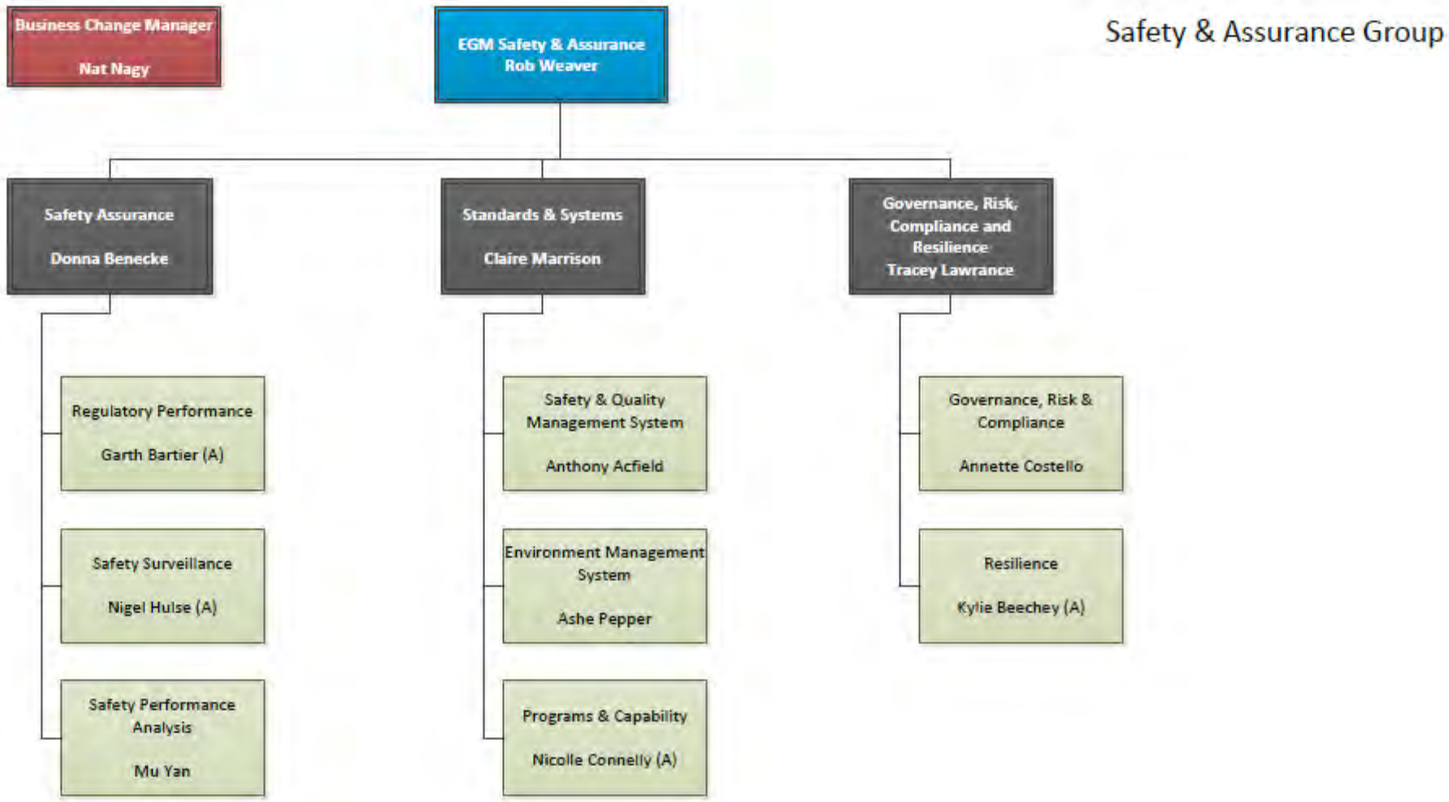
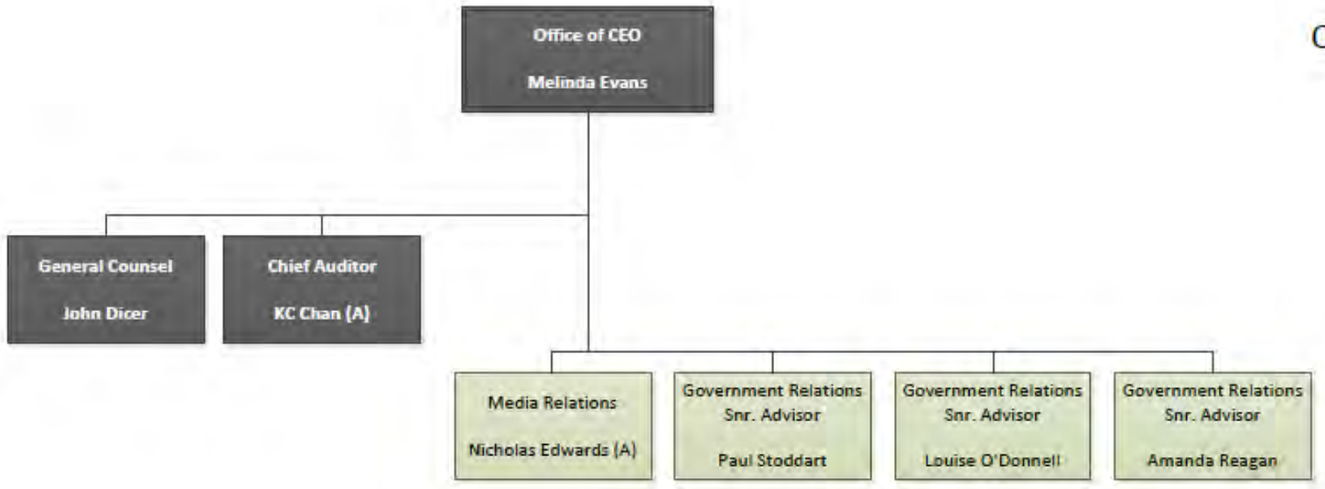

Information Management & Technology Group
Business Change Manager
Michael Snell
Information Management & Technology (CIO)
Chris Seller
Chief Architect (Service Strategy)
Bob Worthington (A)
Service Design & Delivery
Alaine King (A)
Service Integration
Alaine King (A)
ATM Network Services
Paddy Goodall
Technology Strategy & Architecture
Sebastian Piotrowski (A)
Technology Portfolio Management Services
Sebastian Piotrowski
Information Management Strategy
Pierre Truter (A)
Information Security Strategy
Jason Hosmer (A)
Infrastructure Services
Warwick Overall (A)
Workplace & Productivity Services
Warwick Overall (A)
Enterprise Network Services
Philip Mulhall
Application Services
David Webb
Information Management & Data Services
To be advised
Technology Testing Services
To be advised
IM&T Project Delivery
Jason Hosmer
IM&T Support Services
Heidi Tallarida (A)
Information Security Services
Adam Booth
Strategic Partner Management
Phil Cholewick (A)
IM&T Lifecycle Management
To be advised
Network Operations
Sacha Bouma (A)
Network Performance & Analysis
Raquel Salmeron
Network Strategy & Development
Matthew Shepherd (A)
ATM Data Services
Grant Rawstorn (A)
This reflects Airservices management structure as at 1 July 2016. The repointing of staff under this structure is interim and may be subject to further changes and continuing consultation on work performed by our employees, where appropriate.


Corporate Services Group
Business Change Manager
Elissa Keenan
Corporate Services
To be advised
People Policy & Development
Sean Butler
Enterprise Shared Services
Matthew Kay
Transactional Services
Adam Phelan
Enterprise Reporting & Analysis
Andreas Marcelja
Security Services
Johnathon Holmes
People Transformation
Philippa Prothero (A)
People Policy
Shauna McKay (A)
People Development & Enterprise Training
Matthew Lanham
Enterprise Contracts & Purchasing
Amanda Borowski
Property & Facility Services
Tom Williams
Enterprise People Management
To be advised
Enterprise Sourcing Services
To be advised
Communications Services
Amanda Palmer (A)
Payroll
To be advised
AP/AR Finance
Peter Burgess
Document Records Management
Jan Wojna
Corporate People Services Advisor
Kate Helliwell
Corporate People Services Advisor
To be advised
Corporate Services Financial Controller
Jeffrey Barnes
Corporate Financial Services Advisor
Luigi Malfone (A)
Business Process, Policy & Management
David Schoemaker (A)
Enterprise Reporting
Catherine Duck (A)
Enterprise Analysis
George Havas
Security Governance
Lisel Hindle
Protective Services
Mason Scott (A)
Fraud, Ethics & Investigations
To be advised
This reflects Airservices management structure as at 1 July 2016. The repointing of staff under this structure is interim and may be subject to further changes and continuing consultation on work performed by our employees, where appropriate.

Safety & Assurance Group



This reflects Airservices management structure as at 1 July 2016. The repointing of staff under this structure is interim and may be subject to further changes and continuing consultation on work performed by our employees, where appropriate.



Office of the CEO

This reflects Airservices management structure as at 1 July 2016. The repointing of staff under this structure is interim and may be subject to further changes and continuing consultation on work performed by our employees, where appropriate.

1 July 2016 Transition to new Operating Model and Senior Leadership Structure

Safety Case Assessment and Reporting Determination (SCARD)
Issue V1.0

NOTE: Due to compatibility issues with the new Standard Operating Environment (SOE), this version of the SCARD template will not automatically calculate the SCARD outcome, guidance has been included to allow the outcome to be manually determined.

Context

As specified by Operational Safety Change Management Requirements (AA-NOS-SAF-0104): A SCARD must be completed for changes to service levels, procedures or equipment that may affect the performance, functional or technical specification of a system or service; and organisational changes affecting safety accountabilities.

The SCARD template is designed to assist users to evaluate the change proposal, in order to determine what type of operational safety assessment and reporting is required.

Step 1: Change Details

Reference Number (Change Proposal/Project Proposal/ Project Number/NRFC/ASID)		**Services/Systems/ Assets under change**	N/A

Change Description

As part of the Airservices Accelerate Program a new simpler operating model and Executive structure were announced on 17 May 2016 (see Appendix 1) and a Senior Leadership Level structure was announced on 31 May 2016 (see Appendix 2).

Planning work has commenced to realign functions to support the new operating model and to reassign staff performing those functions across the organisation to the new senior leadership structure from 1 July, 2016 (hereinafter referred to as 'repointing' the organisation to the new operating model and structure).

At this time, no changes are being proposed as part of the repointing exercise that will result in changes to ARFF, ATC, P&E or Learning Academy (LA) service levels, procedures or equipment that may affect the performance, functional or technical specificaiton of a system or service under CASA Aviation Safety Regulations nor impact any Airservices Provider Certificates. Frontline staff will continue to perform existing functions and provide existing services, in most cases under the same frontline supervisor, however in some cases under a new Executive and Senior leadership structure.

In support of that change, a key element to ensuring a smooth transition to the new operating model will be to confirm existing operational and work health and safety (WHS) management accountabilities, as described in AA-GOV-SAF-0007 and a variety of CASR and SRTO regulatory compliance obligations and responsibilities are appropriately reassigned from current to new Executive and senior management roles. It is intended to develop specific safety accountability statements for Executives, Direct Reports to the Executive (DREs) or Other Leadership Roles (OLRs) which have key safety accountabilities.

This SCARD assesses the potential operational safety or regulatory impacts that may result from

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repointing the organisation to the new operating model and structure and the associated revision and reallocation of safety accoutabilities in support of that transition. The identification and control of any associated risks shall be essential to ensuring effective and efficient continuity of essential functions and services currently performed in ARFF, ATC, P&E and Learning Academy.

In consideration of the scope of this repointing activity as currently proposed at this time, all Airservices Operations Manuals have been reviewed to identify any potential changes to content, or changes to linked documents to assist in making a determination about the appropriate level of Regulatory reporting required under Section 5.2 of the SCARD. It was identified that the Responsibilities and Accountabilities secitons, and Organisational structure and Functions sections of all Operationsl Manuals (139H, 143, 171, 172, 173 and 175) will require updating to reflect the new Organisational Structure. Work has commenced to update these sections. Additionally, a number of documents embedded in the Operationsl Manuals may require updates due to the changes in which roles perform referenced functions in the new structure. No Level 1 or Level 2 changes have been identified to date.

Out of Scope: Airservices is running a Voluntary Redundancy Program. This is being conducted as a separate exercise to the repointing of the organistation to the new operating model and management structure. A separate SCARD has been developed to assess the impact of the VR program.

Step 2: SCARD Participants

List the persons participating in the completion of this determination:

Adequate representation from all appropriate areas of the business involved in or potentially affected by the change must be present during completion of the SCARD, for example (but not limited to):

- ATC operational representatives, System Supervisors, Operational Authorities, etc
- ARFF operational representatives, Station Command representatives, etc
- Engineering planning, design and integration representatives, maintenance and system operations representatives, software/hardware/data/infrastructure specialists, Technical and Maintenance Authorities and Chief Engineers, etc
- Training design and delivery representatives,
- Other applicable system owners.

This representation should also include subject matter expertise from any specialist safety disciplines relevant to the change, for example (but not limited to):

- System Safety, Human Factors and regulatory compliance representatives.

Changes potentially impacting external stakeholders must also include representation from these stakeholders as appropriate, for example (but not limited to):

- Airline representatives
- Airport representatives
- Regulatory representatives
- Vendor/Contractor representatives

NOTE: The SCARD may be rejected by the signatories in Step 9 if adequate representation is not included. If guidance is required on appropriate attendees, contact **FG SEA ASSURANCE**

Name	Position	Date
Nat Nagy	ATC Manager ATM Service Support & S&A Business Change Manager	14.6.16 / 24.06.16
Claire Marrison	SE&A Manager Strategy, Systems and Analysis	14.6.16 / 24.06.16
Donna Benecke	SE&A Manager P& Business Support & Safety Improvement	14.6.16 / 24.06.16
Stuart Hansford	LA Chief Education & Training Officer,	17.06.16 /27.06.16
Glenn Wood	ARFF Chief Fire Officer	24.06.16
Alex Parkin	P&E Manager Engineering	24.06.16
Doug Scott	ATC Manager East Coast Services North	24.06.16
Phil Mulhall	ATC Executive Officer	24.06.16
Steve Clarke	LA ATS Head of School	24.06.16
Nick King	Accelerate Program Director	24.06.16
Paddy Goodall	ATC Chief Air Traffic Controller	27.06.16
Liza Pegora	ARFF Manager Business Support	27.06.16

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Step 3: Size of the Change

Complete the following questions to determine the size of the change. For each question, choose a rating from 1 (Low) to 7 (High); and provide justification. Then use the ratings to determine the overall size of the change

1	**Assess the significance of the change within Airservices.** *Consider the work areas affected. Consider the effects on P&E (Engineering disciplines, systems, locations), ATC (Service Delivery Lines, Enroute/TMA/Tower) and ARFF (stations, equipment, service).*	**Initial Rating** **7**
Justification: The repoint of the organistion on 1 July 2016 to the new operating model will impact all existing business groups and current senior leadership roles. There will be minimal changes to roles, functions or core processes outside the senior management group at this time. Operational staff and their direct supervisors will be unaffected although they may report to a new senior leader. The most significant aspects of the proposed change are administrative in nature, relating to the revision of the senior management structure and affected role descriptions and accountabilities and administrative changes to business systems to align with the new reporting lines. Responsibility for corporate and operational training will be transitioned from the Learning Academy to ANS, ARFFS and Corporate Services however frontline supervision roles and those who develop, deliver and support training delivery will be largely unaffected other than to be repointed to new senior managers.		

2	**Assess the significance of the change outside Airservices.** *Consider the number and extent of service users and/or stakeholders affected, including the interfaces between these parties.*	**Initial Rating** **2**
Justification: While consultation will occur with a significant number of external stakeholders, the actual impact of the majority of changes will be transparent to those outside of Airservices as there is no proposed change to operational services provided by ATC or ARFF. There may be changes to interfaces between some parties where there is a change in Airservices management roles and/or accountabilities and there are new incumbents in those roles. Airservices must update its list of Managerial Agents on the National Register via the regulator ASQA). This will require some members to undertake a Fit and Proper Person Requiremetns assessment under the RTO regulations to ensure that any appointments have the appropriate capability to undertake key functions and roles in the new structure. Induction and handover checklists will allow incumbents of key roles be made aware of specific regulatory compliance actions and obligations, and also actions and obligations in relation to existing vendors.		

3	**Assess the operational impact of the change on the systems, service and users (i.e. operators, maintainers, etc).** *Does the change:* o *enhance existing system functionality, provide different/new/novel functionality, or remove functionality;* o *alter the services provided;* o *affect the users' roles including their required skills and abilities, HMI interaction, work environments, systems and procedures of work, responsibilities, organisation and staffing or teams and communication?*	**Initial Rating** 2	**Weighted Rating = Initial Rating x 2** **4**
Justification: The repoint of the organisation on 1 July will not result in any changes to operational system functionality, operational services provided, or frontline operational roles/users, or maintainers of operational systems and services. A number of managerial roles and required skills and abilities, along with safety accountabilities and responsibilities, will change. In non-operational areas, work environments and teams may change as a result of the realignment of functions, particularly from within P&E, SE&A and the Learning Academy, into different parts of the organisation in line with the design principles of the Accelerate Program. A number of controlled documents and procedures required to support operational service delivery, including training, will need to be updated. A number of senior managers may exit the organisation so maintaining essential knowledge and capabilitiy will need to be managed.			

4	**Assess the technical impact of the change on the operating system(s).** *Does the change:* o *affect single or multiple systems (e.g. NAIPS/Eurocat/AFTN/MEX/ORS etc.);* o *affect operational or non-operational systems* o *introduce new, or reconfigure, hardware or software affecting operational capability and/or performance*	**Initial Rating** 2	**Weighted Rating = Initial Rating x 2** **4**

	○ *affect system interfaces* ○ *affect redundancy, maintainability, integrity, etc* ○ *affect operational or business data and/or databases?*		

Justification: The 1 July repoint will not technically impact operational systems or introduce changes to hardware or software affecting operational capability and/or performance, system interfaces, redundancy, maintainability, integrity or operational data. Engineering accountabilities supporting technical development or maintenance of systems shall be retained unchanged in the repoint and are not dependent on org structure. Business data and databases (eg SAP, Training Centre and Reporting, CIRRIS actions and notifications, Org charts, Functional Groups, network drive and document access in DMS/ORBIT) will require updating in accordance with the repoint of staff to the new org structure. The ranking for this assessment is based on the technical impact being restricted mainly to administrative updates to business systems and databases.

5	**How complex is the implementation of and transition to the new or changed system or service?** *Consider:* ○ *temporary removal of a system, ghosting/mimicking, operational test and evaluation, control and monitoring, rollback/fallback required, etc* ○ *resources available, training, documentation, procedures, communication, time lines, approvals, etc*	**Initial Rating** 3	**Weighted Rating** = Initial Rating x 2 **6**

Justification: The implementation and transition to the new operating model is complex from a Human Resources and administrative perspective however not from an operational service delivery perspective as the most significant changes are confined to Executive and senior leadership level role changes. The complexity of the implementation will centre on maintaining a strong focus on core service delivery while overseeing the body of work necessary to transition and redistribute a significant number of staff to the new management structure. Additionally, some functions which are currently being delivered via a single homogenous group of staff will need to be split across a number of different business areas. During transition, task lists and RACI tables will assist in ensuring RTO and CASR compliance obligations continue to be met and service continuity and quality are appropriately maintained.

6	**How substantial is the education and training associated with the change?** *Consider type of training required and for whom, none, classroom, online or simulation, time line for design/development and roll-out, duration, resources for design/development and delivery, impact on operational resources, currency, recency and licensing requirements, ongoing/refresher requirements, etc.*	**Initial Rating** **3**

Justification: There are no impacts on operational roles that will require training or education. For management roles where the safety accountabilities and responsibilities are significantly changes, there will be a need for managers to understand and acknowledge new safety accountabilities. Some managers may move into new areas of the business overseeing staff with different technical skillsets and capabilities. There will be a need for the broader organisation to understand and become familiar with where functions sit in the new operating model and who holds accountability for them. Until such time as all existing documents/procedures are revised to reflect the new structure, staff will need to be made aware of how to map existing references to key roles and responsibilities to the new accountable manager in the new structure. Ensuring general awareness of changes across the organisation is a substantial focus of the communication strategy associated with the Accelerate Program.

Total	**26**

Resultant size of the change (Small* - 9 to 25, Medium - 26 to 44, Large - 45 to 63) *** If any single initial rating is greater than 4, a result of Small must be increased to a result of Medium**	**Medium**

Step 4: Operational Safety Impact of the Change

To assess the operational safety impact of the change, conduct an initial hazard identification to determine the potential operational safety hazards that may result from the change and complete the table below. Giving consideration to the number and severity of the potential hazards as well as the criticality of the impacted systems where listed on the System to Service List, complete the safety impact estimations shown below. For assistance completing this identification, refer to AA-GUIDE-SAF-0105C, or contact Safety & Environment Project & Business Support.

Note: *This process must only be used for the determination of the Operational Safety Impact. All Hazards identified through this process that require control and ongoing management, or further assessment must be recorded in HAZLOG and managed in accordance with AA-PROC-SAF-0105.*

Service/System	System Critic -ality	Potential Hazards	Controls		Effect on	
			Existing	Proposed	Airservices' Operations	Aircraft / Aircrew / 3rd Parties
Airservices-Wide	N/A	**Safety accountabilities and responsibilities not appropriately discharged** during or after transition resulting in adverse impact on service delivery and safety due to: - Safety accountabilities and responsibilities for affected positions not being appropriately mapped from existing roles to new roles - Lack of understanding of new accountabilities and responsibilities associated with each new management position due to lack of appropriate recruitment/selection or on boarding - Ambiguity regarding roles, accountabilities and responsibilities due to lack of	Timely communication and consultation with all areas impacted by the change. Adherence to safety change management and document/database amendment processes (eg NRFC) when making changes to documented accountabilities/responsibilities.	Translate current Exec accountabilities and responsibilities to new structure and create Exec safety accountabilities statements. Induct new EGMs with key safety accountabilities, obtain EGM sign off of acceptance of new accountabilities. Develop safety accountabilities statements for DREs and OLRs that have key safety accountabilities. Induct new DREs/OLRs with key safety accountabilities, obtain DRE/OLR signoff of acceptance of new safety accountabilities. Where existing role include safety accountabilities and responsibilities, and that role or that incumbent is changing, the currently held safety	Potential for safety obligations not being fully met, or delay in meeting them. Potential short term confusion or delay in performing required functions as affected staff become familiar with new structure and roles. Minor administrative processing delays and confusion amongst staff.	Nil

Service/System	System Critic -ality	Potential Hazards	Controls		Effect on	
			Existing	Proposed	Airservices' Operations	Aircraft / Aircrew / 3rd Parties
		effective communication of the change - Accountabilities not reassigned appropriately resulting in fractured accountabilities that weaken execution of functions. - Migration of data and organisational controls e.g. role descriptions, accountabilities, delegations, does not occur in parallel with structural changes during the program.		accountabilities must continue to be acquitted until formally handed over to a new incumbent or new role. Ensure safety accountabilities are clearly articulated in new and amended role descriptions and any required safety related competencies are adequately considered in selection processes. Develop appropriate communications and change management arrangements to ensure staff are aware of new points of contact for roles with key safety accountabilities.		
		Accelerate Program causes distraction resulting in disruption to service performance, loss of focus on BAU activities or failure to manage current active safety issues during transition to the new structure	Operational frontline supervisors and staff will continue in existing roles and retain ongoing management of current active issues. Use of data in existing issues/occurrence tracking systems and mechanisms (eg CIRRIS, ASID). Continued acquittal of existing accountabilities and responsibilities until such time as they are formally handed over to	**For roles with key safety and compliance accountabilities**, to ensure smooth transition of functions while maintaining service delivery, quality and regulatory compliance ensure thorough HO/TO process for transfer of role/function/tasks/activities and active issues from existing to new owner. Provide look-up table of existing key roles/functions to new role/unit/branch/group in the revised organisational	Minor potential for increase in distraction to cause errors or delays in performing key functions and/or processes. Potential escalation of current risk levels due to delays in implementing identified controls however considered minimal as frontline staff and supervisors will retain ownership of current	Nil

Service/System	System Critic -ality	Potential Hazards	Controls		Effect on	
			Existing	Proposed	Airservices' Operations	Aircraft / Aircrew / 3rd Parties
			new responsible person.	structure to ensure broader organisational understanding of change. Increased performance monitoring and supervision. Increased direct communication from managers to business areas significantly affected to ensure opportunity for discussion and resolution of concerns to minimise risk of distraction and impact on BAU activities.	active safety issues in most cases.	
Regulatory Compliance during transition to new structure		**Maintenance of sufficient suitably qualified and experienced staff in required roles to support ongoing SRTO/CASR compliance** **(eg short notice loss of staff** from resignation, retirement affects ability to deliver core support services/functions such as conducting scheduled training, updating mandatory training modules)	Existing staff selection and induction process to ensure suitably qualified people are chosen. Roles/accountabilities defined which include succession planning & cross-training options. Maintain sufficient suitably qualified and experienced staff to conduct required activities to comply with relevant standards. (eg AQS staff and instructional design staff who are skilled in validation of training and assessment materials to comply with SRTO/CASR	Keep staff informed to minimise risk of premature/unnecessary departure from organisation. Retain and repoint sufficient suitably qualified and experienced staff who can conduct required activities to comply with and maintain relevant SRTO/CASR standards. Appropriate consideration of essential qualifications and experience when appointing staff in new structure. Transition task list for accountabilities to support	Operational training impacts if significant or key staff depart organisation. Failure to meet mandatory training to CASR standards Loss of accreditation / registration and inability to train required staff against CASR.	Vendor relations for provision of E&T services disrupted during transition.

Service/System	System Critic -ality	Potential Hazards	Controls		Effect on	
			Existing	Proposed	Airservices' Operations	Aircraft / Aircrew / 3rd Parties
			standards VR Program limitations (not to release staff if functions cannot be carried out safely and effectively). MOU with ATC/ARFF operations to provide adequate instructor and trainer/assessor coverage. Internal Audit provides assurance of ongoing maintenance of requirements. Existing staff selection and induction process to ensure suitably qualified people are chosen.	handover of functions. Seek external vendor support to cover unplanned staff losses. Readjustment/review of scheduled needs (especially during transition) to match capacity. Continuing accountability of Services groups (ARFFS/ANS) to provide adequate coverage. Post transition and bedding down of new structure, conduct RTO audit to provide assurance of ongoing compliance of SRTO.		
		Loss of records/ Maintenance of records/ Inadequate data entry	TRIM filing of records in current locations. Sufficient suitably qualified staff who are skilled in maintaining records and data to SRTO/CASR standards.	HO/TO Task List to track transition of accountabilities. Maintain TRIM filing of records in current locations (referenced in Task list). On initial repoint, maintain existing course support staff who are skilled in maintaining records to SRTO/CASR standards.	Loss of accreditation / registration and inability to train required staff against CASR Failure to maintain accurate licensing records to CASR standards	Nil

NOTES: 1) For newly developed systems, a System Criticality will need to be determined. The SCARD process will help inform this determination.

2) If any significant effect on external parties are identified, this assessment must be confirmed by the affected parties and must trigger their involvement in the ongoing management and control of the risk.
3) If any aspects of the change uncovered in this step were not considered in Step 3, the step should be re-validated.

1. Based on the identified Operational Safety hazards; Enter the estimated Operational Safety Impact of the change.	**Minimal**	If unsure, the higher of the considered options should be chosen
2a. Are any of the identified Hazards Human Factors related or do they impact human performance?	**No**	If yes, please seek Human Factors support via PBSresourcing@airservicesaustralia.com
2b. Are any of the identified Hazards Software related?	**No**	If yes, please seek software assurance support via - PBSresourcing@airservicesaustralia.com (for projects) - _FG_PE_ENG_OPS (for other changes)

Step 5: Regulatory Impact

If unsure in the completion of this step, contact Operational Assurance & Regulatory Services (OARS) for assistance.

5.1 - Does the proposed change require an amendment to a Provider Certificate schedule (including exemptions and instruments)?

e.g. Introduce a new service, or change to an existing service under;

- CASR Part 139H (Aerodrome Rescue and Fire-Fighting Services)
- CASR Part 143 (Air Traffic Services Training)
- CASR Part 171 (Aeronautical Telecommunication and Radionavigation Services)
- CASR Part 172 (Air Traffic Services Provider) or
- CASR Part 173 (Instrument Flight Procedure Design).

NOTE: This includes 171 Operations Manual defined Level 1 Changes (i.e. a new ICAO defined service or a new type of airways system, or the removal of an ICAO defined service or a type of airways system.)

Yes ☐	A Safety Case is required. Use the link below to notify OARS of the requirement to prepare a Safety Case. **Continue onto Step 6**
No ☒	**Continue onto Question 5.2**

5.2 - Does the proposed change otherwise require approval from CASA?

e.g. Commissioning of new ATS facilities pursuant to CASR Part 172; changes to Airservices' Operations Manuals related to changes to the services under the CASR Parts listed above; or commissioning of new ARFFS vehicles or facilities pursuant to CASR Part 139H.

Yes ☐	A Safety Case or Safety Assessment Report may be required. Use the link below to contact OARS to discuss the change's safety reporting requirements. **Continue onto Step 6**
No ☒	**Continue onto Question 5.3**

To notify Operational Assurance & Regulatory Services (OARS) of the requirement for a Safety Case, or to discuss the change's safety reporting requirements, contact: casa_compliance@airservicesaustralia.com

5.3 - Does the proposed change require notification to CASA prior to commissioning / notification to industry?

NOTE: This includes 171 Operations Manual defined Level 2 Changes (i.e. where a facility noticeable to the user is being decommissioned or where there is a significant reduction to the level of service). Refer to paragraph 3.2.1.4 of the CASR Part 171 MOS and paragraph 6.1.2.4 of the CASR Part 172 MOS regarding the regulatory requirements for a safety case.

Yes ☐	A Safety Case or Safety Assessment Report may be required. Use the link below to contact OARS to discuss the change's safety reporting requirements. **Continue onto Step 6**
No ☒	**Continue onto Step 6**

To contact Operational Assurance & Regulatory Services (OARS) to discuss the change's safety reporting requirements contact:
casa_compliance@airservicesaustralia.com

Step 6: Overall Operational Safety Magnitude

The Overall Operational Safety Magnitude is determined through a combination of the size of the change **and** its operational safety impact. Apply the results obtained from Steps 3 and 4 to the matrix below to determine the Overall Operational Safety Magnitude.

Overall Operational Safety Magnitude	**Operational Safety Impact**		
Size of the change	**Substantial**	**Reasonable**	**Minimal**
Large	☐ **Major**	☐ **Major**	☐ **Moderate**
Medium	☐ **Major**	☐ **Moderate**	☒ **Minor**
Small	☐ **Moderate**	☐ **Minor**	☐ **Minor**

Step 7: Operational Safety Reporting Requirements

Apply the results from Step 5 **or** Step 6 to the matrix below to determine the Operational Safety Reporting Requirements.

Note that a Step 5 requirement for a Safety Case or Safety Assessment Report overrides any lesser outcome from Step 6.

Outcome[1]	**To be reported as ...**	**Required Actions**
☐ **5.1 Response YES**	**Safety Case**	1. Establish Safety Program Working Group 2. Prepare Safety Plan 3. Execute Safety Program 4. Prepare Safety Case(s) (Indicate phasing below) ☐ Concept/Design & Impl. Phases ☐ All Phases
☐ **5.2 Response YES** ☐ **5.3 Response YES** ☐ **Major**	**Contact OARS to determine safety reporting and CASA notification or approval requirement.** **Discussion Outcome:**	
☐ **Moderate**	**Safety Assessment Report**	1. Establish Safety Program Working Group 2. Prepare Safety Plan 3. Execute Safety Program 4. Prepare Safety Assessment Report(s) (Indicate phasing below) ☐ Concept/Design & Impl. Phases ☐ All Phases
☒ **Minor**	**Safety Statement**	1. Determine whether this SCARD is sufficient to constitute the Safety Statement and indicate below (see AA-NOS-SAF-0104 Section 4.3) 2. Execute Safety Program, as required 3. Prepare Safety Statement, if required 4. Attach SCARD or Safety Statement to RFC or change process ☐ SCARD Only ☒ Additional Safety Statement

[1] A manager with accountability for the change, or the EGM, SE&A, may impose a higher safety reporting requirement.

Step 8: Additional Information

Step 9: Approval

Note that a completed SCARD, once approved below, remains valid for 12 months from the date of its approval on the basis that the change detailed in Step 1 remains as-is in that period. If either a change in scope occurs or the SCARD expires after 12 months, the assessment made herein must be revalidated through either re-assessing and re-approving the SCARD, at a minimum, or completing and approving a new SCARD.

PREPARED BY	PROPOSED BY
Donna Benecke, Manager SE&A Project & Business Support	Claire Marrison, Manager Strategy Systems & Analysis

The level at which this SCARD can be approved is determined by its Overall Operational Safety Magnitude from Step 6 as shown in the table below, however a higher level of approval can be sought if deemed appropriate. Where the change impacts multiple systems, services or business areas, approval from all relevant authorities, or a higher authority, must be sought.

Major	Branch Manager, Service Delivery Line Manager, Chief Fire Officer, Chief Information Officer
Moderate	Chief Engineer, Chief Technology Officer, Chief OA, Chief UA, ATC Line Manager, ARFF Regional Manager, Other Unit Manager
Minor	TA/MA, OA, UA, ATC Line Manager, ARFF Station Manager, Other Unit Manager

APPROVED BY	SIGNATURE	DATE
Nick King, Accelerate Program Director		27/6/16

By approving this SCARD you acknowledge that:

- You are satisfied that the SCARD process has been completed correctly
- Regarding your area of authority or accountability, appropriately experienced and/or qualified staff participated in the process
- Sufficient and valid information has been included to justify the outcome
- This SCARD has been approved within 30 calendar days of its completion.

Step 10: SCARD Record Management

A copy of the approved SCARD must be sent to Operational Assurance & Regulatory Services and Safety & Environment Project & Business Support at FG_SEA_ASSURANCE. Operational Assurance & Regulatory Services will contact the proponent of the change if there are any outstanding regulatory issues with the completion of the SCARD.

The original signed copy of the approved SCARD must be stored in an organisationally approved document repository by the proponent of the change.

Safety Management Accountabilities

AA-GOV-SAF-0007

Version 24

Effective 1 July 2016

Prepared: Claire Marrison
Standards & Systems

Endorsed: Rob Weaver
Executive General Manager, Safety and Assurance

Authorised: Jason Harfield
Chief Executive Officer, Airservices Australia

DRAFT

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Change Summary

Version	Effective date	Brief description of change
23	1 December 2014	NRFC 27277 - Transfer of accountability for operational and technical standards from the EGM SE&A to the EGMs ATC and P&E respectively.
24	1 July 2016	Changes to reflect revised operating model, and revision of presentation of accountabilities to demonstrate linkages between CEO and EGM accountabilities.

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1 Context

Airservices Australia's (Airservices) Safety Management System Objectives and Requirements (AA-NOS-SAF-0002) details the safety objective for safety responsibilities, stating:

> "Everyone working for or under contract to Airservices Australia understands and acts in a manner consistent with the requirements of the Airservices Australia SMS and their own safety responsibilities."

2 Purpose

The purpose of this document is to detail both operational and work health and safety (WHS) management accountabilities and responsibilities for members of the Airservices Executive.

3 Scope

This document applies to executive activities across all Airservices workplaces and specifically to Airservices Executive.

Safety management accountabilities and responsibilities for other workers are contained within the Safety Management System (SMS) document Safety Accountabilities and Responsibilities (AA-NOS-SAF-0007) and other relevant group documentation.

4 Executive Level Accountabilities

Chief Executive Officer (CEO)	Executive General Manager (EGM), Air Navigation Services (ANS)	Executive General Manager, Aviation Rescue Fire Fighting Services (ARFFS)	Executive General Manager, Management Information Management and Technology (IM&T)	Chief Financial Officer (CFO)	Executive General Manager, Safety and Assurance (S&A)	Executive General Manager Corporate Services (CS)
CEO's accountabilities transition across the Executive portfolio						
Safety Accountabilities which flow from Acts						
The CEO is accountable to the Board of Directors of Airservices for:	The EGM ANS is accountable to the CEO for:	The EGM ARFFS is accountable to the CEO for:	The EGM IM&T is accountable to the CEO for:	The CFO is accountable to the CEO for:	The EGM S&A is accountable to the CEO for:	The EGM CS is accountable to the CEO for:
The safety, regularity or efficiency of air navigation, whether in or outside Australia[1]	Ensuring the safe delivery of air navigation services which give effect to the Chicago Convention	Ensuring the safe delivery of ARFF services	Ensuring the delivery of specific air traffic management services, including Aeronautical Information Management (AIM) and Instrument Flight Procedure (IFP) services, and telecommunication networks which support the safe delivery of air navigation services	The financial stability of the organisation	Providing independent advice and assurance in relation to the safety of operational service delivery	
					The development and maintenance of the organisation's Safety Management System (SMS)	
	Ensuring the provision and management of resources[2] to assure the safety of air navigation services	Ensuring the provision and management of resources [3]to assure ARFFS compliance with regulated operational response times	Ensuring the provision and management of network services which support the safe delivery of air navigation services			
	Ensuring the adequacy of emergency planning preparedness and response, that is conducive to air navigation services	Ensuring the adequacy of emergency planning preparedness and response, that is conducive to ARFF services	Ensuring the adequacy of emergency planning preparedness and response for Air Traffic Management (ATM) network services and business systems relative to their impact of air navigation service delivery and ARFF services		The development and implementation of business contingency and continuity capability which addresses a broad range of operational and corporate threats	

[1] Air Services Act 1995 8 1 (ii) and (iii)

[2] Human, technical and property

[3] Human, technical and property

	Ensuring effective interfaces with adjoining Air Navigation Service provides in normal and contingency operations	Ensuring effective interfaces with emergency response agencies to assure response to incidents				
Ensuring that in exercising its powers and performing its functions, Airservices regards safety of navigation as the most important consideration[4]	Evolving Air Navigation Services in a manner which secure future safety outcomes	Evolving ARFF services in a manner which secure future operational response requirements	Evolving air traffic management network systems, telecommunication networks and related business systems in a manner which secures future safety outcomes of air navigation services	Assuring sufficient funding is available to support the delivery of safety improvement for operational service delivery.	Providing assurance in relation to extent to which in exercising its powers and performing its functions, Airservices regards safety of navigation as the most important consideration	
	Assuring that changes to air navigation services and technical systems are introduced in a manner in which the fitness for service is declared, accepted in accordance with internal procedures, and delivers appropriate safety assurance	Assuring that changes to ARFFS are introduced in a manner in which the fitness for service is declared, accepted in accordance with internal procedures and delivers appropriate safety assurance	Assuring that changes to delivery or support of AIM and IFP services, network operations, telecommunication networks and business systems are introduced in a manner in which the fitness for purpose and service is declared, accepted in accordance with internal procedures and delivers safety assurance			
	Assuring that organisational systems and process comply with the requirements of Civil Aviation Safety Regulations Part 172, 171,143 and 65	Assuring that organisational systems and process comply with the requirements of Civil Aviation Safety Regulations Part 139H	Assuring that organisational systems and process comply with the requirements of Civil Aviation Safety Regulations Part 173 and 175		Providing of assurance in relation to Airservices' compliance with the CASR Parts for which it has received Provider Certificates Assuring that the Safety Management System complies with relevant parts and CASR 99	
	Facilitating a culture within the organisation which embeds safety of navigation as the most important consideration.	Facilitating a culture within the organisation which embeds safety of ARFF service delivery as the most important consideration.	Facilitating a culture within the organisation which embeds safety of navigation as the most important consideration.	Facilitating a culture within the organisation which embeds safety of navigation as the most important consideration.	Facilitating a culture within the organisation which embeds safety of navigation as the most important consideration	

[4] Airservices Act Section 9.1

Providing a safe and healthy work environment for workers and visitors.[5]	Providing a safe and healthy work environment for ANS workers and visitors.	Providing a safe and healthy work environment for ARFF workers and visitors.	Providing a safe and healthy work environment for IM&T workers and visitors.	Providing a safe and healthy work environment for Finance workers and visitors.	Providing a safe and healthy work environment for S&A workers and visitors; Ensuring that the SMS complies with relevant WHS legislative requirements	Providing a safe and healthy work environment for CS workers and visitors.
Supporting Safety Responsibilities						
In discharging their high level accountabilities, the CEO is accountable for:	In discharging their high level accountabilities, the EGM ANS is accountable for:	In discharging their high level accountabilities, the EGM ARFFS is accountable for:	In discharging their high level accountabilities, the EGM IM&T is accountable for:	In discharging their high level accountabilities, the CFO is accountable for:	In discharging their high level accountabilities, the EGM S&A is accountable for:	In discharging their high level accountabilities, the EGM Corporate Services is accountable for:
Assuring that the Board's risk tolerance in relation to safety are enacted through policies, management systems, performance targets and key risk controls.	Assuring that the ANS group complies with the requirements of the Safety Policy and SMS	Assuring that the ARFFS group complies with the requirements of the Safety Policy and SMS	Assuring that the IM&T group complies with the requirements of the Safety Policy and SMS	Assuring that the Finance group complies with the requirements of the Safety Policy and SMS	Ensuring that the Safety Policy and SMS embodies the Board's risk appetite for service provision and people safety Assuring that the S&A group complies with the requirements of the Safety Policy and SMS Delivery of assurance in relation to group's compliance with SMS requirements	Assuring that the CS group complies with the requirements of the Safety Policy and SMS
	Ensuring that ANS staff are appropriately trained, competent, and when necessary licensed, to conduct their safety obligations	Ensuring that ARFFS staff are appropriately trained, competent, and when necessary licensed, to conduct their safety obligations	Ensuring that IM&T staff are appropriately trained, competent, and when necessary licensed, to conduct their safety obligations	Ensuring that Finance staff are appropriately trained, competent, and when necessary licensed, to conduct their safety obligations	Ensuring that S&A staff are appropriately trained, competent, and when necessary licensed, to conduct their safety obligations	Ensuring that CS staff are appropriately trained, competent, and when necessary licensed, to conduct their safety obligations
	Monitoring relevant safety performance against set targets	Monitoring relevant safety performance against set targets	Monitoring relevant safety performance against set targets	Monitoring relevant safety performance against set targets	Monitoring relevant safety performance against set targets	Monitoring relevant safety performance against set targets
	Implementing preventative and corrective action to address performance deficiencies, elevated risk levels and secure future safety targets	Implementing preventative and corrective action to address performance deficiencies, elevated risk levels and secure future safety targets	Implementing preventative and corrective action to address performance deficiencies, elevated risk levels and secure future safety targets	Implementing preventative and corrective action to address performance deficiencies, elevated risk levels and secure future safety targets	Implementing preventative and corrective action to address performance deficiencies, elevated risk levels and secure future safety targets	Implementing preventative and corrective action to address performance deficiencies, elevated risk levels and secure future safety targets

[5] Intent of the Work Health and Safety Act 2011

	Ensuring that ANS managers and staff are aware of, and are held accountable for, their safety performance	Ensuring that ARFF managers and staff are aware of, and are held accountable for, their safety performance	Ensuring that IM&T managers and staff are aware of, and are held accountable for, their safety performance	Ensuring that Finance managers and staff are aware of, and are held accountable for, their safety performance	Ensuring that S&A managers and staff are aware of, and are held accountable for, their safety performance	Ensuring that CS managers and staff are aware of, and are held accountable for, their safety performance
	Providing regular reports on safety performance to the Board Safety Committee	Providing regular reports on safety performance to the Board Safety Committee	Providing regular reports on safety performance to the Board Safety Committee	Providing regular reports on safety performance to the Board Safety Committee	Providing independent assurance to the Board Safety Committee in relation to the safety performance of service delivery and WHS	Providing regular reports on safety performance to the Board Safety Committee
Other Safety Authorisations						
The CEO has the authority to veto changes to the operational baseline.					The EGM S&A has the authority to veto changes to the operational baseline when he/she has determined that there is compelling evidence that there will be a significant ongoing safety impact[6]	

[6] Any decision to veto shall be confirmed in writing within 48 hours, including an explanation as to the reasons for the veto, to the CEO and the relevant Executive members

5 Related Documents

Title	Number
Safety Management Policy	C-POL: AA 000 7
Safety Management System Objectives and Requirements	AA-NOS-SAF-0002
Safety Accountabilities and Responsibilities	AA-NOS-SAF-0007

6 Definitions

Terms	Explanation
Accountability	A relationship that exists between two people or groups of people, the person or group held accountable and the person to whom they are accountable
Responsibility	The state of ownership resulting from the performance of an activity or action
Accountability versus Responsibility	A worker is responsible for their actions in performing an activity whereas they are accountable to someone for the outcome of the activity being performed
Workplace	Any premises owned or under the control of Airservices, or a place where employees are performing at the direction of Airservices
Worker	Workers under the Work Health and Safety Act 2011 (Cth) include: • employees • independent contractors • sub-contractors • outworkers (e.g. home based) • apprentices • work experience students • trainees • volunteers who work in employment-like setting

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Executive General Manager

Air Navigation Services

Safety Accountability Statement

July 2016

Attachment 3 – Example EGM Safety Accountabilities Statement

Safe & Secure

Airservices Performance Outcome: Our most important consideration is always the safety of air navigation.

Airservices performs a critical role in the Australian aviation industry providing both an air traffic management service and aviation rescue and fire fighting service for the Australian flight information region.

As a member of Airservices Executive Team, you play a significant role in ensuring the strategic direction and standing of safety within our organisation. Only through the execution of your specific safety accountabilities and the collective efforts and focus of the Executive team will our high standards in both safety performance and management be secured in the short, medium and longer term.

Executive General Manager (EGM) Air Navigation Services (ANS) Safety Accountabilities

As the EGM ANS, you hold key safety accountabilities for both service provision and people safety, and play a significant role is the delivery of the organisational vision:

We are recognized as the industry leader in the provision of safe and innovative services.

The performance of the ANS Group in this regard is critical to the success of our organisation. The accountabilities of your role are presented below:

Safety Accountabilities which flow from Acts	
The CEO is accountable to the Board of Directors of Airservices for:	**The EGM ANS is accountable to the CEO for:**
The safety, regularity or efficiency of air navigation, whether in or outside Australia[1]	Ensuring the safe delivery of air navigation services which give effect to the Chicago Convention Ensuring the provision and management of resources to assure the safety of air navigation services[2] Ensuring the adequacy of emergency planning preparedness and response, that is conducive to air navigation services Ensuring effective interfaces with adjoining Air Navigation Service provides in normal and contingency operations
Ensuring that in exercising its powers and performing its	Evolving Air Navigation Services in a manner which secure future safety outcomes

[1] Air Services Act 1995 8 1 (ii) and (iii)

[2] Human, technical and property

functions, Airservices regards safety of navigation as the most important consideration[3]	Assuring that changes to air navigation services are introduced in a manner in which the fitness for service is declared, accepted in accordance with internal procedures, and delivers appropriate safety assurance Assuring that organisational systems and process comply with the requirements of Civil Aviation Safety Regulations Part 172, 171,143 and 65 Facilitating a culture within the organisation which embeds safety of navigation as the most important consideration.

Supporting Safety Responsibilities

In discharging their high level accountabilities, the CEO is accountable for:	**In discharging their high level accountabilities, the EGM ATC is accountable for:**
	Assuring that the ANS group complies with the requirements of the Safety Policy and SMS Ensuring that ANS staff are appropriately trained, competent, and when necessary licensed, to conduct their safety obligations Monitoring relevant safety performance against set targets
Assuring that the Board's risk tolerance in relation to safety are enacted through policies, management systems, performance targets and key risk controls.	Implementing preventative and corrective action to address performance deficiencies, elevated risk levels and secure future safety targets Providing regular reports on safety performance to the Board Safety Committee

Extract of AA-GOV-SAF 0007 Safety Accountabilities July 2016

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[3] Airservices Act Section 9.1

Attachment 3 – Example EGM Safety Accountabilities Statement

Board Risk Appetite

In oversighting the operations of the ANS Group, you must be cognizant of the Board's risk appetite for both service provision and people safety, and enact decisions which are consistent with their risk appetite.

Risk Class	Description	Risk Appetite
Service Provision	Airservices has a long history of safe and efficient delivery of air traffic management and aviation rescue and fire fighting services. Airservices continually seeks to improve and enhance the Australian aviation industry through the safety, resilience, predictability and efficiency of our services.	Airservices understands the risks to Service Provision and shall manage these risks to minimise exposure to as low as reasonably practicable. Operational safety and environmental risks shall be managed through the implementation of comprehensive safety and environmental management systems.
People Safety	Airservices is committed to providing the highest reasonable standard of safety for all the services that we provide and a safe and healthy working environment for workers, contractors and visitors. We continually strive to eliminate the potential for occurrences that pose a high risk to those who use our services or who work in or visit our premises.	Airservices understands the risks to people safety, and shall manage these risks to minimise exposure to as low as reasonably practicable. People safety risks shall be managed through the implementation of a comprehensive safety management system.

Extract of C-POL 23: Board Risk Appetite Statement May 2016

Safety Management System (SMS)

Airservices SMS will assist you in the execution of your role. Our SMS provides processes, tools and assurance to aid your decision making, whilst also ensuring that all within the ANS group and those which support the group in the delivery of its functions have a shared understanding of the importance of safety and its management.

Key processes, products and assurance which were agreed will assist in the discharge of your safety accountabilities are provided in Appendix 1 of this document.

Safety Accountability Sign-Off

I understand and accept the safety accountabilities of the Executive General Manager, Air Navigation Services.

_____

Date:

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Attachment 3 – Example EGM Safety Accountabilities Statement

Appendix 1: Output of Discussion with the EGM ANS held on <insert date> with <insert S&A rep name and title>

Safety Accountabilities which flow from Acts				
The CEO is accountable to the Board of Directors of Airservices for:	**The EGM ANS is accountable to the CEO for:**	**Key SMS Components[4] which assist in the delivery of this accountability**	**Key SMS Products[5] which demonstrate that the accountability has been acquitted**	**Key Assurance[6] artefacts which will demonstrate performance and compliance**
The safety, regularity or efficiency of air navigation, whether in or outside Australia[1]	Ensuring the safe delivery of air navigation services which give effect to the Chicago Convention			
	Ensuring the provision and management of resources to assure the safety of air navigation services[4]			
	Ensuring the adequacy of emergency planning preparedness and response, that is conducive to air navigation services			
	Ensuring effective interfaces with adjoining Air Navigation Service provides in normal and			

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4 A safety artefact that imposes requirements on what must be accomplished, defines a process by which it is accomplished, or assists in this accomplishment.

5 Evidence which assure correct and thorough application of the **SMS components**

6 SMS Assurance Map AA-Guide-SAF-0040

Attachment 3 – Example EGM Safety Accountabilities Statement

	contingency operations	
Ensuring that in exercising its powers and performing its functions, Airservices regards safety of navigation as the most important consideration[2]	Evolving Air Navigation Services in a manner which secure future safety outcomes	
	Assuring that changes to air navigation services [4] are introduced in a manner in which the fitness for service is declared, accepted in accordance with internal procedures, and delivers appropriate safety assurance	
	Assuring that organisational systems and process comply with the requirements of Civil Aviation Safety Regulations Part 172, 171,143 and 65	
	Facilitating a culture within the organisation which embeds safety of navigation as the most important consideration.	
Providing a safe and healthy work environment for workers and visitors.[3]	Providing a safe and healthy work environment for ANS workers and visitors.	

DRAFT

Attachment 3 – Example EGM Safety Accountabilities Statement

Supporting Safety Responsibilities				
In discharging their high level accountabilities, the CEO is accountable for:	**In discharging their high level accountabilities, the EGM ATC is accountable for:**	**Key SMS Components which assist in the delivery of this accountability**	**Key SMS Products which demonstrate that the accountability has been acquitted**	**Key Assurance artefacts which will demonstrate performance and compliance**
Assuring that the Board's risk tolerance in relation to safety are enacted through policies, management systems, performance targets and key risk controls.	Assuring that the ANS group complies with the requirements of the Safety Policy and SMS			
	Ensuring that ANS staff are appropriately trained, competent, and when necessary licensed, to conduct their safety obligations			
	Monitoring relevant safety performance against set targets			
	Implementing preventative and corrective action to address performance deficiencies, elevated risk levels and secure future safety targets			
	Providing regular reports on safety performance to the Board Safety Committee			

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Attachment 4 – Safety Stability Assessment

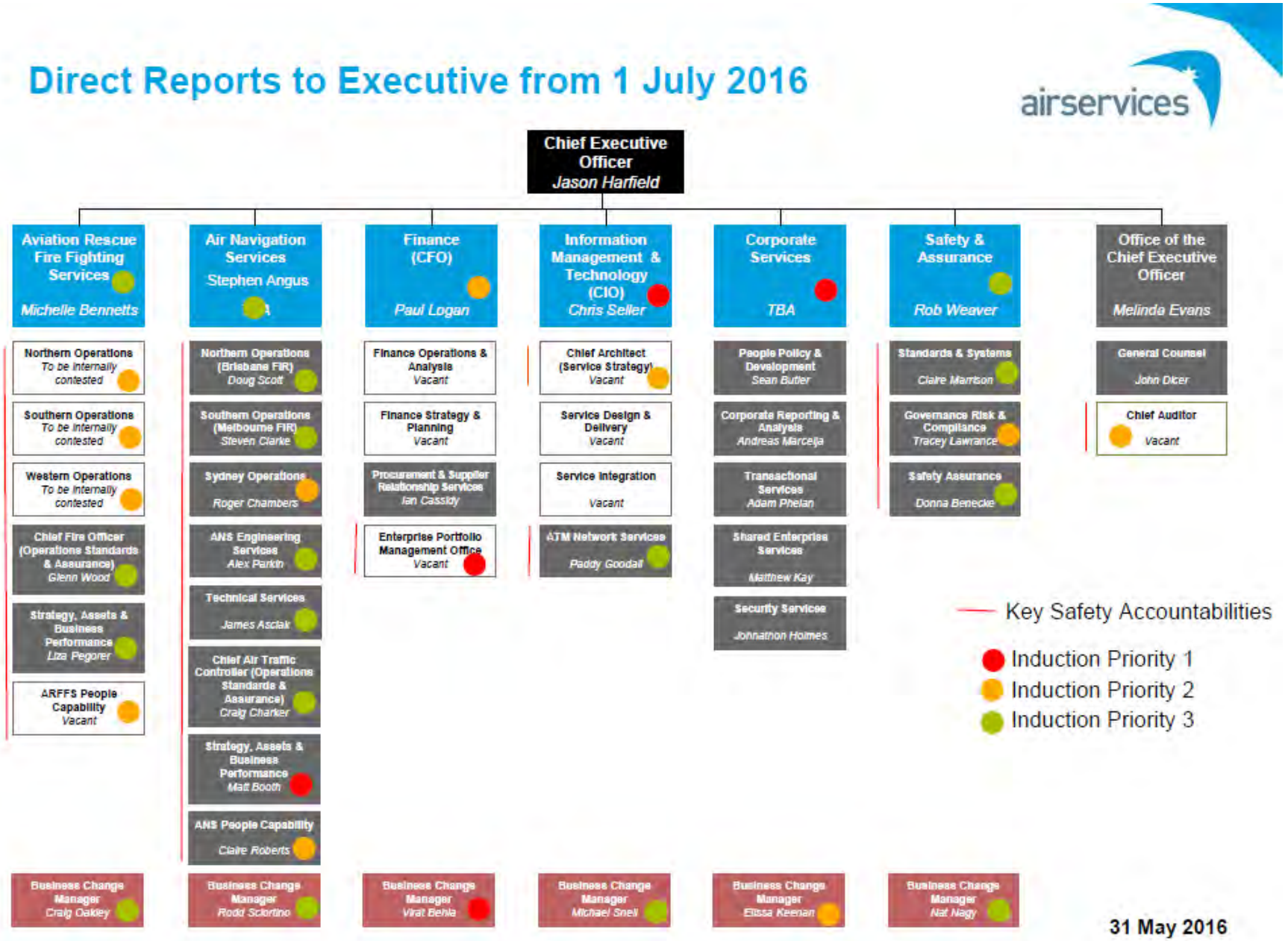
Key Safety Leadership Roles Stability Assessment Summary

Group	Safety Criticality	Executive Member	Direct Reports to Executive												
			Operations			Technical				Standards & Frameworks		Projects	Training	Independent Assurance	Business Change
CEO	High	CEO													PMO
ANS	High	EGM	Northern	Southern	Sydney	ANS ES	TS			CATC		SABP	ANS PC		BCM
ARFFS	High	EGM	Northern	Southern	West					CFO		SABP	*TBA:ARFF PC*		BCM
IM&T	Medium	EGM	ATM NS					CA(SS)	SD&D	SI (SS)					BCM
S&A	Medium	EGM								S&S	GRC			SA	BCM
CS	Low	*EGM*													BCM
Finance	Low	EGM								*TBA: EPMO*					BCM
			Role Impact: Tactical					*Role Impact: Strategic*							

	Stability Assessment	
Key		High
		Medium
		Low
		Unknown: role not filled
		No applicable roles

Note: Full detail of safety stability assessment is available from Manager Strategy, Systems and Analysis, SE&A.

Attachment 5 – Safety Induction Prioritisation



Attachment D. iii.

Voluntary Redundancy Program
Safety Case Assessment and Reporting Determination (SCARD)
Issue 1.0

NOTE: Due to compatibility issues with the new Standard Operating Environment (SOE), this version of the SCARD template will not automatically calculate the SCARD outcome, guidance has been included to allow the outcome to be manually determined.

Context

As specified by Operational Safety Change Management Requirements (AA-NOS-SAF-0104): A SCARD must be completed for changes to service levels, procedures or equipment that may affect the performance, functional or technical specification of a system or service; and organisational changes affecting safety accountabilities.

The SCARD template is designed to assist users to evaluate the change proposal, in order to determine what type of operational safety assessment and reporting is required.

Step 1: Change Details

Reference Number (Change Proposal/Project Proposal/ Project Number/NRFC/ASID)		**Services/Systems/ Assets under change**	

Change Description

As part of the Airservices Accelerate Program a new simpler operating model and Executive structure were announced on 17 May 2016 (see Appendix 1) and a senior leadership structure was announced on 31 May 2016 (see Appendix 2).

One of the key aims of the Accelerate Program is to make Airservices more efficient, particularly in the corporate centre, which has become unsustainably large.

As one step towards achieving that, Airservices is proposing a voluntary redundancy (VR) program.

It is expected this program can achieve three outcomes:
1. For those staff who are thinking of changing careers or making lifestyle decisions, it would give them an opportunity to do so, on their own terms.
2. By reducing staff numbers it may lessen any need for involuntary redundancies as Airservices continues the staged process of looking at changes to the structure and functions of the non-operational workforce that underpin the new operating model.
3. Movement of employees will improve opportunities for redeployment within the business, opening up new opportunities for those people who want to continue to build their careers at Airservices.

Before implementing any VR program, Airservices has sought the views of staff and provided information via a 'proposed process and timings' table and Q&A fact sheet to further explain the proposal. The consultation period closed on 10 June 2016.

This SCARD assesses if there is any potential operational safety impact of offering a VR program for non-operational employees as a component of the Accelerate Program.

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Step 2: SCARD Participants

List the persons participating in the completion of this determination:

Adequate representation from all appropriate areas of the business involved in or potentially affected by the change must be present during completion of the SCARD, for example (but not limited to):

- ATC operational representatives, System Supervisors, Operational Authorities, etc
- ARFF operational representatives, Station Command representatives, etc
- Engineering planning, design and integration representatives, maintenance and system operations representatives, software/hardware/data/infrastructure specialists, Technical and Maintenance Authorities and Chief Engineers, etc
- Training design and delivery representatives,
- Other applicable system owners.

This representation should also include subject matter expertise from any specialist safety disciplines relevant to the change, for example (but not limited to):

- System Safety, Human Factors and regulatory compliance representatives.

Changes potentially impacting external stakeholders must also include representation from these stakeholders as appropriate, for example (but not limited to):

- Airline representatives
- Airport representatives
- Regulatory representatives
- Vendor/Contractor representatives

NOTE: The SCARD may be rejected by the signatories in Step 9 if adequate representation is not included. If guidance is required on appropriate attendees, contact **FG SEA ASSURANCE**

Name	Position	Date
Rob Weaver	Executive General Manager Safety, Environment and Assurance	14.6.16
Nat Nagy	Safety and Assurance Business Change Manager	14.6.16
Andrew Boyd	Executive General Manager People and Culture	29.6.16
Donna Benecke	Manager Project and Business Support	14.6.16
Nick King	Accelerate Program Director	14.6.16

Step 3: Size of the Change

Complete the following questions to determine the size of the change. For each question, choose a rating from 1 (Low) to 7 (High); and provide justification. Then use the ratings to determine the overall size of the change

1	**Assess the significance of the change within Airservices.** *Consider the work areas affected. Consider the effects on P&E (Engineering disciplines, systems, locations), ATC (Service Delivery Lines, Enroute/TMA/Tower) and ARFF (stations, equipment, service).*	**Initial Rating** **3**
Justification: Offers of VR will only be made to eligible staff, that is those staff that are classified as non-operational and non-rostered.		

2	**Assess the significance of the change outside Airservices.** *Consider the number and extent of service users and/or stakeholders affected, including the interfaces between these parties.*	**Initial Rating** **1**
Justification: Negligible impact on service users and/or stakeholders outside of Airservices. Some interfaces between external agencies and Airservices points of contact could be impacted depending on which positions are considered for VR although this would be confined to non-operational roles based on the eligibility and assessment conditions of the VR Program.		

3	**Assess the operational impact of the change on the systems, service and users (i.e. operators, maintainers, etc).** *Does the change:* o *enhance existing system functionality, provide different/new/novel functionality, or remove functionality;* o *alter the services provided;* o *affect the users' roles including their required skills and abilities, HMI interaction, work environments, systems and procedures of work, responsibilities, organisation and staffing or teams and communication?*	**Initial Rating** 1	**Weighted Rating** = Initial Rating x 2 **2**
Justification: As the VR Program is confined to non-operational roles and if it would result in a work area not having the skills or staff needed to safely and effectively carry out its functions, then a VR will not be approved. It is considered that there will be negligible impact on systems, service and users from an operational service delivery perspective.			

4	**Assess the technical impact of the change on the operating system(s).** *Does the change:* o *affect single or multiple systems (e.g. NAIPS/Eurocat/AFTN/MEX/ORS etc.);* o *affect operational or non-operational systems* o *introduce new, or reconfigure, hardware or software affecting operational capability and/or performance* o *affect system interfaces* o *affect redundancy, maintainability, integrity, etc* o *affect operational or business data and/or databases?*	**Initial Rating** 2	**Weighted Rating** = Initial Rating x 2 **4**
Justification: Nil technical impact on operating systems from the offer of the VR Program. Some business databases would need to be updated to reflect any staffing changes resulting from VRs taken.			

5	**How complex is the implementation of and transition to the new or changed system or service?** *Consider:* o *temporary removal of a system, ghosting/mimicking, operational test and evaluation, control and monitoring, rollback/fallback required, etc* o *resources available, training, documentation, procedures, communication, time lines, approvals, etc*	**Initial Rating** 2	**Weighted Rating** = Initial Rating x 2 **4**
Justification: A proposed process and timing of the VR program has been developed. From an industrial relations perspective, the process is well established and not complex. Depending on the scale of VRs offered and accepted, there will be corporate labour overhead costs absorbed by existing resources to administer the process.			

6	**How substantial is the education and training associated with the change?** *Consider type of training required and for whom, none, classroom, online or simulation, time line for design/development and roll-out, duration, resources for design/development and*	**Initial Rating** **2**

	delivery, impact on operational resources, currency, recency and licensing requirements, ongoing/refresher requirements, etc.	

Justification: There is no training requiredment associated with the VR Program. Some education and awareness about the process, timings and assessment guidelines is required to ensure staff undedrstand how the program will be administered, who is eligible to apply and under what conditions a VR may be offered.

Total	**16**

Resultant size of the change (Small* - 9 to 25, Medium - 26 to 44, Large - 45 to 63) *** If any single initial rating is greater than 4, a result of Small must be increased to a result of Medium**	**Small**

Step 4: Operational Safety Impact of the Change

To assess the operational safety impact of the change, conduct an initial hazard identification to determine the potential operational safety hazards that may result from the change and complete the table below. Giving consideration to the number and severity of the potential hazards as well as the criticality of the impacted systems where listed on the System to Service List, complete the safety impact estimations shown below. For assistance completing this identification, refer to AA-GUIDE-SAF-0105C, or contact Safety & Environment Project & Business Support.

Note: *This process must only be used for the determination of the Operational Safety Impact. All Hazards identified through this process that require control and ongoing management, or further assessment must be recorded in HAZLOG and managed in accordance with AA-PROC-SAF-0105.*

Service/System	System Critic -ality	Potential Hazards	Controls		Effect on	
			Existing	Proposed	Airservices' Operations	Aircraft / Aircrew / 3rd Parties
ATC & ARFF operational services	N/A	Inability to provide sufficient resources to meet operational service delivery requirements	Under the advertised conditions of the VR Program, ATC and ARFF operational and rostered staff are ineligible to apply for VR	N/A	NIL	NIL
Operational systems	Various	Inability to provide sufficient resources to maintain systems as required	Under the advertised conditions of the VR Program, VRs will not be granted if it will result in a business area not having the skills or staff needed to safely and effectively carry out its functions.		NIL	NIL
Org-wide	N/A	Where a role is deemed redundant, failure to identify key safety accountabilities and transfer to new role		Where staff in roles with key safety accountabilities are made redundant, their safety accountabilities must be transferred to another function/role	Safety accountabilities not acquitted	NIL

Service/System	System Critic -ality	Potential Hazards	Controls		Effect on	
			Existing	Proposed	Airservices' Operations	Aircraft / Aircrew / 3rd Parties
				prior to their departure from the organisation.		

NOTES: 1) For newly developed systems, a System Criticality will need to be determined. The SCARD process will help inform this determination.
2) If any significant effect on external parties are identified, this assessment must be confirmed by the affected parties and must trigger their involvement in the ongoing management and control of the risk.
3) If any aspects of the change uncovered in this step were not considered in Step 3, the step should be re-validated.

1. Based on the identified Operational Safety hazards; Enter the estimated Operational Safety Impact of the change.	**Minimal**	If unsure, the higher of the considered options should be chosen
2a. Are any of the identified Hazards Human Factors related or do they impact human performance?	**No**	If yes, please seek Human Factors support via PBSresourcing@airservicesaustralia.com
2b. Are any of the identified Hazards Software related?	**No**	If yes, please seek software assurance support via - PBSresourcing@airservicesaustralia.com (for projects) - _FG_PE_ENG_OPS (for other changes)

Step 5: Regulatory Impact

If unsure in the completion of this step, contact Operational Assurance & Regulatory Services (OARS) for assistance.

5.1 - Does the proposed change require an amendment to a Provider Certificate schedule (including exemptions and instruments)?

e.g. Introduce a new service, or change to an existing service under;

- CASR Part 139H (Aerodrome Rescue and Fire-Fighting Services)
- CASR Part 143 (Air Traffic Services Training)
- CASR Part 171 (Aeronautical Telecommunication and Radionavigation Services)
- CASR Part 172 (Air Traffic Services Provider) or
- CASR Part 173 (Instrument Flight Procedure Design).

NOTE: This includes 171 Operations Manual defined Level 1 Changes (i.e. a new ICAO defined service or a new type of airways system, or the removal of an ICAO defined service or a type of airways system.)

Yes ☐	A Safety Case is required. Use the link below to notify OARS of the requirement to prepare a Safety Case. **Continue onto Step 6**
No ☒	**Continue onto Question 5.2**

5.2 - Does the proposed change otherwise require approval from CASA?

e.g. Commissioning of new ATS facilities pursuant to CASR Part 172; changes to Airservices' Operations Manuals related to changes to the services under the CASR Parts listed above; or commissioning of new ARFFS vehicles or facilities pursuant to CASR Part 139H.

Yes ☐	A Safety Case or Safety Assessment Report may be required. Use the link below to contact OARS to discuss the change's safety reporting requirements. **Continue onto Step 6**
No ☒	**Continue onto Question 5.3**

To notify Operational Assurance & Regulatory Services (OARS) of the requirement for a Safety Case, or to discuss the change's safety reporting requirements, contact: casa_compliance@airservicesaustralia.com

5.3 - Does the proposed change require notification to CASA prior to commissioning / notification to industry?

NOTE: This includes 171 Operations Manual defined Level 2 Changes (i.e. where a facility noticeable to the user is being decommissioned or where there is a significant reduction to the level of service). Refer to paragraph 3.2.1.4 of the CASR Part 171 MOS and paragraph 6.1.2.4 of the CASR Part 172 MOS regarding the regulatory requirements for a safety case.

Yes ☐	A Safety Case or Safety Assessment Report may be required. Use the link below to contact OARS to discuss the change's safety reporting requirements. **Continue onto Step 6**
No ☒	**Continue onto Step 6**

To contact Operational Assurance & Regulatory Services (OARS) to discuss the change's safety reporting requirements contact:
casa_compliance@airservicesaustralia.com

Step 6: Overall Operational Safety Magnitude

The Overall Operational Safety Magnitude is determined through a combination of the size of the change **and** its operational safety impact. Apply the results obtained from Steps 3 and 4 to the matrix below to determine the Overall Operational Safety Magnitude.

Overall Operational Safety Magnitude	Operational Safety Impact		
Size of the change	**Substantial**	**Reasonable**	**Minimal**
Large	☐ **Major**	☐ **Major**	☐ **Moderate**
Medium	☐ **Major**	☐ **Moderate**	☐ **Minor**
Small	☐ **Moderate**	☐ **Minor**	☒ **Minor**

Step 7: Operational Safety Reporting Requirements

Apply the results from Step 5 **or** Step 6 to the matrix below to determine the Operational Safety Reporting Requirements.

Note that a Step 5 requirement for a Safety Case or Safety Assessment Report overrides any lesser outcome from Step 6.

Outcome[1]	To be reported as ...	Required Actions
☐ **5.1 Response YES**	**Safety Case**	1. Establish Safety Program Working Group 2. Prepare Safety Plan 3. Execute Safety Program 4. Prepare Safety Case(s) (Indicate phasing below) ☐ Concept/Design & Impl. Phases ☐ All Phases
☐ **5.2 Response YES** ☐ **5.3 Response YES** ☐ **Major**	**Contact OARS to determine safety reporting and CASA notification or approval requirement.** **Discussion Outcome:**	
☐ **Moderate**	**Safety Assessment Report**	1. Establish Safety Program Working Group 2. Prepare Safety Plan 3. Execute Safety Program 4. Prepare Safety Assessment Report(s) (Indicate phasing below) ☐ Concept/Design & Impl. Phases ☐ All Phases
☒ **Minor**	**Safety Statement**	1. Determine whether this SCARD is sufficient to constitute the Safety Statement and indicate below (see AA-NOS-SAF-0104 Section 4.3) 2. Execute Safety Program, as required 3. Prepare Safety Statement, if required 4. Attach SCARD or Safety Statement to RFC or change process ☒ SCARD Only ☐ Additional Safety Statement

[1] A manager with accountability for the change, or the EGM, SE&A, may impose a higher safety reporting requirement.

Step 8: Additional Information

The VR Program is not open to operational and rostered Air Traffic Controllers and Aviation Rescue Fire Fighters. Additionally if a voluntary redundancy would result in a business area not having the skills or staff it needs to safely and effectively carry out its functions, then a manager may not approve a voluntary redeundancy.

Managers should ensure they are able to show that due consideration has been given to an assessment of the minimum number of staff and the skills/knowledge required to be retained in order to safety and effectively fulfil each function prior to granting any VRs.

This is the key control to managing any potential service delivery and flow on operational safety risk associated with the VR Program.

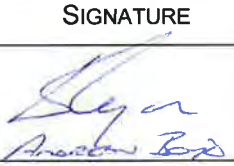
Step 9: Approval

Note that a completed SCARD, once approved below, remains valid for 12 months from the date of its approval on the basis that the change detailed in Step 1 remains as-is in that period. If either a change in scope occurs or the SCARD expires after 12 months, the assessment made herein must be revalidated through either re-assessing and re-approving the SCARD, at a minimum, or completing and approving a new SCARD.

PREPARED BY	PROPOSED BY
Donna Benecke, Manager SE&A PBS	Nick King, Accelerate Program Director

The level at which this SCARD can be approved is determined by its Overall Operational Safety Magnitude from Step 6 as shown in the table below, however a higher level of approval can be sought if deemed appropriate. Where the change impacts multiple systems, services or business areas, approval from all relevant authorities, or a higher authority, must be sought.

Major	Branch Manager, Service Delivery Line Manager, Chief Fire Officer, Chief Information Officer
Moderate	Chief Engineer, Chief Technology Officer, Chief OA, Chief UA, ATC Line Manager, ARFF Regional Manager, Other Unit Manager
Minor	TA/MA, OA, UA, ATC Line Manager, ARFF Station Manager, Other Unit Manager

APPROVED BY	SIGNATURE	DATE
Andrew Boyd, Executive General Manager People & Culture		29 June 16

By approving this SCARD you acknowledge that:

- You are satisfied that the SCARD process has been completed correctly
- Regarding your area of authority or accountability, appropriately experienced and/or qualified staff participated in the process
- Sufficient and valid information has been included to justify the outcome
- This SCARD has been approved within 30 calendar days of its completion.

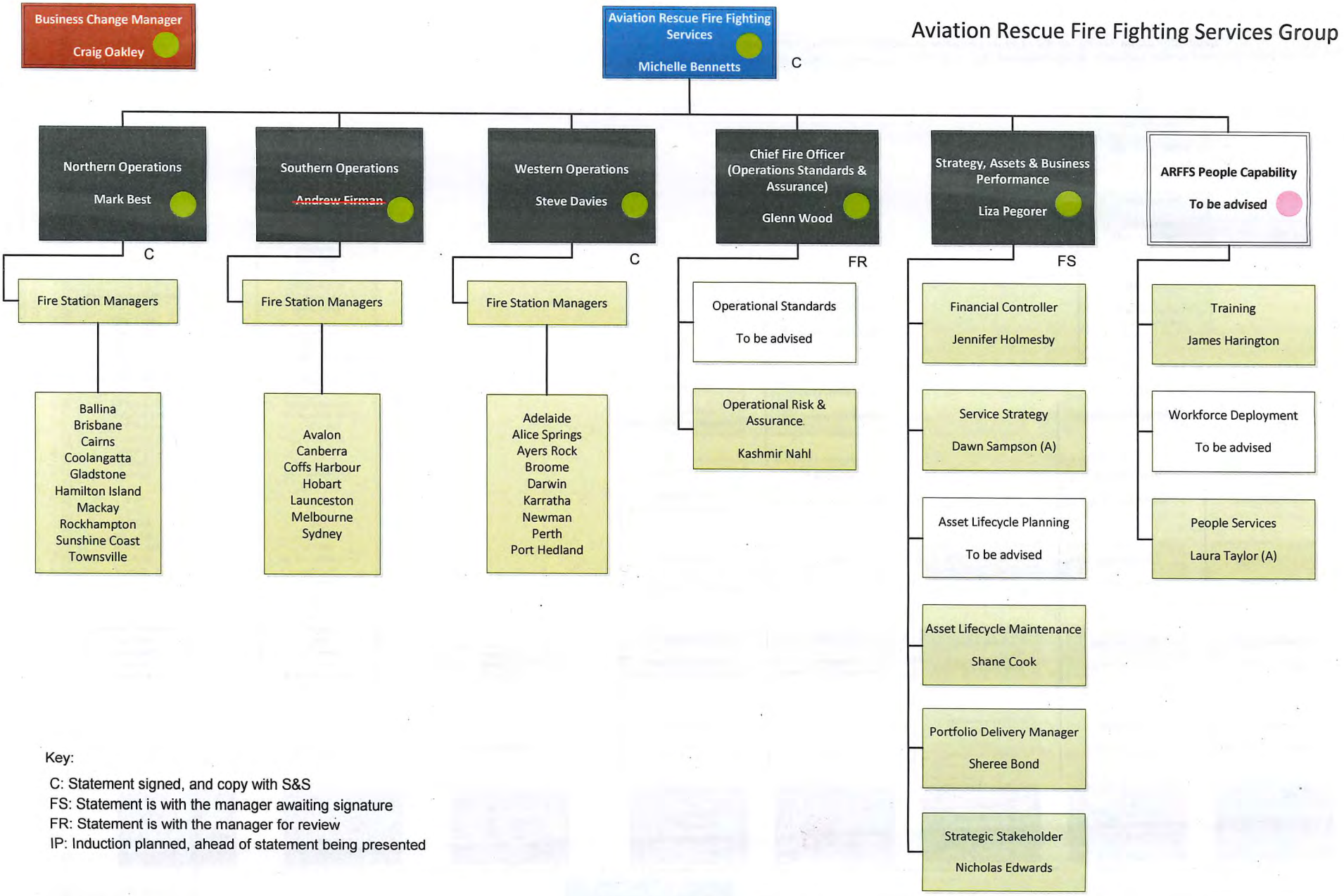
Step 10: SCARD Record Management

A copy of the approved SCARD must be sent to Operational Assurance & Regulatory Services and Safety & Environment Project & Business Support at _FG_SEA_ASSURANCE. Operational Assurance & Regulatory Services will contact the proponent of the change if there are any outstanding regulatory issues with the completion of the SCARD.

The original signed copy of the approved SCARD must be stored in an organisationally approved document repository by the proponent of the change.

SAFETY STATEMENT ACCOUNTABILITY STATUS 1 AUGUST 2016

Attachment D. iv.

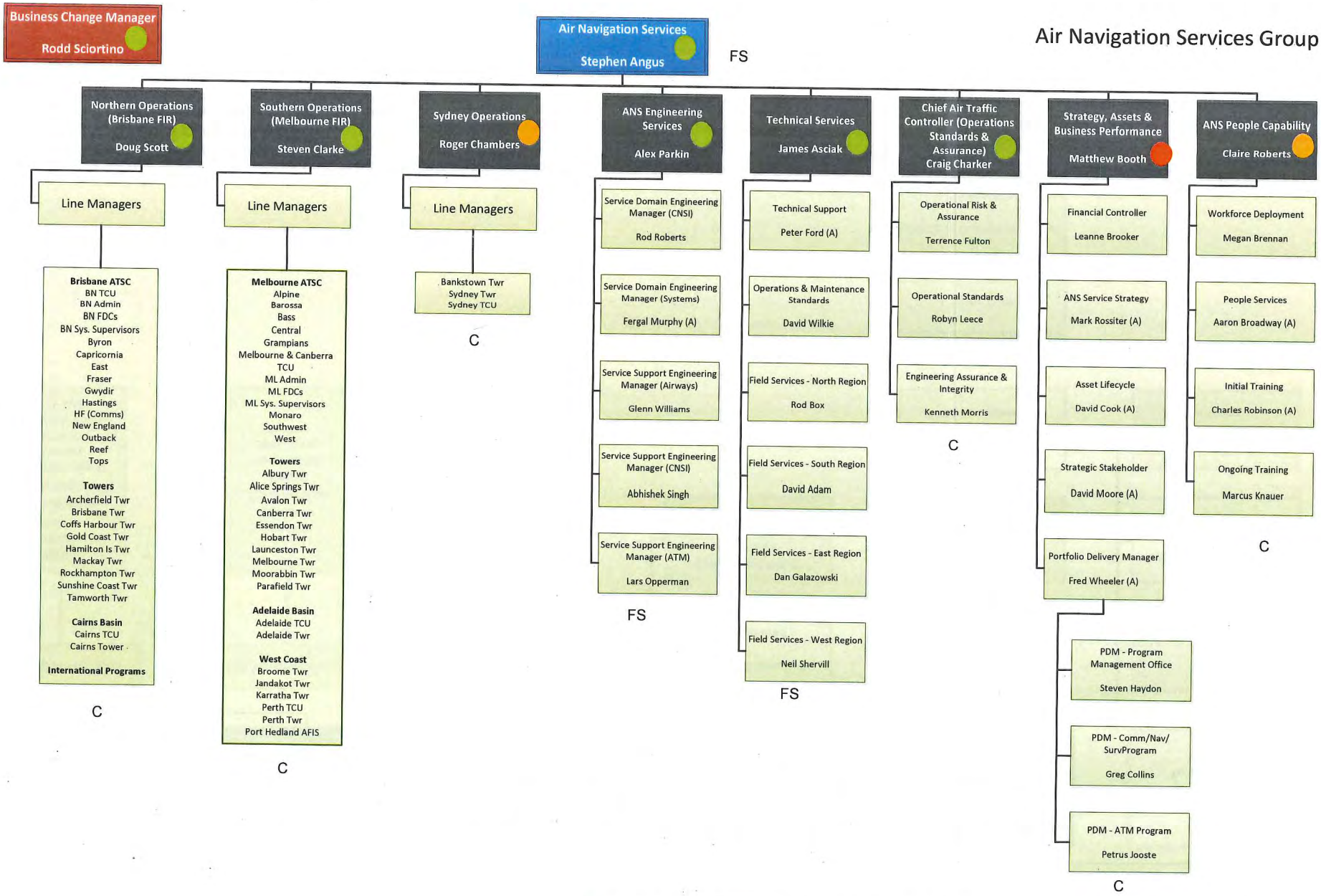


Key:

C: Statement signed, and copy with S&S
FS: Statement is with the manager awaiting signature
FR: Statement is with the manager for review
IP: Induction planned, ahead of statement being presented

This reflects Airservices management structure as at 1 July 2016. The repointing of staff under this structure is interim and may be subject to further changes and continuing consultation on work performed by our employees, where appropriate.

Air Navigation Services Group



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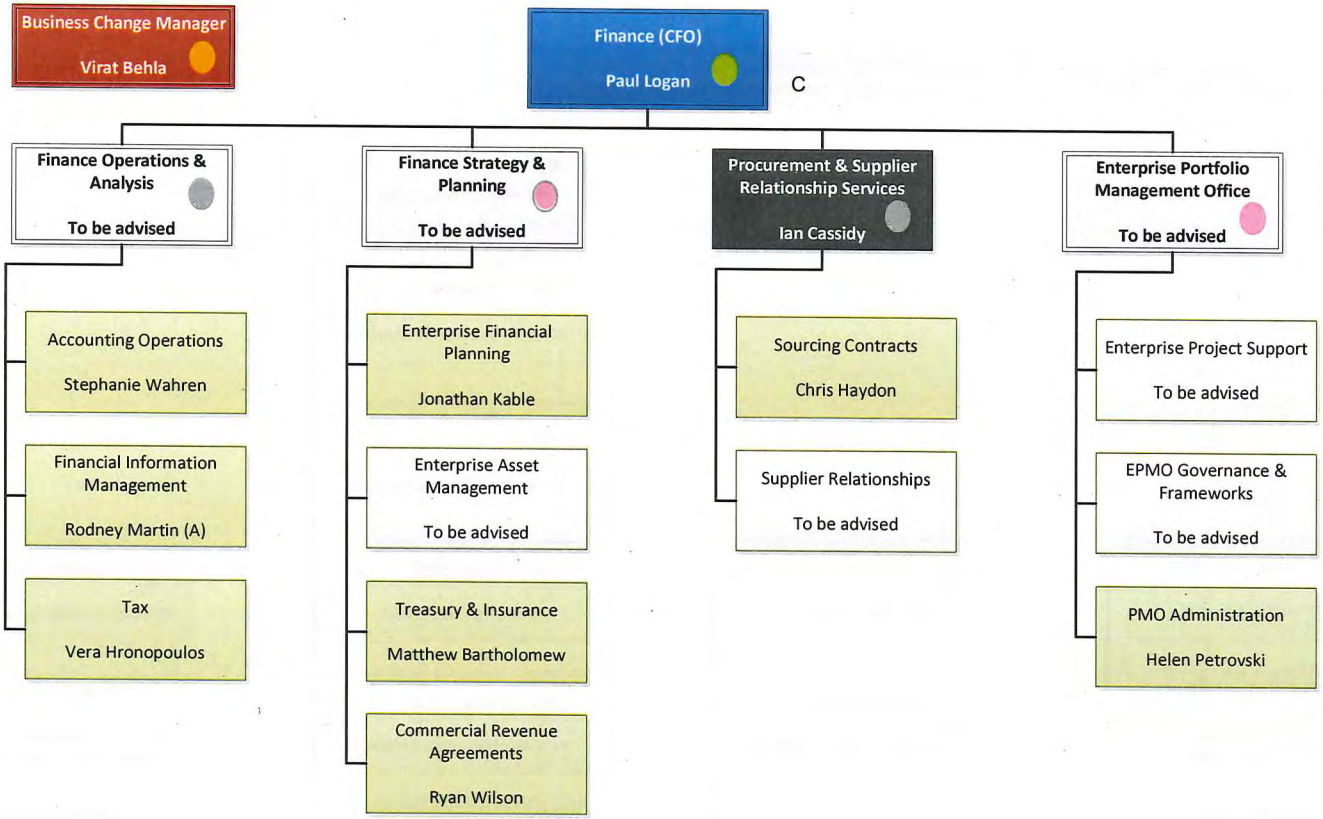
Finance Group



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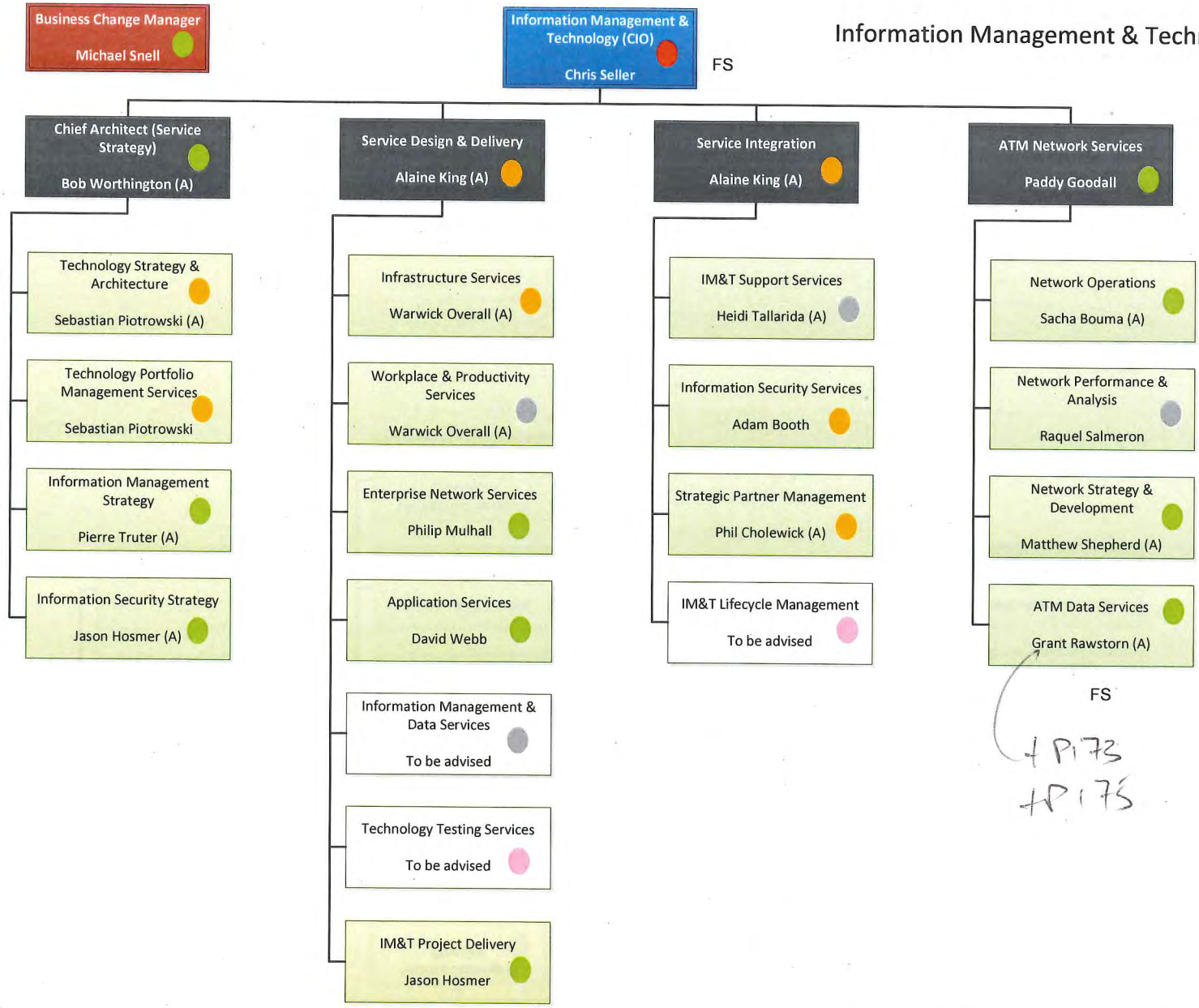
Information Management & Technology Group



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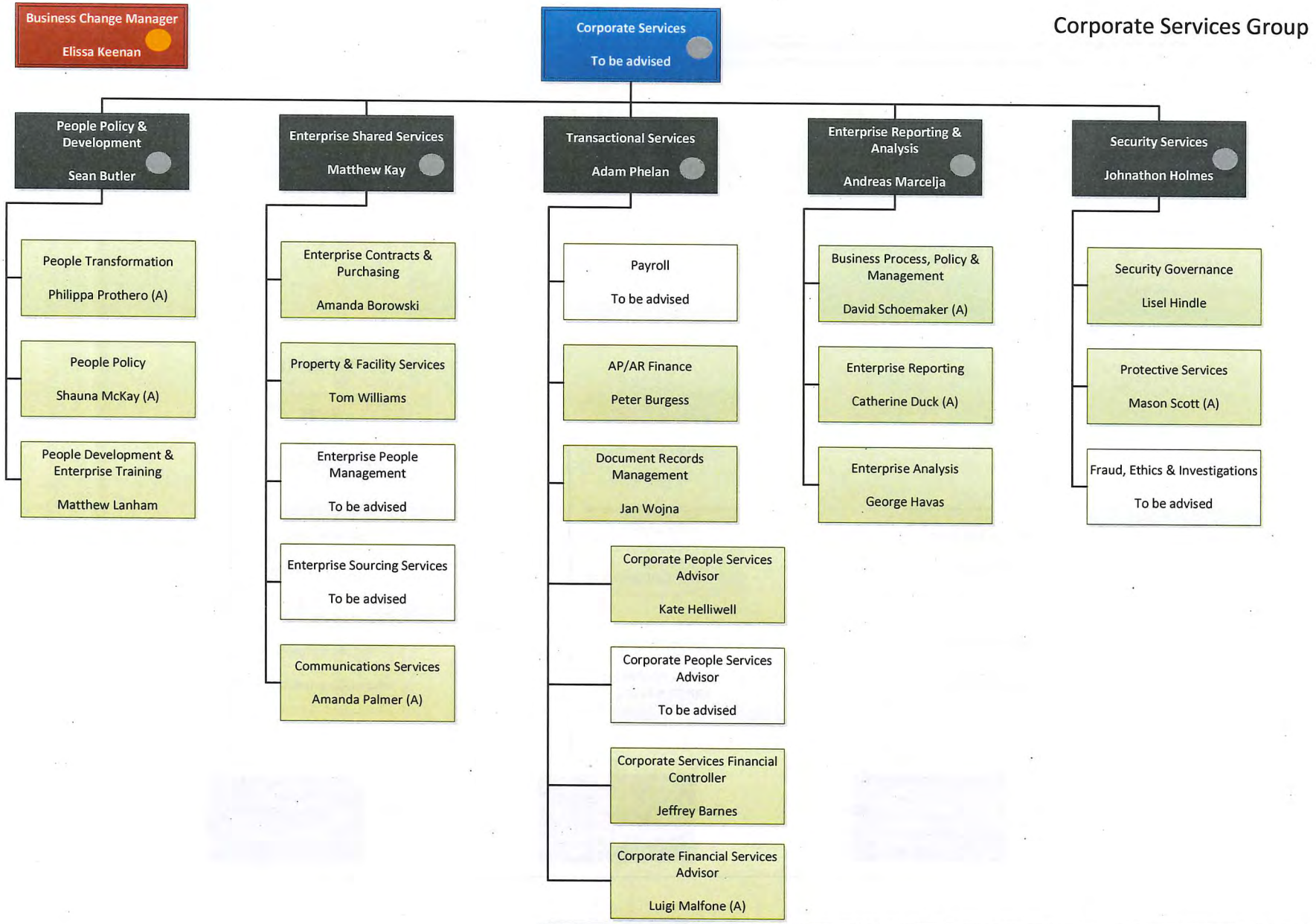
Corporate Services Group



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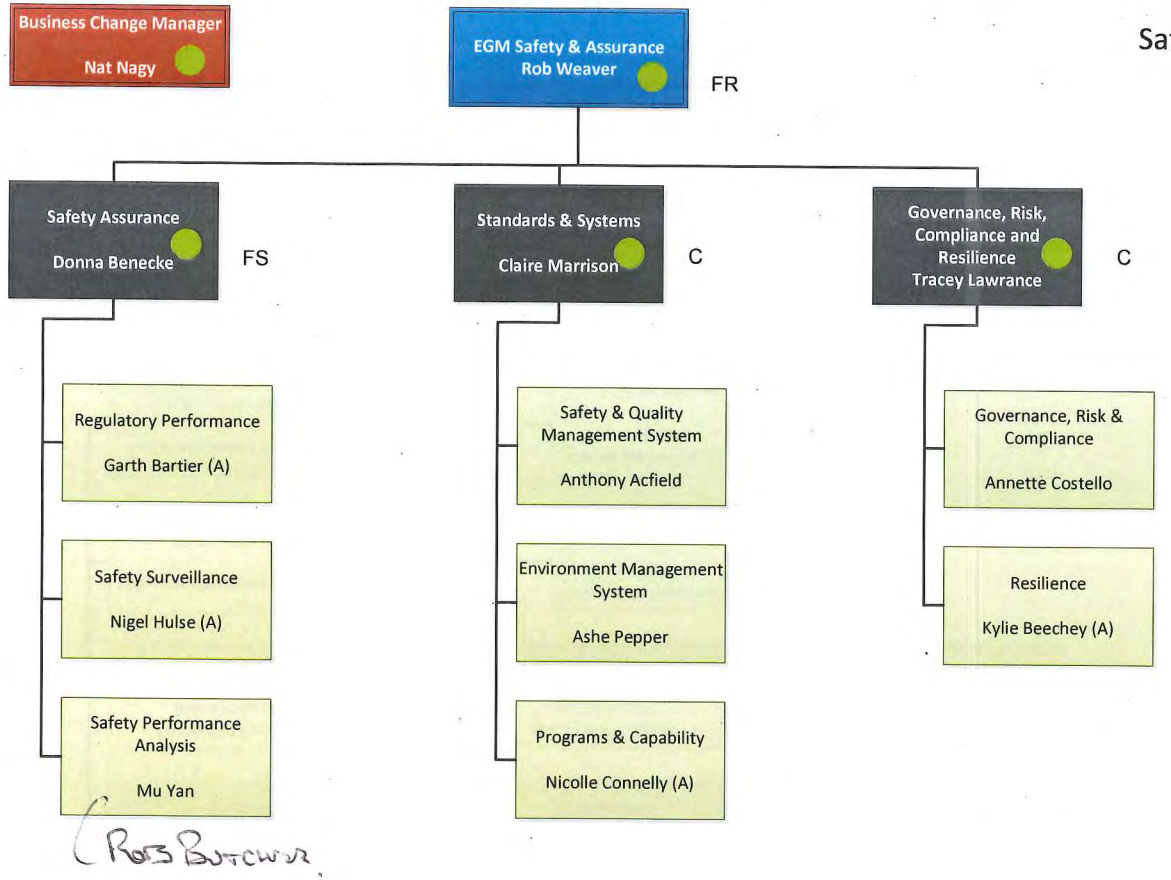
Safety & Assurance Group



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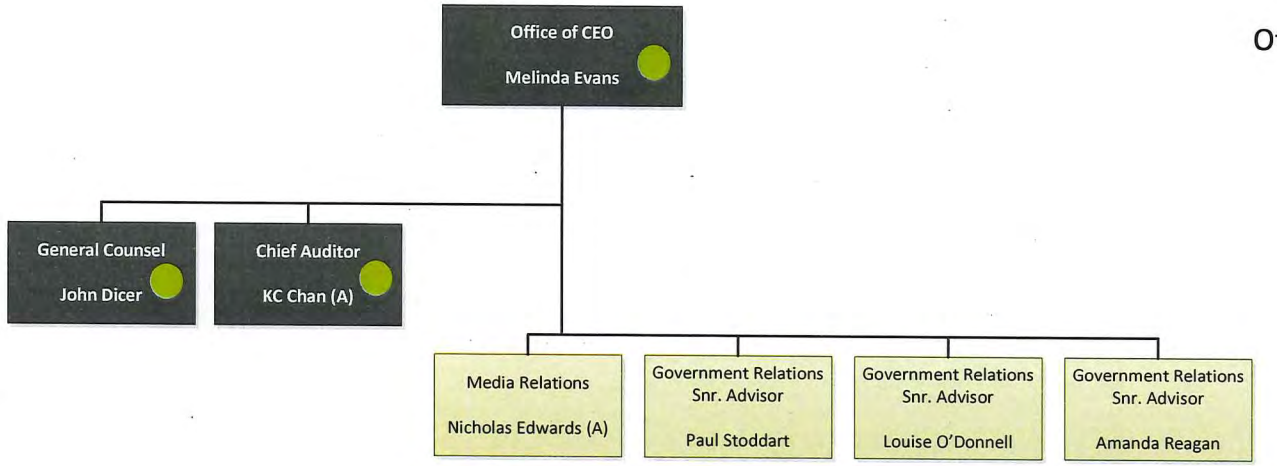
Office of the CEO



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Rural & Regional Affairs and Transport Legislation Committee
ANSWERS TO QUESTIONS ON NOTICE
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Infrastructure and Regional Development

Question no.: 153

Program: N/A
Division/Agency: Airservices Australia
Topic: Accelerate Program
Proof Hansard Page: 97 (17 October 2016)

Senator Xenophon, Nick asked:

Senator XENOPHON: Was there a safety case or a risk assessment done of the quite significant cuts you have had to engineering and IT—that that would not affect the work of your front-line air traffic controllers?
Mr Harfield: That is correct. As I said, we worked through every one of those individually to ensure that they would not have an effect. We also looked at it collectively—for job families—to make sure that was the case.
Senator XENOPHON: Was there a risk assessment undertaken?
Mr Harfield: Yes, there was.
Senator XENOPHON: Could you please provide us with that?
Mr Harfield: Yes, I can.

Answer:

Please refer to answer provided to Question on Notice 152 for details of risk assessments conducted.

Rural & Regional Affairs and Transport Legislation Committee

ANSWERS TO QUESTIONS ON NOTICE

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Infrastructure and Regional Development

Question no.: 154

Program: N/A
Division/Agency: Airservices Australia
Topic: Review and publication of Airservices procurement policies
Proof Hansard Page: 104 (17 October 2016)

Senator Sterle, Glenn asked:

Senator STERLE: Okay, so we have changed from 'quite often' or 'often' to 'do not know'—that is fine. Thank you. If you do not know, maybe someone else might—or Mr Harfield, who has been around a long time too. Can you tell us the last time you reviewed your procedures and procurement policies prior to this committee writing to the ANAO to seek an audit of Airservices?
Mr Logan: I do not know; I can find out.

Answer:

Prior to the Senate Rural and Regional Affairs and Transport Legislation Committee writing to the Australia National Audit Office in August 2015 to seek a performance audit of Airservices the:

- Airservices Finance Policy was last reviewed and issued by the Chief Executive Officer in February 2015; and
- Airservices Finance Manual was last reviewed and issued by the Chief Financial Officer in October 2014.

Rural & Regional Affairs and Transport Legislation Committee
ANSWERS TO QUESTIONS ON NOTICE
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Question no.: 155

Program: N/A
Division/Agency: Airservices Australia
Topic: OneSKY Tender Evaluation Process
Proof Hansard Page: 101 (17 October 2016)

Senator Xenophon, Nick asked:

Senator STERLE: Did Thales meet all 3,000 requirements under the tender evaluation process?
Mr Harfield: As I said just previously, no tenderer was fully compliant. Part of the negotiation period is to make sure that we establish all of those requirements.
Senator STERLE: Of the 3,000, how many short were Thales?
Mr Harfield: I cannot tell you off the top of my head. I can take that on notice.
Senator STERLE: Can Mr Logan?
Mr Logan: Not off the top of my head, no.
Senator STERLE: Give us a clue. Where they miles short? How was the quality of the other tenderers? Are we talking 1,000 short or are we talking half-a-dozen?
Mr Harfield: They were the best tenderer in that regard. What I can say is that they were the most compliant tenderer.
Senator STERLE: What were the procedures used to assess how good they were?
Mr Harfield: There is the tender evaluation process that we have undertaken, which the ANAO are currently auditing.
Senator STERLE: To come back to my question just before: how close were they, roughly?
Mr Harfield: They were the best out of the six tenderers. I cannot tell you. I will have to take that on notice. I really do not know, but they were close.

Answer:

Airservices is currently in negotiations with Thales Australia for the procurement of a Civil Military Air Traffic Management System for Airservices and the Department of Defence. As this is an active negotiation, there are strict commercial provisions which remain in place.

As part of the Request for Tender (RFT) release on 28 June 2013, tenderers were required to submit responses that included compliance statements against the suite of proposed contract documents, including the Contract (Acquisition), Contract (Support) and the Air Traffic Management (ATM) Collateral Deed.

The Joint Functional Performance Specification (JFPS) was one of the documents annexed to the Joint Acquisition Statement of Work (JASOW), itself an attachment to the Contract (Acquisition) framework. The JFPS comprised approximately 3,400 functional requirements for the new civil military air traffic management system and Thales Australia's response to the JFPS was 88 per cent compliant with all of these functional requirements.

These 3,400 functional requirements were also sub-categorised as 'Essential', 'Very Important' and 'Important'. Thales was 100 per cent compliant with the 'Essential' functional requirements and 97 per cent compliant with the 'Very Important' functional requirements.

The JFPS requirements only relate to the Acquisition Contract. Tenderers were required to respond to other requirements relating to the Support Contract, Statement of Work, and additional requirements relating to finance and safety which involved other evaluation methodologies and criteria. The tender evaluation considered Thales Australia's response to all requirements outlined in the RFT.

Rural & Regional Affairs and Transport Legislation Committee
ANSWERS TO QUESTIONS ON NOTICE
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Question no.: 156

Program: n/a
Division/Agency: Airservices Australia
Topic: Membership of the Board of Airservices Australia at engagement of contractors through ICCPM
Proof Hansard Page: 104 (17 October 2016)

Senator O'Sullivan, Barry asked:

CHAIR: We will get to the Allens report, because there was a less than favourable reference made to it in terms of whether those involved were provided with all of the relevant information needed to allow them to properly make recommendations and findings. Thank you for all that, but it did not address the burden of my question. Door to door, house by house, what current members of the board were there when this was allowed to happen—by name?
Mr Harfield: The engagement of these two individuals in their capacity contracting through ICCPM first occurred in 2012, so I would have to have a look at who the board was at that particular stage in 2012.
CHAIR: You have no independent—
Mr Harfield: I am just trying to work through it. The chair of the board depends on the timing. The chair changed from David Forsyth to Angus Houston. Angus Houston was a member of the board. Dr Warren Mundy was the deputy chair. Ms Annette Kimmitt at some stage during 2012 came on board with Mr Paul Lucas, Ms Sam Betzien and Mr Tony Mathews. I would have to recollect to see who was there in 2012. There were some changes on the board during 2012.
CHAIR: I am loath to have you take things on notice.
Mr Harfield: We can look up annual reports—
CHAIR: Would you take that on notice? I am interested in the identity of board members at the time that these appointments were ratified by the board, acknowledged by the board and when the board was briefed about them and those who remain on the board today. So you understand the clarification of my question?
Mr Harfield: Yes, I do.

Answer:

Mr Bradford and Mr Pyke were first appointed on 9 July 2012 and 16 July 2012 respectively, authorised by the then Chief Executive Officer of Airservices Australia.

The Board of Airservices Australia was advised in July 2012 of the engagement of Mr Harry Bradford through the International Centre for Complex Project Management (ICCPM). There is no documentary evidence that Mr Pyke's engagement was reported to the Board at the time of his initial appointment.

The membership of the Board of Airservices Australia for the months of July 2012 and October 2016:

July 2012	**October 2016**
Angus Houston	Angus Houston
Warren Mundy	Tony Mathews
Samantha Betzien	Samantha Betzien
David Burden	David Marchant
Annette Kimmitt	Tim Rothwell
Paul Lucas	Fiona Balfour
Tony Mathews	John McGee
Judith Munro	Jason Harfield
Andrew Clark (Acting CEO – May 2012 – Oct 2012)	

Rural & Regional Affairs and Transport Legislation Committee

ANSWERS TO QUESTIONS ON NOTICE

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Infrastructure and Regional Development

Question no.: 157

Program: N/A
Division/Agency: Airservices Australia
Topic: OneSKY ICCPM
Proof Hansard Page: 105 (28 October 2016)

Senator Sterle, Glenn asked:

Senator STERLE: Sure. So in 2013, without any approach to the market to identify other possible strategic partners, Airservices and ICCPM entered into a strategic partnership for the duration of the OneSKY program—correct?
Mr Harfield: That is correct.
Senator STERLE: For which there was no business case prepared—is that correct?
Mr Harfield: Correct.
Senator STERLE: No performance indicators were established to enable monitoring and evaluation?
Mr Harfield: That is my understanding.
Senator STERLE: No documentation of the nature of services Airservices intended to obtain from or through ICCPM?
Mr Harfield: There was an intent. Whether it is documented I am unaware.
Senator STERLE: So you will take that on notice?
Mr Harfield: Yes, I will take that one on notice.

Answer:

As noted in the ANAO report, Airservices did not document, at the time of establishing the strategic partnership, the nature of the services it intended to obtain from ICCPM.

Rural & Regional Affairs and Transport Legislation Committee
ANSWERS TO QUESTIONS ON NOTICE
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Question no.: 158

Program: N/A
Division/Agency: Airservices Australia
Topic: General Aviation aircraft equipped with ADS-B
Proof Hansard Page: 107 (17 October 2016)

Senator Xenophon, Nick asked:

Senator XENOPHON: How many general aviation aircraft have complied with the ADS-B to date?
Mr Harfield: I cannot tell you exactly. What I can give you is the statistic that for all IFR flights 87 per cent have been equipped and, for those that are operating below 10,000 feet, 60 per cent or 6 out of 10 aircraft have already equipped. VFR aircraft do not have to comply with the mandate—380 of those have actually self-equipped because of the benefits associated with it. As we approach the mandate, we have talked to the 70 top GA fleet that have not equipped and by that stage we are expecting to have 92 per cent equipped. Out of 931 airframes that are yet to equipped with ADS-B 50 per cent of those airframes do less than two IFR flights per month. If the 200 most active of those equip we will have 99 per cent of all flights ADS-B equipped by February.
Senator XENOPHON: That does not take into account all of the GA IFR aircraft at all, does it?
Mr Harfield: No, it is not saying that is all of them. I am saying they are the statistics that include GA IFR aircraft.
Senator XENOPHON: We do not know at this stage what percentage of GA aircraft have got ADS-B?
Mr Harfield: We do. I can provide that to you.

Answer:

To date 65% of aircraft and 77% of flights that submitted flight plans declaring themselves as General Aviation (GA) and flying Instrument Flight Rules (IFR), were ADS-B equipped.

The term GA is a self-declared term by operators. Airservices has used submitted flight plans as the most accurate data source available. In this case GA is distinct from scheduled, non-scheduled and military flights.

Rural & Regional Affairs and Transport Legislation Committee
ANSWERS TO QUESTIONS ON NOTICE
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Question no.: 159

Program: N/A
Division/Agency: Airservices Australia
Topic: Helicopter noise at Adelaide Airport
Proof Hansard Page: 108 (17 October 2016)

Senator Xenophon, Nick asked:

Senator XENOPHON: I have one final question to be put on notice in relation to that. I want to go to the question of helicopter noise at Adelaide Airport. Representations have been made to me about helicopter noise disturbances over Adelaide's western suburbs during curfew hours. I presume Airservices has a record of all operations in the vicinity of Adelaide Airport, or does a curfew not apply to helicopters?
Mr Harfield: The curfew applies to the landings and take-offs of certain categories of aircraft. I am sure you will be aware that aircraft do depart and land at Adelaide Airport outside the curfew hours—turboprops, some freighters. They do not meet the threshold. But we can provide you with the information reference.
Senator XENOPHON: Further to that, could you provide me please with a list of air movements outside the curfew hours for the past three months and whether helicopters are identified as part of that?
Mr Harfield: So you want operations during curfew hours and helicopter operations. Is that correct?
Senator XENOPHON: Just a list of air movements outside curfew. That might be a bit onerous, actually.
Mr Harfield: You are looking at movements that—
Senator XENOPHON: Helicopter movements. Presumably any other aircraft movements would have to comply with the curfew. I only need helicopters. Thank you very much, Chair.

Answer:

There were 79 helicopter movements during the curfew time period (23:00 PM to 6:00 AM) from 1 July to 30 September 2016. All movements were emergency services.

Details for the curfew restrictions at Adelaide Airport, including exemptions for emergency operations, are published on the Department of Infrastructure and Regional Development website (infrastructure.gov.au/aviation/environmental/curfews/AdelaideAirport/index.aspx).

Movement Data

Actual Date/Time	Type
3/07/2016 0:20	Emergency services
9/07/2016 0:20	Emergency services
11/07/2016 0:16	Emergency services
11/07/2016 3:53	Emergency services
15/07/2016 0:34	Emergency services
15/07/2016 4:20	Emergency services
16/07/2016 1:20	Emergency services
16/07/2016 3:31	Emergency services
16/07/2016 23:43	Emergency services
18/07/2016 0:13	Emergency services
18/07/2016 0:56	Emergency services
19/07/2016 5:20	Emergency services
22/07/2016 3:22	Emergency services
23/07/2016 23:49	Emergency services
24/07/2016 4:05	Emergency services
28/07/2016 23:33	Emergency services

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Actual Date/Time	Type
30/07/2016 0:38	Emergency services
30/07/2016 2:51	Emergency services
1/08/2016 23:00	Emergency services
2/08/2016 1:37	Emergency services
2/08/2016 2:41	Emergency services
2/08/2016 23:16	Emergency services
3/08/2016 23:02	Emergency services
4/08/2016 0:38	Emergency services
4/08/2016 3:41	Emergency services
5/08/2016 0:07	Emergency services
4/08/2016 23:42	Emergency services
5/08/2016 0:47	Emergency services
5/08/2016 3:08	Emergency services
5/08/2016 23:17	Emergency services
6/08/2016 0:51	Emergency services
6/08/2016 2:12	Emergency services
6/08/2016 23:36	Emergency services
7/08/2016 0:57	Emergency services
7/08/2016 2:07	Emergency services
7/08/2016 1:41	Emergency services
9/08/2016 4:45	Emergency services
11/08/2016 1:05	Emergency services
11/08/2016 5:43	Emergency services
12/08/2016 0:18	Emergency services
15/08/2016 0:03	Emergency services
15/08/2016 1:22	Emergency services
18/08/2016 1:16	Emergency services
21/08/2016 5:23	Emergency services
23/08/2016 23:40	Emergency services
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26/08/2016 2:08	Emergency services
27/08/2016 5:19	Emergency services
28/08/2016 1:35	Emergency services
28/08/2016 23:47	Emergency services
29/08/2016 5:45	Emergency services
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1/09/2016 0:23	Emergency services
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3/09/2016 0:07	Emergency services
4/09/2016 3:03	Emergency services
6/09/2016 23:07	Emergency services
7/09/2016 3:03	Emergency services
10/09/2016 0:07	Emergency services
10/09/2016 0:37	Emergency services
10/09/2016 3:37	Emergency services
11/09/2016 0:16	Emergency services
11/09/2016 0:42	Emergency services
11/09/2016 3:51	Emergency services
11/09/2016 23:48	Emergency services
12/09/2016 1:54	Emergency services
19/09/2016 0:01	Emergency services

Rural & Regional Affairs and Transport Legislation Committee

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Infrastructure and Regional Development

Actual Date/Time	Type
19/09/2016 3:25	Emergency services
20/09/2016 4:20	Emergency services
24/09/2016 0:22	Emergency services
24/09/2016 23:17	Emergency services
26/09/2016 0:21	Emergency services
26/09/2016 2:02	Emergency services
26/09/2016 3:08	Emergency services
26/09/2016 4:17	Emergency services
26/09/2016 4:37	Emergency services
27/09/2016 2:35	Emergency services
27/09/2016 4:57	Emergency services
28/09/2016 2:53	Emergency services

Rural & Regional Affairs and Transport Legislation Committee

ANSWERS TO QUESTIONS ON NOTICE

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Infrastructure and Regional Development

Question no.: 160

Program: N/A
Division/Agency: Airservices Australia
Topic: Noise monitoring of light aircraft at Jandakot Airport
Proof Hansard Page: 109 (17 October 2016)

Senator Back, Chris asked:

Senator BACK: But do you have noise-monitoring equipment that can be positioned around—let's call it this—a light aircraft airport such as Jandakot?
Mr Harfield: I would just have to take it on notice on where we have them placed in the Perth region, because it would be picking up noise around Jandakot anyway. We usually have noise monitors—I could get the numbers wrong—within, say, 30 kilometres or 50 kilometres of the actual main airport, which would capture the metropolitan airports. But I would have to confirm what radius it is.
Senator BACK: Could you let us know that on notice.
Mr Harfield: Yes.

Answer:

Airservices' Noise and Flight Path Monitoring System (NFPMS) captures and stores radar, flight plan and noise data. The NFPMS covers eight city regions around Australia. Aircraft noise data is collected daily from noise monitors strategically located around communities close to the major airports.

For the Perth region, noise data is captured by six noise monitors, also referred to as Environmental Monitoring Units (EMUs), located around Perth Airport. These EMUs are placed to capture noise from operations at Perth Airport; however, they will also capture other aircraft operations, such as those from Jandakot Airport, which are within the detection zone of the EMU.

Since 2011, Airservices has had a short-term noise monitoring program which can deploy additional EMUs at locations which are often not suitable for long-term noise monitoring. These have been used at secondary airports such as Jandakot Airport.

During 2016, four short-term EMUs were placed around Jandakot Airport for a period of 6 months in order to capture noise information specifically for Jandakot Airport. While in place, these EMUs and their noise level data was also visible on WebTrak Perth. A report was published in August 2016 which is available from the Airservices website www.airservicesaustralia.com/publications/noise-reports/short-term-monitoring

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Question no.: 161

Program: N/a
Division/Agency: Airservices Australia
Topic: OneSKY contractors
Proof Hansard Page: 109 (17 October 2016)

Senator Sterle, Glenn asked:

Senator STERLE: You cannot be any more honest than that. The extensive use of ICCPM to assist with the delivery of OneSKY by Airservices was highlighted by the ANAO, and I will quote them:
Since 2012, there have been 42 engagements of ICCPM employees and sub-contractors through 18 procurement processes. The engagements were given effect through six contracts, 10 contract variations and four uses of an on-call services schedule under one of the contracts. Under the various contractual arrangements, Airservices agreed to pay ICCPM total fees of more than $9 million.
Is that figure correct?
Mr Harfield: Yes.
Senator STERLE: Who were the subcontractors?
Mr Harfield: I would have to take that on notice to give you the full list, but there were a range of services used from a variety of different people: Harry Bradford and Keyholder Services. It included Andrew Pike, Deborah Hein, Stephen Hein and a range of other employees to do other services. We could reply to that on notice.
Senator STERLE: Yes, sure. Take that on notice. Off the top of your head, would you know how many contractors we are talking about?
Mr Harfield: Off the top of my head, no.
Senator STERLE: Okay, that is fine. Can you elaborate for the committee on what an on-call services schedule is.
Mr Harfield: I am not sure what was written down in the on-call schedule of service, but it was that, if we needed a particular capability, we would go to ICCPM and they would provide it. It is sort of like a labour hire company. You go and say, 'Can I have this particular capability,' and you would bring that—
Senator STERLE: Sorry, I get an echo.
Mr Harfield: It is like a temp hire company or an engineering hiring company. You would go along and say, 'We need a capability for a scheduler', or, 'We need a capability for a planner,' and then they would provide that particular capability.
Senator STERLE: So ICCPM would go off and find it.
Mr Harfield: That is correct.
Senator STERLE: Okay, and you will be able to provide who they are.
Mr Harfield: Correct.
Senator STERLE: And the cost.
Mr Harfield: Yes.

Answer:

During the period reviewed by ANAO (1 July 2012 to 31 December 2015) there were a total of ten subcontractors engaged through ICCPM as follows:

- Harry Bradford
- Andrew Pyke
- David Hanley
- Steven Hein
- Fiona Dobson
- Deborah Hein
- John Davies
- Jim McDowell
- David Gapp
- Gravity Consulting.

The costs associated with these contractors are included in Question 164.

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Question no.: 162

Program: N/a
Division/Agency: Airservices Australia
Topic: OneSKY contractors
Proof Hansard Page: 109 (17 October 2016)

Senator Sterle, Glenn asked:

Senator STERLE: You cannot be any more honest than that. The extensive use of ICCPM to assist with the delivery of OneSKY by Airservices was highlighted by the ANAO, and I will quote them:
Since 2012, there have been 42 engagements of ICCPM employees and sub-contractors through 18 procurement processes. The engagements were given effect through six contracts, 10 contract variations and four uses of an on-call services schedule under one of the contracts. Under the various contractual arrangements, Airservices agreed to pay ICCPM total fees of more than $9 million.
Is that figure correct?
Mr Harfield: Yes.
Senator STERLE: Who were the subcontractors?
Mr Harfield: I would have to take that on notice to give you the full list, but there were a range of services used from a variety of different people: Harry Bradford and Keyholder Services. It included Andrew Pike, Deborah Hein, Stephen Hein and a range of other employees to do other services. We could reply to that on notice.
Senator STERLE: Yes, sure. Take that on notice. Off the top of your head, would you know how many contractors we are talking about?
Mr Harfield: Off the top of my head, no.
Senator STERLE: Okay, that is fine. Can you elaborate for the committee on what an on-call services schedule is.
Mr Harfield: I am not sure what was written down in the on-call schedule of service, but it was that, if we needed a particular capability, we would go to ICCPM and they would provide it. It is sort of like a labour hire company. You go and say, 'Can I have this particular capability,' and you would bring that—
Senator STERLE: Sorry, I get an echo.
Mr Harfield: It is like a temp hire company or an engineering hiring company. You would go along and say, 'We need a capability for a scheduler', or, 'We need a capability for a planner,' and then they would provide that particular capability.
Senator STERLE: So ICCPM would go off and find it.
Mr Harfield: That is correct.
Senator STERLE: Okay, and you will be able to provide who they are.
Mr Harfield: Correct.
Senator STERLE: And the cost.
Mr Harfield: Yes.

Answer:

During the period reviewed by ANAO (1 July 2012 to 31 December 2015) there were a total of ten subcontractors engaged through ICCPM as follows:

- Harry Bradford
- Andrew Pyke
- David Hanley
- Steven Hein
- Fiona Dobson
- Deborah Hein
- John Davies
- Jim McDowell
- David Gapp
- Gravity Consulting.

The costs associated with these contractors are included in Question 164.

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Question no.: 163

Program: N/a
Division/Agency: Airservices Australia
Topic: OneSKY contractor rates
Proof Hansard Page: 110 (17 October 2016)

Senator Sterle, Glenn asked:

Senator STERLE: You cannot add any more to that. Furthermore, has Airservices ever attempted to negotiate rates of services charged by ICCPM?
Mr Harfield: Yes. There have been a couple of occasions where that has occurred.
Senator STERLE: How did you go?
Mr Harfield: We had some reductions because of the longer term nature.
Senator STERLE: When you say 'some'—you might want to take this on record, Mr Harfield—can you give us examples of what they were, how much for and how many times?
Mr Harfield: I can give you the whole thing on notice. Rather than just speculating on getting a figure right, we can provide that on notice. That is no problem.

Answer:

The recent ANAO audit of the ICCPM procurement by Airservices reported on all the engagements with ICCPM between 2012 and 2015.

Section 2.40 outlines the four instances, across 42 engagements, where rates were reduced.

- A daily rate was reduced by $500 (from $5000) for a 25 to 35 day engagement to undertake a review of tender documentation before it was issued in March 2013;
- This reduced daily rate was used again for engagements to provide lead negotiator services between May 2014 and November 2015;
- A daily rate was reduced by $200 (from $2100) for advisory services provided by an ICCPM employee during 2013/14; and
- A daily rate was reduced by $150 (from $2100) for advisory services provided by another ICCPM employee during 2013/14.

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Question no.: 164

Program: n/a
Division/Agency: Airservices Australia
Topic: OneSKY contractor costs
Proof Hansard Page: 110 (17 October 2016)

Senator Sterle, Glenn asked:

Senator STERLE: It was between 2012-13 and December 2015. Airservices paid ICCPM a total of $5.8 million in consultancy fees and expenses. Between 2012-13 and 2014-15, the payments from Airservices amounted to 75 per cent of the revenue reported by ICCPM, as derived from consulting work. What consultancy work was completed and what expenses were made using the $5.8 million?
Mr Harfield: That was the contract capability we just discussed beforehand. So it is the Harry Bradfords doing lead negotiation, and the Andrew Pykes and those sorts of people. So it is not extra consultancies on top of that; it is those fees that paid for all those people that we just mentioned previously. I am going to provide, on notice, the work and their costs.
Senator STERLE: Of the contractors and employees?
Mr Harfield: Yes, contracted—brought in—for that. But they will be put in a consultancy bucket.
Senator STERLE: So the $5.8 million is part of the work being done by the contractors?
Mr Harfield: Yes. That is that amount.
Senator STERLE: And you are going to give us some examples and break it down. That is fine. If 75 per cent of the revenue of ICCPM in those years mentioned came from Airservices, where did the remaining 25 per cent come from?
Mr Harfield: I do not know. You will have to ask ICCPM that question.

Answer:

Consultancy services and associated costs delivered through the International Centre for Complex Project Management (ICCPM) for the period 2012 – 2015 is detailed in Attachment A.

Payments were made directly to ICCPM and included consultancy fees, travel and incidentals. Airservices is not aware of the commercial arrangements between ICCPM and its sub-contractors and how payments may have been distributed between parties.

Attachments:

Attachment A: Consultancy services delivered through the International Centre for Complex Project Management (ICCPM) 2012 – 2015

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Attachment A:

Payments for consultancy services delivered through the International Centre for Complex Project Management (ICCPM)
July 2012 – December 2015 including consultancy fees, travel and incidentals. The figures are the gross amounts (excluding GST) paid to ICCPM in relation to services provided by each of the named consultants during the relevant period. Airservices is not aware of the commercial arrangements between ICCPM and its sub-contractors and how payments may have been distributed between parties.

Services provided (2012 – 2015)	Sub-contractor	2012-13	2013-14	2014-15	1 Jul - 31 Dec 15	Total $
• Undertaking independent assurance activities, including reviews, of the OneSKY Program • Development of a negotiation framework to support detailed and critical negotiation phases • Lead contract negotiation team for the Acquisition and Support contracts for the Civil Military Air Traffic Management System (CMATS) • Lead negotiation services for the Acquisition and Support contracts for the Civil Military Air Traffic Management System (CMATS)	Harry Bradford	263,194	279,394	1,230,812	478,341	**2,251,741**
• Complex program management services • Undertaking independent assurance activities, including reviews, of the OneSKY Program • Assist in the development of a negotiation framework to support detailed and critical negotiation phases • Provision of negotiation services for the Acquisition and Support contracts for CMATS	Andrew Pyke	378,045	416,007	508,158	218,572	**1,520,782**
• Development of tender evaluation planning and implementation documentation; coordination of Tender Evaluation Committee	David Hanley	-	358,124	82,009	-	**440,134**
• Development of change management processes and documentation, including the development of an Integrated Master Plan (Flight Plan) for the business transformation required to transition to CMATS • Provision of complex project management support	Steven Hein	-	408,984	-	-	**408,984**
• Provision of configuration management and technical services for the development of CMATS • Provision of document management processes	Fiona Dobson	-	-	282,515	114,644	**397,159**

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Services provided (2012 – 2015)	**Sub-contractor**	**2012-13**	**2013-14**	**2014-15**	**1 Jul - 31 Dec 15**	**Total $**
• Development of a framework to enable operational capability planning within Airservices to deliver CMATS • Provision of training, project management and support services	Deborah Hein	82,556	284,855	-	-	**367,411**
• Provision of project management support to the OneSKY Program • Supported the development of the OneSKY Program Contract Management framework	John Davies	-	69,733	28,102	27,300	**125,135**
• Undertaking independent assurance activities, including reviews, of the OneSKY Program.	Jim McDowell	-	-	-	61,356	**61,356**
• Provision of technical engineering services during the evaluation of the OneSKY Australia CMATS Request For Tender (RFT)	David Gapp	-	-	46,959	-	**46,959**
• Delivery of Developing Influence and Collaboration workshops • Delivery of Alignment and Governance Workshop • Delivery of Senior Responsible Owner (SRO) Training • Delivery of Management of Successful Programs (MSP) Training • Delivery of Polarity Management Workshop • Delivery of Earned Value Management (EVM) Training • Provision of Illustrator • Course registration for System Thinking • Provision of trial for benefits management software *Benefits Architect*	ICCPM (various) Training & Other	34,278	70,030	31,285	19,888	**155,482**
Total		**758,074**	**1,887,126**	**2,209,841**	**920,102**	**5,775,142**

Note: excludes annual partnership subscriptions

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Question no.: 165

Program: N/A
Division/Agency: Airservices Australia
Topic: Western Sydney Airport – Flight Path Design
Proof Hansard Page: 111 (17 October 2016)

Senator Cameron, Doug asked:

Senator CAMERON: Mr Harfield, have you continued to engage in relation to Badgerys Creek airport flight plans?
Mr Harfield: We have provided information, at the request of the Western Sydney Unit for input, from time to time.
Senator CAMERON: Did you provide information in relation to the new proposed west merge point and east merge point?
Mr Harfield: We provided some advice. I would have to take on notice exactly what advice we provided to the department.

Answer:

Airservices was regularly asked by the Department to provide advice and information on a number of airspace management issues leading to the drafting of the final EIS, including matters relating to merge point options.

Airservices confirmed to the Department that the original proof-of-concept designs would remain valid in airspace design terms, and without the need for any additional airspace modelling, as long as the merge point did not move by more than approximately three nautical miles.

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Question no.: 166

Program: N/A
Division/Agency: Airservices Australia
Topic: Western Sydney Airport – Flight Path Design 2
Proof Hansard Page: 112 (17 October 2016)

Senator Cameron, Doug asked:

Senator CAMERON: You provided advice that is fundamental to the future of Western Sydney airport, isn't it?
Mr Harfield: We provided, as I said, concept flight designs based on the operation of Western Sydney airport that allow that to operate as well as Kingsford Smith without touching the Kingsford Smith flight paths.
Senator CAMERON: You provided concept flight designs.
Mr Harfield: That is correct.
Senator CAMERON: Is this a normal international situation, that you provide concept flight designs? Do you ever get airports, when the airport is being built, where you lock in the flights?
Mr Harfield: This is probably our first time at a major greenfields airport and so, going through the environmental impact statement, we would provide advice to those that are setting up and have the responsibility for the environmental impact statement based on the parameters that they give us to do the design, and from a concept. That is not uncommon around other international practices. You have to do it how it may work. Once that is completed, then you will go through a process of refining the designs of the flight paths as the result of consultation et cetera.
Senator CAMERON: Could you provide me with details of the concept, that was put to, that determined how these flight paths would be—
Mr Harfield: We can provide you with the advice that we gave.
Senator CAMERON: The advice you gave is one thing—
Mr Harfield: The concept designs, correct.
Senator CAMERON: You can provide me that, but can you also provide me with the details of what was put to you—what were the restrictions, what were the parameters that you started designing your flight paths on?
Mr Harfield: Designed on the flight paths that—current airspace constraints as well as the flight paths of Kingsford Smith were not to be touched.
Senator CAMERON: There would be a document somewhere that says that. Can you provide me with that document or documents associated with the parameters that were put to you when you designed the flight paths?
Mr Harfield: Yes.

Answer:

Airservices advice in relation to flight paths was provided in a report titled *Western Sydney Airport Preliminary Airspace Management Analysis*.

The document is available on the Western Sydney Airport website: (www.westernsydneyairport.gov.au) and the assumptions and parameters that were agreed for this work are set out in the Disclaimer and further outlined in Section 4.

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Question no.: 167

Program: N/A
Division/Agency: Airservices Australia
Topic: Western Sydney Airport – Flight Path Design 3
Proof Hansard Page: 112-113 (17 October 2016)

Senator Cameron, Doug asked:

Senator CAMERON: If a 747 is flying over an area that is fairly quiet you would hear that five kilometres away.
Mr Harfield: I am working on assumption. I assume so.
Senator CAMERON: Have you had any discussions about whether Kingsford Smith may close, eventually, and whether Western Sydney could carry the full capacity of incoming and outgoing flights for the Sydney Basin?
Mr Harfield: No.
Senator CAMERON: When you designed these parameters and the flights were taking off over Erskine Park, St Marys and some parts of Penrith why did you come to that position, to take over fairly densely populated residential areas?
Mr Harfield: I cannot answer that. You would have to take it on notice, how the concepts were put with those design parameters. I do not have that detail.

Answer:

The principal objective of the flight path design work undertaken by Airservices was to establish whether safe and efficient operations could be introduced at Western Sydney Airport through the development of indicative proof-of-concept air traffic management designs.

The Environmental Impact Statement sets out the process by which final flight paths will be determined.

Question no.: 168

Program: N/A
Division/Agency: Airservices Australia
Topic: Western Sydney Airport – Flight Path Design 4
Proof Hansard Page: 113 (17 October 2016)

Senator Cameron, Doug asked:

Senator CAMERON: What about the government putting out publications basically saying that there is going to be an eastern zone and a western zone away from the central zone, which is the three nautical miles, and you have had no input into that whatsoever. Is that correct?
Mr Harfield: We may have been asked questions, which I am not privy to, around certain parameters and we have provided advice but I have not had conversations around it.
Senator CAMERON: On notice, can you provide me with details of any discussions you have had about those alternate merge points?
Mr Harfield: Yes.

Answer:

See the answer provided to question 165.

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Question no.: 169

Program: N/A
Division/Agency: Airservices Australia
Topic: Western Sydney Airport
Proof Hansard Page: 114 (17 October 2016)

Senator Cameron, Doug asked:

Senator CAMERON: You have had no consultation about these two merge points. What about a no-fly zone?
Mr Harfield: As I said previously, I have no knowledge of that and I am not sure what questions or information has been asked of us or what advice has been given, but we are providing this on notice to you.
Senator CAMERON: Okay. You can provide us with information on whether there has been discussion on no-fly zones. Is that correct?
Mr Harfield: We will provide you with what we have been asked to provide advice on

Answer:

As identified in the *Western Sydney Airport Environmental Impact Statement* (Volume 1: Chapter 7), the Orchard Hills Restricted Area exists to prevent aircraft overflying the Defence Establishment Orchard Hills. Airservices has not been involved in discussions in respect of other “no fly” zones.

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Question no.: 170

Program: N/A
Division/Agency: Airservices Australia
Topic: Western Sydney Airport - Bradfield
Proof Hansard Page: 114 (17 October 2016)

Senator Cameron, Doug asked:

Senator CAMERON: Have you had any complaints about noise impacts of the current airport in Bradfield?
Mr Harfield: I will need to take that on notice but we have seen an increase in noise complaints from, I will call it, the Western Sydney and the Blue Mountains area.
Senator CAMERON: What about the electorate of Bradfield?
Mr Harfield: Not off the top of my head but I will take that on notice.
Senator CAMERON: The minister is based in Bradfield and I know that he has had a number of constituents raising issues and I am just wondering if the minister then raised that with you. Can you provide us with details of that?
Mr Harfield: Yes.

Answer:

Airservices has not received any representations from the Minister regarding complaints from Bradfield constituents.

Bradfield electorate: number of complainants
The number of complainants from suburbs in the Bradfield electorate has remained relatively steady over the last five years. The spike in 2013-2014 correlates with a peak in Mode 10 runway usage in August 2014 of nearly 60 per cent, caused by weather conditions.

Table: Number of complainants, Bradfield electorate suburbs, 2011-16

	2011-12	**2012-13**	**2013-14**	**2014-15**	**2015-16**
Asquith	0	2	1	0	1
Gordon	4	0	1	2	1
Hornsby	4	4	1	1	1
Killara	5	7	15	4	2
Lindfield	2	2	7	1	0
North Turramurra	0	2	1	0	1
North Wahroonga	1	1	1	1	0
Pymble	5	4	6	6	6
Roseville	2	0	2	2	2
South Turramurra	0	1	10	1	1
St Ives	0	0	0	1	1
St Ives Chase	0	1	0	0	0
Turramurra	8	4	11	8	7
Wahroonga	6	9	23	6	11
Waitara	2	0	0	0	0
Warrawee	2	0	3	2	3
West Pymble	6	4	22	7	2
TOTAL	**47**	**41**	**104**	**42**	**39**

- Suburbs within the electorate not listed had no complainants.
- For annual 12 month periods, ending 20 October.
- In accordance with Aircraft Noise Ombudsman recommendations, Airservices reports on the number of complainants (that is, the number of individuals who contact Airservices Noise Complaints and Inquiry Service) rather than complaints.

Nature of noise impact
Suburbs within the electorate of Bradfield are affected by Mode 10 usage at Sydney Airport, specifically, arrivals from the north using the parallel runways.

Mode 10 is one of the two most-used runway modes (with Mode 9) because they are parallel runway modes. One of these two modes will be used in peak periods unless the wind conditions or other factors preclude it. The Sydney peak periods typically last for nine hours a day but may extend beyond this: 7.00 – 11.00am and 3.00 – 8.00pm.

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Question no.: 171

Program: N/A
Division/Agency: Airservices Australia
Topic: Recommendations made by Mr Greg Cavanagh SM in the 2013 Coronial inquest into the death of Kevin Taylor, Lena Yali and Gregory McNamara 011 [2013] NTMC 2
Proof Hansard Page: 116-117 (17 October 2016)

Senator McCarthy, Malrndirri asked:

Senator McCARTHY: I wanted to go back, Mr Harfield, to my initial question from earlier this evening relating to the coroner's report. I would like to get a dollar figure for what Airservices is putting towards the education and training of staff in relation to those recommendations.
Mr Harfield: I do not have that figure off the top of my head, but we can take it on notice and provide the answer.

Answer:

$4.5 million in driver education and training through a program developed immediately after the 2011 accident.

Details of the program are included in the response to question SQ16-000362.

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Question no.: 172

Program: n/a
Division/Agency: Airservices Australia
Topic: PFCs Gold Coast Airport
Proof Hansard Page: Written

Senator Rhiannon, Lee asked:

I understand that a stakeholder meeting, including Air Services Australia, was held in August about the potential contamination of the aquifer at the Gold Coast Airport and previous use of PFCs. At that meeting ASA identified ASA has done additional testing to that previously available from the 2008 report on the issue, and that ASA had yet to put the new information into a formal report which would be available for dissemination in early September to interested parties.

a) Please provide a full copy of that report.

b) Please specifically provide a copy of the Phase 1 investigation at Gold Coast Airport within the framework of the National Environment Protection (Assessment of site contamination) Measure 1999.

Answer:

a) In July 2016, Airservices Australia conducted further investigations at the Gold Coast Airport which included targeted soil, groundwater and surface water testing for perfluorinated compound (PFC) contamination.

The objective of this investigation was to assess potential migration of PFCs across the airport by collecting samples taken from 18 perimeter locations around the airport. A copy of this site investigation and sampling report for Gold Coast Airport completed in October 2016 is at Attachment A.

b) Airservices has previously provided your office with the Phase 1 Preliminary Site Assessment Report for Coolangatta Aviation Rescue Fire Fighting (ARFF) Drill Ground August 2008, which focused on the fire training ground. This was provided on 20 July 2016.

Attachments:

Attachment A: Airservices Australia – Gold Coast Airport Preliminary Site Investigation Report and accompanying Sampling Analysis Report – October 2016

Airservices Australia

Gold Coast Airport

Preliminary Site Investigation

October 2016

Executive summary

Airservices Australia (Airservices) engaged GHD Pty Ltd to conduct a Preliminary Site Investigation (PSI) at the Gold Coast Airport (GCA) with particular regard to the potential for contamination from per- and poly-fluorinated alkyl substances (PFAS).

Based on the review of available site history information, site inspection and site interviews, the following potential sources of PFAS have been identified:

- Areas in which Aviation Rescue Fire Fighting ARFF operate or have historically operated including:
  - The Fire Training Ground.
  - The Main Fire Station and surrounding area.
  - Fire station workshop.
  - The old fire station.
  - 'Crash remote' fire training in isolated areas of the site.
- Incidents that may have included the discharge of foam including:
  - A fuel leak at the end of the apron in 1996.
  - A helicopter crash in 2009 on the boundary with the Tugun Bypass.
  - A single light plane crash in approximately 1984 near the aircraft hangar.
- Other possible sources:
  - Tugun bypass tunnel fire suppression system.
  - Tugun and Boyd Street landfills and the Sewage Treatment Plant (STP).
  - Former airport landfills.
  - Queensland Fire and Rescue Service Coolangatta - Bilinga Fire Station.
  - Irrigation of vegetated areas of the site with the fire trucks.
  - Sediments and/or groundwater in the existing and former surface water drainage channels (possible secondary source).

The desktop review identified the following potential sensitive receptors:

- Site workers.
- Nearby residents using spear pumps.
- Consumers of seafood from the down gradient surface water receiving environment of the Pacific Ocean and Cobaki Broadwater.
- Recreational users of the Pacific Ocean (in the vicinity of the stormwater outfall) and Cobaki Broadwater.
- Flora and fauna in the hydraulically down-gradient marine surface water receiving environment of the Pacific Ocean and Cobaki Broadwater.
- Terrestrial fauna consuming impacted plant material.

Based on the data reviewed in this study and the CSM, the following summary is made:

- The primary source (use of PFAS containing AFFF) no longer exists. Secondary sources include residual soil and groundwater contamination.

- Soil results reported PFAS concentrations below the adopted human health and ecological guidelines, indicating that in the areas sampled, soils do not present an unacceptable risk to human health and ecological receptors.
- Groundwater results at the source of PFAS impacts including the fire training ground and the former fire station reported PFAS concentrations above the ecological guidelines that have the potential to be toxic to aquatic organisms as wells as exceeding the HISL and enHealth drinking water guidelines.
- Groundwater and surface water down gradient of the identified secondary sources and or other possible sources reported PFAS concentrations above the HISL and enHealth drinking water guidelines.
- Surface water samples from Cobaki Broadwater reported PFAS concentrations below the laboratory limit of reporting, however it is noted that the HISL for consumption of fish is lower than the laboratory limit of reporting.

This report should be read in accordance with the limitations set out in Section 10.

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Appendix E – Historical aerial photographs

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1. Introduction

Airservices Australia (Airservices) engaged GHD Pty Ltd (GHD) to conduct a Preliminary Site Investigation (PSI) at the Gold Coast Airport (GCA) with particular regard to the potential for contamination from per- and poly-fluorinated alkyl substances (PFASs).

1.1 Background

Aqueous film-forming foam (AFFF) has been used for fire-fighting purposes around Australia for decades. On airports, AFFF has been used at fuel depots, hangars and for operational and fire training purposes.

AFFF has not been used in the provision of aviation rescue and fire-fighting (ARFF) services by Airservices since 2010 but continues to be used around fuel depots, hangars etc, at many airports. AFFF products historically used on airport sites contained PFAS. Depending on the type of AFFF used, the principal PFAS constituents could have included perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA) and fluorotelomers such as 6:2 fluorotelomer sulfonate (6:2FtS) and 8:2 fluorotelomer sulfonate (8:2FtS).

PFAS are non-biodegradable chemicals that have not only contaminated the sites at which AFFF was employed but also the assets used to apply it. These PFAS are highly persistent in the environment, can bioaccumulate and can be harmful to animal and human health (US EPA 2014).

1.2 Objectives

The objective of this PSI was to identify where there is potential for PFAS contamination to be present at the GCA as a result of previous activities by ARFF and other AFFF users. A preliminary and targeted soil, groundwater and surface water sampling program was undertaken to validate and further investigate the desktop findings of the PSI.

The report also seeks to identify potential sensitive receptors and stakeholders that may be impacted by possible PFAS contamination arising from activities (both historic and current) utilising AFFF at GCA.

1.3 Scope

The scope of work for the PSI included:

- Review of historical aerial photographs to gain an understanding of site development over time and identify potential areas where AFFF may have been used.
- Review of current certificates of title and key lessees to identify site activities that may have included the use of AFFF.
- Review of published data on geology, hydrology and hydrogeology to gain an understanding of site conditions and identify sensitive receptors.
- Search of the groundwater bore database to understand beneficial uses for groundwater in the area.
- Review of historical reports provided by Airservices to provide some background to previous investigations and site conditions.
- A detailed site inspection to gain an understanding of site condition and inspect areas where there is potential for AFFF to have been used.

- Interviews with personnel who have an understanding of current and historical site activities to identify areas where AFFF may have been used.
- Preliminary and targeted soil, groundwater and surface water sampling program.
- Development of a Conceptual Site Model (CSM) demonstrating potential source, pathway, receptor linkages.
- Conclusions.

2. Data quality objectives

The Data Quality Objective (DQO) process was applied to the preliminary investigation as described below, to ensure that data collection activities were appropriate and achieved the stated objectives. The DQO steps have been addressed as follows.

Table 1 Data quality objectives

Step	
Step 1: State the problem.	Where was AFFF historically used on the Airport site? Do possible source, pathway, receptor linkages present an unacceptable risk?
Step 2: Identify the decision.	To address the problem set out in Step 1, the following decisions are required to achieve the task objective and to identify data gaps and additional information that may be required: • What activities have occurred at the site which may have used AFFF (PFAS containing foam)? • Where was AFFF stored on site? • What sensitive receptors are present at and surrounding the site?
Step 3: Identify inputs to the decision.	To inform the decisions and identify key data gaps and needs, the following information is considered necessary: • Review of site conditions • Review of available history information • Interviews with site personnel • Detailed site inspection • Development of a Conceptual Site Model.
Step 4: Define the study boundaries.	The Gold Coast Airport property boundaries.
Step 5: Develop a decision rule.	The key decision rules are: Are there areas of the site, outside the known fire station, former, and current fire training grounds, where PFAS may be present and does this present a potential unacceptable risk? • If NO – further investigations can be targeted in these known areas. • If YES – more extensive investigations may be required.
Step 6: Specify limits on decision error	There is potential for anecdotal information to not always be accurate or to be limited in nature, and it is also difficult to assess site activities from historical aerial photographs based on poor resolution. Where possible any possible sources of PFAS contamination will be cross checked through multiple lines of evidence.

Step	
	The two decision errors that exist include: • False positive – an area identified as potentially containing PFAS does not. • False negative – Areas containing PFAS are not identified. These can be managed through the implementation of a sampling program to confirm the PSI findings.
Step 7: Optimise the design for obtaining data.	The CSM design will be optimised through: • Identification of potential PFAS sources from existing information and investigations conducted by others. • A preliminary and high level review of the likely hydraulic characteristics of the upper aquifer to estimate the groundwater flow direction and seepage velocities at various locations of the site. • A review of the surface water pathways across and leaving the site.

3. Site information

3.1 Site location

The GCA straddles the border of Queensland and New South Wales and is located less than 1 km from the Pacific Ocean and Cobaki Broadwater.

The site location is outlined in Figure 1 in Appendix A and location details are provided in Table 2.

Table 2 Site identification

Street Address	Eastern Avenue, Bilinga, Queensland
Site Area	**Queensland** 128.54 ha **New South Wales** 270.5 ha
Title Identifiers	**Queensland** Lot 1 RP225692 Lot 222 RP839951 Lot 5 RP839952 **New South Wales** Lot 100 DP1120061 Lot 1 DP582467
Parish	**Queensland** Tallebudgera **New South Wales** Terranora
Local Government Area	**Queensland** City of Gold Coast **New South Wales** Tweed Shire Council
Current Land Use	Airport and associated commercial enterprises
Land Use Zoning	**Queensland** 90 – Special purpose 56 – Sportsground, racecourse, airfield 53 – Commonwealth **New South Wales** SP1 – Special activities - Airport

The current operating lease holder for the GCA is Gold Coast Airport Pty Ltd (GCAPL) with portions of the site sub-leased to several other entities including Airservices. The current properties within GCA and relevant lessees are summarised in Table 3 and current certificates of title are provided in Appendix B. The lessees identified are those that are considered to have a major presence on site and/or the potential to undertake activities that could cause contamination. Others are also included on the certificate of title which are not identified here based on their lesser relevance to this investigation.

Table 3 Certificate of title lessee summary

Lot	Owner	Lessee
Queensland		
Lot 222 RP839951	Commonwealth of Australia	Queensland Airports Limited
Lot 5 RP839952	Commonwealth of Australia	Hertz Australia Pty Ltd
		Ascot car and ute rentals Australia
		Queensland Airports Limited
		Gold Coast Airport Pty Limited
		Southern Cross University
Lot 1 RP 225692	Federal Airports Corporation	Airservices Australia
		Careflight Queensland Limited
		Queensland Airports Limited
		Seair Aviation Pty Ltd
		Coolangatta Airport Auto Affair Car Wash Centre Pty Ltd
		Gold Coast Airport Limited
		Helicopter Association of Australia Pty Ltd
		Southern Cross University
		Spotless Services Australia Limited
		Gold Coast Air Terminal Services Pty Ltd
		Air Gold Coast Pty Ltd
		Oceania Aviation Services Pty Ltd
		Australian Air Express Pty Ltd
		Gold Coast Hangars Pty Ltd
		Virgin Blue Airlines Pty Ltd
		Jetpoint Pty Ltd
New South Wales		
Lot 1 on DP582467	Commonwealth of Australia	Queensland Airports Limited
		Gold Coast Airport Limited
		Airservices Australia

Lot	Owner	Lessee
Lot 100 on DP1120061	Commonwealth of Australia	Queensland Airports Limited

3.2 Site description

A site inspection was completed by GHD (accompanied by Airservices) on 8 and 9 June 2016. A summary of the findings are provided below and site photographs are included in Appendix C.

Key site features are outlined on Figure 1 in Appendix A. They included:

- Runway.
- Terminal.
- Southern Cross University (SCU).
- Australian Federal Police (AFP).
- Aircraft hangars.
- Commercial precinct.
- Joint User Hydrant Installation (JUHI).
- Former JUHI and former fire station (FFS).
- ARFF workshop.
- Main Fire station (MFS).
- Fire training ground (FTG).
- Surface water drainage channels.

The areas surrounding the major infrastructure on the site are characterised by grass and a series of surface water drainage channels. Portions of remnant native vegetation are located in the south eastern and western portions of the site adjacent to the Pacific Highway / Tugun Bypass and Cobaki Broadwater.

Runway

The GCA includes one major runway, that runs in a north west to south east direction. There is also a minor runway (for smaller craft) which runs in a north to south direction. There are also a series of taxiways to the east of the major runway that support the runway. The runway apron is also located on the eastern side of the runway in the central portion of the site, directly adjacent to the terminal building.

Terminal

The terminal is located on the eastern portion of the site and includes both domestic and international terminals. Terminal short term parking is located to the east of the terminal and long term parking and car hire to the south east of the terminal. There is also some additional car hire services to the north east of the terminal, on the eastern side of Eastern Avenue. The terminal and car parking areas are characterised by hardstands with some garden beds on the perimeter of the car park, near the site entrance.

A number of freight facilities are located directly to the north east of the terminal.

Southern Cross University

Southern Cross University (SCU), Gold Coast Campus is located on the south eastern portion of the site. The campus includes car parking and two multi-story buildings, with a third currently under construction. There is a water body in the southern portion of the SCU lease area which is hydraulically connected to the airport surface water drainage system. It is understood that this water body will be filled as part of proposed expansion of the university for car parking facilities.

Scrapings from the recent resurfacing of the runway are stockpiled to the west of the university, adjacent to the stormwater drain. It is understood that GCAPL have completed laboratory analysis of this material (including PFAS) and that it has been assessed as suitable for reuse on the site.

Australian Federal Police

An Australian Federal Police (AFP) building is located between the SCU and airport terminal. This area was not inspected as part of the site reconnaissance though it is understood that this is an administration building.

Aircraft hangars

A series of aircraft hangars are located in the north eastern portion of the site. The hangars are leased by light aircraft and helicopter operators. Although a detailed inspection of this area was not undertaken, it is understood that the hangars do not contain stormwater collection or sullage tanks (based on discussion with GCA personnel). Firefighting equipment within the hangars is understood to be limited to handheld fire extinguishers. Old fire extinguishers were noted in the hangers at the time of the inspection that may contain AFFF.

The hangars and associated apron are characterised by sealed surfaces with small garden beds and grassed footpaths on the north eastern side, adjacent to Eastern Avenue.

During the site inspection it was noted that spray painting was being undertaken on the apron at one location.

Commercial precinct

A commercial centre is located to the east of the terminal, which is located on airport land. The commercial area includes the Queensland Airports offices, a service station and a number of food and beverage outlets.

There is a large grassed stormwater drain on the northern eastern perimeter of the site, adjacent to the Gold Coast Highway and some garden beds surrounding the commercial buildings. The remainder of the site is characterised by sealed surfaces.

Joint User Hydrant Installation (JUHI)

The new JUHI is located to the east of the fire station. A wetland area was reclaimed for the construction of the facility. It is understood that the JUHI contains a foam fire management system which includes 'fluorosurfactant-containing protein based' foams (FFFP).

Former JUHI and former fire station (FFS)

The former JUHI and FFS are located north east of the Regular Public Transport (RPT) Apron. All infrastructure has been removed from both facilities. The FFS building footprint and road ways are visible and the former JUHI is characterised by bare earth. GCAPL indicated that hydrocarbon remediation of the former JUHI has been undertaken.

Fire station workshop

The ARFF Workshop is located outside the security fence at the airport (landside), adjacent to the former fire station on Eastern Avenue. Anecdotal information indicates that the workshop has been located here since commencement of fire services at the airport. This area includes a shed and sealed concrete surfaces.

Main Fire Station (MFS)

The current MFS is located adjacent to the control tower, which is directly north of the runway apron. The MFS includes a one storey building, fire truck garage, hardstand and AST bunded area.

The fire truck garage is surrounded by hard stand which drains to a surface water collection system. Operation of the vehicle wash down hose triggers the surface water collection system to open. The system includes a collection trench and triple interceptor trap. All water from the hardstand that passes through the treatment system is discharged to sewer. The hose drying rack is located on a portion of the hardstand separate from the vehicle wash down. Water from the hose drying rack discharges directly to stormwater and does not pass through the treatment system used for vehicle wash down.

The north eastern portion of the hardstand includes two bunded areas for the storage of materials including a diesel AST. The bunds are connected via a valve operated underground drainage line that discharges to stormwater.

The MFS is surrounded by grass and open surface water drainage channels directly to the north, east and west.

Fire training ground (FTG)

The FTG contains the following:

- A hardstand with replica airplane.
- Smoke hut (a two storey brick building).
- A shipping container that have been converted to a fire behaviour training aide.
- Bunded kerosene tank.
- Waste water treatment system.
- Two cars and a small aircraft.

The bunded area contains a waste water collection system, which includes two tanks and a separator. All waste water from the bund is contained in the treatment system and discharged to sewer. The area immediately outside the bunded area is characterised by exposed soil with some grass.

The FTG is surrounded by trees to the north, south and east and a roadway and fence line to the west. There is a small surface water body directly north of the FTG, which appeared to be an expression of groundwater.

Surface water drainage channels

There is a series of surface water drainage channels that transect the site. These are considered to be expressions of groundwater. The main drainage channel is located adjacent to the runway and runs in north east to south west direction. There is also a series of minor open surface water drainage channels on the western side of the runway which divert surface water into the Cobaki Broadwater to the west. Further detail on these are provided in Section 4.3 and outlined in Figure 1 Appendix A.

3.3 Surrounding land uses

Land uses immediately surrounding the airport are summarised as follows and outlined in Figure 1 in Appendix A:

- **North** – Betty Diamond Sporting Complex (former Boyd Street landfill) followed by medium density residential development.
- **South** – Tugun Bypass, Tweed Heads Pony Club and medium density residential development.
- **East** – Gold Coast Highway followed by medium and high density residential development, with some commercial development (retail) and the Pacific Ocean. There are also a number of residential dwellings on the north eastern boundary of the airport on Adina Avenue.
- **West** – Tugun Bypass, followed by the Cobaki Environmental Precinct and the Cobaki Broadwater to the south west and the Desalination Plant and closed Tugun Landfill and Sewage Treatment Plan (STP) to the north west.

3.4 Key stakeholders

The following key stakeholders have been identified at the site:

- Site lessees.
- Nearby residents to the east.
- City of Gold Coast as owner of the Tugun Landfill and Betty Diamond parkland (former Boyd Street landfill) located to the north and north west.
- South East Queensland Water (SEQ Water) as owner and operators of the Tugun desalination plant located to the north west.
- Coolangatta-Bilinga, Queensland Fire and Rescue Service
- Commercial and recreational fisherman operating in Cobaki Broadwater.

4. Site conditions

4.1 Topography

The GCA is located on a coastal plain with generally flat topography and low elevation (less than 5 metres above Australian Height Datum - mAHD). The majority of the site has been built up compared to the natural ground level to establish a relatively consistent, flat site.

4.2 Geology

4.2.1 Regional geology

Regional geology is identified as Pleistocene-aged beach ridges characterised by sand and shelly sand (Queensland Digital Dataset, 2006).

The Queensland Government Minesonlinemap (https://minesonlinemaps.business.qld.gov.au/) Map Sheet 9541, MURWILLUMBAH (1968-1972: F Olgers, P Flood (BMR), A D Robertson (GSQ), 1998; L C Cranfield (GSQ)), indicated that the surface soil geology is comprised of gravel, sand, silt and man-made deposits generally associated with landfilling and levelling. A geological map is included in Appendix D.

4.2.2 Soil profile

Bore logs from previous reports indicated soils at the site are characterised by white and yellow sands and dark brown peaty sands in areas close to wetlands (GHD, 2008). Fill of varying thicknesses has also been identified in areas close to the terminal and other infrastructure. These observations are consistent with the published geological maps.

4.3 Hydrology

A major open surface water drainage channel is located on the eastern side of the runway, which is referred to as Coolangatta Creek. The drain runs parallel to the runway in a general north-south direction and directs water into series of stormwater retention basins south of the terminal building and adjacent to Southern Cross University. One of these basins will be infilled as part of future development at SCU. In high rainfall events surface water discharges through an open drainage channel from these wetlands into the Pacific Ocean. The drain is possibly an expression of groundwater.

There is also a series of minor open surface water drainage channels on the western side of the runway which divert surface water into the Cobaki Broadwater to the west.

Anecdotal information suggests that during high tides, salt water encroaches up to the southern surface water drain, adjacent to the runway apron on the GCA.

Stormwater from the runway and taxiways is directed into the stormwater drainage channels. Stormwater from the remainder of the site is diverted to Stormwater Quality Improvement Devices (SQIDs).

The remainder of the GCA comprises unsealed, grassed areas or bushland. Given the high permeability of the natural geology at the GCA, surface water in these areas is likely to infiltrate through the soil profile into the underlying shallow groundwater. Surface water runoff into the surface water drains can be expected in high intensity or prolonged rainfall events.

4.4 Hydrogeology

A search of the Department of Natural Resources and Mines 2015, *Groundwater Database – Bore Reports*, Queensland State Government, Brisbane, identified numerous bores within 1 km of the site. These were all associated with the Tugun Landfill and Desalination Plant location directly to the north west. The bores were all located within the shallow unconfined aquifer, characterised by sands and extended to a maximum depth of between 5 and 6 m below ground level (mbgl).

A search of the NSW Department of Primary Industries, registered bore database (2009), identified a number of groundwater monitoring bores on the south western portion of the airport (within NSW) and private bores throughout the residential and commercial development to the south and south east of the airport (within NSW). The closest of these was a private bore at the Border Park Raceway, located approximately 300 m from the southern boundary of the site. Dewatering bores were also registered, associated with the Tugun Bypass tunnel.

It is important to note that unregistered and private bores may also exist. The site inspection noted that a number of residents on Adina Avenue (which borders the northern portion of the GCA) displayed signs indicating they had spear pumps. Given the presence of shallow, fresh groundwater on the coastal fringes on the Gold Coast, residential spear pumps are very common.

Groundwater bore data and search results are provided in Appendix D.

Previous groundwater investigations undertaken at the GCA have identified groundwater within 1 m of the ground surface, with groundwater noted at the ground surface in remnant vegetation areas on the GCA. Open surface water drains that transect the GCA are also considered to be expressions of groundwater. Information provided by GCAPL indicated that groundwater at the GCA is at an elevation of approximately 4 mAHD and flows towards both the Pacific Ocean (northeast-wards) and Cobaki Broadwater (southwest-wards) suggesting a groundwater divide through the GCA. It is likely that the Pacific Ocean and Cobaki Broadwater are receiving environments of the groundwater and surface water leaving the GCA.

The extent of saltwater intrusion and tidal influence is largely not understood.

5. Site history

5.1 Aerial photographs

A review of historical aerial photographs between 1947 and 2015 was completed. A summary of the key findings is outlined in Table 4 and a copy of the photographs is provided in Appendix E.

Table 4 Historical aerial photograph summary

Date	Description
1947	There is visual evidence of three small runways, one of which is consistent with the current minor runway for small aircraft. The remainder of the site was characterised by uncleared bushland and wetland areas. An area of cleared land was also visible in the area of the former airport landfills. There was also some low density residential development along the coastline.
1955	The current runway alignment was visible, with one runway in a south east to north west direction. A roadway and cleared area were present where the existing terminal is located. A formalised drainage line had been constructed in a portion of the wetland that runs parallel to the ocean. There were a number of clearings and access tracks also visible across the site. None of these clearings appeared to align with the location of the current fire training ground or the former airport landfills. There was an increase in residential development along the coast line.
1963	Some small buildings were visible in the existing terminal area, which may also include the fire station, although this cannot be determined based on the resolution of the photograph. There appeared to be further clearing of vegetation surrounding the runway and a wide spread clearing running parallel to the shoreline in the southern portion of the site. The area around the existing fire training area was cleared of vegetation and there were a number of tracks that surrounded the area. The current pond was visible directly to the north of the fire training ground. There was an increase in residential development along the coast line and buildings were also visible on Adina Avenue, directly adjacent to the airport. Some cleared land was also visible to the north of the site in the location of the former Boyd Street landfill.
1971	A large amount of land clearing had occurred on the site since the 1963 aerial photograph. This included wide spread clearing in the area of the former airport landfills western side of the site. A runway expansion to the south was visible and a number of taxi ways around the terminal (consistent with the current location) had been constructed. There were also additional buildings within the terminal area and the former fire station building and workshop were visible. Some more formalised open surface water drainage channels had also been constructed on the southern portion of the site, one of which discharged to Cobaki Broadwater. Some of the current stormwater drains that run parallel to the runway were also visible.

Date	Description
	The majority of the land to the north, east, south and west of the fire training area had been cleared and there were more tracks surrounding the fire training area. There was further development along the coast line and within Adina Avenue. The waste water treatment plant ponds and Tugun landfill were also visible to the west and Boyd Street landfill to the north.
1980	It appeared that filling had occurred in the location of the existing terminal building and the current stormwater drains that run parallel to the runway were visible. No other major changes to the site were noted. There was evidence of ongoing landfilling to the west in Tugun landfill and north in Boyd Street landfill.
1985	In the 1985 historical aerial imagery, several upgrades at the airport are noted. A new terminal building has been built at the south-east of the main runway. Between the runway and the terminal are taxi runways and an open drainage channel running almost parallel to the runway. Further clearing of land was visible in the western portion of the site adjacent to Cobaki Broadwater. Structures and what appear to be soil stockpiles are visible in the fire training ground. The area where the current fire station is located had been cleared. The former fire station was visible, as was the Queensland Fire and Rescue Service (QFRS) building. Landfill appeared to have continued to the west in the Tugun landfill and sports field were visible to the north in the Boyd Street landfill.
1992	More filling and formalising of open drainage channels had occurred in the northern portion of the site. The apron had also expanded to the north. Further clearing of land was visible in the western portion of the site adjacent to Cobaki Broadwater. The current fire station building was also visible. One portion of the vegetation adjacent to Cobaki Broadwater has been cleared and two cells are visible. This is consistent with the area that is currently characterised by sparse vegetation.
2003	Clearing and filling of the site appeared to have ceased and vegetation appeared to be establishing in the western, southern and south eastern portions of the site. The terminal building had expanded and additional buildings were visible in the aircraft hangar area. The existing bunded training pad could be seen at the fire training ground.
2007	Further re-vegetation of the site was visible and further filling had been undertaken to the north of the current fire station area. The former fire station building was also gone and the area was characterised by vacant land. The terminal carpark had expanded to the east and earthworks associated with the construction of SCU were visible.

Date	Description
	The Tugun bypass tunnel and desalination plant, to the west of the site were also being constructed. The existing smoke hut was visible at the fire training ground.
2015	Further re-vegetation of the site was visible. Two buildings were visible at SCU as is the AFP building. The new JUHI was visible in the area to the east of the fire training ground. The open drainage channel discharging to Cobaki Broadwater was no longer visible.

5.2 Previous reports

A number of reports were provided by Airservices for review. These are outlined below with a summary of the key points. These historical investigations (excluding the AECOM 2011 investigation) were undertaken at the FTG (the drill ground) which is a known PFAS source and is likely to be the area most heavily impacted by PFASs due to the volume of AFFF used during historical training.

Parsons Brinkerhoff, 2006

***Soil and groundwater assessment, ARFF Fire Training Area, Coolangatta Airport, Tugun, Qld,* Parsons Brinckerhoff, 21 July 2006**

- Wastewater (comprising oily water generated from fire fighting training using kerosene and jet fuel) overflowed from the wastewater separator during treatment, resulting in hydrocarbon impact to the fire training ground.
- The investigation completed by Parsons Brinkerhoff estimated that an area of 150 m^3 had been impacted. These impacts extended to the water table.
- The analysis suite used for soil characterisation was limited to Total Petroleum Hydrocarbons.

Parsons Brinkerhoff, 2007

***Remediation and Validation Report, Fire Training Area, Gold Coast Airport, Coolangatta, Queensland,* Parsons Brinkerhoff, November 2007**

- Impacted soil from the waste water release in 2006 was excavated and placed on site in a bunded lined area.
- Soil was land farmed monthly using a backhoe.
- Four soil validation samples were collected from below the land farm pad following removal.
- Some localised dewatering was also completed within the soil excavation as part of remediation. This included some recirculation, aeration and pumping to sewer. Hydrogen peroxide was also introduced to assist with aeration at one point.
- The groundwater aeration pond leaked, and therefore use of the ponds ceased.
- Analysis was limited to hydrocarbons.

GHD, 2008

***Preliminary Site Contamination Assessment, Coolangatta ARFF Drill Ground, Gold Coast Airport,* GHD Pty Ltd, August 2008**

- The fire training ground is used to light kerosene fires and extinguish them using AFFF.
- Waste water from the fire training ground is passed through a separator on site before discharge to sewer.
- There is evidence of 'over spray' where foam extends outside the bunded area.
- The fire training area includes two kerosene ASTs (1,500L), three waste water USTs and rainwater tank.
- There is also a dis-used triple interceptor trap.
- Sources of contamination immediately surrounding the fire training area were identified as:
  - Landfill site for airport waste – south east of the fire training area.
  - Sand extraction for runway extension
  - South west corner of runway – uncontrolled fill
  - Control tower and fire station – uncontrolled fill for development
- Impacted soil from the waste water leak (PB 2006) was landfarmed on site and then re-instated around the USTs.
- Training in the fire training area can occur up to three times a week.
- Airservices are the only organisation who have used the training ground.
- AFFF 3M Light Water was used at the site for approximately 20 years.
- AFFF has reportedly been used in the fire training area and in areas where Airservices is required for emergencies.
- Training also historically occurred in the vegetated areas along the drainage line.
- The training ground was established in the 1930s.
- The waste water from the 2006 spill would also have included AFFF.

AECOM, 2011

***Limited Wastewater, Surface Water and Sediment Quality Assessment – Gold Coast Airport, Aviation Rescue and Fire Fighting (ARFF) Operations,* AECOM, 16 March 2011**

- Included surface water and sediment investigation in the following areas:
  - ARFF Fire Station – PFOS (<0.02 to 26.4 µg/L) and PFOA (<0.02 to 6.58 µg/L)
  - ARFF Fire Drill Training Ground – PFOS (3.44 to 14.3 µg/L) and PFOA (0.5 to 19.9 µg/L)
  - Drainage lines within the site – PFOS (0.02 to 2.27 µg/L) and PFOA (0.02 to 0.09 µg/L)
  - Sediments in drainage channels – PFOS (<0.0005 mg/kg to 4.78 mg/kg) and PFOA (,0.0005 mg/kg to 0.0228 mg/kg)
- Fire training equipment is cleaned at the fire station.
- Waste water is 'pre-treated' in holding tanks through a CPU (Coalescing Plate Separator) before being released to Coolangatta Creek (open drainage channel on the site). Sometimes the CPU is bypassed and water goes directly to Coolangatta Creek and the

wetland to the east of the Fire Station. The hose drying rack also drains directly into Coolangatta Creek.

- Fire trucks are periodically sent off site to the mechanical workshop. No cleaning is reportedly completed here, but there is draining infrastructure in place which should be assessed.

Parsons Brinkerhoff, 2014

***Groundwater Monitoring and Reporting – ARFF Drill Ground, Gold Coast Airport,* Parsons Brinckerhoff, Letter dated 15 January 2014**

- Groundwater sampling was conducted in 2013 at the fire training ground at monitoring wells BH6, BH7, BH9, BH12 and BH13.
- The analytical suite included TPH, BTEX, PAHs and PFOS, PFOA and 6:2 FTS.
- PFOS concentrations ranged from 12.6 to 2,280 µg/L and PFOA from 1.0 to 51.3 µg/L.
- The report also includes a summary of historical groundwater monitoring for hydrocarbons (TPH) from a number of monitoring wells in the fire training area (BH01, BH07, BH08, BH12 and BH13) between 1999 and 2011.
- PFOS, PFOA and 6:2 Fts was also included in one historical monitoring round in 2011.

Parsons Brinkerhoff, 2015

***Groundwater Monitoring and Reporting – ARFF Training Ground, Gold Coast Airport,* Parsons Brinckerhoff, Letter dated 1 May 2015**

- Groundwater sampling was conducted in 2015 at the fire training ground at monitoring wells BH6, BH7, BH9, BH12 and BH13.
- The analytical suite included TPH, BTEX, PAHs and PFOS, PFOA and 6:2 FTS.
- PFOS concentrations ranged from 17.9 17.9 to 527 µg/L and PFOA concentrations ranged from 2.23 to 37.1 µg/L.
- The report contains discussion of the groundwater results and trends in historical monitoring data.

A copy of this report is provided in Appendix G.

5.3 Operational responses system outputs

Airservices provided GHD with a copy of the ARFF operational response system (ORS) outputs for Gold Coast Airport. The ORS is used to document incidents and includes details of materials used, vehicles involved and actions taken. The recorded incidents and summary of the ORS outputs is provided in Table 5. A copy of the ORS records is provided in Appendix H.

Table 5 ORS output summary

Incident date	Incident location and description	Materials used	Actions taken
15 December 1999 (Incident Report 124)	Uncontrolled fire at Boyd Street landfill	14,000 L water 100 L foam[1]	Assist Queensland Fire and Rescue Service (QFRS) to extinguish the fire at the rubbish tip at Boyd Street, Tugun.

Incident date	Incident location and description	Materials used	Actions taken
17 July 2000 (Incident No. 161)	Vessel fire at Gold Coast Marina Coomera	1,350 L foam[1]	Delivered foam to incident site to assist QFRS to put out the fire of a large vessel.
26 August 2001 (Incident No. 231)	Taxi vehicle on fire at the Ansett Terminal entrance	9 kg dry chemical powder 400 L water 12 L foam[1]	ARFF extinguished the fire from the engine compartment of a taxi vehicle. The road way was washed down and debris from car removed.
15 September 2002 (Incident No. 311)	Fire at the Tugun landfill	50,000 L water[1] 140 L foam	ARFF assisted QRFS in combating the fire at the Tugun Landfill.
2 July 2009 (Incident No, 1320)	Helicopter crash to the west of Runway 32	320 L water 20 L foam[2]	ARFF attended crash site (300 m to the west of Runway 32) and deployed one foam line due to aviation gas leak from aircraft wreckage and applied a foam blanket to the area.

[1] – Based on Airservices foam use dates, foam used is likely to be 3M Lightwater

[2] – Based on Airservices foam use dates, foam is likely to be Ansulite

5.4 Interviews

Site interviews were conducted on the 8 and 9 June 2016 with the following personnel:

- Norbert Benton – Environment Manager – Gold Coast Airport
- Greg Hopgood – Project Environment Coordinator – Gold Coast Airport
- Peter Franks – Fire Station Manager – Airservices Australia

A summary of the key findings from the assessment are listed in Section 5.4.1 and 5.4.2. A transcript of the interviews is provided in Appendix F.

5.4.1 Gold Coast Airport Environmental Manager

Historically soil, groundwater and surface water investigations which included consideration of PFAS have been limited. More recently GCAPL have commissioned soil and groundwater investigations which included consideration of PFAS associated with the development of the Instrument Landing System (ILS) and Project LIFT (terminal and apron expansion) and a preliminary site investigation for the whole airport site. These reports were in draft at the time of the site interview, but GCAPL discussed the key findings of the investigations, which identified a number of possible sources of PFAS including:

- Fuel spill in 1996 at the end of the fuel line (end of apron).
- Helicopter crash in 2009.
- Light plane crash in mid-1980's (1984).
- Irrigation of the grass at the end of the runway (to facilitate establishment).

- Foam may also have been used in the Airport Emergency Plan conducted every two years. Although this cannot be recalled in the past 10 years.
- Tugun bypass tunnel.
- Queensland Fire and Rescue Service.
- Former airport landfills, located on the western boundary. GCAPL indicated that all waste in these landfills was removed from the site and relocated as part of the Tugun Bypass development.
- Anecdotal information from a site worker with over 50 years on the site indicated to GCAPL that 'crash remote' training occurred in a number of locations across the airport. The date time of these operations was unknown.

A Lockheed Lodestar also crashed at the site in March 1949, however, this was prior to the use of AFFF and is therefore not considered a possible source of PFAS.

Nothing else is noted on the register which only goes back to 2007.

Bulk earthworks associated with development of the airport typically included a large amount of importation of fill as well as large amounts of fill sourced from borrow pits on the site. It is also noted that Airservices water trucks were used to water establishing vegetation. GCAPL identified an area on the southern perimeter of the site where this occurred in 2007, but this practice is likely to be more wide spread.

There is no record of on-site surface water drains ever being de-silted. Vegetation is periodically cleared from the drains and stockpiled adjacent to the drain. During earthworks, water from surface water drains has been used for dust suppression and irrigation across the site.

Rainwater is harvested from the terminal building, AFP and SCU and stored in underground storage tanks for use in toilets and urinals at the site.

The new JUHI includes fluorosurfactant-containing protein based foam (FFFP).

5.4.2 Airservices Australia Fire Station Manager

Peter Franks, the ARFF Fire Station Manager noted that Airservices has an incident log that goes back to the 1990s detailing how much foam was discharged at each incident. During the interview, Peter Franks recalled the following incidents:

- A helicopter crash in 2009 where foam was discharged.
- A head on mid-air collision in 1988 – the crash site was outside the airport grounds in a remote location. While ARFF attended the scene it was managed by NSW Fire and Police and foam was not discharged.
- There was a fuel spill near the terminal in 1996, though there was no incident log recorded. Practice was typically to flood fuel spills with water and wash them into the surface water drainage system. Peter considered it possible that water was put on the fuel spill and that there would have been residual PFAS in the truck water tank. It was common practice to spike the water tank with a dose of foam directly into the water tank. However, by the 1990s, this process had ceased due to technological improvements in foam induction methods in the trucks.
- Peter also noted that the hydraulic fluid used in aircraft (Skydrol) contains PFAS. There may have been hydraulic fluid spills in the area of the fuel spill for many years that potentially contributed to the PFAS detections observed by GCAPL.

Historically, AFFF was delivered to the site in plastic 44 gallon drums where it was transferred into an on-site AST. It is considered likely that many of the empty drums were then transported

by Airservices staff to the local Tugun and Boyd Street landfill for disposal (though this was not confirmed). There were no formal records of AFFF storage, and no AFFF is stored by ARFF at the GCA now.

Peter indicated that 99% of fire training was undertaken at the FTG. It was confirmed that 'crash remote' training was also undertaken at isolated locations around the airport which would have included the discharge of foam. The location of the 'crash remote' training would not have been far from the MFS or FTG. Since the training ground was formally constructed (in the late 1990s) 'crash remote' training has been close to it in the southern portion of the GCA.

In addition, there was historically a daily foam test and a six monthly valve and foam consistency test which was completed on each vehicle. These former daily discharges were typically done in the area surrounding the fire station, while the latter discharges occurred in the grassed area to the east of the FTG.

Training at the FTG occurs approximately once every shift. Foam was always used in training until 2010, when training changed to water only releases. There are no records of the volumes of foam used during these exercises. The FTG is also used by the Queensland and NSW fire services approximately every three to six months. The bunded area at the training ground includes a waste water collection system that discharges to sewer.

Fire hoses are flushed at the FTG and general wash down of dirt from hoses and vehicles is completed at the fire station on the hardstand containing a waste water collection system.

5.5 Summary of site history

The site historical review indicates that the airport commenced operation prior to 1947, but major development appeared to have occurred from the 1950s onwards. Parts of the site appeared to have been progressively cleared and filled from the 1960s as the airport expanded. Land clearing and filling appeared to have slowed in the late 1990s, early 2000s and vegetation appeared to have re-established on the west, south and south eastern portions of the site.

GCAPL indicated that the airport historically disposed of waste materials on the site in three small landfills on the western side. It is unknown when landfilling in the area commenced and the historical aerial photographs do not provide any clear information on these. GCA indicated that all waste was removed from these landfills and relocated off-site as part of the construction of the Tugun Bypass. Council operated landfills are also located directly to the north and west. To the west, the Tugun Landfill operated from approximately the 1970s to 2010s. The Boyd Street landfill, to the north operated between the 1960s and 1980s.

Firefighting services have been present at the GCA since commencement of the airport. Airservices was established in 1995. The fire station was originally located on the eastern perimeter of the site adjacent to and north of the former JUHI site and the terminal building; the ARFF workshop is located opposite, landside and across the road. These buildings are present (based on historical aerial photographs) in the 1960s. The current fire station was constructed in 1992 and the former fire station was demolished some years later in late 2008 and the JUHI in early 2013.

Fire training has been undertaken at the current fire training ground location since fire services operated at the site. It is noted that clearing in this area is not visible until the 1960 historical aerial photographs. It is reported that approximately 99% of fire training is undertaken here. Historically, remote access training, involving the discharge of foam was also undertaken in isolated locations of the GCA in close proximity to the MFS and FTG. In addition, there was historically a daily foam test and 6 monthly valve and foam consistency test which was completed on each vehicle. These discharges were typically done in the area surrounding the fire station and the grassed area east of the FTG.

The FTG, current and former fire stations and possibly the fire station workshop are all considered potential sources of PFAS contamination due to the activities that have occurred here and the likely storage of AFFF.

There have been a number of incidents at the site which may have also resulted in discharge for foam including:

- A fuel leak at the end of the runway in 1996.
- A helicopter crash in 2009 on the western boundary.
- A single light plane crash in approximately 1984 near the aircraft hangar.
- 'crash remote' fire training in 44 gallon drums in isolated areas of the site.

The following other possible sources of PFAS contamination have also been identified at the site and in the immediate surrounding area:

- Tugun bypass tunnel fire suppression system – understood to use AFFF and has reportedly had at least one accidental discharge to the capture sumps.
- Tugun and Boyd Street landfills – records of waste disposal are not available, but PFAS-containing wastes including carpets and spent drums of foam concentrate are likely.
- QFRS Coolangatta - Bilinga Fire Station – Established in 1976. QFRS changed to fluorine-free foam in 2003.
- Irrigation of some areas of the site by the fire trucks (under instruction from GCAPL) to assist with establishment of vegetation, with the possibility of residual foam being present in the water released.

These are outlined in Figure 2 in Appendix A.

6. Preliminary and targeted sampling

6.1 Scope of work

Based on the outcomes of the PSI, a Sample Analysis and Quality Plan (SAQP) was developed for the investigation (GHD reference: 31/34071/252132).

The SAQP was prepared so that the field investigations and analyses were undertaken in a way that enabled the collection and reporting of reliable data on which to base any further soil, groundwater and surface water monitoring programs for specific areas of the site.

The historical investigations summarised in Section 5.2 were focused on the FTG which is one of the primary sources of PFASs at the GCA. The Preliminary Sampling program was designed to investigate potential migration pathways from the FTG and potential impacts at down gradient sensitive receptors (though did include limited additional sample collection at the FTG).

The GHD SAQP described drilling methods, sampling equipment, well development strategy, sample collection protocols, sample processing, field and laboratory sample analysis, equipment decontamination and quality-assurance and quality-control (QA / QC) procedures.

The scope of work undertaken, methodology adopted and results of the sampling program are provided in a Preliminary Sampling report (GHD, 2016a).

6.2 Results summary

The investigations completed as part of this scope of works reported the highest groundwater PFAS concentrations at groundwater wells at the FTG and the former fire station. PFOS results at these locations exceeded the ecological screening criteria for aquatic organisms. Groundwater sample locations on the south eastern portion of the site and western perimeter exceeded the adopted human health screening levels and the enHealth drinking water guidelines.

Surface water samples in the drainage channels downstream of the fire station and in the pond adjacent to the FTG also reported PFOS concentrations above the adopted human health screening levels for consumption of fish, but were below the adopted ecological screening values for aquatic organisms and the eHealth guideline for recreational waters. Surface water results from the Cobaki Broadwater reported PFAS and PFOA concentrations below the laboratory limit of reporting.

Full details of the scope of work undertaken, methodology and results are provided in the Preliminary Sampling report (GHD, 2016a).

7. Conceptual site model

Based on our understanding of the contamination issues and site setting a conceptual site model (CSM) has been generated as a basis for assessing the risk posed by any potential *source -> pathway -> receptor* linkages (or pollutant linkages).

The CSM assumes a commercial/industrial land use scenario consistent with the sites current use as an airport. A representation of the CSM using two cross-sections is included as Figure 3a and Figure 3b and CSM Pathways are shown in Figure 4 in Appendix A. A representation is also included in Chart 1.

7.1 Sources

The focus of this assessment is on the potential sources of PFAS on the GCA which are identified as the following:

- The FTG – routine discharge of foam in this area from 1980 to 2010.
- The MFS and surrounding area – wash down of vehicles and hoses, drainage associated with the bunded areas that contained foam, the daily and six-monthly foam discharges adjacent to the current AFFF fire station from 1992 to 2010.
- Fire station workshop.
- The old fire station adjacent to the old JUHI – activities consistent with those identified at the current fire station, with the use for AFFF from 1980 to 1992.
- Discharge of foam associated with a fuel leak at the end of the apron in 1996.
- Discharge of foam associated with a helicopter crash in 2009 on the boundary with the Tugun Bypass.
- Discharge of foam associated with a single light plane crash in approximately 1984 near the aircraft hangar.
- Discharge of foam as 'crash remote' fire training in 44 gallon drums in isolated areas of the site from 1980 to 2010.
- Tugun bypass tunnel fire suppression system.
- Tugun and Boyd Street landfills.
- Sewage Treatment Plant adjacent to the Tugun Landfill.
- Former airport landfills
- Queensland Fire and Rescue Service (QFRS) Coolangatta - Bilinga Fire Station.
- Irrigation of vegetated areas of the site with the fire trucks.
- Sediments and/or groundwater in the existing and former surface water drainage channels (possible secondary source).

The preliminary sampling program confirmed the following sources of PFAS at the site:

- FTG
- Current fire station
- Former fire station

This does not preclude the presence of the other potential sources of PFAS identified.

7.2 Pathways

7.2.1 Contaminant transport mechanisms

The key mechanisms for contaminant transport at the site have been identified as:

- *Surface water overland flow* – lateral overland flow and migration of contaminants via stormwater during rain events, causing re-deposition of contaminants on other areas of the GCA or off-site. There is the potential for migration of contaminated surface water / storm water from the source in open drainage channels.
- *Groundwater advection/dispersion* - horizontal and vertical migration of contaminants from the GCA soils into the underlying aquifer and through groundwater to the point of surface water discharge or via uptake in spear pumps on nearby residential properties.

7.2.2 Potential exposure mechanisms

Based on the identified receptors and the release and fate and transport characteristics of the contaminants of potential concern, contaminant uptake pathways through which receptors may become exposed to contamination include ingestion and dermal absorption.

- *Ingestion exposure pathway* - Ingestion of contaminants by site workers could occur during site works which will involve excavation and handling of site soils, stormwater, or groundwater. This is not considered to be of a concern for indoor site workers. Ingestion could also occur for nearby residents using spear pumps via direct contact or use of water for food production (vegetable gardens, chickens etc).

  Terrestrial and aquatic fauna may ingest contaminants potentially migrating off-site and discharging to the down gradient surface water receiving environment including the Pacific Ocean and Cobaki Broadwater.
- *Dermal exposure pathway* - Exposure may occur via sorption through biological membranes such as skin, based on animal studies. While this has not been confirmed for humans and despite PFOS having a low skin permeability constant, the exposure pathway may be complete as illustrated on the CSM.
- *Inhalation exposure pathway* – PFAS are not considered to be volatile so inhalation is not considered to be a viable exposure route.

7.3 Receptors

The site is located in a highly modified commercial/industrial site setting. The following are the key potential human health and ecological contamination receptors considered to be relevant in the context of the site's setting:

- Site workers whose activities may result in exposure to site soils, surface water and groundwater.
- Nearby residents using spear pumps.
- Consumers of seafood from the down gradient surface water receiving environment of the Pacific Ocean and Cobaki Broadwater who may ingest contaminants.
- Recreational users of the Pacific Ocean and Cobaki Broadwater that may ingest contaminants or have dermal exposure to contaminants.
- Flora and fauna in the hydraulically down-gradient marine surface water receiving environment of the Pacific Ocean and Cobaki Broadwater.

- Terrestrial flora and fauna; fauna through consumption of impacted plant or animal matter (e.g. grasses and worms), which may in turn impact their predators.

7.4 Potential source-pathway receptor linkages

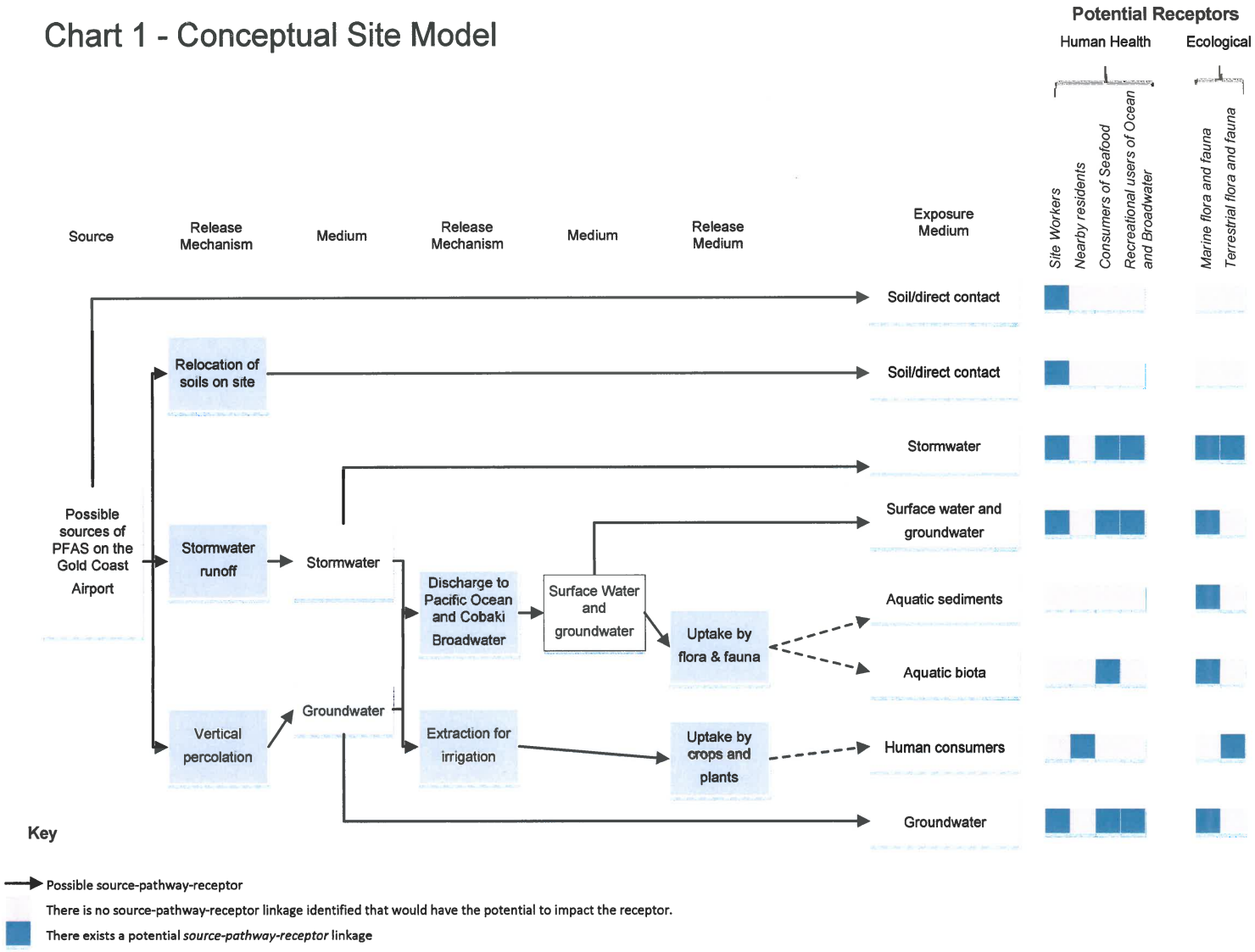
The CSM has identified a number of potential source-pathway-receptor pollutant linkages which are highlighted in Table 6. These are discussed below in the context of the GCA's setting.

Table 6 PFAS contamination – potential pollutant linkages

Potential pollutant linkages	Key exposure routes and risks
Potential human health risks	
Health risks to site workers who may come into contact with contaminated site media	Day to day activities are not likely to expose site personnel to these media. However, it remains a possibility where workers are involved with excavation and handling of contaminated soil, surface water or groundwater. It is expected that this can be managed through good hygiene practices and task-specific management plans.
Health risks to nearby residents who are exposed to potentially contaminated groundwater through spear pumps.	The main risk to human health is considered to be through consumption of extracted water and consumption of food produce irrigated by the extracted water. Consumption of impacted drinking water as well as vegetables, fruit or poultry irrigated with water contaminated by PFAS from a spear pump may lead to bioaccumulation of PFAS in humans. Dermal exposure has not been identified as a dominant exposure pathway for PFAS.
Health risks to consumers of contaminated seafood arising from migration of contaminants through surface water and groundwater to the Pacific Ocean and Cobaki Broadwater and bioaccumulation of contaminants in biota.	As PFAS are highly persistent and have a high propensity to bio-accumulate through the food-chain, the potential for human exposure to PFAS via consumption of contaminated seafood is an issue that needs further investigation.
Migration of contaminants through surface water and groundwater to the Pacific Ocean and Cobaki Broadwater resulting in human health impacts to recreational users of the Pacific Ocean and Cobaki Broadwater.	The main risk is through incidental ingestion of water. Dermal exposure has not been identified as a dominant exposure pathway for PFAS.
Potential ecological risks	
Impacts to the off-site marine ecosystem (flora and fauna) of the Pacific Ocean and Cobaki Broadwater from migration of contaminants through surface water and groundwater	There is the potential for PFAS contaminated surface water and groundwater to discharge to the adjacent marine ecosystem where marine biota (invertebrates and macrofauna) may be exposed. Predation of species can lead to a wider distribution of PFAS in the marine environment due to bioaccumulation.

Potential pollutant linkages	Key exposure routes and risks
Terrestrial ecology – take up of PFAS in plants and subsequent consumption by fauna plus impact to invertebrates via impacted soil	There is potential for prey species to ingest impacted flora or soil and then be predated by larger animals e.g. eagles, snakes, foxes.

Chart 1 - Conceptual Site Model



8. Conclusions

8.1 Conclusions

Based on the review of available site history information, site inspection and site interviews, the following potential sources of PFAS have been identified:

- The FTG – routine discharge of foam in this area from 1980 to 2010.
- The MFS and surrounding area – wash down of vehicles and hoses, drainage associated with the bunded areas that contained foam, the daily and six-monthly foam discharges adjacent to the current ARFF fire station from 1992 to 2010.
- Fire station workshop.
- The old fire station adjacent to the old JUHI – activities consistent with those identified at the current fire station, with the use for AFFF from 1980 to 1992.
- Discharge of foam associated with a fuel leak at the end of the apron in 1996.
- Discharge of foam associated with a helicopter crash in 2009 on the boundary with the Tugun Bypass.
- Discharge of foam associated with a single light plane crash in approximately 1984 near the aircraft hangar.
- Discharge of foam as 'crash remote' fire training in 44 gallon drums in isolated areas of the site from 1980 to 2010.
- Tugun bypass tunnel fire suppression system.
- Tugun and Boyd Street landfill.
- Sewage Treatment Plan adjacent to the Tugun Landfill.
- Former airport landfills
- Queensland Fire and Rescue Service Coolangatta - Bilinga Fire Station.
- Irrigation of vegetated areas of the site with the fire trucks.
- Sediments and/or groundwater in the existing and former surface water drainage channels (possible secondary source.

The following potential sensitive receptors have been identified:

- Site workers whose activities may result in exposure to site soils, surface water and groundwater.
- Nearby residents using spear pumps.
- Consumers of seafood from the down gradient surface water receiving environment of the Pacific Ocean and Cobaki Broadwater who may ingest contaminants.
- Recreational users of the Pacific Ocean (in the vicinity of the stormwater outfall) and Cobaki Broadwater that may ingest contaminants or have dermal exposure to contaminants.
- Flora and fauna in the hydraulically down-gradient marine surface water receiving environment of the Pacific Ocean and Cobaki Broadwater.
- Terrestrial fauna consuming impacted plant material e.g. grasses. This in turn may impact their predators.

8.2 Summary of preliminary sampling program

Based on the data reviewed in this study and the CSM, the following presents a summary of the findings:

- The primary source (use of PFAS containing AFFF) no longer exists. Secondary sources include residual soil and groundwater contamination.
- Soil results reported PFAS concentrations below the adopted human health and ecological guidelines, indicating that in the areas sampled, soils do not present an unacceptable risk to human health and ecological receptors.
- Groundwater results at the source of PFAS impacts including the fire training ground and the former fire station reported PFAS concentrations above the ecological guidelines that have the potential to be toxic to aquatic organisms as wells as exceeding the HISL and enHealth drinking water guidelines.
- Groundwater and surface water down gradient of the identified sources and or other possible sources reported PFAS concentrations above the HISL and enHealth drinking water guidelines.
- Surface water samples from Cobaki Broadwater reported PFAS concentrations below the laboratory limit of reporting, however it is noted that the HISL for consumption of fish is lower than the laboratory limit of reporting.

9. References

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Appendices

Appendix A - Figures

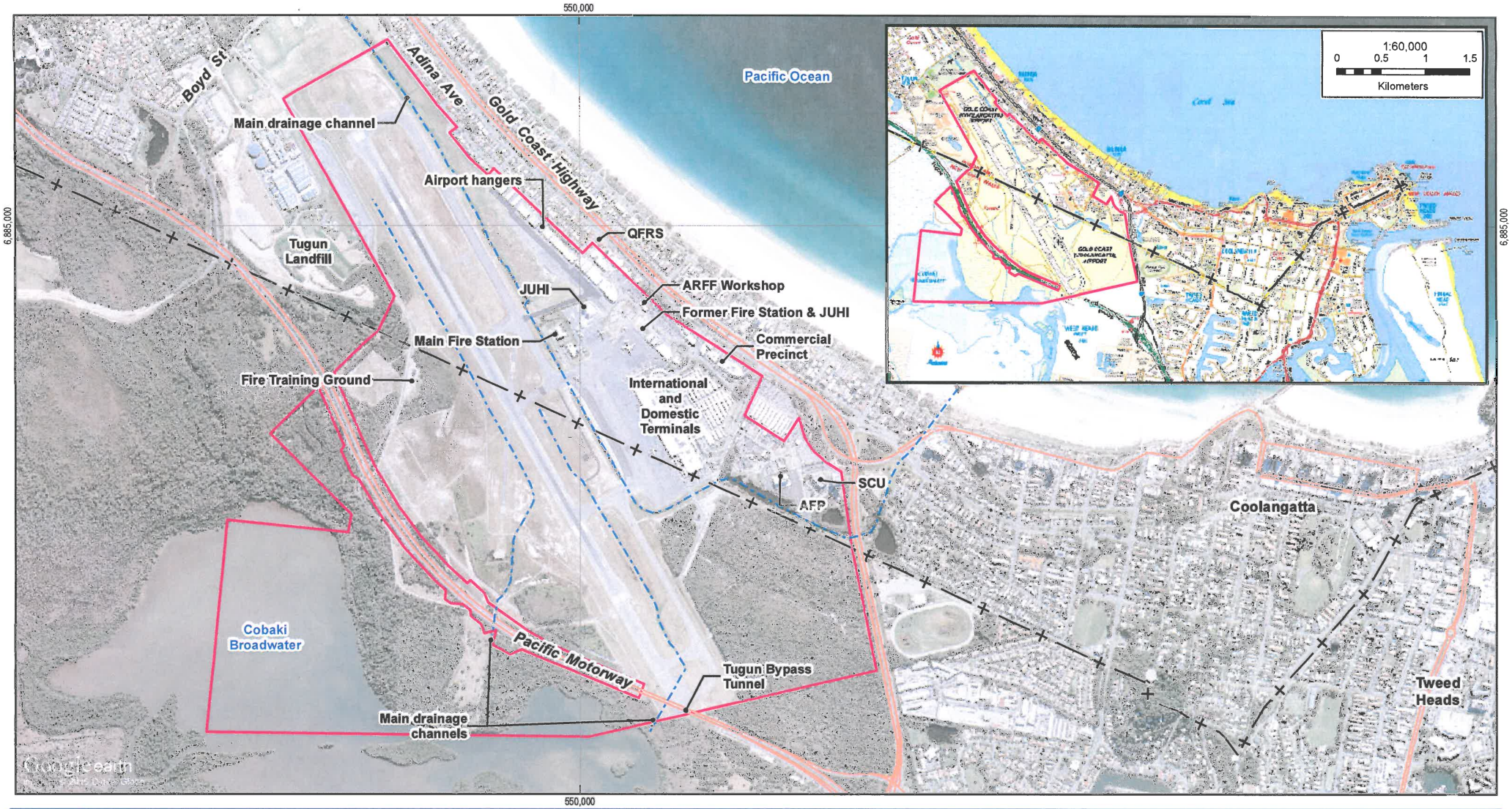
Figure 1 Site location

Figure 2 Possible PFAS impact areas

Figure 3a Conceptual site model, Section A

Figure 3b Conceptual site model, Section B

Figure 4 Conceptual site model pathways



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0 200 400 600 800

metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

Legend

- Site Boundary (Coolangatta Airport)
- Main drainage channel
- Major Road
- Queensland - New South Wales Border

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Gold Coast Airport
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Site Locality

Figure 1

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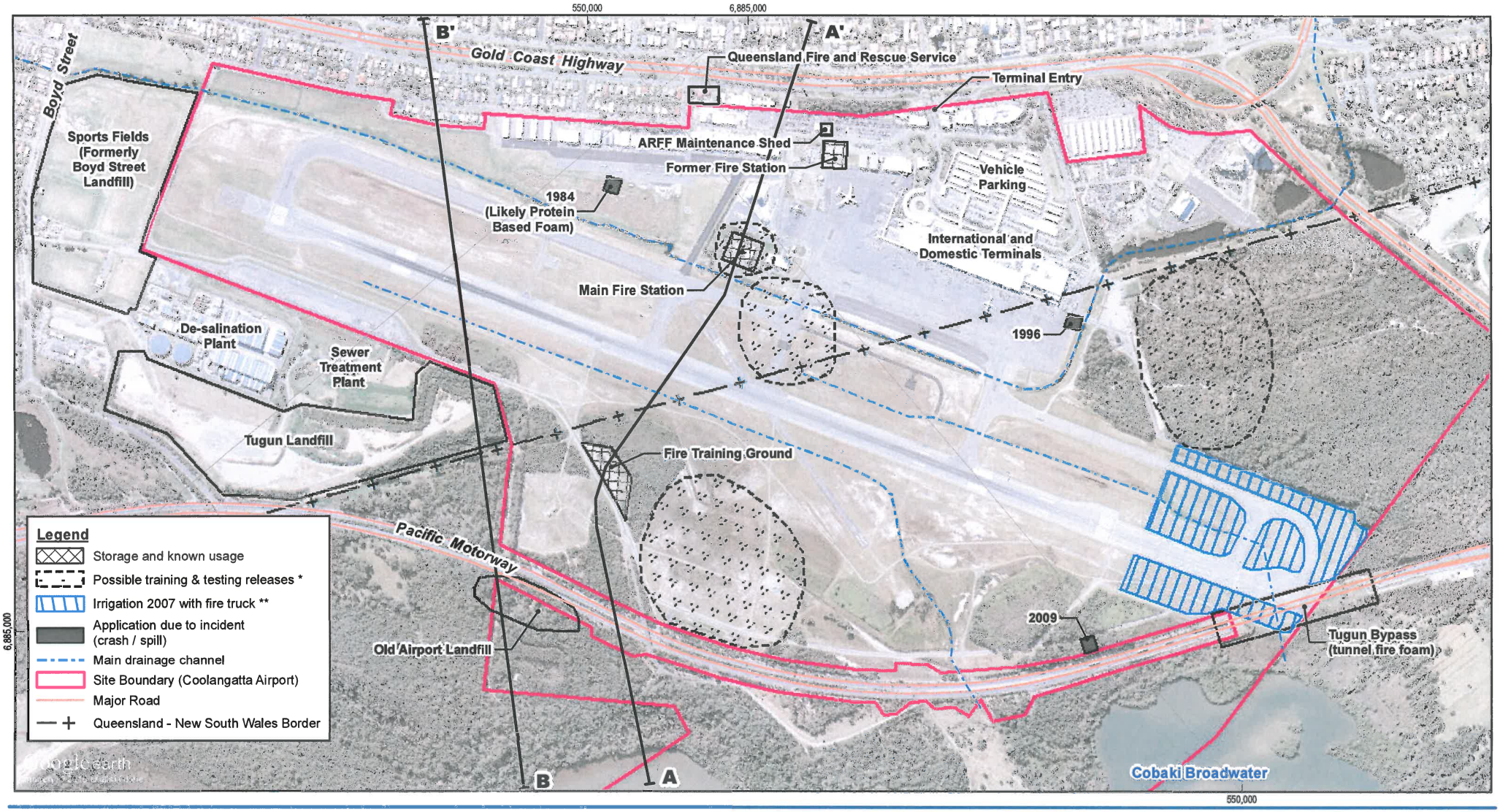

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metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

* Training and testing foam release areas based on information from the ARFF Fire Station Manager and GCA Environment Manager

** Irrigation areas based on information from the GCA Environment Manager

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Possible Sites of PFAS

Figure 2

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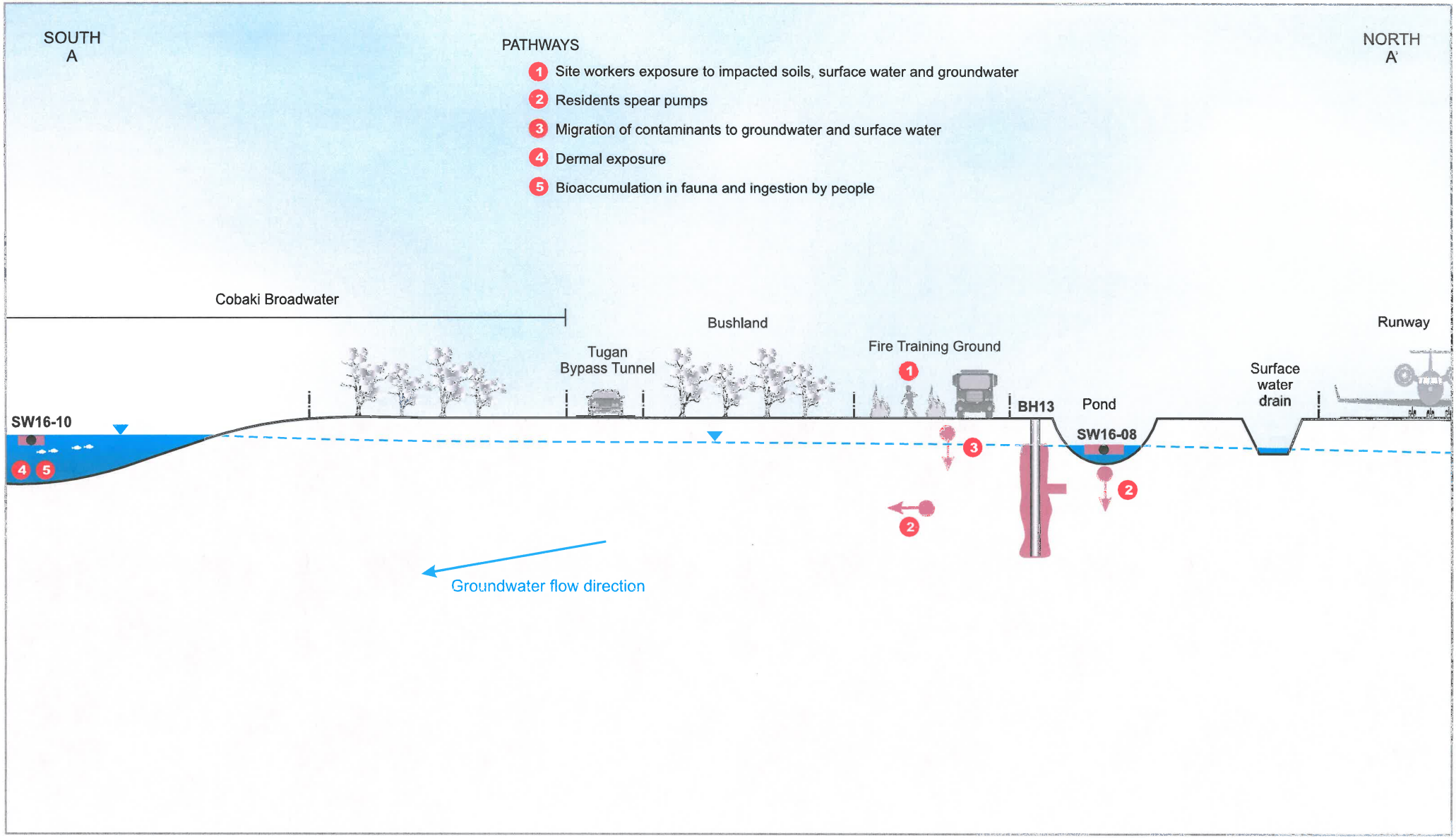

LEGEND

- Sands
- Migration of contaminants
- Potential source of PFAS
- PFAS impact
- Standing water level (approximate)

NOTE

Conceptual diagram only - not to scale

Gold Coast Airport
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Conceptual Site Model (A-A')

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Figure 3a

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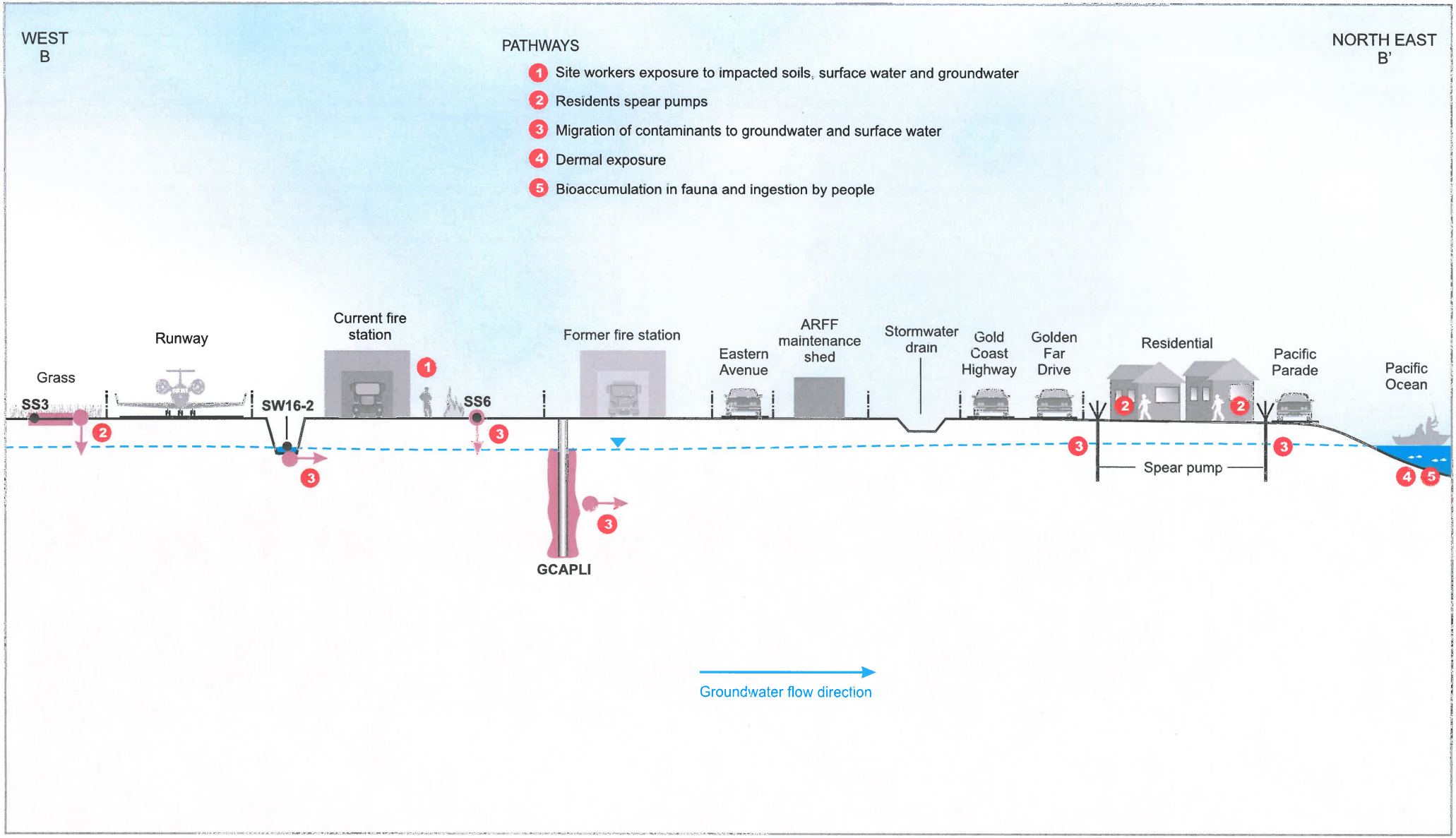

LEGEND

- Sands
- Migration of contaminants
- Potential source of PFAS
- PFAS impact
- Standing water level (approximate)

NOTE

Conceptual diagram only - not to scale

Gold Coast Airport

Preliminary Site Investigation

Conceptual Site Model (B-B')

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Figure 3b

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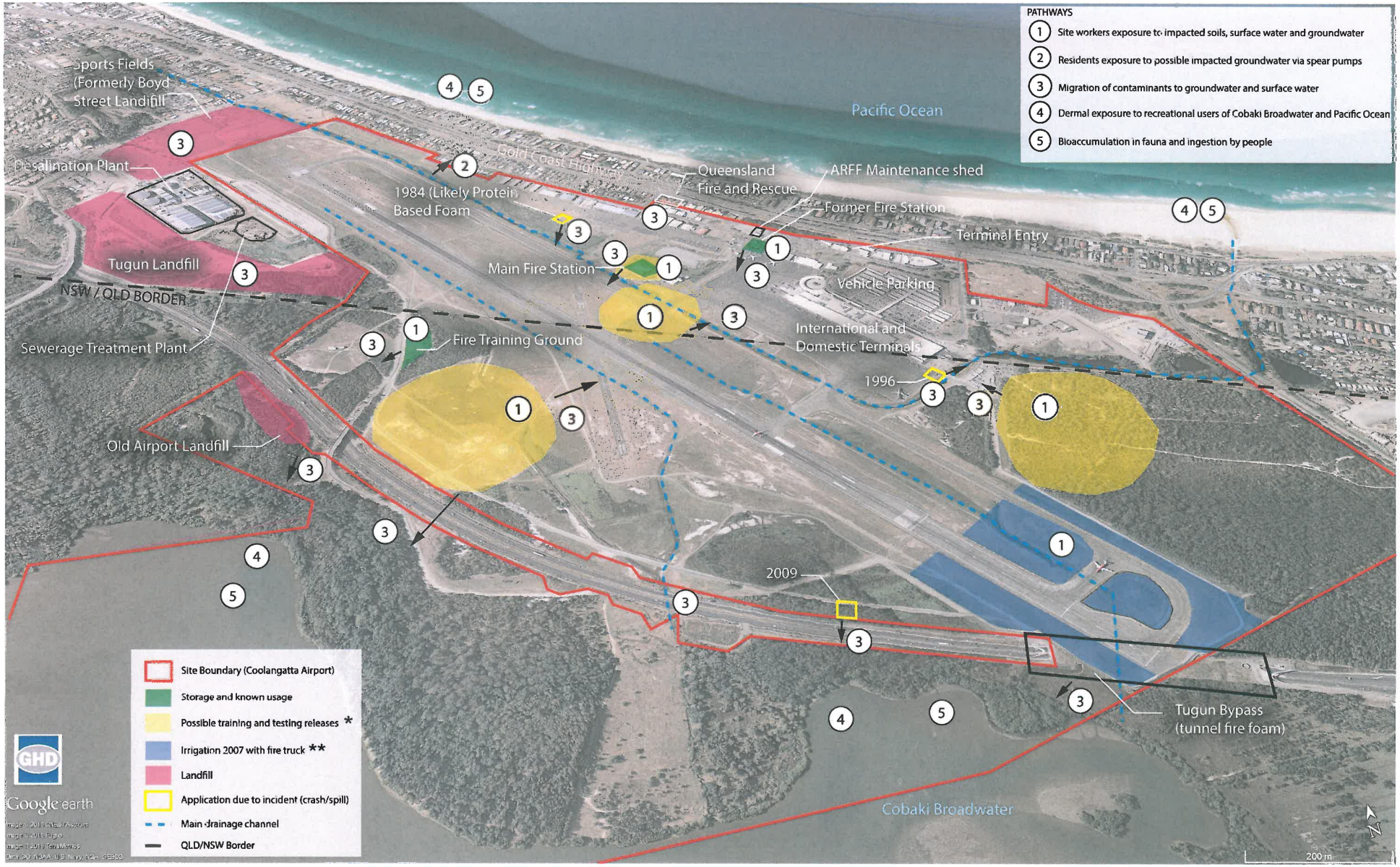

Paper Size A4

* Training and testing foam release areas based on information from the ARFF Fire Station Manager and GCA Environment Manager

** Irrigation areas based on information from the GCA Environment Manager

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Date	4 October 2016

Conceptual Site Model Pathways Figure: 4

S:\GIS\Projects\31-34071\maps\31_34071_GoldCoast_CSM_Pathways_rev_a.indd

145 Ann Street Brisbane QLD 4000 | T 61 7 3316 3000 | F 61 7 3316 3333 | E bnemail@ghd.com | W www.ghd.com

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Appendix B – Certificates of Title

New local government areas were created following the declaration of the results of the local government elections held on 15 March 2008. The new local governments are recognised by the valuation business but local government data, including property records, cannot be formally transferred to the new local governments until all effective valuations in the new local government have a common date of valuation. The conversion for data purposes is scheduled to progressively occur from May 2008.

THE INFORMATION CONTAINED IN THIS REPORT INCORPORATES DATA OBTAINED FROM EXTERNAL & INTERNAL SOURCES OF THIS DEPARTMENT. WHILST SOME VERIFICATION OCCURS AT THE TIME OF PROCESSING, THE DEPARTMENT IS UNABLE TO GUARANTEE THE ACCURACY OF SUCH INFORMATION. THEREFORE, ANY PERSON PURCHASING THIS REPORT SHOULD CONDUCT THEIR OWN INVESTIGATION & ANALYSIS OF THE INFORMATION AND DETERMINE ITS SUITABILITY FOR THEIR PURPOSE. INFORMATION DERIVED FROM THIS REPORT IS NOT TO BE USED FOR DIRECT MARKETING PURPOSES.

Property Status: Active
District: GOLD COAST
Office: GCST:GOLD COAST
LG/Div: 3430/01 GOLD COAST CITY (GOLD COAST) **Property ID:** 25002371 **WTR:** 27666 **Previous Ref:** 25002370

Property Name:
Property Addr: COOLANGATTA RD, BILINGA QLD 4225

Owner (VOLA): COMMONWEALTH OF AUSTRALIA
Service Addr:
Others: N

RPD: L1 RP225692 & L222 RP839951 & L5 RP839952:PAR TALLEBUDGERA
Area/Vol: 128.54 HA

Indicative Planning: 90 SPECIAL PURPOSES (GOLD COAST)
Primary Land Use: 56 SPORTSGROUND, RACECOURSE, AIRFIELD **Secondary Land Use:** 53 COMMONWEALTH (SECONDARY USE ONLY)
Property Type: NON-VALUED **Property Tenure:** FREEHOLD

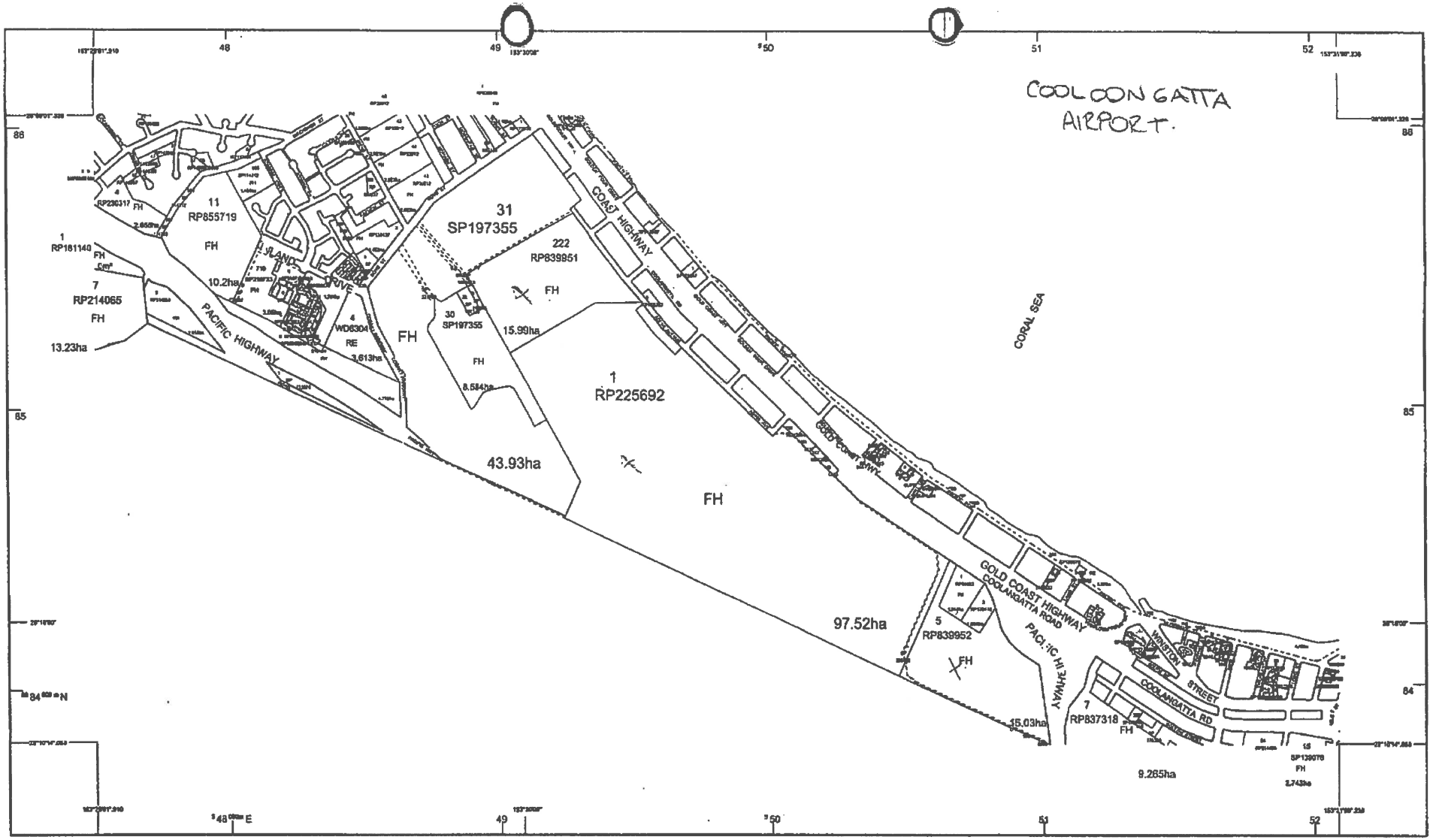
VALUATION INFORMATION

GENERAL PROPERTY INFORMATION

Sale Date: **Sale Price:** $0 **Sale Type:** NONE
Subleased: N

Number of Records Printed: 1

End of Report



STANDARD MAP NUMBER
9841-43434

MAP WINDOW POSITION & NEAREST LOCATION

GDA

SUBJECT PARCEL DESCRIPTION

DCDB

Lot/Plan	No Lot/Plan Selected.
Area/Values	No Lot/Plan Selected.
Tenure	No Lot/Plan Selected.
Land Government	No Lot/Plan Selected.
Locality	No Lot/Plan Selected.
Parish	No Lot/Plan Selected.
County	No Lot/Plan Selected.
Segment/Parcel	No Lot/Plan Selected.

CLIENT SERVICE STANDARDS

PRINTED (dd/mm/yyyy) 16/02/2018

DCDB 16/02/2018 (Lots with an area less than 1500m² are not shown)

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For further information on SmartMap products visit http://www.qld.gov.au/environment/mapping/smartmap/

HORIZONTAL DATUM:GDA94 ZONE:56 SCALE 1 : 13000

SmartMap
An External Product of Spatial Information Services
Based upon or extracting from the Digital Cadastral Data Base

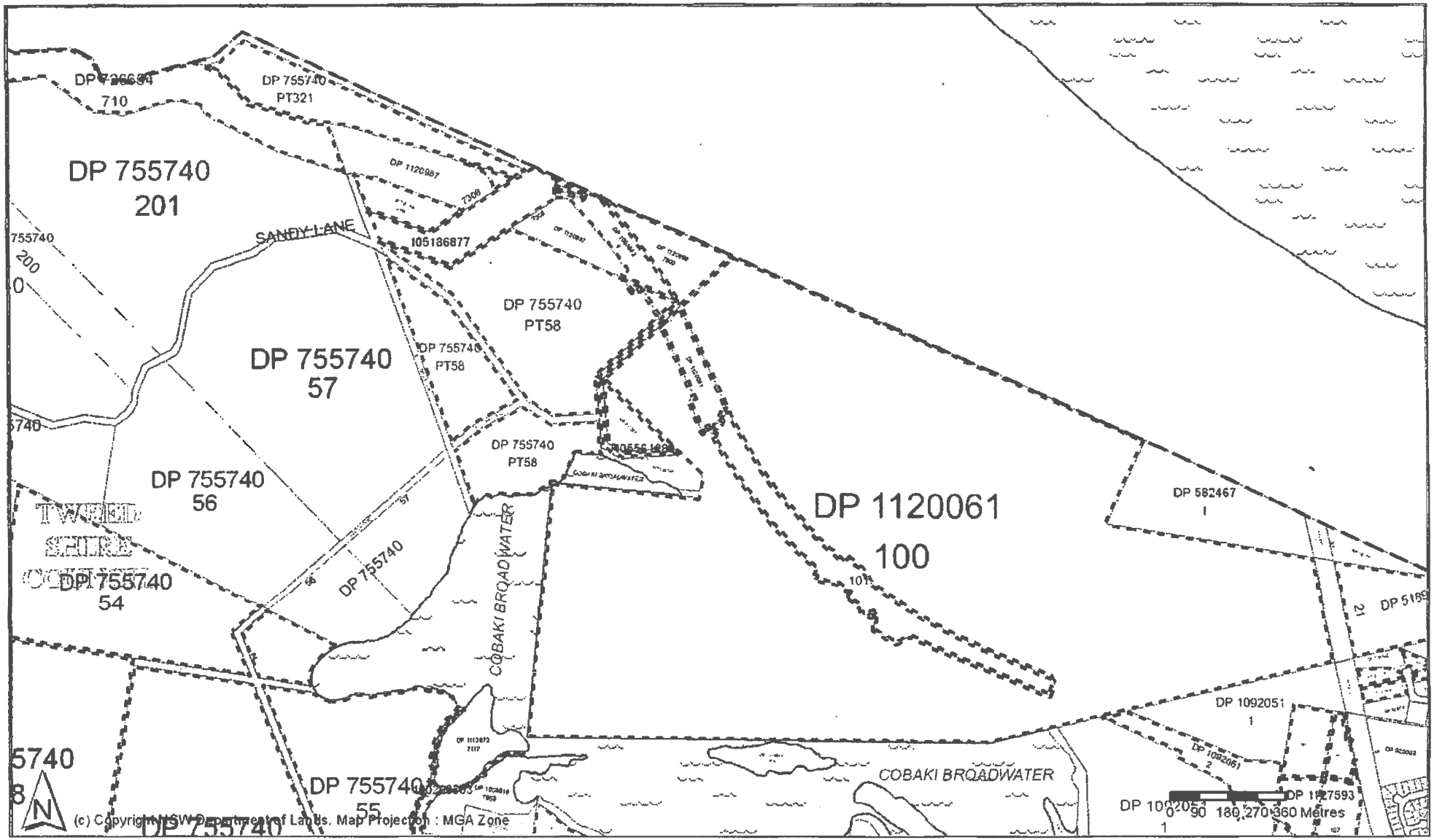
Queensland Government
(c) The State of Queensland, (Department of Environment and Resource Management) 2010.

Department of Lands
Reliable from the ground up

Cadastral Records Enquiry Report

Requested Parcel : Lot 102 DP 1120061 **Identified Parcel** : Lot 102 DP 1120061

Locality : TWEED HEADS WEST **LGA** : TWEED **Parish** : TERRANORA **County** : ROUS



Report Generated 6:03:19 PM, 18 February, 2010

This information is provided as a searching aid only. While every endeavour is made to ensure the current cadastral pattern is accurately reflected, the Registrar General cannot guarantee the information provided. For all ACTIVITY PRIOR to SEPT 2002 you must refer to the RGs Charting and Reference Maps.

	Status	Surv/Comp	Purpose
DP518902			
Lot(s): 21			
DP266190	REGISTERED	COMPILATION	EASEMENT
DP535537			
Lot(s): 1			
CA118368 - LOT 1 DP535537			
DP726654			
Lot(s): 710			
EX SUR 2004/27 - DP1075400. PART OF NORTH-WESTERN BOUNDARY OF LOT 710 DP726654. (NSW/QLD BORDER)			
DP755740			
Lot(s): 54, 55, 228			
DP1051024	REGISTERED	SURVEY	EASEMENT
Lot(s): 58, 321			
DP1093882	REGISTERED	SURVEY	ROADS ACT, 1993
DP837715			
Lot(s): 3			
DP1017336	REGISTERED	SURVEY	SUBDIVISION
DP1092051			
Lot(s): 2			
PA82104 - LOT 2 DP1092051			
NSW GAZ 31-03-2006 Folio : 1741			
Acquired for the Purposes of the Roads Act,1993 LOT 2 DP1092051			
DP1093704			
Lot(s): 670			
DP755740	HISTORICAL	COMPILATION	CROWN ADMIN NO.
DP1093882			
Lot(s): 4, 5, 6, 7			
DP1143758	REGISTERED	SURVEY	SURVEY INFORMATION ONLY
NSW GAZ 10-02-2006 Folio : 771			
Reservation Of Crown Land Reserve No. 1011248 AND GAZ. 17.2.2006 FOL. 841 - ALSO SEE GAZ. 10.2.2006 FOL. 771			
NSW GAZ 26-05-2006 Folio : 3204			
Acquired for the Purposes of the Roads Act,1993 LOTS 4-8 DP1093882			
DP1094312			
Lot(s): 666			
DP610969	HISTORICAL	COMPILATION	SUBDIVISION
DP1120061			
Lot(s): 100, 101, 102			
DP535537	HISTORICAL	SURVEY	RESUMPTION OR ACQUISITION
DP1120987			
Lot(s): 7307			
DP1119883	REGISTERED	COMPILATION	CROWN LAND CONVERSION
DP1120989			
Lot(s): 7300			
DP1143758	REGISTERED	SURVEY	SURVEY INFORMATION ONLY
NSW GAZ 10-02-2006 Folio : 771			
Reservation Of Crown Land Reserve No. 1011248 AND GAZ. 17.2.2006 FOL. 841 - ALSO SEE GAZ. 10.2.2006 FOL. 771			
DP1127593			
Lot(s): 105, 107, 108			
DP226067	HISTORICAL	SURVEY	ROAD OR MOTORWAY
Lot(s): 103, 104			
DP8655	HISTORICAL	SURVEY	UNRESEARCHED
SP77115			
DP755740	HISTORICAL	COMPILATION	CROWN ADMIN NO.
DP1094312	REGISTERED	SURVEY	REDEFINITION
SP77153			
DP755740	HISTORICAL	COMPILATION	CROWN ADMIN NO.
DP1093704	REGISTERED	SURVEY	REDEFINITION
Road			
Polygon Id(s): 105186877			
PA82135 (LOTS 4-8 DP1093882)			

Department of Lands
Reliable from the ground up

Cadastral Records Enquiry Report

Requested Parcel : Lot 102 DP 1120061 **Identified Parcel** : Lot 102 DP 1120061

Locality : TWEED HEADS WEST **LGA** : TWEED **Parish** : TERRANORA **County** : ROUS

	Status	Surv/Comp	Purpose
Polygon Id(s): 105561283			
DP1143758	REGISTERED	SURVEY	SURVEY INFORMATION ONLY
NSW GAZ	26-05-2006		Folio : 3204
Acquired for the Purposes of the Roads Act,1993			
LOTS 4-8 DP1093882			
Water Feature			
Polygon Id(s): 160260553			
NSW GAZ	29-02-2008		Folio : 1394
Acquired for Council Purposes			
LOT 1 DP1104678			

Caution: For all **ACTIVITY PRIOR to SEPT 2002** you must refer to the RGs Charting and Reference Maps.

Department of Lands
Reliable from the ground up

Cadastral Records Enquiry Report

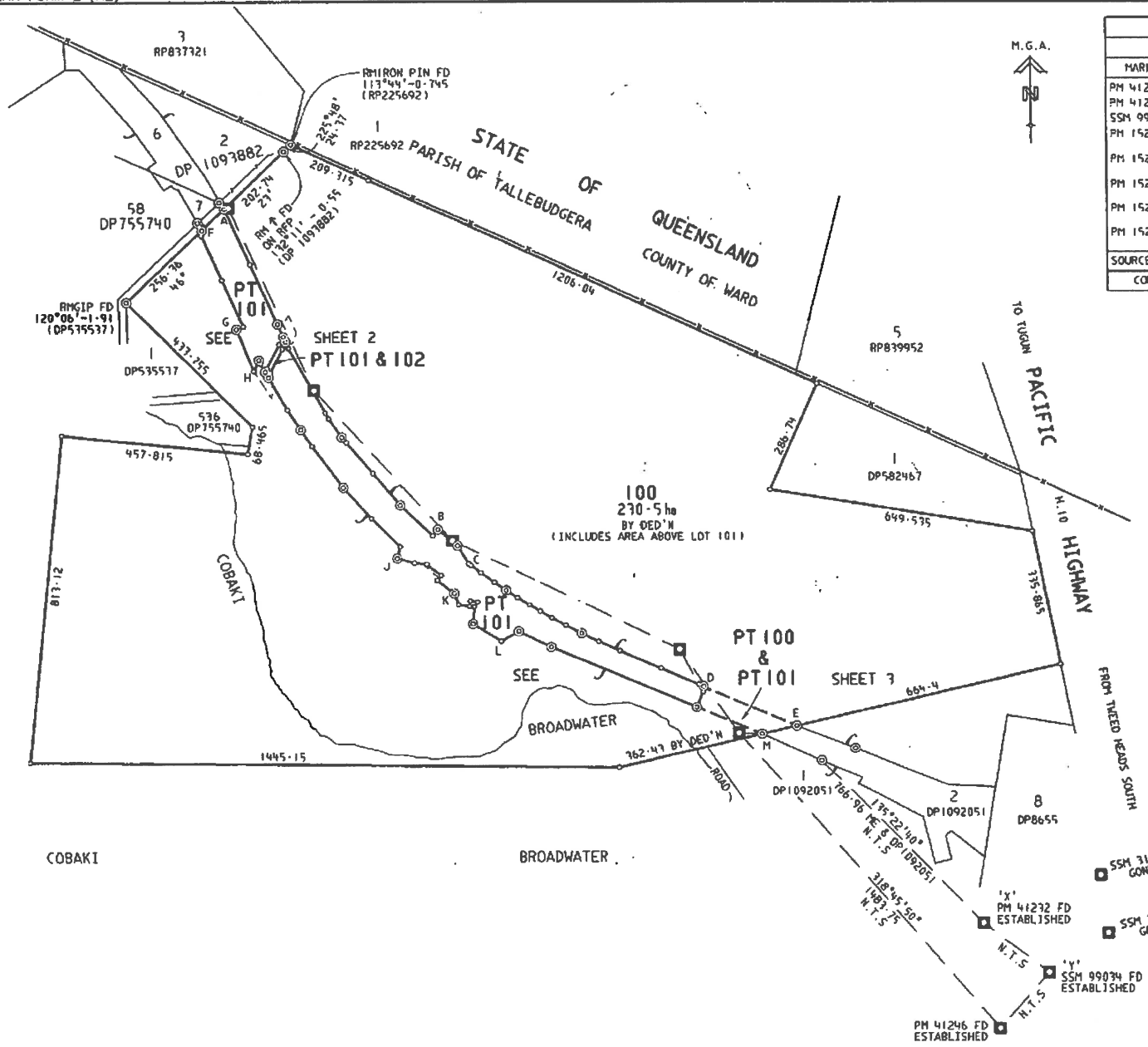
Requested Parcel : Lot 102 DP 1120061 **Identified Parcel** : Lot 102 DP 1120061

Locality : TWEED HEADS WEST **LGA** : TWEED **Parish** : TERRANORA **County** : ROUS

Plan	Surv/Comp	Purpose
DP92695	COMPILATION	DEPARTMENTAL
DP226067	SURVEY	ROAD OR MOTORWAY
DP518902	SURVEY	SUBDIVISION
DP535537	SURVEY	RESUMPTION OR ACQUISITION
DP582467	SURVEY	OLD SYSTEM CONVERSION
DP615054	SURVEY	SUBDIVISION
DP726654	COMPILATION	CROWN FOLIO CREATION
DP755740	COMPILATION	CROWN ADMIN NO.
DP803197	SURVEY	SUBDIVISION
DP812023	SURVEY	SUBDIVISION
DP825038	SURVEY	SUBDIVISION
DP834646	SURVEY	SUBDIVISION
DP837715	SURVEY	SUBDIVISION
DP855362	SURVEY	SUBDIVISION
DP860569	SURVEY	SUBDIVISION
DP1058619	COMPILATION	DEPARTMENTAL
DP1092051	SURVEY	ROADS ACT, 1993
DP1093704	SURVEY	REDEFINITION
DP1093882	SURVEY	ROADS ACT, 1993
DP1094312	SURVEY	REDEFINITION
DP1113328	COMPILATION	DEPARTMENTAL
DP1113336	COMPILATION	DEPARTMENTAL
DP1113622	COMPILATION	DEPARTMENTAL
DP1113872	COMPILATION	DEPARTMENTAL
DP1113873	COMPILATION	DEPARTMENTAL
DP1113881	COMPILATION	DEPARTMENTAL
DP1120061	SURVEY	ROADS ACT, 1993
DP1120987	COMPILATION	CROWN LAND CONVERSION
DP1120989	COMPILATION	CROWN LAND CONVERSION
DP1127593	SURVEY	ROADS ACT, 1993
SP32100	COMPILATION	STRATA PLAN
SP35574	COMPILATION	STRATA PLAN
SP41028	COMPILATION	STRATA PLAN
SP41154	COMPILATION	STRATA PLAN
SP42079	COMPILATION	STRATA PLAN
SP43809	COMPILATION	STRATA PLAN
SP44469	COMPILATION	STRATA PLAN
SP44854	COMPILATION	STRATA PLAN
SP47097	COMPILATION	STRATA PLAN
SP48196	COMPILATION	STRATA PLAN
SP48761	COMPILATION	STRATA PLAN
SP49808	COMPILATION	STRATA PLAN
SP53129	COMPILATION	STRATA PLAN
SP53925	COMPILATION	STRATA PLAN
SP58390	COMPILATION	STRATA PLAN
SP77115	COMPILATION	STRATA PLAN
SP77153	COMPILATION	STRATA PLAN

DP1120061

PLAN FORM 2 (A2) WARNING: CREASING OR FOLDING WILL LEAD TO REJECTION ePlan Sheet 1 of 4 sheets



SURVEYING REGULATION 2006: CLAUSE 7(1)(b) AND 6(2)

M.G.A CO-ORDINATES

MARK	EASTING	NORTHING	CLASS	ORDER	METHOD	ORIGIN
PM 41232	551069·070	6882533·330	B	2	FROM SCIMS	SCIMS
PM 41246	551306·418	6882033·024	A	1	FROM SCIMS	SCIMS
SSM 99034	551331·438	6882253·744	B	2	FROM SCIMS	SCIMS
PM 152210	549084·875	6884447·560	D	N/A	CADASTRAL TRAVERSE	PLACED
PM 152211	549298·397	6883997·596	D	N/A	CADASTRAL TRAVERSE	PLACED
PM 152212	549627·404	6883627·248	D	N/A	CADASTRAL TRAVERSE	PLACED
PM 152213	550183·356	6883355·559	D	N/A	CADASTRAL TRAVERSE	PLACED
PM 152214	550328·744	6883148·397	D	N/A	CADASTRAL TRAVERSE	PLACED

SOURCE: M.G.A CO-ORDS ADOPTED FROM SCIMS 14-9-2007

COMBINED SCALE FACTOR 0.999632 ZONE 56

LOTS 100, 101 & 102

LOT 2 DP535537 - C.T.2/535537

CONNECTIONS

PM 41232 - SSM 99034
136°49'11" ~ 387·54 ME
136°49'11" ~ 387·554 MGA GROUND

SSM 99034 - PM 41246
186°28'06" ~ 222·22 ME
186°28'02" ~ 222·215 MGA GROUND

PM 41246 - PM 41232
334°37'16" ~ 553·944 ME
334°37'12" ~ 553·955 MGA GROUND

NOTES

THIS PLAN IS A STRATUM PLAN.

LOTS 100, 101 AND 102 ARE LIMITED IN HEIGHT AND DEPTH IN ACCORDANCE WITH THE FOLLOWING PLANS AND SECTIONS.

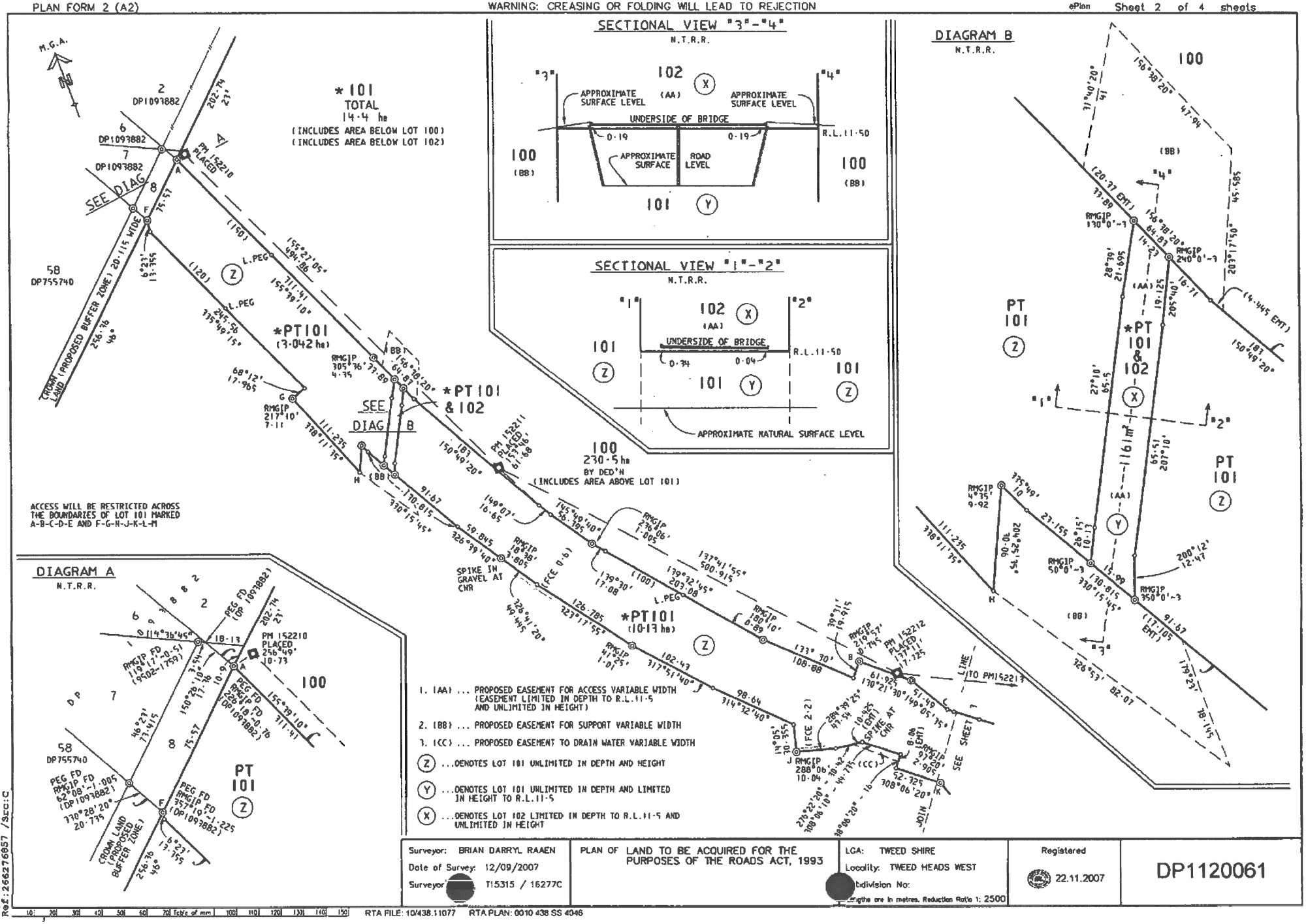
LEVELS ARE AUSTRALIAN HEIGHT DATUM
ORIGIN OF LEVELS: PM 41245 R.L.1·305 A.H.D.

ACCESS WILL BE RESTRICTED ACROSS THE BOUNDARIES OF LOT 101 MARKED A-B-C-D-E AND F-G-H-J-K-L-M

Surveyor: BRIAN DARRYL RAAEN Date of Survey: 12/09/2007 Surveyor's Ref: T15315 / 16277C	PLAN OF LAND TO BE ACQUIRED FOR THE PURPOSES OF THE ROADS ACT, 1993	LGA: TWEED SHIRE Locality: TWEED HEADS WEST Subdivision No: Lengths are in metres. Reduction Ratio 1: 7000	Registered 22.11.2007	DP1120061

RTA FILE: 10/438.11077 RTA PLAN: 0010 438 SS 4046

Req:R163159 /Doc:DP 1120061 P /Rev:26-Nov-2007 /Sts:SG.OK /Prt:22-Feb-2010 09:46 /Pgs:ALL /Seq:1 of 6
Ref:266276857 /Src:C



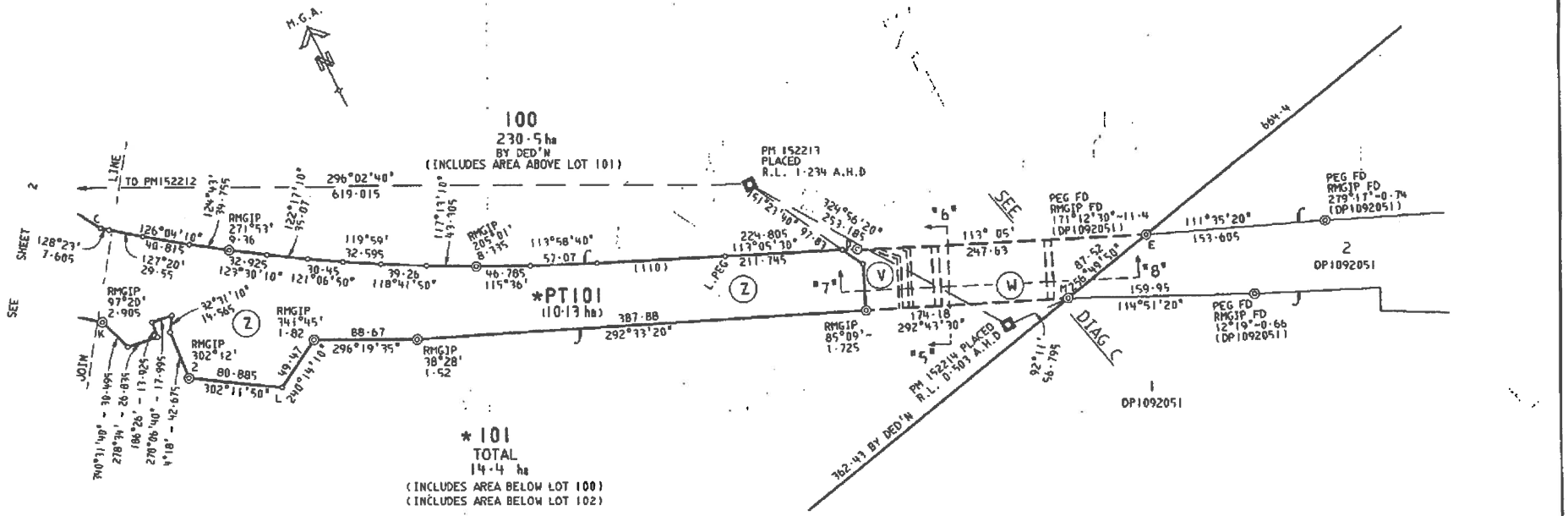
Surveyor: BRIAN DARRYL RAAEN Date of Survey: 12/09/2007 Surveyor's Ref: T15315 / 16277C	PLAN OF LAND TO BE ACQUIRED FOR THE PURPOSES OF THE ROADS ACT, 1993	LGA: TWEED SHIRE Locality: TWEED HEADS WEST Subdivision No: Lengths are in metres. Reduction Ratio 1: 2500	Registered 22.11.2007

DP1120061

RTA FILE: 10/438.11077 RTA PLAN: 0010 438 SS 4046

Rqq:R163159 /Doc:DP 1120061 P /Rev:26-Nov-2007 /Sts:SC.OK /Prt:22-Feb-2010 09:46 /Pgs:ALL /Seq:2 of 6
Ref:266276857 /Src:C

FOR DIAGRAM C
SEE SHEET 4



ACCESS WILL BE RESTRICTED ACROSS THE BOUNDARIES OF LOT 101 MARKED A-B-C-D-E AND F-G-H-J-K-L-M

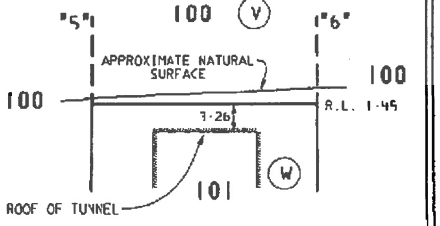
THE LEVELS AT THE CORNERS OF THE PLANE ARE SHOWN BOXED

(Z) ...DENOTES LOT 101 UNLIMITED IN DEPTH AND HEIGHT

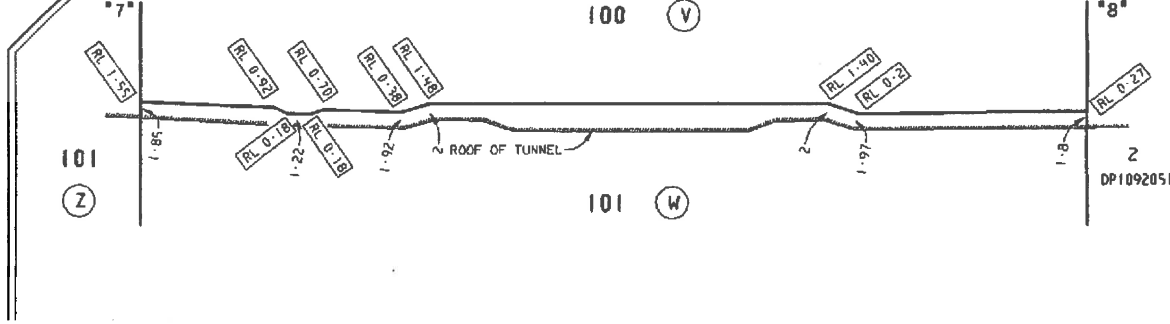
(W) ...DENOTES LOT 101 BEING THE STRATUM LYING BELOW LOT 100 AND IS UNLIMITED IN DEPTH AND LIMITED IN HEIGHT BY THE NOTED LEVEL PLANE AND BY REGULAR SLOPING PLANES FORMED BY THE DIMENSIONS AND/OR DIMENSIONED TRIANGLES.

(V) ...DENOTES LOT 100 AS SHOWN BEING LIMITED IN DEPTH BY THE NOTED LEVEL PLANE AND BY REGULAR SLOPING PLANES FORMED BY THE DIMENSIONS AND/OR DIMENSIONED TRIANGLES AND IS UNLIMITED IN HEIGHT

SECTIONAL VIEW "5"-"6"
N.T.R.R.



SECTIONAL VIEW "7"-"8"
N.T.R.R.



Surveyor: BRIAN DARRYL RAAEN Date of Survey: 12/09/2007 Surveyor's Ref: T15315 / 16277C	PLAN OF LAND TO BE ACQUIRED FOR THE PURPOSES OF THE ROADS ACT, 1993	LGA: TWEED SHIRE Locality: TWEED HEADS WEST Subdivision No: Lengths are in metres. Reduction Ratio 1: 2500	Registered 22.11.2007	DP1120061

RTA FILE: 10/438.11077 RTA PLAN: D010 438 SS 4046

Req:R163159 /Doc:DP 1120061 P /Rev:26-Nov-2007 /Sts:SC.OK /Prt:22-Feb-2010 09:46 /Pgs:ALL /Seq:3 of 6
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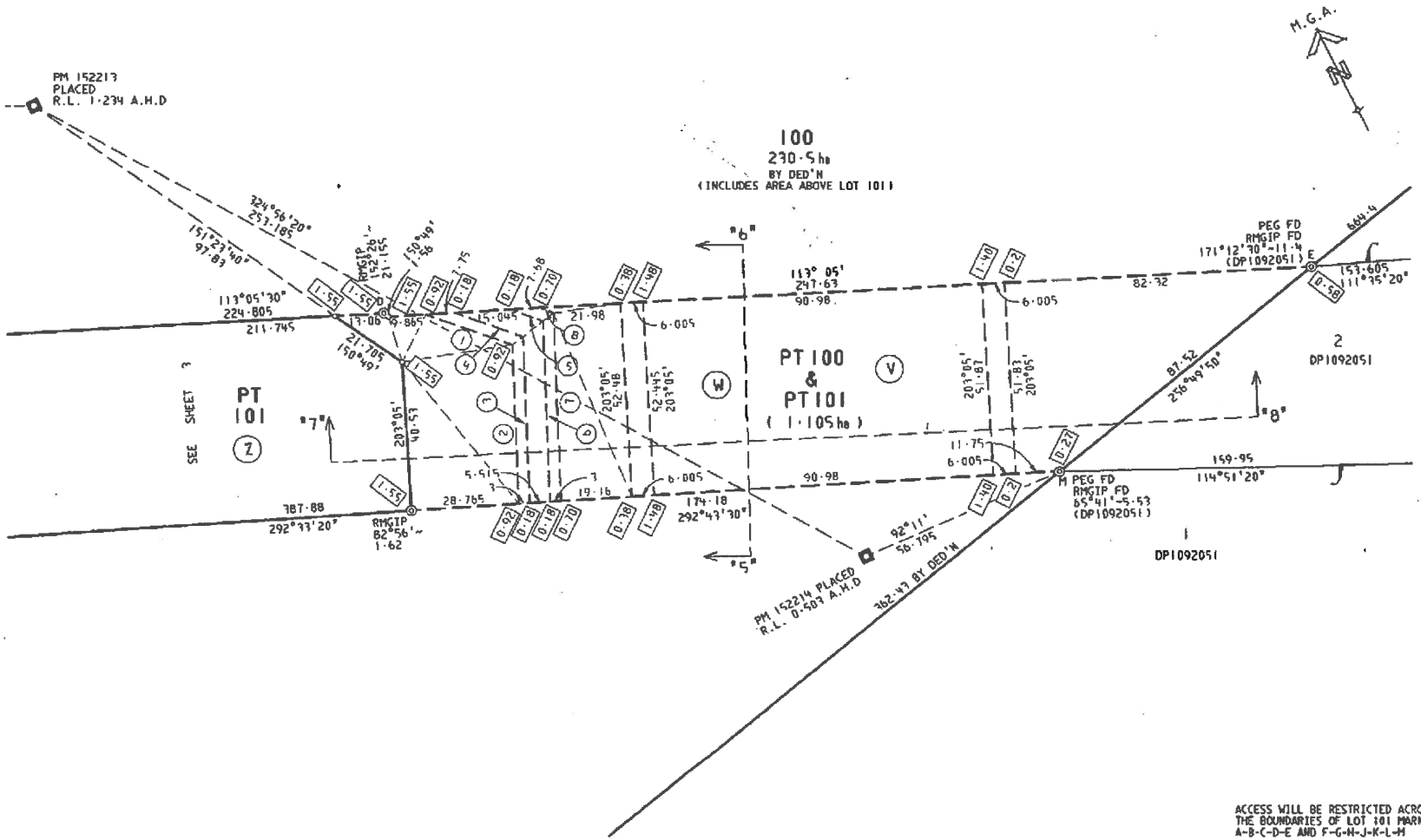
DIAGRAM C



ACCESS WILL BE RESTRICTED ACROSS THE BOUNDARIES OF LOT 101 MARKED A-B-C-D-E AND F-G-H-J-K-L-M

THE LEVELS AT THE CORNERS OF THE PLANE ARE SHOWN BOXED ☐

(Z) ...DENOTES LOT 101 UNLIMITED IN DEPTH AND HEIGHT

(W) ...DENOTES LOT 101 BEING THE STRATUM LYING BELOW LOT 100 AND IS UNLIMITED IN DEPTH AND LIMITED IN HEIGHT BY THE NOTED LEVEL PLANE AND BY REGULAR SLOPING PLANES FORMED BY THE DIMENSIONS AND/OR DIMENSIONED TRIANGLES.

(V) ...DENOTES LOT 100 AS SHOWN BEING LIMITED IN DEPTH BY THE NOTED LEVEL PLANE AND BY REGULAR SLOPING PLANES FORMED BY THE DIMENSIONS AND/OR DIMENSIONED TRIANGLES AND IS UNLIMITED IN HEIGHT

FOR SECTIONAL VIEWS
SEE SHEET 3

SHORT LINES		
NO.	BEARING.	DIST.
1	135°51'40"	24·565
2	204°14'	43·17
3	24°14'	45·13
4	315°51'40"	19·455
5	316°04'	9·27
6	24°17'20"	49·01
7	24°17'20"	50·96
8	316°04'	4·23

Surveyor: BRIAN DARRYL RAAEN
Date of Survey: 12/09/2007
Surveyor: T15315 / 16277C

PLAN OF LAND TO BE ACQUIRED FOR THE PURPOSES OF THE ROADS ACT, 1993

LGA: TWEED SHIRE
Locality: TWEED HEADS WEST
Subdivision No:
Lengths are in metres. Reduction Ratio 1: 800

Registered 22.11.2007

DP1120061

RTA FILE: 10/438.11077 RTA PLAN: 0010 438 SS 4046

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Ref:266276857 /Src:C

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Req:R163159 /Doc:DP 1120061 ALL /Rev:26-Nov-2007 /Sts:SC.OK /Prt:22-Feb-2011 Pg:5 of 6

DEPOSITED PLAN ADMINISTRATION SHEET

Sheet 1 of 2 sheet(s)

SIGNATURES, SEALS and STATEMENTS of intention to dedicate public roads, to create public reserves, drainage reserves, easements, restrictions on the use of land or positive covenants.

LOT 101 IS REQUIRED FOR FREEWAY UNDER SECTION 48 OF THE ROADS ACT 1993.

LOT 102 IS TO BE ACQUIRED BY THE ROADS AND TRAFFIC AUTHORITY FOR ROAD PURPOSES.

ACCESS WILL BE RESTRICTED ACROSS THE BOUNDARIES OF LOT 101 MARKED A-B-C-D-E AND F-G-H-J-K-L-M.

*

DP1120061

Registered: 22.11.2007 *

Title System: TORRENS

Purpose: ROADS ACT 1993

PLAN OF LAND TO BE ACQUIRED FOR THE PURPOSES OF THE ROADS ACT, 1993

* OFFICE USE ONLY

LGA:	**TWEED SHIRE**
Locality:	**TWEED HEADS WEST**
Parish:	**TERRANORA**
County:	**ROUS**

Use PLAN FORM 6A
for additional certificates, signatures, seals and statements

Crown Lands NSW/Western Lands Office Approval

I.....In approving this plan certify
(Authorised Officer)
that all necessary approvals in regard to the allocation of the land shown herein have been given.

Signature:.....
Date:.....
File Number:.....
Office:.....

Subdivision Certificate

I certify that the provisions of s.109J of the Environmental Planning and Assessment Act 1979 have been satisfied in relation to:

the proposed..... set out herein
(insert 'subdivision' or 'new road')

.....
* Authorised Person/General Manager/Accredited Certifier

Consent Authority: .....
Date of Endorsement: .....
Accreditation no: .....
Subdivision Certificate no: .....
File no: .....

* Delete whichever is inapplicable.

Surveying Regulation, 2006

I, .BRIAN DARRYL RAAEN.....
of B & P SURVEYS, PO BOX 327
TWEED HEADS NSW 2485.....
a surveyor registered under the *Surveying Act, 2002*, certify that the survey represented in this plan is accurate, has been made in accordance with the *Surveying Regulation, 2006* and was completed on:...12-09-2007.....
The survey relates to ...Part Lot 100 and Lots 101, 102 and Connections.....
.....
(specify the land actually surveyed or specify any land shown in the plan that is not the subject of the survey)

Signature B. Raaen *Dated:* 27/9/07
Surveyor registered under the Surveying Act, 2002

Datum Line: PM41232 – SSM99034.....
Type: ~~Urban/Rural~~

Plans used in the preparation of survey/~~compilation~~

DP 1092051
DP 1093882
DP 535537
DP 854935

(If insufficient space use Plan Form 6A annexure sheet)

SURVEYOR'S REFERENCE: T15315 / 16277C

RTA FILE: 10/438.11077 RTA PLAN: 0010 438 SS 4046

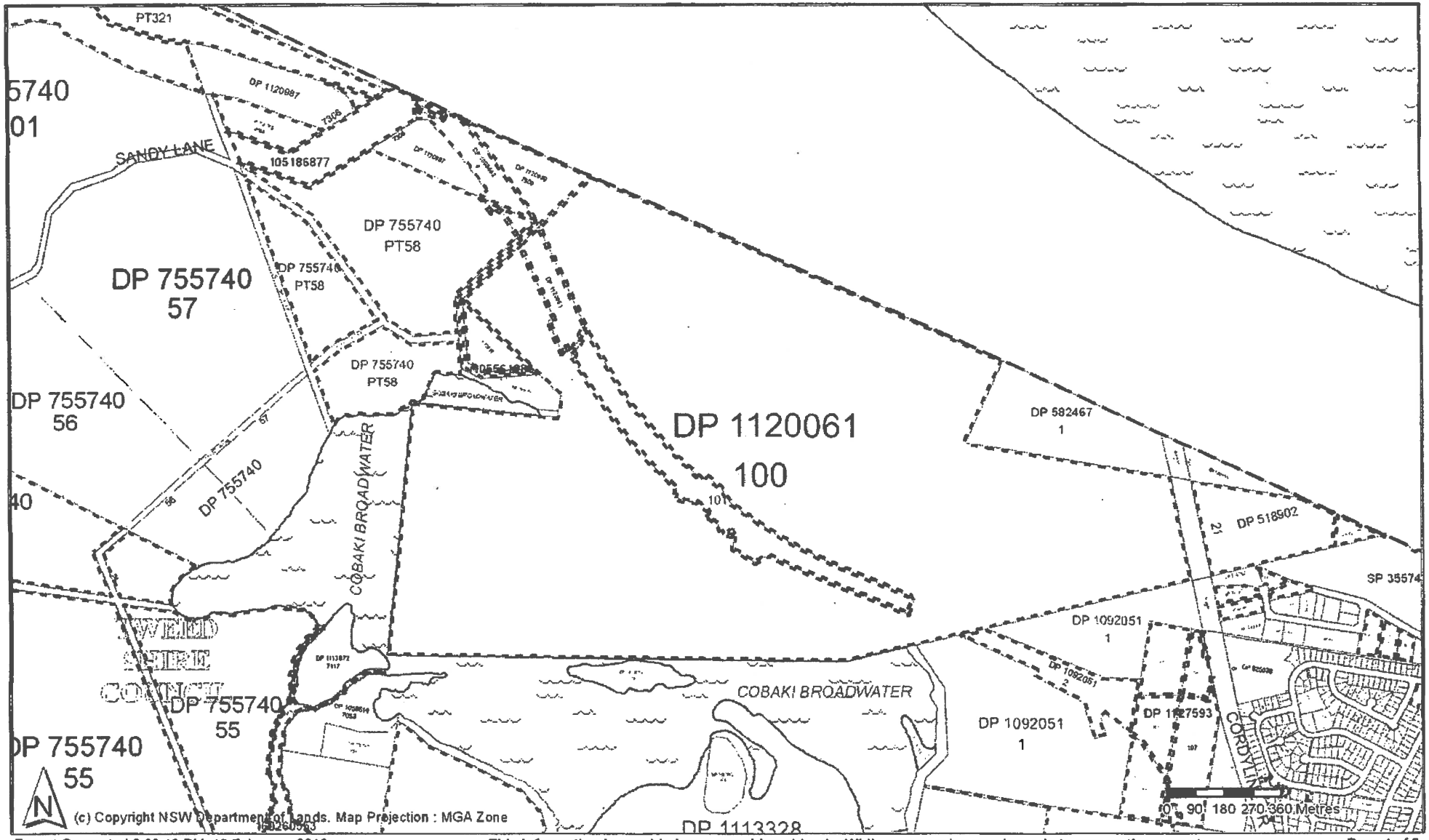
Req:R163159 /Doc:DP 1120061 P /Rev:26-Nov-2007 /Sts:SC.OK /Prt:22-Feb-201
Req:R163159 /Doc:DP 1120061 P /Rev:26-Nov-2007 /Sts:SC.OK /Prt:22-Feb-2011

Department of Lands
Reliable from the ground up

Cadastral Records Enquiry Report

Requested Parcel : Lot 101 DP 1120061 **Identified Parcel** : Lot 101 DP 1120061

Locality : TWEED HEADS WEST **LGA** : TWEED **Parish** : TERRANORA **County** : ROUS



Report Generated 6:03:13 PM, 18 February, 2010

This information is provided as a searching aid only. While every endeavour is made to ensure the current cadastral pattern is accurately reflected, the Registrar General cannot guarantee the information provided. For all ACTIVITY PRIOR to SEPT 2002 you must refer to the RGs Charting and Reference Maps.

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DP518902			
Lot(s): 21			
DP266190	REGISTERED	COMPILATION	EASEMENT
DP535537			
Lot(s): 1			
CA118368 - LOT 1 DP535537			
DP726654			
Lot(s): 710			
EX SUR 2004/27 - DP1075400. PART OF NORTH-WESTERN BOUNDARY OF LOT 710 DP726654. (NSW/QLD BORDER)			
DP755740			
Lot(s): 54, 55			
DP1051024	REGISTERED	SURVEY	EASEMENT
Lot(s): 58, 321			
DP1093882	REGISTERED	SURVEY	ROADS ACT, 1993
DP837715			
Lot(s): 3			
DP1017336	REGISTERED	SURVEY	SUBDIVISION
DP1011625			
Lot(s): 1			
DP607299	HISTORICAL	SURVEY	OLD SYSTEM CONVERSION
DP1092051			
Lot(s): 2			
PA82104 - LOT 2 DP1092051			
NSW GAZ 31-03-2006 Folio : 1741			
Acquired for the Purposes of the Roads Act,1993 LOT 2 DP1092051			
DP1093704			
Lot(s): 670			
DP755740	HISTORICAL	COMPILATION	CROWN ADMIN NO.
DP1093882			
Lot(s): 4, 5, 6, 7			
DP1143758	REGISTERED	SURVEY	SURVEY INFORMATION ONLY
NSW GAZ 10-02-2006 Folio : 771			
Reservation Of Crown Land Reserve No. 1011248 AND GAZ. 17.2.2006 FOL. 841 - ALSO SEE GAZ. 10.2.2006 FOL. 771			
NSW GAZ 26-05-2006 Folio : 3204			
Acquired for the Purposes of the Roads Act,1993 LOTS 4-8 DP1093882			
DP1094312			
Lot(s): 666			
DP610969	HISTORICAL	COMPILATION	SUBDIVISION
DP1102377			
Lot(s): 7			
DP856966	HISTORICAL	SURVEY	SUBDIVISION
DP1114577			
Lot(s): 7			
DP259282	HISTORICAL	SURVEY	SUBDIVISION
DP1120061			
Lot(s): 100, 101, 102			
DP535537	HISTORICAL	SURVEY	RESUMPTION OR ACQUISITION
DP1120987			
Lot(s): 7307			
DP1119883	REGISTERED	COMPILATION	CROWN LAND CONVERSION
DP1120989			
Lot(s): 7300			
DP1143758	REGISTERED	SURVEY	SURVEY INFORMATION ONLY
NSW GAZ 10-02-2006 Folio : 771			
Reservation Of Crown Land Reserve No. 1011248 AND GAZ. 17.2.2006 FOL. 841 - ALSO SEE GAZ. 10.2.2006 FOL. 771			
DP1121137			
Lot(s): 9			
DP856966	HISTORICAL	SURVEY	SUBDIVISION
DP1102377	REGISTERED	SURVEY	SUBDIVISION

Cadastral Records Enquiry Report

Requested Parcel : Lot 101 DP 1120061 **Identified Parcel** : Lot 101 DP 1120061

Locality : TWEED HEADS WEST **LGA** : TWEED **Parish** : TERRANORA **County** : ROUS

	Status	Surv/Comp	Purpose
DP1127593			
Lot(s): 105, 106, 107, 108			
DP226067	HISTORICAL	SURVEY	ROAD OR MOTORWAY
Lot(s): 103, 104			
DP8655	HISTORICAL	SURVEY	UNRESEARCHED
SP47806			
DP266190	REGISTERED	COMPILATION	EASEMENT
SP60680			
DP866281	HISTORICAL	SURVEY	SUBDIVISION
SP62509			
DP866281	HISTORICAL	SURVEY	SUBDIVISION
SP63667			
DP866281	HISTORICAL	SURVEY	SUBDIVISION
SP67145			
DP790029	HISTORICAL	SURVEY	SUBDIVISION
SP77115			
DP755740	HISTORICAL	COMPILATION	CROWN ADMIN NO.
DP1094312	REGISTERED	SURVEY	REDEFINITION
SP77153			
DP755740	HISTORICAL	COMPILATION	CROWN ADMIN NO.
DP1093704	REGISTERED	SURVEY	REDEFINITION
SP80033			
DP822879	HISTORICAL	COMPILATION	CROWN FOLIO CREATION
DP856966	HISTORICAL	SURVEY	SUBDIVISION
DP1102377	REGISTERED	SURVEY	SUBDIVISION
DP1121137	REGISTERED	SURVEY	SUBDIVISION
SP80305			
DP866281	HISTORICAL	SURVEY	SUBDIVISION
Road			
Polygon Id(s): 105186877			
PA82135 (LOTS 4-8 DP1093882)			
Polygon Id(s): 105561283			
DP1143758	REGISTERED	SURVEY	SURVEY.INFORMATION ONLY
NSW GAZ 26-05-2006			Folio : 3204
Acquired for the Purposes of the Roads Act,1993			
LOTS 4-8 DP1093882			
Water Feature			
Polygon Id(s): 160260553			
NSW GAZ 29-02-2008			Folio : 1394
Acquired for Council Purposes			
LOT 1 DP1104678			

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Cadastral Records Enquiry Report

Requested Parcel : Lot 101 DP 1120061 **Identified Parcel** : Lot 101 DP 1120061

Locality : TWEED HEADS WEST **LGA** : TWEED **Parish** : TERRANORA **County** : ROUS

Plan	Surv/Comp	Purpose
DP23726	SURVEY	UNRESEARCHED
DP25241	SURVEY	UNRESEARCHED
DP30600	SURVEY	UNRESEARCHED
DP92695	COMPILATION	DEPARTMENTAL
DP226067	SURVEY	ROAD OR MOTORWAY
DP243479	SURVEY	SUBDIVISION
DP244220	SURVEY	SUBDIVISION
DP246488	SURVEY	SUBDIVISION
DP248924	SURVEY	SUBDIVISION
DP259282	SURVEY	SUBDIVISION
DP261249	SURVEY	SUBDIVISION
DP261250	SURVEY	SUBDIVISION
DP262417	SURVEY	SUBDIVISION
DP412404	SURVEY	UNRESEARCHED
DP518902	SURVEY	SUBDIVISION
DP529871	COMPILATION	SUBDIVISION
DP535537	SURVEY	RESUMPTION OR ACQUISITION
DP569304	SURVEY	SUBDIVISION
DP582467	SURVEY	OLD SYSTEM CONVERSION
DP588564	SURVEY	SUBDIVISION
DP603333	SURVEY	SUBDIVISION
DP615054	SURVEY	SUBDIVISION
DP617065	COMPILATION	SUBDIVISION
DP716288	SURVEY	SUBDIVISION
DP716289	SURVEY	SUBDIVISION
DP716290	SURVEY	SUBDIVISION
DP716291	SURVEY	SUBDIVISION
DP716292	SURVEY	SUBDIVISION
DP726654	COMPILATION	CROWN FOLIO CREATION
DP755740	COMPILATION	CROWN ADMIN NO.
DP774945	COMPILATION	SUBDIVISION
DP788912	COMPILATION	SUBDIVISION
DP790029	SURVEY	SUBDIVISION
DP801161	SURVEY	SUBDIVISION
DP803197	SURVEY	SUBDIVISION
DP812023	SURVEY	SUBDIVISION
DP819023	SURVEY	SUBDIVISION
DP825038	SURVEY	SUBDIVISION
DP828025	SURVEY	SUBDIVISION
DP834646	SURVEY	SUBDIVISION
DP837715	SURVEY	SUBDIVISION
DP841037	SURVEY	SUBDIVISION
DP842123	SURVEY	SUBDIVISION
DP855362	SURVEY	SUBDIVISION
DP856966	SURVEY	SUBDIVISION
DP860569	SURVEY	SUBDIVISION
DP866281	SURVEY	SUBDIVISION
DP866375	COMPILATION	CONSOLIDATION
DP1011625	SURVEY	SUBDIVISION
DP1058619	COMPILATION	DEPARTMENTAL
DP1084319	SURVEY	ROADS ACT, 1993
DP1092051	SURVEY	ROADS ACT, 1993
DP1093704	SURVEY	REDEFINITION
DP1093882	SURVEY	ROADS ACT, 1993
DP1094312	SURVEY	REDEFINITION
DP1102377	SURVEY	SUBDIVISION
DP1113328	COMPILATION	DEPARTMENTAL
DP1113336	COMPILATION	DEPARTMENTAL
DP1113622	COMPILATION	DEPARTMENTAL
DP1113872	COMPILATION	DEPARTMENTAL
DP1113873	COMPILATION	DEPARTMENTAL
DP1113881	COMPILATION	DEPARTMENTAL
DP1114577	COMPILATION	CONSOLIDATION
DP1120061	SURVEY	ROADS ACT, 1993
DP1120987	COMPILATION	CROWN LAND CONVERSION
DP1120989	COMPILATION	CROWN LAND CONVERSION
DP1121137	SURVEY	SUBDIVISION
DP1127593	SURVEY	ROADS ACT, 1993
SP13748	COMPILATION	STRATA PLAN

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Cadastral Records Enquiry Report

Requested Parcel : Lot 101 DP 1120061 **Identified Parcel** : Lot 101 DP 1120061

Locality : TWEED HEADS WEST **LGA** : TWEED **Parish** : TERRANORA **County** : ROUS

Plan	Surv/Comp	Purpose
SP14160	COMPILATION	STRATA PLAN
SP15972	COMPILATION	STRATA PLAN
SP15973	COMPILATION	STRATA PLAN
SP15974	COMPILATION	STRATA PLAN
SP16260	COMPILATION	STRATA PLAN
SP16276	COMPILATION	STRATA PLAN
SP16693	COMPILATION	STRATA PLAN
SP17274	COMPILATION	STRATA PLAN
SP18206	COMPILATION	STRATA PLAN
SP18314	COMPILATION	STRATA PLAN
SP18383	COMPILATION	STRATA PLAN
SP18510	COMPILATION	STRATA PLAN
SP18532	COMPILATION	STRATA PLAN
SP18542	COMPILATION	STRATA PLAN
SP19142	COMPILATION	STRATA PLAN
SP19148	COMPILATION	STRATA PLAN
SP19363	COMPILATION	STRATA PLAN
SP19365	COMPILATION	STRATA PLAN
SP19492	COMPILATION	STRATA PLAN
SP19564	COMPILATION	STRATA PLAN
SP19799	COMPILATION	STRATA PLAN
SP19826	COMPILATION	STRATA PLAN
SP19852	COMPILATION	STRATA PLAN
SP19930	COMPILATION	STRATA PLAN
SP20022	COMPILATION	STRATA PLAN
SP20040	COMPILATION	STRATA PLAN
SP20124	COMPILATION	STRATA PLAN
SP20207	COMPILATION	STRATA PLAN
SP20389	COMPILATION	STRATA PLAN
SP20446	COMPILATION	STRATA PLAN
SP20485	COMPILATION	STRATA PLAN
SP21130	COMPILATION	STRATA PLAN
SP21465	COMPILATION	STRATA PLAN
SP21708	COMPILATION	STRATA PLAN
SP21874	COMPILATION	STRATA PLAN
SP21875	COMPILATION	STRATA PLAN
SP21964	COMPILATION	STRATA PLAN
SP30613	COMPILATION	STRATA PLAN
SP30637	COMPILATION	STRATA PLAN
SP31689	COMPILATION	STRATA PLAN
SP31897	COMPILATION	STRATA PLAN
SP31992	COMPILATION	STRATA PLAN
SP32028	COMPILATION	STRATA PLAN
SP32100	COMPILATION	STRATA PLAN
SP32113	COMPILATION	STRATA PLAN
SP32203	COMPILATION	STRATA PLAN
SP32289	COMPILATION	STRATA PLAN
SP32794	COMPILATION	STRATA PLAN
SP33714	COMPILATION	STRATA PLAN
SP35574	COMPILATION	STRATA PLAN
SP35809	COMPILATION	STRATA PLAN
SP36263	COMPILATION	STRATA PLAN
SP36298	COMPILATION	STRATA PLAN
SP37030	COMPILATION	STRATA PLAN
SP37876	COMPILATION	STRATA PLAN
SP37923	COMPILATION	STRATA PLAN
SP38152	COMPILATION	STRATA PLAN
SP41028	COMPILATION	STRATA PLAN
SP41154	COMPILATION	STRATA PLAN
SP42079	COMPILATION	STRATA PLAN
SP43809	COMPILATION	STRATA PLAN
SP44089	COMPILATION	STRATA PLAN
SP44469	COMPILATION	STRATA PLAN
SP44800	COMPILATION	STRATA PLAN
SP44854	COMPILATION	STRATA PLAN
SP47097	COMPILATION	STRATA PLAN
SP47806	COMPILATION	STRATA PLAN
SP48196	COMPILATION	STRATA PLAN
SP48761	COMPILATION	STRATA PLAN

Department of Lands
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Cadastral Records Enquiry Report

Requested Parcel : Lot 101 DP 1120061 **Identified Parcel** : Lot 101 DP 1120061

Locality : TWEED HEADS WEST **LGA** : TWEED **Parish** : TERRANORA **County** : ROUS

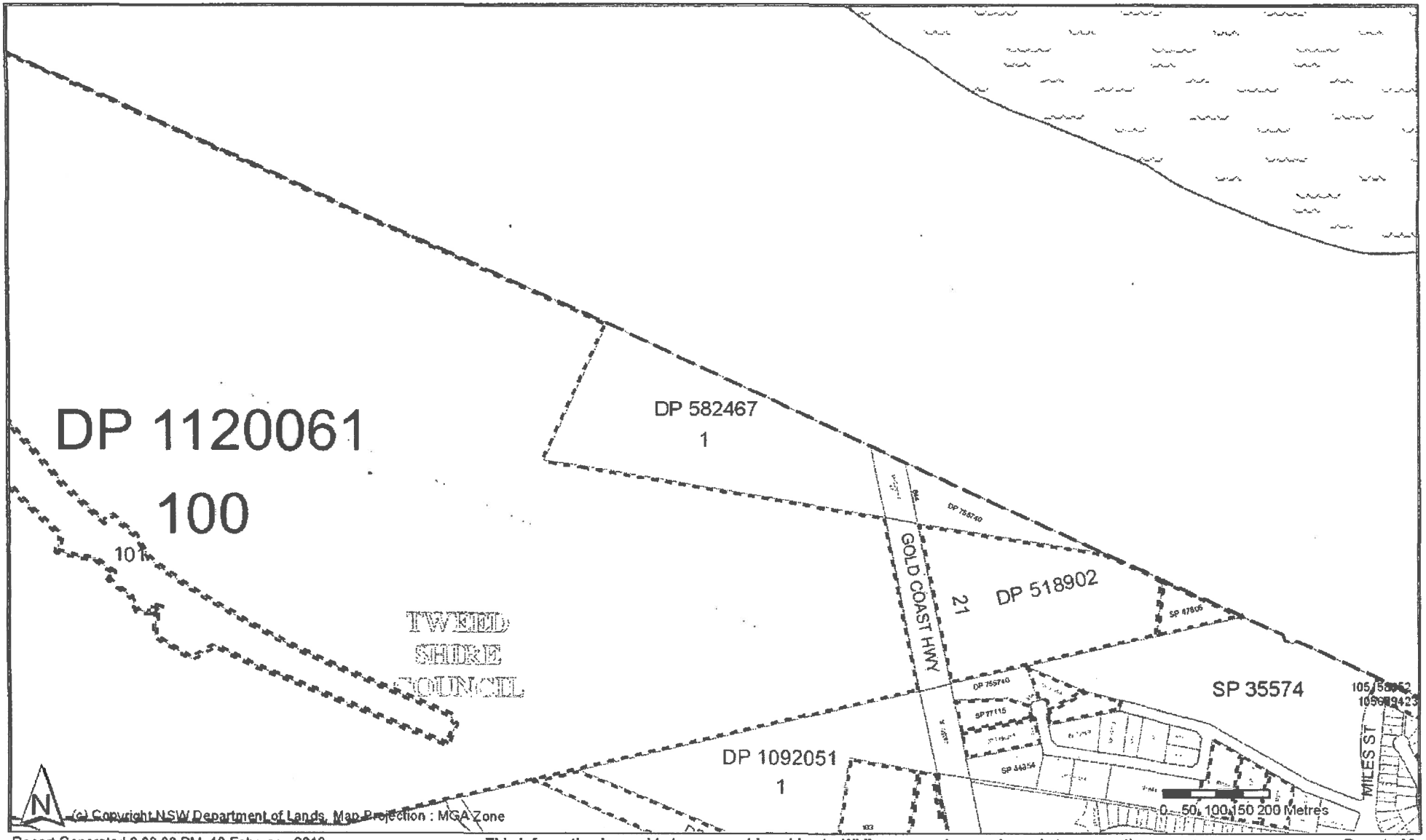
Plan	Surv/Comp	Purpose
SP49532	COMPILATION	STRATA PLAN
SP49808	COMPILATION	STRATA PLAN
SP50367	COMPILATION	STRATA PLAN
SP51452	COMPILATION	STRATA PLAN
SP53129	COMPILATION	STRATA PLAN
SP53925	COMPILATION	STRATA PLAN
SP58390	COMPILATION	STRATA PLAN
SP60680	COMPILATION	STRATA PLAN
SP62509	COMPILATION	STRATA PLAN
SP63667	COMPILATION	STRATA PLAN
SP67145	COMPILATION	STRATA PLAN
SP77115	COMPILATION	STRATA PLAN
SP77153	COMPILATION	STRATA PLAN
SP80033	COMPILATION	STRATA PLAN
SP80305	COMPILATION	STRATA PLAN

Department of Lands
Reliable from the ground up

Cadastral Records Enquiry Report

Requested Parcel : Lot 1 DP 582467 **Identified Parcel** : Lot 1 DP 582467

Locality : TWEED HEADS WEST **LGA** : TWEED **Parish** : TERRANORA **County** : ROUS



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Department of Lands
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Cadastral Records Enquiry Report

Requested Parcel : Lot 1 DP 582467 **Identified Parcel** : Lot 1 DP 582467

Locality : TWEED HEADS WEST **LGA** : TWEED **Parish** : TERRANORA **County** : ROUS

	Status	Surv/Comp	Purpose
DP31369			
Lot(s): 50			
DP268339	REGISTERED	COMPILATION	EASEMENT
DP518902			
Lot(s): 21			
DP266190	REGISTERED	COMPILATION	EASEMENT
DP1092051			
Lot(s): 2			
PA82104 - LOT 2 DP1092051			
NSW GAZ 31-03-2006			Folio : 1741
Acquired for the Purposes of the Roads Act,1993 LOT 2 DP1092051			
DP1093704			
Lot(s): 670			
DP755740	HISTORICAL	COMPILATION	CROWN ADMIN NO.
DP1094312			
Lot(s): 666			
DP610969	HISTORICAL	COMPILATION	SUBDIVISION
DP1102377			
Lot(s): 7			
DP856966	HISTORICAL	SURVEY	SUBDIVISION
DP1120061			
Lot(s): 100, 101			
DP535537	HISTORICAL	SURVEY	RESUMPTION OR ACQUISITION
DP1121137			
Lot(s): 9			
DP856966	HISTORICAL	SURVEY	SUBDIVISION
DP1102377	REGISTERED	SURVEY	SUBDIVISION
DP1127593			
Lot(s): 105, 108			
DP226067	HISTORICAL	SURVEY	ROAD OR MOTORWAY
Lot(s): 103			
DP8655	HISTORICAL	SURVEY	UNRESEARCHED
SP47806			
DP266190	REGISTERED	COMPILATION	EASEMENT
SP77115			
DP755740	HISTORICAL	COMPILATION	CROWN ADMIN NO.
DP1094312	REGISTERED	SURVEY	REDEFINITION
SP77153			
DP755740	HISTORICAL	COMPILATION	CROWN ADMIN NO.
DP1093704	REGISTERED	SURVEY	REDEFINITION
SP80033			
DP822879	HISTORICAL	COMPILATION	CROWN FOLIO CREATION
DP856966	HISTORICAL	SURVEY	SUBDIVISION
DP1102377	REGISTERED	SURVEY	SUBDIVISION
DP1121137	REGISTERED	SURVEY	SUBDIVISION
Intersection			
Polygon Id(s): 105158652			
NSW GAZ 19-12-2003			Folio : 11467
TRANSFER OF CROWN ROAD TO TWEED SHIRE COUNCIL			
Road			
Polygon Id(s): 105659423			
NSW GAZ 19-12-2003			Folio : 11467
TRANSFER OF CROWN ROAD TO TWEED SHIRE COUNCIL			

Caution: For all **ACTIVITY PRIOR to SEPT 2002** you must refer to the RGs Charting and Reference Maps.

Department of Lands
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Cadastral Records Enquiry Report

Requested Parcel : Lot 1 DP 582467 **Identified Parcel** : Lot 1 DP 582467

Locality : TWEED HEADS WEST **LGA** : TWEED **Parish** : TERRANORA **County** : ROUS

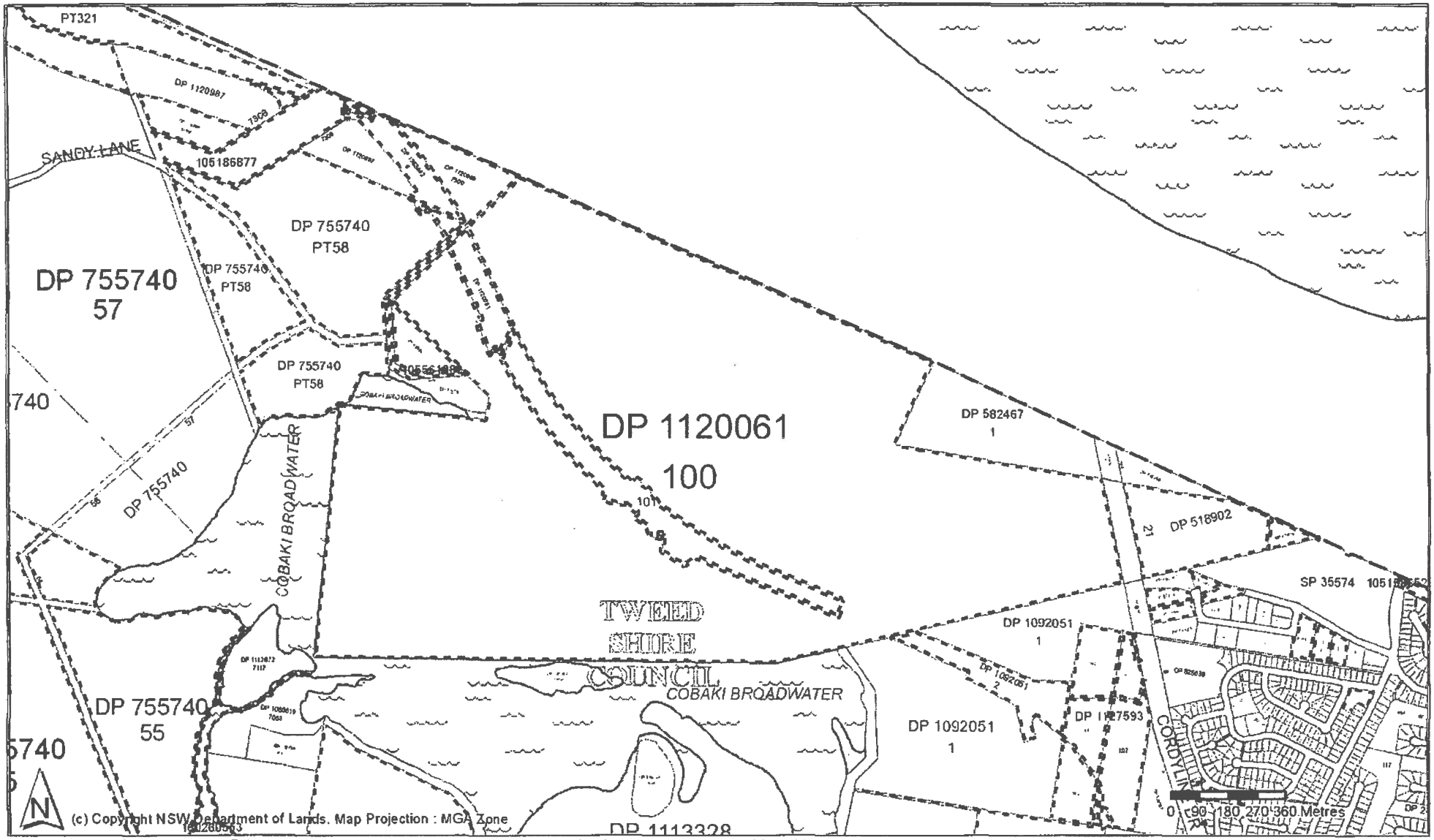
Plan	Surv/Comp	Purpose
DP31368	SURVEY	UNRESEARCHED
DP31369	SURVEY	UNRESEARCHED
DP226067	SURVEY	ROAD OR MOTORWAY
DP259282	SURVEY	SUBDIVISION
DP262417	SURVEY	SUBDIVISION
DP518902	SURVEY	SUBDIVISION
DP542273	SURVEY	SUBDIVISION
DP582467	SURVEY	OLD SYSTEM CONVERSION
DP603333	SURVEY	SUBDIVISION
DP615054	SURVEY	SUBDIVISION
DP755740	COMPILATION	CROWN ADMIN NO.
DP803197	SURVEY	SUBDIVISION
DP825038	SURVEY	SUBDIVISION
DP828025	SURVEY	SUBDIVISION
DP856966	SURVEY	SUBDIVISION
DP866375	COMPILATION	CONSOLIDATION
DP1092051	SURVEY	ROADS ACT, 1993
DP1093704	SURVEY	REDEFINITION
DP1094312	SURVEY	REDEFINITION
DP1102377	SURVEY	SUBDIVISION
DP1113873	COMPILATION	DEPARTMENTAL
DP1120061	SURVEY	ROADS ACT, 1993
DP1121137	SURVEY	SUBDIVISION
DP1127593	SURVEY	ROADS ACT, 1993
SP16693	COMPILATION	STRATA PLAN
SP18383	COMPILATION	STRATA PLAN
SP19852	COMPILATION	STRATA PLAN
SP19930	COMPILATION	STRATA PLAN
SP20207	COMPILATION	STRATA PLAN
SP20485	COMPILATION	STRATA PLAN
SP21130	COMPILATION	STRATA PLAN
SP21875	COMPILATION	STRATA PLAN
SP30378	COMPILATION	STRATA PLAN
SP31784	COMPILATION	STRATA PLAN
SP32100	COMPILATION	STRATA PLAN
SP35574	COMPILATION	STRATA PLAN
SP36263	COMPILATION	STRATA PLAN
SP38152	COMPILATION	STRATA PLAN
SP44854	COMPILATION	STRATA PLAN
SP47806	COMPILATION	STRATA PLAN
SP77115	COMPILATION	STRATA PLAN
SP77153	COMPILATION	STRATA PLAN
SP80033	COMPILATION	STRATA PLAN

Department of Lands
Reliable from the ground up

Cadastral Records Enquiry Report

Requested Parcel : Lot 100 DP 1120061 **Identified Parcel** : Lot 100 DP 1120061

Locality : TWEED HEADS WEST **LGA** : TWEED **Parish** : TERRANORA **County** : ROUS



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Cadastral Records Enquiry Report

Requested Parcel : Lot 100 DP 1120061 **Identified Parcel** : Lot 100 DP 1120061

Locality : TWEED HEADS WEST **LGA** : TWEED **Parish** : TERRANORA **County** : ROUS

	Status	Surv/Comp	Purpose
DP31369			
Lot(s): 49, 50			
DP268339	REGISTERED	COMPILATION	EASEMENT
DP518902			
Lot(s): 21			
DP266190	REGISTERED	COMPILATION	EASEMENT
DP535537			
Lot(s): 1			
CA118368 - LOT 1 DP535537			
DP726654			
Lot(s): 710			
EX SUR 2004/27 - DP1075400. PART OF NORTH-WESTERN BOUNDARY OF LOT 710 DP726654. (NSW/QLD BORDER)			
DP755740			
Lot(s): 54, 55			
DP1051024	REGISTERED	SURVEY	EASEMENT
Lot(s): 58, 321			
DP1093882	REGISTERED	SURVEY	ROADS ACT, 1993
DP837715			
Lot(s): 3			
DP1017336	REGISTERED	SURVEY	SUBDIVISION
P1011625			
Lot(s): 1			
DP607299	HISTORICAL	SURVEY	OLD SYSTEM CONVERSION
DP1092051			
Lot(s): 2			
PA82104 - LOT 2 DP1092051			
NSW GAZ 31-03-2006 Folio : 1741			
Acquired for the Purposes of the Roads Act,1993 LOT 2 DP1092051			
DP1093704			
Lot(s): 670			
DP755740	HISTORICAL	COMPILATION	CROWN ADMIN NO.
DP1093882			
Lot(s): 4, 5, 6, 7			
DP1143758	REGISTERED	SURVEY	SURVEY INFORMATION ONLY
NSW GAZ 10-02-2006 Folio : 771			
Reservation Of Crown Land Reserve No. 1011248 AND GAZ. 17.2.2006 FOL. 841 - ALSO SEE GAZ. 10.2.2006 FOL. 771			
NSW GAZ 26-05-2006 Folio : 3204			
Acquired for the Purposes of the Roads Act,1993 LOTS 4-8 DP1093882			
DP1094312			
t(s): 666			
DP610969	HISTORICAL	COMPILATION	SUBDIVISION
DP1102377			
Lot(s): 7			
DP856966	HISTORICAL	SURVEY	SUBDIVISION
DP1114577			
Lot(s): 7			
DP259282	HISTORICAL	SURVEY	SUBDIVISION
DP1120061			
Lot(s): 100, 101, 102			
DP535537	HISTORICAL	SURVEY	RESUMPTION OR ACQUISITION
DP1120987			
Lot(s): 7307			
DP1119883	REGISTERED	COMPILATION	CROWN LAND CONVERSION
DP1120989			
Lot(s): 7300			
DP1143758	REGISTERED	SURVEY	SURVEY INFORMATION ONLY
NSW GAZ 10-02-2006 Folio : 771			
Reservation Of Crown Land Reserve No. 1011248 AND GAZ. 17.2.2006 FOL. 841 - ALSO SEE GAZ. 10.2.2006 FOL. 771			

Department of Lands
Reliable from the ground up

Cadastral Records Enquiry Report

Requested Parcel : Lot 100 DP 1120061 **Identified Parcel** : Lot 100 DP 1120061

Locality : TWEED HEADS WEST **LGA** : TWEED **Parish** : TERRANORA **County** : ROUS

	Status	Surv/Comp	Purpose
DP1121137			
Lot(s): 9			
DP856966	HISTORICAL	SURVEY	SUBDIVISION
DP1102377	REGISTERED	SURVEY	SUBDIVISION
DP1127593			
Lot(s): 105, 106, 107, 108			
DP226067	HISTORICAL	SURVEY	ROAD OR MOTORWAY
Lot(s): 103, 104			
DP8655	HISTORICAL	SURVEY	UNRESEARCHED
SP47806			
DP266190	REGISTERED	COMPILATION	EASEMENT
SP60680			
DP866281	HISTORICAL	SURVEY	SUBDIVISION
SP62509			
DP866281	HISTORICAL	SURVEY	SUBDIVISION
SP63667			
DP866281	HISTORICAL	SURVEY	SUBDIVISION
SP67145			
DP790029	HISTORICAL	SURVEY	SUBDIVISION
SP77115			
DP755740	HISTORICAL	COMPILATION	CROWN ADMIN NO.
DP1094312	REGISTERED	SURVEY	REDEFINITION
SP77153			
DP755740	HISTORICAL	COMPILATION	CROWN ADMIN NO.
DP1093704	REGISTERED	SURVEY	REDEFINITION
SP80033			
DP822879	HISTORICAL	COMPILATION	CROWN FOLIO CREATION
DP856966	HISTORICAL	SURVEY	SUBDIVISION
DP1102377	REGISTERED	SURVEY	SUBDIVISION
DP1121137	REGISTERED	SURVEY	SUBDIVISION
SP80305			
DP866281	HISTORICAL	SURVEY	SUBDIVISION
Intersection			
Polygon Id(s): 105158652			
NSW GAZ	19-12-2003		Folio : 11467
TRANSFER OF CROWN ROAD TO TWEED SHIRE COUNCIL			
Road			
Polygon Id(s): 105186877			
PA82135 (LOTS 4-8 DP1093882)			
Polygon Id(s): 105561283			
DP1143758	REGISTERED	SURVEY	SURVEY INFORMATION ONLY
NSW GAZ	26-05-2006		Folio : 3204
Acquired for the Purposes of the Roads Act,1993			
LOTS 4-8 DP1093882			
Polygon Id(s): 105659423			
NSW GAZ	19-12-2003		Folio : 11467
TRANSFER OF CROWN ROAD TO TWEED SHIRE COUNCIL			
Water Feature			
Polygon Id(s): 160260553			
NSW GAZ	29-02-2008		Folio : 1394
Acquired for Council Purposes			
LOT 1 DP1104678			

Department of Lands
Reliable from the ground up

Cadastral Records Enquiry Report

Requested Parcel : Lot 100 DP 1120061 **Identified Parcel** : Lot 100 DP 1120061

Locality : TWEED HEADS WEST **LGA** : TWEED **Parish** : TERRANORA **County** : ROUS

Plan	Surv/Comp	Purpose
DP25241	SURVEY	UNRESEARCHED
DP30600	SURVEY	UNRESEARCHED
DP31368	SURVEY	UNRESEARCHED
DP31369	SURVEY	UNRESEARCHED
DP92695	COMPILATION	DEPARTMENTAL
DP226067	SURVEY	ROAD OR MOTORWAY
DP243479	SURVEY	SUBDIVISION
DP244220	SURVEY	SUBDIVISION
DP246488	SURVEY	SUBDIVISION
DP246854	SURVEY	SUBDIVISION
DP248924	SURVEY	SUBDIVISION
DP249155	SURVEY	SUBDIVISION
DP251298	SURVEY	SUBDIVISION
DP253826	SURVEY	SUBDIVISION
DP253915	SURVEY	SUBDIVISION
DP259282	SURVEY	SUBDIVISION
DP261249	SURVEY	SUBDIVISION
DP261250	SURVEY	SUBDIVISION
DP262417	SURVEY	SUBDIVISION
DP412404	SURVEY	UNRESEARCHED
DP518902	SURVEY	SUBDIVISION
DP529871	COMPILATION	SUBDIVISION
DP535537	SURVEY	RESUMPTION OR ACQUISITION
DP542273	SURVEY	SUBDIVISION
DP569304	SURVEY	SUBDIVISION
DP582467	SURVEY	OLD SYSTEM CONVERSION
DP588564	SURVEY	SUBDIVISION
DP603333	SURVEY	SUBDIVISION
DP615054	SURVEY	SUBDIVISION
DP617065	COMPILATION	SUBDIVISION
DP716288	SURVEY	SUBDIVISION
DP716289	SURVEY	SUBDIVISION
DP716290	SURVEY	SUBDIVISION
DP716291	SURVEY	SUBDIVISION
DP716292	SURVEY	SUBDIVISION
DP726654	COMPILATION	CROWN FOLIO CREATION
DP755740	COMPILATION	CROWN ADMIN NO.
DP774945	COMPILATION	SUBDIVISION
DP788912	COMPILATION	SUBDIVISION
DP790029	SURVEY	SUBDIVISION
DP801161	SURVEY	SUBDIVISION
DP803197	SURVEY	SUBDIVISION
DP812023	SURVEY	SUBDIVISION
DP819023	SURVEY	SUBDIVISION
DP825038	SURVEY	SUBDIVISION
DP828025	SURVEY	SUBDIVISION
DP834646	SURVEY	SUBDIVISION
DP837715	SURVEY	SUBDIVISION
DP841037	SURVEY	SUBDIVISION
DP842123	SURVEY	SUBDIVISION
DP855362	SURVEY	SUBDIVISION
DP856966	SURVEY	SUBDIVISION
DP860569	SURVEY	SUBDIVISION
DP866281	SURVEY	SUBDIVISION
DP866375	COMPILATION	CONSOLIDATION
DP1011625	SURVEY	SUBDIVISION
DP1058619	COMPILATION	DEPARTMENTAL
DP1084319	SURVEY	ROADS ACT, 1993
DP1092051	SURVEY	ROADS ACT, 1993
DP1093704	SURVEY	REDEFINITION
DP1093882	SURVEY	ROADS ACT, 1993
DP1094312	SURVEY	REDEFINITION
DP1102377	SURVEY	SUBDIVISION
DP1113328	COMPILATION	DEPARTMENTAL
DP1113336	COMPILATION	DEPARTMENTAL
DP1113622	COMPILATION	DEPARTMENTAL
DP1113872	COMPILATION	DEPARTMENTAL
DP1113873	COMPILATION	DEPARTMENTAL
DP1113881	COMPILATION	DEPARTMENTAL

Department of Lands
Reliable from the ground up

Cadastral Records Enquiry Report

Requested Parcel : Lot 100 DP 1120061 **Identified Parcel** : Lot 100 DP 1120061

Locality : TWEED HEADS WEST **LGA** : TWEED **Parish** : TERRANORA **County** : ROUS

Plan	Surv/Comp	Purpose
DP1114577	COMPILATION	CONSOLIDATION
DP1120061	SURVEY	ROADS ACT, 1993
DP1120987	COMPILATION	CROWN LAND CONVERSION
DP1120989	COMPILATION	CROWN LAND CONVERSION
DP1121137	SURVEY	SUBDIVISION
DP1127593	SURVEY	ROADS ACT, 1993
SP12774	COMPILATION	STRATA PLAN
SP13748	COMPILATION	STRATA PLAN
SP13806	COMPILATION	STRATA PLAN
SP14160	COMPILATION	STRATA PLAN
SP15419	COMPILATION	STRATA PLAN
SP15972	COMPILATION	STRATA PLAN
SP15973	COMPILATION	STRATA PLAN
SP15974	COMPILATION	STRATA PLAN
SP16017	COMPILATION	STRATA PLAN
SP16260	COMPILATION	STRATA PLAN
SP16276	COMPILATION	STRATA PLAN
SP16693	COMPILATION	STRATA PLAN
SP16747	COMPILATION	STRATA PLAN
SP17164	COMPILATION	STRATA PLAN
SP17274	COMPILATION	STRATA PLAN
SP17863	COMPILATION	STRATA PLAN
SP18044	COMPILATION	STRATA PLAN
SP18176	COMPILATION	STRATA PLAN
SP18206	COMPILATION	STRATA PLAN
SP18314	COMPILATION	STRATA PLAN
SP18383	COMPILATION	STRATA PLAN
SP18510	COMPILATION	STRATA PLAN
SP18532	COMPILATION	STRATA PLAN
SP18542	COMPILATION	STRATA PLAN
SP19114	COMPILATION	STRATA PLAN
SP19142	COMPILATION	STRATA PLAN
SP19148	COMPILATION	STRATA PLAN
SP19363	COMPILATION	STRATA PLAN
SP19365	COMPILATION	STRATA PLAN
SP19492	COMPILATION	STRATA PLAN
SP19564	COMPILATION	STRATA PLAN
SP19799	COMPILATION	STRATA PLAN
SP19826	COMPILATION	STRATA PLAN
SP19852	COMPILATION	STRATA PLAN
SP19930	COMPILATION	STRATA PLAN
SP20005	COMPILATION	STRATA PLAN
SP20022	COMPILATION	STRATA PLAN
SP20040	COMPILATION	STRATA PLAN
SP20124	COMPILATION	STRATA PLAN
SP20207	COMPILATION	STRATA PLAN
SP20389	COMPILATION	STRATA PLAN
SP20446	COMPILATION	STRATA PLAN
SP20485	COMPILATION	STRATA PLAN
SP21130	COMPILATION	STRATA PLAN
SP21465	COMPILATION	STRATA PLAN
SP21708	COMPILATION	STRATA PLAN
SP21874	COMPILATION	STRATA PLAN
SP21875	COMPILATION	STRATA PLAN
SP21964	COMPILATION	STRATA PLAN
SP30378	COMPILATION	STRATA PLAN
SP30613	COMPILATION	STRATA PLAN
SP30637	COMPILATION	STRATA PLAN
SP31689	COMPILATION	STRATA PLAN
SP31784	COMPILATION	STRATA PLAN
SP31897	COMPILATION	STRATA PLAN
SP31992	COMPILATION	STRATA PLAN
SP32028	COMPILATION	STRATA PLAN
SP32085	COMPILATION	STRATA PLAN
SP32100	COMPILATION	STRATA PLAN
SP32113	COMPILATION	STRATA PLAN
SP32203	COMPILATION	STRATA PLAN
SP32289	COMPILATION	STRATA PLAN
SP32794	COMPILATION	STRATA PLAN

Department of Lands
Reliable from the ground up

Cadastral Records Enquiry Report

Requested Parcel : Lot 100 DP 1120061 **Identified Parcel** : Lot 100 DP 1120061

Locality : TWEED HEADS WEST **LGA** : TWEED **Parish** : TERRANORA **County** : ROUS

Plan	Surv/Comp	Purpose
SP33714	COMPILATION	STRATA PLAN
SP35574	COMPILATION	STRATA PLAN
SP35809	COMPILATION	STRATA PLAN
SP36263	COMPILATION	STRATA PLAN
SP36298	COMPILATION	STRATA PLAN
SP37030	COMPILATION	STRATA PLAN
SP37876	COMPILATION	STRATA PLAN
SP37923	COMPILATION	STRATA PLAN
SP38152	COMPILATION	STRATA PLAN
SP41028	COMPILATION	STRATA PLAN
SP41154	COMPILATION	STRATA PLAN
SP42079	COMPILATION	STRATA PLAN
SP43809	COMPILATION	STRATA PLAN
SP44089	COMPILATION	STRATA PLAN
SP44469	COMPILATION	STRATA PLAN
SP44800	COMPILATION	STRATA PLAN
SP44854	COMPILATION	STRATA PLAN
SP47097	COMPILATION	STRATA PLAN
SP47806	COMPILATION	STRATA PLAN
SP48196	COMPILATION	STRATA PLAN
SP48761	COMPILATION	STRATA PLAN
SP49532	COMPILATION	STRATA PLAN
SP49808	COMPILATION	STRATA PLAN
SP50367	COMPILATION	STRATA PLAN
SP51452	COMPILATION	STRATA PLAN
SP53129	COMPILATION	STRATA PLAN
SP53925	COMPILATION	STRATA PLAN
SP58390	COMPILATION	STRATA PLAN
SP60680	COMPILATION	STRATA PLAN
SP62509	COMPILATION	STRATA PLAN
SP63667	COMPILATION	STRATA PLAN
SP67145	COMPILATION	STRATA PLAN
SP77115	COMPILATION	STRATA PLAN
SP77153	COMPILATION	STRATA PLAN
SP80033	COMPILATION	STRATA PLAN
SP80305	COMPILATION	STRATA PLAN

CURRENT TITLE SEARCH

ENVIRONMENT AND RESOURCE MANAGEMENT, QUEENSLAND

Request No: 8609498
Search Date: 17/02/2010 10:41

Title Reference: 18265246
Date Created: 07/02/1992

Previous Title: 14507118
15255211

REGISTERED OWNER

Dealing No: 703121067 19/01/1999

COMMONWEALTH OF AUSTRALIA

ESTATE AND LAND

Estate in Fee Simple

LOT 222 REGISTERED PLAN 839951
County of WARD Parish of TALLEBUDGERA
Local Government: GOLD COAST

EASEMENTS, ENCUMBRANCES AND INTERESTS

1. Rights and interests reserved to the Commonwealth by Conveyance No. 601285567 (K828645Y) (Lot 222 on RP 839951)

2. EASEMENT No 601285565 (K133792H) 20/12/1989
BENEFITING THE LAND
OVER LOTS 43 TO 46 ON RP32012 AND LOTS 13 TO 15 ON RP32013

3. LEASE No 703150372 03/02/1999 at 14:42
QUEENSLAND AIRPORTS LIMITED A.C.N. 077 200 821

4. MORTGAGE No 703222327 12/03/1999 at 16:00
NATIONAL AUSTRALIA BANK LIMITED A.C.N. 004 044 937
over
LEASE: 703150372

5. TRANSFER No 706709956 18/06/2003 at 11:16
MORTGAGE: 703222327
WESTPAC ADMINISTRATION PTY LIMITED A.B.N. 67 008 617 203

6. TRANSFER No 709444068 16/03/2006 at 15:07
MORTGAGE: 703222327
CBA CORPORATE SERVICES (NSW) PTY LIMITED A.B.N. 25 072 765 434

7. CHANGE OF NAME No 711164572 09/11/2007 at 09:18
LEASE: 703150372
GOLD COAST AIRPORT PTY LIMITED A.C.N. 077 200 821

ADMINISTRATIVE ADVICES - NIL
UNREGISTERED DEALINGS - NIL

CERTIFICATE OF TITLE ISSUED - No

CURRENT TITLE SEARCH

ENVIRONMENT AND RESOURCE MANAGEMENT, QUEENSLAND

Request No: 8609498
Search Date: 17/02/2010 10:41

Title Reference: 18265246
Date Created: 07/02/1992

Caution - Charges do not necessarily appear in order of priority

** End of Current Title Search **

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Requested By: External Supervisor

CURRENT TITLE SEARCH

ENVIRONMENT AND RESOURCE MANAGEMENT, QUEENSLAND

Request No: 8609498
Search Date: 17/02/2010 10:41 Title Reference: 18287103
Date Created: 17/03/1992

Previous Title: 14505240
14515067
16367240
18074094

REGISTERED OWNER

Dealing No: 703121067 19/01/1999

COMMONWEALTH OF AUSTRALIA

ESTATE AND LAND

Estate in Fee Simple

LOT 5 REGISTERED PLAN 839952
County of WARD Parish of TALLEBUDGERA
Local Government: GOLD COAST

EASEMENTS, ENCUMBRANCES AND INTERESTS

1. Rights and interests reserved to the Crown by
Conveyance No. 601285567 (K828645Y) (POR 87)
(Lot 263 on CP WD5115)

2. EASEMENT No 601285565 (K133792H) 20/12/1989
BENEFITING PART OF THE LAND
OVER LOTS 43 TO 46 ON RP32012 AND LOTS 13 TO 15 ON RP32013

3. EASEMENT IN GROSS No 601999459 (K567185X) 05/03/1991
BURDENING THE LAND
TO COUNCIL OF THE CITY OF GOLD COAST
OVER EASEMENT C ON CP WD6509 AND EASEMENT D ON RP215291

4. LEASE No 702577849 24/03/1998 at 13:46
HERTZ AUSTRALIA PTY LTD A.C.N. 004 407 087
OF PART OF THE LAND AS SHOWN IN SKETCH (SITE 403)

5. AMENDMENT OF LEASE No 711690194 02/06/2008 at 10:09
LEASE: 702577849
TERM: 01/10/1996 TO 30/09/2016 OPTION NIL

6. LEASE No 703150372 03/02/1999 at 14:42
QUEENSLAND AIRPORTS LIMITED A.C.N. 077 200 821

7. MORTGAGE No 703222327 12/03/1999 at 16:00
NATIONAL AUSTRALIA BANK LIMITED A.C.N. 004 044 937
over
LEASE: 703150372

8. TRANSFER No 709444068 16/03/2006 at 15:07
MORTGAGE: 703222327
CBA CORPORATE SERVICES (NSW) PTY LIMITED A.B.N. 25 072 765 434

CURRENT TITLE SEARCH

ENVIRONMENT AND RESOURCE MANAGEMENT, QUEENSLAND

Request No: 8609498
Search Date: 17/02/2010 10:41 **Title Reference: 18287103**
Date Created: 17/03/1992

EASEMENTS, ENCUMBRANCES AND INTERESTS

9. SUB LEASE No 704537998 17/01/2001 at 11:04
   LEASE: 703150372
   W.T.H. PTY LTD A.C.N. 000 165 855
   OF LEASE I ON SP132451

10. AMENDMENT OF LEASE No 711559459 08/04/2008 at 10:10
    SUB LEASE: 704537998
    TERM: 05/06/2000 TO 30/09/2016 OPTION NIL

11. SUB LEASE No 704553894 25/01/2001 at 11:03
    LEASE: 703150372
    JONDAY HOLDINGS PTY LTD A.C.N. 011 049 531
    OF LEASE H ON SP113425

12. SUB LEASE No 704563536 01/02/2001 at 09:37
    LEASE: 703150372
    LUCENT TECHNOLOGIES AUSTRALIA PTY LIMITED A.C.N. 002 326 687

    OVER LEASE C ON SP132455

13. TRANSFER No 705824314 26/07/2002 at 08:54
    SUB LEASE: 704563536
    SUB LEASE: 704565076
    SUB LEASE: 704565079
    HUTCHISON 3G AUSTRALIA PTY LIMITED A.C.N. 096 304 620

14. SUB LEASE No 709595684 16/05/2006 at 11:08
    SUB LEASE: 704563536
    H3GA PROPERTIES (NO. 3) PTY LIMITED A.C.N. 117 230 574
    OF LEASE C ON SP132455
    TERM: 01/12/2005 TO 03/05/2010 OPTION NIL

15. SUB LEASE No 704565076 01/02/2001 at 14:25
    LEASE: 703150372
    LUCENT TECHNOLOGIES AUSTRALIA PTY LIMITED A.C.N. 002 326 678

    OVER LEASE C ON SP132455

16. SUB LEASE No 709595713 16/05/2006 at 11:10
    SUB LEASE: 704565076
    H3GA PROPERTIES (NO. 3) PTY LIMITED A.C.N. 117 230 574
    OF LEASE C ON SP132455
    TERM: 05/05/2010 TO 03/05/2015 OPTION NIL

17. SUB LEASE No 704565079 01/02/2001 at 14:25
    LEASE: 703150372
    LUCENT TECHNOLOGIES AUSTRALIA PTY LIMITED A.C.N. 002 326 687

    OVER LEASE C ON SP132455

EASEMENTS, ENCUMBRANCES AND INTERESTS

18. SUB LEASE No 709595715 16/05/2006 at 11:10
SUB LEASE: 704565079
H3GA PROPERTIES (NO. 3) PTY LIMITED A.C.N. 117 230 574
OF LEASE C ON SP132455
TERM: 05/05/2015 TO 03/05/2020 OPTION NIL

19. SUB LEASE No 704586438 13/02/2001 at 10:06
LEASE: 703150372
TRAZBOARD PTY LTD A.C.N. 002 456 984 TRUSTEE

UNDER INSTRUMENT NO: 704586438.
OVER LEASE A ON SP132455.

20. SUB LEASE No 707452347 06/02/2004 at 12:40
LEASE: 703150372
ASCOT CAR AND UTE RENTALS AUSTRALIA PTY LTD A.C.N. 001 758 309
OVER LEASE J ON SP132452

21. SUB LEASE No 708014282 31/08/2004 at 09:03
LEASE: 703150372
HERTZ AUSTRALIA PTY LTD A.C.N. 004 407 087
OF LEASE X ON SP160631

22. AMENDMENT OF LEASE No 711690190 02/06/2008 at 10:09
SUB LEASE: 708014282
TERM: 01/01/2004 TO 30/09/2016 OPTION NIL

23. CHANGE OF NAME No 711164572 09/11/2007 at 09:18
LEASE: 703150372
GOLD COAST AIRPORT PTY LIMITED A.C.N. 077 200 821.

24. SUB LEASE No 711467844 29/02/2008 at 12:21
LEASE: 703150372
HERTZ AUSTRALIA PTY LTD A.C.N. 004 407 087
OF LEASE Z ON SP172329
TERM: 01/05/2005 TO 30/09/2006 OPTION 10 YEARS

25. AMENDMENT OF LEASE No 711661574 21/05/2008 at 10:12
SUB LEASE: 711467844
TERM: 01/05/2005 TO 30/09/2016 OPTION NIL

26. SUB LEASE No 711954334 30/09/2008 at 13:34
LEASE: 703150372
SOUTHERN CROSS UNIVERSITY
OF PART OF THE LAND (LEASES SCUA AND SCUB)
TERM: 01/03/2008 TO 25/05/2047 OPTION 48 YEARS

CURRENT TITLE SEARCH

ENVIRONMENT AND RESOURCE MANAGEMENT, QUEENSLAND

Request No: 8609498
Search Date: 17/02/2010 10:41

Title Reference: 18287103
Date Created: 17/03/1992

EASEMENTS, ENCUMBRANCES AND INTERESTS

27. SUB LEASE No 712925496 10/12/2009 at 10:35
LEASE: 703150372
TRAZBOARD PTY LTD A.C.N. 002 456 984 TRUSTEE
UNDER INSTRUMENT 712925496
OF LEASE Y ON SP182235
TERM: 19/04/2005 TO 18/04/2010 OPTION 5 YEARS

ADMINISTRATIVE ADVICES - NIL
UNREGISTERED DEALINGS - NIL

CERTIFICATE OF TITLE ISSUED - No

Caution - Charges do not necessarily appear in order of priority

** End of Current Title Search **

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Requested By: External Supervisor

ENVIRONMENT AND RESOURCE MANAGEMENT, QUEENSLAND

Request No: 8609498
Search Date: 17/02/2010 10:41

Title Reference: 17457085
Date Created: 29/01/1990

Previous Title: 11719166
12118003
12840149
13220152
13220153

REGISTERED OWNER

Dealing No: 703121067 19/01/1999

COMMONWEALTH OF AUSTRALIA

ESTATE AND LAND

Estate in Fee Simple

LOT 1 REGISTERED PLAN 225692
County of WARD Parish of TALLEBUDGERA
Local Government: GOLD COAST

EASEMENTS, ENCUMBRANCES AND INTERESTS

1. Rights and interests reserved to the Commonwealth by
Conveyance No. 602364686 (10176) (POR 144)
Conveyance No. 602364687 (9957) (POR 84)
(POR 85)
(POR 86)
Conveyance No. 602364688 (B232406) (POR 49)
Conveyance No. 602364689 (G888133) (POR 63)

2. EASEMENT No 601285565 (K133792H) 20/12/1989
BENEFITING THE LAND
OVER LOTS 43 TO 46 ON RP32012 AND LOTS 13 TO 15 ON RP32013

3. EASEMENT IN GROSS No 601999459 (K567185X) 05/03/1991
BURDENING THE LAND
TO COUNCIL OF THE CITY OF GOLD COAST
OVER EASEMENT A ON RP205436

4. LEASE No 602364682 (L746204E) 30/11/1993
OF PART OF THE LAND
TO ANWAY PTY LTD
ORIGINAL TERM: COMMENCING 01 DEC 1989
TERMINATING 30 NOV 2009
OR OPTIONS AS MAY BE STATED

5. TRANSFER No 704541486 18/01/2001 at 15:58
LEASE: 602364682 (L746204E)
LEISA RENEE CLARK

6. AMENDMENT No 704702385 12/04/2001 at 10:35
LEASE: 602364682 (L746204E)

CURRENT TITLE SEARCH

ENVIRONMENT AND RESOURCE MANAGEMENT, QUEENSLAND

Request No: 8609498
Search Date: 17/02/2010 10:41

Title Reference: 17457085
Date Created: 29/01/1990

EASEMENTS, ENCUMBRANCES AND INTERESTS

7. LEASE No 702482286 02/02/1998 at 11:39
   AIRSERVICES AUSTRALIA
   of part of the land as shown in sketch plan

8. LEASE No 702500558 11/02/1998 at 10:08
   AIRSERVICES AUSTRALIA
   OF PART OF THE LAND AS SHOWN IN SKETCH

9. LEASE No 702784976 14/07/1998 at 10:56
   SHERWELL HOLDINGS PTY LTD A.C.N. 005 651 525
   OVER PART OF THE LAND

10. TRANSFER No 705890296 22/08/2002 at 09:00
    LEASE: 702784976
    CAREFLIGHT QUEENSLAND LIMITED A.C.N. 010 316 462

11. LEASE No 703150372 03/02/1999 at 14:42
    QUEENSLAND AIRPORTS LIMITED A.C.N. 077 200 821

12. MORTGAGE No 703222327 12/03/1999 at 16:00
    NATIONAL AUSTRALIA BANK LIMITED A.C.N. 004 044 937
    over
    LEASE: 703150372

13. TRANSFER No 709444068 16/03/2006 at 15:07
    MORTGAGE: 703222327
    CBA CORPORATE SERVICES (NSW) PTY LIMITED A.B.N. 25 072 765 434

14. SUB LEASE No 705160267 02/11/2001 at 10:26
    LEASE: 703150372
    DUTY FREE STORES GOLD COAST PTY LTD A.C.N. 093 569 263
    OF PARTS OF THE GROUND FLOOR

15. SUB LEASE No 705166348 06/11/2001 at 10:26
    LEASE: 703150372
    SEAIR AVAITION PTY LTD A.C.N. 079 973 827 TRUSTEE
    UNDER INSTRUMENT 705166348
    OF LEASE M ON SP136954

16. SUB LEASE No 705192134 16/11/2001 at 09:27
    LEASE: 703150372
    THL COOLANGATTA PTY LTD A.C.N. 091 486 645
    OF LEASE K ON SP132454
    PRODUCED 09/10/2001 RECORDED ON 10/10/2001
    TO IDENTIFY SUB LEASE 705101120 PRODUCED 09/10/2001

17. SUB LEASE No 705444695 04/03/2002 at 14:18
    SUB LEASE: 705192134
    SUPERCHOOK PTY LTD A.C.N. 094 638 249
    OF PART OF THE GROUND FLOOR

EASEMENTS, ENCUMBRANCES AND INTERESTS

18. AMENDMENT OF LEASE No 711417456 12/02/2008 at 12:38
SUB LEASE: 705444695
TERM: 21/02/2001 TO 20/02/2011 OPTION 5 YEARS

19. TRANSFER No 711680873 28/05/2008 at 13:36
SUB LEASE: 705444695
SKYAN PTY LTD A.C.N. 129 943 666

20. SUB LEASE No 705448476 05/03/2002 at 14:35
SUB LEASE: 705192134
SUBWAY REALTY PTY LTD A.C.N. 009 277 374
PART OF THE GROUND FLOOR

21. AMENDMENT OF LEASE No 709762898 11/07/2006 at 15:00
SUB LEASE: 705448476
TERM: 07/06/2001 TO 06/06/2011 OPTION 5 YEARS

22. SUB LEASE No 705448508 05/03/2002 at 14:37
SUB LEASE: 705192134
COOLANGATTA AIRPORT AUTO AFFAIR CAR WASH CENTRE PTY LTD
A.C.N. 092 908 239
PART OF THE GROUND FLOOR

23. AMENDMENT No 707314691 18/12/2003 at 13:23
SUB LEASE: 705448508

24. AMENDMENT No 706138683 21/11/2002 at 15:57
SUB LEASE: 705192134

25. SUB LEASE No 706363848 17/02/2003 at 15:20
SUB LEASE: 705192134
GOLD COAST AIRPORT LIMITED A.C.N. 077 200 821
OF PART OF THE FIRST FLOOR

26. SUB LEASE No 708366777 17/01/2005 at 12:02
SUB LEASE: 705192134
GAME SHOW PROMOTIONS (AUSTRALIA) PTY LTD A.C.N. 101 197 200
OF PART OF THE GROUND FLOOR (TENANCY F8)
TERM: 15/11/2004 TO 31/03/2008 OPTION 5 YEARS

27. TRANSFER No 709639316 30/05/2006 at 15:51
SUB LEASE: 708366777
QUEENSLAND AIRPORTS LIMITED A.C.N. 077 200 821

28. SUB LEASE No 708589686 18/04/2005 at 12:26
SUB LEASE: 705192134
JAMES ROBERT KAY
PART OF THE GROUND FLOOR OF THE BUILDING

29. TRANSFER No 709911673 06/09/2006 at 08:45
SUB LEASE: 708589686
TENUTO PTY LTD A.B.N. 50 010 365 189

CURRENT TITLE SEARCH

ENVIRONMENT AND RESOURCE MANAGEMENT, QUEENSLAND

Request No: 8609498
Search Date: 17/02/2010 10:41

Title Reference: 17457085
Date Created: 29/01/1990

EASEMENTS, ENCUMBRANCES AND INTERESTS

30. SUB LEASE No 708744374 17/06/2005 at 12:20
SUB LEASE: 705192134
OCEAN & EARTH AUSTRALIA PTY LIMITED A.C.N. 056 504 191
PART OF THE GROUND FLOOR

31. TRANSFER No 708838952 21/07/2005 at 10:17
SUB LEASE: 705192134
C & P PROPERTIES (QLD) PTY LTD A.C.N. 112 576 299
TRUSTEE 1/2
UNDER INSTRUMENT 708838952
C & P PROPERTIES (QLD) PTY LTD A.C.N. 112 576 299
TRUSTEE 1/2
UNDER INSTRUMENT 708838952

32. MORTGAGE No 708839026 21/07/2005 at 10:20
PERPETUAL TRUSTEE COMPANY LIMITED A.B.N. 42 000 001 007
over
SUB LEASE: 705192134

33. SUB LEASE No 709133146 14/11/2005 at 13:26
SUB LEASE: 705192134
ANNEDAN HOLDINGS PTY LTD A.C.N. 115 436 336
OF PART OF THE GROUND FLOOR
TERM: 01/06/2005 TO 31/05/2008 OPTION 3 X 3 YEARS

34. SUB LEASE No 709447346 17/03/2006 at 13:49
SUB LEASE: 705192134
MANORBROCK PTY LTD A.C.N. 099 965 214
OF PART OF THE GROUND FLOOR OF A BUILDING (TENANCY B8)
TERM: 23/09/2005 TO 22/09/2008 OPTION 3 YEARS

35. AMENDMENT OF LEASE No 711732826 19/06/2008 at 11:51
SUB LEASE: 709447346
TERM: 23/09/2005 TO 22/09/2009 OPTION NIL

36. SUB LEASE No 709447379 17/03/2006 at 13:53
SUB LEASE: 705192134
DUTY FREE STORES GOLD COAST PTY LTD A.C.N. 093 569 263
OF PART OF THE GROUND FLOOR OF A BUILDING
(TENANCY F13, F14 AND F15)
TERM: 14/11/2005 TO 13/09/2008 OPTION 2 YEARS

37. SUB LEASE No 709504170 07/04/2006 at 14:12
SUB LEASE: 705192134
BRIDGET GRAY
OF PART OF THE GROUND FLOOR OF A BUILDING (TENANCY B7)
TERM: 15/01/2006 TO 14/01/2009 OPTION 5 YEARS

38. TRANSFER No 710790643 06/07/2007 at 14:10
SUB LEASE: 709504170
MANAGEMENT STRATEGIES PTY LTD A.C.N. 115 054 441

CURRENT TITLE SEARCH

ENVIRONMENT AND RESOURCE MANAGEMENT, QUEENSLAND

Request No: 8609498
Search Date: 17/02/2010 10:41 Title Reference: 17457085
Date Created: 29/01/1990

EASEMENTS, ENCUMBRANCES AND INTERESTS

39. SUB LEASE No 709513450 11/04/2006 at 15:46
SUB LEASE: 705192134
EAST COAST COMMUNITY CARE INCORPORATED A.R.B.N. 108 970 529
OF PART OF THE GROUND FLOOR (LEASE B4/B6)
TERM: 15/01/2006 TO 14/01/2007 OPTION 1 YEAR

40. SUB LEASE No 709531410 20/04/2006 at 13:33
SUB LEASE: 705192134
HELICOPTER ASSOCIATION OF AUSTRALASIA PTY LTD A.C.N. 002 579 580
OF PART OF THE GROUND FLOOR OF THE BUILDING (TENANCY D13)
TERM: 04/04/2006 TO 03/04/2009 OPTION 3 YEARS

41. SUB LEASE No 709723995 28/06/2006 at 13:51
SUB LEASE: 705192134
T & T BUILDING (PRESTIGE) PTY LTD A.C.N. 110 353 181
OF PART OF THE GROUND FLOOR (TENANCY F16)
TERM: 17/06/2006 TO 12/01/2008 OPTION 5 YEARS

42. SUB LEASE No 710165564 07/12/2006 at 14:40
SUB LEASE: 705192134
COMMONWEALTH OF AUSTRALIA
OF PART OF THE GROUND FLOOR (SUBLEASE F10 AND F17)
TERM: 03/04/2006 TO 02/04/2008 OPTION 1 YEAR

43. SUB LEASE No 710790545 06/07/2007 at 13:51
SUB LEASE: 705192134
KEYTE REALTY PTY LTD A.C.N. 111 068 421
OF PART OF THE GROUND FLOOR (TENANCY F1)
TERM: 01/06/2007 TO 31/05/2008 OPTION 3 YEARS

44. AMENDMENT OF LEASE No 711756593 27/06/2008 at 13:33
SUB LEASE: 710790545
TERM: 01/06/2007 TO 30/05/2011 OPTION NIL

45. SUB LEASE No 711406065 07/02/2008 at 14:01
SUB LEASE: 705192134
EAST COAST COMMUNITY CARE INCORPORATED A.R.B.N. 108 970 529
OF PART OF THE GROUND FLOOR (TENANCY B3 & B5)
TERM: 01/09/2007 TO 14/01/2009 OPTION 3 YEARS

46. SUB LEASE No 711471126 03/03/2008 at 12:21
SUB LEASE: 705192134
GLOBAL EDGE GROUP PTY LTD A.C.N. 086 732 809
OF PART OF THE GROUND FLOOR (TENANCY D10)
TERM: 01/03/2008 TO 28/02/2010 OPTION 2 YEARS

47. SUB LEASE No 712050784 17/11/2008 at 12:17
SUB LEASE: 705192134
ANGELA SMITH
OF PART OF THE GROUND FLOOR (TENANCY F6 AND F7)
TERM: 01/01/2008 TO 31/12/2010 OPTION 3 YEARS

CURRENT TITLE SEARCH

ENVIRONMENT AND RESOURCE MANAGEMENT, QUEENSLAND

Request No: 8609498
Search Date: 17/02/2010 10:41 Title Reference: 17457085
Date Created: 29/01/1990

EASEMENTS, ENCUMBRANCES AND INTERESTS

48. SUB LEASE No 712146668 07/01/2009 at 12:49
SUB LEASE: 705192134
SOUTHERN CROSS UNIVERSITY
OF PART OF THE GROUND FLOOR (LEASE F11/12)
TERM: 01/03/2008 TO 28/02/2009 OPTION 1 YEAR

49. SUB LEASE No 712442436 29/05/2009 at 12:18
SUB LEASE: 705192134
ABORIGINAL AND TORRES STRAIT ISLANDERS CORPORATION FOR WELFARE, RESOURCE AND HOUSING
OF PART OF THE GROUND FLOOR (TENANCY F5 AND F9)
TERM: 12/05/2008 TO 11/05/2011 OPTION 3 YEARS

50. AMENDMENT OF LEASE No 712433311 26/05/2009 at 12:33
SUB LEASE: 712442436
TERM: 12/05/2008 TO 11/05/2013 OPTION 5 YEARS

51. SUB LEASE No 712687476 26/08/2009 at 13:01
SUB LEASE: 705192134
FRED KARL AZZARELLO
OF PART OF THE GROUND FLOOR - TENANCY E1
OF PART OF THE FIRST FLOOR - TENANCY E4
TERM: 01/06/2008 TO 06/01/2018 OPTION 10 YEARS

52. SUB LEASE No 712687486 26/08/2009 at 13:04
SUB LEASE: 705192134
AIRPORT TAVERN GOLD COAST PTY LTD A.C.N. 127 618 231
PART OF THE GROUND FLOOR TENANCIES D2, E, E2, E7, F2, F3, F4
PART OF THE FIRST FLOOR - TENANCY E3
TERM: 06/12/2007 TO 05/12/2011 OPTION 10 YEARS

53. SUB LEASE No 713039843 05/02/2010 at 13:30
SUB LEASE: 705192134
QUEENSLAND AIRPORTS LIMITED A.C.N. 104 121 824
OF PART OF THE FIRST FLOOR - TENANCY F19 & F21
TERM: 07/08/2007 TO 15/07/2011 OPTION 10 YEARS

54. SUB LEASE No 713039848 05/02/2010 at 13:30
SUB LEASE: 705192134
QUEENSLAND AIRPORTS LIMITED A.C.N. 104 121 824
OF PART OF THE FIRST FLOOR - TENANCY F20
TERM: 01/05/2008 TO 15/07/2011 OPTION 10 YEARS

55. SUB LEASE No 705319555 10/01/2002 at 15:30
LEASE: 703150372
HOPE'S BUS SERVICE PTY LTD A.C.N. 001 854 771
OF PART OF THE GROUND FLOOR

56. MORTGAGE No 709887866 29/08/2006 at 08:53
COMMONWEALTH BANK OF AUSTRALIA A.B.N. 48 123 123 124
over
SUB LEASE: 705319555

CURRENT TITLE SEARCH

ENVIRONMENT AND RESOURCE MANAGEMENT, QUEENSLAND

Request No: 8609498
Search Date: 17/02/2010 10:41

Title Reference: 17457085
Date Created: 29/01/1990

EASEMENTS, ENCUMBRANCES AND INTERESTS

57. SUB LEASE No 706297284 23/01/2003 at 08:48
LEASE: 703150372
COMMONWEALTH OF AUSTRALIA
OVER LEASE N ON SP136959

58. SUB LEASE No 707194372 14/11/2003 at 10:04
LEASE: 703150372
SPOTLESS SERVICES AUSTRALIA LIMITED A.C.N. 005 309 320
OF PART OF THE GROUND FLOOR

59. SUB LEASE No 707446586 05/02/2004 at 09:40
LEASE: 703150372
SUNDOWN PASTORAL COMPANY PTY LTD A.C.N. 000 334 190
OVER LEASE Q ON SP144103

60. SUB LEASE No 707448151 05/02/2004 at 13:13
LEASE: 703150372
GOLD COAST AIR TERMINAL SERVICES PTY LTD A.C.N. 066 991 259
OVER LEASE R ON SP153201

61. SUB LEASE No 707463521 11/02/2004 at 09:19
LEASE: 703150372
AIR GOLD COAST PTY LTD A.C.N. 010 792 800
OVER LEASE W ON SP160630

62. SUB LEASE No 707674631 28/04/2004 at 09:59
LEASE: 703150372
OCEANIA AVIATION SERVICES PTY LTD A.C.N. 072 468 163
OCEANIA AVIATION MAINTENANCE PTY LTD A.C.N. 099 868 916
JOINT TENANTS
OF LEASE P ON SP144103
TERM: 04/12/2002 TO 03/12/2022 OPTION NIL

63. MORTGAGE No 712398162 11/05/2009 at 14:25
WESTPAC BANKING CORPORATION A.B.N. 33 007 457 141
over
SUB LEASE: 707674631
AGAINST THE INTEREST OF OCEANIA AVIATION SERVICES PTY LTD
A.C.N. 072 468 163

64. TRANSFER No 712712186 07/09/2009 at 14:34
SUB LEASE: 707674631
OCEANIA AVIATION SERVICES PTY LTD A.C.N. 072 768 163

65. SUB LEASE No 707743695 24/05/2004 at 10:09
LEASE: 703150372
AUSTRALIAN AIR EXPRESS PTY LTD A.C.N. 054 307 336
LEASE AAE ON SP160636

CURRENT TITLE SEARCH

ENVIRONMENT AND RESOURCE MANAGEMENT, QUEENSLAND

Request No: 8609498
Search Date: 17/02/2010 10:41

Title Reference: 17457085
Date Created: 29/01/1990

EASEMENTS, ENCUMBRANCES AND INTERESTS

66. SUB LEASE No 707750720 26/05/2004 at 09:50
LEASE: 703150372
GOLD COAST HANGERS PTY LTD A.C.N. 103 791 480
LEASE S ON SP157946

67. SUB LEASE No 708586575 15/04/2005 at 12:34
LEASE: 703150372
VIRGIN BLUE AIRLINES PTY LTD A.C.N. 090 670 965
PART OF THE GROUND FLOOR

68. SUB LEASE No 708603758 22/04/2005 at 09:58
LEASE: 703150372
JETPOINT PTY LTD A.C.N. 086 471 132
OF LEASE JETP ON SP113421 AND LEASE Z ON SP172328
TERM: 01/01/2005 30/06/2008 OPTION NIL

69. SUB LEASE No 708829430 18/07/2005 at 12:09
LEASE: 703150372
OCEANIA AVIATION SERVICES PTY LTD A.C.N. 072 468 163
OF PART OF THE GROUND FLOOR

70. SUB LEASE No 709124227 10/11/2005 at 10:58
LEASE: 703150372
COMMONWEALTH OF AUSTRALIA
PART OF THE GROUND FLOOR

71. CHANGE OF NAME No 711164572 09/11/2007 at 09:18
LEASE: 703150372
GOLD COAST AIRPORT PTY LIMITED A.C.N. 077 200 821

72. SUB LEASE No 703955021 24/03/2000 at 11:29
LEASE: 702839463
RAYMOND JOHN BATTISTELLA
OF PART OF THE GROUND FLOOR

73. SUB LEASE No 704537886 17/01/2001 at 10:39
LEASE: 702839463
ANTHONY PERCY RANDALL TENANT IN COMMON 1/2
PATRICIA ANN RANDALL TENANT IN COMMON 1/2
OF PART OF THE GROUND FLOOR

74. SUB LEASE No 704568475 02/02/2001 at 16:31
LEASE: 702839463
ASIA PACIFIC MANAGEMENT CONSULTANTS (QLD) PTY LTD A.C.N. 063 876 273
OF PART OF THE GROUND FLOOR

75. TRANSFER No 705624099 16/05/2002 at 11:03
SUB LEASE: 704568475
AYMEYE PTY LTD A.C.N. 003 308 521

CURRENT TITLE SEARCH

ENVIRONMENT AND RESOURCE MANAGEMENT, QUEENSLAND

Request No: 8609498
Search Date: 17/02/2010 10:41 Title Reference: 17457085
Date Created: 29/01/1990

EASEMENTS, ENCUMBRANCES AND INTERESTS

76. SUB LEASE No 705763230 03/07/2002 at 09:27
LEASE: 702839463
JAYLINNO PTY LTD A.C.N. 010 456 194
OF PART OF THE GROUND FLOOR

77. MORTGAGE No 705890306 22/08/2002 at 09:02
WESTPAC BANKING CORPORATION A.B.N. 33 007 457 141

78. SUB LEASE No 706154898 28/11/2002 at 10:22
LEASE: 702839463
MAXWELL JAMES BALDWIN
OF PART OF THE GROUND FLOOR

79. SUB LEASE No 706444043 17/03/2003 at 15:15
LEASE: 702839463
GRAEME JOHN BURKE
OF PART OF THE GROUND FLOOR

80. LEASE No 711783572 10/07/2008 at 12:20
KOVS PTY LTD A.C.N. 001 879 732
OF PART OF THE GROUND FLOOR OF A BUILDING (TENANCY D11)
TERM: 01/07/2008 TO 30/06/2009 OPTION 3 YEARS

ADMINISTRATIVE ADVICES - NIL
UNREGISTERED DEALINGS - NIL

CERTIFICATE OF TITLE ISSUED - No

Corrections have occurred - Refer to Historical Search

Caution - Charges do not necessarily appear in order of priority

** End of Current Title Search **

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Requested By: External Supervisor

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 1/582467

SEARCH DATE	TIME	EDITION NO	DATE
22/2/2010	12:59 PM	4	2/5/2008

LAND

LOT 1 IN DEPOSITED PLAN 582467
AT TWEED HEADS
LOCAL GOVERNMENT AREA TWEED
PARISH OF TERRANORA COUNTY OF ROUS
TITLE DIAGRAM DP582467

FIRST SCHEDULE

COMMONWEALTH OF AUSTRALIA (R 5065093)

SECOND SCHEDULE (2 NOTIFICATIONS)

1 5340961 LEASE TO QUEENSLAND AIRPORTS LIMITED EXPIRES: 28/5/2048. OPTION OF RENEWAL: 49 YEARS.
5340962 MORTGAGE OF LEASE 5340961 TO NATIONAL AUSTRALIA BANK LIMITED
9630525 TRANSFER OF MORTGAGE 5340962 MORTGAGEE NOW WESTPAC ADMINISTRATION PTY LIMITED
AC917294 CHANGE OF NAME AFFECTING LEASE 5340961 LESSEE NOW GOLD COAST AIRPORT PTY LIMITED
AC917295 VARIATION OF MORTGAGE 5340962
AC917296 TRANSFER OF MORTGAGE 5340962 MORTGAGEE NOW CBA CORPORATE SERVICES (NSW) PTY LIMITED
2 AD927845 THIS EDITION ISSUED PURSUANT TO S.111 REAL PROPERTY ACT, 1900

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

266276857 PRINTED ON 22/2/2010

Provided on 22/02/2010 11:59 AM

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Any entries preceded by an asterisk do not appear on the current edition of the Certificate of Title. Warning: the information appearing under notations has not been formally recorded in the Register.

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 100/1120061

SEARCH DATE	TIME	EDITION NO	DATE
22/2/2010	12:59 PM	1	30/5/2008

LAND

LOT 100 IN DEPOSITED PLAN 1120061
AT TWEED HEADS WEST
LOCAL GOVERNMENT AREA TWEED
PARISH OF TERRANORA COUNTY OF ROUS
TITLE DIAGRAM DP1120061

FIRST SCHEDULE

COMMONWEALTH OF AUSTRALIA

SECOND SCHEDULE (9 NOTIFICATIONS)

1 THE LAND ABOVE DESCRIBED IS LIMITED IN STRATUM IN THE MANNER DESCRIBED IN DP1120061
2 N319843 COVENANT AS REGARDS THE PART FORMERLY IN LOT 2 IN DP227199
3 2247659 LEASE TO AIRSERVICES AUSTRALIA OF PART BEING LOTS 1, 2 & 3 IN DP854935. EXPIRES 30/6/2034.
5340961 CONCURRENT LEASE
4 5340961 LEASE TO QUEENSLAND AIRPORTS LIMITED EXPIRES: 28/5/2048. OPTION OF RENEWAL: 49 YEARS.
5340962 MORTGAGE OF LEASE 5340961 TO NATIONAL AUSTRALIA BANK LIMITED
9630525 TRANSFER OF MORTGAGE 5340962 MORTGAGEE NOW WESTPAC ADMINISTRATION PTY LIMITED
AC917269 CHANGE OF NAME AFFECTING LEASE 5340961 LESSEE NOW GOLD COAST AIRPORT PTY LIMITED
AC917270 VARIATION OF MORTGAGE 5340962
AC917271 TRANSFER OF MORTGAGE 5340962 MORTGAGEE NOW CBA CORPORATE SERVICES (NSW) PTY LIMITED
5 AD962626 EASEMENT FOR ACCESS VARIABLE WIDTH APPURTENANT TO THE LAND ABOVE DESCRIBED AFFECTING THE PART SHOWN DESIGNATED (AA) IN THE TITLE DIAGRAM
6 AD962626 EASEMENT FOR SUPPORT VARIABLE WIDTH AFFECTING THE PART SHOWN DESIGNATED (BB) IN THE TITLE DIAGRAM
7 AD962626 EASEMENT FOR SUPPORT VARIABLE WIDTH AFFECTING THE PART SHOWN DESIGNATED (DD) IN PLAN WITH AD962626
8 AD962626 EASEMENT FOR SUPPORT VARIABLE WIDTH APPURTENANT TO THE LAND ABOVE DESCRIBED AFFECTING THE PART SHOWN DESIGNATED (DD) IN PLAN WITH AD962626
9 AD962626 EASEMENT TO DRAIN WATER VARIABLE WIDTH AFFECTING THE

END OF PAGE 1 - CONTINUED OVER

FOLIO: 100/1120061 PAGE 2

SECOND SCHEDULE (9 NOTIFICATIONS) (CONTINUED)

PART SHOWN DESIGNATED (CC) IN DP1120061

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

Provided on 22/02/2010 11:59 AM

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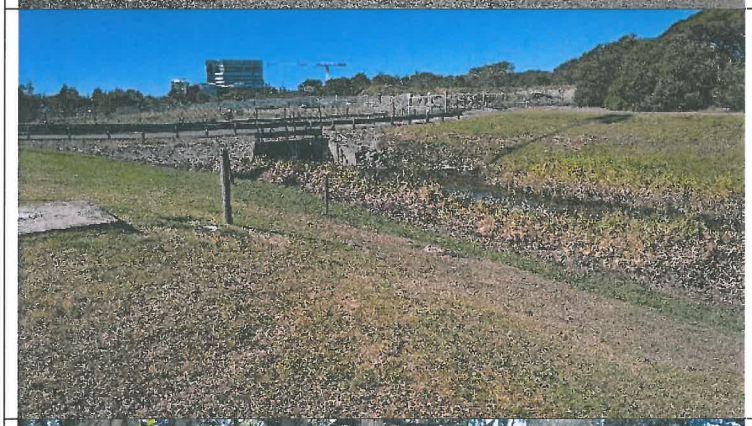
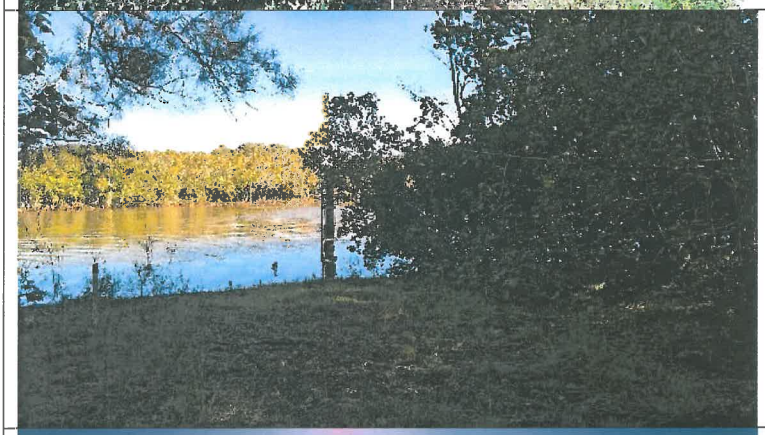
Any entries preceded by an asterisk do not appear on the current edition of the Certificate of Title. Warning: the information appearing under notations has not been formally recorded in the Register.

Appendix C – Site photographs

Gold Coast Airport – Site inspection photographs 8 and 9 June 2016

	Plate 1 – Former Fire station area in foreground and existing fire station workshop in the background
	Plate 2 – Former JUHI
	Plate 3 – Location of 1996 fuel leak
	Plate 4 – Possible location of 2009 helicopter crash

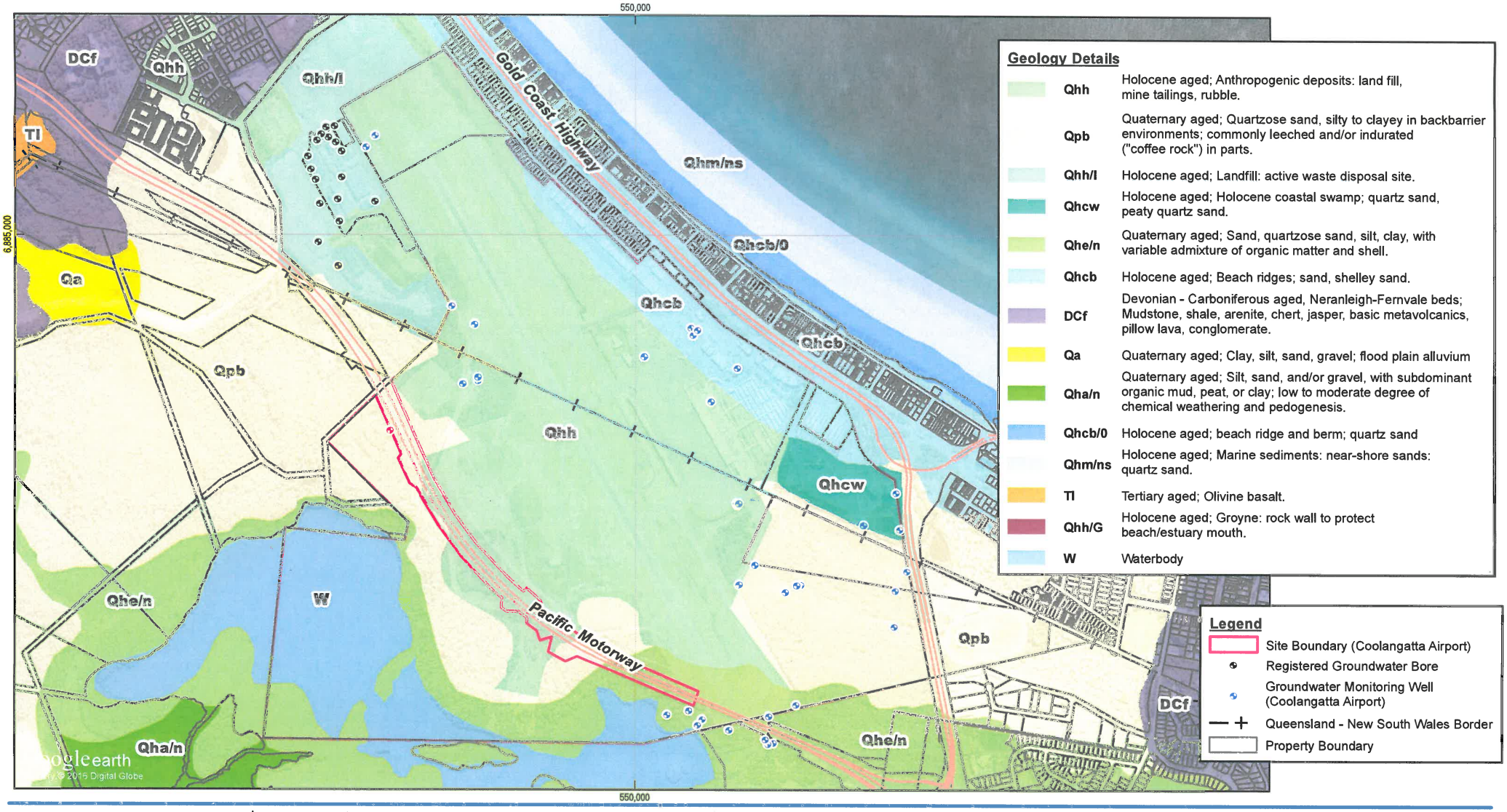
Gold Coast Airport – Site inspection photographs 8 and 9 June 2016

	Plate 5 – Fire training ground
	Plate 6 – Pond adjacent to fire training ground
	Plate 7 - Cobaki Broadwater from the western perimeter of the site
	Plate 8 – Surface water outflow to Pacific Ocean

Gold Coast Airport – Site inspection photographs 8 and 9 June 2016

	Plate 9 – Fire station hardstand
	Plate 10 – Fire station hose drying rack

Appendix D – Geological mapping and Groundwater data search results



1:20,000 (at A4)

0 200 400 600 800

metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

Airservices Australia Pty Ltd
Coolangatta Airport
Preliminary Site Investigation

Job Number	31-34071
Revision	A
Date	15 Jun 2016

Local Geology

Figure 2

H:\Projects\31\34071\GIS\maps\31-34071-212_CgtGeology_revA.mxd

145 Ann Street Brisbane QLD 4000 T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

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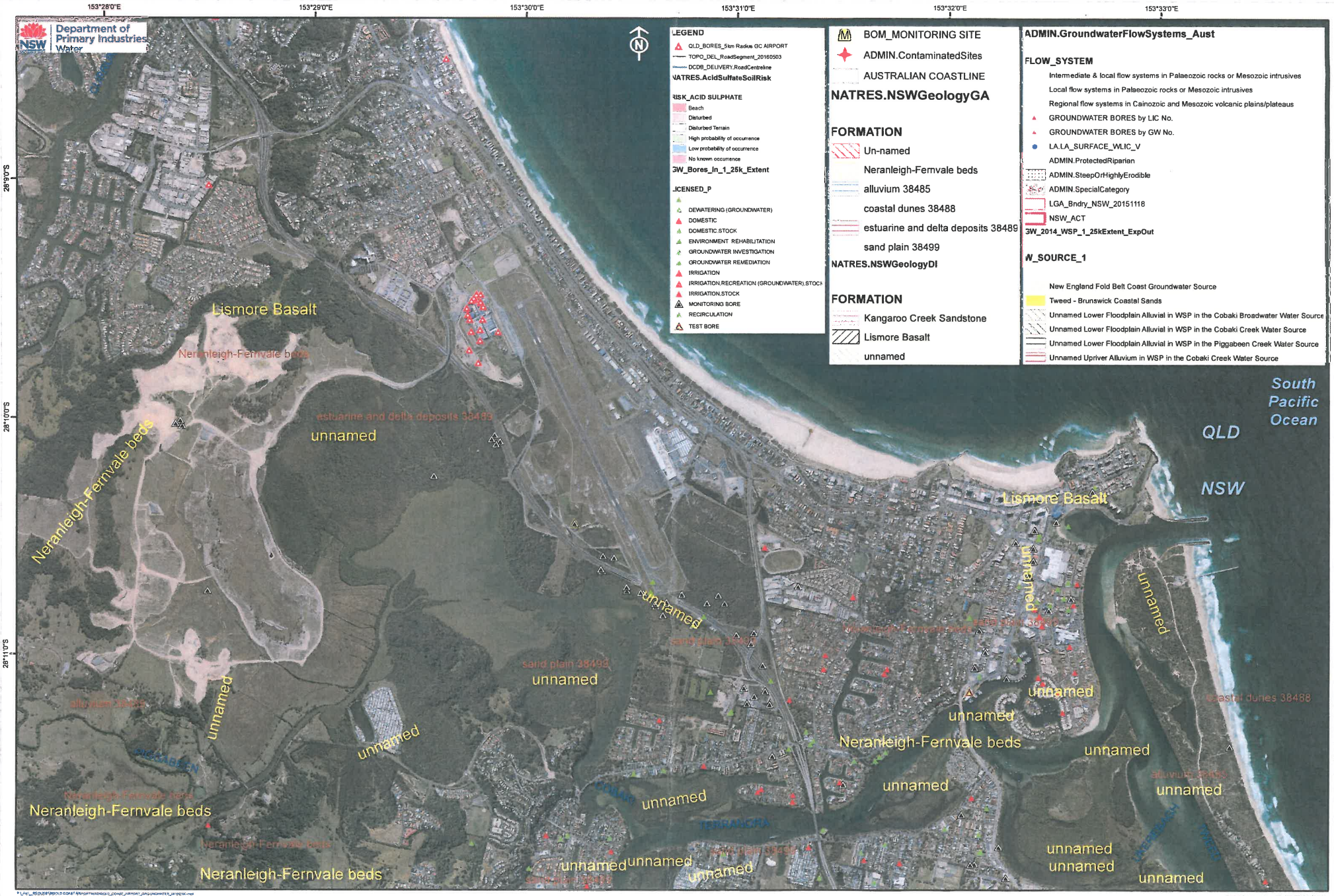
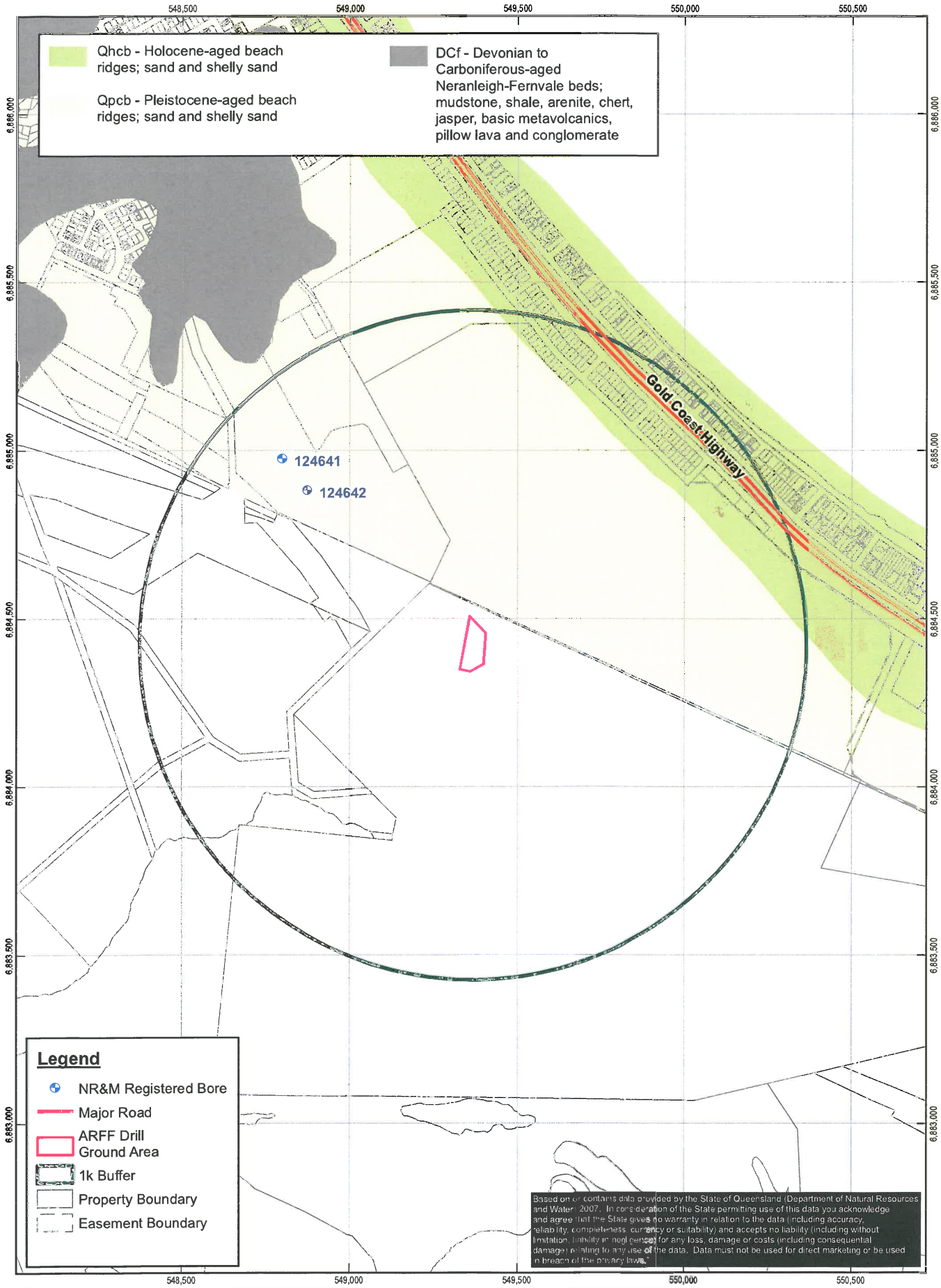
Data source: Google Earth: imagery (May 2015, extracted March 2016). Created : jvc



AIR PHOTO IMAGERY IS LPI ADS40 Captured in September 2009
Minimum Elevation Contour Interval 2 metres; Maximum is 10 metres

GOLD COAST AIRPORT GROUNDWATER



1:15,000

0 100 200 300 400 500

Metres (A4)

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid of Australia, Zone 55

N

AIRSERVICES AUSTRALIA
ARFF National Testing Project
Preliminary Site Contamination Assessment
Cairns ARFF Drill Ground
REGIONAL GEOLOGY

Job Number 41-20219
Revision A
Date 1 September 2008

Figure 2

G:\41\20219\GIS\Projects\SCA_June08\00_Cns_Fig2_Geology.mxd

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Data source: Dept NRW, DCDB and Geology, Nov 2007

Appendix E – Historical aerial photographs

1:20,000 (at A4)

0 200 400 600 800

metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

Legend

Site Boundary (Coolangatta Airport)

Queensland - New South Wales Border

Airservices Australia Pty Ltd
Gold Coast Airport
Preliminary Site Investigation

Job Number	31-34071
Revision	A
Date	20 Jun 2016

1947 Historical Aerial

Figure A

H:\Projects\31\34071\GIS Brisbane by jvc\maps\31-34071-201_Cgt1947aerial_revA.mxd

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Data source: NSWgov: aerial photograph (1947). Created : jvc

1:20,000 (at A4)

0 200 400 600 800

metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

Legend

Site Boundary (Coolangatta Airport)

Queensland - New South Wales Border

Airservices Australia Pty Ltd
Gold Coast Airport
Preliminary Site Investigation

Job Number	31-34071
Revision	A
Date	20 Jun 2016

1955 Historical Aerial

Figure B

H:\Projects\31\34071\GIS Brisbane by jvc\maps\31-34071-202_Cgt1955aerial_revA.mxd

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Data source: NSWgov: aerial photograph (1955). Created : jvc

1:20,000 (at A4)

0 200 400 600 800

metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

Legend

Site Boundary (Coolangatta Airport)

Queensland - New South Wales Border

Airservices Australia Pty Ltd
Gold Coast Airport
Preliminary Site Investigation

Job Number	31-34071
Revision	A
Date	20 Jun 2016

1963 Historical Aerial

Figure C

H:\Projects\31\34071\GIS Brisbane by jvc\maps\31-34071-203_Cgt1963aerial_revA.mxd

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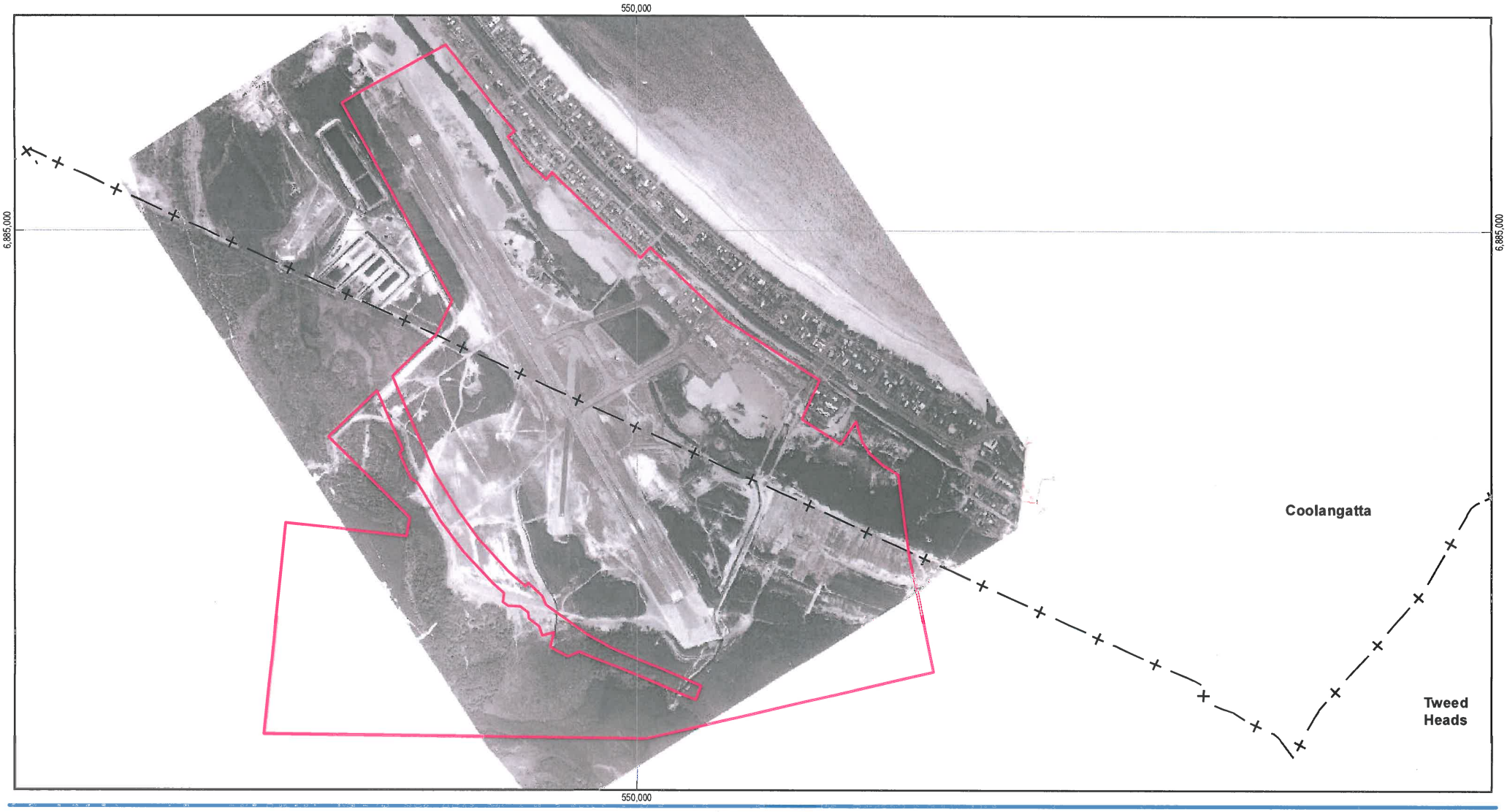
Data source: NSWgov: aerial photograph (1963). Created : jvc



1:20,000 (at A4)

0 200 400 600 800

metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

Legend

Site Boundary (Coolangatta Airport)

Queensland - New South Wales Border

Airservices Australia Pty Ltd
Gold Coast Airport
Preliminary Site Investigation

Job Number	31-34071
Revision	A
Date	20 Jun 2016

1971 Historical Aerial

Figure D

H:\Projects\31\34071\GIS Brisbane by jvc\maps\31-34071-204_Cgt1971aerial_revA.mxd

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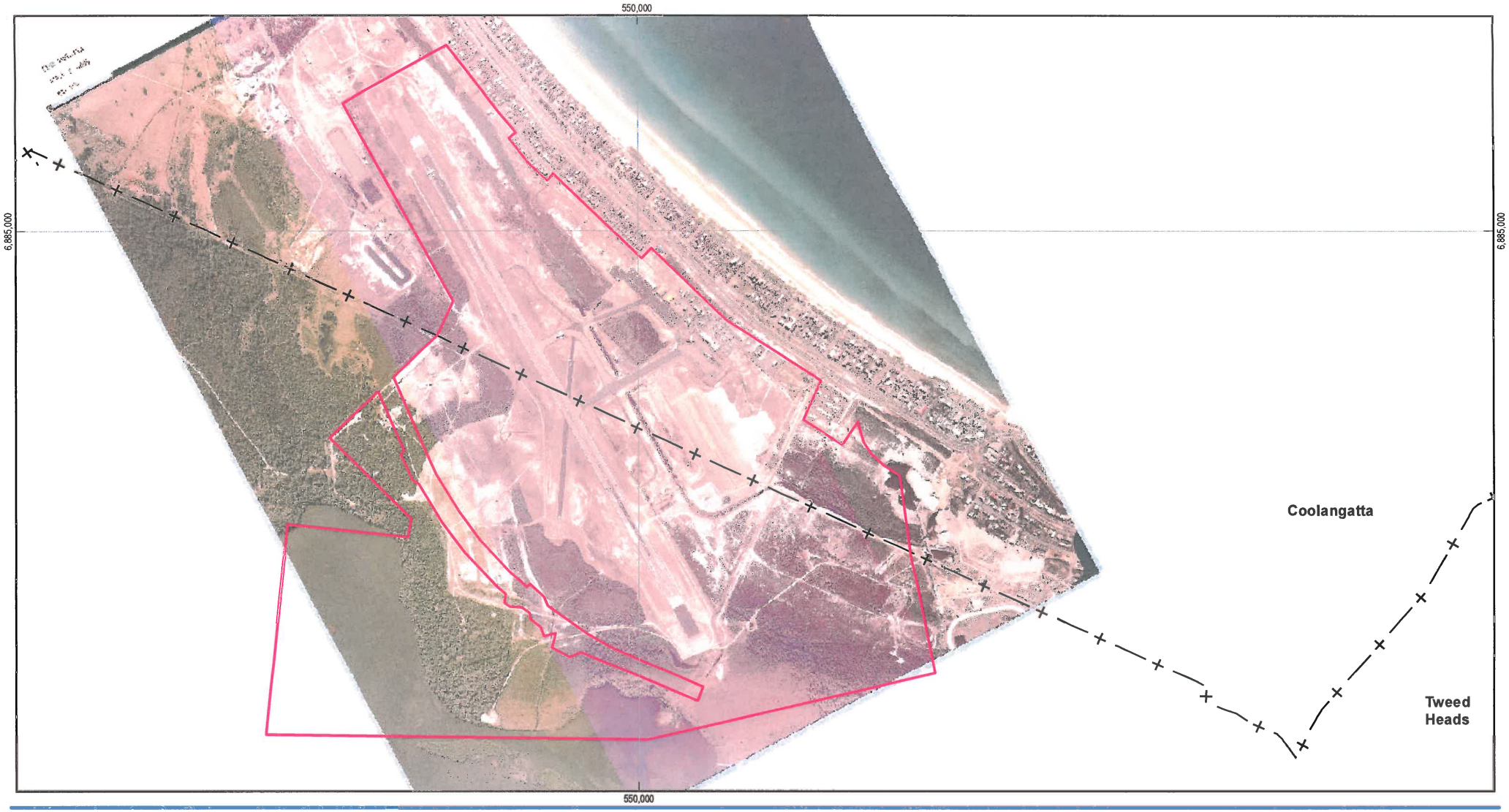
Data source: NSWgov: aerial photograph (1971). Created : jvc



1:20,000 (at A4)

0 200 400 600 800

metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

Legend

Site Boundary (Coolangatta Airport)

Queensland - New South Wales Border

Airservices Australia Pty Ltd
Gold Coast Airport
Preliminary Site Investigation

Job Number	31-34071
Revision	A
Date	20 Jun 2016

1980 Historical Aerial

Figure E

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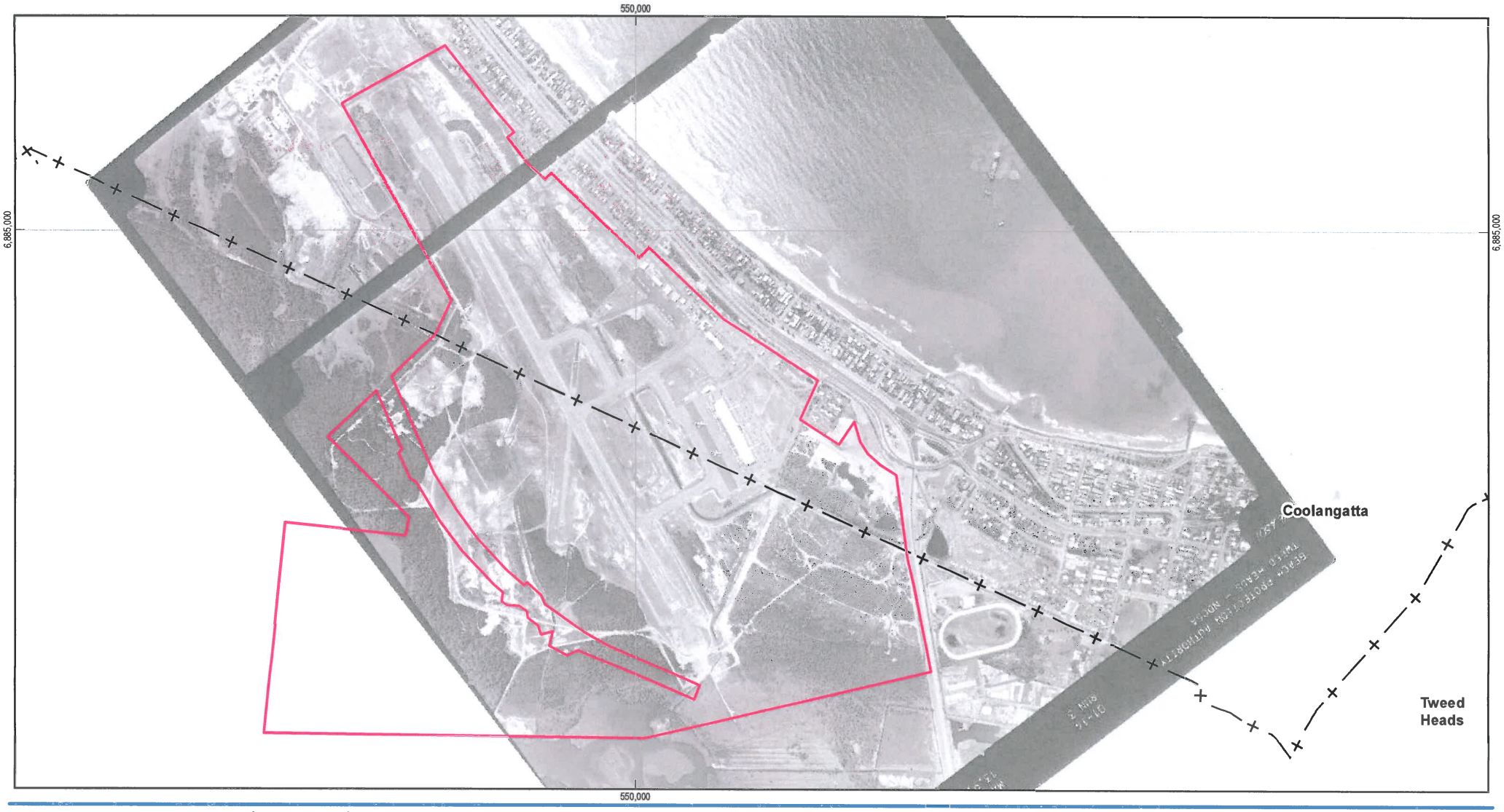
Data source: NSWgov: aerial photograph (1980). Created : jvc



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0 200 400 600 800

metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

Legend

Site Boundary (Coolangatta Airport)

Queensland - New South Wales Border

Airservices Australia Pty Ltd
Gold Coast Airport
Preliminary Site Investigation

Job Number	31-34071
Revision	A
Date	20 Jun 2016

1985 Historical Aerial

Figure F

H:\Projects\31\34071\GIS Brisbane by jvc\maps\31-34071-206_Cgt1985aerial_revA.mxd

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Data source: DNRM: aerial photograph (1985). Created : jvc

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0 200 400 600 800

metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

Legend

Site Boundary (Coolangatta Airport)

Queensland - New South Wales Border

GHD airservices

Airservices Australia Pty Ltd
Gold Coast Airport
Preliminary Site Investigation

Job Number	31-34071
Revision	A
Date	20 Jun 2016

1992 Historical Aerial

Figure G

H:\Projects\31\34071\GIS Brisbane by jvc\maps\31-34071-207_Cgt1992aerial_revA.mxd

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Data source: NSWgov: aerial photograph (1992). Created : jvc

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metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

Legend

Site Boundary (Coolangatta Airport)

Queensland - New South Wales Border

Airservices Australia Pty Ltd
Gold Coast Airport
Preliminary Site Investigation

Job Number	31-34071
Revision	A
Date	20 Jun 2016

2003 Historical Aerial

Figure H

H:\Projects\31\34071\GIS Brisbane by jvc\maps\31-34071-208_Cgt2003aerial_revA.mxd

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Data source: QASCO: aerial photograph (2003). Created : jvc

1:20,000 (at A4)

0 200 400 600 800

metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

Legend

Site Boundary (Coolangatta Airport)

Queensland - New South Wales Border

Airservices Australia Pty Ltd
Gold Coast Airport
Preliminary Site Investigation

Job Number	31-34071
Revision	A
Date	20 Jun 2016

2007 Historical Aerial

Figure I

H:\Projects\31\34071\GIS Brisbane by jvc\maps\31-34071-209_Cgt2007aerial_revA.mxd

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Data source: DNRM: aerial photograph (2003). Created : jvc

1:20,000 (at A4)

0 200 400 600 800

metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

Legend

Site Boundary (Coolangatta Airport)

Queensland - New South Wales Border

Airservices Australia Pty Ltd
Gold Coast Airport
Preliminary Site Investigation

Job Number	31-34071
Revision	A
Date	20 Jun 2016

2015 Historical Aerial

Figure J

H:\Projects\31\34071\GIS Brisbane by jvc\maps\31-34071-210_Cgt2015aerial_revA.mxd

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Data source: Google Earth: aerial imagery(Apr 2015 extracted Jun 2016). Created : jvc

Appendix F – Interview transcripts

Interview with Peter Franks – Airservices Fire Station – 9 June 2016

Peter Franks – Airservices Australia

Craig Barnes – Airservices Australia

Imogen Bird - GHD

1 – Are you aware of any PFAS investigations and testing that have been undertaken across the wider Airport?

No

2. Is there an incident log that detailed where actual fires and fuel spills have been attended that require the use of firefighting foams.

There is an incident log that goes back to the late 1990s. The log will outline how much foam was discharged at an incident. It is noted that foam is not typically discharged unless required.

- Helicopter crash in 2009 – foam was discharged
- early or mid 1980s two light aircraft crash. The exact location of this crash needs to be confirmed. Peter assumed it was within the bushland in a remote, difficult to access location.
- Peter has no recollection of foam discharge associated with a fuel leakage near the terminal in 1996.

3. If there is not an inventory, can you recall any fires or fuel spills at the airport? Dates?

As above.

4. Is there an inventory of AFFF storage within the airport?

No.

The AFFF was delivered in plastic 44 gallon drums and dispensed into an on site AST.

The drums were historically disposed of to the local Tugun landfill by ARFF staff.

5. Are you aware of any AFFF use outside of the Airport but within the general vicinity?

- Tugun bypass tunnel
- Queensland Fire and Rescue Service
- The new JUHI includes protein based foam.

6. Is there any AFFF still stored within the Airport? If so, where and for what purpose?

Not aware of any

7. Has training involving AFFF (e.g extinguishers, AEP exercises) been undertaken in areas outside the current fire station and/or training ground?

Yes.

99% of the training occurs in the fire training ground. This area was bunded in the 1980s or early 1990s. Prior to this the area was characterised by unsealed ground.

A number of possible 'crash remote' sites were highlighted in the bush around the fire training ground of old fire station site. Peter indicated that these locations were more likely to be in bushland in close proximity to ARFF operations.

AEP is conducted at the training ground no knowledge of foam discharged as part of these operations.

8. What is the age of the current fire station and fire training ground? What was the previous use of these sites?

Current fire station constructed in the 1992, previous location adjacent to the former fuel depot. The former fire station was likely to be there since the 1960s. The old fire station was demolished between 2005 and 2007.

9. When AFFF was used in training, how often and for how long did this occur?

Training occurs at the training ground at least once per shift. During development training it may be more often.

There are no records of the volumes of foam used during these exercise. Foam was always used in training until 2010. Since 2010 all training is undertaken with water and foam only used once a year.

NSW Fire Service and QFRS also undertake training at the ARFF training ground. This occurs every 3-6 months. Foam is not used as part of these operations.

10. When AFFF was used in training, what volumes were used and what was the methodology for wash down of waste and equipment?

Hoses are flushed at the training ground, they are cleaned at the fire station to remove dirt and placed on the hose drying rack. Water from the wash down at the fire station goes into a contained treatment system that is disposed to sewer. Runoff from the drying rack drains to stormwater.

Foam used in the training ground is allowed to dissipate. Sometimes it will be blown around the fire training area up to approximately 100 metres away.

A daily test which includes the release of foam from each truck was undertaken in the area around the fire station.

Every 6 months valve and foam consistency testing was also undertaken in the area around the fire station.

11. How widely was the AFFF dispersed aerially? Photos?

Outlined above

12. Was wash down of the fire fighting equipment restricted to the fire training areas?

Trucks and hoses are cleaned at the fire station. All water from wash down on the hardstand at the fire station is collected in a UST where some hydrocarbon separation occurs. The water then passes through a triple interceptor trap and then pumped to sewer.

It is noted that the bund where AFFF was stored at the fire station contains a drain, which drains to the diesel tank bund. This discharged to stormwater through a valve operated pipe.

Water in the bunded area at the fire training ground goes into two phase UST where some hydrocarbon separation occurs, it then goes through a triple interceptor trap and is pumped to sewer.

13. Where did the wash down water end up? Do any drawings discharge off-site and, if so where?

As above question

14. Has there been any significant bulk earth works (relevant to AFFF use) on the site that resulted in soil being relocated from one area of the airport to another?

Hydrocarbon impacted soil associated with the waste water leak at the fire training ground included excavation of soils and remediation, then re-instatement.

Peter confirmed that the fire trucks are used for irrigation of grass around the airport as requested by the airport.

15. Have any activities associated with the airport even been undertaken at the pony club to the south of the site which will be used for the ILS?

No

16. How were spent drums or excess product disposed of?

Spent drums were disposed of to the local Tugun landfill by ASA staff.

17. Does groundwater 'daylight' in areas of the site?

Yes, in all drains

18. What was the location of the ARFF sites?

Covered above.

19. Is stormwater harvested within the Airport and if so, for what purposes and where?

Stormwater is not harvested at the fire station.

There is a small tank on the environment shed at the training ground, which is used to clean the separator filters.

20. Is groundwater abstracted within the Airport and if so, for what purposes and where?

No.

21. What activities have occurred in the cleared area directly to the west of the fire training ground.

NA.

Interview with Gold Coast Airport – 8 June 2016

Norbert Benton – Gold Coast Airport

Greg Hopgood – Gold Coast Airport

Craig Barnes – Airservices Australia

Imogen Bird - GHD

1 – Are you aware of any PFAS investigations and testing that have been undertaken across the wider Airport?

GCA provided a figure of previous elevated PFAS results identified in isolated groundwater and soil sample locations. Based on this it appears that previous investigation were limited in extent and scope.

More recently

- Environmental Earth Science undertook a PSI and SAQP as part of the Project LIFT and ILS.
- AECOM then undertook soil and groundwater investigations. This information is in draft and is not available at this stage. However, the groundwater PFAS contamination contour was sighted and a groundwater contour figure provided.
- Jacobs recently completed a PSI and risk assessment this has also not been finalised, but a copy of the key PFAS sources identified in the report was discussed.

2. Is there an incident log that detailed where actual fires and fuel spills have been attended that require the use of firefighting foams.

Key fuel spill and firefight events include:

- Significant fuel spill in 1996 at the end of the fuel line
- Helicopter crash in 2009
- Light plane crash in mid-1980's
- Lockheed Loadstar 1945
- Nothing else is noted on the register which only goes back to 2007.
- ASA also helped irrigate the grass at the end of the runway to assist with establishment for a period of time
- Foam may also have been used in the Airport Emergency Plan conducted every two years. However, Norbert has no recollection of foam being used in the past 10 years.

3. If there is not an inventory, can you recall any fires or fuel spills at the airport? Dates?

As above.

4. Is there an inventory of AFFF storage within the airport?

There is a fuel tank register.

Not known to hold AFFF in any other areas apart for fire station.

Not known to be in the hangers, however it is not known if the hangers include fire extinguishers.

It is also noted that it is not known where the hanger lessees undertake fire training and if this has even been completed on the site in the past.

5. Are you aware of any AFFF use outside of the Airport but within the general vicinity?

Tugun bypass tunnel:

Fire and spill management as part of the Tugun bypass includes AFFF foam. Water captured within the tunnel drains to sumps at either end of the tunnel, which is then pumped to treatment ponds and discharged. In the event of an incident (including release of AFFF) and if contaminated material enters the sump, this is sucked out and disposed off site, this water is not passed through the typical stormwater management system. GCA indicated that there had been a release of 'concentrate' which may include residual impacts.

Queensland Fire and Rescue Service:

The fire station has been present for a long time.

(It was noted during the site visit that QFRS was undertaking an exercise on the ASA training area.)

6. Is there any AFFF still stored within the Airport? If so, where and for what purpose?

The new JUHI includes 10,000 L of FFP (protein based foam)

7. Has training involving AFFF (e.g extinguishers, AEP exercises) been undertaken in areas outside the current fire station and/or training ground?

It is noted that the fire station relocated in 1992. The workshop has remained in the same area. The previous GHD investigation of the training ground (GHD 2008) indicated that the fire training ground was always present in the current area.

GCA provided anecdotal evidence from a site worker (Dan Boyd) who had undertaken work on the site for a period of over 50 years. While he could not confirm the timing (likely to be before 1994), he indicated that fire training had been completed in a number of specific locations across the site in 44 gallon drums. The areas were provided on a map by GCA.

8. What is the age of the current fire station and fire training ground? What was the previous use of these sites?

Current fire station constructed in the 1990s (1992), previous location adjacent to the former fuel depot. Prior to this the area was swamp land.

9. When AFFF was used in training, how often and for how long did this occur?

There was a requirement to test every truck (4 trucks) every day from 1978 to 2010[1].

10. When AFFF was used in training, what volumes were used and what was the methodology for wash down of waste and equipment?

There was no licencing around 'dark smoke agreement', which allowed dark smoke as part of training exercises. As part of this agreement a form was completed that outlined the volume of foam discharged. This register goes back to 1997[1].

11. How widely was the AFFF dispersed aerially? Photos?

NA

---

[1] Although this was the answer provided during the interview, it should be noted that it is not entirely relevant to the question.

12. Was wash down of the fire fighting equipment restricted to the fire training areas?

NA

13. Where did the wash down water end up? Do any drawings discharge off-site and, if so where?

NA

14. Has there been any significant bulk earth works (relevant to AFFF use) on the site that resulted in soil being relocated from one area of the airport to another?

- There were three former landfills located on the southern side of the Tugun bypass. This material was removed and disposed of to a licensed landfill as part of the bypass development.

- Material from the construction of the bypass was stockpiled on site, some near SCU.

- The 2006/2007 runway expansion the ground surface was stripped and this material was used in other areas of the site.

- Soil was imported to fill in the wetland for construction of the new fuel depot.

- There was some soil remediation for hydrocarbons associated with the old fuel depot.

- Soil scraped as part of the taxiway extension and stockpiled on site. This material has been characterised, including PFAS analysis.

- SCU drilling materials are stockpiled on the site and will be characterised.

- Drain silting has not been undertaken at the site, at least in the past 10 years.

15. Have any activities associated with the airport even been undertaken at the pony club to the south of the site which will be used for the ILS?

No

16. How were spent drums or excess product disposed of?

NA

17. Does groundwater 'daylight' in areas of the site?

Yes, in most but not all drains

18. What was the location of the ARFF sites?

Covered above.

19. Is stormwater harvested within the Airport and if so, for what purposes and where?

Rain water is harvested from roof tops and stored in underground tanks at the terminal, AFP and SCU. It is used for flushing toilets and urinals. May have also been used for irrigation.

20. Is groundwater abstracted within the Airport and if so, for what purposes and where?

Water from the stormwater drains, which includes groundwater has been used for dust suppression and irrigation as part of some previous construction activities.

21. What activities have occurred in the cleared area directly to the west of the fire training ground.

ASA instrumentation only.

Appendix G – Groundwater Monitoring Report

PARSONS BRINCKERHOFF

Parsons Brinckerhoff Australia Pty Limited

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Certified to ISO 9001, ISO 14001, OHSAS 18001

1 May 2015

Darrel Spence
Facilities Manager
Airservices
NE NSW & Central - SE QLD
P&E FMS Property Services

Our ref: 2171302F-CLM-LTR001A
Airservices ARFF GME

Your ref: 4500008810 / 10

By email
darrel.spence@airservicesaustralia.com

Dear Darrel

Groundwater Monitoring and Reporting - ARFF Training Ground, Gold Coast Airport

1. Introduction

Parsons Brinckerhoff Australia (Parsons Brinckerhoff) is pleased to provide this letter report to Airservices Australia (Airservices) summarising the April 2015 groundwater monitoring event (GME) undertaken at the Aviation Rescue and Fire Fighting (ARFF) fire training ground, Gold Coast Airport, Bilinga, QLD (the site). The site location is shown on Figure 1, Attachment A.

ARFF is a division of Airservices Australia that conducts training exercises on site. Training exercises involve lighting controlled fires and then putting them out using water and surfactants. Kerosene is generally the fuel used to generate the controlled fire. Historically, aqueous film forming foams (AFFF), including Perfluorooctanesulfonic acid (PFOS), Perfluorooctanoic acid (PFOA) and fluorotelomer sulfonate (6:2 FtS) were used to suppress the fires during training exercises.

Training exercises are undertaken on a purpose-built training facility comprised of a sunken, bunded concrete slab surrounded by a concrete skirt to prevent discharges of fluids to ground during training activities. Parsons Brinckerhoff understands that any excess fluid runoff from the concrete slab drains into a series of temporary holding tanks, into an oil/water separator, then into another temporary holding tank prior to discharge to sewer (through a trade waste permit).

2. Background

2.1 Oil/water separator release

In July 2006 the oil/water separator overflowed at the site, releasing an unknown volume of petroleum hydrocarbons into the receiving environment. It is understood that the release comprised mostly A1 Jet fuel. The release occurred due to the oil/water separator pump being switched from automatic to manual, resulting in the pump not turning on when the oil/water separator reached its maximum volume.

Parsons Brinckerhoff initially collected soil samples to delineate the extent of the affected area. Laboratory analytical results indicated concentrations of petroleum hydrocarbons were present in soil above the adopted soil assessment criteria. An investigation into groundwater contamination was also undertaken; laboratory analytical results indicated concentrations of petroleum hydrocarbons were also present in groundwater above the adopted groundwater assessment criteria, prompting the development of a remediation strategy.

2.2 Remediation of soil and groundwater

Remediation of soil and groundwater to remove petroleum related compounds was undertaken in 2007. Impacted soils were remediated by onsite land-farming of impacted soil. A pump and treat system was installed on site to treat impacted groundwater. The pump and treat system incorporated enhanced biodegradation and oxidation processes.

2.3 PFOS and PFOA

Laboratory analysis of groundwater samples for PFOS and PFOA was added to the sampling program in 2011, due to concerns relating to the historical use of these chemicals on site for training purposes, and the potential risks to human health and the environment posed by PFOS and PFOA.

The properties of PFOS and PFOA are summarised below:

- PFOS and PFOA are man-made chemicals comprising a carbon chain surrounded by fluorine atoms with an acid group at the end of the chain. They are also known as C8 perflurocarbons (PFCs), because molecule contains eight carbon atoms. PFCs have unique surfactant properties; they repel oil, grease and water. PFOS and PFOA are not naturally found in the environment. PFOS and PFOA are not volatile (ATSDR, 2009).
- PFOS and PFOA are resistant to biodegradation, photo-oxidation, direct photolysis and hydrolysis. They breakdown very slowly in air and are not known to breakdown in soil or water. They may undergo long-range transport and bio-accumulate within the food chain (ATSDR, 2009).

Products containing PFOS were known to cause detrimental impacts to the environment and a ban on the manufacture of PFOS was imposed in early 2000. In April 2003, the National Industrial Chemical Notification and Assessment Scheme (NICNAS) issued a PFOS alert and advised that AFFF products containing PFOS should not be used for training purposes.

PFOS and PFOA are listed on the Safe Work Australia, Hazardous Substances Information System (HSIS) as hazardous substances due to risks to human health.

3. Scope of works

The scope of works for the April 2015 GME comprised the following tasks:

- Preparation of a health, environment and safety plan (HESP) to protect human health and the environment during site works.
- Purging of groundwater monitoring wells using bailers and measurement of groundwater physiochemical parameters using a water quality meter.

- Collection of groundwater samples from five monitoring wells for laboratory analysis for the following contaminants typically associated with fire training activities:
  - Total petroleum hydrocarbons (TPH C_6-C_{36})
  - Benzene, toluene, ethyl benzene, xylenes (BTEX)
  - Polycyclic aromatic hydrocarbons (PAHs)
  - Methylene blue active substances (MBAS) (indicator of anionic surfactants)
  - PFOS, PFOA and 6:2 FtS.
- Preparation of this letter report summarising the works undertaken, methodology used, and analytical results, with findings and recommendations.

4. Methodology

Five existing groundwater monitoring wells (BH6, BH7, BH9, BH12 and BH13) were sampled on 2 April 2015 using the methodology summarised in Table 4.1. The approximate locations of the groundwater monitoring wells are shown on Figure 2, Attachment A.

Table 4.1 Groundwater assessment methodology

Activity	Details
Well Gauging	Monitoring wells were gauged using an oil/water interface probe (IP) prior to purging and sampling.
Sampling method	Dedicated disposable polyethylene bailers were used to collect groundwater samples. The 2013 NEPM which was finalised in April 2013 stipulates that use of low flow sampling is required for volatiles (i.e. TPH and BTEX). However due to the amount of water within the monitoring wells (less than 1m of water column), groundwater had to be sampled with bailers.
Well Purging	Wells were purged of five bore volumes, or until groundwater quality indicators stabilised after a minimum of three bore volumes were removed, or until the well was purged dry, whichever occurred first. Groundwater quality indicators were measured after removal of each bore volume.
Decontamination Procedure	All non-disposable sampling equipment (e.g. IP) was triple washed. The triple washing technique comprised washing equipment with water, scrubbing with phosphate free detergent (Decon 90) and potable water, followed by a final rinse with deionised water.
Sample Preservation	Samples were collected in laboratory supplied and appropriately preserved sample containers. Samples were stored on ice in a cooler while on-site and during transit to the laboratory. All samples were delivered and analysed within appropriate holding times.

5. Groundwater assessment criteria

Assessing the concentrations of contaminants of concern requires appropriate assessment criteria. The site is located on airport property and the primary environmental legislation applicable for the site is:

- Airport (Environment Protection) Regulation 1997 – Accepted limit for Fresh Water, Water pollution — accepted limits Schedule 2. Section 1.03 Table — accepted limits of contamination ("the Airport Regulation guidelines")

Assessment criteria for TPH and BTEX are provided in the Airport Regulation guidelines and are presented for two categories:

- acceptable limits for fresh water
- acceptable limits for marine water.

Electrical conductivity measured during the GME ranged from 101 µS/cm (BH7) to 352 µS/cm (BH12) suggesting fresh water; as such, the assessment criteria for fresh water were adopted.

Where criteria are not available in the Airport Regulation guidelines for a contaminant of concern, the following guidelines have been referenced:

- National Environmental Protection Council (2013), National Environmental Protection (Assessment of Site Contamination) Measure (NEPM), Groundwater Investigation Levels (GILs), Fresh Waters (A).
- Minnesota Department of Health (MDH) (2008) Chronic Health Risk Limits (HRLs) for PFOS and PFOA in drinking water.

A summary of the adopted assessment criteria is provided in Table 5.1.

Table 5.1 Groundwater assessment criteria

Analyte	Airport Regulations (1997) Freshwater (µg/L)	MDH (2008) HRLs (µg/L)	NEPC (2013) Freshwater GILs (µg/L)
TPH C_6-C_9	150	NR	NR
TPH C_{10}-C_{36}	600	NR	NR
Benzene	300	NR	NR
Toluene	300	NR	NR
Ethyl benzene	140	NR	NR
Xylene (o)	NC	NR	350
Xylene (p)	NC	NR	200
Total PAH	3	NR	NR
MBAS	NC	NC	NC
PFOS	NC	0.3	NR
PFOA	NC	0.3	NR
6:2 FtS	NC	NC	NC

(1) 'NC' No investigation criteria available

(2) 'NR' Indicates guideline not referenced for a particular analyte as criteria already adopted from the Airport Regulations (1997).

6. Investigation results

6.1 Groundwater physiochemical measurements

Groundwater levels measured in April 2015 had increased by 600 mm to 1100 mm compared to groundwater levels measured in the September 2014 event which is reflective of the heavy rain events that occurred prior

to sampling. Groundwater levels on site have historically fluctuated. Historical depths to groundwater are included with the groundwater analytical results in Table 1, Attachment B.

Groundwater physiochemical measurements, recorded during the GME, are summarised in Table 6.1.

Table 6.1 Summary of groundwater conditions

Condition	Comments
Depth to Groundwater	▪ Standing water levels ranged between 0.191 meters below top-of-casing (mBTOC) (BH12) and 1.296 mBTOC (BH13). ▪ No light non-aqueous phase liquids (LNAPLs) were encountered.
Groundwater Occurrence	▪ Based on historical bore log data collected during well installation, it is considered that the shallow aquifer occurs within the natural sand at the site and is assumed to be recharged through infiltration of rainwater. ▪ The site is considered to be tidally influenced given its proximity to Cobaki Broadwater and the Coral Sea, and the groundwater level fluctuations observed for each monitoring event.
Hydraulic Conductivity	▪ Based on the sandy soil types encountered, the hydraulic conductivity of the underlying aquifer is expected to range from 1 x 10^{0} to 1 x10^{-5} cm/s (Freeze and Cherry, 1979).
Groundwater quality	▪ **Electrical conductivity** ranged from 101 µS/cm (BH7) to 352 µS/cm (BH12) indicating the groundwater is, based on salinity, potentially suitable for potable uses. The recorded electrical conductivity is considerably less than what had been recorded in the previous GME indicating potential rainwater infiltration. ▪ **pH** ranged from 3.45 (BH6) to 6.36 (BH12) indicating that the groundwater is acidic. ▪ **Dissolved oxygen** ranged between 3.22 parts per million (ppm) (BH12) to 5.25 ppm (BH6) indicating low to moderate dissolved oxygen concentrations. ▪ **Redox potential** ranged between – 110 mV (BH12) and 181 mV (BH9) indicating strongly to moderately reducing conditions. ▪ **Temperature** ranged from 23.1 °C (BH7) to 27.3 °C (BH12).

6.2 Groundwater analytical results

6.2.1 Summary of groundwater analytical results

The number of primary samples collected, analytes tested for, minimum/maximum analyte concentrations and those samples that exceeded the adopted investigation levels are summarised in Table 6.2.

Table 6.2 Summary of groundwater analytical results

No. of primary samples	Analyte	Min. Conc. (µg/L)	Max. Conc. (µg/L)	Sample locations exceeding investigation levels
Hydrocarbons				
5	TPH C_6-C_9	<20	30	None
5	TPH C_{10}-C_{36}	<50	420	None
5	BTEX	<1	19	None
5	Total PAHs	<0.5	<0.5	None
Surfactants				
5	PFOS	17.9	527	BH6, BH7, BH9, BH12, BH13
5	PFOA	2.23	37.1	BH6, BH7, BH9, BH12, BH13
5	6:2 FtS	<0.1	<0.1	No assessment criteria
5	MBAS	<2	3	No assessment criteria

A summary of historical and current groundwater analytical results is included as Table 1, Attachment B. Copies of laboratory analytical certificates are included in Attachment C.

6.2.2 Discussion of groundwater analytical results

6.2.2.1 TPH

- The concentration of TPH C_6-C_9 detected was below the laboratory practical quantification limit (PQL), which is below the adopted assessment criteria, in all monitoring wells with the exception of BH7 during the April 2015 GME.
- In the previous GME, the concentration of TPH C_6-C_9 was below the laboratory PQL (which is below the adopted assessment criteria).
- The concentration of TPH C_6-C_9 has remained below PQLs in 4 of the 5 monitoring wells with 1 monitoring well (i.e. BH7) increasing since the previous GME.
- The concentration of TPH C_{10}-C_{36} detected in all monitoring wells was below the adopted assessment criteria
- In the previous GME, the concentrations of TPH C_{10}-C_{36} detected in monitoring wells BH9 and BH12 exceeded the adopted assessment criteria.
- The concentration of TPH C_{10}-C_{36} has decreased or remained below PQLs in monitoring wells BH9, BH12 and BH13, and increased in monitoring wells BH6 and BH7 since the previous GME.

6.2.2.2 BTEX

- In the April 2015 GME, toluene was detected in monitoring well BH7, however the concentration detected was below the adopted assessment criteria.
- In the previous GME the various BTEX compounds detected were below the laboratory practical quantification limits (PQLs), which were below the adopted assessment criteria, in all monitoring wells.

- The concentration of BTEX has increased in BH7 with the remaining 4 monitoring wells reporting below PQLs in all monitoring wells since the previous GME.

6.2.2.3 PAHs

- The concentration of PAHs was below the laboratory practical quantification limit (PQL) for all monitoring wells, which is below the adopted assessment criteria, in all monitoring wells for the April 2015 GME.
- In the previous GME, the concentrations of PAHs detected in monitoring wells BH12 and BH13 exceeded the adopted assessment criteria.
- The concentration of PAHs has decreased in monitoring well BH12 since the previous GME.

6.2.2.4 PFOS and PFOA

- The concentrations of PFOS and PFOA detected in all monitoring wells exceeded the adopted assessment criteria. The concentrations of PFOS and PFOA have exceeded the adopted assessment criteria in all previous GMEs.
- The detected concentrations of PFOS and PFOA decreased in monitoring wells BH9 and BH12 since the previous GME. The detected concentrations of PFOS and PFOA increased in monitoring wells BH6, BH7 and BH13 since the previous GME.

6.2.2.5 6:2 FtS

There is no assessment criterion with which to assess the concentration of 6:2 FtS.

- The concentration of 6:2 FtS was below the laboratory PQL in all monitoring wells.

6.2.2.6 MBAS – anionic surfactant concentrations

MBAS is colorimetric analytical test method that uses methyl blue to detect the presence of anionic surfactants. This test covers a broad range of anionic surfactants (including, but not limited to, PFOS and PFOA), however the detection limit is relatively high compared to other analytical test methods. There is no assessment criterion with which to assess the concentration of MBAS.

- MBAS concentrations have decreased in monitoring wells BH6, BH9 and BH12 since the previous GME.
- The MBAS concentration in monitoring wells BH7 and BH13 has remained below the laboratory PQL for the two most recent GMEs.

7. Quality Assurance and Quality Controls

In accordance with AS4482.1-2005, quality assurance and quality control (QA/QC) samples were collected. Quality assurance sampling is detailed below:

- **Blind Duplicates** – Blind duplicate samples were collected at a rate of one for every 20 samples collected. Blind duplicates are used to identify variation in analyte concentration between samples collected from the same sampling point and/or the repeatability of the laboratory analysis. The samples were submitted to the same laboratory for analysis. One blind duplicate was collected and submitted for analysis for this investigation.

- **Split Duplicates** - Split duplicate samples were collected at a rate of one for every 20 samples collected. Split duplicates are used to provide a check on the analytical proficiency of the laboratories. The samples were submitted to a separate laboratory for analysis. One split duplicate was collected and submitted for analysis for this investigation.
- **Rinsate Blanks** - Rinsate blanks are collected at a rate of one for each day of sampling. Rinsate blanks are used to provide confirmation cross-contamination of samples from sampling equipment has not occurred. One rinsate blank was collected and submitted for analysis for this investigation.
- **Trip Blanks** - Trip blanks are collected at a rate of one for each group of samples shipped. Trip blanks are used to identify and estimate the amount of contamination introduced during the transport and storage of samples from the time of sampling to the time of analysis. One trip blank was prepared and submitted for analysis for this investigation.

Samples were given unique identification numbers containing the sample location and the date and time the sample was collected. All samples were recorded on the chain-of-custody (CoC) form at the time of sampling. The CoC form remained with the samples at all times during storage and transport to the laboratory. Samples were stored and transported on ice within insulated coolers with appropriate packaging to prevent breakage of the sample containers. Internal laboratory QA/QC procedures are provided within the laboratory reports. Table 7.1 provides a summary of the QA/QC data validation.

Table 7.1 QA/QC data validation

Data quality indicator	Completed	Comments
Precision		
Laboratory matrix duplicate RPDs within acceptable limits	Yes	Laboratory matrix RPDs were acceptable limits.
Blind duplicate and split duplicate RPDs within acceptable limits	Yes	All blind duplicate and split duplicate RPDs were below 50% with the exception of split duplicate for TPH C_{15}-C_{28}, See Table 2, Attachment B. As reported the split duplicate result for TPH C_{15}-C_{28} is blow the adopted assessment criteria and as such it is considered not to affect the outcome of the GME.
Accuracy		
Laboratory control spike sample recoveries reported within prescribed limits	Yes	Laboratory control spike sample recoveries were reported with prescribed limits
Matrix spike sample results reported within prescribed limits	Yes	All matrix spike sample results were reported within prescribed limits, however matrix spike recovery was not determined for. Perfluorinated Compounds within sample BH6, as the background level was greater than or equal to 4x spike level.
Surrogate spike sample results reported within prescribed limits	Yes	Surrogate spike sample results were reported within prescribed limits.
Laboratory method blanks reported within prescribed limits	Yes	Laboratory method blanks were reported within prescribed limits
All analyses NATA accredited	Yes	All analysis was undertaken by a NATA accredited laboratory.
Representativeness		
Samples delivered to laboratory within sample holding times, chilled and with correct	Yes	All samples were compliant with requirements of the testing laboratories. The samples for MBAS were extracted outside the holding time. However, there is no adopted assessment

Data quality indicator	Completed	Comments
preservative		criteria to assess against and as such this will not affect the outcome of the GME.
Required number of field duplicates and sample blanks taken	Yes	The correct number of sample duplicates and sample blanks were collected and analysed.
Sample blanks reported results below detection limits	Yes	All sample blanks reported concentrations below laboratory detection limits
Samples collected in accordance with regulatory and Parsons Brinckerhoff procedures	Yes	Refer to the methodology section of this report.
Comparability		
PQLs below the adopted assessment criteria	Yes	Laboratory PQL's were below the Airport (Environment Protection) Regulations 1997.
Qualified sampler	Yes	Samples collected by a suitably qualified and trained environmental scientist.
Completeness		
All laboratory data reviewed and presented in this report (i.e. COCs, SRNs, COAs and QCRs)	Yes	All laboratory data represented in this report has been reviewed.
All sample results reported	Yes	Refer to result summary Table 1, Attachment B.
Sample blanks data reported	Yes	Refer to result summary Table 2, Attachment B.
Relative percent differences (RPDs) calculated	Yes	Refer to result summary Table 2, Attachment B.
NATA stamp on reports	Yes	All laboratory reports have a NATA stamp.

Parsons Brinckerhoff considers the sample collection, documentation; handling, storage and transportation procedures used in this investigation are of an acceptable standard. The analytical results provided by the laboratories (ALS and Envirolab) are deemed reliable based on the results of field and laboratory QA/QC samples which demonstrated an adequate level of precision and accuracy.

The analytical data reported is considered acceptable for the purpose of this report.

8. Duty to notify

With respect to the duty to notify, refer to the previous GME reports.

9. Summary and Conclusions

The following summary and conclusions are based on the findings of this GME:

- Detected concentrations of TPH C_6-C_9 are below the level of detection for all monitoring wells with the exception of BH7 which only marginally exceeded the detection limit since the previous GME. There were no exceedences of the adopted assessment criteria for TPH C_6-C_9.

- Detected concentrations of BTEX are below the level of detection for all monitoring wells with the exception of toluene in BH7 since the previous GME. There were no exceedences of the adopted assessment criteria for BTEX.
- The concentration of TPH C_{10}-C_{36} has decreased or remained below PQLs in monitoring wells BH9, BH12 and BH13, and increased in monitoring wells BH6 and BH7 since the previous GME. There were no exceedences of the adopted assessment criteria.
- The detected concentrations of PFOS and PFOA decreased in monitoring wells BH9 and BH12 since the previous GME. The detected concentrations of PFOS and PFOA increased in monitoring wells BH6, BH7 and BH13 since the previous GME. The concentrations PFOS and PFOA detected in all monitoring wells exceeded the adopted assessment criteria.
- The concentration of MBAS decreased and 6:2 FtS was below the detection limit in all monitoring wells.
- Detected concentrations of PAHs have decreased in monitoring well BH12 since the previous GME. The concentration of PAHs detected in all monitoring wells were below the detection limit which in turn are below the adopted assessment criteria.
- Concentrations of TRH C_{10}-C_{36}, PFOS, PFOA and PAHs are higher in monitoring wells located to the west of the fire training ground (BH9 and BH12) than they are in monitoring wells located to the east of the fire training ground (BH6, BH7 and BH13).
- Elevated concentrations of PFOS and PFOA, above the adopted assessment criteria, are present in all monitoring wells and the extent of which has not been delineated in any direction.
- Groundwater flow direction and tidal influences on the area have not been determined.
- Ongoing use of the site for fire training may be affecting the configuration and migration rate of the dissolved phase contaminant plume.
- The rain events that occurred prior to the GME may have influenced the contaminant concentrations as a result of the infiltration process.

10. Recommendations

Parsons Brinckerhoff recommends the following:

- Additional monitoring wells should be installed to delineate the extent of PFOS and PFOA impacts in the groundwater underlying the site.
- Six-monthly GMEs should be continued, to provide further information regarding the trends of PFOS PFOA, TPH C_{10}-C_{36} and PAHs concentrations.
- Surface water and sediment samples should be collected from the drainage ditch to the east of the site and assessed for PFOS/PFOA.
- The top-of-casing elevation (mAHD) and location (easting and northing) of monitoring wells at the site should be surveyed by a licensed surveyor so the groundwater flow direction can be determined.

Given that the PFOS and PFOA impacts identified in monitoring wells have not been delineated, Parsons Brinckerhoff recommends undertaking further works to identify the extent of the impact.

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Yours sincerely

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Senior nvironmental Scientist
Contaminated Land Management

Encl: Attachment A - Figures
Attachment B - Groundwater results and QA/QC results summary tables
Attachment C - Laboratory analytical certificates

11. References

- Airport (Environment Protection) Regulation 1997.
- ATSDR (2009), *Draft Toxicological Profile for Perfluroalkyls*, Agency for Toxic Substances and Disease Registry, May 2009.
- Department of Environment and Heritage Protection (EHP), August 2014, Guideline: Contaminated Land Professionals.
- EHP, July 2014, Contaminated Land Assessment Guideline.
- Environment Canada (2006) *Ecological Screening Assessment Report on Perflurooctane Sulfonate, Its Salts and Its Precursors that Contain the C8F17SO2 or C8F17SO3, or C8F17SO2N Moiety*.
- Minnesota Department of Health (2008) Health Risk Limits for Perfl uorochemicals, Report to Minnesota Legislature 2008, Final Report
- National Environment Protection Council (NEPC) National Environment Protection (Assessment of Site Contamination) Measure (NEPM), Schedule B (1) Guideline on the Investigation Levels for Soil and Groundwater, Amendment Measure 2013 (No. 1).
- Safe Work Australia, Hazardous Substances Information System (HSIS). (Available www.hsis.safeworkaustralia.gov.au, accessed 20 October 2014).
- U.S. Department of Health and Public Services, Agency for Toxic Substances and Disease Registry, Draft Toxicological profile for Perfluoroalkyls, May 2009. (Available www.atsdr.cdc.gov, accessed 20 October 2014).
- 3M (1999). The science of organic fluorochemistry. 3M Company, February 5, 1999.

12. Statement of limitations

12.1 Scope of services

This environmental site assessment report (the report) has been prepared in accordance with the scope of services set out in the contract, or as otherwise agreed, between the client and Parsons Brinckerhoff (scope of services). In some circumstances the scope of services may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints.

12.2 Reliance on data

In preparing the report, Parsons Brinckerhoff has relied upon data, surveys, analyses, designs, plans and other information provided by the client and other individuals and organisations, most of which are referred to in the report (the data). Except as otherwise stated in the report, Parsons Brinckerhoff has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report (conclusions) are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. Parsons Brinckerhoff will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to Parsons Brinckerhoff.

12.3 Environmental conclusions

In accordance with the scope of services, Parsons Brinckerhoff has relied upon the data and has conducted environmental field monitoring and/or testing in the preparation of the report. The nature and extent of monitoring and/or testing conducted is described in the report.

On all sites, varying degrees of non-uniformity of the vertical and horizontal soil or groundwater conditions are encountered. Hence no monitoring, common testing or sampling technique can eliminate the possibility that monitoring or testing results/samples are not totally representative of soil and/or groundwater conditions encountered. The conclusions are based upon the data and the environmental field monitoring and/or testing and are therefore merely indicative of the environmental condition of the site at the time of preparing the report, including the presence or otherwise of contaminants or emissions.

Also, it should be recognised that site conditions, including the extent and concentration of contaminants, can change with time.

Within the limitations imposed by the scope of services, the monitoring, testing, sampling and preparation of this report have been undertaken and performed in a professional manner, in accordance with generally accepted practices and using a degree of skill and care ordinarily exercised by reputable environmental consultants under similar circumstances. No other warranty, expressed or implied, is made.

12.4 Report for benefit of client

The report has been prepared for the benefit of the client and no other party. Parsons Brinckerhoff assumes no responsibility and will not be liable to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report (including without limitation matters arising from any negligent act or omission of Parsons Brinckerhoff or for any loss or damage suffered by any other party relying upon the matters dealt with or conclusions expressed in the report). Other parties should not rely upon the report or the accuracy or completeness of any conclusions and should make their own enquiries and obtain independent advice in relation to such matters.

12.5 Other limitations

Parsons Brinckerhoff will not be liable to update or revise the report to take into account any events or emergent circumstances or facts occurring or becoming apparent after the date of the report.

The scope of services did not include any assessment of the title to or ownership of the properties, buildings and structures referred to in the report nor the application or interpretation of laws in the jurisdiction in which those properties, buildings and structures are located.

Attachment A

Figures

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airservices

Google earth

miles 1
km 2

Figure 1. Site Locality Map

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airservices

Google earth

feet 200
meters 80

Figure 2. Groundwater Monitoring Well Locations

Attachment B

Groundwater results and QA/QC results summary tables

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Table 1: Summary of historical and current data

Groundwater monitoring event
Fire Training Grounds, Gold Coast Airport, QLD
Current GME Date: 2 April 2015
Project No. 2171302F

Analytes				Total Petroleum Hydrocarbons					BTEX				PAHs	Surfactants			
Sample ID	Date Sampled	Casing Height (mAGL)	Depth to groundwater (mBTOC)	C6-C9 (µg/L)	C10-C14 (µg/L)	C15- C28 (µg/L)	C29-C36 (µg/L)	C10-C36 (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl benzene (µg/L)	Total Xylene (µg/L)	Total PAHs (µg/L)	PFOS (µg/L)	PFOA (µg/L)	MBAS (µg/L)	6:2 FtS (µg/L)
Airport (Environmental Protection) Regulations 1997				150	No Criteria			600	300	300	140	No criteria	3	No criteria	No criteria	No criteria	No criteria
Minessota Department of Health 2008				NR	NR			NR	NR	NR	NR	NR	NR	0.3	0.3	NR	NR
BH06	13/01/2009		0.690	<20	<50	<100	<50	<200	-	-	-	-	-	-	-	-	-
BH6	5/01/2011		0.543	<20	<50	<100	<50	<200	-	-	-	-	-	6.99	0.61	-	-
BH6	14/07/2011		0.840	<40	<50	<100	<100	<250	-	-	-	-	-	VB	VB	-	-
BH6	20/01/2012		0.555	<20	<50	<100	<50	<200	-	-	-	-	-	13.9	1.1	-	-
BH6	17/07/2012	0.13	0.464	<20	<50	110	<50	110	<1	<2	<2	<2	<0.5	18.2	1.72	2,500	<0.1
BH6	10/12/2012		1.175	<20	<50	<100	<50	<200	<1	<2	<2	<2	-	13.6	0.9	<100	<0.1
BH6	2/08/2013		0.645	<20	<50	110	<50	110	<1	<2	<2	<2	<0.5	24.5	3.35	<100	<0.1
BH6	12/12/2013		1.358	<20	200	320	80	600	<1	<2	<2	<2	<0.5	12.6	3.16	<100	<0.1
BH6	5/09/2014		1.079	<20	<50	<100	<50	<50	<1	<2	<2	<2	<0.5	5.2	0.40	500	<0.1
BH6	2/04/2015		0.278	<20	<50	160	110	270	<1	<2	<2	<2	<0.5	38.8	2.23	3	<1.0
BH7	19/09/1999		-	-	860	44,600	17,900	63,360	-	-	-	-	-	-	-	-	-
BH7	9/02/2000		-	-	80	4,350	1,910	6,340	-	-	-	-	-	-	-	-	-
BH7	6/07/2000		-	-	186	303	-	489	-	-	-	-	-	-	-	-	-
BH7	14/10/2003		-	26	60	767	578	1,405	-	-	-	-	-	-	-	-	-
BH7	15/10/2005		Well dry, no sample could be obtained														
BH7	24/03/2006		0.830	<20	<20	<100	<100	<220	-	-	-	-	-	-	-	-	-
BH7	7/07/2006		0.930	<5	<20	<20	<20	<60	-	-	-	-	-	-	-	-	-
BH7	3/05/2007		0.920	<20	55	<100	<100	55	-	-	-	-	-	-	-	-	-
BH7	11/12/2007		0.990	<20	<40	<100	<100	<240	-	-	-	-	-	-	-	-	-
BH7	19/06/2008		0.655	<20	<40	<100	<100	<240	-	-	-	-	-	-	-	-	-
BH7	13/07/2009	0.13	0.720	<20	<50	<100	<50	<200	-	-	-	-	-	-	-	-	-
BH7	11/02/2010		0.890	<20	<50	<100	<50	<200	-	-	-	-	-	-	-	-	-
BH7	11/02/2010		0.790	60	140	<50	200	340	-	-	-	-	-	-	-	-	-
BH7	14/07/2011		0.890	<400	<50	<100	<100	<200	-	-	-	-	-	17.4	0.86	-	-
BH7	20/01/2012		0.645	<20	<50	<100	<50	<200	-	-	-	-	-	3.36	0.51	-	-
BH7	17/07/2012		0.595	<20	<50	100	<50	100	<1	<2	<2	<2	<0.5	25	1.73	1,300	<0.1
BH7	10/12/2012		1.185	<20	<50	<100	70	70	<1	<2	<2	<2	-	38.8	1.29	<100	<0.01
BH7	2/08/2013		0.710	<20	<50	<100	<50	<200	<1	<2	<2	<2	<0.5	21.2	1.25	<100	<0.1
BH7	12/12/2013		1.455	<20	<50	<100	<50	<50	<1	<2	<2	<2	<0.5	36.1	1.00	<100	<0.1
BH7	5/09/2014		1.046	<20	<50	<100	<50	<50	<1	<2	<2	<2	<0.5	10.50	0.62	<500	<0.1
BH7	2/04/2015		0.449	30	<50	100	60	160	<1	19	<2	<2	<0.5	23.40	3.57	<2.0	<1.0
BH9	5/01/2011		0.539	<20	<50	<100	<50	<200	-	-	-	-	-	399	12.7	-	-
BH9	14/07/2011		0.970	<20	<50	<100	<100	<250	-	-	-	-	-	23.4	3.03	-	-
BH9	20/01/2012		0.645	<20	<50	<100	<50	<200	-	-	-	-	-	94.5	8.7	-	-
BH9	17/07/2012		0.456	<20	<50	<100	<50	<200	<1	<2	<2	<2	<0.5	379	2.78	500	<0.1
BH9	12/12/2012	-0.012	1.380	<20	<50	<100	<50	<200	<1	<2	<2	<2	-	24.2	2.79	<100	<0.01
BH9	2/08/2013		0.745	<20	<50	<100	<50	<200	<1	<2	<2	<2	<0.5	335	5.71	600	<0.1
BH9	12/12/2013		1.500	<20	<50	<100	<50	<50	<1	<2	<2	<2	<0.5	31.8	1.34	100	<0.1
BH9	5/09/2014		1.357	<20	330	360	<50	690	<1	<2	<2	<2	<0.5	526	9.08	1,300	0.5
BH9	2/04/2015		0.276	<20	<50	<100	<50	<50	<1	<2	<2	<2	<0.5	196	4.50	1	<1.0
BH12	11/10/2005		1.320	<20	200	168	<100	368	-	-	-	-	-	-	-	-	-
BH12	24/03/2006		2.500	<20	380	294	<20	674	-	-	-	-	-	-	-	-	-
BH12	7/07/2006		2.100	<5	250	297	<20	547	-	-	-	-	-	-	-	-	-
BH12	3/05/2007		1.350	<20	370	193	<100	563	-	-	-	-	-	-	-	-	-
BH12	11/12/2007		1.080	130	610	290	<100	900	-	-	-	-	-	-	-	-	-
BH12	19/06/2008		0.580	77	500	380	<100	880	-	-	-	-	-	-	-	-	-
BH12	13/01/2009		0.580	40	1,140	500	80	1,720	-	-	-	-	-	-	-	-	-
BH12	13/07/2009		0.680	30	360	500	70	930	-	-	-	-	-	-	-	-	-
BH12	11/02/2010		1.165	20	590	600	<50	1,190	-	-	-	-	-	-	-	-	-
BH12	5/10/2010	-0.07	0.470	30	320	220	<50	540	-	-	-	-	-	166	18.7	-	-
BH12	5/01/2011		0.448	<20	500	970	180	1,650	-	-	-	-	-	836	49.2	-	-
BH12	14/07/2011		0.890	<20	200	200	<100	400	-	-	-	-	-	580	64.6	-	-
BH12	20/01/2012		0.555	20	220	220	<50	440	-	-	-	-	-	190	13	-	-
BH12	17/07/2012		0.362	40	530	360	<50	890	<1	<2	<2	<2	8	1340	53.5	2,200	0.7
BH12	10/12/2012		1.290	50	440	400	<50	840	1	<2	22	<2	-	1280	54.1	2,200	7.7
BH12	2/08/2013		0.656	60	640	410	<50	1,050	2	<2	31	<2	47.7	1460	38.6	-	2.5
BH12	12/12/2013		1.410	20	690	1,150	90	1,930	<1	<2	12	<2	4.1	2280	51.3	1,700	1.7
BH12	5/09/2014		1.286	<20	280	550	90	920	<1	<2	<2	<2	10.8	2100	29.60	1,600	0.7
BH12	2/04/2015		0.191	<20	130	240	50	420	<1	<2	<2	<2	<0.5	527	15.00	1	<1.0
BH13	11/10/2005		1.670	220	340	129	<100	469	-	-	-	-	-	-	-	-	-
BH13	24/03/2006		1.000	90	140	<100	<100	140	-	-	-	-	-	-	-	-	-
BH13	3/10/2006		1.420	50	340	<100	<100	340	-	-	-	-	-	-	-	-	-
BH13	3/05/2007		1.250	<20	<20	<100	<100	<220	-	-	-	-	-	-	-	-	-
BH13	11/12/2007		1.330	<20	<40	<100	<100	<240	-	-	-	-	-	-	-	-	-
BH13	19/06/2008		0.945	22	<40	<100	<100	<240	-	-	-	-	-	-	-	-	-
BH13	13/01/2009		1.070	50	120	100	<50	220	-	-	-	-	-	-	-	-	-
BH13	13/07/2009		1.020	100	250	<100	<50	250	-	-	-	-	-	-	-	-	-
BH13	11/02/2010		1.290	50	<50	<100	<50	<200	-	-	-	-	-	-	-	-	-
BH13	5/10/2010	0.74	1.410	<20	<50	<100	<50	<200	-	-	-	-	-	-	-	-	-
BH13	5/01/2011		1.546	<20	440	380	190	1,010	-	-	-	-	-	11.6	6.83	-	-
BH13	14/07/2011		1.840	<100	<50	<100	<100	<250	-	-	-	-	-	7.38	1.23	-	-
BH13	20/01/2012		1.557	<20	<50	<100	<50	<200	-	-	-	-	-	9.22	2.24	-	-
BH13	17/07/2012		1.490	<20	220	200	<50	420	<1	<2	25	<2	<0.5	39.2	3.76	200	<0.1
BH13	10/12/2012		2.220	200	230	<100	<50	230	<1	<2	10	131	-	19.8	2.1	200	<0.1
BH13	2/08/2013		1.467	<20	100	130	<50	230	<1	<2	<2	3	<0.5	32.6	3.37	<100	<0.1
BH13	12/12/2013		2.385	320	4,880	2,610	150	7,640	18	<2	38	186	12.9	26.1	1.89	200	<0.1
BH13	5/09/2014		2.075	<20	130	280	140	550	<1	<2	<2	<2	<0.5	14.7	1.5	<200	<0.1
BH13	2/04/2015		1.296	<20	<50	120	80	200	<1	<2	<2	<2	<0.5	17.9	37.1	<2.0	<1.0

Notes
All units are in ug/L
mAGL metres above ground level
mBTOC metres below top of groundwater well casing
Results Items shaded and bold exceed Airport (Environmental Protection) Regulations 1997, Schedule 2 Freshwater
Results Items shaded and bold exceed Minnesota Department of Health, 2008
VB Indicates sample vessel broken
\- Indicates not analysed
NR Not referenced

Attachment C

Laboratory analytical certificates

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EB1516017**	Page	: 1 of 6
Client	: **WSP ENVIRONMENTAL PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MR IVAN NERALIC	Contact	: Jodie Hancock
Address	: 1 GARDNER CLOSE MILTON QLD, AUSTRALIA 4064	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: ivan.neralic@wspgroup.com	E-mail	: Jodie.Hancock@alsenviro.com
Telephone	: +61 3368 6600	Telephone	: +61 7 3552 8654
Facsimile	: +61 07 33674399	Facsimile	: +61-7-3243 7218
Project	: Airservices GME Gold Coast Airport	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: 2171302E	Date Samples Received	: 02-Apr-2015 16:15
C-O-C number	: ----	Date Analysis Commenced	: 07-Apr-2015
Sampler	: MICHAEL AITKEN	Issue Date	: 13-Apr-2015 12:42
Site	: ----		
		No. of samples received	: 8
Quote number	: ----	No. of samples analysed	: 8

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Alex Rossi	Organic Chemist	Sydney Organics
Andrew Epps	Senior Inorganic Chemist	Brisbane Inorganics
Matt Frost	Senior Organic Chemist	Brisbane Organics
Ryan Story	2IC Organic Instrument Chemist	Brisbane Organics

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.

- EP050 (Anionic Surfactants as MBAS): Samples BH7; BH13 were diluted due to matrix interference. LOR adjusted accordingly.
- EP231: Particular samples required dilution due to matrix interferences. LOR values have been adjusted accordingly.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.
- PFOS and PFOA results are reported as an aggregate of linear and branched isomers.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	BH6	BH7	BH9	BH12	BH13
			Client sampling date / time	[02-Apr-2015]	[02-Apr-2015]	[02-Apr-2015]	[02-Apr-2015]	[02-Apr-2015]
Compound	CAS Number	LOR	Unit	EB1516017-001	EB1516017-002	EB1516017-003	EB1516017-004	EB1516017-005
				Result	Result	Result	Result	Result
EP050: Anionic Surfactants as MBAS								
Anionic Surfactants as MBAS	---	0.1	mg/L	3.4	<2.0	0.6	0.9	<2.0
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthylene	208-96-8	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Acenaphthene	83-32-9	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Fluorene	86-73-7	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Phenanthrene	85-01-8	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Anthracene	120-12-7	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Fluoranthene	206-44-0	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Pyrene	129-00-0	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benz(a)anthracene	56-55-3	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Chrysene	218-01-9	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
^ Sum of polycyclic aromatic hydrocarbons	---	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	---	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	---	20	µg/L	<20	30	<20	<20	<20
C10 - C14 Fraction	---	50	µg/L	<50	<50	<50	130	<50
C15 - C28 Fraction	---	100	µg/L	160	100	<100	240	120
C29 - C36 Fraction	---	50	µg/L	110	60	<50	50	80
^ C10 - C36 Fraction (sum)	---	50	µg/L	270	160	<50	420	200
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	40	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	20	<20	<20	<20
>C10 - C16 Fraction	>C10_C16	100	µg/L	<100	<100	<100	200	<100
>C16 - C34 Fraction	---	100	µg/L	250	140	<100	220	170
>C34 - C40 Fraction	---	100	µg/L	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	---	100	µg/L	250	140	<100	420	170

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH6	BH7	BH9	BH12	BH13
				Client sampling date / time	[02-Apr-2015]	[02-Apr-2015]	[02-Apr-2015]	[02-Apr-2015]	[02-Apr-2015]
Compound	CAS Number	LOR	Unit		EB1516017-001	EB1516017-002	EB1516017-003	EB1516017-004	EB1516017-005
					Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ >C10 - C16 Fraction minus Naphthalene (F2)	---	100	µg/L		<100	<100	<100	200	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	19	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	1330-20-7	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	---	1	µg/L		<1	19	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP231: Perfluorinated Compounds									
PFOS	1763-23-1	0.02	µg/L		38.8	23.4	196	527	17.9
PFOA	335-67-1	0.02	µg/L		2.23	3.57	4.50	15.0	37.1
6:2 Fluorotelomer sulfonate (6:2 FtS)	27619-97-2	0.1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
8:2 Fluorotelomer sulfonate	39108-34-4	0.1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1	%		26.6	26.5	27.2	27.5	27.0
2-Chlorophenol-D4	93951-73-6	1	%		62.6	68.4	68.1	67.7	67.3
2.4.6-Tribromophenol	118-79-6	1	%		87.1	94.8	90.5	99.5	99.3
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1	%		63.2	68.0	72.5	77.4	72.8
Anthracene-d10	1719-06-8	1	%		75.5	79.6	81.4	84.6	83.2
4-Terphenyl-d14	1718-51-0	1	%		78.2	85.6	87.2	89.8	87.9
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		117	116	122	120	124
Toluene-D8	2037-26-5	2	%		94.5	93.0	92.6	94.7	89.0
4-Bromofluorobenzene	460-00-4	2	%		89.7	89.3	87.1	88.4	85.5

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	QC01a	QC02	QC03	----	----
				Client sampling date / time	[02-Apr-2015]	[02-Apr-2015]	[02-Apr-2015]	----	----
Compound	CAS Number	LOR	Unit		EB1516017-006	EB1516017-007	EB1516017-008	------	------
					Result	Result	Result	Result	Result
EP050: Anionic Surfactants as MBAS									
Anionic Surfactants as MBAS	----	0.1	mg/L		0.8	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1	µg/L		<1.0	<1.0	----	----	----
Acenaphthylene	208-96-8	1	µg/L		<1.0	<1.0	----	----	----
Acenaphthene	83-32-9	1	µg/L		<1.0	<1.0	----	----	----
Fluorene	86-73-7	1	µg/L		<1.0	<1.0	----	----	----
Phenanthrene	85-01-8	1	µg/L		<1.0	<1.0	----	----	----
Anthracene	120-12-7	1	µg/L		<1.0	<1.0	----	----	----
Fluoranthene	206-44-0	1	µg/L		<1.0	<1.0	----	----	----
Pyrene	129-00-0	1	µg/L		<1.0	<1.0	----	----	----
Benz(a)anthracene	56-55-3	1	µg/L		<1.0	<1.0	----	----	----
Chrysene	218-01-9	1	µg/L		<1.0	<1.0	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L		<1.0	<1.0	----	----	----
Benzo(k)fluoranthene	207-08-9	1	µg/L		<1.0	<1.0	----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L		<0.5	<0.5	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L		<1.0	<1.0	----	----	----
Dibenz(a.h)anthracene	53-70-3	1	µg/L		<1.0	<1.0	----	----	----
Benzo(g.h.i)perylene	191-24-2	1	µg/L		<1.0	<1.0	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L		<0.5	<0.5	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L		<0.5	<0.5	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	----	----
C10 - C14 Fraction	----	50	µg/L		170	<50	----	----	----
C15 - C28 Fraction	----	100	µg/L		290	<100	----	----	----
C29 - C36 Fraction	----	50	µg/L		60	<50	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		520	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	----	----
>C10 - C16 Fraction	>C10_C16	100	µg/L		260	<100	----	----	----
>C16 - C34 Fraction	----	100	µg/L		270	<100	----	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		530	<100	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	QC01a	QC02	QC03	----	----
				Client sampling date / time	[02-Apr-2015]	[02-Apr-2015]	[02-Apr-2015]	----	----
Compound	CAS Number	LOR	Unit		EB1516017-006	EB1516017-007	EB1516017-008	------	------
					Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		260	<100	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	----	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	----	----
^ Total Xylenes	1330-20-7	2	µg/L		<2	<2	<2	----	----
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	----	----
EP231: Perfluorinated Compounds									
PFOS	1763-23-1	0.02	µg/L		----	----	----	----	----
PFOA	335-67-1	0.02	µg/L		----	----	----	----	----
6:2 Fluorotelomer sulfonate (6:2 FtS)	27619-97-2	0.1	µg/L		----	----	----	----	----
8:2 Fluorotelomer sulfonate	39108-34-4	0.1	µg/L		----	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1	%		30.3	22.6	----	----	----
2-Chlorophenol-D4	93951-73-6	1	%		74.2	62.0	----	----	----
2.4.6-Tribromophenol	118-79-6	1	%		107	91.9	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1	%		79.2	65.7	----	----	----
Anthracene-d10	1719-06-8	1	%		89.5	77.0	----	----	----
4-Terphenyl-d14	1718-51-0	1	%		94.0	87.3	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		97.2	104	101	----	----
Toluene-D8	2037-26-5	2	%		81.8	95.5	94.5	----	----
4-Bromofluorobenzene	460-00-4	2	%		96.5	100.0	97.2	----	----

Envirolab Services Pty Ltd
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CERTIFICATE OF ANALYSIS 126267

Client:
WSP Environment & Energy QLD
1 Gardner Cl
Milton
QLD 4064

Attention: Michael Aitken

Sample log in details:

Your Reference:	**2171302E**	
No. of samples:	1 Water	
Date samples received / completed instructions received	09/04/15	/ 09/04/15

Analysis Details:
Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date:	16/04/15	/ 16/04/15
Date of Preliminary Report:	Not Issued	

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Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

Results Approved By:

Jacinta Hurst
Laboratory Manager

vTRH(C6-C10)/BTEXN in Water Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ---------- 	 126267-1 QC01b 02/04/2015 Water
Date extracted	-	09/04/2015
Date analysed	-	10/04/2015
$TRHC_6$ - C_9	µg/L	<10
$TRHC_6$ - C_{10}	µg/L	<10
$TRHC_6$ - C_{10} less BTEX (F1)	µg/L	<10
Benzene	µg/L	<1
Toluene	µg/L	<1
Ethylbenzene	µg/L	<1
m+p-xylene	µg/L	<2
o-xylene	µg/L	<1
Naphthalene	µg/L	<1
Surrogate Dibromofluoromethane	%	108
Surrogate toluene-d8	%	94
Surrogate 4-BFB	%	97

svTRH (C10-C40) in Water Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ---------- 	126267-1 QC01b 02/04/2015 Water
Date extracted	-	10/04/2015
Date analysed	-	10/04/2015
TRHC$_{10}$ - C$_{14}$	µg/L	91
TRHC$_{15}$ - C$_{28}$	µg/L	140
TRHC$_{29}$ - C$_{36}$	µg/L	<100
TRH>C$_{10}$ - C$_{16}$	µg/L	130
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	µg/L	130
TRH>C$_{16}$ - C$_{34}$	µg/L	<100
TRH>C$_{34}$ - C$_{40}$	µg/L	<100
Surrogate o-Terphenyl	%	81

PAHs in Water Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	126267-1 QC01b 02/04/2015 Water
Date extracted	-	10/04/2015
Date analysed	-	10/04/2015
Naphthalene	µg/L	<1
Acenaphthylene	µg/L	<1
Acenaphthene	µg/L	<1
Fluorene	µg/L	<1
Phenanthrene	µg/L	<1
Anthracene	µg/L	<1
Fluoranthene	µg/L	<1
Pyrene	µg/L	<1
Benzo(a)anthracene	µg/L	<1
Chrysene	µg/L	<1
Benzo(b,j+k)fluoranthene	µg/L	<2
Benzo(a)pyrene	µg/L	<1
Indeno(1,2,3-c,d)pyrene	µg/L	<1
Dibenzo(a,h)anthracene	µg/L	<1
Benzo(g,h,i)perylene	µg/L	<1
Benzo(a)pyrene TEQ	µg/L	<5
Total +ve PAH's	µg/L	NIL (+)VE
Surrogate p-Terphenyl-d14	%	70

Miscellaneous Inorganics		
Our Reference:	UNITS	126267-1
Your Reference	----------	QC01b
Date Sampled	----------	02/04/2015
Type of sample		Water
Date prepared	-	16/04/2015
Date analysed	-	16/04/2015
M.B.A.S Methylene Blue Active Substances	mg/L	0.13

Method ID	Methodology Summary
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-013	Water samples are analysed directly by purge and trap GC-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-012 subset	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.
Ext-044	Analysed by LabPoint NATA accreditation 11111.

Client Reference: 2171302E

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			09/04/2015	[NT]	[NT]	LCS-W1	09/04/2015
Date analysed	-			10/04/2015	[NT]	[NT]	LCS-W1	10/04/2015
$TRHC_6$ - C_9	µg/L	10	Org-016	<10	[NT]	[NT]	LCS-W1	112%
$TRHC_6$ - C_{10}	µg/L	10	Org-016	<10	[NT]	[NT]	LCS-W1	112%
Benzene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	117%
Toluene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	115%
Ethylbenzene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	109%
m+p-xylene	µg/L	2	Org-016	<2	[NT]	[NT]	LCS-W1	109%
o-xylene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	109%
Naphthalene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Surrogate Dibromofluoromethane	%		Org-016	100	[NT]	[NT]	LCS-W1	99%
Surrogate toluene-d8	%		Org-016	96	[NT]	[NT]	LCS-W1	100%
Surrogate 4-BFB	%		Org-016	96	[NT]	[NT]	LCS-W1	96%

QUALITY CONTROL svTRH (C10-C40) in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			10/04/2015	126267-1	10/04/2015 || 10/04/2015	LCS-W1	10/04/2015
Date analysed	-			10/04/2015	126267-1	10/04/2015 || 10/04/2015	LCS-W1	10/04/2015
$TRHC_{10}$ - C_{14}	µg/L	50	Org-003	<50	126267-1	91 || 120 || RPD: 27	LCS-W1	93%
$TRHC_{15}$ - C_{28}	µg/L	100	Org-003	<100	126267-1	140 || 280 || RPD: 67	LCS-W1	85%
$TRHC_{29}$ - C_{36}	µg/L	100	Org-003	<100	126267-1	<100 || <100	LCS-W1	81%
$TRH>C_{10}$ - C_{16}	µg/L	50	Org-003	<50	126267-1	130 || 170 || RPD: 27	LCS-W1	93%
$TRH>C_{16}$ - C_{34}	µg/L	100	Org-003	<100	126267-1	<100 || 220	LCS-W1	85%
$TRH>C_{34}$ - C_{40}	µg/L	100	Org-003	<100	126267-1	<100 || <100	LCS-W1	81%
Surrogate o-Terphenyl	%		Org-003	75	126267-1	81 || 71 || RPD: 13	LCS-W1	96%

QUALITY CONTROL PAHs in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			10/04/2015	[NT]	[NT]	LCS-W1	10/04/2015
Date analysed	-			10/04/2015	[NT]	[NT]	LCS-W1	10/04/2015
Naphthalene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	LCS-W1	71%
Acenaphthylene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	[NR]	[NR]
Acenaphthene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	[NR]	[NR]
Fluorene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	LCS-W1	70%
Phenanthrene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	LCS-W1	70%

Client Reference: 2171302E

QUALITY CONTROL PAHs in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Anthracene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	[NR]	[NR]
Fluoranthene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	LCS-W1	71%
Pyrene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	LCS-W1	73%
Benzo(a)anthracene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	[NR]	[NR]
Chrysene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	LCS-W1	75%
Benzo(b,j+k) fluoranthene	µg/L	2	Org-012 subset	<2	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	LCS-W1	93%
Indeno(1,2,3-c,d)pyrene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d14	%		Org-012 subset	70	[NT]	[NT]	LCS-W1	91%
QUALITY CONTROL Miscellaneous Inorganics	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			16/04/2015	126267-1	16/04/2015 || 16/04/2015	126267-1	16/04/2015
Date analysed	-			16/04/2015	126267-1	16/04/2015 || 16/04/2015	126267-1	16/04/2015
M.B.A.S Methylene Blue Active Substances	mg/L	0.1	Ext-044	<0.10	126267-1	0.13 || 0.14 || RPD: 7	126267-1	95%

Report Comments:

MBAS analysed by LabPoint. Report No.NAA15-0611.

Asbestos ID was analysed by Approved Identifier:	Not applicable for this job
Asbestos ID was authorised by Approved Signatory:	Not applicable for this job

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NA: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike : A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample) : This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.
Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.
Spikes for Physical and Aggregate Tests are not applicable.
For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Appendix H – ORS Records

ARFF Incident Detail Report

Air Services Australia COOLANGATTA **Incident No:** 124

ARFF Incident Details for **Mutual Aid Call** **15/12/1999**

Incident Site:	BOYD ST RUBBISH TIP TUGUN	**Number of Lives Saved:**	0
Origin of Call:	IC from MFB	**Number of Deaths:**	0
Company:	QLD Emergency Services	**Number of Injuries:**	0
Est Damage Value:	$0	**Est Facility Value:**	$0

Incident Times (UTC)

Call Time:	15/12/1999 18:57:00	**Arrival Time:**	15/12/1999 19:05:00	**End Time:**	15/12/1999 19:38:00
Dispatch Time:	15/12/1999 19:00:46	**Control Time:**	15/12/1999 19:38:00	**Return Time:**	15/12/1999 19:52:46

Materials Used

DCP Used:	0.00 **kg**	**Foam Used:**	100 **litres**
WaterUsed:	14000 **litres**	**Other Used:**	

Vehicles Involved

Vehicle Code	Quantity	Vehicle Code	Quantity	Vehicle Code	Quantity
ULFV 5	1				

Staff in Attendance

Team Leader: **FSM:**

Other Staff:

Actions Taken

ARFF responded to a request for fire fighting assistancefrom QRFAat anuncontrolled fire at the Boyd St rubbish tipTugun. One vehicle wasdispatched which allowed ARFF to remain at Category 6 and cover allflights. A second vehicle was dispatched upon the return of the firstvehicle. The fire was eventually controlled and extinguished after heavyearth moving equipment was used to turn over the fire area.

ARFF Incident Detail Report

Air Services Australia COOLANGATTA **Incident No:** 161

ARFF Incident Details for **Mutual Aid Call** **17/07/2000**

Incident Site:	GOLD COAST MARINA COOMERA.	**Number of Lives Saved:**	0
Origin of Call:		**Number of Deaths:**	0
Company:	QLD Emergency Services	**Number of Injuries:**	0
Est Damage Value:	$0	**Est Facility Value:**	$0

Incident Times (UTC)

Call Time:	17/07/2000 14:20:00	**Arrival Time:**	17/07/2000 15:20:00	**End Time:**	17/07/2000 22:00:00
Dispatch Time:	17/07/2000 14:40:00	**Control Time:**	17/07/2000 22:00:00	**Return Time:**	17/07/2000 22:40:00

Materials Used

DCP Used:	0.00 **kg**	**Foam Used:**	1350 **litres**
WaterUsed:	**litres**	**Other Used:**	

Vehicles Involved

Vehicle Code	Quantity	Vehicle Code	Quantity	Vehicle Code	Quantity
ULFV 6	1	ULFV 5	1		

Staff in Attendance

Team Leader: **FSM:**

Other Staff:

Actions Taken

QFRA requested quantity of AFFF delivered to a large vessel fireDOcontacted staff and despatched a ULFV5 with two crew. 1000 l of AFFFwas delivered to incident site in GUV and TO vehicle. ARFF crew remainedat incident site an assisted QFRA in fire fighting operations.

ARFF Incident Detail Report

Air Services Australia COOLANGATTA **Incident No:** 231

ARFF Incident Details for **Fire Non-Aircraft** **26/08/2001**

Incident Site:	ANSETT TERMINAL ROAD SIDE	**Number of Lives Saved:**	0
Origin of Call:	PABX	**Number of Deaths:**	0
Company:		**Number of Injuries:**	0
Est Damage Value:	$0	**Est Facility Value:**	$0

Incident Times (UTC)

Call Time:	26/08/2001 04:41:00	**Arrival Time:**	26/08/2001 04:43:05	**End Time:**	26/08/2001 04:46:55
Dispatch Time:	26/08/2001 04:41:35	**Control Time:**	26/08/2001 04:46:55	**Return Time:**	26/08/2001 05:21:00

Materials Used

DCP Used:	9.00 **kg**	**Foam Used:**	12 **litres**
WaterUsed:	400 **litres**	**Other Used:**	

Vehicles Involved

Vehicle Code	Quantity	Vehicle Code	Quantity	Vehicle Code	Quantity
ULFV 6	1				

Staff in Attendance

Team Leader: **FSM:**

Other Staff:

Actions Taken

ARFF responded Ansett Terminal entrance where Yellow Cab No. T38-401 hadsmoke and flame issuing from the engine compartment.Fire attacked with 9kg DCP and hose reelfrom beneath before raising thebonnet and fully extinguishing the fire. Battery disconnected and LPGsystem turned off. Engine and LPG converter cooled with hose reel. Taxideemed safe and pushed away from the terminal entrance. Taxidriver arranged for a tow truck.Road way washed down and debris from car removed.QFRA responded and assisted in isolating gas cylinder.ARFF returned to station.Taxi owned by Professional Taxis 2/7 Hinde St Southport ph 0417 923 033driver Mark Williams 7/21 Alinjarra Drive Tugun Heights 0417 726 629.

ARFF Incident Detail Report

Air Services Australia COOLANGATTA **Incident No:** 311

ARFF Incident Details for **Mutual Aid Call** **15/09/2002**

Incident Site:	GOLD COAST CITY DUMP TUGUN	**Number of Lives Saved:**	0
Origin of Call:	Fire Line	**Number of Deaths:**	0
Company:		**Number of Injuries:**	0
Est Damage Value:	$0	**Est Facility Value:**	$0

Incident Times (UTC)

Call Time:	15/09/2002 03:58:00	**Arrival Time:**	15/09/2002 04:05:00	**End Time:**	15/09/2002 06:55:00
Dispatch Time:	15/09/2002 04:00:00	**Control Time:**	15/09/2002 06:55:00	**Return Time:**	15/09/2002 07:01:00

Materials Used

DCP Used:	0.00 **kg**	**Foam Used:**	140 **litres**
WaterUsed:	50000 **litres**	**Other Used:**	NIL

Vehicles Involved

Vehicle Code	Quantity	Vehicle Code	Quantity	Vehicle Code	Quantity
ULFV 5	1				

Staff in Attendance

Team Leader: **FSM:**

Other Staff:

Actions Taken

FIRE ASSISTANCE WITH THE QRFS IN COMBATING A RUBBISH DUMP FIRE.

ARFF Incident Detail Report

Air Services Australia COOLANGATTA **Incident No:** 1320

ARFF Incident Details for **Aircraft - Crash** **02/07/2009**

Incident Site:	West of Runway 32 Undershoot area	**Number of Lives Saved:**	0
Origin of Call:	Crash Alarm	**Number of Deaths:**	1
Company:	OTHER - Company unknown	**Number of Injuries:**	0
Est Damage Value:	$250000	**Est Facility Value:**	$0

Incident Times (UTC)

Call Time:	02/07/2009 00:16:00	**Arrival Time:**	02/07/2009 00:20:00	**End Time:**	02/07/2009 05:59:00
Dispatch Time:	02/07/2009 00:17:00	**Control Time:**	02/07/2009 00:50:00	**Return Time:**	02/07/2009 06:12:00

Materials Used

DCP Used:	0.00 **kg**	**Foam Used:**	20 **litres**
WaterUsed:	320 **litres**	**Other Used:**	

Vehicles Involved

Vehicle Code	Quantity	Vehicle Code	Quantity	Vehicle Code	Quantity
Police	1	Ambulance	1	MFB	1
Airport Safety	1	ULFV 8	2	FSM Vehicle	1
Aust Federal Police	1				

Staff in Attendance

Team Leader: KALENDRA, Paul G **FSM:** EVANS, Rodney J

Other Staff:

FRANKS, Peter R DAWSON, Steven J JOHNSTONE, Jonathon

ROSE, Warwick B REEVES, Mark B FISHER, William J

POWELL, Matthew D

Actions Taken

Incident 02/07/2009 00:16 -ATC activated crash alarm with nil details initially to FCC. FCC contacted ATC to confirm helicopter crash in vicinity SW area of the aerodrome.

Dispatch 02/07/2009 00:17 -Tenders 2 and 4 dispatched to area west of Runway 32 undershoot. Exact location unknown but ATC advised area west of southern secondary wind indicator. Airport ground staff directed ARFF to location of crash site south of airport perimeter fence and north of Tugun By-pass in swampy medium closed forest.

Arrival 02/07/2009 00:20 - ARFF on scene with Tender 4 adjacent crash site 300 metres west of Runway 32 on a narrow outer perimeter road via Gate 11. Tender 2 positioned 100 meters to the rear of Tender4 due to access difficulties. ARFF deployed one FB10x foam line due to Avgas leak from aircraft wreckage and applied foam blanket to area. ARFF gained access to R22 and extricated pilot to roadway. Resuscitation attempts were undertaken by ARFF. Fire Commander advised FCC that ARFF at Category 0.
00:26 Emergency services arrived and Qld Ambulance Service and Queensland Fire & Rescue Service staff took over resuscitation of pilot with Careflight doctor in attendance. Australian Federal Police, New South Wales Police in attendance and secured the crash site. SFC Evans on scene.
Resuscitation attempts continued for approximately 30 minutes and failed to revive the casualty. ARFF searched area around crash site and confirmed with ATC aircraft POB (one on board). Foam blanket reapplied as required.
Control 02/07/2009 00:50 -ARFF control time and Tender 2 returned to station with Category 6 restoration.
Tender 4 remained on scene with Police until ASTB arrival.

0520 ATSB arrived on scene

End 02/07/2009 05:59 -ARFF end time. Tender 4 left incident site

Return 02/07/2009 06:12 -Tender 4 returned to station. Category 8 restoration.

GHD

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Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
Rev 0	B Ng I. Bird	M. Clough		I. Gregson		01/07/2016
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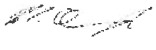
Final	B.Ng I Bird	I. Gregson		M. Clough		12/10/2016

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Airservices Australia

Gold Coast Airport

Preliminary Sampling Report

October 2016

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Appendix E – Surface Soil and Surface Water Observation Notes

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List of abbreviations

General terms	
AFFF	Aqueous Film Forming Foam
AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment and Conservation Council
ARFF	Aviation Rescue and Fire Fighting
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
ASA	Airservices Australia
bgl	Below ground level
CoPC	Contaminants of Potential Concern
CSM	Conceptual Site Model
DBYD	Dial Before You Dig
DNRM	Department of Natural Resource and Mining
DO	Dissolved Oxygen
DQI	Data Quality Indicator
EC	Electrical Conductivity
EHP	Department of Environment and Heritage Protection
ERA	Environmentally Relevant Activity
EIL	Environmental Investigation Level
FTG	Firefighting Training Ground
GCA	Gold Coast Airport
GCAPL	Gold Coast Airport Pty Ltd
HIL	Health Investigation Level
HSE	Health, Safety and Environment
ISL	Interim Screening Level
JSEA	Job Safety and Environmental Assessment
LOR	Limit of Reporting
NATA	National Association of Testing Authorities
NDD	Non Destructive Drilling
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
PFASs	Per- and poly fluorinated alkyl substances
PFCs	Perfluorinated Compounds
PFOS	Perfluorooctane sulfonate
PFOA	Perfluorooctanoic acid
PSD	Particle Size Distribution
QA	Quality Assurance
QC	Quality Control
QLD	Queensland
RPD	Relative Percentage Difference
SAQP	Sampling Analysis and Quality Plan
SWL	Standing Water Level
TDS	Total Dissolved Solids
ToC	Top of Casing

TOC	Total Organic Carbon
WHS	Work Health and Safety

Units	
ha	Hectare
L	Litre
km	Kilometre
m	Metre
m^2	square metres
mg/L	milligrams per litre
mbgl	metres below ground level
mg/kg	milligrams per kilogram
mbToC	metres below top of casing
mV	milli-Volt
µg/L	micrograms per litre
µS/cm	micro-Siemens per centimetre

1. Introduction

GHD Pty Ltd (GHD) was engaged by Airservices Australia (Airservices) to complete a preliminary site investigation (PSI)[1] for the Gold Coast Airport (herein referred as 'the site').

A Sample Analysis and Quality Plan (SAQP)[2] was subsequently prepared and executed by GHD (the Preliminary Sampling) which focused on the assessment of potential contamination from the historical use of Aqueous Film Forming Foams (AFFF).

This report documents the methodology and findings of the Preliminary Sampling and provides supporting information to the PSI (GHD reference 31\34071\252132). The Site locality and investigation area are shown in Figure 1 of Appendix A.

This report is subject to, and must be read in conjunction with, the limitations set out in Section 1.4. The report should also be read with reference to the PSI which contains further interpretation of the data, including a conceptual site model (CSM).

1.1 Objective of the preliminary sampling

The objective of the Preliminary Sampling was to validate and further investigate the desktop findings of the PSI through a preliminary and targeted soil, groundwater and surface water sampling program.

1.2 Scope of works

Based on the outcomes of the PSI, a Sampling Analysis and Quality Plan (SAQP) was developed for the investigation (GHD, 2016 - reference: 31/34071/252132).

The SAQP was prepared so that the field investigations and analyses were undertaken in a way that enabled the collection and reporting of reliable data on which to base any further soil, groundwater and surface water monitoring programs for specific areas of the site.

The GHD SAQP described drilling methods, sampling equipment, well development strategy, sample collection protocols, sample processing, field and laboratory sample analysis, equipment decontamination and quality-assurance and quality-control (QA / QC) procedures.

The scope of the Preliminary Sampling was as follows:

- Development of a Site Work Program including a Health Safety & Environment (HSE) Plan, and review of underground services plans and site plans
- Liaison and coordination of fieldwork with subcontractors, Airservices, Gold Coast Airport Pty Ltd (GCAPL)
- Clearance of all sample locations by a Services Locator
- Hand augering of the top 1.2 m of five borehole sample locations (GW16-01 to GW16-05) for clearance of underground services
- Drilling of soil bores GW16-01 to GW16-05 to a maximum depth of 5 metres below ground level (mbgl) and conversion of the bores to groundwater monitoring wells

[1] GHD, 2016[b]. *Preliminary Site Investigation, Gold Coast Airport, Airservices Australia*. (GHD Reference 31\34071\251713).

[2] GHD, 2016[e]. Airservices Australia, Gold Coast Airport Sampling Analysis and Quality Plan (GHD reference 31\34071\252132)

- Collection of soil samples from soil boreholes at depths of 0.2, 0.5 and 1.0 mbgl and then every metre thereafter, with additional samples collected at any changes in the lithology, to a maximum depth of 5.0 mbgl
- Collection of six targeted surface soil samples (SS1 to SS6)
- Collection of ten surface water samples (SW16-01 to SW16-10)
- Laboratory analysis of collected samples at Australian Laboratory Services (ALS) Environmental (primary lab) and Eurofins MGT (secondary lab)
- Gauging of 15 monitoring wells (including the five newly installed monitoring wells) using an oil/water interface probe, to measure the depth to groundwater
- Groundwater sampling of 15 monitoring wells (including the five newly installed monitoring wells) using low flow sampling techniques
- Collection of QA / QC samples for soil, surface water and groundwater including "Blind" and "Split" duplicate samples
- Laboratory analysis of soil, surface water and groundwater samples by ALS Environmental (primary laboratory) and Eurofins MGT (secondary laboratory)
- Collection of QA / QC samples for soil, surface water and groundwater including Duplicate and Split samples
- Placement of all soil cuttings and purged groundwater in drums for storage and off-site disposal to a licensed facility
- Preparation of this Preliminary Sampling Report

1.3 Methodology references

This Preliminary Sampling report was undertaken with reference to the following:

- *Airports Act*, 1996
- *Airports (Environment Protection) Regulations* 1997
- Australian Standard AS 4482.1,2005. *Guide to the investigation and sampling of sites with potentially contaminated soil - Part 1: Non-volatile and semi-volatile compounds*
- Australian/New Zealand Standard (AS/NZ) 5667.1,1998. *Water Quality – Sampling. Standards Australia*
- Department of Environment and Conservation NSW, 2007: Guidelines for the Assessment and Management of Groundwater Contamination.
- EnHealth, 2016. *enHealth Statement: Interim National guidance on human health reference values for per- and poly-fluoroalkyl substances for use in site investigations in Australia.*
- *Environmental Protection Act* 1994 (EP Act)
- GHD, 2015. *Airservices Australia, Managing PFC Contamination at Airports, Interim Contamination Management Strategy and Decision Framework* (GHD Reference 31\32279\239419)
- GHD, 2016[a]. *Airservices Australia, Gold Coast Airport Sampling Analysis and Quality Plan* (GHD reference 31\34071\252132)
- National Environment Protection Council (NEPC), *National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended by the National*

Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 No. 1 (the ASC NEPM).

1.4 Limitations

This report has been prepared by GHD for Airservices Australia and may only be used and relied on by Airservices Australia for the purpose agreed between GHD and Airservices Australia as set out in Section 1 of this report. Reliance of other parties on this report is subject to agreement in writing by GHD.

GHD otherwise disclaims responsibility to any person other than Airservices Australia arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

GHD has prepared this report on the basis of information provided by Airservices Australia, which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

GHD has considered and/or tested for only those chemicals specifically referred to in this Report and makes no statement or representation as to the existence (or otherwise) of any other chemicals.

GHD has considered and/or tested for only those chemicals specifically referred to in this Report and makes no statement or representation as to the existence (or otherwise) of any other chemicals.

Except as otherwise expressly stated in this Report GHD makes no warranty or representation as to the presence or otherwise of asbestos and/or asbestos containing materials ("ACM") on the site. If fill material has been imported on to the site at any time, or if any buildings constructed prior to 2003 have been demolished on the site or material from such buildings disposed of on the site, the site may contain asbestos or ACM.

Site conditions (including the presence of hazardous substances and/or site contamination) may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

These Limitations should be read in conjunction with the entire Report and no excerpts are taken to be representative of the findings of this Report.

2. Assessment criteria

The focus of the Preliminary Sampling is on PFASs which are regarded as the key contaminants of potential concern for the site.

A national consensus has not yet been reached on appropriate investigation levels for PFASs in soil, sediment, groundwater or surface water in Australia. In the interim, use of the following is considered appropriate and has been adopted as the basis for this assessment:

- *GHD (2015). Airservices Australia, Managing PFC Contamination at Airports, Interim Contamination Management Strategy and Decision Framework* (GHD Reference 31\32279\239419). GHD has developed a set of interim screening levels (ISLs) for use at federally leased airport sites, based on currently available international guidelines. The ISLs include criteria for of soils, sediments, groundwater and surface water to assess protection of human health (HISLs) and ecosystems (EISLs).
- *enHealth (2016). enHealth Statement: Interim National guidance on human health reference values for per- and poly-fluoroalkyl substances for use in site investigations in Australia.* Human health interim values have been developed by enHealth for drinking water quality and recreational water quality.

The values for the adopted screening / investigation levels from these sources are summarised in Table 1.

Table 1 Adopted PFASs interim screening criteria

Exposure Scenario	PFOS	PFOA / 8:2FtS	6:2FtS	Source
SOIL				
Human health interim screening levels (HISLs) – residential (direct contact only)	6 mg/kg	16 mg/kg	60 mg/kg	USEPA Region 4 2009 (in US EPA 2014) Jarman et al 2014
HISLs – industrial (direct contact only)	90 mg/kg	240 mg/kg	900 mg/kg	Criteria have not been published for commercial and industrial land use, and for this document a scaling factor has been applied to the residential criteria to derive screening levels for commercial/industrial land. For PFAS a scaling factor of 15 is proposed.
Ecological interim screening levels (EISLs) (terrestrial)	0.373 mg/kg (95% protection) 0.91 mg/kg (residential, 80% protection, low reliability) 4.71 mg/kg (commercial / industrial, 60% protection, low reliability)	3.73 mg/kg	NA	UK Environmental Agency 2009
GROUNDWATER				
HISLs (drinking water only)	0.2 µg/L	0.4 µg/L	5.0 µg/L	USEPA Region 4 2009a (PFOS/PFOA) Jarman et al 2014 (6:2 FtS)
	PFOS	PFOA	Perfluorohexane sulfonic acid (PFHxS)	Source
	0.5 µg/L	5 µg/L	0.5 µg/L	enHealth Interim Values 2016
EISLs	In most cases the assessment of ecological impact will relate to the discharge of groundwater to a surface water, and impact on the aquatic ecosystems of the surface water (see below). In assessing risk to surface waters, consideration should be given to the flux of the chemical in groundwater, the resulting dilution that will occur in the surface water and the existing PFAS concentrations in the surface water. This can then be compared to the surface water screening values below.			
SURFACE WATER				
EISLs (toxicity effects on aquatic organisms)	6.66 µg/L	2900 µg/L	NA	Qi et al 2011 Giesy et al 2010
HISLs (consumption of fish)	0.65 ng/L (Freshwater) 0.53 ng/L (marine water)	300 ng/L	6.5 ng/L	RIVM 2010
Recreational	PFOS	PFOA	(PFHxS)	Source
	5 µg/L	50 µg/L	5 µg/L	enHealth Interim Values 2016

Notes:
NA – not available

3. Field investigations

3.1 Fieldwork methodology

3.1.1 Fieldwork program

The fieldwork program completed by GHD for the site is summarised in Table 2. It included the following:

- Drilling and installation of five groundwater monitoring wells to approximately 5 mbgl
- Collection of six surface soil samples at targeted areas
- Collection of 10 surface water samples from open drains and the Cobaki Broadwater
- Gauging and sampling of the five new groundwater monitoring wells and 10 existing groundwater monitoring wells

The sampling locations are shown in Figure 2 of Appendix A.

Table 2 Summary of fieldwork program

Date	Activity
15 July 2016	Underground services location
18–20 July 2016	Drilling, sampling and conversion into groundwater monitoring wells for GW16-01 to GW16-05 Development of newly installed groundwater monitoring wells.
25-28 July 2016	Gauging and sampling of all groundwater monitoring wells (including five newly installed monitoring wells and 10 existing monitoring wells, Refer to Section 3.3) Collection of six surface soil samples (Refer to Table 3) and 10 surface water samples (Refer to Table 6)
24 August 2016	Surveying of the five newly installed monitoring wells.

3.1.2 Soil investigation

The soil sampling methodology is summarised in Table 3.

Table 3 Soil sampling methodology

Activity	Details
Underground services locating	A Telstra-accredited independent contractor cleared underground services using radio-detection and ground penetrating radar with reference to utility plans provided by Dial Before You Dig (DBYD) and GCA, prior to any sub-surface works being undertaken
Sampling plan design	The objectives and rationale of the sampling locations were detailed in the SAQP (GHD, 2016).
Soil borehole drilling	For the five soil borehole sampling locations (GW16-01 to GW16-05) non-destructive drilling (NDD) was undertaken to a depth of 1.2 mbgl to assist with clearance of underground services. Boreholes were then advanced with hollow-stem auger to a depth of 4 to 5.2 mbgl for the purpose of installing the five groundwater monitoring wells Decontamination of the hollow flight auger was undertaken between each sampling location in accordance with the decontamination methodology outlined in the SAQP.
Soil bore sampling	Soil samples were collected from each of the soil boreholes generally at the surface, 0.2 mbgl, 0.5 mbgl and 1 mbgl, and then at approximately 1 m

Activity	Details
	intervals to a maximum depth of 5 m or where changes in lithology or potential contamination were observed. Please note that at GW16-05, no samples were collected after 1 mbgl, as the soil was soft and saturated when recovered from the auger and the depth of the samples could not be determined. Soil samples were placed into laboratory-supplied glass and plastic jars. A total of 29 soil samples were collected [including two quality assurance (QA)/quality control (QC) samples (QA01, QA02)]. The records of the soils encountered, and the samples collected (including depths and related observations) are presented in the borehole records (Appendix B) and Laboratory reports (Appendix H). Samples were identified with a unique label, incorporating the sample location and depth (i.e. GW16-01-0.2 was collected from borehole GW16-01 at a depth of 0.2 mbgl). Care was taken during the sampling to obtain representative samples from each target level.
Surface soil samples	Six surface samples (SS1-SS6) were collected from around the main fire station and helicopter landing area, focusing on areas of potential contamination risk and surface water runoff. One QA sample (SS-QA01) was collected. Description of samples collected are provided in Appendix E. The surface soil samples were collected by mattock and placed into laboratory-supplied jars/containers. Sampling implements were decontaminated between sampling locations in accordance with the decontamination methodology outlined in the SAQP.
Soil logging	Soils encountered during drilling were described and logged by an environmental scientist. Borehole logs are presented in Appendix C.
QA/QC	Three quality control samples (QA01, QA02 and SS-QA01) were collected including two intra-laboratory ("blind") samples and one inter-laboratory ("split") sample. Refer to Appendix G.
Sample preservation and transport	Samples were chilled upon collection, stored on ice in an insulated cooler box while on site and in transit to the laboratory. Samples were transferred to the laboratory under Chain of Custody (COC) documentation. COC documentation is presented in Appendix H.
Soil cuttings	NDD waste and soil cuttings from drilling activities were contained in 205 L sealed drums and placed at the fire training ground for disposal off site to a licensed facility. Disposal documentation is included in Appendix J.

3.2 Groundwater monitoring and sampling methodology

3.2.1 Groundwater well installation

Soil bores were converted to groundwater monitoring wells as detailed in Table 4. Locations are shown in Figure 2 in Appendix A. Well construction details are provided in the bore logs contained in Appendix C.

Table 4 Groundwater well installation

Activity	Details
Well construction	The monitoring wells were installed in accordance with the *Minimum Construction Requirements for Water Bores in Australia, Edition 3* (2012) and were constructed using 50 mm ID uPVC, Class 18, acid washed threaded standpipe with machine slotted (0.4 mm) screened section. Graded and washed filter sand was installed in and slightly above (0.2 m) the screened interval, then a bentonite seal (0.5 m thick) and grout to the surface. Screened and installation depths varied according to strata, identified conductive horizons, areas of potential contamination and the need to minimise the risk of cross contamination between soil horizons/ units. Wells were completed at the surface with flush mounted gatic covers concreted below the ground surface. Details of the

Activity	Details
	monitoring wells construction were provided in the borehole logs in Appendix B.
Well survey	The top of the well casings were surveyed to Australian Height Datum (AHD). In the instance where the top of casing was not evenly cut, the highest point of the top of casing was surveyed. The survey data (with reference level at top of casing) is presented in Appendix C.
Well development	The newly installed wells were developed following construction by the air-lifting method using an air compressor. The air compressor had an air filter so no hydrocarbons were introduced into the wells. GHD considers that the development procedure undertaken was adequate to prepare the wells for collection of representative groundwater samples.
Development water disposal	Development water from the wells was collected by the driller for disposal off site to a licensed facility. Disposal documentation is included in Appendix J.

3.3 Groundwater monitoring and sampling methodology

A total of 15 monitoring wells, including five newly installed monitoring wells (GW16-01 to GW16-05) and 10 existing monitoring wells (GW1, GCAPL1, MWA, MW11, GDCA16, BH40, BH13, MB17, MB24A and MW4) were gauged, purged and sampled.

Details of the groundwater monitoring and sampling methodologies are summarised in Table 5.

Table 5 Groundwater monitoring and sampling methodology

Activity	Details
Well gauging	Prior to the sampling of wells, groundwater standing water levels (SWL) were gauged using an interface probe measuring from the top of the bore casing (TOC). Standing water levels were recorded on field record sheets. The gauged groundwater levels for each well at the site are summarised in Appendix D. The calibration certificate of the interface probe is provided in Appendix I.
Groundwater sampling	All monitoring wells were purged and sampled through low-flow sampling methods using a Geopump® peristaltic pump. Groundwater field parameters were monitored during the purging process using a multi-probe water quality meter, reporting temperature, DO, pH, ORP and EC. The calibration certificate of the water quality meter is provided in Appendix I. Groundwater samples were collected directly from the tubing into laboratory-supplied containers (pre-preserved where appropriate) and filled up to minimise headspace. A total of 17 groundwater samples were collected [including two quality assurance (QA)/quality control (QC) samples (GW-QA01, GW-QA02)]. All samples were stored on ice in an esky until delivered to the laboratory. Groundwater gauging and sampling records are provided in Appendix D.
Decontamination	Decontamination of the interface probe was undertaken through a three stage approach. The first stage involved cleaning the equipment using a mixture of pH neutral phosphate free detergent (Decon® Neutracon) in water, followed by a deionised water wash and a final rinse stage Single-use tubing was used for sample collection to minimise potential for cross contamination.
QA/QC	Two quality control samples were collected including one intra-laboratory ("blind") samples and one inter-laboratory ("split") samples. Refer to Appendix G.
Purge water disposal	Purged water from the well development was placed into 205 L sealed drums and placed at the fire training ground for disposal off site to a licensed facility. Disposal documentation is included in Appendix J.

3.4 Surface water sampling methodology

The surface water sampling methodology is summarised in Table 6.

Table 6 Surface water sampling methodology

Activity	Details
Sampling plan design	The objectives and rationale of the sampling locations were detailed in the SAQP (GHD, 2016).
Surface water sampling	Surface water samples were collected from 10 locations (refer to Figure 2 in Appendix A for the sample locations). A total of 12 surface water samples [including two quality assurance (QA)/quality control (QC) samples (SW-QA01, SW-QA02)] were submitted to the laboratory for analysis. Samples were collected directly from the surface water bodies using laboratory-supplied bottles.
Surface water logging	Field observations and physicochemical parameters (pH, electrical conductivity (EC), dissolved oxygen (DO) and oxidation-reduction potential (ORP)) of the surface water were recorded by an environmental scientist and results presented in Appendix E.
Sample preservation and transport	Samples were chilled upon collection by storing on ice in an insulated cooler box while on site and in transit to the laboratory. Samples were transferred to the laboratory under Chain of Custody (COC) documentation. COC documentation is presented in Appendix H.

3.5 Work health and safety

GHD prepared a project-specific Job Safety and Environmental Analysis (JSEA) for the site works in accordance with Work Health and Safety (WHS) legislation and associated Codes of Practice. The JSEA consisted of a summary of relevant site activities and specific job-related tasks; a hazard register that identifies all foreseeable hazards; risk ranking and risk management measures for each identified hazard; and procedures for monitoring and / or implementing remedial actions to manage all project-based risks. Prior to undertaking the fieldworks, the GHD field representatives and all subcontractors held a pre-start meeting on site. Daily GHD WHS forms were completed before commencement of work each day.

3.6 Laboratory analysis program

3.6.1 Analytical laboratories

GHD consigned all primary soil, water and groundwater samples and intra-laboratory field duplicate (blind) samples to ALS for analysis. The analysis of inter-laboratory duplicate (split) samples, for QC purposes, was completed by Eurofins MGT.

Both the primary and secondary laboratories are National Association of Testing Authorities (NATA) registered for the analytical program undertaken.

Certified laboratory documentation including chain of custody records, sample receipt notifications, certificates of analysis and laboratory QA / QC reports are provided in Appendix H.

3.6.2 Sample analysis

Table 7 summarises the number of soil, groundwater and surface water samples collected at the site and analysed for the selected analytical suite.

Table 7 Laboratory analytical schedule

Sample type	No. primary samples		No. QC samples	Analytical suite
	Collected	Analysed		
Soil				
Soil borehole	27	10	2	PFOS, PFOA, 6:2 FtS, 8:2 FtS + extended PFASs suite Total organic carbon (TOC) Metals [3] Cation exchange capacity (CEC) Particle size distribution (PSD) pH Electrical Conductivity (EC) Potassium
Soil surface	6	6	1	PFOS, PFOA, 6:2 FtS, 8:2 FtS + extended PFASs suite Metals[3] Cation exchange capacity (CEC) pH Total organic carbon (TOC) Potassium
Water				
Groundwater	15	15	2	PFOS, PFOA, 6:2 FtS, 8:2 FtS + extended PFASs suite pH Total Dissolved Solids (TDS) Major cations and anions
Surface water	10	10	2	PFOS, PFOA, 6:2 FtS, 8:2 FtS + extended PFASs suite pH Total Dissolved Solids (TDS)

[3] Metal analysis included aluminium, arsenic, cadmium, chromium (III+VI), copper, iron, lead, mercury, nickel, silicon and zinc.

4. Results

The following sections summarise the field observations and analytical results of the Preliminary Sampling. Sample locations are shown in Figure 2 of Appendix A, and the locations of exceedances of the adopted screening levels are shown on Figure 3 of Appendix A. Interpretation and discussion of the results has been provided in Section 6.

4.1 Soil

4.1.1 Field observations

Soil samples were collected from boreholes and surface soils. The soil field observations are presented in the borehole logs and soil field observations sheets contained in Appendix C and Appendix E.

Soil borelogs typically included soils characterised as sandy material with silt and limited instances of fine gravels, while surface soils were typically characterised as being of silty sand material.

4.1.2 Analytical results

The tabulated analytical results of soil samples are presented in Appendix F and laboratory reports are provided in Appendix H.

Fate and transport indicators

Particle size distribution

Two soil samples were submitted for particle size distribution (PSD) analysis. The samples had a typical sand content of between 98 and 99% ranging from fine to medium grained, which was generally consistent with observations made in the field.

Physico-chemical parameters

- The pH results of the soil bore and surface soil samples ranged between pH 4.1(GW16-05 – 0.0-0.2) and pH 7.2 (GW16-05 – 0.8-1.0) indicating acidic to neutral conditions.
- The total organic carbon (TOC) results of the soil samples collected from the boreholes ranged from 0.09 % (GW16-01 – 2.8-3.0) to 1.21% (GW16-05 – 0.0 - 0.2). Surface soil samples had higher TOC concentrations, ranging from 0.72 % (SS3) to 2.53 % (SS1).
- Cation Exchangeable Capacity (CEC) of the soil samples ranged from 0.1 meq/100g (GW16-01 – 2.8-3.0) to 6.6 meq/100g (GW16-05 - 0.0-0.2). Soil bore results and surface soils results were generally within a similar concentration range.

Metals/Metalloids and minerals

The concentrations of most metals in the analysed soil samples were less than or close to the laboratory limit of reporting (LOR), with the exception of the following:

- Aluminium results ranged from 80 (SS1) to 9,690 mg/kg (GW16-05 – 0.0-0.2).
- Iron concentrations ranged from 80 (SS1) to 20,900 mg/kg (SS6).
- Silica (Silicon Dioxide) of the soil bore samples ranged from 83.2 (GW16-03 -2.8-3.0) to 97.7 % (GW16-01 – 0.3-0.5).

There was no discernible difference in soil bore and surface soil metal results.

PFASs

Soil borehole and surface soil samples analysed as part of the assessment recorded concentrations less than the adopted HISLs and EISLs criteria for PFASs, but above the LOR in some instances as follows:

- Seven soil bore samples reported detectable PFOS concentrations above the LOR, ranging from 0.0002 mg/kg (GW16-03 – 2.8 – 3.0) to 0.0057 mg/kg (GW16-03 – 0.8-1.0) and two samples reported detectable PFOA at 0.0002 mg/kg (GW16-03 – 0.8-1.0 and GW16-05 – 0.0-0.2). Most of the PFASs derivatives results were reported less than laboratory LOR, except for minor detections of Perfluorohexane sulfonic acid (PFHxS) and Perfluorhexanoic Acid (PFHxA).
- All six surface soil samples reported detectable concentration for PFOS, ranging from 0.0008 mg/kg (SS1) to 0.0434 mg/kg (SS2), and four also reported detectable PFOA, ranging between 0.0002 mg/kg (SS3) and 0.0014 mg/kg (SS2).
- The soil surface samples also reported detectable concentrations for most PFASs, where most of the compounds detected represented chain lengths from C_5 to C_{10} (perfluorinated carbons).

4.2 Groundwater

4.2.1 Field observations and parameters

During drilling of the soil boreholes, groundwater was encountered at depths ranging from 1.3 to 3.5 mbgl.

Groundwater field physicochemical parameters (i.e. temperature, DO, pH, ORP and EC) were recorded during the sampling process and results recorded on field purging sheets, which are presented in Appendix D. The groundwater field physicochemical results are also presented in Table 3 in Appendix F, and are summarised as follows:

- The groundwater pH results ranged between pH 4.49 (MW11) to pH 6.83 (GW16-05) indicating slight acidic to neutral groundwater conditions.
- Field EC measurements indicated fresh to saline conditions, ranging from 48.5 µS/cm (MW11) to 43,184 µS/cm (MB24A).

4.2.2 Analytical results

The tabulated analytical results of groundwater samples are provided in Appendix F, and are summarised in the following sections. A site impact map is included as Figure 3 in Appendix A.

Physico-chemical parameters

- TDS results of the groundwater samples were generally consistent with field EC measurements, and ranged from 62 mg/L (MWA) to 25,900 mg/L (MB24A).
- Elevated TDS results were generally accompanied with relatively high sodium, calcium, magnesium, bicarbonate (as $CaCO_3$), sulfate and chloride results.

PFOS

The majority of groundwater sample locations reported concentrations of PFOS above the LOR and ranged from 0.01 µg/L (MWA) to 12.5 µg/L (BH13). PFOS screening level exceedances are summarised as follows:

- Two locations; BH13, in the fire training ground and GCAPL1, in the former fire station area exceeded the adopted EISL (toxicity effects on aquatic organisms) of 6.66 µS/cm.

- Six (BH13, GCAPL1, GW1, GW16-05, MB17 and MW11) out of the 15 groundwater samples analysed reported PFOS concentrations greater than the adopted HISL (drinking water) of 0.2 µS/cm.
- Five locations (BH13, GCAPL1, GW16-05, MB17 and MW11) exceeded the enHealth (drinking water) guideline level of 0.5 µS/cm.

The exceedances were reported at wells located at the fire training ground, former fire station, Southern Cross University, near old airport landfill and the southern site boundary near the Cobaki Broadwater.

PFOA

Seven of the 15 groundwater samples reported detectable PFOA concentrations that ranged between 0.03 µg/L and 6.04 µg/L. One groundwater sample (BH13) reported a PFOA result (6.04 µg/L) that exceeded the adopted HISL and enHealth (drinking water) guidelines of 0.4 µg/L and 5 µg/L respectively. All others were below the adopted screening levels.

PFHxS

Eleven groundwater samples out of the 15 had PFHxS concentrations ranging from 0.02 µg/L (GW16-01) to 1.76 µg/L (GCAPL1). Six of these exceeded the adopted enHealth interim values for drinking water of 0.5 µg/L.

8:2 fluorotelomer sulfonate (8:2FtS)

One groundwater sample (BH13) contained concentrations of 8:2FtS greater than the laboratory LOR. The result also exceeded the HISLs (0.4 µg/L), with a concentration of 0.42 µg/L.

6:2 fluorotelomer sulfonate (6:2FtS)

All 6:2 FtS results of the groundwater samples were less than laboratory LOR.

4.2.3 Groundwater levels and flow direction

Standing water level (SWL) of the groundwater monitoring wells during this GME ranged between 0.475 m (GW16-05) and 3.602 m bToC (GW16-03).

All new monitoring wells (GW16-01 to GW16-05) were surveyed to m AHD and survey data on existing wells was provided by GCAPL to allow assessment of the inferred groundwater flow direction. The inferred groundwater contour is presented in Figure 4 in Appendix A. The survey results were used to calculate groundwater elevations at each monitoring well during gauging. Groundwater elevations were used for the preparation of an inferred groundwater contour plan (Figure 4 in Appendix A) and the groundwater elevations are summarised in Appendix E.

The surveyed groundwater elevations were calculated to be between 0.37 (MB24) and 4.911 mAHD (GCDA16). As expected, based on the groundwater elevations, groundwater on the north eastern portions of the site appears to flow towards the Pacific Ocean, while groundwater on the western and south portions of the site appears to flow toward the Cobaki Broadwater. The main surface water drainage channel running parallel to the taxiway also appears to have some influence on groundwater.

4.3 Surface water

4.3.1 Field observations and parameters

The surface water samples (SW16-01 to SW16-05 and SW16-08) collected from the open drains and ponds were typically with tannin staining, with low to moderate turbidity and suspended solids. While surface water samples collected from the Cobaki Broadwater (SW16-

06, SW16-07, SW16-09 and SW16-10) were relatively clearer, with low turbidity and suspended solids.

Field physico-chemical measurements indicated the following:

- pH readings of the surface water samples ranged between pH 6.25 (SW16-08) and 8.17 (SW16-02), indicating a slight acidic to alkaline environment. There was no discernible difference in pH levels from Cobaki Broadwater and the on site surface water drains and ponds.
- Field EC measurements of the surface water at upstream drainage locations within the site (SW16-01, SW16-02, SW16-03) and the pond (SW16-08) were typically fresh and ranged from 71.6 µS/cm (SW16-08) to 416.5 µS/cm (SW16-01). Surface water samples from downstream locations (SW16-04 and SW16-05, which discharge ultimately to the Pacific Ocean) were brackish 1,104 µS/cm and 2,017 µS/cm respectively. The EC of the Cobaki Broadwater samples were saline and ranged from 45,409 µS/cm (SW16-10) to 47,444 µS/cm (SW16-06).

4.3.2 Analytical results

Ten surface water samples were analysed by the primary lab for the extended PFASs suite.

Physico-chemical parameters

- TDS results of the surface water samples were generally consistent with field EC measurements, ranged from 54 mg/L (SW16-08) to 32,000 mg/L (SW16-07).
- Elevated TDS results were generally accompanied with relatively high sodium, calcium, bicarbonate (as $CaCO_3$), sulfate and chloride results.

PFOS

- Six of the surface water samples (which were collected from the upstream locations and ponds within the site), have exceeded the adopted HISLs for consumption of fish, ranging from 0.06 µg/L (SW16-01) to 2.3 µg/L (SW16-08).
- PFOS results from the Cobaki Broadwater all reported results less than laboratory LOR (0.05 µg/L). However, as the LOR for PFOS (<0.05 µg/L) was greater than the adopted HISL for fish consumption (0.00053 µg/L) and subsequently all results were above the adopted guideline level.
- All results were below the EISL (toxicity effects in aquatic organisms) of 6.66 µg/L and the enHealth (recreational water guideline) of 5 µg/L.

PFOA

- Four of the surface water samples (collected from open drains and ponds) reported detectable PFOA results ranging from 0.04 µg/L (SW16-04) to 0.22 µg/L (SW16-08). Surface water samples from Cobaki Broadwater reported concentrations of PFOA below the LOR. PFOA results were lower compared to PFOS, and no exceedances of the adopted screening levels were reported.

8:2FtS

- One surface water sample (SW16-08), collected from the pond at the fire training ground had a concentration of 8:2 FtS of 0.08 µg/L. All other surface water samples reported 8:2 FtS as being below the LOR.

6:2FtS

- All surface water samples reported 6:2 FtS concentrations less than the LOR (<0.05 µg/L). However, the HISLs (consumption of fish) guideline limit is 0.0065 µg/L and therefore subsequently all results exceeded the adopted guideline.

PFHxS

- Six surface water sample locations from drains and ponds on the site reported detectable PFHxS concentrations ranging from 0.04 µg/L (SW16-01) to 1.98 µg/L (SW16-08). All surface water sample locations from the Cobaki Broadwater reported concentrations below the LOR.
- All PFHxS results were less than the adopted enHealth 2016 for recreational water of 5 µg/L

5. Quality assurance and quality control

The following Table 8 is a summary of the Quality Assurance and Quality Control (QA/QC) Data Quality Indicators (DQIs) used for the Preliminary Sampling and an assessment of the compliance of the data set with these QA/QC DQIs. Appendix G of this report contains further details of the QA/QC assessment program.

Table 8 Summary of QA/QC Compliance

Item	Objective	Reference	Summary of Results	Compliance
Comparison of field and analytical data	Agreement between visual and olfactory evidence with laboratory results		Field observations correspond with the laboratory results	Yes
Calibration of field instruments	Meet calibration specifications	AS4482.1-2005	Calibration certificates included Refer to Appendix I	Yes
Chain of Custody documentation	Completed		Completed in full Refer to Appendix H	Yes
Sample analysis and extraction holding times	Comply with holding times	AS4482.1-2005/NEPM (2013)	All criteria met. Refer to Appendix G	Yes
Sample Preservation	Samples are collected in appropriately preserved containers		All criteria met	Yes
Analysis of intra-laboratory duplicate samples	1 for every 20 samples RPD 30% - 50%	AS4482.1-2005	Refer to Appendix G	Yes
Analysis of inter-laboratory duplicate samples	1 for every 20 samples RPD 30% - 50%	AS4482.1-2005	Refer to Appendix G	Yes. Some exceedances due to sample heterogeneity and different analytical machinery/ method used between the two laboratories
Analysis of laboratory method blanks	No contamination of blanks	NEPM (2013)	All analytes were less than the laboratory LOR for ALS	Yes

Item	Objective	Reference	Summary of Results	Compliance
Analysis of matrix and laboratory control spikes	Recoveries within the laboratory specified recovery limits	NEPM (2013)	Outliers reported for primary laboratory samples (Refer to Appendix G)	Outliers were mostly due to the matrix interferences of the samples
Analysis of laboratory surrogates	No surrogate recovery outliers	NEPM (2013)	Refer to Appendix G	Yes.
Analysis of laboratory duplicates	Frequencies and Relative Percent Differences (RPDs) within guideline and internal laboratory limits	NEPM (2013)	RPD outliers reported for primary laboratory soil samples (Refer to Appendix G)	Yes. Some exceedances due to sample heterogeneity

Based on the field and laboratory QA/QC program undertaken, the results indicate that the data was considered to be reasonable and of sufficient quality to meet the data quality objectives for this investigation.

6. Discussion

6.1 Summary of results

The scope of this investigation did not include investigation of all possible sources of PFASs at the site. It instead focused on assessment of boundary conditions and former source areas of most likely impact.

The investigations completed as part of this scope of works reported the highest groundwater PFASs concentrations at groundwater wells at the fire training ground (BH13) and the former fire station (GCAPL1). PFOS results at these locations exceeded the EISL's for aquatic organisms. Groundwater sample locations on the south eastern portion of the site (MW11 and GW1) and western perimeter (GDCA16, MB17 and GW16-05) exceeded the HISL and enHealth drinking water guidelines.

Surface water samples in the drainage channels downstream of the fire station (SW16-02, SW16-03, SW16-04 and SW16-05) and in the pond adjacent to the fire training ground (SW16-08) also reported PFOS concentrations above the HISL for consumption of fish, but were below the EISL for aquatic organisms and the eHealth guideline for recreational waters. Surface water results from the Cobaki Broadwater (SW16-06, SW16-07, SW16-09 and SW16-10) reported PFAS concentrations below the laboratory limit of reporting.

An impact map is included in Appendix A as Figure 4.

6.2 Sources

Primary potential sources of PFASs include the current and former fire station and training ground, fire station workshop and remote fire training areas. Other sources/uses may include previous training or releases of AFFF due to spills or crash incidents in other parts of the airport (GHD, 2016).

Other possible sources outside the airport have been identified as; the Tugun Bypass, adjacent landfills, Queensland Fire and Rescue Service (QFRS). Most of these potential sources were located near the boundaries of the site, however, results at the sampling locations located near the boundaries have not showed clear evidence of PFASs impact.

With the cessation of use of PFAS-containing AFFF, the primary source has been removed. Secondary sources of PFASs remaining at the site include contaminated infrastructure (e.g. concrete pads and drains) as well as residual soil, sediment and groundwater contamination.

The concentrations of PFASs in soils analysed in this Preliminary Sampling ranged from below the laboratory LOR to 0.0589 mg/kg. This material may act as an ongoing secondary source of PFASs contamination to both drains and groundwater.

6.3 Migration

A summary of the PFASs (and their carbon chain length) found in each media of the analysed samples are shown in Table 9.

Table 9 Detectable PFASs in various media at the MFS

Soil - surface	C#[4]	Soil - > 1m	C#	Groundwater	C#	Surface water	C#
PFHxA	5	PFHxA	5	PFBS	4	PFBS	4
PFPeA	5	PFHxS	6	PFHxA	5	PFHxA	5

[4] C# only accounts for the number of perfluorinated carbons in the PFAS compound.

Soil - surface	C#[4]	Soil - > 1m	C#	Groundwater	C#	Surface water	C#
PFPeS	5	PFOA	7	PFPeA	5	PFPeA	5
PFHxS	6	PFOS	8	PFPeS	5	PFHxS	6
PFHpA	6			PFHxS	6	PFHpA	6
PFOA	7			PFHpA	6	PFHpS	7
PFOS	8			PFOA	7	PFOA	7
8:2 FtS	8			PFHpS	7	PFNA	8
PFNA	8			PFOS	8	PFOS	8
PFOSA	8			PFNA	8	PFDcA	9
N-Et-FOSA	8			8:2 FtS	8	PFDcS	10
PFDcA	9			PFDcS	10		
PFUnA	10						
PFDcS	10						
PFDoA	11						
PFTrA	12						

6.3.1 Soil to groundwater

The PFASs present in surface soil samples ranged from short (5 perfluorinated carbons) to long chain (12 perfluorinated carbons), with PFOS being the dominant species present (refer to Table 9). This is consistent with a PFOS-dominant AFFF product. The surface samples were collected close to the fire station building and at areas where AFFF was known to have been previously released.

Fewer PFASs were reported for the soil bore samples collected from GW16-01 to GW16-05, and PFOS concentrations were lower compared to near the surface. The type of PFASs reported in the groundwater samples (GW16-01 to GW16-05) were consistent with those reported in the soil bore samples, which suggest the potential of leaching of PFASs from soil to groundwater at these locations.

The PFASs identified in the existing groundwater wells were also dominated by PFOS but did not contain compounds in excess of 10 perfluorinated carbons (only one groundwater sample has reported the C-10 PFAS) unlike the surface soil samples. The lack of the longer chain PFASs in groundwater may reflect two properties of PFASs:

- Longer chain PFASs have a greater potential to sorb readily to soil particles than shorter chain compounds
- Longer chain PFASs have lower solubilities than shorter chain compounds

Both of these properties would reduce the mass of these longer chain PFASs entering the groundwater via leaching compared to the shorter chain PFASs. In this regard the general behaviour of PFASs is similar to other aliphatic organic compounds.

PFASs have been shown to sorb readily to organic material in an aquifer. Analysis of TOC was conducted to assess the relationship between PFASs and TOC. A possible positive relationship was observed in soil samples which indicated surface samples may attenuate PFOS more than deeper soils as these contained, on average, higher TOC than the deeper samples. Some studies have found high silica sand and high iron sand can also serve as a good sorption sites for PFASs (Arcadis, 2016). However, no relationships were observed between iron, silica and PFASs. This lack of a clear relationship is likely due to the low organic carbon content of the soils, the near neutral pH and redox conditions and the competition for the limited available sorption site by other solutes.

Assessment of the soil data suggests the soil has a relatively low capacity to attenuate PFASs.

6.3.2 Surface water

Detectable PFASs were reported in surface water samples collected from the open drains/pond within the GCA but concentrations were all below the laboratory limit of reporting in the Cobaki Broadwater area. The type of PFAS reported in the surface water locations of SW16-01 to SW16-05 and SW16-08 coincides with that of the adjacent groundwater sample (GW16-01, GW1 and BH13 respectively). And due to the shallow groundwater levels, interaction between groundwater and surface water environment is likely.

The absence of PFASs in the Cobaki Broadwater may be explained by:

- Dilution of PFASs contaminant load to below detection limit
- Solubility of PFASs, notably PFOS decreases significantly from fresh water to seawater and it can partition to sediments when entering the marine environment (You et al 2010[5]). In particular, the high concentrations of dissolved calcium and magnesium in seawater have a significant sorption enhancing effect on PFOS, which is further enhanced by the higher organic carbon typical in marine sediments (Chen et al 2012)[6]

6.3.3 Groundwater

The migration of PFASs through an aquifer to a receiving water body is a complex process. Attenuation of PFASs migration at the GCA is likely to be controlled predominantly by aquifer properties and tidal influences. Biodegradation is not considered a significant attenuation mechanism, particularly for PFOS and PFOA. Moreover, due to the sandy unconfined aquifer at the site, the hydraulic conductivity of the aquifer is expected to be relatively high.

As discussed above, the sorption capacity of the aquifer matrix may be relatively low at the site, particularly in relation to organic material. This suggests that there is no evidence to support sorption of dissolved phase PFASs as being a significant attenuation mechanism at the site.

[5] YOU,C, JIA,C and PAN,G 2010. Effect of salinity and sediment characteristics on the sorption and desorption of perfluorooctane sulfonate at sediment-water interface. Environmental Pollution. 2010 May;158(5):1343-7. 2010 Feb 23

[6] CHEN.H, ZHANG.C and HAN.J 2012. Sorption of perfluorooctane sulfonate (PFOS) on marine sediments. Mar Pollut Bull. 2012.03.012. Epub 2012 Apr 1

7. Summary

Based on the data reviewed in this study and the CSM, the following summary is made:

- The primary source (use of AFFF containing PFASs) no longer exists. Secondary sources include residual soil and groundwater contamination.
- Soil results reported concentrations of PFASs below the adopted human health and ecological guidelines, indicating that in the areas sampled, soils do not present an unacceptable risk to human health and ecological receptors.
- Groundwater results at the source of PFAS impacts including the fire training ground and the former fire station reported concentrations of PFASs above the ecological guidelines that have the potential to be toxic to aquatic organisms as wells as exceeding the HISL and enHealth drinking water guidelines.
- Groundwater and surface water down gradient of the identified sources and or other possible sources reported concentrations of PFASs above the HISL and enHealth drinking water guidelines.
- Surface water samples from Cobaki Broadwater reported concentrations of PFASs below the laboratory limit of reporting, however it is noted that the HISL for consumption of fish is lower than the laboratory limit of reporting.

8. References

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- Environment Protection Act 1970.
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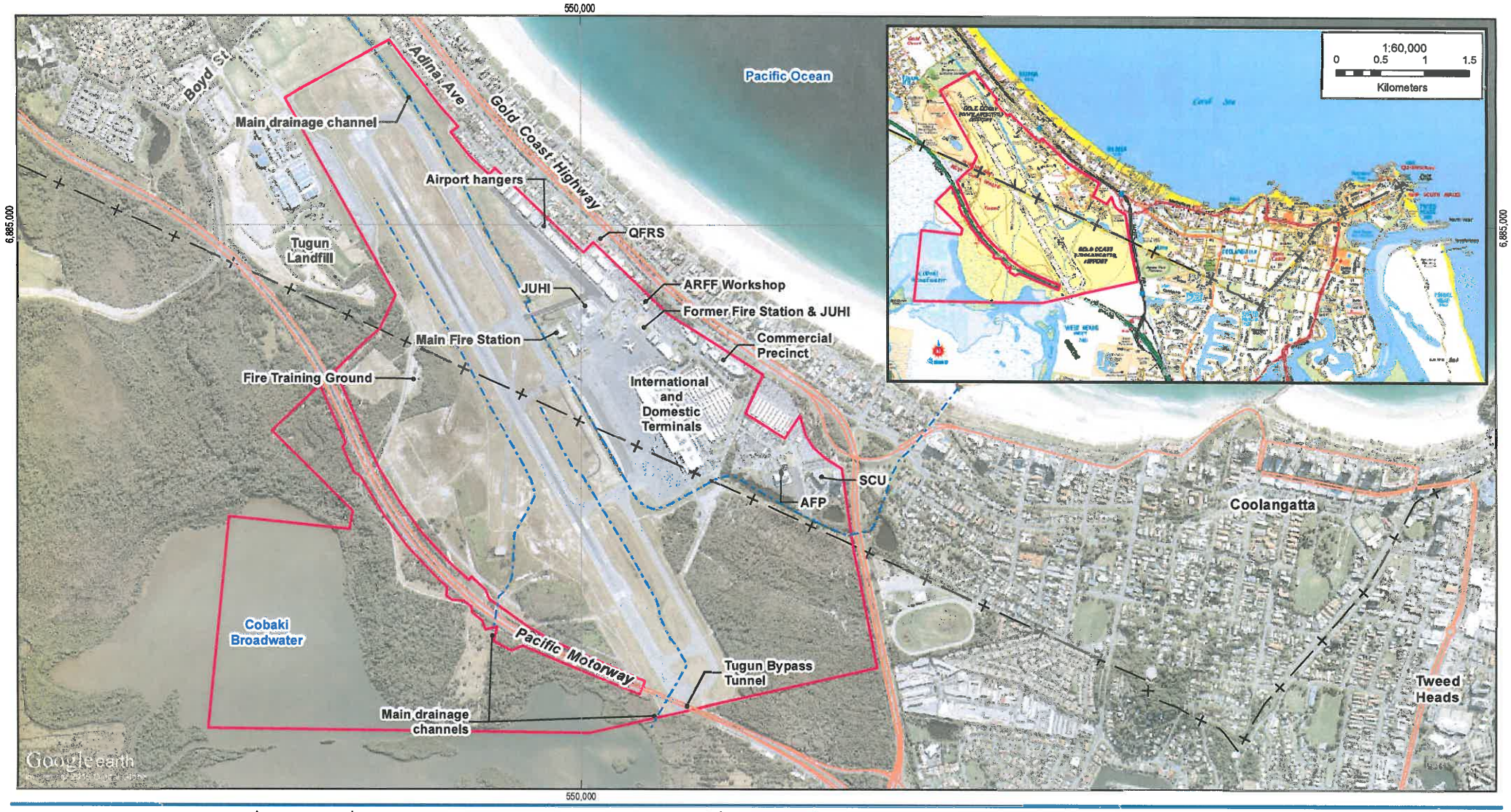
- Parsons Brinckerhoff, November 2007, Remediation and Validation Report, Fire Training Area, Gold Coast Airport, Coolangatta, Queensland.
- Parsons Brinckerhoff, Letter dated 15 January 2014, Groundwater Monitoring and Reporting – ARFF Drill Ground, Gold Coast Airport.
- Tweed Local Environmental Plan 2014, Land Zoning Map – Sheet LZN_014.
- US EPA US EPA 2014, *Emerging Contaminants – Perfluorooctane Sulfonate (PFOS) and Perfluorooctanoic Acid (PFOA)*, Emerging Contaminants Fact Sheet – PFOS and PFOA, http://www2.epa.gov/sites/production/files/2014-04/documents/factsheet_contaminant_pfos_pfoa_march2014.pdf, viewed 28 April 2015.

Appendices

Appendix A Figures



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0 200 400 600 800

metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

Legend

- Site Boundary (Coolangatta Airport)
- Main drainage channel
- Major Road
- Queensland - New South Wales Border

GHD

airservices

Airservices Australia Pty Ltd
Gold Coast Airport
Preliminary Sampling Report

Job Number	31-34071
Revision	B
Date	05 Oct 2016

Site Locality

Figure 1

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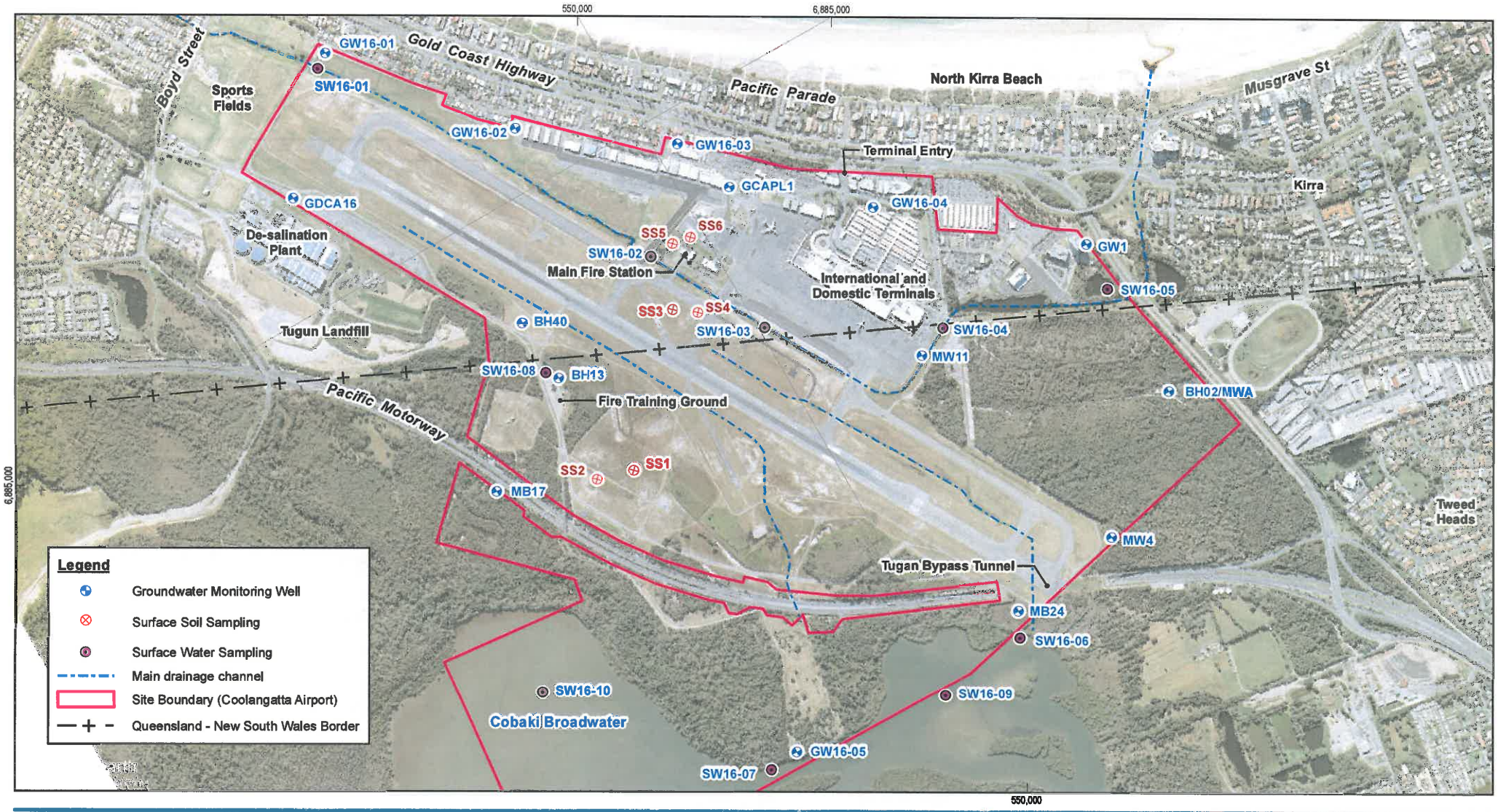
Data source: Google Earth: imagery (May 2015, extracted March 2016). Created : jvc



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metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

Airservices Australia Pty Ltd
Gold Coast Airport
Preliminary Sampling Report

Job Number 31-34071
Revision B
Date 8 Sept 2016

Soil, Surface Water Sampling and Groundwater Monitoring Locations

Figure 2

H:\Projects\31\34071\GIS Brisbane by jvc\maps\31-34071-302_CgtSAQPmonLocs_revB.mxd

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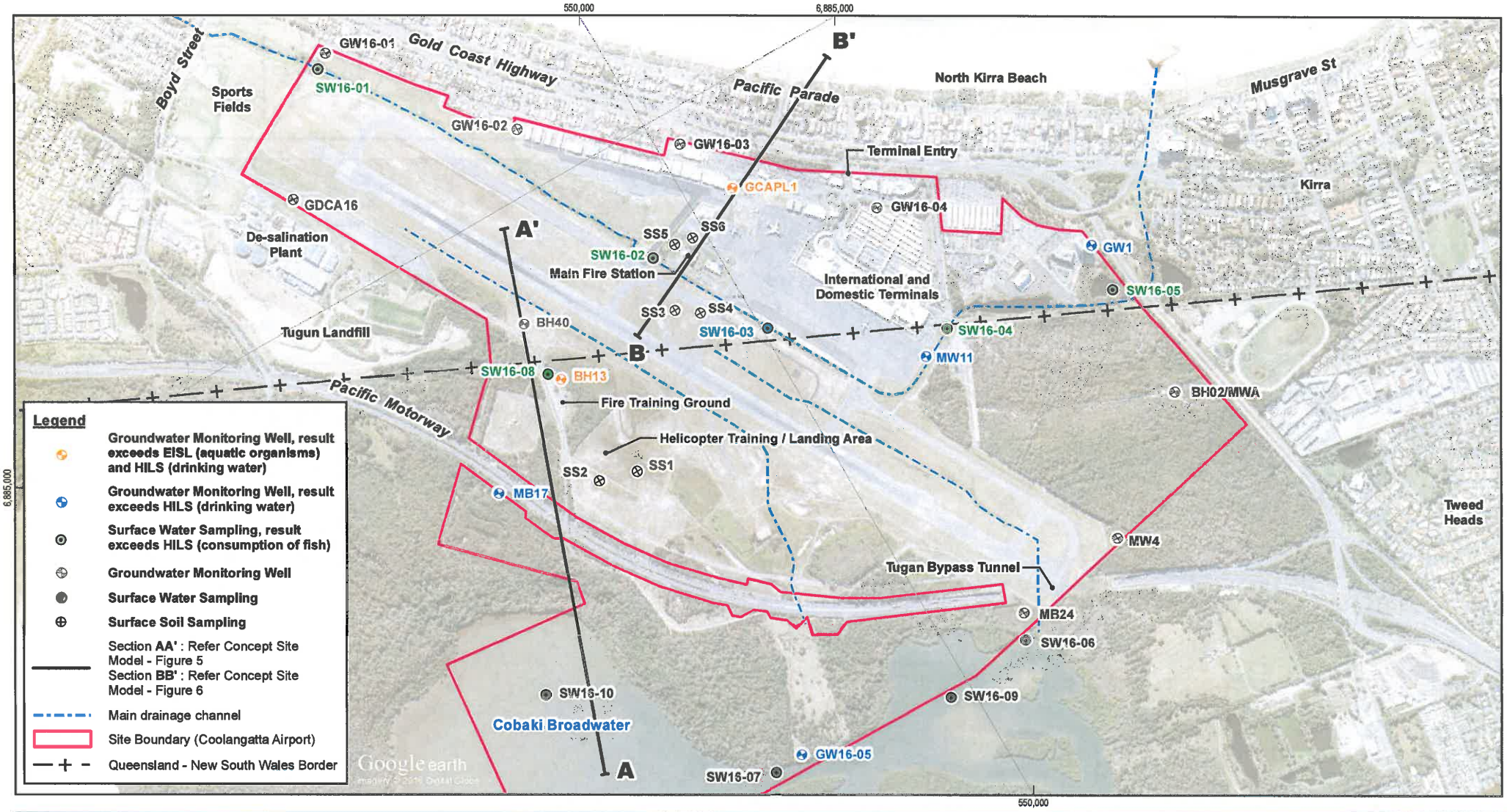
Data source: Google Earth: imagery (May 2015, extracted March 2016). Created : jvc



1:16,000 (at A4)

0 100 200 300 400 500 600

metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

Note
Only detectable results above criteria is considered to be an exceedence in this figure.

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Gold Coast Airport
Preliminary Sampling Report

Job Number	31-34071
Revision	A
Date	8 Sept 2016

PFAS Impacted Areas

Figure 3

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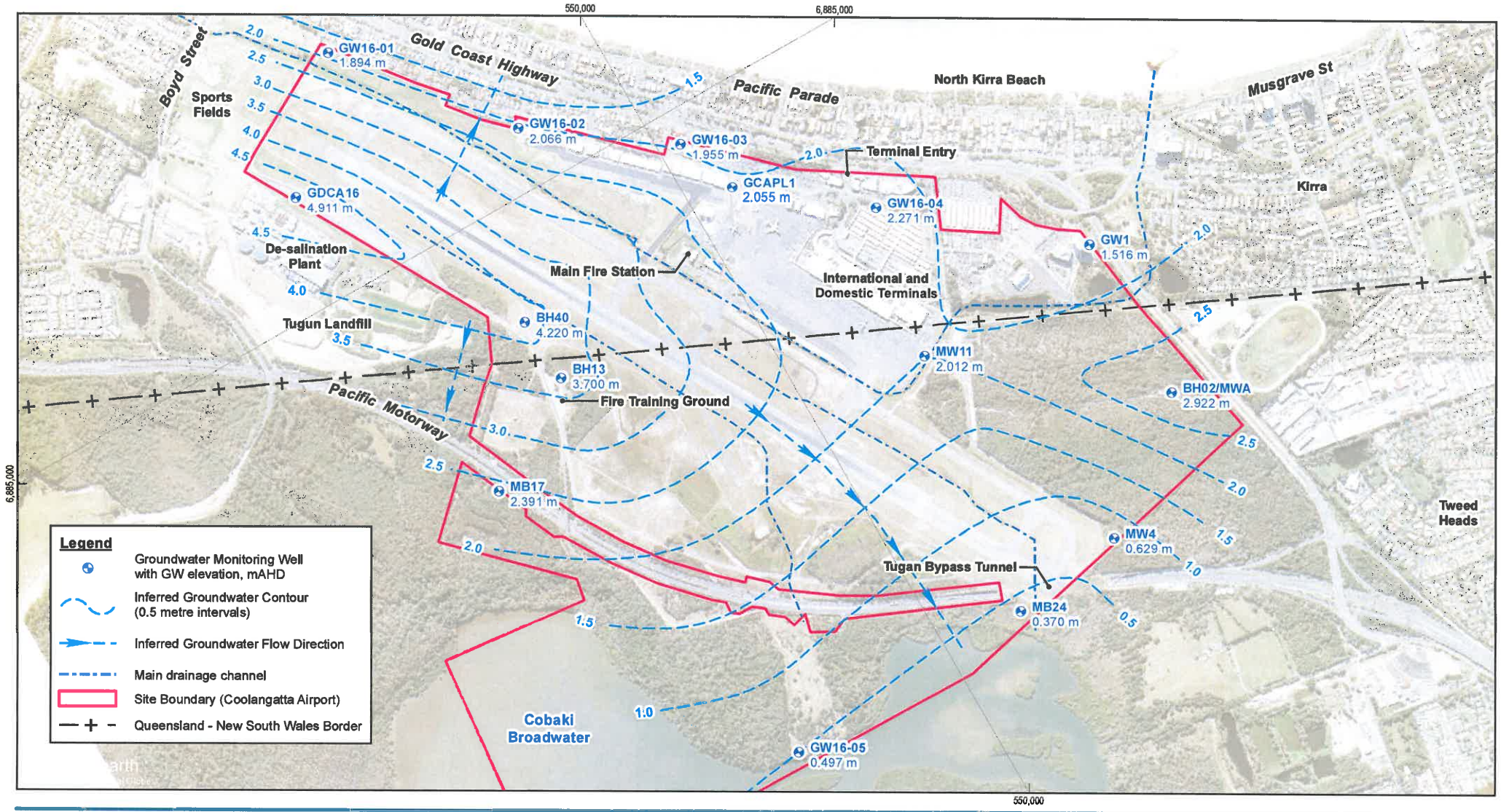
Data source: Google Earth: imagery (May 2015, extracted March 2016). Created : jvc



1:16,000 (at A4)

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metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

Airservices Australia Pty Ltd
Gold Coast Airport
Preliminary Sampling Report

Inferred Groundwater Contours

Job Number	31-34071
Revision	B
Date	8 Sept 2016

Figure 4

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Data source: Google Earth: imagery (May 2015, extracted March 2016). Created : jvc

Appendix B – Borehole Logs

BOREHOLE LOG

ENVIRONMENTAL-GROUNDWATER

MONITORING WELL GW16-01

Client Airservices Australia
Project ASA Environmental Investigation
Project No. 313407101
Site Gold Coast Airport
Location Eastern Avenue, Bilinga, Queensland
Date Drilled 18/07/2016 - 18/07/2016

Drill Co. Numac
Driller M.Hopkins
Rig Type Geoprobe 782207
Drill Method
Total Depth (m) 5
Diameter (mm) 100

Easting, Northing 549282.07854, 6885667.06137
Grid Ref GDA94_MGA_zone_56
Elevation
Collar RL -
Logged By B.N
Checked By I.B

B.C.L No. N/A | **Casing** Class 18 uPVC | **Screen** Machine Slotted | **Surface Completion**

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	GW16-01 Well Details	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
0	HA		GW16-01_0.2		Grout		GRAVELLY SAND, fine, Yellow brown, fine to coarse subrounded gravel	D/M	L	No odour, No staining, some grass and roots present	0
0.5			GW16-01_0.5		Benotite		SAND, fine, Light grey	D/M	L	No odour, No staining	-0.5
1			GW16-01_1.0				SAND, fine, Light grey-brown	D/M	L	No odour, No staining	-1
1.5	HFA						SAND, fine, Light brown	M	L	No odour, No staining	-1.5
2			GW16-01_2.0								-2
2.5											-2.5
3			GW16-01_3.0		Filter Sand		SAND, fine, Light brown	W	L	No odour, No staining	-3
3.5											-3.5
4			GW16-01_4.0								-4
4.5											-4.5
5							Termination Depth at:5.0 m				-5
5.5											-5.5

Notes

GHD Soil Classifications The GHD Soil Classification is based on Australian Standards AS 1726-1993. This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils**VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils**VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-GROUNDWATER

MONITORING WELL GW16-02

Client Airservices Australia	**Drill Co.** Numac	**Easting, Northing** 549666.437563, 6885183.06484
Project ASA Environmental Investigation	**Driller** M.Hopkins	**Grid Ref** GDA94_MGA_zone_56
Project No. 313407101	**Rig Type** Geoprobe 782207	**Elevation**
Site Gold Coast Airport	**Drill Method**	**Collar RL** -
Location Eastern Avenue, Bilinga, Queensland	**Total Depth (m)** 5	**Logged By** B.N
Date Drilled 18/07/2016 - 18/07/2016	**Diameter (mm)** 100	**Checked By** I.B

B.C.L No. N/A **Casing** Class 18 uPVC **Screen** Machine Slotted **Surface Completion**

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	GW16-02 Well Details	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
0	HA		GW16-02_0.2		Grout		SAND, fine, Brown, trace silt	D/M	L	No odour, No staining	0
			GW16-02_0.5								
0.5					Benotite		SAND, fine, Light brown and grey, trace medium subrounded gravel	M	L	No odour, No staining	-0.5
							SAND, fine, Light grey	M	L	No odour, No staining	
1			GW16-02_1.0								-1
	HFA										
1.5											-1.5
			GW16-02_2.0								
2							SAND WITH SILT, fine, Dark brown	M	L	No odour, No staining	-2
2.5											-2.5
			GW16-02_3.0		Filter Sand						
3							SAND, fine, Brown, trace fine subrounded gravel	M	L	No odour, No staining	-3
3.5											-3.5
			GW16-02_4.0								
4							SAND, fine, Beige-light brown	W	L	No odour, No staining	-4
4.5											-4.5
5							Termination Depth at:5.0 m				-5
5.5											-5.5

Notes

GHD Soil Classifications The GHD Soil Classification is based on Australian Standards AS 1726-1993. This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils**VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils**VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-GROUNDWATER

MONITORING WELL GW16-03

Client Airservices Australia
Project ASA Environmental Investigation
Project No. 313407101
Site Gold Coast Airport
Location Eastern Avenue, Bilinga, Queensland
Date Drilled 18/07/2016 - 18/07/2016

Drill Co. Numac
Driller M.Hopkins
Rig Type Geoprobe 782207
Drill Method
Total Depth (m) 5.2
Diameter (mm) 100

Easting, Northing 550067.743089, 6884899.4448
Grid Ref GDA94_MGA_zone_56
Elevation
Collar RL -
Logged By B.N
Checked By I.B

B.C.L No. N/A | **Casing** Class 18 uPVC | **Screen** Machine Slotted | **Surface Completion**

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	GW16-03	Well Details	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
0	HA		GW16-03_0.2			Grout		SAND, fine, Grey	D/M	L	No odour, No staining, roots present	
			GW16-03_0.5					SAND, fine, Grey, trace fine to medium sub-rounded gravel	D/M	L	No odour, No staining, roots present	-0.5
0.5						Benotite		GRAVELLY SAND, fine, Grey-light brown, fine to coarse subrounded to subangular gravel	D/M	L	No odour, No staining	
1			GW16-03_1.0					SAND, fine, Grey-brown	M	L	No odour, No staining	-1
	HFA							SAND, fine, Light grey	M	L	No odour, No staining	
1.5												-1.5
2			GW16-03_2.0					SAND, fine, Light brown-light grey	M	L	No odour, No staining	-2
2.5												-2.5
3			GW16-03_3.0			Filter Sand		SAND, fine, Brown-light brown, trace silt	M/W	L	No odour, No staining	-3
3.5												-3.5
4								SAND, fine, Brown, trace silt	W	L	No odour, No staining	-4
4.5												-4.5
5												-5
5.5								Termination Depth at:5.2 m				-5.5

Notes

GHD Soil Classifications The GHD Soil Classification is based on Australian Standards AS 1726-1993. This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils**VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils**VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-GROUNDWATER

MONITORING WELL GW16-04

Client Airservices Australia
Project ASA Environmental Investigation
Project No. 313407101
Site Gold Coast Airport
Location Eastern Avenue, Bilinga, Queensland
Date Drilled 19/07/2016 - 19/07/2016

Drill Co. Numac
Driller M.Hopkins
Rig Type Geoprobe 782207
Drill Method
Total Depth (m) 5
Diameter (mm) 100

Easting, Northing 550483.291057, 6884438.99133
Grid Ref GDA94_MGA_zone_56
Elevation
Collar RL -
Logged By B.N
Checked By I.B

B.C.L No. N/A | **Casing** Class 18 uPVC | **Screen** Machine Slotted | **Surface Completion**

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Well Details	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
0	HA		GW16-04_0.2		Grout		GRAVELLY SAND, fine, Light brown, fine to medium subangular gravel	M	L	No odour, No staining	0
			GW16-04_0.5		Benotite		SAND, fine, Light brown	M	L	No odour, No staining	-0.5
1			GW16-04_1.0				SAND, fine, Grey	M	L	No odour, No staining	-1
1.5	HFA										-1.5
2			GW16-04_2.0				SAND, fine, Light grey-white	M/W	L	No odour, No staining	-2
2.5				▽							-2.5
3			GW16-04_3.0		Filter Sand		SAND, fine, Grey with trace black-brown spots	W	L	No odour, No staining	-3
3.5											-3.5
4			GW16-04_4.0				SAND, fine, Dark brown	W	L	No odour, No staining	-4
4.5											-4.5
5			GW16-04_5.0				Termination Depth at:5.0 m				-5
5.5											-5.5

Notes

GHD Soil Classifications The GHD Soil Classification is based on Australian Standards AS 1726-1993. This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils**VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils**VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-GROUNDWATER

MONITORING WELL GW16-05

Client Airservices Australia
Project ASA Environmental Investigation
Project No. 313407101
Site Gold Coast Airport
Location Eastern Avenue, Bilinga, Queensland
Date Drilled 19/07/2016 - 19/07/2016

Drill Co. Numac
Driller M.Hopkins
Rig Type Geoprobe 782207
Drill Method
Total Depth (m) 4
Diameter (mm) 100

Easting, Northing 549388.972074, 6883142.11246
Grid Ref GDA94_MGA_zone_56
Elevation
Collar RL -
Logged By B.N
Checked By I.B

B.C.L No. N/A | **Casing** Class 18 uPVC | **Screen** Machine Slotted | **Surface Completion**

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	GW16-05 Well Details	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
0	HA		GW16-05_0.2		Grout		SILTY SAND, fine, Dark brown, trace clay	M	L	No odour, No staining, roots present	0
0.5			GW16-05_0.5		Benotite		SAND WITH SILT, fine, Brown	M	L	No odour, No staining	-0.5
1			GW16-05_1.0				CLAYEY SAND, low plasticity, fine, Dark brown	M	F	No odour, No staining	-1
1	HFA			▽			SAND, fine, Brown-grey, trace silt	W	L	No odour, No staining	-1
2.5					Filter Sand						-2.5
4							Termination Depth at:4.0 m				-4
4.5											-4.5
5											-5
5.5											-5.5

Notes

GHD Soil Classifications The GHD Soil Classification is based on Australian Standards AS 1726-1993. This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils**VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils**VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

Appendix C – Groundwater Well Survey Data

Gold Coast Airport - Monitors					
Easting MGA94	Northing MGA94	RL mAHD	Top Cap	Ground Level	Description
549258.536	6885690.566		4.885		GW16-01
549679.069	6885206.731		5.39		GW16-02
550042.839	6884926.402		5.557		GW16-03
550534.45	6884447.855		4.904		GW16-04
549462.401	6883117.699		0.972		GW16-05
550241.381	6883153.671		1.095		MB24
549793.783	6885101.593	5.425			PM124909

Date : 24th August 2016

Appendix D – Groundwater Gauging and Purging Records

Groundwater Gauging Sheet

Client: Airservices Australia

Project: Gold Coast Airport SAQP Implementation Report

Job No.: 3134071

Location: Gold Coast Airport

WL Meter Type: Int.Fce

Date	Location / Bore ID	SWL (mbTOC)	TOC (mAHD)	SWL (mAHD)
25/07/2016	GDCA16	2.225	7.136	4.911
25/07/2016	GW16-01	2.991	4.885	1.894
25/07/2016	GW16-02	3.324	5.39	2.066
25/07/2016	GW16-05	0.475	0.972	0.497
26/07/2016	BH13	1.782	5.482	3.7
26/07/2016	BH40	1.47	5.69	4.22
26/07/2016	MB17	1.7	4.091	2.391
26/07/2016	MW4	0.805	1.434	0.629
27/07/2016	GCAPL1	2.212	4.267	2.055
27/07/2016	GW1	2.435	3.951	1.516
27/07/2016	MB24A	0.725	1.095	0.37
27/07/2016	MW11	0.585	2.597	2.012
28/07/2016	GW16-03	3.602	5.557	1.955
28/07/2016	GW16-04	2.633	4.904	2.271
28/07/2016	MWA	0.733	3.655	2.922

GROUNDWATER PURGING AND SAMPLING FIELD SHEET

PROJECT DETAILS	Borehole ID: MB24A
Project Number: 3134071	
Project Name: Gold Coast Airport SAQO Implementation Report	Sample ID: MB24A
Client: ASA	Date: 27/7/16 Time:14:18
Site: Gold Coast Airport	Sampler: B.N
Well Condition (i.e road box, locked etc): Road Box, fine.	Purge Method: Low Flow
Depth to Water Table Pre-purge (from TOC): 0.725	Sample Method: Low Flow
Depth of PSH (from TOC): -	Casing Type: uPVC Class 18
Depth to Bottom of Casing (BOC) from TOC:	Well Diameter: 50 mm
Casing Stickup: Gatic	Calculated Bore Volume(L): -
Depth to Water Table Post - purge (from TOC):	QA Collected: -

FIELD PARAMETERS (RECORDED USING *YSI*)

Time	Volume (L)	Depth to Water from TOC(m)	D.O (mg/L)	E.C (us/cm)	pH	Eh (mv)	Temp (°C)	Comments
14:22	0.2	0.73	0.25	43140	5.67	-41	19.9	Pale Yellow, Low turbidity/ Suspended Solids
14:30	0.5	0.73	0.51	43091	5.75	-65.7	19.5	
14:35	1	0.73	1.16	43099	5.76	-71.9	19.4	
14:40	2	0.73	1.56	43129	5.77	-75.2	19.4	
14:45	3	0.73	1.79	43224	5.77	-77.9	19.3	
14:50	4	0.73	1.84	43238	5.77	-80.6	19.4	
14:55	5	0.73	1.85	43184	5.77	-82.2	19.3	
Post Sample Parameters								

Number of Bottles:

Comments: Analysing for VOC and SVOC

Well Volume Calculation (50mm diameter) 3.8xH (H=height of water column)

GROUNDWATER PURGING AND SAMPLING FIELD SHEET

PROJECT DETAILS	MW11
Project Number: 3134071	
Project Name: Gold Coast Airport SAQO Implementation Report	Sample ID: MW11
Client: ASA	Date: 27/7/16 Time: 11:13
Site: Gold Coast Airport	Sampler: B.N
Well Condition (i.e road box, locked etc): Gatic Well	Purge Method: Low Flow
Depth to Water Table Pre-purge (from TOC): 0.585	Sample Method: Low Flow
Depth of PSH (from TOC): -	Casing Type: uPVC Class 18
Depth to Bottom of Casing (BOC) from TOC: -	Well Diameter: 50 mm
Casing Stickup: Gatic	Calculated Bore Volume(L): -
Depth to Water Table Post - purge (from TOC): 0.99	QA Collected: -

FIELD PARAMETERS (RECORDED USING YSI)

Time	Volume (L)	Depth to Water from TOC(m)	D.O (mg/L)	E.C (us/cm)	pH	Eh (mv)	Temp (°C)	Comments
11:20	0.3	0.84	1.84	53.2	4.42	207	18.9	Brown- tanin, High turbidity , moderate suspended solids.
11:25	0.8	0.965	1.41	52.7	4.41	202.3	19	" "
11:30	1	1.06	1.47	52.5	4.43	194.5	1.1	" "
11:35	1.5	1.12	2.46	52	4.44	178.6	19.2	Purged Dry - wait for recharge
11:50		0.773	2.31	48.5	4.49	163	19.4	sample
Post Sample Parameters								

Number of Bottles:

Comments: Analysing for VOC and SVOC

Well Volume Calculation (50mm diameter) 3.8xH (H=height of water column)

GROUNDWATER PURGING AND SAMPLING FIELD SHEET

PROJECT DETAILS	Borehole ID: MWA
Project Number: 3134071	
Project Name: Gold Coast Airport SAQO Implementation Report	Sample ID: MWA
Client: ASA	Date: 28/7/2016 Time: 08:09
Site: Gold Coast Airport	Sampler: B.N
Well Condition (i.e road box, locked etc):	Purge Method: Low Flow
Depth to Water Table Pre-purge (from TOC): 0.733	Sample Method: Low Flow
Depth of PSH (from TOC): -	Casing Type: uPVC Class 18
Depth to Bottom of Casing (BOC) from TOC: -	Well Diameter: 50 mm
Casing Stickup: Gatic	Calculated Bore Volume(L): -
Depth to Water Table Post - purge (from TOC): 0.775	QA Collected: -

FIELD PARAMETERS (RECORDED USING YSI)

Time	Volume (L)	Depth to Water from TOC(m)	D.O (mg/L)	E.C (us/cm)	pH	Eh (mv)	Temp (°C)	Comments
8:15	0.5	0.78	0.16	75.3	5.11	127.8	17.2	pale- yellow , Moderate Turbidity/ Suspended Solids
8:20	2	0.79	0.14	74.5	5.13	104.6	17.4	
8:25	4	0.795	0.15	73.2	5.13	88.3	17.7	
8:30	6	0.795	0.18	72.9	5.12	79.1	17.7	
8:35	8	0.8	0.34	73	5.13	70.4	17.8	
8:40	10	0.805	0.51	72.9	5.13	65.1	17.9	
8:45	12	0.81	0.6	73.2	5.15	62.9	17.9	sample
Post Sample Parameters								

Number of Bottles:

Comments: Analysing for VOC and SVOC

Well Volume Calculation (50mm diameter) 3.8xH (H=height of water column)

GROUNDWATER PURGING AND SAMPLING FIELD SHEET

PROJECT DETAILS	
Project Number: 3134071	Borehole ID: GCAPL1
Project Name: Gold Coast Airport SAQO Implementation Report	Sample ID: GCAPL 1
Client: ASA	Date: 27/7/16 Time: 10:10
Site: Gold Coast Airport	Sampler: B.N
Well Condition (i.e road box, locked etc): Gatic	Purge Method: Low Flow
Depth to Water Table Pre-purge (from TOC): 2.212	Sample Method: Low Flow
Depth of PSH (from TOC): -	Casing Type: uPVC Class 18
Depth to Bottom of Casing (BOC) from TOC:	Well Diameter: 50 mm
Casing Stickup: Gatic	Calculated Bore Volume(L): -
Depth to Water Table Post - purge (from TOC):	QA Collected: -

FIELD PARAMETERS (RECORDED USING YSI)

Time	Volume (L)	Depth to Water from TOC(m)	D.O (mg/L)	E.C (us/cm)	pH	Eh (mv)	Temp (°C)	Comments
10:15	0.3	2.215	0.88	362.2	5.87	92	23.6	Pale yellow, Low Turbidity/Suspended Solids
10:20	1	2.218	0.98	363	5.85	103.8	23.9	" "
10:25	2	2.218	1.22	364.1	5.83	110.2	24	" "
10:30	3	2.218	1.42	364.3	5.82	112.1	24.1	" "
10:35	4	2.218	1.57	362.2	5.81	111.9	24.1	" "
10:40	5	2.218	1.72	361.1	5.81	109.5	24.3	sample
Post Sample Parameters								

Number of Bottles:

Comments: Analysing for VOC and SVOC

Well Volume Calculation (50mm diameter) 3.8xH (H=height of water column)

GROUNDWATER PURGING AND SAMPLING FIELD SHEET

PROJECT DETAILS	
Project Number: 3134071	Borehole ID: GW1
Project Name: Gold Coast Airport SAQO Implementation Report	Sample ID: GW1
Client: ASA	Date: 27/7/16 Time:08:23
Site: Gold Coast Airport	Sampler: B.N
Well Condition (i.e road box, locked etc):	Purge Method: Low Flow
Depth to Water Table Pre-purge (from TOC): 2.435	Sample Method: Low Flow
Depth of PSH (from TOC): -	Casing Type: uPVC Class 18
Depth to Bottom of Casing (BOC) from TOC:	Well Diameter: 50 mm
Casing Stickup: Gatic	Calculated Bore Volume(L): -
Depth to Water Table Post - purge (from TOC): 2.445	QA Collected: -

FIELD PARAMETERS (RECORDED USING YSI)

Time	Volume (L)	Depth to Water from TOC(m)	D.O (mg/L)	E.C (us/cm)	pH	Eh (mv)	Temp (°C)	Comments
8:30	1	2.455	1.63	722	5.89	25.5	20.2	Yellow, Low Turbidity/Suspended Solids
8:35	3	2.45	2.96	722	5.87	-31.9	20	" "
8:40	4	2.45	3.39	718	5.86	-36.5	20.2	" "
8:45	5	2.455	3.46	717	5.85	-40.7	20.3	" "
8:50	6	2.455	3.46	714	5.84	-44.6	20.5	" " (sample)
Post Sample Parameters								

Number of Bottles:

Comments: Analysing for VOC and SVOC

Well Volume Calculation (50mm diameter) 3.8xH (H=height of water column)

GROUNDWATER PURGING AND SAMPLING FIELD SHEET

PROJECT DETAILS	
Project Number: 3134071	Borehole ID: MB17
Project Name: Gold Coast Airport SAQO Implementation Report	Sample ID: MB17
Client: ASA	Date: 26/7/16 Time:11:50
Site: Gold Coast Airport	Sampler: B.N
Well Condition (i.e road box, locked etc): Monument	Purge Method: Low Flow
Depth to Water Table Pre-purge (from TOC): 1.700	Sample Method: Low Flow
Depth of PSH (from TOC): -	Casing Type: uPVC Class 18
Depth to Bottom of Casing (BOC) from TOC:	Well Diameter: 50 mm
Casing Stickup: Gatic	Calculated Bore Volume(L): -
Depth to Water Table Post - purge (from TOC):	QA Collected: -

FIELD PARAMETERS (RECORDED USING YSI)

Time	Volume (L)	Depth to Water from TOC(m)	D.O (mg/L)	E.C (us/cm)	pH	Eh (mv)	Temp (°C)	Comments
11:55	0.3	1.705	0.27	238	5.4	68.9	21.4	Yellow -tannin colour, Moderate Turbidity/ Suspended Solids
12:00	1.5	1.705	0.78	230.8	5.34	66	21.4	
12:05	3	1.705	1.56	227.2	5.31	63.8	21.4	
12:10	4	1.705	2.16	234.2	5.38	53.8	21.4	
12:15	5	1.705	2.32	244	5.43	46.4	21.4	
12:20	6	1.705	2.37	250.8	5.48	38.6	21.4	
12:25	7	1.705	2.39	252.9	5.49	35.7	21.4	sample
Post Sample Parameters								

Number of Bottles:

Comments: Analysing for VOC and SVOC

Well Volume Calculation (50mm diameter) 3.8xH (H=height of water column)

GROUNDWATER PURGING AND SAMPLING FIELD SHEET

PROJECT DETAILS	
Project Number: 3134071	Borehole ID: BH40
Project Name: Gold Coast Airport SAQO Implementation Report	Sample ID: BH40
Client: ASA	Date: 26/7/16 Time:08:17
Site: Gold Coast Airport	Sampler: B.N
Well Condition (i.e road box, locked etc): Standpipe	Purge Method: Low Flow
Depth to Water Table Pre-purge (from TOC): 1.470	Sample Method: Low Flow
Depth of PSH (from TOC): -	Casing Type: uPVC Class 18
Depth to Bottom of Casing (BOC) from TOC: -	Well Diameter: 50 mm
Casing Stickup: Gatic	Calculated Bore Volume(L): -
Depth to Water Table Post - purge (from TOC):	QA Collected: -

FIELD PARAMETERS (RECORDED USING YSI)

Time	Volume (L)	Depth to Water from TOC(m)	D.O (mg/L)	E.C (us/cm)	pH	Eh (mv)	Temp (°C)	Comments
8:29	0.3	1.48	1.88	85.7	6.32	106.4	18.7	Grey, Moderate turbidity. High Suspended Solids (fine sand)
8:35	1	1.48	1.29	95.7	6.21	108.8	18.9	Light/pale yellow, Low turbidity/suspended solids. No odour
8:40	3	1.48	1.16	94.9	6.17	3.9	19.1	" '
8:50	5	1.485	1.02	95.7	6.15	96.9	19.3	" "
8:55	7	1.485	1.06	95.8	6.15	97.1	19.3	" " (sample)
Post Sample Parameters								

Number of Bottles:

Comments: Analysing for VOC and SVOC

Well Volume Calculation (50mm diameter) 3.8xH (H=height of water column)

GROUNDWATER PURGING AND SAMPLING FIELD SHEET

PROJECT DETAILS	
Project Number: 3134071	Borehole ID: GDCA16
Project Name: Gold Coast Airport SAQO Implementation Report	Sample ID: GDCA16
Client: ASA	Date: 25/7/16 Time: 15:48
Site: Gold Coast Airport	Sampler: B.N
Well Condition (i.e road box, locked etc): Monument Lid Broken	Purge Method: Low Flow
Depth to Water Table Pre-purge (from TOC): 2.225	Sample Method: Low Flow
Depth of PSH (from TOC): -	Casing Type: uPVC Class 18
Depth to Bottom of Casing (BOC) from TOC: -	Well Diameter: 50 mm
Casing Stickup: Gatic	Calculated Bore Volume(L): -
Depth to Water Table Post - purge (from TOC):	QA Collected: -

FIELD PARAMETERS (RECORDED USING YSI)

Time	Volume (L)	Depth to Water from TOC(m)	D.O (mg/L)	E.C (us/cm)	pH	Eh (mv)	Temp (°C)	Comments
15:50	0.2	2.475	0.22	815	6.44	-30	21.7	pale yellow, Low turbidity/ suspended solids
15:55	0.8	2.48	0.59	766	6.34	-46.9	21.8	" "
16:00	1.5	2.48	1.95	842	6.27	-63	21.9	" "
16:05	2.5	2.48	2.81	905	6.25	-69.5	21.9	" "
16:10	3.5	2.48	3.29	956	6.23	-74	21.9	" "
16:15	4.5	2.48	3.43	982	6.22	-75.9	22	" " (sample)
Post Sample Parameters								

Number of Bottles:

Comments: Analysing for VOC and SVOC

Well Volume Calculation (50mm diameter) 3.8xH (H=height of water column)

GROUNDWATER PURGING AND SAMPLING FIELD SHEET

PROJECT DETAILS	Borehole ID: GW16-02
Project Number: 3134071	
Project Name: Gold Coast Airport SAQO Implementation Report	Sample ID: GW16-02
Client: ASA	Date:25/7/16 Time:11:17
Site: Gold Coast Airport	Sampler: B.N
Well Condition (i.e road box, locked etc): gatic well	Purge Method: Low Flow
Depth to Water Table Pre-purge (from TOC): 3.324	Sample Method: Low Flow
Depth of PSH (from TOC): -	Casing Type: uPVC Class 18
Depth to Bottom of Casing (BOC) from TOC: -	Well Diameter: 50 mm
Casing Stickup: Gatic	Calculated Bore Volume(L): -
Depth to Water Table Post - purge (from TOC): 3.326	QA Collected: -

FIELD PARAMETERS (RECORDED USING YSI)

Time	Volume (L)	Depth to Water from TOC(m)	D.O (mg/L)	E.C (us/cm)	pH	Eh (mv)	Temp (°C)	Comments
11:20	0.2	3.334	1.3	152	7.26	115.9	22.2	Pale yellow, Low turbidity/Suspended Solids
11:25	0.4	3.324	0.97	150.8	6.71	119.1	22.2	" "
11:30	0.6	3.326	0.91	149.6	6.62	118	22.2	" "
11:35	0.8	3.325	1	153.1	6.58	119	21.9	" "
11:40	1	3.328	1.17	156	6.56	111.3	21.9	" "
11:45	1.2	3.328	1.18	160.2	6.57	99.3	22.1	" ' (sample)
Post Sample Parameters								

Number of Bottles:

Comments: Analysing for VOC and SVOC

Well Volume Calculation (50mm diameter) 3.8xH (H=height of water column)

GROUNDWATER PURGING AND SAMPLING FIELD SHEET

PROJECT DETAILS	
Project Number: 3134071	Borehole ID: BH13
Project Name: Gold Coast Airport SAQO Implementation Report	Sample ID: BH13
Client: ASA	Date:26/7/16 Time:09:20
Site: Gold Coast Airport	Sampler: B.N
Well Condition (i.e road box, locked etc): monument	Purge Method: Low Flow
Depth to Water Table Pre-purge (from TOC): 1.782	Sample Method: Low Flow
Depth of PSH (from TOC): -	Casing Type: uPVC Class 18
Depth to Bottom of Casing (BOC) from TOC: -	Well Diameter: 50 mm
Casing Stickup: Gatic	Calculated Bore Volume(L): -
Depth to Water Table Post - purge (from TOC): 1.790	QA Collected: - GW - QA1, GW QA2

FIELD PARAMETERS (RECORDED USING YSI)

Time	Volume (L)	Depth to Water from TOC(m)	D.O (mg/L)	E.C (us/cm)	pH	Eh (mv)	Temp (°C)	Comments
9:25	0.5	1.79	0.12	104.6	5.8	19.5	18.6	Yellow, Low turbidity/Suspended Solids. No odour
9:30	2	1.79	0.17	105	5.79	10.2	18.7	" "
9:35	3	1.79	0.33	105.4	5.83	2.4	18.7	" "
9:40	4	1.79	0.72	105.8	5.84	-2.7	18.7	" "
9:45	5	1.79	0.96	106.2	5.84	-5	18.6	" "
9:50	6	1.79	1.19	106.9	5.85	-9	18.6	" "
9:55	7	1.79	1.29	106.9	5.85	-11	18.7	" " (sample)
Post Sample Parameters								

Number of Bottles:

Comments: Analysing for VOC and SVOC

Well Volume Calculation (50mm diameter) 3.8xH (H=height of water column)

GROUNDWATER PURGING AND SAMPLING FIELD SHEET

PROJECT DETAILS	Borehole ID: GW16-01
Project Number: 3134071	
Project Name: Gold Coast Airport SAQO Implementation Report	Sample ID: GW16-01
Client: ASA	Date: 25/7/16 Time: 12:03
Site: Gold Coast Airport	Sampler: B.N
Well Condition (i.e road box, locked etc): gatic	Purge Method: Low Flow
Depth to Water Table Pre-purge (from TOC): 2.991	Sample Method: Low Flow
Depth of PSH (from TOC): -	Casing Type: uPVC Class 18
Depth to Bottom of Casing (BOC) from TOC: 5	Well Diameter: 50 mm
Casing Stickup: Gatic	Calculated Bore Volume(L): -
Depth to Water Table Post - purge (from TOC):	QA Collected: -

FIELD PARAMETERS (RECORDED USING *YSI*)

Time	Volume (L)	Depth to Water from TOC(m)	D.O (mg/L)	E.C (us/cm)	pH	Eh (mv)	Temp (°C)	Comments
12:10	0.5	2.996	0.23	101.3	6.21	178.9	23.7	Light Brown. Low turbidity/suspended solids. No odour/sheen
12:15	1	3.001	0.19	101.7	6.18	70.3	23.9	
12:20	1.5	3.005	0.23	101.7	6.19	66.6	23.7	Becoming clear; Very low turbidity/ suspended solids
12:25	2	3.005	29	101.3	6.16	61.3	23.7	
12:30	2.5	3	0.33	1000.6	6.16	59.8	23.7	
12:35	3	3	0.43	100.2	6.16	54.2	23.5	sample
Post Sample Parameters								

Number of Bottles:

Comments: Analysing for VOC and SVOC

Well Volume Calculation (50mm diameter) 3.8xH (H=height of water column)

GROUNDWATER PURGING AND SAMPLING FIELD SHEET

PROJECT DETAILS	Borehole ID: GW16-05
Project Number: 3134071	
Project Name: Gold Coast Airport SAQO Implementation Report	Sample ID: GW16-05
Client: ASA	Date: 25/7/16 Time:13:33
Site: Gold Coast Airport	Sampler: B.N
Well Condition (i.e road box, locked etc): Gatic	Purge Method: Low Flow
Depth to Water Table Pre-purge (from TOC): 0.475	Sample Method: Low Flow
Depth of PSH (from TOC): -	Casing Type: uPVC Class 18
Depth to Bottom of Casing (BOC) from TOC: 4	Well Diameter: 50 mm
Casing Stickup: Gatic	Calculated Bore Volume(L): -
Depth to Water Table Post - purge (from TOC):	QA Collected: -

FIELD PARAMETERS (RECORDED USING *YSI*)

Time	Volume (L)	Depth to Water from TOC(m)	D.O (mg/L)	E.C (us/cm)	pH	Eh (mv)	Temp (°C)	Comments
13:37	0.2	0.515	0.08	6304	6.99	-144	21.7	Yellow, Moderate Turbidity, Low Suspended Solids, organic odour
13:40	0.4	0.52	<0.01	6200	6.93	-167.2	21.9	" "
13:45	1	0.52	0.03	6181	6.91	-175.9	22.1	" "
13:50	2	0.52	0.18	6449	6.88	-190.4	22	" "
13:55	3	0.52	0.37	6754	6.86	-199.8	22.1	" "
14:00	4	0.52	0.48	7025	6.85	-202	21.9	" "
14:05	5	0.52	0.6	7308	6.84	-208.1	21.8	" "
14:10	6	0.52	0.68	7521	6.83	-209.5	21.9	" " (sample)
Post Sample Parameters								

Number of Bottles:	Comments: Analysing for VOC and SVOC

Well Volume Calculation (50mm diameter) 3.8xH (H=height of water column)

GROUNDWATER PURGING AND SAMPLING FIELD SHEET

PROJECT DETAILS	Borehole ID: MW4
Project Number: 3134071	
Project Name: Gold Coast Airport SAQO Implementation Report	Sample ID: MW4
Client: ASA	Date: 26/7/16 Time: 15:42
Site: Gold Coast Airport	Sampler: B.N
Well Condition (i.e road box, locked etc): Monument	Purge Method: Low Flow
Depth to Water Table Pre-purge (from TOC): 0.805	Sample Method: Low Flow
Depth of PSH (from TOC): -	Casing Type: uPVC Class 18
Depth to Bottom of Casing (BOC) from TOC: -	Well Diameter: 50 mm
Casing Stickup: Gatic	Calculated Bore Volume(L): -
Depth to Water Table Post - purge (from TOC):	QA Collected: -

FIELD PARAMETERS (RECORDED USING YSI)

Time	Volume (L)	Depth to Water from TOC(m)	D.O (mg/L)	E.C (us/cm)	pH	Eh (mv)	Temp (°C)	Comments
15:50	0.5	0.795	0.42	1461	6.13	-68.5	17.6	Brown, High Turbidity/ Suspended Solids
15:55	1.5	0.815	1.12	1486	6.12	-65.3	17.5	Light Brown, Moderate Turbidity/ Suspended Solids
16:00	3	0.83	1.82	1533	6.14	-66	17.5	" "
16:07	4	0.83	2.32	1595	6.15	-66.7	17.5	" "
16:10	5	0.84	2.47	1614	6.15	-67.1	17.5	" "
16:15	6	0.84	2.6	1641	6.15	-66.6	17.5	" "
16:20	7	0.84	2.68	1659	6.15	-66.7	17.4	" " (sample)
Post Sample Parameters								

Number of Bottles:

Comments: Analysing for VOC and SVOC

Well Volume Calculation (50mm diameter) 3.8xH (H=height of water column)

GROUNDWATER PURGING AND SAMPLING FIELD SHEET

PROJECT DETAILS	
Project Number: 3134071	Borehole ID: GW16-04
Project Name: Gold Coast Airport SAQO Implementation Report	Sample ID: GW16-04
Client: ASA	Date:28/7/16 Time:09:23
Site: Gold Coast Airport	Sampler: B.N
Well Condition (i.e road box, locked etc):	Purge Method: Low Flow
Depth to Water Table Pre-purge (from TOC): 2.633	Sample Method: Low Flow
Depth of PSH (from TOC): -	Casing Type: uPVC Class 18
Depth to Bottom of Casing (BOC) from TOC: 5.0	Well Diameter: 50 mm
Casing Stickup: Gatic	Calculated Bore Volume(L): -
Depth to Water Table Post - purge (from TOC):	QA Collected: -

FIELD PARAMETERS (RECORDED USING YSI)

Time	Volume (L)	Depth to Water from TOC(m)	D.O (mg/L)	E.C (us/cm)	pH	Eh (mv)	Temp (°C)	Comments
9:30	0.3	2.755	0.22	232	5.94	37.4	22	Pale Yellow, Low Turbidity/ suspended solids
9:35	1	2.75	0.2	223.8	5.91	13.2	22.4	
9:40	1.5	2.753	0.4	223.8	5.98	2.3	22.8	
9:46	2.5	2.75	0.85	2223	5.98	-4.7	22.9	
9:50	3.5	2.75	1.03	222.2	5.98	-9.3	23	
9:55	5	2.755	1.24	229	5.97	-9.5	23	
10:00	6.5	2.755	1.32	221.4	5.98	-14.1	23.1	sample
Post Sample Parameters								

Number of Bottles:

Comments: Analysing for VOC and SVOC

Well Volume Calculation (50mm diameter) 3.8xH (H=height of water column)

GROUNDWATER PURGING AND SAMPLING FIELD SHEET

PROJECT DETAILS	
Project Number: 3134071	Borehole ID: GW16-03
Project Name: Gold Coast Airport SAQO Implementation Report	Sample ID: GW16-03
Client: ASA	Date:28/7/16 Time:10:30
Site: Gold Coast Airport	Sampler: B.N
Well Condition (i.e road box, locked etc):	Purge Method: Low Flow
Depth to Water Table Pre-purge (from TOC): 3.602	Sample Method: Low Flow
Depth of PSH (from TOC): -	Casing Type: uPVC Class 18
Depth to Bottom of Casing (BOC) from TOC: 5	Well Diameter: 50 mm
Casing Stickup: Gatic	Calculated Bore Volume(L): -
Depth to Water Table Post - purge (from TOC): 3.610	QA Collected: -

FIELD PARAMETERS (RECORDED USING YSI)

Time	Volume (L)	Depth to Water from TOC(m)	D.O (mg/L)	E.C (us/cm)	pH	Eh (mv)	Temp (°C)	Comments
10:40	0.1	3.602	2.15	103.7	5.82	101.7	21.7	Clear, no visible turbidity and suspended solids.
10:45	0.5	3.61	1.17	101.2	5.45	124.9	22.1	
10:50	1	3.61	1.04	100.4	5.38	134.5	22	
10:55	2	3.61	0.85	102.3	5.36	139.5	22.1	
11:00	3	3.61	0.89	103.4	5.36	143.4	22.1	
11:05	4.5	3.61	0.89	102.3	5.36	146	22.1	
11:10	5.5	3.61	0.92	103.8	5.36	149.7	22.2	sample
Post Sample Parameters								

Number of Bottles:

Comments: Analysing for VOC and SVOC

Well Volume Calculation (50mm diameter) 3.8xH (H=height of water column)

Appendix E – Surface Soil and Surface Water Observation Notes

Surface Water Samples

Site: Gold Coast Airport **Date:** 26/07/2016 **Monitoring Personnel:** B.Ng

Field Measurements

Location	Time/ date	Sample ID	DO (mg/L)	EC (µS/cm)	pH	Redox (ORP or mV)	Temp (°C)	Comments)
SW16-01	25/07/2016	SW16-01	2.9	416.5	6.37	50.2	23.8	Yellow, Low Turbidity/ Suspended Solids
SW16-02	26/07/2016	SW16-02	2.35	298.3	8.17	111.7	17.2	Yellow, Low Turbidity/suspended solids. Trace detritus
SW16-03	26/07/2016	SW16-03	3.9	291.8	7.74	135.9	18.3	Yellow, Low Turbidity/suspended solids. Trace detritus
SW16-04	27/07/2016	SW16-04	4.24	1104	6.23	118.2	17.8	Yellow, Moderate Turbidity/ Suspended Solids. No odour
SW16-05	27/07/2016	SW16-05	5.64	2017	7.33	186.5	17.7	Yellow, Low Turbidity/Suspended Solids. No odour
SW16-06	26/07/2016	SW16-06	6.45	47444	7.96	113.2	19.3	clear - pale yellow. Low turbidity/ suspended solids
SW16-07	26/07/2016	SW16-07	6.63	46970	7.85	115.8	20.1	clear - pale yellow. Low turbidity/ suspended solids
SW16-08	26/07/2016	SW16-08	3.7	71.6	6.25	17.3	14.9	Yellow, Moderate Turbidity/ suspended solids. No odour
SW16-09	26/07/2016	SW16-09	6.17	46985	7.92	112.4	20.2	clear - pale yellow. Low turbidity/ suspended solids
SW16-10	26/07/2016	SW16-10	6.73	45409	7.33	121.1	20.1	clear - pale yellow. Low turbidity/ suspended solids

Surface Soil Samples

Site: Gold Coast Airport **Date:** 25/7/2016 - 26/7/2016

Monitoring Personnel: B.Ng

Field Observations

Location	Time/ date	Comments
SS1	26/07/2016	Silty sand, grey -brown, fine sand, organic matter
SS2	26/07/2016	Silty sand, grey-dark drown, organic matter, moist, loose. (SS-QA1)
SS3	25/07/2016	Silty sand, grey-brown, moist, loose.
SS4	25/07/2016	Silty sand, grey-brown, moist, loose.
SS5	25/07/2016	Silty Sand, fine sand. Brown, loose, D
SS6	25/07/2016	Silty Sand, fine sand. Brown, loose, D

Appendix F – Summary Tabulated Results

Table 1. Soil Results (Ecological Interim Screening Levels)

	Cations					Exchange Acidity by 1M Potassi	Exchangeable Cations with pre-	Soil Classification				Particle Sizing											Major Ions	TOC	Inor		
	Exchangeable Aluminium	Exchangeable Calcium	Exchangeable Magnesium	Exchangeable Potassium	Exchangeable Sodium	Exchange Acidity	Magnesium/Potassium Ratio	Fines (<75 µm) EA150	Sand (>75 µm) EA150	Cobbles (>6cm)	Gravel (>2mm)	+1180µm	+2.36mm	+4.75mm	+9.5mm	+19.0mm	+37.5mm	+75.0mm	+600µm EA150H	+150µm EA150H	+300µm EA150H	+425µm EA150H	+75µm EA150H	Potassium	Total Organic Carbon	Calcium/Magnesium Ratio	Exchangeable Sodium Percent	CEC
	meq/100g	meq/100g	meq/100g	meq/100g	meq/100g	meq/100g	-	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	mg/kg	%	-	%	meq/100
LOR	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	10	0.02	0.1	0.1	0.1
Airservices EISLs (terrestrial) – 95% protection																												
Airservices EISLs (terrestrial) – com./ind., 60% protection, low reliability																												
Airservices EISLs (terrestrial) – residential, 80% protection, low reliability																												
Location_Code	**Sample_Depth_Range**	**Sampled_Date_Time**																										
GW16-01	0.3-0.5	18/07/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<10	0.13	-	-	-
GW16-01	1.8-2	18/07/2016	-	-	-	-	-	-	-	1	99	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	97	7	<1	99	-	-	-	-
GW16-01	2.8-3	18/07/2016	0.1	<0.1	<0.1	<0.1	<0.1	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<10	0.09	-	15.4	0.1
GW16-02	0-0.2	18/07/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<10	0.48	-	-	-
GW16-02	2.8-3	18/07/2016	0.2	<0.1	<0.1	<0.1	<0.1	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<10	0.11	-	11.8	0.2
GW16-03	0.8-1	18/07/2016	0.6	0.2	0.1	<0.1	<0.1	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<10	0.37	2	5.5	0.9
GW16-03	1.8-2	18/07/2016	-	-	-	-	-	-	-	2	98	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	97	12	1	98	-	-	-	-	-
GW16-03	2.8-3	18/07/2016	0.5	<0.1	<0.1	<0.1	<0.1	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<10	0.3	-	21.4	0.5
GW16-04	0.3-0.5	19/07/2016	-	1.2	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<10	0.24	-	1.1	1.3
GW16-04	4.8-5	19/07/2016	-	0.4	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<10	0.16	-	7.2	0.5
GW16-05	0-0.2	19/07/2016	3.3	2	1.3	<0.1	<0.1	3.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	1.21	1.5	1.9	6.6
GW16-05	0.8-1	19/07/2016	-	1.4	0.7	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	0.22	2	2.6	2.3
SS1	0.0	26/07/2016	0.1	0.5	0.4	<0.1	<0.1	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<10	2.53	1.2	7.6	1
SS2	0.0	26/07/2016	0.1	0.3	0.1	<0.1	<0.1	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<10	0.9	3	8	0.5
SS3	0.0	25/07/2016	0.3	0.2	0.1	<0.1	<0.1	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<10	0.72	2	9.7	0.4
SS4	0.0	25/07/2016	0.5	0.1	0.1	<0.1	<0.1	0.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<10	0.89	1	9.3	0.3
SS5	0.0	25/07/2016	-	1.8	0.3	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<10	0.91	6	1.8	2.2
SS6	0.0	25/07/2016	-	4.6	0.4	0.1	<0.1	-	3.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<10	1.04	11.5	1.1	5.2
Statistical Summary																												
Number of Results			9	14	14	14	14	9	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	16	16	9	14	14
Number of Detects			9	11	9	1	0	9	1	2	2	0	0	0	0	0	0	0	0	0	2	2	1	2	2	16	9	14	14
Minimum Concentration			0.1	<0.1	<0.1	<0.1	<0.1	0.1	3.2	1	98	<1	<1	<1	<1	<1	<1	<1	<1	<1	97	7	<1	98	<10	0.09	1	1.1	0.1
Minimum Detect			0.1	0.1	0.1	0.1	ND	0.1	3.2	1	98	ND	ND	ND	ND	ND	ND	ND	ND	ND	97	7	1	98	10	0.09	1	1.1	0.1
Maximum Concentration			3.3	4.6	1.3	0.1	<0.1	3.3	3.2	2	99	<1	<1	<1	<1	<1	<1	<1	<1	<1	97	12	1	99	20	2.53	11.5	21.4	6.6
Maximum Detect			3.3	4.6	1.3	0.1	ND	3.3	3.2	2	99	ND	ND	ND	ND	ND	ND	ND	ND	ND	97	12	1	99	20	2.53	11.5	21.4	6.6
Average Concentration			0.63	0.92	0.27	0.054	0.05	0.73																	6.3	0.64	3.4	7.5	1.6
Median Concentration			0.3	0.35	0.1	0.05	0.05	0.5	3.2	1.5	98.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	97	9.5	0.75	98.5	5	0.425	2	7.4	0.7
Standard Deviation			1	1.3	0.35	0.013	0	0.98																	3.9	0.63	3.4	5.9	2
Number of Guideline Exceedances			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 1. Soil Results (Ecological Interim Screening Levels)

			rganics			Metals																								
			Electrical conductivity (lab)	Moisture	pH (lab)	Aluminium	Arsenic	Cadmium	Chromium (III+VI)	Copper	Iron	Lead	Mercury	Nickel	Silicon	Zinc	SiO_2	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	1H,1H,2H,2H-perfluorohexanesulfonic acid (4:2 FTS)	N-Ethyl perfluorooctane sulfonamidoacetic acid (Et	N-Methyl perfluorooctane sulfonamidoacetic acid (M	Perfluorobutane Sulfonate (PFBS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoropentanoic acid (PFPeA)	8:2 Fluorotelomer sulfonate	N-Et-FOSA	N-Et-FOSE	N-Me-FOSA
			µS/cm	%	pH Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR			1	1	0.1	50	5	1	2	5	50	5	0.1	2	1	5	0.2	0.0005	0.0005	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0005	0.0005	0.0005	0.0005
Airservices EISLs (terrestrial) – 95% protection																										3.73			
Airservices EISLs (terrestrial) – com./ind., 60% protection, low reliability																										3 73			
Airservices EISLs (terrestrial) – residential, 80% protection, low reliability																										3.73			
Location_Code	Sample_Depth_Range	Sampled_Date_Time																												
GW16-01	0.3-0.5	18/07/2016	-	3.6	-	690	<5	<1	<2	<5	1200	22	<0.1	<2	-	6	97.7	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
GW16-01	1.8-2	18/07/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW16-01	2.8-3	18/07/2016	4	6.3	5.7	330	<5	<1	<2	<5	310	<5	<0.1	<2	-	<5	94.3	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
GW16-02	0-0.2	18/07/2016	-	4.6	-	960	<5	<1	<2	<5	3310	<5	<0.1	2	-	10	95	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
GW16-02	2.8-3	18/07/2016	6	22.5	6	1090	<5	<1	<2	<5	970	<5	<0.1	<2	-	6	95.4	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
GW16-03	0.8-1	18/07/2016	2	8.5	5.8	210	<5	<1	<2	<5	150	<5	<0.1	<2	-	<5	95.9	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0008	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
GW16-03	1.8-2	18/07/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW16-03	2.8-3	18/07/2016	7	8.5	5.4	1420	<5	<1	<2	<5	370	<5	<0.1	<2	-	<5	83.2	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
GW16-04	0.3-0.5	19/07/2016	59	3.2	7.2	1070	<5	<1	4	7	1960	<5	<0.1	<2	-	<5	92.5	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
GW16-04	4.8-5	19/07/2016	11	20.9	6.6	620	<5	<1	<2	<5	820	<5	<0.1	<2	-	<5	96.5	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
GW16-05	0-0.2	19/07/2016	618	13	4.1	9690	5	<1	9	<5	12,500	5	<0.1	4	-	18	85	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0012	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
GW16-05	0.8-1	19/07/2016	87	18.6	7.2	1300	<5	<1	<2	<5	2260	<5	<0.1	<2	-	<5	97.5	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
SS1	0.0	26/07/2016	10	34.2	4.9	80	<5	<1	<2	<5	80	<5	<0.1	<2	3	<5		<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	0.0008	<0.0005	<0.0005
SS2	0.0	26/07/2016	10	27.4	5.1	110	<5	<1	<2	<5	110	<5	<0.1	<2	5	<5		<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0037	0.001	0.001	<0.0005	<0.0005	<0.0005
SS3	0.0	25/07/2016	8	5.2	5.4	520	<5	<1	<2	<5	700	<5	<0.1	<2	10	<5		<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
SS4	0.0	25/07/2016	5	26.2	5.2	340	<5	<1	<2	<5	310	<5	<0.1	<2	8	<5		<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0007	0.0009	<0.0005	<0.0005	<0.0005	<0.0005
SS5	0.0	25/07/2016	8	27.2	6.2	2660	<5	<1	2	<5	2270	<5	<0.1	<2	16	13		<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0007	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
SS6	0.0	25/07/2016	21	25.8	7.1	2180	28	<1	6	11	20,900	<5	<0.1	3	18	121		<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0016	<0.0002	0.0017	<0.0005	<0.0005	<0.0005
Statistical Summary																														
Number of Results			14	16	14	16	16	16	16	16	16	16	16	16	6	16	12	16	16	16	16	16	16	16	16	16	16	16	16
Number of Detects			14	16	14	16	2	0	4	2	16	2	0	3	6	6	12	0	0	0	0	0	0	8	2	2	1	0	0
Minimum Concentration			2	3.2	4.1	80	<5	<1	<2	<5	80	<5	<0.1	<2	3	<5	83.2	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005
Minimum Detect			2	3.2	4.1	80	5	ND	2	7	80	5	ND	2	3	6	83.2	ND	ND	ND	ND	ND	ND	0.0003	0.0009	0.001	0.0008	ND	ND
Maximum Concentration			618	34.2	7.2	9690	28	<1	9	11	20900	22	<0.1	4	18	121	97.7	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0037	0.001	0.0017	0.0008	<0.0005	<0.0005
Maximum Detect			618	34.2	7.2	9690	28	ND	9	11	20900	22	ND	4	18	121	97.7	ND	ND	ND	ND	ND	ND	0.0037	0.001	0.0017	0.0008	ND	ND
Average Concentration			61	16	5.9	1454	4.3	0.5	2.1	3.3	3014	3.9	0.05	1.4	10	12	93	0.00025	0.00025	0.0001	0.0001	0.0001	0.0001	0.00064	0.00021	0.00039	0.00028	0.00025	0.00025
Median Concentration			9	15.8	5.75	825	2.5	0.5	1	2.5	895	2.5	0.05	1	9	2.5	95.2	0.00025	0.00025	0.0001	0.0001	0.0001	0.0001	0.0002	0.0001	0.00025	0.00025	0.00025	0.00025
Standard Deviation			162	10	0.93	2313	6.4	0	2.3	2.3	5637	4.9	0	0.89	6	29	5.1	0	0	0	0	0	0	0.00094	0.00029	0.0004	0.00014	0	0
Number of Guideline Exceedances			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 1. Soil Results (Ecological Interim Screening Levels)

			PFAS																	
			N-Me-FOSE	6:2 Fluorotelomer Sulfonate (6:2 FtS)	PFOA	PFPeS	PFBA	PFDcA	PFDcS	PFDoA	PFHpA	PFHxA	PFNA	PFOS	PFOSA	PFTeA	PFTrIA	PFUnA	Sum of PFAS	Sum of PFHxS and PFOS
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	µg/kg	µg/L
LOR			0.0005	0.0005	0.0002	0.0002	0.001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0005	0.0002	0.0002	0.2	0.2
Airservices EISLs (terrestrial) – 95% protection					3.73									0.373						
Airservices EISLs (terrestrial) – com./ind., 60% protection, low reliability					3.73									4.71						
Airservices EISLs (terrestrial) – residential, 80% protection, low reliability					**3.73**									**0.91**						
Location_Code	**Sample_Depth_Range**	**Sampled_Date_Time**																		
GW16-01	0.3-0.5	18/07/2016	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0005	<0.0002	<0.0005	<0.0002	<0.0002	0.5	-
GW16-01	1.8-2	18/07/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW16-01	2.8-3	18/07/2016	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0023	<0.0002	<0.0005	<0.0002	<0.0002	2.3	-
GW16-02	0-0.2	18/07/2016	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0009	<0.0002	<0.0005	<0.0002	<0.0002	0.9	-
GW16-02	2.8-3	18/07/2016	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.2	-
GW16-03	0.8-1	18/07/2016	<0.0005	<0.0005	0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	0.0057	<0.0002	<0.0005	<0.0002	<0.0002	7	-
GW16-03	1.8-2	18/07/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW16-03	2.8-3	18/07/2016	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	<0.0002	<0.0005	<0.0002	<0.0002	0.6	-
GW16-04	0.3-0.5	19/07/2016	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.2	-
GW16-04	4.8-5	19/07/2016	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.2	-
GW16-05	0-0.2	19/07/2016	<0.0005	<0.0005	0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	0.0042	<0.0002	<0.0005	<0.0002	<0.0002	5.9	-
GW16-05	0.8-1	19/07/2016	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0042	<0.0002	<0.0005	<0.0002	<0.0002	4.5	-
SS1	0.0	26/07/2016	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	0.0008	<0.0002	<0.0005	<0.0002	<0.0002	1.9	0.8
SS2	0.0	26/07/2016	<0.0005	<0.0005	0.0014	0.0003	<0.001	0.0008	0.0015	0.0005	0.0008	0.0014	0.0005	0.0434	0.0017	<0.0005	<0.0002	0.0009	58.9	47.7
SS3	0.0	25/07/2016	<0.0005	<0.0005	0.0002	<0.0002	<0.001	0.0005	<0.0002	<0.0002	0.0002	<0.0002	0.0003	0.0018	<0.0002	<0.0005	<0.0002	0.0003	3.3	1.8
SS4	0.0	25/07/2016	<0.0005	<0.0005	0.0009	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	0.0012	0.0008	0.0004	0.0081	<0.0002	<0.0005	<0.0002	<0.0002	13	8.8
SS5	0.0	25/07/2016	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	0.0004	0.0004	0.0003	<0.0002	0.0002	<0.0002	0.0098	<0.0002	<0.0005	<0.0002	0.0004	12.2	10.5
SS6	0.0	25/07/2016	<0.0005	<0.0005	0.0005	<0.0002	<0.001	0.0025	0.01	0.003	0.0003	0.0003	0.0007	0.0213	0.0038	<0.0005	0.0013	0.0051	52.1	22.9
Statistical Summary																				
Number of Results			16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	6
Number of Detects			0	0	6	1	0	4	3	3	4	7	4	13	2	0	1	4	13	6
Minimum Concentration			<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.2	0.8
Minimum Detect			ND	ND	0.0002	0.0003	ND	0.0004	0.0004	0.0003	0.0002	0.0002	0.0003	0.0002	0.0017	ND	0.0013	0.0003	0.5	0.8
Maximum Concentration			<0.0005	<0.0005	0.0014	0.0003	<0.001	0.0025	0.01	0.003	0.0012	0.0014	0.0007	0.0434	0.0038	<0.0005	0.0013	0.0051	58.9	47.7
Maximum Detect			ND	ND	0.0014	0.0003	ND	0.0025	0.01	0.003	0.0012	0.0014	0.0007	0.0434	0.0038	ND	0.0013	0.0051	58.9	47.7
Average Concentration			0.00025	0.00025	0.00028	0.00011	0.0005	0.00034	0.00083	0.00032	0.00023	0.00028	0.00019	0.0065	0.00043	0.00025	0.00018	0.00049	10	15
Median Concentration			0.00025	0.00025	0.0001	0.0001	0.0005	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00205	0.0001	0.00025	0.0001	0.0001	2.8	9.65
Standard Deviation			0	0	0.00037	0.00005	0	0.00061	0.0025	0.00072	0.00031	0.00035	0.00018	0.011	0.00098	0	0.0003	0.0012	18	18
Number of Guideline Exceedances			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 2. Soil Results (Human Health Interim Screening Levels)

			Cations					Exchange Acidity by 1M Potassi	Exchangeable Cations with pre-	TOC	Major Ions	Inorganics						Metals					
			Exchangeable Aluminium	Exchangeable Calcium	Exchangeable Magnesium	Exchangeable Potassium	Exchangeable Sodium	Exchange Acidity	Magnesium/Potassium Ratio	Total Organic Carbon	Potassium	Calcium/Magnesium Ratio	Exchangeable Sodium Percent	CEC	Electrical conductivity (lab)	Moisture	pH (Lab)	Aluminium	Arsenic	Cadmium	Chromium (III+VI)	Copper	Iron
			meq/100g	meq/100g	meq/100g	meq/100g	meq/100g	meq/100g	-	%	mg/kg	-	%	meq/100g	µS/cm	%	pH Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR			0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.02	10	0.1	0.1	0.1	1	1	0.1	50	5	1	2	5	50
Airservices HISLs – industrial (direct contact only)																							
Airservices HISLs – residential (direct contact only)																							
Location_Code	Sample_Depth_Range	Sampled_Date_Time																					
GW16-01	0.3-0.5	18/07/2016	-	-	-	-	-	-	-	0.13	<10	-	-	-	-	3.6	-	690	<5	<1	<2	<5	1200
GW16-01	1.8-2	18/07/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW16-01	2.8-3	18/07/2016	0.1	<0.1	<0.1	<0.1	<0.1	0.1	-	0.09	<10	-	15.4	0.1	4	6.3	5.7	330	<5	<1	<2	<5	310
GW16-02	0-0.2	18/07/2016	-	-	-	-	-	-	-	0.48	<10	-	-	-	-	4.6	-	960	<5	<1	<2	<5	3310
GW16-02	2.8-3	18/07/2016	0.2	<0.1	<0.1	<0.1	<0.1	0.2	-	0.11	<10	-	11.8	0.2	6	22.5	6	1090	<5	<1	<2	<5	970
GW16-03	0.8-1	18/07/2016	0.6	0.2	0.1	<0.1	<0.1	0.6	-	0.37	<10	2	5.5	0.9	2	8.5	5.8	210	<5	<1	<2	<5	150
GW16-03	1.8-2	18/07/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW16-03	2.8-3	18/07/2016	0.5	<0.1	<0.1	<0.1	<0.1	0.5	-	0.3	<10	-	21.4	0.5	7	8.5	5.4	1420	<5	<1	<2	<5	370
GW16-04	0.3-0.5	19/07/2016	-	1.2	<0.1	<0.1	<0.1	-	-	0.24	<10	-	1.1	1.3	59	3.2	7.2	1070	<5	<1	4	7	1960
GW16-04	4.8-5	19/07/2016	-	0.4	<0.1	<0.1	<0.1	-	-	0.16	<10	-	7.2	0.5	11	20.9	6.6	620	<5	<1	<2	<5	820
GW16-05	0-0.2	19/07/2016	3.3	2	1.3	<0.1	<0.1	3.3	-	1.21	20	1.5	1.9	6.6	618	13	4.1	9690	5	<1	9	<5	12,500
GW16-05	0.8-1	19/07/2016	-	1.4	0.7	<0.1	<0.1	-	-	0.22	10	2	2.6	2.3	87	18.6	7.2	1300	<5	<1	<2	<5	2260
SS1	0.0	26/07/2016	0.1	0.5	0.4	<0.1	<0.1	0.5	-	2.53	<10	1.2	7.6	1	10	34.2	4.9	80	<5	<1	<2	<5	80
SS2	0.0	26/07/2016	0.1	0.3	0.1	<0.1	<0.1	0.3	-	0.9	<10	3	8	0.5	10	27.4	5.1	110	<5	<1	<2	<5	110
SS3	0.0	25/07/2016	0.3	0.2	0.1	<0.1	<0.1	0.4	-	0.72	<10	2	9.7	0.4	8	5.2	5.4	520	<5	<1	<2	<5	700
SS4	0.0	25/07/2016	0.5	0.1	0.1	<0.1	<0.1	0.7	-	0.89	<10	1	9.3	0.3	5	26.2	5.2	340	<5	<1	<2	<5	310
SS5	0.0	25/07/2016	-	1.8	0.3	<0.1	<0.1	-	-	0.91	<10	6	1.8	2.2	8	27.2	6.2	2660	<5	<1	2	<5	2270
SS6	0.0	25/07/2016	-	4.6	0.4	0.1	<0.1	-	3.2	1.04	<10	11.5	1.1	5.2	21	25.8	7.1	2180	28	<1	6	11	20,900
Statistical Summary																							
Number of Results			9	14	14	14	14	9	1	16	16	9	14	14	14	16	14	16	16	16	16	16	16
Number of Detects			9	11	9	1	0	9	1	16	2	9	14	14	14	16	14	16	2	0	4	2	16
Minimum Concentration			0.1	<0.1	<0.1	<0.1	<0.1	0.1	3.2	0.09	<10	1	1.1	0.1	2	3.2	4.1	80	<5	<1	<2	<5	80
Minimum Detect			0.1	0.1	0.1	0.1	ND	0.1	3.2	0.09	10	1	1.1	0.1	2	3.2	4.1	80	5	ND	2	7	80
Maximum Concentration			3.3	4.6	1.3	0.1	<0.1	3.3	3.2	2.53	20	11.5	21.4	6.6	618	34.2	7.2	9690	28	<1	9	11	20900
Maximum Detect			3.3	4.6	1.3	0.1	ND	3.3	3.2	2.53	20	11.5	21.4	6.6	618	34.2	7.2	9690	28	ND	9	11	20900
Average Concentration			0.63	0.92	0.27	0.054	0.05	0.73		0.64	6.3	3.4	7.5	1.6	61	16	5.9	1454	4.3	0.5	2.1	3.3	3014
Median Concentration			0.3	0.35	0.1	0.05	0.05	0.5	3.2	0.425	5	2	7.4	0.7	9	15.8	5.75	825	2.5	0.5	1	2.5	895
Standard Deviation			1	1.3	0.35	0.013	0	0.98		0.63	3.9	3.4	5.9	2	162	10	0.93	2313	6.4	0	2.3	2.3	5637
Number of Guideline Exceedances			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 2. Soil Results (Human Health Interim Screening Levels)

							PFCs																	
			Lead	Mercury	Nickel	Silicon	Zinc	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	1H,1H,2H,2H-perfluorohexanesulfonic acid (4:2 FTS)	N-Ethyl perfluorooctane sulfonamidoacetic acid (Et	N-Methyl perfluorooctane sulfonamidoacetic acid (M	Perfluorobutane Sulfonate	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoropentanoic acid (PFPeA)	8:2 Fluorotelomer sulfonate	N-Et-FOSA	N-Et-FOSE	N-Me-FOSA	N-Me-FOSE	6:2 Fluorotelomer Sulfonate (6:2 FtS)	PFOA	PFPeA	PFBA	PFDcA
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR			5	0.1	2	1	5	0.0005	0.0005	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0002	0.0002	0.001	0.0002
Airservices HISLs – industrial (direct contact only)																240					900	240			
Airservices HISLs – residential (direct contact only)																16					60	16			
Location_Code	Sample_Depth_Range	Sampled_Date_Time																							
GW16-01	0.3-0.5	18/07/2016	22	<0.1	<2	-	6	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002
GW16-01	1.8-2	18/07/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW16-01	2.8-3	18/07/2016	<5	<0.1	<2	-	<5	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002
GW16-02	0-0.2	18/07/2016	<5	<0.1	2	-	10	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002
GW16-02	2.8-3	18/07/2016	<5	<0.1	<2	-	6	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002
GW16-03	0.8-1	18/07/2016	<5	<0.1	<2	-	<5	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0008	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0002	<0.0002	<0.001	<0.0002
GW16-03	1.8-2	18/07/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GW16-03	2.8-3	18/07/2016	<5	<0.1	<2	-	<5	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002
GW16-04	0.3-0.5	19/07/2016	<5	<0.1	<2	-	<5	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002
GW16-04	4.8-5	19/07/2016	<5	<0.1	<2	-	<5	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002
GW16-05	0-0.2	19/07/2016	5	<0.1	4	-	18	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0012	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0002	<0.0002	<0.001	<0.0002
GW16-05	0.8-1	19/07/2016	<5	<0.1	<2	-	<5	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002
SS1	0.0	26/07/2016	<5	<0.1	<2	3	<5	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	0.0008	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002
SS2	0.0	26/07/2016	<5	<0.1	<2	5	<5	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0037	0.001	0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0014	0.0003	<0.001	0.0008
SS3	0.0	25/07/2016	<5	<0.1	<2	10	<5	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0002	<0.0002	<0.001	0.0005
SS4	0.0	25/07/2016	<5	<0.1	<2	8	<5	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0007	0.0009	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0009	<0.0002	<0.001	<0.0002
SS5	0.0	25/07/2016	<5	<0.1	<2	16	13	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0007	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	0.0004
SS6	0.0	25/07/2016	<5	<0.1	3	18	121	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0016	<0.0002	0.0017	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0005	<0.0002	<0.001	0.0025
Statistical Summary																									
Number of Results			16	16	16	6	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
Number of Detects			2	0	3	6	6	0	0	0	0	0	0	8	2	2	1	0	0	0	0	6	1	0	4
Minimum Concentration			<5	<0.1	<2	3	<5	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.001	<0.0002
Minimum Detect			5	ND	2	3	6	ND	ND	ND	ND	ND	ND	0.0003	0.0009	0.001	0.0008	ND	ND	ND	ND	0.0002	0.0003	ND	0.0004
Maximum Concentration			22	<0.1	4	18	121	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0037	0.001	0.0017	0.0008	<0.0005	<0.0005	<0.0005	<0.0005	0.0014	0.0003	<0.001	0.0025
Maximum Detect			22	ND	4	18	121	ND	ND	ND	ND	ND	ND	0.0037	0.001	0.0017	0.0008	ND	ND	ND	ND	0.0014	0.0003	ND	0.0025
Average Concentration			3.9	0.05	1.4	10	12	0.00025	0.00025	0.0001	0.0001	0.0001	0.0001	0.00064	0.00021	0.00039	0.00028	0.00025	0.00025	0.00025	0.00025	0.00028	0.00011	0.0005	0.00034
Median Concentration			2.5	0.05	1	9	2.5	0.00025	0.00025	0.0001	0.0001	0.0001	0.0001	0.0002	0.0001	0.00025	0.00025	0.00025	0.00025	0.00025	0.00025	0.0001	0.0001	0.0005	0.0001
Standard Deviation			4.9	0	0.89	6	29	0	0	0	0	0	0	0.00094	0.00029	0.0004	0.00014	0	0	0	0	0.00037	0.00005	0	0.00061
Number of Guideline Exceedances			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 2. Soil Results (Human Health Interim Screening Levels)

			PFDcS	PFDoA	PFHpA	PFHxA	PFNA	PFOS	PFOSA	PFTeA	PFTtiA	PFUnA	Sum of PFAS	Sum of PFHxS and PFOS
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	µg/L	µg/L
LOR			0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0005	0.0002	0.0002	0.2	0.2
Airservices HISLs – industrial (direct contact only)								90						
Airservices HISLs – residential (direct contact only)								6						
Location_Code	**Sample_Depth_Range**	**Sampled_Date_Time**												
GW16-01	0.3-0.5	18/07/2016	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0005	<0.0002	<0.0005	<0.0002	<0.0002	0.5	-
GW16-01	1.8-2	18/07/2016	-	-	-	-	-	-	-	-	-	-	-	-
GW16-01	2.8-3	18/07/2016	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0023	<0.0002	<0.0005	<0.0002	<0.0002	2.3	-
GW16-02	0-0.2	18/07/2016	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0009	<0.0002	<0.0005	<0.0002	<0.0002	0.9	-
GW16-02	2.8-3	18/07/2016	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.2	-
GW16-03	0.8-1	18/07/2016	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	0.0057	<0.0002	<0.0005	<0.0002	<0.0002	7	-
GW16-03	1.8-2	18/07/2016	-	-	-	-	-	-	-	-	-	-	-	-
GW16-03	2.8-3	18/07/2016	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	<0.0002	<0.0005	<0.0002	<0.0002	0.6	-
GW16-04	0.3-0.5	19/07/2016	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.2	-
GW16-04	4.8-5	19/07/2016	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.2	-
GW16-05	0-0.2	19/07/2016	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	0.0042	<0.0002	<0.0005	<0.0002	<0.0002	5.9	-
GW16-05	0.8-1	19/07/2016	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0042	<0.0002	<0.0005	<0.0002	<0.0002	4.5	-
SS1	0.0	26/07/2016	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	0.0008	<0.0002	<0.0005	<0.0002	<0.0002	1.9	0.8
SS2	0.0	26/07/2016	0.0015	0.0005	0.0008	0.0014	0.0005	0.0434	0.0017	<0.0005	<0.0002	0.0009	58.9	47.7
SS3	0.0	25/07/2016	<0.0002	<0.0002	0.0002	<0.0002	0.0003	0.0018	<0.0002	<0.0005	<0.0002	0.0003	3.3	1.8
SS4	0.0	25/07/2016	<0.0002	<0.0002	0.0012	0.0008	0.0004	0.0081	<0.0002	<0.0005	<0.0002	<0.0002	13	8.8
SS5	0.0	25/07/2016	0.0004	0.0003	<0.0002	0.0002	<0.0002	0.0098	<0.0002	<0.0005	<0.0002	0.0004	12.2	10.5
SS6	0.0	25/07/2016	0.01	0.003	0.0003	0.0003	0.0007	0.0213	0.0038	<0.0005	0.0013	0.0051	52.1	22.9
Statistical Summary														
Number of Results			16	16	16	16	16	16	16	16	16	16	16	6
Number of Detects			3	3	4	7	4	13	2	0	1	4	13	6
Minimum Concentration			<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002	<0.2	0.8
Minimum Detect			0.0004	0.0003	0.0002	0.0002	0.0003	0.0002	0.0017	ND	0.0013	0.0003	0.5	0.8
Maximum Concentration			0.01	0.003	0.0012	0.0014	0.0007	0.0434	0.0038	<0.0005	0.0013	0.0051	58.9	47.7
Maximum Detect			0.01	0.003	0.0012	0.0014	0.0007	0.0434	0.0038	ND	0.0013	0.0051	58.9	47.7
Average Concentration			0.00083	0.00032	0.00023	0.00028	0.00019	0.0065	0.00043	0.00025	0.00018	0.00049	10	15
Median Concentration			0.0001	0.0001	0.0001	0.0001	0.0001	0.00205	0.0001	0.00025	0.0001	0.0001	2.8	9.65
Standard Deviation			0.0025	0.00072	0.00031	0.00035	0.00018	0.011	0.00098	0	0.0003	0.0012	18	18
Number of Guideline Exceedances			0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)			0	0	0	0	0	0	0	0	0	0	0	0

Table 3. Groundwater Results

			Field Parameters					Inorganics		Alkalinity				Major Ions																				
			DO (mg/L) (Field)	Electrical conductivity (field)	pH (Field)	Redox (Field)	Temperature (Field)	Sulfate as SO4 - Turbidimetric (Filtered)	Total Dissolved Solids	Alkalinity (Carbonate as CaCO3)	Alkalinity (Hydroxide as CaCO3)	Alkalinity (total as CaCO3)	Bicarbonate Alkalinity as CaCO3	Calcium (Filtered)	Chloride	Magnesium (Filtered)	Anions Total	Potassium (Filtered)	Sodium (Filtered)	Cations Total	Ionic Balance	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	1H,1H,2H,2H-perfluorohexanesulfonic acid (4:2 FTS)	N-Ethyl perfluorooctane sulfonamidoacetic acid (Et	N-Methyl perfluorooctane sulfonamidoacetic acid (M	Perfluorobutane Sulfonate	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoropentanoic acid (PFPeA)	8:2 Fluorotelomer sulfonate	N-ER-FOSA	N-ER-FOSE
			mg/L	µS/cm	pH Units	mV	°C	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	mg/L	mg/L	meq/L	%	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L
EQL								1	10	1	1	1	1	1	1	1	0.01	1	1	0.01	0.01	0.05	0.05	0.02	0.02	0.02	0.02	0.02	0.02	0.05	0.00005	0.00005
Airservices EISLs (toxicity effects on aquatic organisms)																														2900		
Airservices HISLs (drinking water only)																														0.4		
enHealth Interim Human Health PFC Guidelines (Drinking Water)																												0.5				
Site_ID	Location_Code	Sampled_Date_Time																															
Gold Coast Airport	BH40	26/07/2016	1.06	95.8	6.15	97.1	19.3	4	72	<1	<1	38	38	12	8	1	1.07	<1	5	0.9	-	<0.05	<0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.00005	<0.00005
Gold Coast Airport	BH13	26/07/2016	1.29	106.9	5.85	-11	18.7	<5	86	<1	<1	42	42	12	8	2	1.06	<1	6	1.02	-	<0.05	<0.05	<0.02	<0.02	2.49	0.67	22	2.76	0.42	<0.00005	<0.00005
Gold Coast Airport	GCAPL1	27/07/2016	1.72	361.1	5.81	109.5	24.3	60	275	<1	<1	42	42	34	27	5	2.85	2	18	2.94	-	<0.05	<0.05	<0.02	<0.02	0.27	0.04	1.76	0.03	<0.05	<0.00005	<0.00005
Gold Coast Airport	GDCA16	25/07/2016	3.43	982	6.22	-75.9	22	4	618	<1	<1	437	437	124	95	16	11.5	8	47	9.75	8.17	<0.05	<0.05	<0.02	<0.02	0.37	<0.02	0.58	0.04	<0.05	<0.00005	<0.00005
Gold Coast Airport	GW1	27/07/2016	3.46	714	5.84	-44.6	20.5	102	641	<1	<1	133	133	49	82	19	7.09	14	54	6.72	2.73	<0.05	<0.05	<0.02	<0.02	<0.02	<0.02	0.09	0.11	<0.05	<0.00005	<0.00005
Gold Coast Airport	GW16-01	25/07/2016	0.43	100.2	6.16	54.2	23.5	4	67	<1	<1	32	32	10	12	2	1.06	1	12	1.21	-	<0.05	<0.05	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.05	<0.00005	<0.00005
Gold Coast Airport	GW16-02	25/07/2016	1.18	160.2	6.57	99.3	22.1	13	119	<1	<1	58	58	13	24	4	2.11	1	21	1.92	-	<0.05	<0.05	<0.02	<0.02	<0.02	<0.02	0.07	<0.02	<0.05	<0.00005	<0.00005
Gold Coast Airport	GW16-03	28/07/2016	0.92	103.8	5.36	149.7	22.2	5	77	<1	<1	3	3	4	19	2	0.7	<1	12	0.89	-	<0.05	<0.05	<0.02	<0.02	<0.02	<0.02	0.21	<0.02	<0.05	<0.00005	<0.00005
Gold Coast Airport	GW16-04	28/07/2016	1.32	221.4	5.98	-14.1	23.1	29	157	<1	<1	54	54	16	25	3	2.39	3	25	2.21	-	<0.05	<0.05	<0.02	<0.02	<0.02	<0.02	0.07	<0.02	<0.05	<0.00005	<0.00005
Gold Coast Airport	GW16-05	25/07/2016	0.68	7521	6.83	-209.5	21.9	632	5210	<1	<1	440	440	88	2460	163	91.3	70	1390	80	6.6	<0.05	<0.05	<0.02	<0.02	0.18	0.07	1.42	<0.02	<0.05	<0.00005	<0.00005
Gold Coast Airport	MB17	26/07/2016	2.39	252.9	5.49	35.7	21.4	55	236	<1	<1	47	47	28	26	5	2.82	2	18	2.64	-	<0.05	<0.05	<0.02	<0.02	0.23	0.05	1.48	0.04	<0.05	<0.00005	<0.00005
Gold Coast Airport	MB24A	27/07/2016	1.85	43,184	5.77	-82.2	19.3	2250	25,900	<1	<1	122	122	393	14,800	1260	467	422	9630	553	8.44	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.00012	<0.00012
Gold Coast Airport	MW11	27/07/2016	2.31	48.5	4.49	163	19.4	<5	82	<1	<1	<1	<1	1	9	<1	0.25	<1	5	0.27	-	<0.05	<0.05	<0.02	<0.02	0.04	0.07	1.29	0.02	<0.05	<0.00005	<0.00005
Gold Coast Airport	MW4	26/07/2016	2.68	1659	6.15	-66.7	17.4	731	1380	<1	<1	187	187	260	72	41	21	6	42	18.3	6.72	<0.05	<0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.00005	<0.00005
Gold Coast Airport	MWA	28/07/2016	0.6	73.2	5.15	62.9	17.9	<5	62	<1	<1	8	8	2	15	2	0.58	<1	10	0.7	-	<0.05	<0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.00005	<0.00005
Statistical Summary																																	
Number of Results			15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	5	15	15	15	15	15	15	15	15	15	15	15	15
Number of Detects			15	15	15	15	15	12	15	0	0	14	14	15	15	14	15	10	15	15	5	0	0	0	0	6	5	11	6	1	0	0
Minimum Concentration			0.43	48.5	4.49	-209.5	17.4	4	62	<1	<1	<1	<1	1	8	<1	0.25	<1	5	0.27	2.73	<0.05	<0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.00005	<0.00005
Minimum Detect			0.43	48.5	4.49	ND	17.4	4	62	ND	ND	3	3	1	8	1	0.25	1	5	0.27	2.73	ND	ND	ND	ND	0.04	0.04	0.02	0.02	0.42	ND	ND
Maximum Concentration			3.46	43184	6.83	163	24.3	2250	25900	<1	<1	440	440	393	14800	1260	467	422	9630	553	8.44	<0.05	<0.05	<0.05	<0.05	2.49	0.67	22	2.76	0.42	<0.00012	<0.00012
Maximum Detect			3.46	43184	6.83	163	24.3	2250	25900	ND	ND	440	440	393	14800	1260	467	422	9630	553	8.44	ND	ND	ND	ND	2.49	0.67	22	2.76	0.42	ND	ND
Average Concentration			1.7	3706	5.9	18	21	260	2332	0.5	0.5	110	110	70	1179	102	41	35	753	45	6.5	0.025	0.025	0.011	0.011	0.25	0.068	1.9	0.21	0.051	0.000027	0.000027
Median Concentration			1.32	221.4	5.85	35.7	21.4	13	157	0.5	0.5	47	47	16	25	4	2.39	2	18	2.21	6.72	0.025	0.025	0.01	0.01	0.01	0.01	0.09	0.01	0.025	0.000025	0.000025
Standard Deviation			0.98	11084	0.57	102	2.1	598	6651	0	0	143	143	113	3820	323	120	108	2481	142	2.3	0	0	0.0039	0.0039	0.63	0.17	5.6	0.71	0.1	0.000009	0.000009
Number of Guideline Exceedances			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	1	0	0
Number of Guideline Exceedances(Detects Only)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	1	0	0

Table 3. Groundwater Results

			PFASs																			
			N-Me-FOSA	N-Me-FOSE	6:2 Fluorotelomer Sulfonate (6:2 FtS)	PFOA	PFPeA	PFBA	PFDcA	PFDcS	PFDoA	PFHpA	PFHxA	PFNA	PFOS	PFOSA	PFTeA	PFTrIA	PFUnA	Sum of PFAS	Sum of PFAS (Swedish Water Quality Guideline plus	Sum of PFHxS and PFOS
			mg/L	mg/L	µg/L	µg/L	mg/L	ug/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L
EQL			0.00005	0.00005	0.05	0.01	0.00002	0.1	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.01	0.00002	0.00005	0.00002	0.00002	0.01	0.01	0.01
Airservices EISLs (toxicity effects on aquatic organisms)						2900									6.66							
Airservices HISLs (drinking water only)					5	0.4									0.2							
enHealth Interim Human Health PFC Guidelines (Drinking Water)						5									0.5							
Site_ID	Location_Code	Sampled_Date_Time																				
Gold Coast Airport	BH40	26/07/2016	<0.00005	<0.00005	<0.05	<0.01	<0.00002	<0.1	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	0.03	<0.00002	<0.00005	<0.00002	<0.00002	0.03	0.03	0.03
Gold Coast Airport	BH13	26/07/2016	<0.00005	<0.00005	<0.05	6.04	0.00187	<0.1	0.00048	0.00018	<0.00002	0.00297	0.00569	0.00088	12.5	<0.00002	<0.00005	<0.00002	<0.00002	59	56.2	34.5
Gold Coast Airport	GCAPL1	27/07/2016	<0.00005	<0.00005	<0.05	0.03	0.00016	<0.1	<0.00002	<0.00002	<0.00002	<0.00002	0.00009	<0.00002	8.54	<0.00002	<0.00005	<0.00002	<0.00002	10.9	10.7	10.3
Gold Coast Airport	GDCA16	25/07/2016	<0.00005	<0.00005	<0.05	<0.01	0.00022	<0.1	<0.00002	<0.00002	<0.00002	<0.00002	0.00012	<0.00002	0.07	<0.00002	<0.00005	<0.00002	<0.00002	1.4	1.18	0.65
Gold Coast Airport	GW1	27/07/2016	<0.00005	<0.00005	<0.05	0.2	<0.00002	<0.1	<0.00002	<0.00002	<0.00002	0.00004	0.00008	<0.00002	0.31	<0.00002	<0.00005	<0.00002	<0.00002	0.83	0.83	0.4
Gold Coast Airport	GW16-01	25/07/2016	<0.00005	<0.00005	<0.05	<0.01	<0.00002	<0.1	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	0.04	<0.00002	<0.00005	<0.00002	<0.00002	0.06	0.06	0.06
Gold Coast Airport	GW16-02	25/07/2016	<0.00005	<0.00005	<0.05	<0.01	<0.00002	<0.1	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	0.07	<0.00002	<0.00005	<0.00002	<0.00002	0.14	0.14	0.14
Gold Coast Airport	GW16-03	28/07/2016	<0.00005	<0.00005	<0.05	<0.01	<0.00002	<0.1	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	0.17	<0.00002	<0.00005	<0.00002	<0.00002	0.38	0.38	0.38
Gold Coast Airport	GW16-04	28/07/2016	<0.00005	<0.00005	<0.05	0.06	<0.00002	<0.1	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	0.09	<0.00002	<0.00005	<0.00002	<0.00002	0.22	0.22	0.16
Gold Coast Airport	GW16-05	25/07/2016	<0.00005	<0.00005	<0.05	0.09	0.00012	<0.1	<0.00002	<0.00002	<0.00002	<0.00002	0.00008	<0.00002	1.39	<0.00002	<0.00005	<0.00002	<0.00002	3.35	3.16	2.81
Gold Coast Airport	MB17	26/07/2016	<0.00005	<0.00005	<0.05	0.05	0.00016	<0.1	<0.00002	<0.00002	<0.00002	<0.00002	0.00012	<0.00002	1.48	<0.00002	<0.00005	<0.00002	<0.00002	3.61	3.4	2.96
Gold Coast Airport	MB24A	27/07/2016	<0.00012	<0.00012	<0.05	<0.05	<0.00005	<0.1	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.05	<0.00005	<0.00012	<0.00005	<0.00005	<0.05	<0.05	<0.05
Gold Coast Airport	MW11	27/07/2016	<0.00005	<0.00005	<0.05	0.03	0.00011	<0.1	<0.00002	<0.00002	<0.00002	<0.00002	0.00008	<0.00002	3.31	<0.00002	<0.00005	<0.00002	<0.00002	4.95	4.77	4.6
Gold Coast Airport	MW4	26/07/2016	<0.00005	<0.00005	<0.05	<0.01	<0.00002	<0.1	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	0.02	<0.00002	<0.00005	<0.00002	<0.00002	0.02	0.02	0.02
Gold Coast Airport	MWA	28/07/2016	<0.00005	<0.00005	<0.05	<0.01	<0.00002	<0.1	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	0.01	<0.00002	<0.00005	<0.00002	<0.00002	0.01	0.01	0.01
Statistical Summary																						
Number of Results			15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Number of Detects			0	0	0	7	6	0	1	1	0	2	7	1	14	0	0	0	0	14	14	14
Minimum Concentration			<0.00005	<0.00005	<0.05	<0.01	<0.00002	<0.1	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	0.01	<0.00002	<0.00005	<0.00002	<0.00002	0.01	0.01	0.01
Minimum Detect			ND	ND	ND	0.03	0.00011	ND	0.00048	0.00018	ND	0.00004	0.00008	0.00088	0.01	ND	ND	ND	ND	0.01	0.01	0.01
Maximum Concentration			<0.00012	<0.00012	<0.05	6.04	0.00187	<0.1	0.00048	0.00018	<0.00005	0.00297	0.00569	0.00088	12.5	<0.00005	<0.00012	<0.00005	<0.00005	59	56.2	34.5
Maximum Detect			ND	ND	ND	6.04	0.00187	ND	0.00048	0.00018	ND	0.00297	0.00569	0.00088	12.5	ND	ND	ND	ND	59	56.2	34.5
Average Concentration			0.000027	0.000027	0.025	0.44	0.00018	0.05	0.000042	0.000022	0.000011	0.00021	0.00042	0.000069	1.9	0.000011	0.000027	0.000011	0.000011	5.7	5.4	3.8
Median Concentration			0.000025	0.000025	0.025	0.025	0.00001	0.05	0.00001	0.00001	0.00001	0.00001	0.000025	0.00001	0.09	0.00001	0.000025	0.00001	0.00001	0.38	0.38	0.38
Standard Deviation			0.000009	0.000009	0	1.6	0.00047	0	0.00012	0.000044	0.0000039	0.00076	0.0015	0.00022	3.7	0.0000039	0.000009	0.0000039	0.0000039	15	14	8.9
Number of Guideline Exceedances			0	0	0	1	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)			0	0	0	1	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0

Table 4. Surface Water Results

			Field Parameters					Inorganics		Alkalinity				Major Ions																							
			DO (mg/L) (Field)	Electrical conductivity (Field)	pH (Field)	Redox (Field)	Temperature (Field)	Sulfate as SO4 - Turbidimetric (Filtered)	Total Dissolved Solids	Alkalinity (Carbonate as CaCO3)	Alkalinity (Hydroxide as CaCO3)	Alkalinity (total as CaCO3)	Bicarbonate Alkalinity as CaCO3	Calcium (Filtered)	Chloride	Magnesium (Filtered)	Anions Total	Potassium (Filtered)	Sodium (Filtered)	Cations Total	Ionic Balance	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	1H,1H,2H,2H-perfluorohexanesulfonic acid (4:2 FTS)	N-Ethyl perfluorooctane sulfonamidoacetic acid (Et	N-Methyl perfluorooctane sulfonamidoacetic acid (M	Perfluorobutane Sulfonate	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoropentanoic acid (PFPeA)	8:2 Fluorotelomer sulfonate	N-Et-FOSA	N-Et-FOSE
			mg/L	µS/cm	pH Units	mV	°C	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	mg/L	mg/L	meq/L	%	µg/L	µg/L	µg/L	µg/L	ug/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L
EQL								1	10	1	1	1	1	1	1	1	0.01	1	1	0.01	0.01	0.05	0.05	0.02	0.02	0.02	0.02	0.02	0.02	0.05	0.00005	0.00005
Airservices EISLs (toxicity effects on aquatic organisms)																														2900		
Airservices HISLs (consumption of fish)																																				
enHealth Interim Human Health PFC Guidelines (Recreational Water)																														0.3		
																													5					
Site_ID	Location_Code	Sampled_Date_Time																																		
Gold Coast Airport	SW16-01	25/07/2016	2.9	416.5	6.37	50.2	23.8	28	266	<1	<1	85	85	26	70	6	4.26	2	48	3.93	3.98	<0.05	<0.05	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.05	<0.00005	<0.00005
Gold Coast Airport	SW16-02	25/07/2016	2.35	298.3	8.17	111.7	17.2	11	194	<1	<1	60	60	15	52	5	2.89	1	35	2.71	-	<0.05	<0.05	<0.02	<0.02	0.13	0.05	0.78	0.04	<0.05	<0.00005	<0.00005
Gold Coast Airport	SW16-03	25/07/2016	3.9	291.8	7.74	135.9	18.3	12	196	<1	<1	58	58	15	51	5	2.85	1	34	2.66	-	<0.05	<0.05	<0.02	<0.02	0.18	0.08	1.18	0.06	<0.05	<0.00005	<0.00005
Gold Coast Airport	SW16-04	27/07/2016	4.24	1104	6.23	118.2	17.8	46	658	<1	<1	54	54	18	334	19	11.4	6	166	9.84	7.63	<0.05	<0.05	<0.02	<0.02	0.18	0.07	1.04	0.05	<0.05	<0.00005	<0.00005
Gold Coast Airport	SW16-05	27/07/2016	5.64	2017	7.33	186.5	17.7	57	1180	<1	<1	68	68	22	622	35	20.1	14	290	17	8.49	<0.05	<0.05	<0.02	<0.02	<0.02	<0.02	0.08	<0.02	<0.05	<0.00005	<0.00005
Gold Coast Airport	SW16-06	25/07/2016	6.45	47,444	7.96	113.2	19.3	2570	31,000	<1	<1	119	119	452	16,200	1390	513	505	10,600	611	8.71	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.00012	<0.00012
Gold Coast Airport	SW16-07	25/07/2016	6.63	46,970	7.85	115.8	20.1	2540	32,000	<1	<1	119	119	440	15,800	1350	501	487	10,300	594	8.44	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.00012	<0.00012
Gold Coast Airport	SW16-08	26/07/2016	3.7	71.6	6.25	17.3	14.9	1	54	<1	<1	27	27	6	8	2	0.78	3	7	0.84	-	<0.05	<0.05	<0.02	<0.02	0.15	0.12	1.98	0.13	0.08	<0.00005	<0.00005
Gold Coast Airport	SW16-09	26/07/2016	6.17	46,985	7.92	112.4	20.2	2560	29,000	<1	<1	120	120	442	16,000	1360	507	491	10,400	599	8.29	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.00012	<0.00012
Gold Coast Airport	SW16-10	25/07/2016	6.73	445,409	7.33	121.1	20.1	2500	30,600	<1	<1	120	120	452	15,900	1380	503	497	10,700	614	9.95	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.00012	<0.00012
Statistical Summary																																				
Number of Results			10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	7	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Number of Detects			10	10	10	10	10	10	10	0	0	10	10	10	10	10	10	10	10	10	7	0	0	0	0	4	4	6	4	1	0	0	0	0	4	4	6	4	1	0	0
Minimum Concentration			2.35	71.6	6.23	17.3	14.9	1	54	<1	<1	27	27	6	8	2	0.78	1	7	0.84	3.98	<0.05	<0.05	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.05	<0.00005	<0.00005
Minimum Detect			2.35	71.6	6.23	17.3	14.9	1	54	ND	ND	27	27	6	8	2	0.78	1	7	0.84	3.98	ND	ND	ND	ND	0.13	0.05	0.04	0.04	0.08	ND	ND
Maximum Concentration			6.73	445409	8.17	186.5	23.8	2570	32000	<1	<1	120	120	452	16200	1390	513	505	10700	614	9.95	<0.05	<0.05	<0.05	<0.05	0.18	0.12	1.98	0.13	0.08	<0.00012	<0.00012
Maximum Detect			6.73	445409	8.17	186.5	23.8	2570	32000	ND	ND	120	120	452	16200	1390	513	505	10700	614	9.95	ND	ND	ND	ND	0.18	0.12	1.98	0.13	0.08	ND	ND
Average Concentration			4.9	59101	7.3	108	19	1033	12515	0.5	0.5	83	83	189	6504	555	207	201	4258	245	7.9	0.025	0.025	0.016	0.016	0.076	0.044	0.52	0.04	0.031	0.000039	0.000039
Median Concentration			4.94	1560.5	7.535	114.5	18.8	51.5	919	0.5	0.5	76.5	76.5	24	478	27	15.75	10	228	13.42	8.44	0.025	0.025	0.01	0.01	0.025	0.025	0.06	0.025	0.025	0.000025	0.000025
Standard Deviation			1.6	137490	0.76	46	2.4	1300	15628	0	0	34	34	222	8154	701	258	253	5374	309	1.9	0	0	0.0077	0.0077	0.074	0.036	0.69	0.035	0.017	0.000018	0.000018
Number of Guideline Exceedances			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 4. Surface Water Results

			PFCs																			
			N-Me-FOSA	N-Me-FOSE	6:2 Fluorotelomer Sulfonate (6:2 FtS)	PFOA	PFPeA	PFBA	PFDcA	PFDcS	PFDoA	PFHpA	PFHxA	PFNA	PFOS	PFOSA	PFTeA	PFTriA	PFUnA	Sum of PFAS	Sum of PFAS (Swedish Water Quality Guideline plus	Sum of PFHxS and PFOS
			mg/L	mg/L	µg/L	µg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L
EQL			0.00005	0.00005	0.05	0.01	0.00002	0.1	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.01	0.00002	0.00005	0.00002	0.00002	0.01	0.01	0.01
Airservices EISLs (toxicity effects on aquatic organisms)						2900									6.66							
Airservices HISLs (consumption of fish)					0.0065	0.3									0.00065							
enHealth Interim Human Health PFC Guidelines (Recreational Water)						50									5							
Site_ID	Location_Code	Sampled_Date_Time																				
Gold Coast Airport	SW16-01	25/07/2016	<0.00005	<0.00005	<0.05	<0.01	<0.00002	<0.1	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	0.06	<0.00002	<0.00005	<0.00002	<0.00002	0.1	0.1	0.1
Gold Coast Airport	SW16-02	25/07/2016	<0.00005	<0.00005	<0.05	0.05	0.00009	<0.1	<0.00002	<0.00002	<0.00002	0.00002	0.00011	<0.00002	1.14	<0.00002	<0.00005	<0.00002	<0.00002	2.41	2.27	1.92
Gold Coast Airport	SW16-03	25/07/2016	<0.00005	<0.00005	<0.05	0.06	0.00013	<0.1	<0.00002	<0.00002	<0.00002	0.00004	0.00016	<0.00002	2.2	<0.00002	<0.00005	<0.00002	<0.00002	4.09	3.88	3.38
Gold Coast Airport	SW16-04	27/07/2016	<0.00005	<0.00005	<0.05	0.04	0.00012	<0.1	<0.00002	<0.00002	<0.00002	<0.00002	0.00012	<0.00002	1.79	<0.00002	<0.00005	<0.00002	<0.00002	3.41	3.22	2.83
Gold Coast Airport	SW16-05	27/07/2016	<0.00005	<0.00005	<0.05	<0.01	<0.00002	<0.1	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	0.12	<0.00002	<0.00005	<0.00002	<0.00002	0.2	0.2	0.2
Gold Coast Airport	SW16-06	25/07/2016	<0.00012	<0.00012	<0.05	<0.05	<0.00005	<0.1	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.05	<0.00005	<0.00012	<0.00005	<0.00005	<0.05	<0.05	<0.05
Gold Coast Airport	SW16-07	25/07/2016	<0.00012	<0.00012	<0.05	<0.05	<0.00005	<0.1	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.05	<0.00005	<0.00012	<0.00005	<0.00005	<0.05	<0.05	<0.05
Gold Coast Airport	SW16-08	26/07/2016	<0.00005	<0.00005	<0.05	0.22	0.00019	<0.1	0.00009	0.00003	<0.00002	0.00014	0.00046	0.00005	2.3	<0.00002	<0.00005	<0.00002	0.00007	6.01	5.6	4.28
Gold Coast Airport	SW16-09	26/07/2016	<0.00012	<0.00012	<0.05	<0.05	<0.00005	<0.1	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.05	<0.00005	<0.00012	<0.00005	<0.00005	<0.05	<0.05	<0.05
Gold Coast Airport	SW16-10	25/07/2016	<0.00012	<0.00012	<0.05	<0.05	<0.00005	<0.1	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.05	<0.00005	<0.00012	<0.00005	<0.00005	<0.05	<0.05	<0.05
Statistical Summary																						
Number of Results			10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Number of Detects			0	0	0	4	4	0	1	1	0	3	4	1	6	0	0	0	1	6	6	6
Minimum Concentration			<0.00005	<0.00005	<0.05	<0.01	<0.00002	<0.1	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.05	<0.00002	<0.00005	<0.00002	<0.00002	<0.05	<0.05	<0.05
Minimum Detect			ND	ND	ND	0.04	0.00009	ND	0.00009	0.00003	ND	0.00002	0.00011	0.00005	0.06	ND	ND	ND	0.00007	0.1	0.1	0.1
Maximum Concentration			<0.00012	<0.00012	<0.05	0.22	0.00019	<0.1	0.00009	<0.00005	<0.00005	0.00014	0.00046	0.00005	2.3	<0.00005	<0.00012	<0.00005	0.00007	6.01	5.6	4.28
Maximum Detect			ND	ND	ND	0.22	0.00019	ND	0.00009	0.00003	ND	0.00014	0.00046	0.00005	2.3	ND	ND	ND	0.00007	6.01	5.6	4.28
Average Concentration			0.000039	0.000039	0.025	0.048	0.000065	0.05	0.000024	0.000018	0.000016	0.000033	0.000097	0.00002	0.77	0.000016	0.000039	0.000016	0.000022	1.6	1.5	1.3
Median Concentration			0.000025	0.000025	0.025	0.025	0.000025	0.05	0.0000175	0.0000175	0.00001	0.000025	0.000025	0.0000175	0.09	0.00001	0.000025	0.00001	0.0000175	0.15	0.15	0.15
Standard Deviation			0.000018	0.000018	0	0.063	0.000063	0	0.000024	0.0000086	0.0000077	0.000039	0.00014	0.000013	0.98	0.0000077	0.000018	0.0000077	0.000018	2.2	2.1	1.7
Number of Guideline Exceedances			0	0	10	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)			0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0

Appendix F
Table 5
QAQC Results (Water Samples)

Table 6. QAQC Results (Water Samples)

		SDG	ALSE-Brisbane 28-Jul-16	ALSE-Brisbane 28-Jul-16		ALSE-Brisbane 28-Jul-16	ALSE-Brisbane 28-Jul-16		ALSE-Brisbane 28-Jul-16	28-Jul-16		ALSE-Brisbane 28-Jul-16	28-Jul-16	
		Field ID	SW16-09	SW-QA1	RPD	BH13	GW-QA1	RPD	BH13	GW-QA2	RPD	SW16-09	SW-QA2	RPD
		Sampled Date/Time	26/07/2016 15:00	26/07/2016 15:00		26/07/2016 15:00	26/07/2016 15:00		26/07/2016 15:00	26/07/2016 15:00		26/07/2016 15:00	26/07/2016 15:00	
Chem_Group	ChemName	Units	EQL											
Per- and Polyfluor	Sum of PFHxS and PFOS	ug/L	0.01	<0.05	<0.05	0	34.5	38.3	2	34.5			<0.05		
Inorganics	Sulfate as SO4 - Turbidimetric (Filtered)	mg/l	1				<5	<5	0	<5					
	Total Dissolved Solids	mg/l	10	29000			86	65	28	86	90	5	29000		
PFCs	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05			<0.05		
	1H,1H,2H,2H-perfluorohexanesulfonic acid (4:2 FTS)	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.01	0
	N-Ethyl perfluorooctane sulfonamidoacetic acid (Et	µg/L	0.02	<0.05	<0.05	0	<0.02	<0.02	0	<0.02			<0.05		
	N-Methyl perfluorooctane sulfonamidoacetic acid (M	µg/L	0.02	<0.05	<0.05	0	<0.02	<0.02	0	<0.02			<0.05		
	Perfluorobutane Sulfonate	µg/L	0.02 : 0.01 (Interlab)	<0.05	<0.05	0	2.49	2.66	7	2.49	1.5	50	<0.05	<0.01	0
	Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.02	<0.05	<0.05	0	0.67	0.69	3	0.67			<0.05		
	Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.02 : 0.01 (Interlab)	<0.05	<0.05	0	22	22.5	2	22	17	26	<0.05	<0.01	0
	Perfluoropentanoic acid (PFPeA)	µg/L	0.02 : 0.01 (Interlab)	<0.05	<0.05	0	2.75	2.8	6	2.76	1.4	65	<0.05	<0.01	0
	8:2 Fluorotelomer sulfonate	µg/L	0.05 : 0.01 (Interlab)	<0.05	<0.05	0	0.42	0.41	2	0.42	0.25	51	<0.05	<0.01	0
	N-Et-FOSA	mg/l	5e-005	<0.00012	<0.00012	0	<0.00005	<0.00005	0	<0.00005	<0.00005	0	<0.00012	<0.00005	0
	N-Et-FOSE	mg/l	5e-005	<0.00012	<0.00012	0	<0.00005	<0.00005	0	<0.00005			<0.00012		
	N-Me-FOSA	mg/l	5e-005	<0.00012	<0.00012	0	<0.00005	<0.00005	0	<0.00005	<0.00005	0	<0.00012	<0.00005	0
	N-Me-FOSE	mg/l	5e-005	<0.00012	<0.00012	0	<0.00005	<0.00005	0	<0.00005			<0.00012		
	6:2 Fluorotelomer Sulfonate (6:2 FtS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
	PFOA	µg/L	0.01	<0.05	<0.05	0	6.04	6.08	0	6.04	5.1	17	<0.05	<0.01	0
	PFPeA	mg/l	2e-005	<0.00005	<0.00005	0	0.00187	0.00199	6	0.00187			<0.00005		
	PFBA	ug/L	0.1 : 0.05 (Interlab)	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	0.83	145	<0.1	<0.05	0
	PFDoA	mg/l	2e-005 : 1e-005 (Interlab)	<0.00005	<0.00005	0	0.00048	0.00046	4	0.00048	0.00032	40	<0.00005	<0.00001	0
	PFDoS	mg/l	2e-005	<0.00005	<0.00005	0	0.00018	0.00022	20	0.00018			<0.00005		
	PFDoA	mg/l	2e-005 : 1e-005 (Interlab)	<0.00005	<0.00005	0	<0.00002	<0.00002	0	<0.00002	<0.00001	0	<0.00005	<0.00001	0
	PFHpA	mg/l	2e-005 : 1e-005 (Interlab)	<0.00005	<0.00005	0	0.00297	0.00278	7	0.00297	0.003	1	<0.00005	<0.00001	0
	PFHxA	mg/l	2e-005 : 1e-005 (Interlab)	<0.00005	<0.00005	0	0.00569	0.00518	8	0.00569	0.0077	30	<0.00005	<0.00001	0
	PFNA	mg/l	2e-005 : 1e-005 (Interlab)	<0.00005	<0.00005	0	0.00088	0.00068	0	0.00088	0.00075	16	<0.00005	<0.00001	0
	PFOS	µg/L	0.01	<0.05	<0.05	0	12.6	12.8	2	12.6	16	25	<0.05	0.02	0
	PFOSA	mg/l	2e-005 : 5e-005 (Interlab)	<0.00005	<0.00005	0	<0.00002	<0.00002	0	<0.00002	<0.00005	0	<0.00005	<0.00005	0
	PFTeA	mg/l	5e-005 : 1e-005 (Interlab)	<0.00012	<0.00012	0	<0.00005	<0.00005	0	<0.00005	<0.00001	0	<0.00012	<0.00001	0
	PFTrA	mg/l	2e-005 : 1e-005 (Interlab)	<0.00005	<0.00005	0	<0.00002	<0.00002	0	<0.00002	<0.00001	0	<0.00005	<0.00001	0
	PFUnA	mg/l	2e-005 : 1e-005 (Interlab)	<0.00005	<0.00005	0	<0.00002	<0.00002	0	<0.00002	0.00001	0	<0.00005	<0.00001	0
	Sum of PFAS	µg/L	0.01	<0.05	<0.05	0	59	59.2	0	59			<0.05		
	Sum of PFAS (Swedish Water Quality Guideline_plus	µg/L	0.01	<0.05	<0.05	0	56.2	56.3	0	56.2			<0.05		
Alkalinity	Alkalinity (Carbonate as CaCO3)	mg/l	1 : 10 (Interlab)	<1			<1	<1	0	<1	<10	0	<1		
	Alkalinity (Hydroxide as CaCO3)	mg/l	1				<1	<1	0	<1					
	Alkalinity (total as CaCO3)	mg/l	1				42	42	0	42					
	Bicarbonate Alkalinity as CaCO3	mg/l	1 : 20 (Interlab)	120			42	42	0	42	42	0	120		
Major Ions	Calcium (Filtered)	mg/l	1				12	13	8	12					
	Chloride	mg/l	1	16000			8	8	0	9	14	55	16000		
	Magnesium (Filtered)	mg/l	1				2	2	0	2					
	Anions Total	meq/L	0.01				1.06	1.06	0	1.06					
	Potassium (Filtered)	mg/l	1				<1	<1	0	<1					
	Sodium (Filtered)	mg/l	1				5	6	0	6					
	Cations Total	meq/L	0.01				1.02	1.07	5	1.02					

*RPDs have only been considered where a concentration is greater than 1 times the EQL.
**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 200 (1-10 x EQL); 50 (10-30 x EQL); 30 (> 30 x EQL))
***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

Appendix G – QA/QC

G. Data quality objectives and quality assurance / quality control

G.1 Data quality objectives

The data quality objectives (DQOs) and investigation strategy have been developed using the methodology discussed in NEPM Schedule B (2) *Guideline on Data Collection, Sample Design and Reporting.* The guideline nominates the implementation of the DQO process in Section 5 of AS4482.1-2005. The purpose of the DQO process is to ensure that the data collection activities are focused on collecting the information needed to make decisions, and answering the relevant questions leading up to such decisions.

The Data Quality Objectives (DQOs) establish a framework for contamination investigations which incorporates a seven stepped continuum that defines the problem at the site. A series of stages then optimises the design of the investigation.

G.1.1 Step 1: state the problem

Are PFAS contamination migrating off site from the Airport boundaries?

Is possible source, pathway, receptor linkages present and unacceptable risk posing to on site and off site receptors?

G.1.2 Step 2: Identify the principal study question

To address the problem set out in Step 1, the following decisions are required to achieve the task objective and to identify data gaps and additional information that may be required:

- Are the PFAS levels (if present) near the Airport boundaries of acceptable range?

What are the immediate impacted sensitive receptors in the surroundings if PFAS is migrating off site?

G.1.3 Step 3: Inputs to the decision

To inform the decisions and identify key data gaps and needs, the following information is considered necessary:

- Quantitative data gained through intrusive sampling, analytical works and observations during intrusive investigations.

Development of a Conceptual Site Model.

G.1.4 Step 4: Boundaries of the study

The Gold Coast Airport property boundaries as outlined in Figure 1 in Appendix A.

G.1.5 Step 5: Decision rules

Soil surface water and groundwater analytical data will be assessed against the criteria adopted from relevant guidance as discussed in Section 2.

G.1.6 Step 6: Tolerable limits on decision errors

Data generated as part of the investigation must be appropriate to allow decisions to be made with confidence. Specific limits have been adopted in accordance with the appropriate guidance from the AS4482.1 which includes appropriate indicators of data quality [data quality indicators (DQIs) used to assess QA/QC and GHD's Standard Field Operating Procedures].

To assess the usability of the data prior to making decisions, the data will be assessed against pre-determined DQIs. The DQIs including precision, accuracy, representativeness, comparability and completeness, will be reviewed at the completion of the invetsigation to assess for the presence of decision errors.

The pre-determined DQIs established for the investigation are discussed below and shown in Table G-1.

- Precision - measures the reproducibility of measurements under a given set of conditions. The precision of the laboratory data and sampling techniques is assessed by calculating the Relative Percentage Difference (RPD) of duplicate samples
- Accuracy - measures the bias in a measurement system. The accuracy of the laboratory data that are generated during this investigation is a measure of the closeness of the analytical results obtained by a method to the 'true' (or standard) value. Accuracy is assessed by reference to the analytical results of laboratory control samples, laboratory spikes and analyses against reference standards
- Representativeness - expresses the degree to which sample data accurately and precisely represent a characteristic of a population or an environmental condition. Representativeness is achieved by collecting samples on a representative basis across the site, and by using an adequate number of sample locations to characterise the site to the required accuracy
- Comparability - expresses the confidence with which one data set can be compared with another. This is achieved through maintaining a level of consistency in techniques used to collect samples; ensuring analysing laboratories use consistent analysis techniques and reporting methods
- Completeness - is defined as the percentage of measurements made which are judged to be valid measurements.

Table G-1 Summary of quality assurance / quality control criteria

Data quality indicator	Frequency	Data quality acceptance criteria
Precision		
Duplicates (Intra-Laboratory) Duplicates (Inter-Laboratory)	1 / 20 samples 1 / 20 samples	30% - 50% of mean concentration of analyte, however, this variation can be expected to be higher for organic analyses than for inorganics, and for low concentrations of analytes.
Accuracy		
Laboratory (Method) Blank	One sample per batch of 20 samples or fewer	Less than detection limit or limit of reporting (LOR) of the method used.
Laboratory Control Spike		Dynamic Limits varying on previous laboratory data.
Laboratory Spike (Surrogate and Matrix)		Percent recovery is used to assess spiked samples and surrogate standards. Percent recovery is dependent on the type of analyte tested, the concentrations of analytes, and the sample matrix. For matrix spikes Eurofins adopts a matrix spike recovery range of 70-130%. For surrogate spikes Eurofins adopts static limits that vary dependant on matrix and surrogate compounds.

Data quality indicator	Frequency	Data quality acceptance criteria
Laboratory Duplicates	One sample per batch of 10 samples or fewer	Laboratory duplicate samples should have RPD's within the NEPM acceptance criteria of ±30%. The laboratory RPDs have been assessed using the following ranges: Results <10 times LOR: no limits. Results between 10 and 20 times LOR 0% - 50%. Results >20 times LOR: 0-20%.
Representativeness		
Sampling appropriate for media and analytes	All samples	-
Samples extracted and analysed within holding times	All samples	Organics (14 days) Inorganics (6 months)
LORs appropriate and consistent	All samples	All samples
Comparability		
Consistent field conditions, sampling staff and laboratory analysis	All samples	All samples
Standard operating procedures for sample collection & handling	All samples	All samples
Standard analytical methods used for all analyses	All samples	All samples
Completeness		
Sample description and COCs completed and appropriate	All Samples	All Samples
Appropriate documentation	All Samples	All Samples
Satisfactory frequency and result for QA/QC samples	All QA/QC samples	-
Data from critical samples is considered valid	-	Critical samples valid

Notes:
COC: Chain of Custody
LOR: Limit of Reporting
QA/QC: Quality assurance / quality control

G.1.7 Step 7: Optimisation of the data collection process

To optimise the design of the investigation, a sampling and analytical program was completed. Results (including QA/QC results) were reviewed as they were received from the laboratory and any inconsistencies or unexpected data were further investigated with the laboratory. Corrective actions were implemented as required.

G.2 Field QA/QC

A series of QA/QC procedures were implemented for the field investigation works, which included:

- Collection of QC Samples
- Use of standard sampling procedures
- Use of standard field sampling forms, including Chain of Custodies (COCs)

- Documenting the calibration and use of field equipment.

All field works were conducted by a GHD environmental scientist in accordance with GHD's *Standard Field Operating Procedures* (SFOP).

G.2.1 QA/QC sampling

Field QA/QC samples were collected and analysed. Field QC sampling was conducted in reference to AS 4482.1: 2005 and NEPM 2013 Schedule B (3) requirements and included the analyses of the following types of samples in Table G-2.

Table G-2 Field QA/QC sample details

Field QA/QC sample type	Details
Intra-Laboratory Duplicate (Blind)	Comprise a single sample that is divided into two separate sampling containers. Both samples are sent anonymously to the primary project laboratory. Blind duplicates provide an indication of the analytical precision of the laboratory, but are inherently influenced by other factors such as sampling techniques and sample media heterogeneity.
Inter-Laboratory Duplicate (Split)	Inter-Laboratory Duplicate (Split) samples are two separate samples collected at the same location and analysed by two separate laboratories to determine the analytical proficiency of the primary laboratory.

GHD adopts the AS4482.1 acceptance criteria of 30% and 50% RPD for field duplicates of inorganics and organics, respectively. Blind duplicate and split samples should have RPDs less than the criteria in each instance. However, it is noted that the criteria will not always be achieved, particularly in heterogeneous materials, or at low analyte concentrations.

In the instance where samples and their corresponding duplicates have concentrations of target analytes less than the laboratory LOR, no quantitative comparison can be carried out and therefore the RPD is undefined. This is also the case for situations where the sample result is less than ten times the laboratory LOR.

Duplicate and split sample results and Relative Percentage Difference (RPD) calculations are presented in Appendix F.

G.2.2 Sample handling and preservation

All soil samples were collected by hand, using single use nitrile gloves between each sample, and placed directly into pre-treated laboratory supplied jars and bags. The samples were placed immediately into a chilled esky for storage while on site and upon completion of site works the sealed esky was delivered, via courier, to the laboratory.

Groundwater samples were collected using disposable equipment and transferred to the laboratory-supplied applicable sample bottles. Surface water samples were collected using laboratory supplied applicable sample bottles. Samples were placed directly into the chilled esky and delivered upon return from site to the laboratory.

All samples were received intact as per the Sample Receipt Notification (included in Appendix H).

G.2.3 Chain of custody

Unique Chain of Custody documentation and distinct batch numbers accompany all sample batches. This documentation is included in Appendix H.

G.3 Laboratory QA/QC

The laboratories subcontracted by GHD to analyse samples (ALS and Eurofins MGT) are certified by the NATA for the required analysis. NATA certification provides for laboratory QA procedures to be in place and to be carried out on an on-going basis.

As part of the NATA requirements, the laboratories carried out and reported analysis of laboratory quality control samples, such as:

- Duplicate samples (the same sample analysed more than once)
- Blanks (containing none of the analytes to be analysed)
- Spiked samples (containing known additions of the analytes to appropriate matrices)
- Standard samples (samples containing known concentrations of the analytes - also known as reference standards).

G.3.1 Laboratory QA/QC procedures

As part of NATA requirements, the laboratories incorporated a range of QA methods to ensure accuracy of data. This includes the analyses of internal laboratory QC samples, details of which have been provided in Table G-3.

Table G-3 Laboratory QC sample details

Laboratory QA/QC sample	Details
Laboratory (Method) Blank	Usually an organic or aqueous solution that is as free as possible of analytes of interest to which is added all the reagents, in the same volume, as used in the preparation and subsequent analysis of the samples. The reagent blank is carried through the complete sample preparation procedure and contains the same reagent concentrations in the final solution as in the sample solution used for analysis. The reagent blank is used to correct for possible contamination resulting from the preparation or processing of the sample.
Laboratory Control Sample	A reference standard of known concentration is analysed along with a batch of samples. The Laboratory Control Sample provides an indication of the analytical accuracy and the precision of the test method and is used for inorganic analyses.

Laboratory QA/QC sample	Details
Laboratory Spike	An authentic field sample is 'spiked' by adding an aliquot of known concentration of the target analyte(s) prior to sample extraction and analysis. A spike documents the effect of the sample matrix on the extraction and analytical techniques. Spiked samples will be analysed for each batch where samples are analysed for organic chemicals of concern.
Surrogate Samples	These are organic compounds which are similar to the analyte of interest in terms of chemical composition, extractability, and chromatographic conditions (retention time), but which are not normally found in environmental samples. These surrogate compounds are 'spiked' into blanks, standards and samples submitted for organic analyses by gas-chromatographic techniques prior to sample extraction. Surrogate Standard / Spikes provide a means of checking that no gross errors have occurred during any stage of the test method leading to significant analyte loss.
Laboratory Duplicates	The analytical laboratory collects duplicate sub samples from one sample submitted for analytical testing at a rate equivalent to one in twenty samples per analytical batch, or one sample per batch if less than twenty samples are analysed in a batch. A laboratory duplicate provides data on the analytical precision and reproducibility of the test result. The precision of analysis performed by the laboratory is determined by the calculation of the relative percent difference (RPD). The RPD is calculated based on a comparison of an intra-laboratory split of the sample material with results representing the percent difference between the two sample concentrations for a specific contaminant. The RPD is calculated using the following formula: $RPD(\%) = \frac{\lvert C_o - C_d \rvert}{C_o + C_d} \times 200$ Where Co = Analyte concentration of the original sample Cd = Analyte concentration of the duplicate sample

The laboratory is required to provide this information to GHD. The individual analytical laboratories conduct an assessment of the laboratory QC program internally; however, the results are also reviewed and assessed by GHD.

G.4 Field QC results

The field QC results discussion below considered all the soil, groundwater and surface water samples collected as part of the investigation stage for the GCA site.

G.4.1 Soil

A total of 29 soil samples were collected and 18 were analysed during the site sampling program. Three soil QC samples (including two intra-laboratory and one inter-laboratory samples) were collected and analysed as part of the field work program. The target frequency for collection and analysis of field QC samples is 1 in 20 (5%). In this instance, this frequency was achieved for analysis (10%) and collection (15%).

RPDs were calculated between the duplicate results. Field QC samples collected are provided in the Table G-4.

Table G-4 Analysed field QC samples for soil

QA sample ID	QA/QC sample	Primary sample
QA01	Intra-laboratory	GW16-02-3.0
QA02	Inter-laboratory	GW16-01-0.5
SS-QA01	Intra-laboratory	SS2

All RPD results were within the adopted data quality objectives.

G.4.2 Groundwater/surface water

A total of 25 water samples (groundwater and surface water) were submitted as part of the groundwater and surface water investigations at the Gold Coast Airport.

Two field duplicate (intra-laboratory) and two split (inter-laboratory) samples were collected and analysed as part of the investigation. The target frequency for analysis of field QC samples is 1 in 20 (5%). In this instance, this frequency was achieved for analysis (16%).

The field QC sample collected are provided in the Table G-6.

Table G-6 Analysed field QC samples for groundwater/surface water

QA sample	QA/QC sample	Primary sample
GW-QA1	Intra-laboratory	BH13
GW-QA2	Inter-laboratory	BH13
SW-QA1	Intra-laboratory	SW16-09
SW-QA2	Inter-laboratory	SW16-09

Table G-7 RPD results outside of data quality limits

Primary & QA Pair	Analyte	Primary (µg/L)	QA/QC (µg/L)	RPD (%)
BH13 & GW-QA2	Perfluoropentanoic acid (PFPeA)	2.76	1.4	65
	8:2 Fluorotelomer sulfonate	0.42	0.25	51
	PFBA	<0.1	0.63	145
	Magnesium	8	14	55

The primary and secondary laboratory results of the PFAS had different LORs, which could be due to the different methods and analytical equipment used for the analysis at both laboratories. Most of the primary sample results were generally greater than the QA/QC samples, therefore the results are considered to be valid for this assessment.

G.5 Laboratory program

The NATA certified laboratories utilised for this assessment (ALS and Eurofins MGT) undertook their own internal quality assurance and quality control procedures for sample analysis. GHD has reviewed the internal laboratory control data provided within the laboratory reports, which are provided in Appendix H.

All of the internal laboratory QA QC analysis, including method blanks, control samples, laboratory spikes and surrogates spikes was within the data quality criteria, with the exceptions summarised in the following Table G-8.

Table G-8 Laboratory QA outliers summary

Types	Laboratory Reports	Analytes	Reasons
Laboratory Duplicate	EB1618423 (Soil) EB1619114 (Soil)	Zinc Iron	RPD exceeds LOR based limits
Matrix Spike	EB1619114 (Water)	Sulfate Chloride PFOS	MS recovery not determined, background level greater than or four times greater than spike level

Following the enquiries from GHD, the laboratory has informed the poor matrix spike recoveries were due to sample matrix interferences. Some soil samples which had laboratory duplicate outlier results, were due to sample heterogeneity, as confirmed by the laboratory.

G.6 Overall assessment of data quality

With the exception of the non-conformances listed above, as the majority of the GHD QAQC parameters were within the specified requirements, therefore the data is considered to be valid and of sufficient quality for the purposes of this Preliminary Sampling report.

Appendix H –Laboratory Reports

11

GHD CLIENTS|PEOPLE|PERFORMANCE

GHD Pty Ltd ABN 39 008 488 373
145 Ann Street Brisbane QLD 4000 GPO Box 668 Brisbane QLD 4001 Australia
T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

ANALYSIS REQUEST FORM/CHAIN OF CUSTODY DOCUMENTATION

PROJECT ID:	3134071	QUOTE:	~~GHD QUOTE~~ BN/531/15
PROJECT:	ASA Gold Coast Airport		
CLIENT:	Airservices Australia		
POSTAL ADDRESS:	GPO Box 668, Brisbane 4001, QLD		
CONTACT:	Bernice Ng /Imogen Bird		
PHONE:	0432 289 398	FAX: 3316 3333	
EMAIL:	bernice.ng@ghd.com; imogen.bird@ghd.com; Therese.Hammond@ghd.com		
DATA NEEDED BY:	Standard		
REPORT FORMAT:	EMAIL		
EMAIL FORMAT:	EXCEL, ESDAT & PDF		

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

QA02 → forward to MGT.
For analysis not covered in quote BN/531/15, please refer to GHD 2015 quote.

LABORATORY REFERENCE NO: FOR LABORATORY USE ONLY

COOLER SEAL: Yes / No / Broken / Intact

COOLER TEMP: Ambient / Chilled

DESPATCHED TO: ~~GHD~~ ALS

SAMPLE DATA

	SAMPLE ID	MATRIX	Date/Time	Bottle NO.	PRESERVATION
1	GW16-01-0.2	S	18/7/16	2	ICE
2	GW16-01-0.5				ICE
	QA02				ICE
3	GW16-01-1.0				ICE
4	GW16-01-2.0				ICE
5	GW16-01-3.0				ICE
6	GW16-01-4.0				ICE
7	GW16-02-0.2				ICE
8	GW16-02-0.5				ICE
9	GW16-02-1.0				ICE
10	GW16-02-2.0				ICE
11	GW16-02-3.0				ICE
12	QA01				ICE
13	GW16-02-4.0				ICE
					ICE

ANALYSIS REQUIRED

PFAS EP231 Extended list suite	TOC CEP003	Total Iron	~~8~~ 8 metals (S-2)	K, Al, Si	CEC	PSD	pH						HOLD	NOTES
✓	✓	✓	✓	✓										
✓														
						✓								
✓	✓	✓	✓	✓	✓		✓							CEC method depends on pH results ~~GHD~~
✓	✓	✓	✓	✓										
✓	✓	✓	✓	✓	✓		✓							
✓														

RELINQUISHED BY:
NAME: Bernice Ng
OF: GHD
DATE: 20/7/16
TIME: 2900 ~~AM~~

RECEIVED BY:
NAME: ~~GHD~~
OF: ALS
DATE: 20/7/16
TIME: 10:55

PLEASE EMAIL COMPLETED ANALYSIS REQUEST TO: bernice.ng@ghd.com; damien.morris@ghd.com

*Container Type and Preservative Codes: P = Neutral Plastic; N = Nitric Acid Preserved; C = Sodium Hydroxide Preserved; J = Solvent Washed Acid Rinced Jar; S = Solvent Washed Acid Rinced Glass Bottle; VC = Hydrochloric Acid Preserved Vial; VS = Sulfuric Acid Preserved Vial; BS = Sulfuric Acid Preserved Glass Bottle; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; O = Other.

Environmental Division
Brisbane
Work Order Reference
EB1618423

Telephone : +61-7-3243 7222

GHD CLIENTS|PEOPLE|PERFORMANCE

GHD Pty Ltd ABN 39 008 488 373
145 Ann Street Brisbane QLD 4000 GPO Box 668 Brisbane QLD 4001 Australia
T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

ANALYSIS REQUEST FORM/CHAIN OF CUSTODY DOCUMENTATION

PROJECT ID:	3134071
QUOTE:	~~GHD 2016 quote~~ BN/531/15
PROJECT:	ASA Gold Coast Airport
CLIENT:	Airservices Australia
POSTAL ADDRESS:	GPO Box 668, Brisbane 4001, QLD
CONTACT:	Bernice Ng /Imogen Bird
PHONE:	0432 289 398
FAX:	3316 3333
EMAIL:	bernice.ng@ghd.com; imogen.bird@ghd.com; Therese.Hammond@ghd.com
DATA NEEDED BY:	Standard
REPORT FORMAT:	EMAIL
EMAIL FORMAT:	EXCEL, ESDAT & PDF

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

LABORATORY BATCH NO:

FOR LAB USE ONLY

COOLER SEAL: Yes / No / Broken

COOLER TEMP: Ambient / Chilled

DESPATCHED TO: ~~SGS~~ ALS

ANALYSIS REQUIRED

	SAMPLE ID	MATRIX	Date/Time	Bottle NO.	PRESERVATION	SP231 PFAS Extended (24)	TOC (CEP003)	Total Iron	4 metals (S-2) K, Al, Si	CEC	PSD	PH	HOLD	NOTES
14	GW16-03-0.2	S	18/7/16	2	ICE									
15	GW16-03-0.5	"	"	"	ICE									
16	GW16-03-1.0	"	"	"	ICE									
17	GW16-03-2.0	"	"	"	ICE	✓	✓	✓	✓	✓	✓	✓		
18	GW16-03-3.0	"	"	"	ICE						✓			
19	GW16-04-0.2	S	19/7/16	2	ICE	✓	✓	✓	✓	✓	✓	✓		CEC method depends on pH result
20	GW16-04-0.5	"	"	"	ICE									
21	GW16-04-1.0	"	"	"	ICE	✓	✓	✓	✓	✓	✓	✓		
22	GW16-04-2.0	"	"	"	ICE									
23	GW16-04-3.0	"	"	"	ICE									
24	GW16-04-4.0	"	"	"	ICE									
25	GW16-04-5.0	"	"	"	ICE									
26	GW16-05-0.2	"	"	"	ICE	✓	✓	✓	✓	✓	✓	✓		
27	GW16-05-0.5	"	"	"	ICE	✓	✓	✓	✓	✓	✓	✓		
28	GW16-05-1.0	"	"	"	ICE									
						✓	✓	✓	✓	✓	✓	✓		

RELINQUISHED BY:
NAME: Bernice Ng
OF: GHD
DATE: 20/7/16
TIME: 0900 AM

RECEIVED BY:
NAME: ~~SGS~~
OF: ALS
DATE: 20/7/16
TIME: 1055

PLEASE EMAIL COMPLETED ANALYSIS REQUEST TO: bernice.ng@ghd.com; damien.morris@ghd.com

*Container Type and Preservative Codes: P = Neutral Plastic; N = Nitric Acid Preserved; C = Sodium Hydroxide Preserved; J = Solvent Washed Acid Rinced Jar; S = Solvent Washed Acid Rinced Glass Bottle; VC = Hydrochloric Acid Preserved Vial; VS = Sulfuric Acid Preserved Vial; BS = Sulfuric Acid Preserved Glass Bottle; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; O = Other.

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EB1618423**

Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MS BERNICE NG	Contact	: Vanessa Turnbull
Address	: GPO BOX 668 BRISBANE QLD, AUSTRALIA 4001	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: bernice.ng@ghd.com	E-mail	: vanessa.turnbull@alsenviro.com
Telephone	: +61 07 3316 3000	Telephone	: 61-7-3552 8660
Facsimile	: +61 07 3316 3333	Facsimile	: +61-7-3243 7218
Project	: 3134071 - ASA Gold Coast Airport	Page	: 1 of 4
Order number	: —	Quote number	: EB2015GHDSER0919 (BN/531/15)
C-O-C number	: —	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: —		
Sampler	:		

Dates

Date Samples Received	: 20-Jul-2016 10:55 AM	Issue Date	: 21-Jul-2016
Client Requested Due Date	: 25-Jul-2016	Scheduled Reporting Date	: **25-Jul-2016**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 3	Temperature	: 0.4, 0.8, 0.3°C - Ice present
Receipt Detail	:	No. of samples received / analysed	: 28 / 13

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- ***21/7/16*: SRN has been resent to acknowledge changes made specifically to adjustments to the SRN comment.**
- Discounted Package Prices apply only when specific ALS Group Codes ('W', 'S', 'NT' suites) are referenced on COCs.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911 (Micro site no. 14913).**
- **Where 'Cation Exchange Capacity' has been referenced, pH and electrical conductivity have been assigned as the results for these methods will be used to determine the correct method for analysis. These results will be reported on a 3 day TAT with no surcharge on 25/07/2016. All other analysis will be reported on 27/07/2016. Except for Particle Size Distribution and Silica which will be reported 03/08/2016. Once the correct method has been determined, CEC will be added to this work order and reported on a standard TAT from that date.**
- **Silica analysis will be conducted by ALS Minerals, Brisbane, NATA accreditation no. 825, Site No. 818.**
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (14 days), Solid (60 days) from date of completion of work order.
- Analysis will be conducted by ALS Environmental, Brisbane, NATA accreditation no. 825, Site No. 818 (Micro site no. 18958).
- **Breaches in recommended extraction / analysis holding times (if any) are displayed overleaf in the Proactive Holding Time Report table.**
- **Please be advised that the jar for ALS sample 25 is labelled as 'GW16-04-4.0' instead of 'GW16-0-5.0' as per the COC. The lid is labelled correctly. Per confirmation from Bernice Ng via email on 21/7/16 the jar was labelled incorrectly. ALS will report per the lid label and COC.**
- **Sample 'QA02' has been forwarded to Eurofins as requested.**

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default to 15:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory for processing purposes and will be shown bracketed without a time component.

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	(On Hold) SOIL - No analysis requested	SOIL - EA055-103 Moisture Content	SOIL - ED093S Cations - Soluble	SOIL - EG005T (soils) Total Metals by ICP-AES	SOIL - EP231X PFAS (Per- and Polyfluoroalkyl Substances) -	SOIL - ME-ICP81 (Subcontracted) Silica by Peroxide fusion - ICPAES finish	SOIL - S-02 8 Metals (incl. Digestion)
EB1618423-001	[18-Jul-2016]	GW16-01-0.2	✓						
EB1618423-002	[18-Jul-2016]	GW16-01-0.5		✓	✓	✓	✓	✓	✓
EB1618423-003	[18-Jul-2016]	GW16-01-1.0	✓						
EB1618423-005	[18-Jul-2016]	GW16-01-3.0		✓	✓	✓	✓	✓	✓
EB1618423-006	[18-Jul-2016]	GW16-01-4.0	✓						
EB1618423-007	[18-Jul-2016]	GW16-02-0.2		✓	✓	✓	✓	✓	✓
EB1618423-008	[18-Jul-2016]	GW16-02-0.5	✓						
EB1618423-009	[18-Jul-2016]	GW16-02-1.0	✓						
EB1618423-010	[18-Jul-2016]	GW16-02-2.0	✓						
EB1618423-011	[18-Jul-2016]	GW16-02-3.0		✓	✓	✓	✓	✓	✓
EB1618423-012	[18-Jul-2016]	QA01		✓			✓		
EB1618423-013	[18-Jul-2016]	GW16-02-4.0	✓						
EB1618423-014	[18-Jul-2016]	GW16-03-0.2	✓						
EB1618423-015	[18-Jul-2016]	GW16-03-0.5	✓						
EB1618423-016	[18-Jul-2016]	GW16-03-1.0		✓	✓	✓	✓	✓	✓
EB1618423-018	[18-Jul-2016]	GW16-03-3.0		✓	✓	✓	✓	✓	✓
EB1618423-019	[19-Jul-2016]	GW16-04-0.2	✓						
EB1618423-020	[19-Jul-2016]	GW16-04-0.5		✓	✓	✓	✓	✓	✓
EB1618423-021	[19-Jul-2016]	GW16-04-1.0	✓						
EB1618423-022	[19-Jul-2016]	GW16-04-2.0	✓						
EB1618423-023	[19-Jul-2016]	GW16-04-3.0	✓						
EB1618423-024	[19-Jul-2016]	GW16-04-4.0	✓						
EB1618423-025	[19-Jul-2016]	GW16-04-5.0		✓	✓	✓	✓	✓	✓
EB1618423-026	[19-Jul-2016]	GW16-05-0.2		✓	✓	✓	✓	✓	✓
EB1618423-027	[19-Jul-2016]	GW16-05-0.5	✓						
EB1618423-028	[19-Jul-2016]	GW16-05-1.0		✓	✓	✓	✓	✓	✓

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - ALS TYPED REPORT_SOIL (Subcontracted)	SOIL - EA002 pH (1:5)	SOIL - EA010 (solids): Electrical Conductivity (1:5)	SOIL - EA150* Particle Size Analysis by Sieving (Default sieves	SOIL - EP003 Total Organic Carbon (TOC) in Soil
EB1618423-002	[18-Jul-2016]	GW16-01-0.5					✓
EB1618423-004	[18-Jul-2016]	GW16-01-2.0				✓	
EB1618423-005	[18-Jul-2016]	GW16-01-3.0	✓	✓	✓		✓
EB1618423-007	[18-Jul-2016]	GW16-02-0.2					✓
EB1618423-011	[18-Jul-2016]	GW16-02-3.0	✓	✓	✓		✓
EB1618423-016	[18-Jul-2016]	GW16-03-1.0	✓	✓	✓		✓
EB1618423-017	[18-Jul-2016]	GW16-03-2.0				✓	
EB1618423-018	[18-Jul-2016]	GW16-03-3.0	✓	✓	✓		✓
EB1618423-020	[19-Jul-2016]	GW16-04-0.5	✓	✓	✓		✓
EB1618423-025	[19-Jul-2016]	GW16-04-5.0	✓	✓	✓		✓
EB1618423-026	[19-Jul-2016]	GW16-05-0.2	✓	✓	✓		✓
EB1618423-028	[19-Jul-2016]	GW16-05-1.0	✓	✓	✓		✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (Brisbane)		
- A4 - AU Tax Invoice (INV)	Email	ap-fss@ghd.com
BERNICE NG		
- *AU Certificate of Analysis - NATA (COA)	Email	bernice.ng@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	bernice.ng@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	bernice.ng@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	bernice.ng@ghd.com
- A4 - AU Tax Invoice (INV)	Email	bernice.ng@ghd.com
- Attachment - Report (SUBCO)	Email	bernice.ng@ghd.com
- Chain of Custody (CoC) (COC)	Email	bernice.ng@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	bernice.ng@ghd.com
- EDI Format - XTab (XTAB)	Email	bernice.ng@ghd.com
IMOGEN BIRD		
- *AU Certificate of Analysis - NATA (COA)	Email	Imogen.Bird@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	Imogen.Bird@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	Imogen.Bird@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	Imogen.Bird@ghd.com
- A4 - AU Tax Invoice (INV)	Email	Imogen.Bird@ghd.com
- Attachment - Report (SUBCO)	Email	Imogen.Bird@ghd.com
- Chain of Custody (CoC) (COC)	Email	Imogen.Bird@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	Imogen.Bird@ghd.com
- EDI Format - XTab (XTAB)	Email	Imogen.Bird@ghd.com
THERESE HAMMOND		
- *AU Certificate of Analysis - NATA (COA)	Email	therese.hammond@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	therese.hammond@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	therese.hammond@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	therese.hammond@ghd.com
- A4 - AU Tax Invoice (INV)	Email	therese.hammond@ghd.com
- Attachment - Report (SUBCO)	Email	therese.hammond@ghd.com
- Chain of Custody (CoC) (COC)	Email	therese.hammond@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	therese.hammond@ghd.com
- EDI Format - XTab (XTAB)	Email	therese.hammond@ghd.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EB1618423**	Page	: 1 of 15
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MS BERNICE NG	Contact	: Vanessa Turnbull
Address	: GPO BOX 668 BRISBANE QLD, AUSTRALIA 4001	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 3316 3000	Telephone	: 61-7-3552 8660
Project	: 3134071 - ASA Gold Coast Airport	Date Samples Received	: 20-Jul-2016 10:55
Order number	: ----	Date Analysis Commenced	: 21-Jul-2016
C-O-C number	: ----	Issue Date	: 01-Aug-2016 10:42
Sampler	: ----		
Site	: ----		
Quote number	: ----		
No. of samples received	: 28		
No. of samples analysed	: 13		

NATA Accredited Laboratory 825
Accredited for compliance with
ISO/IEC 17025.

NATA
WORLD RECOGNISED ACCREDITATION

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Andrew Epps	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Andrew Epps	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Greg Vogel	Laboratory Manager	Brisbane Acid Sulphate Soils, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Lana Nguyen	Senior LCMS Chemist	Sydney Organics, Smithfield, NSW
Matt Frost	Senior Organic Chemist	Stafford Minerals - ST, Stafford, QLD
Satishkumar Trivedi	Acid Sulfate Soils Supervisor	Brisbane Acid Sulphate Soils, Stafford, QLD
Satishkumar Trivedi	Acid Sulfate Soils Supervisor	Brisbane Inorganics, Stafford, QLD

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EG005T (Total Metals) Sample EB1618392-001 shows poor duplicate results due to sample heterogeneity. Confirmed by visual inspection.
- ED008(Exchangeable Cations with pre-treatment): Unable to calculate Magnesium/Potassium Ratio for samples EB1618423-026 as the required results for Magnesium/Potassium are below LOR.
- ED007(Exchangeable Cations): Unable to calculate Calcium/Magnesium Ratio for samples EB1618423-005,011,018,020,025 as the required results for Calcium/Magnesium are below LOR.
- ED007(Exchangeable Cations): Unable to calculate Magnesium/Potassium Ratio for samples EB1618423-005,011,016,018,020,025,028 as the required results for Magnesium/Potassium are below LOR.
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H+ + Al3+).

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	GW16-01-0.5	GW16-01-2.0	GW16-01-3.0	GW16-02-0.2	GW16-02-3.0
			Client sampling date / time	[18-Jul-2016]	[18-Jul-2016]	[18-Jul-2016]	[18-Jul-2016]	[18-Jul-2016]
Compound	CAS Number	LOR	Unit	EB1618423-002	EB1618423-004	EB1618423-005	EB1618423-007	EB1618423-011
				Result	Result	Result	Result	Result
EA002 : pH (Soils)								
pH Value	---	0.1	pH Unit	---	---	5.7	---	6.0
EA010: Conductivity								
Electrical Conductivity @ 25°C	---	1	µS/cm	---	---	4	---	6
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	---	1	%	3.6	---	6.3	4.6	22.5
EA150: Particle Sizing								
+75µm	---	1	%	---	99	---	---	---
+150µm	---	1	%	---	97	---	---	---
+300µm	---	1	%	---	7	---	---	---
+425µm	---	1	%	---	<1	---	---	---
+600µm	---	1	%	---	<1	---	---	---
+1180µm	---	1	%	---	<1	---	---	---
+2.36mm	---	1	%	---	<1	---	---	---
+4.75mm	---	1	%	---	<1	---	---	---
+9.5mm	---	1	%	---	<1	---	---	---
+19.0mm	---	1	%	---	<1	---	---	---
+37.5mm	---	1	%	---	<1	---	---	---
+75.0mm	---	1	%	---	<1	---	---	---
EA150: Soil Classification based on Particle Size								
Fines (<75 µm)	---	1	%	---	1	---	---	---
Sand (>75 µm)	---	1	%	---	99	---	---	---
Gravel (>2mm)	---	1	%	---	<1	---	---	---
Cobbles (>6cm)	---	1	%	---	<1	---	---	---
ED005: Exchange Acidity								
Exchange Acidity	---	0.1	meq/100g	---	---	0.1	---	0.2
Exchangeable Aluminium	---	0.1	meq/100g	---	---	0.1	---	0.2
ED007: Exchangeable Cations								
Exchangeable Calcium	---	0.1	meq/100g	---	---	<0.1	---	<0.1
Exchangeable Magnesium	---	0.1	meq/100g	---	---	<0.1	---	<0.1
Exchangeable Potassium	---	0.1	meq/100g	---	---	<0.1	---	<0.1
Exchangeable Sodium	---	0.1	meq/100g	---	---	<0.1	---	<0.1
Cation Exchange Capacity	---	0.1	meq/100g	---	---	0.1	---	0.2
Cation Exchange Capacity	---	0.1	meq/100g	---	---	---	---	---
Exchangeable Sodium Percent	---	0.1	%	---	---	15.4	---	11.8

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	GW16-01-0.5	GW16-01-2.0	GW16-01-3.0	GW16-02-0.2	GW16-02-3.0
				Client sampling date / time	[18-Jul-2016]	[18-Jul-2016]	[18-Jul-2016]	[18-Jul-2016]	[18-Jul-2016]
Compound	CAS Number	LOR	Unit		EB1618423-002	EB1618423-004	EB1618423-006	EB1618423-007	EB1618423-011
					Result	Result	Result	Result	Result
ED007: Exchangeable Cations - Continued									
Calcium/Magnesium Ratio	---	0.1	-		---	---	---	---	---
ED008: Exchangeable Cations									
Exchangeable Calcium	---	0.1	meq/100g		---	---	---	---	---
Exchangeable Magnesium	---	0.1	meq/100g		---	---	---	---	---
Exchangeable Potassium	---	0.1	meq/100g		---	---	---	---	---
Exchangeable Sodium	---	0.1	meq/100g		---	---	---	---	---
Cation Exchange Capacity	---	0.1	meq/100g		---	---	---	---	---
Exchangeable Sodium Percent	---	0.1	%		---	---	---	---	---
Calcium/Magnesium Ratio	---	0.1	-		---	---	---	---	---
ED093S: Soluble Major Cations									
Potassium	7440-09-7	10	mg/kg		<10	---	<10	<10	<10
EG005T: Total Metals by ICP-AES									
Aluminium	7429-90-5	50	mg/kg		690	---	330	960	1090
Iron	7439-89-6	50	mg/kg		1200	---	310	3310	970
Arsenic	7440-38-2	5	mg/kg		<5	---	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg		<1	---	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		<2	---	<2	<2	<2
Copper	7440-50-8	5	mg/kg		<5	---	<5	<5	<5
Lead	7439-92-1	5	mg/kg		22	---	<5	<5	<5
Nickel	7440-02-0	2	mg/kg		<2	---	<2	2	<2
Zinc	7440-66-6	5	mg/kg		6	---	<5	10	6
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	---	<0.1	<0.1	<0.1
EP003: Total Organic Carbon (TOC) in Soil									
Total Organic Carbon	---	0.02	%		0.13	---	0.09	0.48	0.11
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		<0.0002	---	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		<0.0002	---	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		<0.0002	---	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		<0.0002	---	<0.0002	<0.0002	<0.0002

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	GW16-01-0.5	GW16-01-2.0	GW16-01-3.0	GW16-02-0.2	GW16-02-3.0
				Client sampling date / time	[18-Jul-2016]	[18-Jul-2016]	[18-Jul-2016]	[18-Jul-2016]	[18-Jul-2016]
Compound	CAS Number	LOR	Unit		EB1618423-002	EB1618423-004	EB1618423-005	EB1618423-007	EB1618423-011
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		**0.0005**	---	**0.0023**	**0.0009**	<0.0002
Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.0002	mg/kg		<0.0002	---	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	---	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0002	---	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		<0.0002	---	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	---	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		<0.0002	---	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	---	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	---	<0.0002	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	---	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	---	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	---	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	---	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	---	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	---	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	---	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg		<0.0005	---	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	---	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	---	<0.0002	<0.0002	<0.0002

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	GW16-01-0.5	GW16-01-2.0	GW16-01-3.0	GW16-02-0.2	GW16-02-3.0
				Client sampling date / time	[18-Jul-2016]	[18-Jul-2016]	[18-Jul-2016]	[18-Jul-2016]	[18-Jul-2016]
Compound	CAS Number	LOR	Unit		EB1618423-002	EB1618423-004	EB1618423-005	EB1618423-007	EB1618423-011
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	---	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	---	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	---	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	---	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	---	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	---	0.0002	mg/kg		0.0005	---	0.0023	0.0009	<0.0002
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.0002	%		84.1	---	92.3	86.4	79.7

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	QA01	GW16-03-1.0	GW16-03-2.0	GW16-03-3.0	GW16-04-0.5
			Client sampling date / time	[18-Jul-2016]	[18-Jul-2016]	[18-Jul-2016]	[18-Jul-2016]	[19-Jul-2016]
Compound	CAS Number	LOR	Unit	EB1618423-012	EB1618423-016	EB1618423-017	EB1618423-018	EB1618423-020
				Result	Result	Result	Result	Result
EA002 : pH (Soils)								
pH Value	---	0.1	pH Unit	---	5.8	---	5.4	7.2
EA010: Conductivity								
Electrical Conductivity @ 25°C	---	1	µS/cm	---	2	---	7	59
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	---	1	%	5.5	8.5	---	8.5	3.2
EA150: Particle Sizing								
+75µm	---	1	%	---	---	98	---	---
+150µm	---	1	%	---	---	97	---	---
+300µm	---	1	%	---	---	12	---	---
+425µm	---	1	%	---	---	1	---	---
+600µm	---	1	%	---	---	<1	---	---
+1180µm	---	1	%	---	---	<1	---	---
+2.36mm	---	1	%	---	---	<1	---	---
+4.75mm	---	1	%	---	---	<1	---	---
+9.5mm	---	1	%	---	---	<1	---	---
+19.0mm	---	1	%	---	---	<1	---	---
+37.5mm	---	1	%	---	---	<1	---	---
+75.0mm	---	1	%	---	---	<1	---	---
EA150: Soil Classification based on Particle Size								
Fines (<75 µm)	---	1	%	---	---	2	---	---
Sand (>75 µm)	---	1	%	---	---	98	---	---
Gravel (>2mm)	---	1	%	---	---	<1	---	---
Cobbles (>6cm)	---	1	%	---	---	<1	---	---
ED005: Exchange Acidity								
Exchange Acidity	---	0.1	meq/100g	---	0.6	---	0.5	---
Exchangeable Aluminium	---	0.1	meq/100g	---	0.6	---	0.5	---
ED007: Exchangeable Cations								
Exchangeable Calcium	---	0.1	meq/100g	---	0.2	---	<0.1	1.2
Exchangeable Magnesium	---	0.1	meq/100g	---	0.1	---	<0.1	<0.1
Exchangeable Potassium	---	0.1	meq/100g	---	<0.1	---	<0.1	<0.1
Exchangeable Sodium	---	0.1	meq/100g	---	<0.1	---	<0.1	<0.1
Cation Exchange Capacity	---	0.1	meq/100g	---	0.9	---	0.5	---
Cation Exchange Capacity	---	0.1	meq/100g	---	---	---	---	1.3
Exchangeable Sodium Percent	---	0.1	%	---	5.5	---	21.4	1.1

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	QA01	GW16-03-1.0	GW16-03-2.0	GW16-03-3.0	GW16-04-0.5
				Client sampling date / time	[18-Jul-2016]	[18-Jul-2016]	[18-Jul-2016]	[18-Jul-2016]	[19-Jul-2016]
Compound	CAS Number	LOR	Unit		EB1618423-012	EB1618423-016	EB1618423-017	EB1618423-018	EB1618423-020
					Result	Result	Result	Result	Result
ED007: Exchangeable Cations - Continued									
Calcium/Magnesium Ratio	---	0.1	-		---	2.0	---	---	---
ED008: Exchangeable Cations									
Exchangeable Calcium	---	0.1	meq/100g		---	---	---	---	---
Exchangeable Magnesium	---	0.1	meq/100g		---	---	---	---	---
Exchangeable Potassium	---	0.1	meq/100g		---	---	---	---	---
Exchangeable Sodium	---	0.1	meq/100g		---	---	---	---	---
Cation Exchange Capacity	---	0.1	meq/100g		---	---	---	---	---
Exchangeable Sodium Percent	---	0.1	%		---	---	---	---	---
Calcium/Magnesium Ratio	---	0.1	-		---	---	---	---	---
ED093S: Soluble Major Cations									
Potassium	7440-09-7	10	mg/kg		---	<10	---	<10	<10
EG005T: Total Metals by ICP-AES									
Aluminium	7429-90-5	50	mg/kg		---	210	---	1420	1070
Iron	7439-89-6	50	mg/kg		---	150	---	370	1960
Arsenic	7440-38-2	5	mg/kg		---	<5	---	<5	<5
Cadmium	7440-43-9	1	mg/kg		---	<1	---	<1	<1
Chromium	7440-47-3	2	mg/kg		---	<2	---	<2	4
Copper	7440-50-8	5	mg/kg		---	<5	---	<5	7
Lead	7439-92-1	5	mg/kg		---	<5	---	<5	<5
Nickel	7440-02-0	2	mg/kg		---	<2	---	<2	<2
Zinc	7440-66-6	5	mg/kg		---	<5	---	<5	<5
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		---	<0.1	---	<0.1	<0.1
EP003: Total Organic Carbon (TOC) in Soil									
Total Organic Carbon	---	0.02	%		---	0.37	---	0.30	0.24
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		<0.0002	<0.0002	---	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		<0.0002	<0.0002	---	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		<0.0002	0.0008	---	0.0004	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		<0.0002	<0.0002	---	<0.0002	<0.0002

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	QA01	GW16-03-1.0	GW16-03-2.0	GW16-03-3.0	GW16-04-0.5
				Client sampling date / time	[18-Jul-2016]	[18-Jul-2016]	[18-Jul-2016]	[18-Jul-2016]	[19-Jul-2016]
Compound	CAS Number	LOR	Unit		EB1618423-012	EB1618423-016	EB1618423-017	EB1618423-018	EB1618423-020
					Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		<0.0002	**0.0057**	---	**0.0002**	<0.0002
Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.0002	mg/kg		<0.0002	<0.0002	---	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	<0.001	---	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0002	<0.0002	---	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		<0.0002	**0.0003**	---	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	<0.0002	---	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		<0.0002	**0.0002**	---	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	<0.0002	---	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	<0.0002	---	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	---	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	---	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	---	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	---	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	---	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	---	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	---	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg		<0.0005	<0.0005	---	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	---	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	---	<0.0002	<0.0002

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	QA01	GW16-03-1.0	GW16-03-2.0	GW16-03-3.0	GW16-04-0.5
				Client sampling date / time	[18-Jul-2016]	[18-Jul-2016]	[18-Jul-2016]	[18-Jul-2016]	[19-Jul-2016]
Compound	CAS Number	LOR	Unit		EB1618423-012	EB1618423-016	EB1618423-017	EB1618423-018	EB1618423-020
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	---	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	---	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	---	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	---	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	---	<0.0005	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	---	0.0002	mg/kg		<0.0002	**0.0070**	---	**0.0006**	<0.0002
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.0002	%		**84.5**	**83.7**	---	**89.8**	**78.4**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	GW16-04-5.0	GW16-05-0.2	GW16-05-1.0	---	---
			Client sampling date / time	[19-Jul-2016]	[19-Jul-2016]	[19-Jul-2016]	---	---
Compound	CAS Number	LOR	Unit	EB1618423-025	EB1618423-026	EB1618423-028	----	----
				Result	Result	Result	---	---
EA002 : pH (Soils)								
pH Value	---	0.1	pH Unit	6.6	4.1	7.2	---	---
EA010: Conductivity								
Electrical Conductivity @ 25°C	---	1	µS/cm	11	618	87	---	---
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	---	1	%	20.9	13.0	18.6	---	---
EA150: Particle Sizing								
+75µm	---	1	%	---	---	---	---	---
+150µm	---	1	%	---	---	---	---	---
+300µm	---	1	%	---	---	---	---	---
+425µm	---	1	%	---	---	---	---	---
+600µm	---	1	%	---	---	---	---	---
+1180µm	---	1	%	---	---	---	---	---
+2.36mm	---	1	%	---	---	---	---	---
+4.75mm	---	1	%	---	---	---	---	---
+9.5mm	---	1	%	---	---	---	---	---
+19.0mm	---	1	%	---	---	---	---	---
+37.5mm	---	1	%	---	---	---	---	---
+75.0mm	---	1	%	---	---	---	---	---
EA150: Soil Classification based on Particle Size								
Fines (<75 µm)	---	1	%	---	---	---	---	---
Sand (>75 µm)	---	1	%	---	---	---	---	---
Gravel (>2mm)	---	1	%	---	---	---	---	---
Cobbles (>6cm)	---	1	%	---	---	---	---	---
ED005: Exchange Acidity								
Exchange Acidity	---	0.1	meq/100g	---	3.3	---	---	---
Exchangeable Aluminium	---	0.1	meq/100g	---	3.3	---	---	---
ED007: Exchangeable Cations								
Exchangeable Calcium	---	0.1	meq/100g	0.4	---	1.4	---	---
Exchangeable Magnesium	---	0.1	meq/100g	<0.1	---	0.7	---	---
Exchangeable Potassium	---	0.1	meq/100g	<0.1	---	<0.1	---	---
Exchangeable Sodium	---	0.1	meq/100g	<0.1	---	<0.1	---	---
Cation Exchange Capacity	---	0.1	meq/100g	---	---	---	---	---
Cation Exchange Capacity	---	0.1	meq/100g	0.5	---	2.3	---	---
Exchangeable Sodium Percent	---	0.1	%	7.2	---	2.6	---	---

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	GW16-04-5.0	GW16-05-0.2	GW16-05-1.0	---	---
				Client sampling date / time	[19-Jul-2016]	[19-Jul-2016]	[19-Jul-2016]	---	---
Compound	CAS Number	LOR	Unit		EB1618423-025	EB1618423-026	EB1618423-028	-----	-----
					Result	Result	Result	---	---
ED007: Exchangeable Cations - Continued									
Calcium/Magnesium Ratio	---	0.1	-		---	---	2.0	---	---
ED008: Exchangeable Cations									
Exchangeable Calcium	---	0.1	meq/100g		---	2.0	---	---	---
Exchangeable Magnesium	---	0.1	meq/100g		---	1.3	---	---	---
Exchangeable Potassium	---	0.1	meq/100g		---	<0.1	---	---	---
Exchangeable Sodium	---	0.1	meq/100g		---	<0.1	---	---	---
Cation Exchange Capacity	---	0.1	meq/100g		---	6.6	---	---	---
Exchangeable Sodium Percent	---	0.1	%		---	1.9	---	---	---
Calcium/Magnesium Ratio	---	0.1	-		---	1.5	---	---	---
ED093S: Soluble Major Cations									
Potassium	7440-09-7	10	mg/kg		<10	20	10	---	---
EG005T: Total Metals by ICP-AES									
Aluminium	7429-90-5	50	mg/kg		620	9690	1300	---	---
Iron	7439-89-6	50	mg/kg		820	12500	2260	---	---
Arsenic	7440-38-2	5	mg/kg		<5	5	<5	---	---
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	---	---
Chromium	7440-47-3	2	mg/kg		<2	9	<2	---	---
Copper	7440-50-8	5	mg/kg		<5	<5	<5	---	---
Lead	7439-92-1	5	mg/kg		<5	5	<5	---	---
Nickel	7440-02-0	2	mg/kg		<2	4	<2	---	---
Zinc	7440-66-6	5	mg/kg		<5	18	<5	---	---
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	---	---
EP003: Total Organic Carbon (TOC) in Soil									
Total Organic Carbon	---	0.02	%		0.16	1.21	0.22	---	---
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	---	---
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	---	---
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		<0.0002	0.0012	0.0003	---	---
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	---	---

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	GW16-04-5.0	GW16-05-0.2	GW16-05-1.0	---	---
				Client sampling date / time	[19-Jul-2016]	[19-Jul-2016]	[19-Jul-2016]	---	---
Compound	CAS Number	LOR	Unit		EB1618423-025	EB1618423-026	EB1618423-028	-------	-------
					Result	Result	Result	---	---
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		<0.0002	**0.0042**	**0.0042**	---	---
Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	---	---
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	<0.001	<0.001	---	---
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	---	---
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		<0.0002	**0.0003**	<0.0002	---	---
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	---	---
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		<0.0002	**0.0002**	<0.0002	---	---
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	---	---
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	---	---
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	---	---
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	---	---
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	---	---
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	---	---
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	---	---
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	---	---
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	---	---
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	---	---
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	---	---
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	---	---

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	GW16-04-5.0	GW16-05-0.2	GW16-05-1.0	---	---
				Client sampling date / time	[19-Jul-2016]	[19-Jul-2016]	[19-Jul-2016]	---	---
Compound	CAS Number	LOR	Unit		EB1618423-025	EB1618423-026	EB1618423-028	------	------
					Result	Result	Result	---	---
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	---	---
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	---	---
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	---	---
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	---	---
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	---	---
EP231P: PFAS Sums									
Sum of PFAS	---	0.0002	mg/kg		<0.0002	**0.0059**	**0.0045**	---	---
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.0002	%		**77.0**	**75.9**	**80.7**	---	---

Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	---	70	130

Australian Laboratory Services Pty. Ltd.
32 Shand Street
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Phone: +61 (7) 3243 7222 Fax: +61 (7) 3243 7218
www.alsglobal.com

ALS Brisbane is a NATA Accredited Testing Laboratory. Corporate Accreditation No: 825, Corporate Site No: 818.

Finalized Date: 27-JUL-2016
Account: ALSENV

CERTIFICATE BR16117360

Project: EB1618423

This report is for 10 Pulp samples submitted to our lab in Brisbane, QLD, Australia on 21-JUL-2016.

The following have access to data associated with this certificate:

SUB RESULTS		

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
LOG-22	Sample login - Rcd w/o BarCode

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
ME-ICP81x	Peroxide Fusion - 51 Elements by ICP-AES	ICP-AES

To: **ALS ENVIRONMENTAL**
ATTN: SUB RESULTS
32 SHAND STREET
STAFFORD QLD 4053

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

***** See Appendix Page for comments regarding this certificate *****

Signature:

Shaun Kenny, Brisbane Laboratory Manager

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ALS Brisbane is a NATA Accredited Testing Laboratory. Corporate Accreditation No: 825, Corporate Site No: 818.

Project: EB1618423

CERTIFICATE OF ANALYSIS BR16117360

Sample Description	Method Analyte Units LOR	ME- ICP81x SiO2 % 0.2
GW16- 01- 0.5		97.7
GW16- 01- 3.0		94.3
GW16- 02- 0.2		95.0
GW16- 02- 3.0		95.4
GW16- 03- 1.0		95.9
GW16- 03- 3.0		83.2
GW16- 04- 0.5		92.5
GW16- 04- 5.0		96.5
GW16- 05- 0.2		85.0
GW16- 05- 1.0		97.5

***** See Appendix Page for comments regarding this certificate *****

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Project: EB1618423

CERTIFICATE OF ANALYSIS BR16117360

CERTIFICATE COMMENTS

ACCREDITATION COMMENTS

Applies to Method: NATA Accredited. Corporate Accreditation No: 825, Corporate Site No: 818. The Technical Signatory is Samantha Profke, ICPAES Supervising Chemist
ME-ICP81x

LABORATORY ADDRESSES

Applies to Method: Processed at ALS Brisbane located at 32 Shand Street, Stafford, Brisbane, QLD, Australia. NATA Accreditation does not cover the performance of ALS Brisbane Sample Preparation which is processed at 116 Delta Street, Geebung, QLD 4034, Australia
LOG-22 ME-ICP81x

Certificate of Analysis

ALS Laboratory Group Pty Ltd
2 Byth Street,
Stafford, QLD 4053
pH 07 3552 8678
fax 07 3352 3662
samples.brisbane@alsglobal.com

ALS Environmental

Brisbane, QLD

CLIENT: Berniceng

COMPANY: GHD PTY LTD

ADDRESS: GPO BOX 668
BRISBANE QLD,
AUSTRALIA 4001

PROJECT: 3134071 - ASA Gold Coast Airport

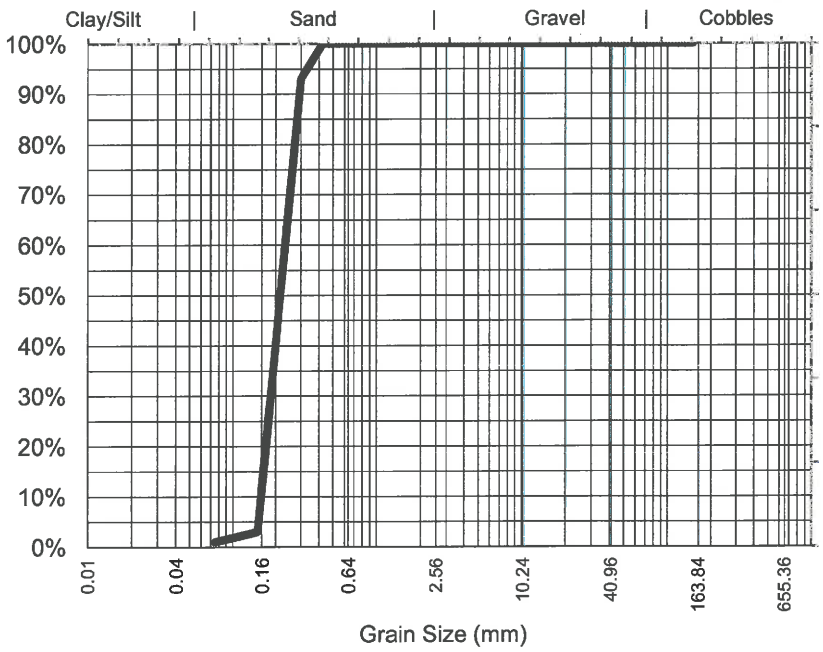
DATE REPORTED: 26-Jul-2016

DATE RECEIVED: 20-Jul-2016

REPORT NO: EB1618423-004 / PSD

SAMPLE ID: GW16-01-2.0

Particle Size Distribution



Particle Size (mm)	Percent Passing
0.425	100%
0.300	93%
0.150	3%
0.075	1%

Samples analysed as received.

Median Particle Size (mm)*	0.228

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

Sample Comments:

Analysed: 22-Jul-16

Loss on Pretreatment NA

Limit of Reporting: 1%

Sample Description:

Test Method: AS1289.3.6.1

NATA Accreditation: 825 Site: Brisbane
This document is issued in accordance with NATA's accreditation requirements. Accredited for compliance with ISO/IEC 17025. This document shall not be reproduced, except in full.

Satish Trivedi
Soil Chemist
Authorised Signatory

Certificate of Analysis

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fax 07 3352 3662
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ALS Environmental

Brisbane, QLD

CLIENT: Berniceng

COMPANY: GHD PTY LTD

ADDRESS: GPO BOX 668
BRISBANE QLD,
AUSTRALIA 4001

PROJECT: 3134071 - ASA Gold Coast Airport

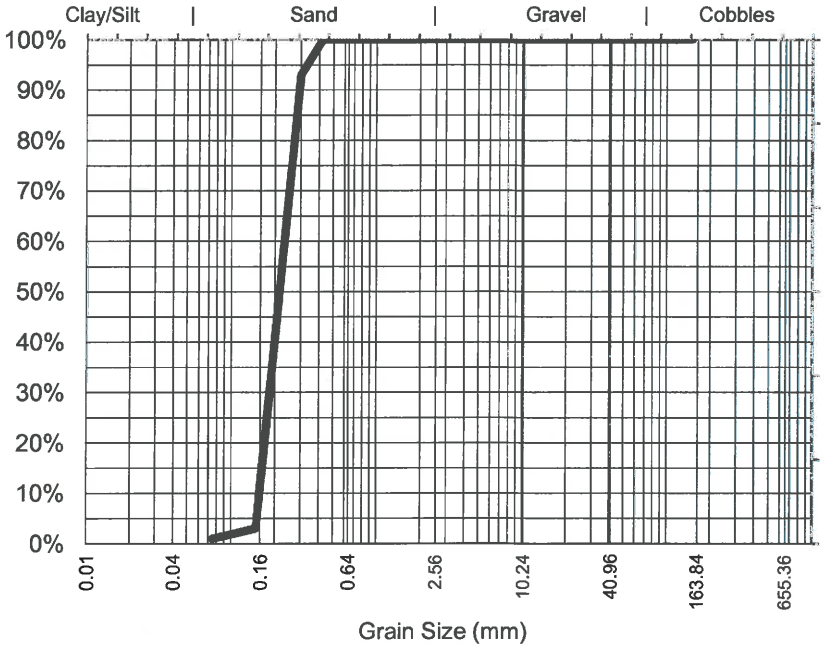
DATE REPORTED: 26-Jul-2016

DATE RECEIVED: 20-Jul-2016

REPORT NO: EB1618423-004DUP / PSD

SAMPLE ID: GW16-01-2.0

Particle Size Distribution



Particle Size (mm)	Percent Passing
0.425	100%
0.300	93%
0.150	3%
0.075	1%

Samples analysed as received.

Median Particle Size (mm)*	0.228

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

Sample Comments:

Analysed: 22-Jul-16

Loss on Pretreatment NA

Limit of Reporting: 1%

Sample Description:

Test Method: AS1289.3.6.1

NATA Accreditation: 825 Site: Brisbane
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Satish Trivedi
Soil Chemist
Authorised Signatory

Certificate of Analysis

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ALS Environmental

Brisbane, QLD

CLIENT: Berniceng

COMPANY: GHD PTY LTD

ADDRESS: GPO BOX 668
BRISBANE QLD,
AUSTRALIA 4001

PROJECT: 3134071 - ASA Gold Coast Airport

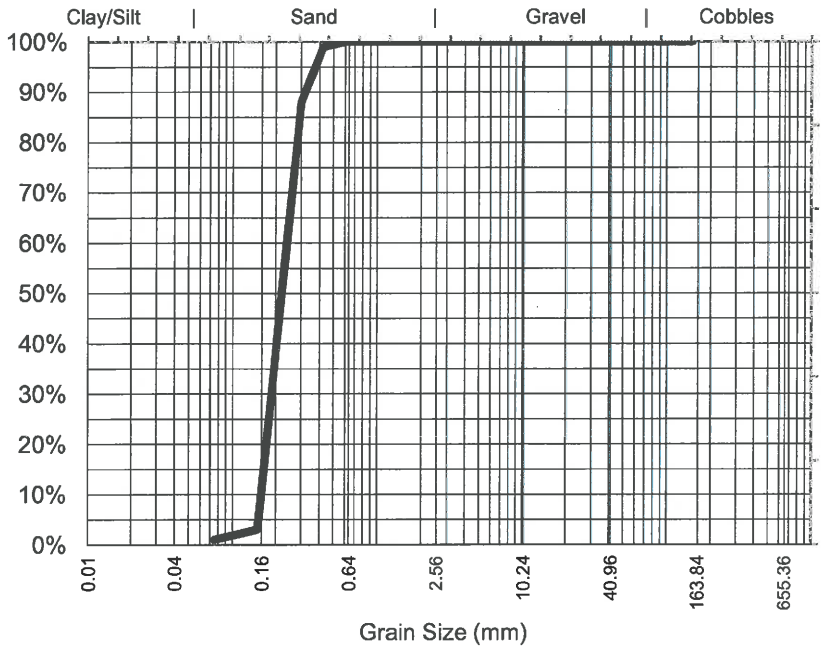
DATE REPORTED: 26-Jul-2016

DATE RECEIVED: 20-Jul-2016

REPORT NO: EB1618423-017 / PSD

SAMPLE ID: GW16-03-2.0

Particle Size Distribution



Particle Size (mm)	Percent Passing
0.600	100%
0.425	99%
0.300	88%
0.150	3%
0.075	1%

Samples analysed as received.

Median Particle Size (mm)*	0.233

Median Particle Size is not covered under the current scope of ALS's NATA accreditation.

Sample Comments:

Analysed: 22-Jul-16

Loss on Pretreatment NA

Limit of Reporting: 1%

Sample Description:

Test Method: AS1289.3.6.1

NATA Accreditation: 825 Site: Brisbane
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Satish Trivedi
Soil Chemist
Authorised Signatory

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EB1618423**	Page	: 1 of 9
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MS BERNICE NG	Contact	: Vanessa Turnbull
Address	: GPO BOX 668 BRISBANE QLD, AUSTRALIA 4001	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 3316 3000	Telephone	: 61-7-3552 8660
Project	: 3134071 - ASA Gold Coast Airport	Date Samples Received	: 20-Jul-2016
Order number	: ----	Date Analysis Commenced	: 21-Jul-2016
C-O-C number	: ----	Issue Date	: 01-Aug-2016
Sampler	: ----		
Site	: ----		
Quote number	: ----		
No. of samples received	: 28		
No. of samples analysed	: 13		

NATA Accredited Laboratory 825
Accredited for compliance with
ISO/IEC 17025.

NATA
WORLD RECOGNISED ACCREDITATION

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Andrew Epps	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Andrew Epps	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Greg Vogel	Laboratory Manager	Brisbane Acid Sulphate Soils, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Lana Nguyen	Senior LCMS Chemist	Sydney Organics, Smithfield, NSW
Matt Frost	Senior Organic Chemist	Stafford Minerals - ST, Stafford, QLD
Satishkumar Trivedi	Acid Sulfate Soils Supervisor	Brisbane Acid Sulphate Soils, Stafford, QLD
Satishkumar Trivedi	Acid Sulfate Soils Supervisor	Brisbane Inorganics, Stafford, QLD

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA002 : pH (Soils) (QC Lot: 524560)									
EB1618423-005	GW16-01-3.0	EA002: pH Value	---	0.1	pH Unit	5.7	5.7	0.00	0% - 20%
EA010: Conductivity (QC Lot: 524561)									
EB1618423-005	GW16-01-3.0	EA010: Electrical Conductivity @ 25°C	---	1	µS/cm	4	4	0.00	No Limit
EA055: Moisture Content (QC Lot: 524566)									
EB1618392-001	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	---	1	%	21.8	20.0	8.63	0% - 20%
EB1618423-028	GW16-05-1.0	EA055-103: Moisture Content (dried @ 103°C)	---	1	%	18.6	19.5	4.62	0% - 50%
EA055: Moisture Content (QC Lot: 528165)									
EB1618479-002	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	---	1	%	12.9	12.9	0.00	0% - 50%
EP1606558-022	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	---	1	%	<1.0	<1.0	0.00	No Limit
ED005: Exchange Acidity (QC Lot: 527226)									
EB1618423-005	GW16-01-3.0	ED005: Exchange Acidity	---	0.1	meq/100g	0.1	0.1	0.00	No Limit
		ED005: Exchangeable Aluminium	---	0.1	meq/100g	0.1	0.1	0.00	No Limit
ED007: Exchangeable Cations (QC Lot: 527227)									
EB1618423-005	GW16-01-3.0	ED007: Exchangeable Calcium	---	0.1	meq/100g	<0.1	<0.1	0.00	No Limit
		ED007: Exchangeable Magnesium	---	0.1	meq/100g	<0.1	<0.1	0.00	No Limit
		ED007: Exchangeable Potassium	---	0.1	meq/100g	<0.1	<0.1	0.00	No Limit
		ED007: Exchangeable Sodium	---	0.1	meq/100g	<0.1	<0.1	0.00	No Limit
ED008: Exchangeable Cations (QC Lot: 527228)									
EB1618423-026	GW16-05-0.2	ED008: Exchangeable Calcium	---	0.1	meq/100g	2.0	2.0	0.00	0% - 20%
		ED008: Exchangeable Magnesium	---	0.1	meq/100g	1.3	1.2	0.00	0% - 50%
		ED008: Exchangeable Potassium	---	0.1	meq/100g	<0.1	<0.1	0.00	No Limit
		ED008: Exchangeable Sodium	---	0.1	meq/100g	<0.1	<0.1	0.00	No Limit
ED093S: Soluble Major Cations (QC Lot: 524559)									

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED093S: Soluble Major Cations (QC Lot: 524559) - continued									
EB1618423-002	GW16-01-0.5	ED093S: Potassium	7440-09-7	10	mg/kg	<10	<10	0.00	No Limit
EB1618423-005	GW16-01-3.0	ED093S: Potassium	7440-09-7	10	mg/kg	<10	<10	0.00	No Limit
EG005T: Total Metals by ICP-AES (QC Lot: 524562)									
EB1618392-001	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	2	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	10	10	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	4	4	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	8	8	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	112	103	8.23	0% - 20%
		EG005T: Lead	7439-92-1	5	mg/kg	43	52	19.7	0% - 50%
		EG005T: Zinc	7440-66-6	5	mg/kg	70	# 103	37.4	0% - 20%
		EG005T: Aluminium	7429-90-5	50	mg/kg	10400	10100	3.01	0% - 20%
		EG005T: Iron	7439-89-6	50	mg/kg	17700	17900	1.05	0% - 20%
EB1618423-028	GW16-05-1.0	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Aluminium	7429-90-5	50	mg/kg	1300	1110	16.5	0% - 20%
		EG005T: Iron	7439-89-6	50	mg/kg	2260	2180	3.48	0% - 20%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 524563)									
EB1618423-002	GW16-01-0.5	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP003: Total Organic Carbon (TOC) in Soil (QC Lot: 524998)									
EB1618423-002	GW16-01-0.5	EP003: Total Organic Carbon	---	0.02	%	0.13	0.12	0.00	No Limit
ES1615153-001	Anonymous	EP003: Total Organic Carbon	---	0.02	%	24.9	25.0	0.108	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 527248)									
EB1618423-002	GW16-01-0.5	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0005	0.0005	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EB1618423-028	GW16-05-1.0	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0003	0.0004	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0042	0.0041	2.82	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 527248)									
EB1618423-002	GW16-01-0.5	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EB1618423-028	GW16-05-1.0	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 527248)									
EB1618423-002	GW16-01-0.5	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EB1618423-028	GW16-05-1.0	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 527248) - continued									
EB1618423-028	GW16-05-1.0	EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 527248)									
EB1618423-002	GW16-01-0.5	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EB1618423-028	GW16-05-1.0	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA002 : pH (Soils) (QCLot: 524560)								
EA002: pH Value	---	---	pH Unit	---	4 pH Unit	100	98	102
				---	7 pH Unit	99.6	98	102
EA010: Conductivity (QCLot: 524561)								
EA010: Electrical Conductivity @ 25°C	---	1	µS/cm	<1	1412 µS/cm	99.5	97	103
ED005: Exchange Acidity (QCLot: 527226)								
ED005: Exchange Acidity	---	0.1	meq/100g	<0.1	---	---	---	---
ED005: Exchangeable Aluminium	---	0.1	meq/100g	<0.1	---	---	---	---
ED007: Exchangeable Cations (QCLot: 527227)								
ED007: Exchangeable Calcium	---	0.1	meq/100g	<0.1	12.8121 meq/100g	99.9	79	113
ED007: Exchangeable Magnesium	---	0.1	meq/100g	<0.1	9.6617 meq/100g	105	85	115
ED007: Exchangeable Potassium	---	0.1	meq/100g	<0.1	0.3712 meq/100g	90.7	70	122
ED007: Exchangeable Sodium	---	0.1	meq/100g	<0.1	0.818 meq/100g	98.8	76	112
ED007: Cation Exchange Capacity	---	0.1	meq/100g	<0.1	23.663 meq/100g	101	82	112
ED008: Exchangeable Cations (QCLot: 527228)								
ED008: Exchangeable Calcium	---	0.1	meq/100g	<0.1	12.073 meq/100g	94.7	91	109
ED008: Exchangeable Magnesium	---	0.1	meq/100g	<0.1	8.8293 meq/100g	99.0	89	111
ED008: Exchangeable Potassium	---	0.1	meq/100g	<0.1	0.3146 meq/100g	86.0	79	116
ED008: Exchangeable Sodium	---	0.1	meq/100g	<0.1	0.2113 meq/100g	115	75	118
ED008: Cation Exchange Capacity	---	0.1	meq/100g	<0.1	21.4283 meq/100g	96.6	88	110
ED093S: Soluble Major Cations (QCLot: 524559)								
ED093S: Potassium	7440-09-7	10	mg/kg	<10	500 mg/kg	98.4	80	120
EG005T: Total Metals by ICP-AES (QCLot: 524562)								
EG005T: Aluminium	7429-90-5	50	mg/kg	<50	---	---	---	---
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	118.9 mg/kg	115	84	123
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	1.87125 mg/kg	106	88	117
EG005T: Chromium	7440-47-3	2	mg/kg	<2	22.7 mg/kg	111	83	125
EG005T: Copper	7440-50-8	5	mg/kg	<5	55 mg/kg	110	86	122
EG005T: Iron	7439-89-6	50	mg/kg	<50	34900 mg/kg	109	70	120
EG005T: Lead	7439-92-1	5	mg/kg	<5	72.1 mg/kg	109	84	119
EG005T: Nickel	7440-02-0	2	mg/kg	<2	16.6 mg/kg	103	89	126
EG005T: Zinc	7440-66-6	5	mg/kg	<5	182.3 mg/kg	112	87	127
EG035T: Total Recoverable Mercury by FIMS (QCLot: 524563)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	0.09821 mg/kg	103	78	122

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP003: Total Organic Carbon (TOC) in Soil (QCLot: 524998)								
EP003: Total Organic Carbon	----	0.02	%	<0.02	100 %	97.1	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 527248)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	59.2	57	121
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	75.2	55	125
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	101	52	126
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.8	54	123
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.8	55	127
EP231X: Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.0002	mg/kg	<0.0002	0.00125 mg/kg	79.9	54	125
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 527248)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00125 mg/kg	75.7	52	128
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	71.7	54	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.1	58	127
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	112	57	128
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	109	60	134
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	113	63	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	107	55	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	113	62	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	82.9	53	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	82.6	49	129
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	97.7	59	129
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 527248)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.8	52	132
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	84.4	65	126
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	87.1	64	126
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	91.2	63	124
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	82.2	58	125
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	103	61	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	112	55	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 527248)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	104	54	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	117	61	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	116	62	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	103	60	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 524562)							
EB1618423-002	GW16-01-0.5	EG005T: Arsenic	7440-38-2	50 mg/kg	112	70	130
		EG005T: Cadmium	7440-43-9	25 mg/kg	114	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	113	70	130
		EG005T: Copper	7440-50-8	50 mg/kg	101	70	130
		EG005T: Lead	7439-92-1	50 mg/kg	123	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	111	70	130
		EG005T: Zinc	7440-66-6	50 mg/kg	110	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 524563)							
EB1618423-005	GW16-01-3.0	EG035T: Mercury	7439-97-6	2.5 mg/kg	109	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 527248)							
EB1618423-002	GW16-01-0.5	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	65.2	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	77.2	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	89.0	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	103	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	97.4	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.00125 mg/kg	84.1	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 527248)							
EB1618423-002	GW16-01-0.5	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00125 mg/kg	79.6	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	69.3	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	88.1	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	108	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	105	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	96.1	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	66.8	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	93.4	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	82.0	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	84.1	30	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	88.2	30	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 527248)							
EB1618423-002	GW16-01-0.5	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	89.8	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	65.9	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	73.8	50	130

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 527248) - continued							
EB1618423-002	GW16-01-0.5	EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.00312 mg/kg	75.3	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	87.2	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	114	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	99.2	30	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 527248)							
EB1618423-002	GW16-01-0.5	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	114	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	103	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	71.3	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	99.2	50	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EB1618423**	Page	: 1 of 8
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MS BERNICE NG	Telephone	: 61-7-3552 8660
Project	: 3134071 - ASA Gold Coast Airport	Date Samples Received	: 20-Jul-2016
Site	: ---	Issue Date	: 01-Aug-2016
Sampler	: ---	No. of samples received	: 28
Order number	: ---	No. of samples analysed	: 13

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **Duplicate outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Duplicate (DUP) RPDs							
EG005T: Total Metals by ICP-AES	EB1618392-001	Anonymous	**Zinc**	7440-66-6	**37.4 %**	0% - 20%	**RPD exceeds LOR based limits**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method / *Container* / Client Sample ID(s)	*Sample Date*	*Extraction / Preparation*			*Analysis*		
		Date extracted	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EA002 : pH (Soils)							
Soil Glass Jar - Unpreserved (EA002)							
GW16-01-3.0, GW16-02-3.0, GW16-03-1.0, GW16-03-3.0	**18-Jul-2016**	**21-Jul-2016**	25-Jul-2016	✓	**21-Jul-2016**	21-Jul-2016	✓
Soil Glass Jar - Unpreserved (EA002)							
GW16-04-0.5, GW16-04-5.0, GW16-05-0.2, GW16-05-1.0	**19-Jul-2016**	**21-Jul-2016**	26-Jul-2016	✓	**21-Jul-2016**	21-Jul-2016	✓
EA010: Conductivity							
Soil Glass Jar - Unpreserved (EA010)							
GW16-01-3.0, GW16-02-3.0, GW16-03-1.0, GW16-03-3.0	**18-Jul-2016**	**21-Jul-2016**	25-Jul-2016	✓	**21-Jul-2016**	18-Aug-2016	✓
Soil Glass Jar - Unpreserved (EA010)							
GW16-04-0.5, GW16-04-5.0, GW16-05-0.2, GW16-05-1.0	**19-Jul-2016**	**21-Jul-2016**	26-Jul-2016	✓	**21-Jul-2016**	18-Aug-2016	✓
EA055: Moisture Content							
HDPE Soil Jar (EA055-103)							
QA01	**18-Jul-2016**	---	---	---	**25-Jul-2016**	01-Aug-2016	✓
Soil Glass Jar - Unpreserved (EA055-103)							
GW16-01-0.5, GW16-01-3.0, GW16-02-0.2, GW16-02-3.0, GW16-03-1.0, GW16-03-3.0	**18-Jul-2016**	---	---	---	**21-Jul-2016**	01-Aug-2016	✓
Soil Glass Jar - Unpreserved (EA055-103)							
GW16-04-0.5, GW16-04-5.0, GW16-05-0.2, GW16-05-1.0	**19-Jul-2016**	---	---	---	**21-Jul-2016**	02-Aug-2016	✓

Matrix: **SOIL**

Evaluation: ✗ = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA150: Particle Sizing							
Snap Lock Bag (EA150)							
GW16-01-2.0, GW16-03-2.0	18-Jul-2016	---	---	---	26-Jul-2016	14-Jan-2017	✓
EA150: Soil Classification based on Particle Size							
Snap Lock Bag (EA150)							
GW16-01-2.0, GW16-03-2.0	18-Jul-2016	---	---	---	26-Jul-2016	14-Jan-2017	✓
ED005: Exchange Acidity							
Soil Glass Jar - Unpreserved (ED005)							
GW16-01-3.0, GW16-02-3.0, GW16-03-1.0, GW16-03-3.0	18-Jul-2016	25-Jul-2016	15-Aug-2016	✓	26-Jul-2016	15-Aug-2016	✓
Soil Glass Jar - Unpreserved (ED005)							
GW16-05-0.2	19-Jul-2016	25-Jul-2016	16-Aug-2016	✓	26-Jul-2016	16-Aug-2016	✓
ED007: Exchangeable Cations							
Soil Glass Jar - Unpreserved (ED007)							
GW16-01-3.0, GW16-02-3.0, GW16-03-1.0, GW16-03-3.0	18-Jul-2016	25-Jul-2016	15-Aug-2016	✓	26-Jul-2016	15-Aug-2016	✓
Soil Glass Jar - Unpreserved (ED007)							
GW16-04-0.5, GW16-04-5.0, GW16-05-1.0	19-Jul-2016	25-Jul-2016	16-Aug-2016	✓	26-Jul-2016	16-Aug-2016	✓
ED008: Exchangeable Cations							
Soil Glass Jar - Unpreserved (ED008)							
GW16-05-0.2	19-Jul-2016	25-Jul-2016	16-Aug-2016	✓	26-Jul-2016	16-Aug-2016	✓
ED093S: Soluble Major Cations							
Soil Glass Jar - Unpreserved (ED093S)							
GW16-01-0.5, GW16-01-3.0, GW16-02-0.2, GW16-02-3.0, GW16-03-1.0, GW16-03-3.0	18-Jul-2016	21-Jul-2016	14-Jan-2017	✓	21-Jul-2016	14-Jan-2017	✓
Soil Glass Jar - Unpreserved (ED093S)							
GW16-04-0.5, GW16-04-5.0, GW16-05-0.2, GW16-05-1.0	19-Jul-2016	21-Jul-2016	15-Jan-2017	✓	21-Jul-2016	15-Jan-2017	✓
EG005T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T)							
GW16-01-0.5, GW16-01-3.0, GW16-02-0.2, GW16-02-3.0, GW16-03-1.0, GW16-03-3.0	18-Jul-2016	21-Jul-2016	14-Jan-2017	✓	21-Jul-2016	14-Jan-2017	✓
Soil Glass Jar - Unpreserved (EG005T)							
GW16-04-0.5, GW16-04-5.0, GW16-05-0.2, GW16-05-1.0	19-Jul-2016	21-Jul-2016	15-Jan-2017	✓	21-Jul-2016	15-Jan-2017	✓

Matrix: SOIL

Evaluation: ✗ = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T)							
GW16-01-0.5, GW16-01-3.0, GW16-02-0.2, GW16-02-3.0, GW16-03-1.0, GW16-03-3.0	18-Jul-2016	21-Jul-2016	15-Aug-2016	✓	22-Jul-2016	15-Aug-2016	✓
Soil Glass Jar - Unpreserved (EG035T)							
GW16-04-0.5, GW16-04-5.0, GW16-05-0.2, GW16-05-1.0	19-Jul-2016	21-Jul-2016	16-Aug-2016	✓	22-Jul-2016	16-Aug-2016	✓
EP003: Total Organic Carbon (TOC) in Soil							
Pulp Bag (EP003)							
GW16-01-0.5, GW16-01-3.0, GW16-02-0.2, GW16-02-3.0, GW16-03-1.0, GW16-03-3.0	18-Jul-2016	21-Jul-2016	15-Aug-2016	✓	21-Jul-2016	15-Aug-2016	✓
Pulp Bag (EP003)							
GW16-04-0.5, GW16-04-5.0, GW16-05-0.2, GW16-05-1.0	19-Jul-2016	21-Jul-2016	16-Aug-2016	✓	21-Jul-2016	16-Aug-2016	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X)							
GW16-01-0.5, GW16-01-3.0, GW16-02-0.2, GW16-02-3.0, QA01, GW16-03-1.0, GW16-03-3.0	18-Jul-2016	25-Jul-2016	14-Jan-2017	✓	25-Jul-2016	03-Sep-2016	✓
HDPE Soil Jar (EP231X)							
GW16-04-0.5, GW16-04-5.0, GW16-05-0.2, GW16-05-1.0	19-Jul-2016	25-Jul-2016	15-Jan-2017	✓	25-Jul-2016	03-Sep-2016	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X)							
GW16-01-0.5, GW16-01-3.0, GW16-02-0.2, GW16-02-3.0, QA01, GW16-03-1.0, GW16-03-3.0	18-Jul-2016	25-Jul-2016	14-Jan-2017	✓	25-Jul-2016	03-Sep-2016	✓
HDPE Soil Jar (EP231X)							
GW16-04-0.5, GW16-04-5.0, GW16-05-0.2, GW16-05-1.0	19-Jul-2016	25-Jul-2016	15-Jan-2017	✓	25-Jul-2016	03-Sep-2016	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X)							
GW16-01-0.5, GW16-01-3.0, GW16-02-0.2, GW16-02-3.0, QA01, GW16-03-1.0, GW16-03-3.0	18-Jul-2016	25-Jul-2016	14-Jan-2017	✓	25-Jul-2016	03-Sep-2016	✓
HDPE Soil Jar (EP231X)							
GW16-04-0.5, GW16-04-5.0, GW16-05-0.2, GW16-05-1.0	19-Jul-2016	25-Jul-2016	15-Jan-2017	✓	25-Jul-2016	03-Sep-2016	✓

Matrix: **SOIL**

Evaluation: ✗ = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X)							
GW16-01-0.5, GW16-01-3.0, GW16-02-0.2, GW16-02-3.0, QA01, GW16-03-1.0, GW16-03-3.0	**18-Jul-2016**	**25-Jul-2016**	14-Jan-2017	✓	**25-Jul-2016**	03-Sep-2016	✓
HDPE Soil Jar (EP231X)							
GW16-04-0.5, GW16-04-5.0, GW16-05-0.2, GW16-05-1.0	**19-Jul-2016**	**25-Jul-2016**	15-Jan-2017	✓	**25-Jul-2016**	03-Sep-2016	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X)							
GW16-01-0.5, GW16-01-3.0, GW16-02-0.2, GW16-02-3.0, QA01, GW16-03-1.0, GW16-03-3.0	**18-Jul-2016**	**25-Jul-2016**	14-Jan-2017	✓	**25-Jul-2016**	03-Sep-2016	✓
HDPE Soil Jar (EP231X)							
GW16-04-0.5, GW16-04-5.0, GW16-05-0.2, GW16-05-1.0	**19-Jul-2016**	**25-Jul-2016**	15-Jan-2017	✓	**25-Jul-2016**	03-Sep-2016	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: SOIL

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Cations - soluble by ICP-AES	ED093S	2	10	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Electrical Conductivity (1:5)	EA010	1	8	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Exchange Acidity by 1M Potassium Chloride	ED005	1	5	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations	ED007	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	1	100.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055-103	2	11	18.18	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	11	18.18	10.00	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	1	8	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	10	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	11	18.18	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP003	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Cations - soluble by ICP-AES	ED093S	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Electrical Conductivity (1:5)	EA010	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations	ED007	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	1	100.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	8	25.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP003	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Cations - soluble by ICP-AES	ED093S	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Electrical Conductivity (1:5)	EA010	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Exchange Acidity by 1M Potassium Chloride	ED005	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations	ED007	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	1	100.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP003	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH (1:5)	EA002	SOIL	In house: Referenced to APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM (2013) Schedule B(3) (Method 103)
Electrical Conductivity (1:5)	EA010	SOIL	In house: Referenced to APHA 2510. Conductivity is determined on soil samples using a 1:5 soil/water leach. This method is compliant with NEPM (2013) Schedule B(3) (Method 104)
Moisture Content	EA055-103	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 103-105 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Particle Size Analysis (Sieving)	EA150	SOIL	In house: Referenced to AS1289.3.6.1 - 2009. Particle Size Analysis by Sieving
Exchange Acidity by 1M Potassium Chloride	ED005	SOIL	In house: referenced to Rayment and Lyons, (2011), method 15G1. This method is unsuitable for near neutral and alkaline soils. NATA accreditation does not cover performance of this service.
Exchangeable Cations	ED007	SOIL	In house: Referenced to Rayment & Lyons (2011) Method 15A1. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM (2013) Schedule B(3) (Method 301)
Exchangeable Cations with pre-treatment	ED008	SOIL	In house: Referenced to Rayment & Higginson (2011) Method 15A2. Soluble salts are removed from the sample prior to analysis. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM (2013) Schedule B(3) (Method 301)
Cations - soluble by ICP-AES	ED093S	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010 (ICPAES) Water extracts of the soil are analyzed for major cations by ICPAES. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Total Organic Carbon	EP003	SOIL	In house C-IR17. Dried and pulverised sample is reacted with acid to remove inorganic Carbonates, then combusted in a LECO furnace in the presence of strong oxidants / catalysts. The evolved (Organic) Carbon (as CO2) is automaticaly measured by infra-red detector.
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-House. A portion of soil is extracted with MTBE. The extract is taken to dryness, made up in mobile phase. Analysis is by LC/MSMS, ESI Negative Mode using MRM.
Sodium Peroxide fusion - ICPAES finish	ME-ICP81x	SOIL	Analysis conducted by ALS Minerals.

Preparation Methods	Method	Matrix	Method Descriptions

Preparation Methods	Method	Matrix	Method Descriptions
Exchangeable Cations Preparation Method	ED007PR	SOIL	In house: Referenced to Rayment & Higginson (1992) method 15A1. A 1M NH4Cl extraction by end over end tumbling at a ratio of 1:20. There is no pretreatment for soluble salts. Extracts can be run by ICP for cations.
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of distilled water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Sample Extraction for Perfluoroalkyl Compounds	EP231-PR	SOIL	In house
Dry and Pulverise (up to 100g)	GEO30	SOIL	#

GHD CLIENTS|PEOPLE|PERFORMANCE

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ANALYSIS REQUEST FORM/CHAIN OF CUSTODY DOCUMENTATION

PROJECT ID:	3134071	QUOTE:	GHD 2015 quote
PROJECT:	ASA Gold Coast Airport		
CLIENT:	Airservices Australia		
POSTAL ADDRESS:	GPO Box 668, Brisbane 4001, QLD		
CONTACT:	Bernice Ng /Imogen Bird		
PHONE:	0432 289 398	FAX: 3316 3333	
EMAIL:	bernice.ng@ghd.com; Imogen.bird@ghd.com; Therese.Hammond@ghd.com		
DATA NEEDED BY:	Standard		
REPORT FORMAT:	EMAIL		
EMAIL FORMAT:	EXCEL, ESDAT & PDF		

LABORATORY REFERENCE
COOLER SEALS
COOLER TEMP

DESPATCHED TO: ~~SGS~~ ALS

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ANALYSIS REQUIRED

	SAMPLE ID	MATRIX	Date/Time	Bottle NO.	PRESERVATION	TDS	Major Cations/Anions	PCBs/Extended Suite PCBs		TOC	Total Iron	Standard & metals	K,	Al	Si	CEC	pH/EC		HOLD	NOTES
1	SS1	S	26/7/16	2	ICE			✓		✓	✓	✓	✓	✓	✓	✓	✓			
2	SS2		26/7/16	2	ICE			✓		✓	✓	✓	✓	✓	✓	✓	✓			
3	SS3		25/7/16	2	ICE			✓		✓	✓	✓	✓	✓	✓	✓	✓			
4	SS4		25/7/16	2	ICE			✓		✓	✓	✓	✓	✓	✓	✓	✓			
5	SS5		25/7/16	2	ICE			✓		✓	✓	✓	✓	✓	✓	✓	✓			
6	SS6		25/7/16	2	ICE			✓		✓	✓	✓	✓	✓	✓	✓	✓			
7	SW16-01	W	25/7/16	2	ICE	✓	✓	✓												
8	SW16-02		25/7/16	2	ICE	✓	✓	✓												
9	SW16-03		25/7/16	2	ICE	✓	✓	✓												
10	SW16-04		27/7/16	2	ICE	✓	✓	✓												
11	SW16-05		27/7/16	2	ICE	✓	✓	✓												
12	SW16-06		25/7/16	2	ICE	✓	✓	✓												
13	SW16-07		25/7/16	2	ICE	✓	✓	✓												
14	SW16-08		26/7/16	2	ICE	✓	✓	✓												
15	SW16-09		26/7/16	2	ICE	✓	✓	✓												

RELINQUISHED BY:
NAME: Bernice Ng
OF: GHD
DATE: 28/7/16
TIME: 13:45

RECEIVED BY:
NAME: ~~SGS~~
OF: ALS
DATE: 28/7/16
TIME: 13:55

PLEASE EMAIL COMPLETED ANALYSIS REQUEST TO: bernice.ng@ghd.com; damien.morris@ghd.com

*Container Type and Preservative Codes: P = Neutral Plastic; N = Nitric Acid Preserved; C = Sodium Hydroxide Preserved; J = Solvent Washed Acid Rinced Jar; S = Solvent Washed Acid Rinced Glass Bottle; VC = Hydrochloric Acid Preserved Vial; VS = Sulfuric Acid Preserved Vial; BS = Sulfuric Acid Preserved Glass Bottle; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; O = Other.

Environmental Division
Brisbane
Work Order Reference
EB1619114

Telephone : +61-7-3243 7222

GHD | CLIENTS | PEOPLE | PERFORMANCE

GHD Pty Ltd ABN 39 008 488 373
145 Ann Street Brisbane QLD 4000 GPO Box 668 Brisbane QLD 4001 Australia
T 61 7 3316 3000 F 61 7 3316 3333 E bnamail@ghd.com W www.ghd.com

ANALYSIS REQUEST FORM/CHAIN OF CUSTODY DOCUMENTATION

PROJECT ID:	3134071	QUOTE:	GHD 2015 quote
PROJECT:	ASA Gold Coast Airport		
CLIENT:	Airservices Australia		
POSTAL ADDRESS:	GPO Box 668, Brisbane 4001, QLD		
CONTACT:	Bernice Ng /Imogen Bird		
PHONE:	0432 289 398	FAX: 3316 3333	
EMAIL:	bernice.ng@ghd.com; imogen.bird@ghd.com; Therese.Hammond@ghd.com		
DATA NEEDED BY:	Standard		
REPORT FORMAT:	EMAIL		
EMAIL FORMAT:	EXCEL, ESDAT & PDF		

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

LABORATORY JOB NO.

FOR LAB USE ONLY

COOLER SEAL — INTACT: Y / N — COOLER TEMP

DESPATCHED TO: ~~SGS~~ ALS

ANALYSIS REQUIRED

	SAMPLE ID	MATRIX	Date/Time	Bottle NO.	PRESERVATION	TDS	Major Cation/Anion	PFOS/PFOA Extended Suite	HOLD	NOTES
16	GW16-10		25/7/16		ICE	✓	✓	✓		
17	GW16-01		25/7/16		ICE	✓	✓	✓		
18	GW16-02		25/7/16		ICE	✓	✓	✓		
19	GW16-03		28/7/16		ICE	✓	✓	✓		
20	GW16-04		28/7/16		ICE	✓	✓	✓		
21	GW16-05		25/7/16		ICE	✓	✓	✓		
22	GDCA16		25/7/16		ICE	✓	✓	✓		
23	BH40		26/7/16		ICE	✓	✓	✓		
24	BH9		26/7/16		ICE	✓	✓	✓		
25	MB17		26/7/16		ICE	✓	✓	✓		
26	MW4		26/7/16		ICE	✓	✓	✓		
27	SNR MW12		27/7/16		ICE	✓	✓	✓		
28	MW11		27/7/16		ICE	✓	✓	✓		
29	MB24A		27/7/16		ICE	✓	✓	✓		
30	GW1		27/7/16		ICE	✓	✓	✓		

RELINQUISHED BY:
NAME: Bernice Ng — DATE: 28/7/16
OF: GHD — TIME:

RECEIVED BY:
NAME: [illegible] — DATE: 28/7/16
OF: ALS — TIME: 12:55

PLEASE EMAIL COMPLETED ANALYSIS REQUEST TO: bernice.ng@ghd.com; damien.morris@ghd.com

*Container Type and Preservative Codes: P = Neutral Plastic; N = Nitric Acid Preserved; C = Sodium Hydroxide Preserved; J = Solvent Washed Acid Rinced Jar; S = Solvent Washed Acid Rinced Glass Bottle; VC = Hydrochloric Acid Preserved Vial; VS = Sulfuric Acid Preserved Vial; BS = Sulfuric Acid Preserved Glass Bottle; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; O = Other.

GHD CLIENTS|PEOPLE|PERFORMANCE

GHD Pty Ltd ABN 39 008 488 373
145 Ann Street Brisbane QLD 4000 GPO Box 668 Brisbane QLD 4001 Australia
T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

ANALYSIS REQUEST FORM/CHAIN OF CUSTODY DOCUMENTATION

PROJECT ID:	3134071	QUOTE:	GHD 2015 quote
PROJECT:	ASA Gold Coast Airport		
CLIENT:	Airservices Australia		
POSTAL ADDRESS:	GPO Box 668, Brisbane 4001, QLD		
CONTACT:	Bernice Ng /Imogen Bird		
PHONE:	0432 289 398	FAX: 3316 3333	
EMAIL:	bernice.ng@ghd.com; Imogen.bird@ghd.com; Therese.Hammond@ghd.com		
DATA NEEDED BY:	Standard		
REPORT FORMAT:	EMAIL		
EMAIL FORMAT:	EXCEL, ESDAT & PDF		

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

LABORATORY BATCH NO.

FOR LAB USE ONLY

COOLER SEAL: Yes / No / Broken / N/A

COOLER TEMP: °C

DESPATCHED TO: ~~SGS~~ ALS

ANALYSIS REQUIRED

	SAMPLE ID	MATRIX	Date/Time	Bottle NO.	PRESERVATION	TDS	Major Cation / Anion	PFOS/PFOA extended suite	TOC	Total Iron	Standard 8 Metals	K	Al	Si	CEC	pH / Ec.			HOLD	NOTES
31	MWA	W	28/7/16	2	ICE	✓	✓	✓												
32	SS-QA1	S	26/7/16	2	ICE			✓	✓	✓	✓	✓	✓	✓	✓	✓				
33	SW-QA1	W	25/7/16	2	ICE	✓	✓	✓												
	SW-QA2	W	25/7/16	2	ICE	✓	✓	✓												— SW-QA2/GW-QA2 forward to Eurofins MAT.
34	GW-QA1	W	26/7/16	2	ICE	✓	✓	✓												
	GW-QA2	W	26/7/16	2	ICE	✓	✓	✓												
	Extra Sample				ICE															
35	GCAPL1	W	27/7/16	2	ICE															
					ICE															
					ICE															
					ICE															
					ICE															
					ICE															
					ICE															
					ICE															
					ICE															

RELINQUISHED BY:
NAME: Bernice Ng
OF: GHD
DATE: 28/7/16
TIME: 13:45

RECEIVED BY:
NAME:
OF: ALS
DATE: 28/7/16
TIME: 13:55

PLEASE EMAIL COMPLETED ANALYSIS REQUEST TO: bernice.ng@ghd.com; imogen.bird@ghd.com; Therese.Hammond@ghd.com

*Container Type and Preservative Codes: P = Neutral Plastic; N = Nitric Acid Preserved; C = Sodium Hydroxide Preserved; J = Solvent Washed Acid Rinced Jar; S = Solvent Washed Acid Rinced Glass Bottle; VC = Hydrochloric Acid Preserved Vial; VS = Sulfuric Acid Preserved Vial; BS = Sulfuric Acid Preserved Glass Bottle; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; O = Other.

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EB1619114**
Amendment	: **1**

Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MS BERNICE NG	Contact	: Vanessa Turnbull
Address	: GPO BOX 668 BRISBANE QLD, AUSTRALIA 4001	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: bernice.ng@ghd.com	E-mail	: vanessa.turnbull@alsenviro.com
Telephone	: +61 07 3316 3000	Telephone	: 61-7-3552 8660
Facsimile	: +61 07 3316 3333	Facsimile	: +61-7-3243 7218
Project	: 3134071 - ASA Gold Coast Airport	Page	: 1 of 6
Order number	: —	Quote number	: ES2015GHDSER0820 (EN/005/15)
C-O-C number	: —	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: —		
Sampler	:		

Dates

Date Samples Received	: 28-Jul-2016 1:55 PM	Issue Date	: 18-Aug-2016
Client Requested Due Date	: 04-Aug-2016	Scheduled Reporting Date	: **04-Aug-2016**

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Not Available
No. of coolers/boxes	: 3	Temperature	: 1.4°C, 2.1°C, 1.3°C - Ice present
Receipt Detail	: MEDIUM ESKY	No. of samples received / analysed	: 34 / 34

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- ***29/7/16*: SRN has been resent to acknowledge changes made specifically to addition of analysis to sample GCAPL1 (#35) per email directive received from Bernice Ng on 29/7/16.**
- **1/8/16: SRN has been resent to acknowledge CEC methods assigned according to pH/EC decission tree. For any further information regarding these adjustments please contact client services at ALSEnviro.Brisbane@alsglobal.com.**
- ***18/8/16*: SRN has been resent to acknowledge changes made specifically to amend the sample id for lab #24 per email request received from Bernice Ng on 17/8/16.**
- **Please be advised that sample "MW12" (ALS#27) was not received at the laboratory (denoted SNR on the scanned COC). Per email directive received from Bernice Ng on 29/7/16, sample MW12 as noted on the COC is now GCAPL1 (ALS #35).**
- **Please be advised that an extra sample "GCAPL1" (ALS#35) was received in addition to the samples listed on the COC. This sample has been added to the end of the work order and will be analysed as per analysis requested as noted on the COC for sample id: MW12.**
- **Please be advised that pH and Electrical Conductivity analysi will be performed so that the appropriate CEC method can be determined as per Raymont and Lyons (2011). CEC does not appear on the SRN and will be added once the appropriate method has been determined.**
- Discounted Package Prices apply only when specific ALS Group Codes ('W', 'S', 'NT' suites) are referenced on COCs.
- **EP231X: PFOS/PFOA analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911 (Micro site no. 14913). The results for this analysis will be reported 08/08/16.**
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (14 days), Solid (60 days) from date of completion of work order.
- Analysis will be conducted by ALS Environmental, Brisbane, NATA accreditation no. 825, Site No. 818 (Micro site no. 18958).
- **Breaches in recommended extraction / analysis holding times (if any) are displayed overleaf in the Proactive Holding Time Report table.**

- **Please be advised that ALS is unable to perform Total Dissolved Solids, Major Cations and Major Anions analysis for samples "SW-QA1" and "SW-QA2" as no appropriate container was received for these tests. Please note that the recommended container for these tests is 1 x 250mL or 500mL unpreserved plastic container (green label). If you have any further questions please contact Client Services at ALSEnviro.Brisbane@alsglobal.com.**
- **Please be advised that samples "SW-QA2" and "GW-QA2" have been forwarded to Eurofins MGT for analysis as per COC request. Please note that this will incur a freight forwarding fee.**

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default to 15:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory for processing purposes and will be shown bracketed without a time component.

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - EA010 (solids): Electrical Conductivity (1:5)	SOIL - EA055-103 Moisture Content	SOIL - ED005 Exchange Acidity by 1M Potassium Chloride	SOIL - ED007 CEC / Exchangeable Cations (ED007) -All	SOIL - ED040S Soluble Major Anions	SOIL - ED093S Cations - Soluble	SOIL - EP231X PFAS (Per- and Polyfluoroalkyl Substances) -
EB1619114-001	[26-Jul-2016]	SS1	✓	✓	✓	✓	✓	✓	✓
EB1619114-002	[26-Jul-2016]	SS2	✓	✓	✓	✓	✓	✓	✓
EB1619114-003	[25-Jul-2016]	SS3	✓	✓	✓	✓	✓	✓	✓
EB1619114-004	[25-Jul-2016]	SS4	✓	✓	✓	✓	✓	✓	✓
EB1619114-005	[25-Jul-2016]	SS5	✓	✓		✓	✓	✓	✓
EB1619114-006	[25-Jul-2016]	SS6	✓	✓		✓	✓	✓	✓
EB1619114-032	[26-Jul-2016]	SS-QA1	✓	✓	✓	✓	✓	✓	✓

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - EA002 pH (1:5)	SOIL - EG005T (solids) Total Metals by ICP-AES	SOIL - EG035T (solids) Total Mercury by FIMS	SOIL - EP003 Total Organic Carbon (TOC) in Soil
EB1619114-001	[26-Jul-2016]	SS1	✓	✓	✓	✓
EB1619114-002	[26-Jul-2016]	SS2	✓	✓	✓	✓
EB1619114-003	[25-Jul-2016]	SS3	✓	✓	✓	✓
EB1619114-004	[25-Jul-2016]	SS4	✓	✓	✓	✓
EB1619114-005	[25-Jul-2016]	SS5	✓	✓	✓	✓
EB1619114-006	[25-Jul-2016]	SS6	✓	✓	✓	✓
EB1619114-032	[26-Jul-2016]	SS-QA1	✓	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - ED037-P Alkalinity as CaCO3 (PCT)	WATER - ED045G Chloride by Discrete Analyser	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G &
EB1619114-007	[25-Jul-2016]	SW16-01	✓	✓	✓
EB1619114-008	[25-Jul-2016]	SW16-02	✓	✓	✓
EB1619114-009	[25-Jul-2016]	SW16-03	✓	✓	✓
EB1619114-010	[27-Jul-2016]	SW16-04	✓	✓	✓
EB1619114-011	[27-Jul-2016]	SW16-05	✓	✓	✓
EB1619114-012	[25-Jul-2016]	SW16-06	✓	✓	✓
EB1619114-013	[25-Jul-2016]	SW16-07	✓	✓	✓
EB1619114-014	[26-Jul-2016]	SW16-08	✓	✓	✓
EB1619114-015	[26-Jul-2016]	SW16-09	✓	✓	✓
EB1619114-016	[25-Jul-2016]	SW16-10	✓	✓	✓
EB1619114-017	[25-Jul-2016]	GW16-01	✓	✓	✓
EB1619114-018	[25-Jul-2016]	GW16-02	✓	✓	✓
EB1619114-019	[28-Jul-2016]	GW16-03	✓	✓	✓
EB1619114-020	[28-Jul-2016]	GW16-04	✓	✓	✓
EB1619114-021	[25-Jul-2016]	GW16-05	✓	✓	✓
EB1619114-022	[25-Jul-2016]	GDCA16	✓	✓	✓
EB1619114-023	[26-Jul-2016]	BH40	✓	✓	✓
EB1619114-024	[26-Jul-2016]	BH13	✓	✓	✓
EB1619114-025	[26-Jul-2016]	MB17	✓	✓	✓
EB1619114-026	[26-Jul-2016]	MW4	✓	✓	✓
EB1619114-028	[27-Jul-2016]	MW11	✓	✓	✓
EB1619114-029	[27-Jul-2016]	MB24A	✓	✓	✓
EB1619114-030	[27-Jul-2016]	GW1	✓	✓	✓
EB1619114-031	[28-Jul-2016]	MWA	✓	✓	✓
EB1619114-034	[26-Jul-2016]	GW-QA1	✓	✓	✓
EB1619114-035	[27-Jul-2016]	GCAPL1	✓	✓	✓

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EA015H Total Dissolved Solids - High Level	WATER - ED041G Sulfate (Turbidimetric) as SO4 2- by Discrete	WATER - ED093F Dissolved Major Cations	WATER - EP231X PFAS (Per- and Polyfluoroalkyl Substances) -
EB1619114-007	[25-Jul-2016]	SW16-01	✓	✓	✓	✓
EB1619114-008	[25-Jul-2016]	SW16-02	✓	✓	✓	✓
EB1619114-009	[25-Jul-2016]	SW16-03	✓	✓	✓	✓
EB1619114-010	[27-Jul-2016]	SW16-04	✓	✓	✓	✓

			WATER - EA015H Total Dissolved Solids - High Level	WATER - ED041G Sulfate (Turbidimetric) as SO4 2- by Discrete	WATER - ED093F Dissolved Major Cations	WATER - EP231X PFAS (Per- and Polyfluoroalkyl Substances) -
EB1619114-011	[27-Jul-2016]	SW16-05	✓	✓	✓	✓
EB1619114-012	[25-Jul-2016]	SW16-06	✓	✓	✓	✓
EB1619114-013	[25-Jul-2016]	SW16-07	✓	✓	✓	✓
EB1619114-014	[26-Jul-2016]	SW16-08	✓	✓	✓	✓
EB1619114-015	[26-Jul-2016]	SW16-09	✓	✓	✓	✓
EB1619114-016	[25-Jul-2016]	SW16-10	✓	✓	✓	✓
EB1619114-017	[25-Jul-2016]	GW16-01	✓	✓	✓	✓
EB1619114-018	[25-Jul-2016]	GW16-02	✓	✓	✓	✓
EB1619114-019	[28-Jul-2016]	GW16-03	✓	✓	✓	✓
EB1619114-020	[28-Jul-2016]	GW16-04	✓	✓	✓	✓
EB1619114-021	[25-Jul-2016]	GW16-05	✓	✓	✓	✓
EB1619114-022	[25-Jul-2016]	GDCA16	✓	✓	✓	✓
EB1619114-023	[26-Jul-2016]	BH40	✓	✓	✓	✓
EB1619114-024	[26-Jul-2016]	BH13	✓	✓	✓	✓
EB1619114-025	[26-Jul-2016]	MB17	✓	✓	✓	✓
EB1619114-026	[26-Jul-2016]	MW4	✓	✓	✓	✓
EB1619114-028	[27-Jul-2016]	MW11	✓	✓	✓	✓
EB1619114-029	[27-Jul-2016]	MB24A	✓	✓	✓	✓
EB1619114-030	[27-Jul-2016]	GW1	✓	✓	✓	✓
EB1619114-031	[28-Jul-2016]	MWA	✓	✓	✓	✓
EB1619114-033	[25-Jul-2016]	SW-QA1				✓
EB1619114-034	[26-Jul-2016]	GW-QA1	✓	✓	✓	✓
EB1619114-035	[27-Jul-2016]	GCAPL1	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (Brisbane)		
- A4 - AU Tax Invoice (INV)	Email	ap-fss@ghd.com
BERNICE NG		
- *AU Certificate of Analysis - NATA (COA)	Email	bernice.ng@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	bernice.ng@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	bernice.ng@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	bernice.ng@ghd.com
- Chain of Custody (CoC) (COC)	Email	bernice.ng@ghd.com
- EDI Format - ENMRG (ENMRG)	Email	bernice.ng@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	bernice.ng@ghd.com
- EDI Format - XTab (XTAB)	Email	bernice.ng@ghd.com
IMOGEN BIRD		
- *AU Certificate of Analysis - NATA (COA)	Email	imogen.bird@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	imogen.bird@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	imogen.bird@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	imogen.bird@ghd.com
- Chain of Custody (CoC) (COC)	Email	imogen.bird@ghd.com
- EDI Format - ENMRG (ENMRG)	Email	imogen.bird@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	imogen.bird@ghd.com
- EDI Format - XTab (XTAB)	Email	imogen.bird@ghd.com
THERESE HAMMOND		
- *AU Certificate of Analysis - NATA (COA)	Email	therese.hammond@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	therese.hammond@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	therese.hammond@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	therese.hammond@ghd.com
- Chain of Custody (CoC) (COC)	Email	therese.hammond@ghd.com
- EDI Format - ENMRG (ENMRG)	Email	therese.hammond@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	therese.hammond@ghd.com
- EDI Format - XTab (XTAB)	Email	therese.hammond@ghd.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EB1619114**	Page	: 1 of 27
Amendment	: **1**		
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MS BERNICE NG	Contact	: Vanessa Turnbull
Address	: GPO BOX 668 BRISBANE QLD, AUSTRALIA 4001	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 3316 3000	Telephone	: 61-7-3552 8660
Project	: 3134071 - ASA Gold Coast Airport	Date Samples Received	: 28-Jul-2016 13:55
Order number	: ----	Date Analysis Commenced	: 29-Jul-2016
C-O-C number	: ----	Issue Date	: 18-Aug-2016 18:09
Sampler	: ----		
Site	: ----		
Quote number	: ----		
No. of samples received	: 34		
No. of samples analysed	: 34		

NATA Accredited Laboratory 825
Accredited for compliance with
ISO/IEC 17025.

NATA
WORLD RECOGNISED ACCREDITATION

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
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General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ED007(Exchangeable Cations): Unable to calculate Calcium/Magnesium Ratio for sample EB1619114-001,002,003,004,005,032 as the required results for Calcium/Magnesium are below LOR.
- EG005T (Total Metals by ICP-AES): Sample EB1618899-001 shows poor duplicate result due to sample heterogeneity. Confirmed by visual inspection.
- ED041G (Sulfate as SO4 2-): Samples were diluted due to matrix interference. LOR adjusted accordingly.
- TDS by method EA-015 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- Amend 1 (18/8/16): This report has been amended as a result of a request to change sample identification numbers (IDs) received by ALS from Bernice Ng on 17/8/16. All analysis results are as per the previous report.
- EP231: Particular samples required dilution due to matrix interferences. LOR values have been adjusted accordingly.
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H+ + Al3+).

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	SS1	SS2	SS3	SS4	SS5
			Client sampling date / time	[26-Jul-2016]	[26-Jul-2016]	[25-Jul-2016]	[25-Jul-2016]	[25-Jul-2016]
Compound	CAS Number	LOR	Unit	EB1619114-001	EB1619114-002	EB1619114-003	EB1619114-004	EB1619114-005
				Result	Result	Result	Result	Result
EA002 : pH (Soils)								
pH Value	---	0.1	pH Unit	4.9	5.1	5.4	5.2	6.2
EA010: Conductivity								
Electrical Conductivity @ 25°C	---	1	µS/cm	10	10	8	5	8
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	---	1	%	34.2	27.4	5.2	26.2	27.2
ED005: Exchange Acidity								
Exchange Acidity	---	0.1	meq/100g	0.5	0.3	0.4	0.7	---
Exchangeable Aluminium	---	0.1	meq/100g	0.1	0.1	0.3	0.5	---
ED007: Exchangeable Cations								
Exchangeable Calcium	---	0.1	meq/100g	0.5	0.3	0.2	0.1	1.8
Exchangeable Magnesium	---	0.1	meq/100g	0.4	0.1	0.1	0.1	0.3
Exchangeable Potassium	---	0.1	meq/100g	<0.1	<0.1	<0.1	<0.1	<0.1
Exchangeable Sodium	---	0.1	meq/100g	<0.1	<0.1	<0.1	<0.1	<0.1
Cation Exchange Capacity	---	0.1	meq/100g	1.0	0.5	0.4	0.3	2.2
Exchangeable Sodium Percent	---	0.1	%	7.6	8.0	9.7	9.3	1.8
Calcium/Magnesium Ratio	---	0.1	-	1.2	3.0	2.0	1.0	6.0
Magnesium/Potassium Ratio	---	0.1	-	---	---	---	---	---
ED040S : Soluble Sulfate by ICPAES								
Silicon	7440-21-3	1	mg/kg	3	5	10	8	16
ED093S: Soluble Major Cations								
Potassium	7440-09-7	10	mg/kg	<10	<10	<10	<10	<10
EG005T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	80	110	520	340	2660
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	<2	<2	<2	<2	2
Copper	7440-50-8	5	mg/kg	<5	<5	<5	<5	<5
Iron	7439-89-6	50	mg/kg	80	110	700	310	2270
Lead	7439-92-1	5	mg/kg	<5	<5	<5	<5	<5
Nickel	7440-02-0	2	mg/kg	<2	<2	<2	<2	<2
Zinc	7440-66-6	5	mg/kg	<5	<5	<5	<5	13
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP003: Total Organic Carbon (TOC) in Soil								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	SS1	SS2	SS3	SS4	SS5
			Client sampling date / time	[26-Jul-2016]	[26-Jul-2016]	[25-Jul-2016]	[25-Jul-2016]	[25-Jul-2016]
Compound	CAS Number	LOR	Unit	EB1619114-001	EB1619114-002	EB1619114-003	EB1619114-004	EB1619114-005
				Result	Result	Result	Result	Result
EP003: Total Organic Carbon (TOC) in Soil - Continued								
Total Organic Carbon	---	0.02	%	2.53	0.90	0.72	0.89	0.91
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.0003	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.0037	<0.0002	0.0007	0.0007
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0008	0.0434	0.0018	0.0081	0.0098
Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.0002	mg/kg	<0.0002	0.0015	<0.0002	<0.0002	0.0004
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.0010	<0.0002	0.0009	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0003	0.0014	<0.0002	0.0008	0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.0008	0.0002	0.0012	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.0014	0.0002	0.0009	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.0005	0.0003	0.0004	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.0008	0.0005	<0.0002	0.0004
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.0009	0.0003	<0.0002	0.0004
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.0005	<0.0002	<0.0002	0.0003
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.0017	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SS1	SS2	SS3	SS4	SS5
				Client sampling date / time	[26-Jul-2016]	[26-Jul-2016]	[25-Jul-2016]	[25-Jul-2016]	[25-Jul-2016]
Compound	CAS Number	LOR	Unit		EB1619114-001	EB1619114-002	EB1619114-003	EB1619114-004	EB1619114-005
					Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		**0.0008**	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	**0.0010**	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	---	0.0002	mg/kg		**0.0019**	**0.0589**	**0.0033**	**0.0130**	**0.0122**
Sum of PFHxS and PFOS	375-85-9/1763-23-1	0.0002	mg/kg		**0.0008**	**0.0477**	**0.0018**	**0.0088**	**0.0105**
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.0002	%		**84.0**	**79.0**	**79.0**	**79.0**	**84.0**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	SS6	SS-QA1	---	---	---
			Client sampling date / time	[25-Jul-2016]	[26-Jul-2016]	---	---	---
Compound	CAS Number	LOR	Unit	EB1619114-006	EB1619114-032	-----	-----	-----
				Result	Result	---	---	---
EA002 : pH (Soils)								
pH Value	---	0.1	pH Unit	7.1	5.1	---	---	---
EA010: Conductivity								
Electrical Conductivity @ 25°C	---	1	µS/cm	21	15	---	---	---
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	---	1	%	25.8	28.0	---	---	---
ED005: Exchange Acidity								
Exchange Acidity	---	0.1	meq/100g	---	0.2	---	---	---
Exchangeable Aluminium	---	0.1	meq/100g	---	0.1	---	---	---
ED007: Exchangeable Cations								
Exchangeable Calcium	---	0.1	meq/100g	4.6	0.9	---	---	---
Exchangeable Magnesium	---	0.1	meq/100g	0.4	0.2	---	---	---
Exchangeable Potassium	---	0.1	meq/100g	0.1	<0.1	---	---	---
Exchangeable Sodium	---	0.1	meq/100g	<0.1	<0.1	---	---	---
Cation Exchange Capacity	---	0.1	meq/100g	5.2	1.2	---	---	---
Exchangeable Sodium Percent	---	0.1	%	1.1	4.1	---	---	---
Calcium/Magnesium Ratio	---	0.1	-	11.5	4.5	---	---	---
Magnesium/Potassium Ratio	---	0.1	-	3.2	---	---	---	---
ED040S : Soluble Sulfate by ICPAES								
Silicon	7440-21-3	1	mg/kg	18	6	---	---	---
ED093S: Soluble Major Cations								
Potassium	7440-09-7	10	mg/kg	<10	<10	---	---	---
EG005T: Total Metals by ICP-AES								
Aluminium	7429-90-5	50	mg/kg	2180	170	---	---	---
Arsenic	7440-38-2	5	mg/kg	28	<5	---	---	---
Cadmium	7440-43-9	1	mg/kg	<1	<1	---	---	---
Chromium	7440-47-3	2	mg/kg	6	<2	---	---	---
Copper	7440-50-8	5	mg/kg	11	<5	---	---	---
Iron	7439-89-6	50	mg/kg	20900	190	---	---	---
Lead	7439-92-1	5	mg/kg	<5	<5	---	---	---
Nickel	7440-02-0	2	mg/kg	3	<2	---	---	---
Zinc	7440-66-6	5	mg/kg	121	<5	---	---	---
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	---	---	---
EP003: Total Organic Carbon (TOC) in Soil								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SS6	SS-QA1	---	---	---
				Client sampling date / time	[25-Jul-2016]	[26-Jul-2016]	---	---	---
Compound	CAS Number	LOR	Unit		EB1619114-006	EB1619114-032	---	---	---
					Result	Result	---	---	---
EP003: Total Organic Carbon (TOC) in Soil - Continued									
Total Organic Carbon	---	0.02	%		1.04	1.16	---	---	---
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		<0.0002	<0.0002	---	---	---
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		<0.0002	0.0004	---	---	---
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		0.0016	0.0048	---	---	---
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		<0.0002	0.0002	---	---	---
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		0.0213	0.0520	---	---	---
Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.0002	mg/kg		0.0100	0.0016	---	---	---
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	<0.001	---	---	---
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0002	0.0012	---	---	---
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		0.0003	0.0017	---	---	---
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		0.0003	0.0012	---	---	---
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		0.0005	0.0017	---	---	---
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		0.0007	0.0008	---	---	---
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		0.0025	0.0009	---	---	---
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		0.0051	0.0012	---	---	---
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		0.0030	0.0004	---	---	---
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		0.0013	<0.0002	---	---	---
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	---	---	---
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		0.0038	0.0013	---	---	---
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	---	---	---

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SS6	SS-QA1	---	---	---
				Client sampling date / time	[25-Jul-2016]	[26-Jul-2016]	---	---	---
Compound	CAS Number	LOR	Unit		EB1619114-006	EB1619114-032	-----	-----	-----
					Result	Result	---	---	---
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	---	---	---
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg		<0.0005	<0.0005	---	---	---
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	---	---	---
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		<0.0002	<0.0002	---	---	---
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		<0.0002	<0.0002	---	---	---
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	---	---	---
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	---	---	---
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		**0.0017**	**0.0008**	---	---	---
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	---	---	---
EP231P: PFAS Sums									
Sum of PFAS	---	0.0002	mg/kg		**0.0521**	**0.0702**	---	---	---
Sum of PFHxS and PFOS	375-85-9/1763-23-1	0.0002	mg/kg		**0.0229**	**0.0568**	---	---	---
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.0002	%		**82.0**	**86.0**	---	---	---

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW16-01	SW16-02	SW16-03	SW16-04	SW16-05
				Client sampling date / time	[25-Jul-2016]	[25-Jul-2016]	[25-Jul-2016]	[27-Jul-2016]	[27-Jul-2016]
Compound	CAS Number	LOR	Unit		EB1619114-007	EB1619114-008	EB1619114-009	EB1619114-010	EB1619114-011
					Result	Result	Result	Result	Result
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	---	10	mg/L		266	194	196	658	1180
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		85	60	58	54	68
Total Alkalinity as CaCO3	---	1	mg/L		85	60	58	54	68
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		28	11	12	46	57
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		70	52	51	334	622
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		26	15	15	18	22
Magnesium	7439-95-4	1	mg/L		6	5	5	19	35
Sodium	7440-23-5	1	mg/L		48	35	34	166	290
Potassium	7440-09-7	1	mg/L		2	1	1	6	14
EN055: Ionic Balance									
Total Anions	---	0.01	meq/L		4.26	2.89	2.85	11.4	20.1
Total Cations	---	0.01	meq/L		3.93	2.71	2.66	9.84	17.0
Ionic Balance	---	0.01	%		3.98	---	---	7.63	8.49
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	0.13	0.18	0.18	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	0.09	0.13	0.12	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		0.04	0.78	1.18	1.04	0.08
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	0.05	0.08	0.07	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		0.06	1.14	2.20	1.79	0.12
Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW16-01	SW16-02	SW16-03	SW16-04	SW16-05
				Client sampling date / time	[25-Jul-2016]	[25-Jul-2016]	[25-Jul-2016]	[27-Jul-2016]	[27-Jul-2016]
Compound	CAS Number	LOR	Unit		EB1619114-007	EB1619114-008	EB1619114-009	EB1619114-010	EB1619114-011
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	**0.04**	**0.06**	**0.05**	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	**0.11**	**0.16**	**0.12**	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	**0.02**	**0.04**	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	**0.05**	**0.06**	**0.04**	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW16-01	SW16-02	SW16-03	SW16-04	SW16-05
				Client sampling date / time	[25-Jul-2016]	[25-Jul-2016]	[25-Jul-2016]	[27-Jul-2016]	[27-Jul-2016]
Compound	CAS Number	LOR	Unit		EB1619114-007	EB1619114-008	EB1619114-009	EB1619114-010	EB1619114-011
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	---	0.01	µg/L		**0.10**	**2.41**	**4.09**	**3.41**	**0.20**
Sum of PFAS (Swedish Water Quality Guideline plus 8:2-FTS)	---	0.01	µg/L		**0.10**	**2.27**	**3.88**	**3.22**	**0.20**
Sum of PFHxS and PFOS	375-85-9/1763-23-1	0.01	µg/L		**0.10**	**1.92**	**3.38**	**2.83**	**0.20**
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.02	%		**100**	**102**	**111**	**95.3**	**108**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	SW16-06	SW16-07	SW16-08	SW16-09	SW16-10
			Client sampling date / time	[25-Jul-2016]	[25-Jul-2016]	[26-Jul-2016]	[26-Jul-2016]	[25-Jul-2016]
Compound	CAS Number	LOR	Unit	EB1619114-012	EB1619114-013	EB1619114-014	EB1619114-015	EB1619114-016
				Result	Result	Result	Result	Result
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	---	10	mg/L	31000	32000	54	29000	30600
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	119	119	27	120	120
Total Alkalinity as CaCO3	---	1	mg/L	119	119	27	120	120
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2570	2540	1	2560	2500
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	16200	15800	8	16000	15900
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	452	440	6	442	452
Magnesium	7439-95-4	1	mg/L	1390	1350	2	1360	1380
Sodium	7440-23-5	1	mg/L	10600	10300	7	10400	10700
Potassium	7440-09-7	1	mg/L	505	487	3	491	497
EN055: Ionic Balance								
Total Anions	---	0.01	meq/L	513	501	0.78	507	503
Total Cations	---	0.01	meq/L	611	594	0.84	599	614
Ionic Balance	---	0.01	%	8.71	8.44	---	8.29	9.95
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.05	<0.05	0.15	<0.05	<0.05
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.05	<0.05	0.19	<0.05	<0.05
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.05	<0.05	1.98	<0.05	<0.05
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.05	<0.05	0.12	<0.05	<0.05
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.05	<0.05	2.30	<0.05	<0.05
Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.02	µg/L	<0.05	<0.05	0.03	<0.05	<0.05
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW16-06	SW16-07	SW16-08	SW16-09	SW16-10
				Client sampling date / time	[25-Jul-2016]	[25-Jul-2016]	[26-Jul-2016]	[26-Jul-2016]	[25-Jul-2016]
Compound	CAS Number	LOR	Unit		EB1619114-012	EB1619114-013	EB1619114-014	EB1619114-015	EB1619114-016
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.05	<0.05	0.13	<0.05	<0.05
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.05	<0.05	0.46	<0.05	<0.05
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.05	<0.05	0.14	<0.05	<0.05
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.05	<0.05	0.22	<0.05	<0.05
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.05	<0.05	0.05	<0.05	<0.05
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.05	<0.05	0.09	<0.05	<0.05
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.05	<0.05	0.07	<0.05	<0.05
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.05	<0.05	<0.02	<0.05	<0.05
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.05	<0.05	<0.02	<0.05	<0.05
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.12	<0.12	<0.05	<0.12	<0.12
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.05	<0.05	<0.02	<0.05	<0.05
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.12	<0.12	<0.05	<0.12	<0.12
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.12	<0.12	<0.05	<0.12	<0.12
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L		<0.12	<0.12	<0.05	<0.12	<0.12
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.12	<0.12	<0.05	<0.12	<0.12
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.05	<0.05	<0.02	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.05	<0.05	<0.02	<0.05	<0.05
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW16-06	SW16-07	SW16-08	SW16-09	SW16-10
				Client sampling date / time	[25-Jul-2016]	[25-Jul-2016]	[26-Jul-2016]	[26-Jul-2016]	[25-Jul-2016]
Compound	CAS Number	LOR	Unit		EB1619114-012	EB1619114-013	EB1619114-014	EB1619114-015	EB1619114-016
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	0.08	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	---	0.01	µg/L		<0.05	<0.05	6.01	<0.05	<0.05
Sum of PFAS (Swedish Water Quality Guideline plus 8:2-FTS)	---	0.01	µg/L		<0.05	<0.05	5.60	<0.05	<0.05
Sum of PFHxS and PFOS	375-85-9/1763-23-1	0.01	µg/L		<0.05	<0.05	4.28	<0.05	<0.05
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.02	%		96.6	99.3	99.8	90.6	103

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	GW16-01	GW16-02	GW16-03	GW16-04	GW16-05
			Client sampling date / time	[25-Jul-2016]	[25-Jul-2016]	[28-Jul-2016]	[28-Jul-2016]	[25-Jul-2016]
Compound	CAS Number	LOR	Unit	EB1619114-017	EB1619114-018	EB1619114-019	EB1619114-020	EB1619114-021
				Result	Result	Result	Result	Result
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	---	10	mg/L	67	119	77	157	5210
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	32	58	3	54	440
Total Alkalinity as CaCO3	---	1	mg/L	32	58	3	54	440
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	4	13	5	29	632
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	12	24	19	25	2460
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	10	13	4	16	88
Magnesium	7439-95-4	1	mg/L	2	4	2	3	163
Sodium	7440-23-5	1	mg/L	12	21	12	25	1390
Potassium	7440-09-7	1	mg/L	1	1	<1	3	70
EN055: Ionic Balance								
Total Anions	---	0.01	meq/L	1.06	2.11	0.70	2.39	91.3
Total Cations	---	0.01	meq/L	1.21	1.92	0.89	2.21	80.0
Ionic Balance	---	0.01	%	---	---	---	---	6.60
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	0.18
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	0.12
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.02	0.07	0.21	0.07	1.42
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	0.07
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.04	0.07	0.17	0.09	1.39
Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW16-01	GW16-02	GW16-03	GW16-04	GW16-05
				Client sampling date / time	[25-Jul-2016]	[25-Jul-2016]	[28-Jul-2016]	[28-Jul-2016]	[25-Jul-2016]
Compound	CAS Number	LOR	Unit		EB1619114-017	EB1619114-018	EB1619114-019	EB1619114-020	EB1619114-021
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	**0.08**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	<0.01	**0.06**	**0.09**
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW16-01	GW16-02	GW16-03	GW16-04	GW16-05
				Client sampling date / time	[25-Jul-2016]	[25-Jul-2016]	[28-Jul-2016]	[28-Jul-2016]	[25-Jul-2016]
Compound	CAS Number	LOR	Unit		EB1619114-017	EB1619114-018	EB1619114-019	EB1619114-020	EB1619114-021
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	---	0.01	µg/L		0.06	0.14	0.38	0.22	3.35
Sum of PFAS (Swedish Water Quality Guideline plus 8:2-FTS)	---	0.01	µg/L		0.06	0.14	0.38	0.22	3.16
Sum of PFHxS and PFOS	375-85-9/1763-23-1	0.01	µg/L		0.06	0.14	0.38	0.16	2.81
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.02	%		105	97.2	93.8	96.0	98.7

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GDCA16	BH40	BH13	MB17	MW4
				Client sampling date / time	[25-Jul-2016]	[26-Jul-2016]	[26-Jul-2016]	[26-Jul-2016]	[26-Jul-2016]
Compound	CAS Number	LOR	Unit		EB1619114-022	EB1619114-023	EB1619114-024	EB1619114-025	EB1619114-026
					Result	Result	Result	Result	Result
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	---	10	mg/L		618	72	86	236	1380
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		437	38	42	47	187
Total Alkalinity as CaCO3	---	1	mg/L		437	38	42	47	187
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		4	4	<5	55	731
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		95	8	8	26	72
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		124	12	12	28	260
Magnesium	7439-95-4	1	mg/L		16	1	2	5	41
Sodium	7440-23-5	1	mg/L		47	5	6	18	42
Potassium	7440-09-7	1	mg/L		8	<1	<1	2	6
EN055: Ionic Balance									
Total Anions	---	0.01	meq/L		11.5	1.07	1.06	2.82	21.0
Total Cations	---	0.01	meq/L		9.75	0.90	1.02	2.64	18.3
Ionic Balance	---	0.01	%		8.17	---	---	---	6.72
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		0.37	<0.02	2.49	0.23	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		0.22	<0.02	1.87	0.16	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		0.58	<0.02	22.0	1.48	<0.02
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	0.67	0.05	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		0.07	0.03	12.5	1.48	0.02
Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.02	µg/L		<0.02	<0.02	0.18	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GDCA16	BH40	BH13	MB17	MW4
				Client sampling date / time	[25-Jul-2016]	[26-Jul-2016]	[26-Jul-2016]	[26-Jul-2016]	[26-Jul-2016]
Compound	CAS Number	LOR	Unit		EB1619114-022	EB1619114-023	EB1619114-024	EB1619114-025	EB1619114-026
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**0.04**	<0.02	**2.76**	**0.04**	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**0.12**	<0.02	**5.69**	**0.12**	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	**2.97**	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	**6.04**	**0.05**	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.02	**0.88**	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.02	**0.48**	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GDCA16	BH40	BH13	MB17	MW4
				Client sampling date / time	[25-Jul-2016]	[26-Jul-2016]	[26-Jul-2016]	[26-Jul-2016]	[26-Jul-2016]
Compound	CAS Number	LOR	Unit		EB1619114-022	EB1619114-023	EB1619114-024	EB1619114-025	EB1619114-026
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	0.42	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	---	0.01	µg/L		1.40	0.03	59.0	3.61	0.02
Sum of PFAS (Swedish Water Quality Guideline plus 8:2-FTS)	---	0.01	µg/L		1.18	0.03	56.2	3.40	0.02
Sum of PFHxS and PFOS	375-85-9/1763-23-1	0.01	µg/L		0.65	0.03	34.6	2.96	0.02
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.02	%		99.6	99.4	90.6	95.0	108

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW11	MB24A	GW1	MWA	SW-QA1
				Client sampling date / time	[27-Jul-2016]	[27-Jul-2016]	[27-Jul-2016]	[28-Jul-2016]	[25-Jul-2016]
Compound	CAS Number	LOR	Unit		EB1619114-028	EB1619114-029	EB1619114-030	EB1619114-031	EB1619114-033
					Result	Result	Result	Result	Result
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	---	10	mg/L		82	25900	641	62	---
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	---
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	---
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		<1	122	133	8	---
Total Alkalinity as CaCO3	---	1	mg/L		<1	122	133	8	---
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		<5	2250	102	<5	---
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		9	14800	82	15	---
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		1	393	49	2	---
Magnesium	7439-95-4	1	mg/L		<1	1260	19	2	---
Sodium	7440-23-5	1	mg/L		5	9630	54	10	---
Potassium	7440-09-7	1	mg/L		<1	422	14	<1	---
EN055: Ionic Balance									
Total Anions	---	0.01	meq/L		0.25	467	7.09	0.58	---
Total Cations	---	0.01	meq/L		0.27	553	6.72	0.70	---
Ionic Balance	---	0.01	%		---	8.44	2.73	---	---
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		0.04	<0.05	<0.02	<0.02	<0.05
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		0.11	<0.05	<0.02	<0.02	<0.05
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L		1.29	<0.05	0.09	<0.02	<0.05
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		0.07	<0.05	<0.02	<0.02	<0.05
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		3.31	<0.05	0.31	0.01	<0.05
Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.02	µg/L		<0.02	<0.05	<0.02	<0.02	<0.05
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L		<0.1	<0.1	<0.1	<0.1	<0.1

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW11	MB24A	GW1	MWA	SW-QA1
				Client sampling date / time	[27-Jul-2016]	[27-Jul-2016]	[27-Jul-2016]	[28-Jul-2016]	[25-Jul-2016]
Compound	CAS Number	LOR	Unit		EB1619114-028	EB1619114-029	EB1619114-030	EB1619114-031	EB1619114-033
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**0.02**	<0.05	**0.11**	<0.02	<0.05
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**0.08**	<0.05	**0.08**	<0.02	<0.05
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.05	**0.04**	<0.02	<0.05
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**0.03**	<0.05	**0.20**	<0.01	<0.05
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	<0.05	<0.02	<0.02	<0.05
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<0.02	<0.05	<0.02	<0.02	<0.05
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.05	<0.02	<0.02	<0.05
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.05	<0.02	<0.02	<0.05
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.05	<0.02	<0.02	<0.05
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.12	<0.05	<0.05	<0.12
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.05	<0.02	<0.02	<0.05
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.12	<0.05	<0.05	<0.12
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.12	<0.05	<0.05	<0.12
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L		<0.05	<0.12	<0.05	<0.05	<0.12
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.12	<0.05	<0.05	<0.12
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.05	<0.02	<0.02	<0.05
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.05	<0.02	<0.02	<0.05
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW11	MB24A	GW1	MWA	SW-QA1
				Client sampling date / time	[27-Jul-2016]	[27-Jul-2016]	[27-Jul-2016]	[28-Jul-2016]	[25-Jul-2016]
Compound	CAS Number	LOR	Unit		EB1619114-028	EB1619114-029	EB1619114-030	EB1619114-031	EB1619114-033
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	---	0.01	µg/L		4.95	<0.05	0.83	0.01	<0.05
Sum of PFAS (Swedish Water Quality Guideline plus 8:2-FTS)	---	0.01	µg/L		4.77	<0.05	0.83	0.01	<0.05
Sum of PFHxS and PFOS	375-85-9/1763-23-1	0.01	µg/L		4.60	<0.05	0.40	0.01	<0.05
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.02	%		110	100	109	98.2	91.4

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	GW-QA1	GCAPL1	---	---	---
			Client sampling date / time	[26-Jul-2016]	[27-Jul-2016]	---	---	---
Compound	CAS Number	LOR	Unit	EB1619114-034	EB1619114-035	-----	-----	-----
				Result	Result	---	---	---
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	---	10	mg/L	65	275	---	---	---
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	---	---	---
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	---	---	---
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	42	42	---	---	---
Total Alkalinity as CaCO3	---	1	mg/L	42	42	---	---	---
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<5	60	---	---	---
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	8	27	---	---	---
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	13	34	---	---	---
Magnesium	7439-95-4	1	mg/L	2	5	---	---	---
Sodium	7440-23-5	1	mg/L	6	18	---	---	---
Potassium	7440-09-7	1	mg/L	<1	2	---	---	---
EN055: Ionic Balance								
Total Anions	---	0.01	meq/L	1.06	2.85	---	---	---
Total Cations	---	0.01	meq/L	1.07	2.94	---	---	---
Ionic Balance	---	0.01	%	---	---	---	---	---
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	2.66	0.27	---	---	---
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	1.99	0.16	---	---	---
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	22.5	1.76	---	---	---
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.69	0.04	---	---	---
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	12.8	8.54	---	---	---
Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.02	µg/L	0.22	<0.02	---	---	---
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	---	---	---

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-QA1	GCAPL1	---	---	---
				Client sampling date / time	[26-Jul-2016]	[27-Jul-2016]	---	---	---
Compound	CAS Number	LOR	Unit		EB1619114-034	EB1619114-035	---	---	---
					Result	Result	---	---	---
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**2.60**	**0.03**	---	---	---
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**5.18**	**0.09**	---	---	---
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**2.78**	<0.02	---	---	---
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**6.06**	**0.03**	---	---	---
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		**0.88**	<0.02	---	---	---
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		**0.46**	<0.02	---	---	---
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<0.02	<0.02	---	---	---
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<0.02	<0.02	---	---	---
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<0.02	<0.02	---	---	---
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<0.05	<0.05	---	---	---
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<0.02	<0.02	---	---	---
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<0.05	<0.05	---	---	---
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	---	---	---
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L		<0.05	<0.05	---	---	---
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<0.05	<0.05	---	---	---
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<0.02	<0.02	---	---	---
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<0.02	<0.02	---	---	---
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	---	---	---
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	---	---	---

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW-QA1	GCAPL1	---	---	---
				Client sampling date / time	[26-Jul-2016]	[27-Jul-2016]	---	---	---
Compound	CAS Number	LOR	Unit		EB1619114-034	EB1619114-035	-----	-----	-----
					Result	Result	---	---	---
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		**0.41**	<0.05	---	---	---
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	---	---	---
EP231P: PFAS Sums									
Sum of PFAS	---	0.01	µg/L		**59.2**	**10.9**	---	---	---
Sum of PFAS (Swedish Water Quality Guideline plus 8:2-FTS)	---	0.01	µg/L		**56.3**	**10.7**	---	---	---
Sum of PFHxS and PFOS	375-85-9/1763-23-1	0.01	µg/L		**35.3**	**10.3**	---	---	---
EP231S: PFAS Surrogate									
13C4-PFOS	---	0.02	%		**102**	**108**	---	---	---

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	—	70	130

Sub-Matrix: **WATER**

Compound	CAS Number	Recovery Limits (%) Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	—	60	130

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EB1619114**	Page	: 1 of 18
Amendment	: **1**		
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MS BERNICE NG	Contact	: Vanessa Turnbull
Address	: GPO BOX 668 BRISBANE QLD, AUSTRALIA 4001	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 3316 3000	Telephone	: 61-7-3552 8660
Project	: 3134071 - ASA Gold Coast Airport	Date Samples Received	: 28-Jul-2016
Order number	: ----	Date Analysis Commenced	: 29-Jul-2016
C-O-C number	: ----	Issue Date	: 18-Aug-2016
Sampler	: ----		
Site	: ----		
Quote number	: ----		
No. of samples received	: 34		
No. of samples analysed	: 34		

NATA Accredited Laboratory 825
Accredited for compliance with
ISO/IEC 17025.

NATA
WORLD RECOGNISED ACCREDITATION

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
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General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA002 : pH (Soils) (QC Lot: 533839)									
EB1619114-001	SS1	EA002: pH Value	---	0.1	pH Unit	4.9	4.9	0.00	0% - 20%
EA010: Conductivity (QC Lot: 533840)									
EB1619114-001	SS1	EA010: Electrical Conductivity @ 25°C	---	1	µS/cm	10	10	0.00	0% - 50%
EA055: Moisture Content (QC Lot: 535970)									
EB1619114-001	SS1	EA055-103: Moisture Content (dried @ 103°C)	---	1	%	34.2	34.5	0.770	0% - 20%
EB1619205-010	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	---	1	%	5.6	6.2	9.87	No Limit
ED005: Exchange Acidity (QC Lot: 536169)									
EB1619114-001	SS1	ED005: Exchange Acidity	---	0.1	meq/100g	0.5	0.5	0.00	No Limit
		ED005: Exchangeable Aluminium	---	0.1	meq/100g	0.1	0.1	0.00	No Limit
ED007: Exchangeable Cations (QC Lot: 536168)									
EB1619114-001	SS1	ED007: Exchangeable Calcium	---	0.1	meq/100g	0.5	0.4	0.00	No Limit
		ED007: Exchangeable Magnesium	---	0.1	meq/100g	0.4	0.4	0.00	No Limit
		ED007: Exchangeable Potassium	---	0.1	meq/100g	<0.1	<0.1	0.00	No Limit
		ED007: Exchangeable Sodium	---	0.1	meq/100g	<0.1	<0.1	0.00	No Limit
ED093S: Soluble Major Cations (QC Lot: 533842)									
EB1619114-001	SS1	ED093S: Potassium	7440-09-7	10	mg/kg	<10	<10	0.00	No Limit
EG005T: Total Metals by ICP-AES (QC Lot: 535925)									
EB1618899-011	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	3	3	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	9	8	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG005T: Total Metals by ICP-AES (QC Lot: 535925) - continued									
EB1618899-011	Anonymous	EG005T: Aluminium	7429-90-5	50	mg/kg	4030	4390	8.44	0% - 20%
		EG005T: Iron	7439-89-6	50	mg/kg	1320	1210	8.54	0% - 20%
EB1618899-001	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	31	37	16.2	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	5	5	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	10	10	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	6	7	16.2	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	15	15	0.00	No Limit
		EG005T: Aluminium	7429-90-5	50	mg/kg	11800	12000	1.49	0% - 20%
		EG005T: Iron	7439-89-6	50	mg/kg	24200	# 34000	33.6	0% - 20%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 535928)									
EB1619114-001	SS1	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EB1619170-004	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP003: Total Organic Carbon (TOC) in Soil (QC Lot: 535351)									
EB1619114-001	SS1	EP003: Total Organic Carbon	---	0.02	%	2.53	2.44	3.42	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 537035)									
EB1619114-001	SS1	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0008	0.0008	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 537035)									
EB1619114-001	SS1	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0003	0.0003	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 537035)									
EB1619114-001	SS1	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 537035) - continued									
EB1619114-001	SS1	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	0.0008	<0.0005	40.1	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 537035)									
EB1619114-001	SS1	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 533165)									
EB1619114-007	SW16-01	EA015H: Total Dissolved Solids @180°C	---	10	mg/L	266	263	1.26	0% - 20%
EB1619114-016	SW16-10	EA015H: Total Dissolved Solids @180°C	---	10	mg/L	30600	32800	6.94	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 533166)									
EB1619114-028	MW11	EA015H: Total Dissolved Solids @180°C	---	10	mg/L	82	79	4.02	No Limit
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 534535)									
EB1619114-035	GCAPL1	EA015H: Total Dissolved Solids @180°C	---	10	mg/L	275	239	13.9	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 533347)									
EB1619114-007	SW16-01	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	85	86	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	---	1	mg/L	85	86	0.00	0% - 20%
EB1619114-017	GW16-01	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	32	32	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	---	1	mg/L	32	32	0.00	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 533348)									
EB1619114-028	MW11	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED037P: Alkalinity by PC Titrator (QC Lot: 533348) - continued									
EB1619114-028	MW11	ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	---	1	mg/L	<1	<1	0.00	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 534612)									
ET1600233-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	43	40	8.27	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	---	1	mg/L	43	40	8.27	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 534232)									
EB1619114-007	SW16-01	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	28	28	0.00	0% - 20%
EB1619114-016	SW16-10	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2500	2520	0.427	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 534235)									
EB1619114-028	MW11	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<5	<5	0.00	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 534233)									
EB1619114-007	SW16-01	ED045G: Chloride	16887-00-6	1	mg/L	70	71	0.00	0% - 20%
EB1619114-016	SW16-10	ED045G: Chloride	16887-00-6	1	mg/L	15900	15900	0.259	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 534234)									
EB1619114-028	MW11	ED045G: Chloride	16887-00-6	1	mg/L	9	9	0.00	No Limit
ED093F: Dissolved Major Cations (QC Lot: 534679)									
EB1619114-007	SW16-01	ED093F: Calcium	7440-70-2	1	mg/L	26	26	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	6	6	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	48	47	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	2	2	0.00	No Limit
EB1619114-016	SW16-10	ED093F: Calcium	7440-70-2	1	mg/L	452	431	4.85	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1380	1320	3.90	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	10700	10300	3.95	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	497	475	4.40	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 534680)									
EB1619114-028	MW11	ED093F: Calcium	7440-70-2	1	mg/L	1	1	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	5	5	0.00	No Limit
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
ED093F: Dissolved Major Cations (QC Lot: 534739)									
EB1619114-035	GCAPL1	ED093F: Calcium	7440-70-2	1	mg/L	34	34	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	5	5	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	18	18	0.00	0% - 50%
		ED093F: Potassium	7440-09-7	1	mg/L	2	2	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 537036)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 537036) - continued									
EB1619114-007	SW16-01	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.06	0.05	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.04	0.04	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EB1619114-017	GW16-01	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.04	0.04	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.02	0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 537037)									
EB1619114-028	MW11	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	3.31	3.31	0.00	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.04	0.04	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.11	0.10	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	1.29	1.30	0.00	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.07	0.07	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 537036)									
EB1619114-007	SW16-01	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EB1619114-017	GW16-01	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 537036) - continued									
EB1619114-017	GW16-01	EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 537037)									
EB1619114-028	MW11	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.03	0.03	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.02	0.03	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.08	0.09	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 537036)									
EB1619114-007	SW16-01	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EB1619114-017	GW16-01	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 537037)									
EB1619114-028	MW11	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 537036)									
EB1619114-007	SW16-01	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EB1619114-017	GW16-01	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 537037)									
EB1619114-028	MW11	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 537036)									
EB1619114-007	SW16-01	EP231X: Sum of PFAS	---	0.01	µg/L	0.10	0.09	10.5	0% - 50%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231P: PFAS Sums (QC Lot: 537036) - continued									
EB1619114-017	GW16-01	EP231X: Sum of PFAS	---	0.01	µg/L	0.06	0.06	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 537037)									
EB1619114-028	MW11	EP231X: Sum of PFAS	---	0.01	µg/L	4.95	4.97	0.403	0% - 20%

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA002 : pH (Soils) (QCLot: 533839)								
EA002: pH Value	---	---	pH Unit	---	4 pH Unit	101	98	102
				---	7 pH Unit	100	98	102
EA010: Conductivity (QCLot: 533840)								
EA010: Electrical Conductivity @ 25°C	---	1	µS/cm	<1	1412 µS/cm	101	97	103
ED005: Exchange Acidity (QCLot: 536169)								
ED005: Exchange Acidity	---	0.1	meq/100g	<0.1	---	---	---	---
ED005: Exchangeable Aluminium	---	0.1	meq/100g	<0.1	---	---	---	---
ED007: Exchangeable Cations (QCLot: 536168)								
ED007: Exchangeable Calcium	---	0.1	meq/100g	<0.1	12.8121 meq/100g	96.3	79	113
ED007: Exchangeable Magnesium	---	0.1	meq/100g	<0.1	9.6617 meq/100g	100	85	115
ED007: Exchangeable Potassium	---	0.1	meq/100g	<0.1	0.3712 meq/100g	105	70	122
ED007: Exchangeable Sodium	---	0.1	meq/100g	<0.1	0.818 meq/100g	93.0	76	112
ED007: Cation Exchange Capacity	---	0.1	meq/100g	<0.1	23.663 meq/100g	96.5	82	112
ED040S: Soluble Major Anions (QCLot: 533841)								
ED040S: Silicon	7440-21-3	1	mg/kg	<1	---	---	---	---
ED093S: Soluble Major Cations (QCLot: 533842)								
ED093S: Potassium	7440-09-7	10	mg/kg	<10	500 mg/kg	101	80	120
EG005T: Total Metals by ICP-AES (QCLot: 535925)								
EG005T: Aluminium	7429-90-5	50	mg/kg	<50	---	---	---	---
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	118.9 mg/kg	101	84	123
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	1.87125 mg/kg	106	88	117
EG005T: Chromium	7440-47-3	2	mg/kg	<2	22.7 mg/kg	100	83	125
EG005T: Copper	7440-50-8	5	mg/kg	<5	55 mg/kg	110	86	122
EG005T: Iron	7439-89-6	50	mg/kg	<50	34900 mg/kg	103	70	120
EG005T: Lead	7439-92-1	5	mg/kg	<5	72.1 mg/kg	101	84	119
EG005T: Nickel	7440-02-0	2	mg/kg	<2	16.6 mg/kg	102	89	126
EG005T: Zinc	7440-66-6	5	mg/kg	<5	182.3 mg/kg	104	87	127
EG035T: Total Recoverable Mercury by FIMS (QCLot: 535928)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	0.09821 mg/kg	110	78	122
EP003: Total Organic Carbon (TOC) in Soil (QCLot: 535351)								
EP003: Total Organic Carbon	---	0.02	%	<0.02	100 %	101	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 537035)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.0	57	121

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 537035) - continued								
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.7	55	125
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.1	52	126
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.9	54	123
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.3	55	127
EP231X: Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.9	54	125
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 537035)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00125 mg/kg	96.0	52	128
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	97.2	54	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	81.3	58	127
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	111	57	128
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	103	60	134
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	110	63	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	55	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	109	62	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	106	53	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	111	49	129
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	93.0	59	129
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 537035)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.5	52	132
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	92.0	65	126
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	109	64	126
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	85.8	63	124
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	91.6	58	125
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	81.8	61	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	81.9	55	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 537035)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	86.3	54	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	103	61	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	118	62	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	119	60	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 533165)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 533165) - continued								
EA015H: Total Dissolved Solids @180°C	---	10	mg/L	<10	293 mg/L	100	88	112
				<10	2000 mg/L	91.8	88	112
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 533166)								
EA015H: Total Dissolved Solids @180°C	---	10	mg/L	<10	293 mg/L	101	88	112
				<10	2000 mg/L	92.3	88	112
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 534535)								
EA015H: Total Dissolved Solids @180°C	---	10	mg/L	<10	293 mg/L	112	88	112
				<10	2000 mg/L	93.7	88	112
ED037P: Alkalinity by PC Titrator (QCLot: 533347)								
ED037-P: Total Alkalinity as CaCO3	---	---	mg/L	---	200 mg/L	108	80	120
ED037P: Alkalinity by PC Titrator (QCLot: 533348)								
ED037-P: Total Alkalinity as CaCO3	---	---	mg/L	---	200 mg/L	101	80	120
ED037P: Alkalinity by PC Titrator (QCLot: 534612)								
ED037-P: Total Alkalinity as CaCO3	---	---	mg/L	---	200 mg/L	102	80	120
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 534232)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	106	85	118
				<1	100 mg/L	99.3	85	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 534235)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	107	85	118
				<1	100 mg/L	99.0	85	118
ED045G: Chloride by Discrete Analyser (QCLot: 534233)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	94.4	90	115
				<1	1000 mg/L	98.0	90	115
ED045G: Chloride by Discrete Analyser (QCLot: 534234)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	95.5	90	115
				<1	1000 mg/L	99.0	90	115
ED093F: Dissolved Major Cations (QCLot: 534679)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	---	---	---	---
ED093F: Magnesium	7439-95-4	1	mg/L	<1	---	---	---	---
ED093F: Sodium	7440-23-5	1	mg/L	<1	---	---	---	---
ED093F: Potassium	7440-09-7	1	mg/L	<1	---	---	---	---
ED093F: Dissolved Major Cations (QCLot: 534680)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	---	---	---	---
ED093F: Magnesium	7439-95-4	1	mg/L	<1	---	---	---	---
ED093F: Sodium	7440-23-5	1	mg/L	<1	---	---	---	---
ED093F: Potassium	7440-09-7	1	mg/L	<1	---	---	---	---
ED093F: Dissolved Major Cations (QCLot: 534739)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
ED093F: Dissolved Major Cations (QCLot: 534739) - continued								
ED093F: Calcium	7440-70-2	1	mg/L	<1	---	---	---	---
ED093F: Magnesium	7439-95-4	1	mg/L	<1	---	---	---	---
ED093F: Sodium	7440-23-5	1	mg/L	<1	---	---	---	---
ED093F: Potassium	7440-09-7	1	mg/L	<1	---	---	---	---
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 537036)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	88.6	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	105	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	110	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	115	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	111	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.02	µg/L	<0.02	0.5 µg/L	116	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 537037)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	88.0	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	100	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	119	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	118	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	113	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.02	µg/L	<0.02	0.5 µg/L	123	70	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 537036)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	0.5 µg/L	77.8	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	87.4	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	114	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	121	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	102	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	109	71	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	117	70	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	116	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	119	70	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	112	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	99.8	70	124
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 537037)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	0.5 µg/L	111	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	87.2	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	106	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	110	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	109	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	114	71	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	119	70	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report		
					Spike	Spike Recovery (%)	Recovery Limits (%)
				Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 537037) - continued								
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	104	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	106	70	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	112	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	99.0	70	124
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 537036)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	115	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	96.6	70	130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	106	70	129
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	1.25 µg/L	100	70	129
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	106	70	126
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	95.2	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	110	70	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 537037)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	109	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	103	70	130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	100	70	129
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	1.25 µg/L	97.5	70	129
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	85.9	70	126
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	104	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	113	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 537036)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	121	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	83.8	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	111	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	87.8	70	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 537037)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	91.8	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	107	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	106	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	114	70	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 535925)							
EB1618899-002	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	98.4	70	130
		EG005T: Cadmium	7440-43-9	25 mg/kg	99.2	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	93.5	70	130
		EG005T: Copper	7440-50-8	50 mg/kg	96.2	70	130
		EG005T: Lead	7439-92-1	50 mg/kg	95.9	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	77.9	70	130
		EG005T: Zinc	7440-66-6	50 mg/kg	81.1	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 535928)							
EB1619114-002	SS2	EG035T: Mercury	7439-97-6	2.5 mg/kg	120	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 537035)							
EB1619114-001	SS1	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	85.5	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	69.1	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	84.4	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	69.6	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	113	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.00125 mg/kg	79.7	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 537035)							
EB1619114-001	SS1	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00125 mg/kg	115	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	83.6	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	87.8	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	103	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	103	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	110	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	76.7	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	79.2	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	94.8	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	89.8	30	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	80.5	30	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 537035)							
EB1619114-001	SS1	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	74.6	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	95.0	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	80.9	50	130

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	Matrix Spike (MS) Report: SpikeRecovery(%) MS	Recovery Limits (%) Low	Recovery Limits (%) High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 537035) - continued							
EB1619114-001	SS1	EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.00312 mg/kg	82.8	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	85.6	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	100	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	82.7	30	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 537035)							
EB1619114-001	SS1	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	69.9	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	109	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	119	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	75.2	50	130

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	Matrix Spike (MS) Report: SpikeRecovery(%) MS	Recovery Limits (%) Low	Recovery Limits (%) High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 534232)							
EB1619114-008	SW16-02	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	20 mg/L	99.5	70	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 534235)							
EB1619114-029	MB24A	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	20 mg/L	# Not Determined	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 534233)							
EB1619114-008	SW16-02	ED045G: Chloride	16887-00-6	400 mg/L	97.7	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 534234)							
EB1619114-029	MB24A	ED045G: Chloride	16887-00-6	400 mg/L	# Not Determined	70	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 537036)							
EB1619114-007	SW16-01	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	108	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	103	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	103	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	111	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	108	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.5 µg/L	107	50	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 537037)							
EB1619114-028	MW11	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	99.2	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	105	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	112	50	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 537037) - continued							
EB1619114-028	MW11	EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	114	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	# Not Determined	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	67906-42-7	0.5 µg/L	114	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 537036)							
EB1619114-007	SW16-01	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.5 µg/L	97.4	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	93.4	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	84.0	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	81.6	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	106	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	97.4	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	109	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	120	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	85.2	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	94.4	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	107	50	130
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 537037)							
EB1619114-028	MW11	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.5 µg/L	76.4	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	92.8	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	88.2	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	99.2	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	115	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	105	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	111	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	124	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	100	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	107	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	88.6	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 537036)							
EB1619114-007	SW16-01	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	107	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	96.8	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	97.6	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	1.25 µg/L	92.5	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	83.7	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	92.4	50	130

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	Matrix Spike (MS) Report: SpikeRecovery(%) MS	Matrix Spike (MS) Report: Recovery Limits (%) Low	Matrix Spike (MS) Report: Recovery Limits (%) High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 537036) - continued							
EB1619114-007	SW16-01	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	111	50	130
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 537037)							
EB1619114-028	MW11	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	108	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	100	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	96.0	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	1.25 µg/L	89.9	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	89.5	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	92.4	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	108	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 537036)							
EB1619114-007	SW16-01	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	99.0	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	118	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	108	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	75.2	50	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 537037)							
EB1619114-028	MW11	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	106	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	113	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	116	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	85.2	50	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EB1619114**	Page	: 1 of 14
Amendment	: **1**		
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MS BERNICE NG	Telephone	: 61-7-3552 8660
Project	: 3134071 - ASA Gold Coast Airport	Date Samples Received	: 28-Jul-2016
Site	: ---	Issue Date	: 18-Aug-2016
Sampler	: ---	No. of samples received	: 34
Order number	: ---	No. of samples analysed	: 34

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Duplicate outliers exist - please see following pages for full details.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Duplicate (DUP) RPDs							
EG005T: Total Metals by ICP-AES	EB1618899–001	Anonymous	**Iron**	7439-89-6	33.6 %	0% - 20%	**RPD exceeds LOR based limits**

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EB1619114–029	MB24A	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	—	**MS recovery not determined, background level greater than or equal to 4x spike level.**
ED045G: Chloride by Discrete Analyser	EB1619114–029	MB24A	**Chloride**	16887-00-6	Not Determined	—	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	EB1619114–028	MW11	**Perfluorooctane sulfonic acid (PFOS)**	1763-23-1	Not Determined	—	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Frequency of Quality Control Samples

Matrix: **SOIL**

Quality Control Sample Type / Method	Count QC	Count Regular	Rate (%) Actual	Rate (%) Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
Major Anions - Soluble	0	7	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)					
Major Anions - Soluble	0	7	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / *Container / Client Sample ID(s)*	*Sample Date*	*Extraction / Preparation* Date extracted	Due for extraction	Evaluation	*Analysis* Date analysed	Due for analysis	Evaluation

Matrix: **SOIL**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA002 : pH (Soils)							
Soil Glass Jar - Unpreserved (EA002) SS3, SS4, SS5, SS6	**25-Jul-2016**	**29-Jul-2016**	01-Aug-2016	✓	**29-Jul-2016**	29-Jul-2016	✓
Soil Glass Jar - Unpreserved (EA002) SS1, SS2, SS-QA1	**26-Jul-2016**	**29-Jul-2016**	02-Aug-2016	✓	**29-Jul-2016**	29-Jul-2016	✓
EA010: Conductivity							
Soil Glass Jar - Unpreserved (EA010) SS3, SS4, SS5, SS6	**25-Jul-2016**	**29-Jul-2016**	01-Aug-2016	✓	**29-Jul-2016**	26-Aug-2016	✓
Soil Glass Jar - Unpreserved (EA010) SS1, SS2, SS-QA1	**26-Jul-2016**	**29-Jul-2016**	02-Aug-2016	✓	**29-Jul-2016**	26-Aug-2016	✓
EA055: Moisture Content							
Soil Glass Jar - Unpreserved (EA055-103) SS3, SS4, SS5, SS6	**25-Jul-2016**	---	---	---	**01-Aug-2016**	08-Aug-2016	✓
Soil Glass Jar - Unpreserved (EA055-103) SS1, SS2, SS-QA1	**26-Jul-2016**	---	---	---	**01-Aug-2016**	09-Aug-2016	✓
ED005: Exchange Acidity							
Soil Glass Jar - Unpreserved (ED005) SS3, SS4	**25-Jul-2016**	**03-Aug-2016**	22-Aug-2016	✓	**03-Aug-2016**	22-Aug-2016	✓
Soil Glass Jar - Unpreserved (ED005) SS1, SS2, SS-QA1	**26-Jul-2016**	**03-Aug-2016**	23-Aug-2016	✓	**03-Aug-2016**	23-Aug-2016	✓
ED007: Exchangeable Cations							
Soil Glass Jar - Unpreserved (ED007) SS3, SS4, SS5, SS6	**25-Jul-2016**	**03-Aug-2016**	22-Aug-2016	✓	**03-Aug-2016**	22-Aug-2016	✓
Soil Glass Jar - Unpreserved (ED007) SS1, SS2, SS-QA1	**26-Jul-2016**	**03-Aug-2016**	23-Aug-2016	✓	**03-Aug-2016**	23-Aug-2016	✓
ED040S : Soluble Sulfate by ICPAES							
Soil Glass Jar - Unpreserved (ED040S) SS3, SS4, SS5, SS6	**25-Jul-2016**	**29-Jul-2016**	22-Aug-2016	✓	**01-Aug-2016**	26-Aug-2016	✓
Soil Glass Jar - Unpreserved (ED040S) SS1, SS2, SS-QA1	**26-Jul-2016**	**29-Jul-2016**	23-Aug-2016	✓	**01-Aug-2016**	26-Aug-2016	✓

Matrix: SOIL

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED093S: Soluble Major Cations							
Soil Glass Jar - Unpreserved (ED093S) SS3, SS4, SS5, SS6	25-Jul-2016	29-Jul-2016	21-Jan-2017	✓	01-Aug-2016	21-Jan-2017	✓
Soil Glass Jar - Unpreserved (ED093S) SS1, SS2, SS-QA1	26-Jul-2016	29-Jul-2016	22-Jan-2017	✓	01-Aug-2016	22-Jan-2017	✓
EG005T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T) SS3, SS4, SS5, SS6	25-Jul-2016	01-Aug-2016	21-Jan-2017	✓	01-Aug-2016	21-Jan-2017	✓
Soil Glass Jar - Unpreserved (EG005T) SS1, SS2, SS-QA1	26-Jul-2016	01-Aug-2016	22-Jan-2017	✓	01-Aug-2016	22-Jan-2017	✓
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T) SS3, SS4, SS5, SS6	25-Jul-2016	01-Aug-2016	22-Aug-2016	✓	02-Aug-2016	22-Aug-2016	✓
Soil Glass Jar - Unpreserved (EG035T) SS1, SS2, SS-QA1	26-Jul-2016	01-Aug-2016	23-Aug-2016	✓	02-Aug-2016	23-Aug-2016	✓
EP003: Total Organic Carbon (TOC) in Soil							
Soil Glass Jar - Unpreserved (EP003) SS3, SS4, SS5, SS6	25-Jul-2016	01-Aug-2016	22-Aug-2016	✓	01-Aug-2016	22-Aug-2016	✓
Soil Glass Jar - Unpreserved (EP003) SS1, SS2, SS-QA1	26-Jul-2016	01-Aug-2016	23-Aug-2016	✓	01-Aug-2016	23-Aug-2016	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X) SS3, SS4, SS5, SS6	25-Jul-2016	03-Aug-2016	21-Jan-2017	✓	03-Aug-2016	12-Sep-2016	✓
HDPE Soil Jar (EP231X) SS1, SS2, SS-QA1	26-Jul-2016	03-Aug-2016	22-Jan-2017	✓	03-Aug-2016	12-Sep-2016	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X) SS3, SS4, SS5, SS6	25-Jul-2016	03-Aug-2016	21-Jan-2017	✓	03-Aug-2016	12-Sep-2016	✓
HDPE Soil Jar (EP231X) SS1, SS2, SS-QA1	26-Jul-2016	03-Aug-2016	22-Jan-2017	✓	03-Aug-2016	12-Sep-2016	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X) SS3, SS4, SS5, SS6	**25-Jul-2016**	**03-Aug-2016**	21-Jan-2017	✓	**03-Aug-2016**	12-Sep-2016	✓
HDPE Soil Jar (EP231X) SS1, SS2, SS-QA1	**26-Jul-2016**	**03-Aug-2016**	22-Jan-2017	✓	**03-Aug-2016**	12-Sep-2016	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X) SS3, SS4, SS5, SS6	**25-Jul-2016**	**03-Aug-2016**	21-Jan-2017	✓	**03-Aug-2016**	12-Sep-2016	✓
HDPE Soil Jar (EP231X) SS1, SS2, SS-QA1	**26-Jul-2016**	**03-Aug-2016**	22-Jan-2017	✓	**03-Aug-2016**	12-Sep-2016	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X) SS3, SS4, SS5, SS6	**25-Jul-2016**	**03-Aug-2016**	21-Jan-2017	✓	**03-Aug-2016**	12-Sep-2016	✓
HDPE Soil Jar (EP231X) SS1, SS2, SS-QA1	**26-Jul-2016**	**03-Aug-2016**	22-Jan-2017	✓	**03-Aug-2016**	12-Sep-2016	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H)							
SW16-01, SW16-02, SW16-03, SW16-06, SW16-07, SW16-10, GW16-01, GW16-02, GW16-05, GDCA16	**25-Jul-2016**	---	---	---	**01-Aug-2016**	01-Aug-2016	✓
Clear Plastic Bottle - Natural (EA015H)							
SW16-08, SW16-09, BH40, BH13, MB17, MW4, GW-QA1	**26-Jul-2016**	---	---	---	**01-Aug-2016**	02-Aug-2016	✓
Clear Plastic Bottle - Natural (EA015H)							
SW16-04, SW16-05, MW11, MB24A, GW1	**27-Jul-2016**	---	---	---	**01-Aug-2016**	03-Aug-2016	✓
Clear Plastic Bottle - Natural (EA015H)							
GCAPL1	**27-Jul-2016**	---	---	---	**29-Jul-2016**	03-Aug-2016	✓
Clear Plastic Bottle - Natural (EA015H)							
GW16-03, GW16-04, MWA	**28-Jul-2016**	---	---	---	**01-Aug-2016**	04-Aug-2016	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
SW16-01, SW16-02, SW16-03, SW16-06, SW16-07, SW16-10, GW16-01, GW16-02, GW16-05, GDCA16	**25-Jul-2016**	---	---	---	**30-Jul-2016**	08-Aug-2016	✓
Clear Plastic Bottle - Natural (ED037-P)							
SW16-08, SW16-09, BH40, BH13, MB17, MW4, GW-QA1	**26-Jul-2016**	---	---	---	**30-Jul-2016**	09-Aug-2016	✓
Clear Plastic Bottle - Natural (ED037-P)							
SW16-04, SW16-05, MW11, MB24A, GW1, GCAPL1	**27-Jul-2016**	---	---	---	**30-Jul-2016**	10-Aug-2016	✓
Clear Plastic Bottle - Natural (ED037-P)							
GW16-03, GW16-04, MWA	**28-Jul-2016**	---	---	---	**30-Jul-2016**	11-Aug-2016	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G) SW16-01, SW16-02, SW16-03, SW16-06, SW16-07, SW16-10, GW16-01, GW16-02, GW16-05, GDCA16	**25-Jul-2016**	---	---	---	**29-Jul-2016**	22-Aug-2016	✓
Clear Plastic Bottle - Natural (ED041G) SW16-08, SW16-09, BH40, BH13, MB17, MW4, GW-QA1	**26-Jul-2016**	---	---	---	**29-Jul-2016**	23-Aug-2016	✓
Clear Plastic Bottle - Natural (ED041G) SW16-04, SW16-05, MW11, MB24A, GW1, GCAPL1	**27-Jul-2016**	---	---	---	**29-Jul-2016**	24-Aug-2016	✓
Clear Plastic Bottle - Natural (ED041G) GW16-03, GW16-04, MWA	**28-Jul-2016**	---	---	---	**29-Jul-2016**	25-Aug-2016	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G) SW16-01, SW16-02, SW16-03, SW16-06, SW16-07, SW16-10, GW16-01, GW16-02, GW16-05, GDCA16	**25-Jul-2016**	---	---	---	**29-Jul-2016**	22-Aug-2016	✓
Clear Plastic Bottle - Natural (ED045G) SW16-08, SW16-09, BH40, BH13, MB17, MW4, GW-QA1	**26-Jul-2016**	---	---	---	**29-Jul-2016**	23-Aug-2016	✓
Clear Plastic Bottle - Natural (ED045G) SW16-04, SW16-05, MW11, MB24A, GW1, GCAPL1	**27-Jul-2016**	---	---	---	**29-Jul-2016**	24-Aug-2016	✓
Clear Plastic Bottle - Natural (ED045G) GW16-03, GW16-04, MWA	**28-Jul-2016**	---	---	---	**29-Jul-2016**	25-Aug-2016	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
SW16-01, SW16-02, SW16-03, SW16-06, SW16-07, SW16-10, GW16-01, GW16-02, GW16-05, GDCA16	**25-Jul-2016**	---	---	---	**01-Aug-2016**	01-Aug-2016	✓
Clear Plastic Bottle - Natural (ED093F)							
SW16-08, SW16-09, BH40, BH13, MB17, MW4, GW-QA1	**26-Jul-2016**	---	---	---	**01-Aug-2016**	02-Aug-2016	✓
Clear Plastic Bottle - Natural (ED093F)							
SW16-04, SW16-05, MW11, MB24A, GW1, GCAPL1	**27-Jul-2016**	---	---	---	**01-Aug-2016**	03-Aug-2016	✓
Clear Plastic Bottle - Natural (ED093F)							
GW16-03, GW16-04, MWA	**28-Jul-2016**	---	---	---	**01-Aug-2016**	04-Aug-2016	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
SW16-01, SW16-02, SW16-03, SW16-06, SW16-07, SW16-10, GW16-01, GW16-02, GW16-05, GDCA16, SW-QA1	**25-Jul-2016**	---	---	---	**03-Aug-2016**	21-Jan-2017	✓
HDPE (no PTFE) (EP231X)							
SW16-08, SW16-09, BH40, BH13, MB17, MW4, GW-QA1	**26-Jul-2016**	---	---	---	**03-Aug-2016**	22-Jan-2017	✓
HDPE (no PTFE) (EP231X)							
SW16-04, SW16-05, MW11, MB24A, GW1, GCAPL1	**27-Jul-2016**	---	---	---	**03-Aug-2016**	23-Jan-2017	✓
HDPE (no PTFE) (EP231X)							
GW16-03, GW16-04, MWA	**28-Jul-2016**	---	---	---	**03-Aug-2016**	24-Jan-2017	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X) SW16-01, SW16-02, SW16-03, SW16-06, SW16-07, SW16-10, GW16-01, GW16-02, GW16-05, GDCA16, SW-QA1	**25-Jul-2016**	---	---	---	**03-Aug-2016**	21-Jan-2017	✓
HDPE (no PTFE) (EP231X) SW16-08, SW16-09, BH40, BH13, MB17, MW4, GW-QA1	**26-Jul-2016**	---	---	---	**03-Aug-2016**	22-Jan-2017	✓
HDPE (no PTFE) (EP231X) SW16-04, SW16-05, MW11, MB24A, GW1, GCAPL1	**27-Jul-2016**	---	---	---	**03-Aug-2016**	23-Jan-2017	✓
HDPE (no PTFE) (EP231X) GW16-03, GW16-04, MWA	**28-Jul-2016**	---	---	---	**03-Aug-2016**	24-Jan-2017	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X) SW16-01, SW16-02, SW16-03, SW16-06, SW16-07, SW16-10, GW16-01, GW16-02, GW16-05, GDCA16, SW-QA1	**25-Jul-2016**	---	---	---	**03-Aug-2016**	21-Jan-2017	✓
HDPE (no PTFE) (EP231X) SW16-08, SW16-09, BH40, BH13, MB17, MW4, GW-QA1	**26-Jul-2016**	---	---	---	**03-Aug-2016**	22-Jan-2017	✓
HDPE (no PTFE) (EP231X) SW16-04, SW16-05, MW11, MB24A, GW1, GCAPL1	**27-Jul-2016**	---	---	---	**03-Aug-2016**	23-Jan-2017	✓
HDPE (no PTFE) (EP231X) GW16-03, GW16-04, MWA	**28-Jul-2016**	---	---	---	**03-Aug-2016**	24-Jan-2017	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X) SW16-01, SW16-02, SW16-03, SW16-06, SW16-07, SW16-10, GW16-01, GW16-02, GW16-05, GDCA16, SW-QA1	**25-Jul-2016**	---	---	---	**03-Aug-2016**	21-Jan-2017	✓
HDPE (no PTFE) (EP231X) SW16-08, SW16-09, BH40, BH13, MB17, MW4, GW-QA1	**26-Jul-2016**	---	---	---	**03-Aug-2016**	22-Jan-2017	✓
HDPE (no PTFE) (EP231X) SW16-04, SW16-05, MW11, MB24A, GW1, GCAPL1	**27-Jul-2016**	---	---	---	**03-Aug-2016**	23-Jan-2017	✓
HDPE (no PTFE) (EP231X) GW16-03, GW16-04, MWA	**28-Jul-2016**	---	---	---	**03-Aug-2016**	24-Jan-2017	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X) SW16-01, SW16-02, SW16-03, SW16-06, SW16-07, SW16-10, GW16-01, GW16-02, GW16-05, GDCA16, SW-QA1	**25-Jul-2016**	---	---	---	**03-Aug-2016**	21-Jan-2017	✓
HDPE (no PTFE) (EP231X) SW16-08, SW16-09, BH40, BH13, MB17, MW4, GW-QA1	**26-Jul-2016**	---	---	---	**03-Aug-2016**	22-Jan-2017	✓
HDPE (no PTFE) (EP231X) SW16-04, SW16-05, MW11, MB24A, GW1, GCAPL1	**27-Jul-2016**	---	---	---	**03-Aug-2016**	23-Jan-2017	✓
HDPE (no PTFE) (EP231X) GW16-03, GW16-04, MWA	**28-Jul-2016**	---	---	---	**03-Aug-2016**	24-Jan-2017	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: SOIL

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Cations - soluble by ICP-AES	ED093S	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Electrical Conductivity (1:5)	EA010	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Exchange Acidity by 1M Potassium Chloride	ED005	1	5	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations	ED007	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Anions - Soluble	ED040S	0	7	0.00	10.00	×	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055-103	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP003	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Cations - soluble by ICP-AES	ED093S	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Electrical Conductivity (1:5)	EA010	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations	ED007	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Anions - Soluble	ED040S	0	7	0.00	5.00	×	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	7	28.57	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP003	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Cations - soluble by ICP-AES	ED093S	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Electrical Conductivity (1:5)	EA010	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Exchange Acidity by 1M Potassium Chloride	ED005	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations	ED007	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Anions - Soluble	ED040S	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP003	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	4	31	12.90	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	3	26	11.54	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	4	26	15.38	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	27	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	3	26	11.54	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	26	15.38	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	3	31	9.68	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	26	15.38	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	27	7.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	26	15.38	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	6	26	23.08	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chloride by Discrete Analyser	ED045G	2	26	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	3	26	11.54	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	27	7.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	26	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	3	26	11.54	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	2	26	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	27	7.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	26	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH (1:5)	EA002	SOIL	In house: Referenced to APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM (2013) Schedule B(3) (Method 103)
Electrical Conductivity (1:5)	EA010	SOIL	In house: Referenced to APHA 2510. Conductivity is determined on soil samples using a 1:5 soil/water leach. This method is compliant with NEPM (2013) Schedule B(3) (Method 104)
Moisture Content	EA055-103	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 103-105 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Exchange Acidity by 1M Potassium Chloride	ED005	SOIL	In house: referenced to Rayment and Lyons, (2011), method 15G1. This method is unsuitable for near neutral and alkaline soils. NATA accreditation does not cover performance of this service.
Exchangeable Cations	ED007	SOIL	In house: Referenced to Rayment & Lyons (2011) Method 15A1. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM (2013) Schedule B(3) (Method 301)
Major Anions - Soluble	ED040S	SOIL	In house: Soluble Anions are determined off a 1:5 soil / water extract by ICPAES.
Cations - soluble by ICP-AES	ED093S	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010 (ICPAES) Water extracts of the soil are analyzed for major cations by ICPAES. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Total Organic Carbon	EP003	SOIL	In house C-IR17. Dried and pulverised sample is reacted with acid to remove inorganic Carbonates, then combusted in a LECO furnace in the presence of strong oxidants / catalysts. The evolved (Organic) Carbon (as CO2) is automaticaly measured by infra-red detector.
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-House. A portion of soil is extracted with MTBE. The extract is taken to dryness, made up in mobile phase. Analysis is by LC/MSMS, ESI Negative Mode using MRM.
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In house: Direct injection analysis of fresh waters after dilution (1:1) with methanol. Analysis by LC-Electrospray-MS-MS, Negative Mode using MRM.

Preparation Methods	Method	Matrix	Method Descriptions
Exchangeable Cations Preparation Method	ED007PR	SOIL	In house: Referenced to Rayment & Higginson (1992) method 15A1. A 1M NH4Cl extraction by end over end tumbling at a ratio of 1:20. There is no pretreatment for soluble salts. Extracts can be run by ICP for cations.
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of distilled water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Sample Extraction for PFAS	EP231-PR	SOIL	In house
Dry and Pulverise (up to 100g)	GEO30	SOIL	#

Rh. 21/7/16 1PM 5°C 5.5°C 10.6°C 8°C

E CN III AP CR # CON NOTES POST CODE MASS

GHD Pty Ltd ABN 39 008 488 373
145 Ann Street Brisbane QLD 4000 GPO Box 668 Brisbane Qld 4001 Australia
T 61 7 3316 3000 F 61 7 3316 3333 E brsmail@ghd.com W www.ghd.com

GHD CLIENTS|PEOPLE.PERFORMANCE

ANALYSIS REQUEST FORM/CHAIN OF CUSTODY DOCUMENTATION

PROJECT ID:	3134071	QUOTE:	~~GHD~~ BN/531/15
PROJECT:	ASA Gold Coast Airport		
CLIENT:	Airservices Australia		
POSTAL ADDRESS:	GPO Box 668, Brisbane 4001, QLD		
CONTACT:	Bernice Ng /Imogen Bird		
PHONE:	0432 289 398	FAX: 3316 3333	
EMAIL:	bernice.ng@ghd.com; imogen.bird@ghd.com; Therese.Hammond@ghd.com		
DATA NEEDED BY:	Standard		
REPORT FORMAT:	EMAIL		
EMAIL FORMAT:	EXCEL, ESDAT & PDF		

LABORATORY BATCH NO.:

FOR LAB USE ONLY

COOLER SEAL: Yes ..... No / Broken ..... Intact — COOLER TEMP: ..... deg.C

DESPATCHED TO: ~~GHD~~ ALS

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

QA02 → forward to MAT.

For analysis not covered in quote BN/531/15, please refer to GHD 2015 quote.

SAMPLE DATA

ANALYSIS REQUIRED

	SAMPLE ID	MATRIX	Date/Time	Bottle NO.	PRESERVATION	EP231 PFAS Extended list	TOC (EP003)	Total Iron	8 metals (S-2)	K, Al, Si	CEC	PSD	pH						HOLD	NOTES
1	GW16-01-0.2	S	18/7/16	2	ICE															
2	GW16-01-0.5				ICE	✓	✓	✓	✓	✓										
	QA02				ICE	✓														
3	GW16-01-1.0				ICE															
	GW16-01-2.0				ICE							✓								
	GW16-01-3.0				ICE	✓	✓	✓	✓	✓	✓		✓							
	GW16-01-4.0				ICE															
	GW16-02-0.2				ICE	✓	✓	✓	✓	✓										
	GW16-02-0.5				ICE															
	GW16-02-1.0				ICE															
	GW16-02-2.0				ICE															
	GW16-02-3.0				ICE	✓	✓	✓	✓	✓	✓		✓							
12	QA01				ICE	✓														
13	GW16-02-4.0				ICE															
					ICE															

1 = 250AUGS

CEC method dependent on pH result

RELINQUISHED BY: DATE: 20/7/16 TIME: 3900 qds

NAME: Bernice Ng OF: GHD

RECEIVED BY: NAME: QDO OF: QLS DATE: 20/7/16 TIME: 10:55

PLEASE EMAIL COMPLETED ANALYSIS REQUEST TO: bernice.ng@ghd.com; damien.morris@ghd.com

*Container Type and Preservative Codes: P = Neutral Plastic; N = Nitric Acid Preserved; C = Sodium Hydroxide Preserved; J = Solvent Washed Acid Rinced Jar; S = Solvent Washed Acid Rinced Glass Bottle; VC = Hydrochloric Acid Preserved Vial; VS = Sulfuric Acid Preserved Vial; BS = Sulfuric Acid Preserved Glass Bottle; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; O = Other.

S. BERDOUNI (ALS) 21/7/16 8:15

Environmental Division Brisbane
Work Order Reference
EB1618423

Telephone : +61-7-3243 7222

GHD CLIENTS|PEOPLE|PERFORMANCE

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ANALYSIS REQUEST FORM/CHAIN OF CUSTODY DOCUMENTATION

PROJECT ID:	3134071	QUOTE:	~~GHD 2015 quote~~ BN 531/15
PROJECT:	ASA Gold Coast Airport		
CLIENT:	Airservices Australia		
POSTAL ADDRESS:	GPO Box 668, Brisbane 4001, QLD		
CONTACT:	Bernice Ng /Imogen Bird		
PHONE:	0432 289 398	FAX: 3316 3333	
EMAIL:	bernice.ng@ghd.com; imogen.bird@ghd.com; Therese.Hammond@ghd.com		
DATA NEEDED BY:	Standard		
REPORT FORMAT:	EMAIL		
EMAIL FORMAT:	EXCEL, ESDAT & PDF		

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

LABORATORY BATCH NO.:

FOR LAB USE ONLY

COOLER SEAL: Yes ..... No / Broken ..... Intact

COOLER TEMP: ..... deg.C

DESPATCHED TO: ~~SGS~~ ALS

ANALYSIS REQUIRED

SAMPLE DATA

	SAMPLE ID	MATRIX	Date/Time	Bottle NO.	PRESERVATION	EP231 - PFC PFAS Extended (24)	TOC (EP003)	Total iron	N metals (S-2)	K, Al, Si	CEC	PSD	PH							HOLD	NOTES
14	GW16-03-0.2	S	18/7/16	2	ICE																
15	GW16-03-0.5	"	"	"	ICE																
16	GW16-03-1.0	"	"	"	ICE	✓	✓	✓	✓	✓	✓		✓								
17	GW16-03-2.0	"	"	"	ICE							✓									
18	GW16-03-3.0				ICE	✓	✓	✓	✓	✓	✓		✓								
19	GW16-04-0.2	S	19/7/16	2	ICE																
20	GW16-04-0.5	"	"	"	ICE	✓	✓	✓	✓	✓	✓		✓								
21	GW16-04-1.0	"	"	"	ICE																
22	GW16-04-2.0	"	"	"	ICE																
23	GW16-04-3.0	"	"	"	ICE																
24	GW16-04-4.0	"	"	"	ICE																
25	GW16-04-5.0	"	"	"	ICE	✓	✓	✓	✓	✓	✓		✓								
26	GW16-05-0.2	"	"	"	ICE	✓	✓	✓	✓	✓	✓		✓								
27	GW16-05-0.5	"	"	"	ICE																
28	GW16-05-1.0	"	"	"	ICE	✓	✓	✓	✓	✓	✓		✓								

CEC method dependson pH result

RELINQUISHED BY:

NAME: Bernice Ng DATE: 20/7/16

OF: GHD TIME: ~~0900 am~~

RECEIVED BY:

NAME: Dion

OF: ALS

DATE: 20/7/16

TIME: 10:55

PLEASE EMAIL COMPLETED ANALYSIS REQUEST TO: bernice.ng@ghd.com; damien.morris@ghd.com

*Container Type and Preservative Codes: P = Neutral Plastic; N = Nitric Acid Preserved; C = Sodium Hydroxide Preserved; J = Solvent Washed Acid Rinced Jar; S = Solvent Washed Acid Rinced Glass Bottle; VC = Hydrochloric Acid Preserved Vial; VS = Sulfuric Acid Preserved Vial; BS = Sulfuric Acid Preserved Glass Bottle; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; O = Other.

DBERNDT (ALS) 21/7/16 8:15

eurofins | mgt

ABN – 50 005 085 521 e.mail : EnviroSales@eurofins.com web : www.eurofins.com.au

Melbourne
3-5 Kingston Town Close
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Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
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Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Sample Receipt Advice

Company name:	**GHD Pty Ltd QLD**
Contact name:	Bernice Ng
Project name:	ASA GOLD COAST AIRPORT
Project ID:	3134071
COC number:	Not provided
Turn around time:	5 Day
Date/Time received:	Jul 21, 2016 1:00 PM
Eurofins | mgt reference:	**508843**

Sample information

- ☑ A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- ☑ Sample Temperature of a random sample selected from the batch as recorded by Eurofins | mgt Sample Receipt : 8 degrees Celsius.
- ☑ All samples have been received as described on the above COC.
- ☑ COC has been completed correctly.
- ☑ Attempt to chill was evident.
- ☑ Appropriately preserved sample containers have been used.
- ☑ All samples were received in good condition.
- ☑ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- ☑ Appropriate sample containers have been used.
- ☒ Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Contact notes

If you have any questions with respect to these samples please contact:

Mary Makarios on Phone : +61 3 8564 5000 or by e.mail: MaryMakarios@eurofins.com

Results will be delivered electronically via e.mail to Bernice Ng - Bernice.Ng@ghd.com.

eurofins | mgt

ABN – 50 005 085 521 e.mail : EnviroSales@eurofins.com web : www.eurofins.com.au

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NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Company Name:	GHD Pty Ltd QLD	**Order No.:**		**Received:**	Jul 21, 2016 1:00 PM
Address:	201 Charlotte St Brisbane QLD 4000	**Report #:**	508843	**Due:**	Jul 28, 2016
		Phone:	07 3316 3000	**Priority:**	5 Day
		Fax:	07 3316 3333	**Contact Name:**	Bernice Ng
Project Name:	ASA GOLD COAST AIRPORT				
Project ID:	3134071				

Eurofins | mgt Analytical Services Manager : Mary Makarios

Sample Detail						Per- and Polyfluorinated Alkyl Substances (PFASs)	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271							
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794						X	X
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	QA02	Jul 18, 2016		Soil	B16-JI17619	X	X
Test Counts						1	1

eurofins | mgt

Certificate of Analysis

GHD Pty Ltd QLD
201 Charlotte St
Brisbane
QLD 4000

NATA Accredited
Accreditation Number 1261
Site Number 20794

Accredited for compliance with ISO/IEC 17025.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Therese. Hammond**

Report **508843-S**
Project name ASA GOLD COAST AIRPORT
Project ID 3134071
Received Date Jul 21, 2016

Client Sample ID			**QA02**
Sample Matrix			**Soil**
Eurofins | mgt Sample No.			**B16-JI17619**
Date Sampled			**Jul 18, 2016**
Test/Reference	LOR	Unit	
Per- and Polyfluorinated Alkyl Substances (PFASs)			
Perfluorobutanesulfonic acid (PFBS)	0.005	mg/kg	< 0.005
Perfluorobutanoic acid (PFBA)	0.005	mg/kg	< 0.005
Perfluorohexanesulfonic acid (PFHxS)	0.005	mg/kg	< 0.005
Perfluorooctanesulfonic acid (PFOS)	0.005	mg/kg	< 0.005
Perfluorodecanesulfonic acid (PFDS)	0.005	mg/kg	< 0.005
Perfluoropentanoic acid (PFPeA)	0.005	mg/kg	< 0.005
Perfluorohexanoic acid (PFHxA)	0.005	mg/kg	< 0.005
Perfluoroheptanoic acid (PFHpA)	0.005	mg/kg	< 0.005
Perfluorooctanoic acid (PFOA)	0.005	mg/kg	< 0.005
Perfluorononanoic acid (PFNA)	0.005	mg/kg	< 0.005
Perfluorodecanoic acid (PFDA)	0.005	mg/kg	< 0.005
Perfluoroundecanoic acid (PFUnA)	0.005	mg/kg	< 0.005
Perfluorododecanoic acid (PFDoA)	0.005	mg/kg	< 0.005
Perfluorotridecanoic acid (PFTrDA)	0.005	mg/kg	< 0.005
Perfluorotetradecanoic acid (PFTeDA)	0.005	mg/kg	< 0.005
Perfluorooctanesulfonamide (PFOSA)	0.01	mg/kg	< 0.01
N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	0.01	mg/kg	< 0.01
N-methyl-perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	0.01	mg/kg	< 0.01
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	0.005	mg/kg	< 0.005
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	0.01	mg/kg	0.02
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	0.005	mg/kg	< 0.005
d5-n-EtFOSAA (surr.)	1	%	104
13C-PFHxA (surr.)	1	%	89
13C8-PFOS (surr.)	1	%	98
% Moisture	1	%	3.2

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Per- and Polyfluorinated Alkyl Substances (PFASs)	Brisbane	Jul 26, 2016	180 Day
- Method: LTM-ORG-2100 Analysis of PFCs in environmental samples by LC-MS/MS			
% Moisture	Brisbane	Jul 21, 2016	14 Day
- Method: LTM-GEN-7080 Moisture			

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NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Company Name:	GHD Pty Ltd QLD	**Order No.:**		**Received:**	Jul 21, 2016 1:00 PM
Address:	201 Charlotte St Brisbane QLD 4000	**Report #:** **Phone:** **Fax:**	508843 07 3316 3000 07 3316 3333	**Due:** **Priority:** **Contact Name:**	Jul 28, 2016 5 Day Bernice Ng
Project Name:	ASA GOLD COAST AIRPORT				
Project ID:	3134071				

Eurofins | mgt Analytical Services Manager : Mary Makarios

Sample Detail						Per- and Polyfluorinated Alkyl Substances (PFASs)	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271							
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794						X	X
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	QA02	Jul 18, 2016		Soil	B16-JI17619	X	X
Test Counts						1	1

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis. 7. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Advice.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per Kilogram

ug/l: micrograms per litre

ppb: Parts per billion

org/100ml: Organisms per 100 millilitres

MPN/100mL: Most Probable Number of organisms per 100 millilitres

mg/l: milligrams per litre

ppm: Parts per million

%: Percentage

NTU: Nephelometric Turbidity Units

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery
CRM	Certified Reference Material - reported as percent recovery
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands. In the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs 20-130%

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

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Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Per- and Polyfluorinated Alkyl Substances (PFASs)							
Perfluorobutanesulfonic acid (PFBS)	mg/kg	< 0.005			0.005	Pass	
Perfluorobutanoic acid (PFBA)	mg/kg	< 0.005			0.005	Pass	
Perfluorohexanesulfonic acid (PFHxS)	mg/kg	< 0.005			0.005	Pass	
Perfluorooctanesulfonic acid (PFOS)	mg/kg	< 0.005			0.005	Pass	
Perfluorodecanesulfonic acid (PFDS)	mg/kg	< 0.005			0.005	Pass	
Perfluoropentanoic acid (PFPeA)	mg/kg	< 0.005			0.005	Pass	
Perfluorohexanoic acid (PFHxA)	mg/kg	< 0.005			0.005	Pass	
Perfluoroheptanoic acid (PFHpA)	mg/kg	< 0.005			0.005	Pass	
Perfluorooctanoic acid (PFOA)	mg/kg	< 0.005			0.005	Pass	
Perfluorononanoic acid (PFNA)	mg/kg	< 0.005			0.005	Pass	
Perfluorodecanoic acid (PFDA)	mg/kg	< 0.005			0.005	Pass	
Perfluoroundecanoic acid (PFUnA)	mg/kg	< 0.005			0.005	Pass	
Perfluorododecanoic acid (PFDoA)	mg/kg	< 0.005			0.005	Pass	
Perfluorotridecanoic acid (PFTrDA)	mg/kg	< 0.005			0.005	Pass	
Perfluorotetradecanoic acid (PFTeDA)	mg/kg	< 0.005			0.005	Pass	
Perfluorooctanesulfonamide (PFOSA)	mg/kg	< 0.01			0.01	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	mg/kg	< 0.01			0.01	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	mg/kg	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	mg/kg	< 0.005			0.005	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	mg/kg	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	mg/kg	< 0.005			0.005	Pass	
LCS - % Recovery							
Per- and Polyfluorinated Alkyl Substances (PFASs)							
Perfluorobutanesulfonic acid (PFBS)	%	105			50-150	Pass	
Perfluorobutanoic acid (PFBA)	%	103			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	109			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	97			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	121			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	103			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	101			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	103			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	109			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	118			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	113			50-150	Pass	
Perfluoroundecanoic acid (PFUnA)	%	123			50-150	Pass	
Perfluorododecanoic acid (PFDoA)	%	118			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	128			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	128			50-150	Pass	
Perfluorooctanesulfonamide (PFOSA)	%	122			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	%	123			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	%	119			50-150	Pass	
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	%	87			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	%	111			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	%	103			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Per- and Polyfluorinated Alkyl Substances (PFASs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	B16-JI17619	CP	%	103			50-150	Pass	
Perfluorobutanoic acid (PFBA)	B16-JI17619	CP	%	101			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	B16-JI17619	CP	%	104			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	B16-JI17619	CP	%	98			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	B16-JI17619	CP	%	117			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	B16-JI17619	CP	%	98			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	B16-JI17619	CP	%	102			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	B16-JI17619	CP	%	101			50-150	Pass	
Perfluorooctanoic acid (PFOA)	B16-JI17619	CP	%	112			50-150	Pass	
Perfluorononanoic acid (PFNA)	B16-JI17619	CP	%	115			50-150	Pass	
Perfluorodecanoic acid (PFDA)	B16-JI17619	CP	%	111			50-150	Pass	
Perfluoroundecanoic acid (PFUnA)	B16-JI17619	CP	%	120			50-150	Pass	
Perfluorododecanoic acid (PFDoA)	B16-JI17619	CP	%	114			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	B16-JI17619	CP	%	123			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	B16-JI17619	CP	%	126			50-150	Pass	
Perfluorooctanesulfonamide (PFOSA)	B16-JI17619	CP	%	120			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	B16-JI17619	CP	%	117			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	B16-JI17619	CP	%	116			50-150	Pass	
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	B16-JI17619	CP	%	93			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	B16-JI17619	CP	%	79			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	B16-JI17619	CP	%	108			50-150	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Per- and Polyfluorinated Alkyl Substances (PFASs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	B16-JI18691	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
Perfluorobutanoic acid (PFBA)	B16-JI18691	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	B16-JI18691	NCP	mg/kg	0.038	0.040	6.0	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	B16-JI18691	NCP	mg/kg	0.56	0.55	2.0	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	B16-JI18691	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	B16-JI18691	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	B16-JI18691	NCP	mg/kg	0.007	0.007	8.0	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	B16-JI18691	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	B16-JI18691	NCP	mg/kg	0.005	0.006	7.0	30%	Pass	
Perfluorononanoic acid (PFNA)	B16-JI18691	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	B16-JI18691	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnA)	B16-JI18691	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
Perfluorododecanoic acid (PFDoA)	B16-JI18691	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	B16-JI18691	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Per- and Polyfluorinated Alkyl Substances (PFASs)				Result 1	Result 2	RPD			
Perfluorotetradecanoic acid (PFTeDA)	B16-JI18691	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
Perfluorooctanesulfonamide (PFOSA)	B16-JI18691	NCP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	B16-JI18691	NCP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	B16-JI18691	NCP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	B16-JI18691	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	B16-JI18691	NCP	mg/kg	0.01	0.01	2.0	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	B16-JI18691	NCP	mg/kg	0.006	0.006	5.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	B16-JI08208	NCP	%	22	22	1.0	30%	Pass	

Quality Control Analyte Summary Compliance

The table below is the actual occurrence of QC performed on the batch of samples within this report and as defined below

Analysis	Samples Analysed	Laboratory Duplicates Reported	Laboratory Matrix Spikes Reported	Method Blanks Reported	Laboratory Control Samples Reported
Per- and Polyfluorinated Alkyl Substances	1	1	1	1	1
% Moisture	1	1	NA	NA	NA

Quality Control Parameter Frequency Compliance follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure April 2011, Schedule B3, Guideline on Laboratory Analysis of Potentially Contaminated Soils and US EPA SW-846 Chapter 1: 'Quality Control'.

It comprises the following when a laboratory process batch is deemed to consist of up to 20 samples that are similar in terms of matrix and test procedure, and are processed as one unit for QC purposes. If more than 20 samples are being processed, they are considered as more than one batch.

Method blank

One method blank per process batch.

Laboratory duplicate

There should be at least one duplicate per process batch, or two duplicates if the process batch exceeds 10 samples.

Laboratory control sample (LCS)

There should be at least one LCS per process batch.

Matrix spikes

There should be one matrix spike per matrix type per process batch.

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Authorised By

Mary Makarios	Analytical Services Manager
Bryan Wilson	Senior Analyst-Metal (QLD)
Jonathon Angell	Senior Analyst-Inorganic (QLD)
Jonathon Angell	Senior Analyst-Organic (QLD)

Glenn Jackson
National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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GHD CLIENTS|PEOPLE|PERFORMANCE

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ANALYSIS REQUEST FORM/CHAIN OF CUSTODY DOCUMENTATION

PROJECT ID:	3134071		QUOTE:	GHD 2015 quote	LABORATORY BATCH NO.:
PROJECT:	ASA Gold Coast Airport				FOR LAB USE ONLY
CLIENT:	Airservices Australia				COOLER SEAL: Yes ..... No / Broken ..... Intact — COOLER TEMP: ..... deg.C
POSTAL ADDRESS:	GPO Box 668, Brisbane 4001, QLD				
CONTACT:	Bernice Ng /Imogen Bird				
PHONE:	0432 289 398		FAX: 3316 3333		DESPATCHED TO: ~~SGS~~ ALS
EMAIL:	bernice.ng@ghd.com; imogen.bird@ghd.com; Therese.Hammond@ghd.com				
DATA NEEDED BY:	Standard				
REPORT FORMAT:	EMAIL				
EMAIL FORMAT:	EXCEL, ESDAT & PDF				
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:					

	SAMPLE DATA					ANALYSIS REQUIRED															
	SAMPLE ID	MATRIX	Date/Time	Bottle NO.	PRESERVATION	TDS	Major Cations / Anions	PFOS/PFAS suite + additional suite	TOC	Total Iron	Standard suite + Metals	K	Al	Cl	CEC	pH / EC			HOLD	NOTES
31	MWA	W	28/7/16	2	ICE	✓	✓	✓												
32	BS-QA1	S	26/7/16	2	ICE			✓	✓	✓	✓	✓	✓	✓	✓	✓				
33	SW-QA1	W	25/7/16	2	ICE	✓	✓	✓												
	SW-QA2	W	25/7/16	2	ICE	✓	✓	✓												— SW-QA2/GW-QA2 forwarded to Eurofins MAT.
34	GW-QA1	W	26/7/16	2	ICE	✓	✓	✓												
	GW-QA2	W	26/7/16	2	ICE	✓	✓	✓												
	Extra Sample				ICE															
35	GCAPL1	W	27/7/16	2	ICE															
					ICE															
					ICE															
					ICE															
					ICE															
					ICE															
					ICE															
					ICE															
					ICE															

RELINQUISHED BY:		RECEIVED BY:	
NAME: Bernice Ng	DATE: 28/7/16	NAME: GW	DATE: 28/7/16
OF: GHD	TIME: 13:45	OF: ALS	TIME: 1855

PLEASE EMAIL COMPLETED ANALYSIS REQUEST TO: bernice.ng@ghd.com; imogen.bird@ghd.com; Therese.Hammond@ghd.com

*Container Type and Preservative Codes: P = Neutral Plastic; N = Nitric Acid Preserved; C = Sodium Hydroxide Preserved; J = Solvent Washed Acid Rinced Jar; S = Solvent Washed Acid Rinced Glass Bottle; VC = Hydrochloric Acid Preserved Vial; VS = Sulfuric Acid Preserved Vial; BS = Sulfuric Acid Preserved Glass Bottle; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; O = Other.

D. Bradley (ALS) 29/7/16 @ 8:15

509814

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Site # 1254 & 14271

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NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Sample Receipt Advice

Company name:	GHD Pty Ltd QLD
Contact name:	Bernice Ng
Project name:	ASA GOLD COAST AIRPORT
Project ID:	3134071
COC number:	Not provided
Turn around time:	5 Day
Date/Time received:	Jul 29, 2016 10:00 AM
Eurofins | mgt reference:	509814

Sample information

- ☑ A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- ☑ All samples have been received as described on the above COC.
- ☑ COC has been completed correctly.
- ☑ Attempt to chill was evident.
- ☑ Appropriately preserved sample containers have been used.
- ☑ All samples were received in good condition.
- ☑ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- ☑ Appropriate sample containers have been used.
- ☑ Sample containers for volatile analysis received with zero headspace.
- ☒ Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Contact notes

If you have any questions with respect to these samples please contact:

Mary Makarios on Phone : +61 3 8564 5000 or by e.mail: MaryMakarios@eurofins.com

Results will be delivered electronically via e.mail to Bernice Ng - Bernice.Ng@ghd.com.

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Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Company Name: GHD Pty Ltd QLD
Address: 201 Charlotte St
Brisbane
QLD 4000

Project Name: ASA GOLD COAST AIRPORT
Project ID: 3134071

Order No.:
Report #: 509814
Phone: 07 3316 3000
Fax: 07 3316 3333

Received: Jul 29, 2016 10:00 AM
Due: Aug 5, 2016
Priority: 5 Day
Contact Name: Bernice Ng

Eurofins | mgt Analytical Services Manager : Mary Makarios

Sample Detail						Total Dissolved Solids	Major Anions	Major Cations	Per- and Polyfluorinated Alkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	
Sydney Laboratory - NATA Site # 18217									
Brisbane Laboratory - NATA Site # 20794									X
External Laboratory									
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**				
1	GW-QA2	Not Provided		Water	B16-Au02264	X	X	X	X
2	SW-QA2	Not Provided		Water	B16-JI24818	X	X	X	X
Test Counts						2	2	2	2

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Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 20794

Accredited for compliance with ISO/IEC 17025.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

GHD Pty Ltd QLD
201 Charlotte St
Brisbane
QLD 4000

Attention: **Bernice Ng**

Report **509814-W**
Project name ASA GOLD COAST AIRPORT
Project ID 3134071
Received Date Jul 29, 2016

Client Sample ID			**SW-QA2**	**GW-QA2**
Sample Matrix			**Water**	**Water**
Eurofins | mgt Sample No.			**B16-JI24818**	**B16-Au02264**
Date Sampled			**Not Provided**	**Not Provided**
Test/Reference	LOR	Unit		
Per- and Polyfluorinated Alkyl Substances (PFASs)				
Perfluorobutanesulfonic acid (PFBS)	0.00001	mg/L	< 0.00001	0.0015
Perfluorobutanoic acid (PFBA)	0.00005	mg/L	< 0.00005	0.00063
Perfluorohexanesulfonic acid (PFHxS)	0.00001	mg/L	< 0.00001	[N09]0.017
Perfluorooctanesulfonic acid (PFOS)	0.00001	mg/L	[N09]0.00002	[N09]0.016
Perfluorodecanesulfonic acid (PFDS)	0.00001	mg/L	< 0.00001	0.00003
Perfluoropentanoic acid (PFPeA)	0.00001	mg/L	< 0.00001	[N09]0.0014
Perfluorohexanoic acid (PFHxA)	0.00001	mg/L	< 0.00001	[N09]0.0077
Perfluoroheptanoic acid (PFHpA)	0.00001	mg/L	< 0.00001	[N09]0.0030
Perfluorooctanoic acid (PFOA)	0.00001	mg/L	< 0.00001	[N09]0.0051
Perfluorononanoic acid (PFNA)	0.00001	mg/L	< 0.00001	0.00075
Perfluorodecanoic acid (PFDA)	0.00001	mg/L	< 0.00001	0.00032
Perfluoroundecanoic acid (PFUnA)	0.00001	mg/L	< 0.00001	0.00001
Perfluorododecanoic acid (PFDoA)	0.00001	mg/L	< 0.00001	< 0.00001
Perfluorotridecanoic acid (PFTrDA)	0.00001	mg/L	< 0.00001	< 0.00001
Perfluorotetradecanoic acid (PFTeDA)	0.00001	mg/L	< 0.00001	< 0.00001
Perfluorooctanesulfonamide (PFOSA)	0.00005	mg/L	< 0.00005	< 0.00005
N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	0.00005	mg/L	< 0.00005	< 0.00005
N-methyl-perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	0.00005	mg/L	< 0.00005	< 0.00005
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	0.00001	mg/L	< 0.00001	< 0.00001
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	0.00005	mg/L	< 0.00005	< 0.00005
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	0.00001	mg/L	< 0.00001	0.00025
d5-n-EtFOSAA (surr.)	1	%	36	59
13C-PFHxA (surr.)	1	%	71	73
13C8-PFOS (surr.)	1	%	68	68
Ammonia (as N)	0.01	mg/L	< 0.01	< 0.01
Total Dissolved Solids	10	mg/L	90	90
Major Anions				
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	43	42
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10
Chloride	1	mg/L	10	14
Nitrate (as N)	0.02	mg/L	< 0.02	< 0.02
Sulphate (as S)	5	mg/L	< 5	< 5

Client Sample ID			SW-QA2	GW-QA2
Sample Matrix			Water	Water
Eurofins | mgt Sample No.			B16-JI24818	B16-Au02264
Date Sampled			Not Provided	Not Provided
Test/Reference	LOR	Unit		
Alkali Metals				
Calcium	0.5	mg/L	13	13
Magnesium	0.5	mg/L	2.5	2.5
Potassium	0.5	mg/L	0.6	0.6
Sodium	0.5	mg/L	5.3	5.4

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Per- and Polyfluorinated Alkyl Substances (PFASs)	Brisbane	Aug 02, 2016	14 Day
- Method: LTM-ORG-2100 Analysis of PFCs in environmental samples by LC-MS/MS			
Total Dissolved Solids	Melbourne	Aug 02, 2016	7 Day
- Method: LM-LTM-INO-4110 (Total Dissolved Solids @ 178°C - 182°C)			
Major Anions			
Bicarbonate Alkalinity (as CaCO3)	Melbourne	Aug 02, 2016	14 Day
- Method: APHA 2320 Alkalinity by Titration			
Carbonate Alkalinity (as CaCO3)	Melbourne	Aug 02, 2016	14 Day
- Method: APHA 2320 Alkalinity by Titration			
Chloride	Melbourne	Aug 02, 2016	28 Day
- Method: LTM-INO-4090 Chloride by Discrete Analyser			
Nitrate (as N)	Melbourne	Aug 02, 2016	7 Day
- Method: APHA 4500-NO3 Nitrate Nitrogen by FIA			
Sulphate (as S)	Melbourne	Aug 02, 2016	28 Day
- Method: LTM-INO-4110 Sulfate by Discrete Analyser			
Major Cations			
Ammonia (as N)	Melbourne	Aug 03, 2016	28 Day
- Method: APHA 4500-NH3 Ammonia Nitrogen by FIA			
Alkali Metals	Melbourne	Aug 02, 2016	180 Day
- Method: USEPA 6010 Alkali Metals			

Company Name:	GHD Pty Ltd QLD	**Order No.:**	
Address:	201 Charlotte St Brisbane QLD 4000	**Report #:** **Phone:** **Fax:**	509814 07 3316 3000 07 3316 3333
Project Name:	ASA GOLD COAST AIRPORT	**Received:**	Jul 29, 2016 10:00 AM
Project ID:	3134071	**Due:** **Priority:** **Contact Name:**	Aug 5, 2016 5 Day Bernice Ng

Eurofins | mgt Analytical Services Manager : Mary Makarios

Sample Detail						Total Dissolved Solids	Major Anions	Major Cations	Per- and Polyfluorinated Alkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	
Sydney Laboratory - NATA Site # 18217									
Brisbane Laboratory - NATA Site # 20794									X
External Laboratory									
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**				
1	GW-QA2	Not Provided		Water	B16-Au02264	X	X	X	X
2	SW-QA2	Not Provided		Water	B16-JI24818	X	X	X	X
Test Counts						2	2	2	2

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis. 7. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Advice.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per Kilogram

ug/l: micrograms per litre

ppb: Parts per billion

org/100ml: Organisms per 100 millilitres

MPN/100mL: Most Probable Number of organisms per 100 millilitres

mg/l: milligrams per litre

ppm: Parts per million

%: Percentage

NTU: Nephelometric Turbidity Units

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery
CRM	Certified Reference Material - reported as percent recovery
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands. In the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs 20-130%

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

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Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Per- and Polyfluorinated Alkyl Substances (PFASs)							
Perfluorobutanesulfonic acid (PFBS)	mg/L	< 0.00001			0.00001	Pass	
Perfluorobutanoic acid (PFBA)	mg/L	< 0.00005			0.00005	Pass	
Perfluorohexanesulfonic acid (PFHxS)	mg/L	< 0.00001			0.00001	Pass	
Perfluorooctanesulfonic acid (PFOS)	mg/L	< 0.00001			0.00001	Pass	
Perfluorodecanesulfonic acid (PFDS)	mg/L	< 0.00001			0.00001	Pass	
Perfluoropentanoic acid (PFPeA)	mg/L	< 0.00001			0.00001	Pass	
Perfluorohexanoic acid (PFHxA)	mg/L	< 0.00001			0.00001	Pass	
Perfluoroheptanoic acid (PFHpA)	mg/L	< 0.00001			0.00001	Pass	
Perfluorooctanoic acid (PFOA)	mg/L	< 0.00001			0.00001	Pass	
Perfluorononanoic acid (PFNA)	mg/L	< 0.00001			0.00001	Pass	
Perfluorodecanoic acid (PFDA)	mg/L	< 0.00001			0.00001	Pass	
Perfluoroundecanoic acid (PFUnA)	mg/L	< 0.00001			0.00001	Pass	
Perfluorododecanoic acid (PFDoA)	mg/L	< 0.00001			0.00001	Pass	
Perfluorotridecanoic acid (PFTrDA)	mg/L	< 0.00001			0.00001	Pass	
Perfluorotetradecanoic acid (PFTeDA)	mg/L	< 0.00001			0.00001	Pass	
Perfluorooctanesulfonamide (PFOSA)	mg/L	< 0.00005			0.00005	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	mg/L	< 0.00005			0.00005	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	mg/L	< 0.00005			0.00005	Pass	
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	mg/L	< 0.00001			0.00001	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	mg/L	< 0.00005			0.00005	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	mg/L	< 0.00001			0.00001	Pass	
Method Blank							
Ammonia (as N)	mg/L	< 0.01			0.01	Pass	
Total Dissolved Solids	mg/L	< 10			10	Pass	
Method Blank							
Major Anions							
Bicarbonate Alkalinity (as CaCO3)	mg/L	< 20			20	Pass	
Carbonate Alkalinity (as CaCO3)	mg/L	< 10			10	Pass	
Chloride	mg/L	< 1			1	Pass	
Nitrate (as N)	mg/L	< 0.02			0.02	Pass	
Sulphate (as S)	mg/L	< 5			5	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
LCS - % Recovery							
Per- and Polyfluorinated Alkyl Substances (PFASs)							
Perfluorobutanesulfonic acid (PFBS)	%	117			50-150	Pass	
Perfluorobutanoic acid (PFBA)	%	94			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	127			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	119			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	79			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	96			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	113			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	121			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	114			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	118			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	112			50-150	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluoroundecanoic acid (PFUnA)	%	92			50-150	Pass	
Perfluorododecanoic acid (PFDoA)	%	72			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	75			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	98			50-150	Pass	
Perfluorooctanesulfonamide (PFOSA)	%	99			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	%	88			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	%	93			50-150	Pass	
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	%	124			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	%	106			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	%	76			50-150	Pass	
LCS - % Recovery							
Ammonia (as N)	%	93			70-130	Pass	
Total Dissolved Solids	%	96			70-130	Pass	
LCS - % Recovery							
Major Anions							
Chloride	%	105			70-130	Pass	
Nitrate (as N)	%	97			70-130	Pass	
Sulphate (as S)	%	109			70-130	Pass	
LCS - % Recovery							
Alkali Metals							
Calcium	%	106			70-130	Pass	
Magnesium	%	110			70-130	Pass	
Potassium	%	101			70-130	Pass	
Sodium	%	101			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Per- and Polyfluorinated Alkyl Substances (PFASs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	B16-JI24751	NCP	%	119			50-150	Pass	
Perfluorobutanoic acid (PFBA)	B16-JI24751	NCP	%	119			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	B16-JI24751	NCP	%	115			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	B16-JI24751	NCP	%	106			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	B16-JI24751	NCP	%	127			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	B16-JI24751	NCP	%	112			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	B16-JI24751	NCP	%	101			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	B16-JI24751	NCP	%	124			50-150	Pass	
Perfluorooctanoic acid (PFOA)	B16-JI24751	NCP	%	106			50-150	Pass	
Perfluorononanoic acid (PFNA)	B16-JI24751	NCP	%	134			50-150	Pass	
Perfluorodecanoic acid (PFDA)	B16-JI24751	NCP	%	133			50-150	Pass	
Perfluoroundecanoic acid (PFUnA)	B16-JI24751	NCP	%	136			50-150	Pass	
Perfluorododecanoic acid (PFDoA)	B16-JI24751	NCP	%	134			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	B16-JI24751	NCP	%	137			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	B16-JI24751	NCP	%	140			50-150	Pass	
Perfluorooctanesulfonamide (PFOSA)	B16-JI24751	NCP	%	120			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	B16-JI24751	NCP	%	137			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	B16-JI24751	NCP	%	130			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	B16-JI24751	NCP	%	107			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	B16-JI24751	NCP	%	110			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	B16-JI24751	NCP	%	134			50-150	Pass	
Spike - % Recovery									
				Result 1					
Ammonia (as N)	M16-JI24587	NCP	%	91			70-130	Pass	
Spike - % Recovery									
Major Anions				Result 1					
Bicarbonate Alkalinity (as CaCO3)	M16-Au01156	NCP	%	127			70-130	Pass	
Chloride	S16-JI24660	NCP	%	113			70-130	Pass	
Nitrate (as N)	M16-JI24587	NCP	%	95			70-130	Pass	
Sulphate (as S)	B16-JI24946	NCP	%	106			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Per- and Polyfluorinated Alkyl Substances (PFASs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	B16-Au00284	NCP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	
Perfluorobutanoic acid (PFBA)	B16-Au00284	NCP	mg/L	< 0.00005	< 0.00005	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	B16-Au00284	NCP	mg/L	0.00015	0.00014	7.0	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	B16-Au00284	NCP	mg/L	0.00006	0.00007	3.0	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	B16-Au00284	NCP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	B16-Au00284	NCP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	B16-Au00284	NCP	mg/L	0.00002	0.00002	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	B16-Au00284	NCP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	B16-Au00284	NCP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	B16-Au00284	NCP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	B16-Au00284	NCP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnA)	B16-Au00284	NCP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	
Perfluorododecanoic acid (PFDoA)	B16-Au00284	NCP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	B16-Au00284	NCP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	B16-Au00284	NCP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	
Perfluorooctanesulfonamide (PFOSA)	B16-Au00284	NCP	mg/L	< 0.00005	< 0.00005	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	B16-Au00284	NCP	mg/L	< 0.00005	< 0.00005	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	B16-Au00284	NCP	mg/L	< 0.00005	< 0.00005	<1	30%	Pass	
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	B16-Au00284	NCP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	B16-Au00284	NCP	mg/L	< 0.00005	< 0.00005	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	B16-Au00284	NCP	mg/L	< 0.00001	< 0.00001	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	M16-JI24587	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Total Dissolved Solids	B16-JI24818	CP	mg/L	90	92	2.0	30%	Pass	

Duplicate									
Major Anions				Result 1	Result 2	RPD			
Bicarbonate Alkalinity (as CaCO3)	M16-Au00530	NCP	mg/L	< 20	< 20	<1	30%	Pass	
Carbonate Alkalinity (as CaCO3)	M16-Au00530	NCP	mg/L	< 10	< 10	<1	30%	Pass	
Chloride	S16-Jl24660	NCP	mg/L	81	82	<1	30%	Pass	
Nitrate (as N)	M16-Jl24587	NCP	mg/L	0.11	0.10	7.0	30%	Pass	
Sulphate (as S)	B16-Jl24946	NCP	mg/L	< 5	< 5	<1	30%	Pass	
Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Calcium	M16-Au03718	NCP	mg/L	2.1	2.0	1.0	30%	Pass	
Magnesium	M16-Au03718	NCP	mg/L	6.3	6.3	1.0	30%	Pass	
Potassium	M16-Au03718	NCP	mg/L	1.2	1.1	10	30%	Pass	
Sodium	M16-Au03718	NCP	mg/L	17	17	2.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Total Dissolved Solids	B16-Au02264	CP	mg/L	90	92	2.0	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N09	Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear standard.

Authorised By

Mary Makarios	Analytical Services Manager
Emily Rosenberg	Senior Analyst-Metal (VIC)
Huong Le	Senior Analyst-Inorganic (VIC)
Jonathon Angell	Senior Analyst-Organic (QLD)

Glenn Jackson
National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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Appendix I – Calibration Certificates

Gas Detection Air Sampling & Monitoring Environmental & Water Quality Monitoring
Air-Met Scientific Pty Ltd
ABN 73 006 849 949
Ph 1300 137 067

Multi Parameter Water Meter

Instrument YSI Quatro Pro Plus
Serial No. 12D101325

Item	Test	Pass	Comments
Battery	Charge Condition	✓	
	Capacity	✓	
	Recharge OK?		
Switch/keypad	Operation	✓	
Display	Intensity	✓	
	Operation (segments)	✓	
	Seal	✓	
Connectors	Condition	✓	
Sensor	1. pH	✓	
	2. mV	✓	
	3. Conductivity	✓	
	4. D.O	✓	
	5. Temp	✓	
Alarms	Beeper	✓	
	Settings	✓	
Software	Version	✓	
Data logger	Operation	✓	
Download	Operation	✓	
Other tests:			

Certificate of Calibration

This is to certify that the above instrument has been calibrated to the following specifications:

Sensor	Serial no	Standard Solutions	Certified	Solution Bottle Number	Instrument Reading
1. pH 7.00		pH 7.01		MJ1970	7.01pH
2. pH 4.00		pH 4.00		288772	4.02pH
3. EC		2760 mS		MJ1634	2760mS
4. Temp		25.5 °C		Multitherm	25.5 °C
5. Redox (mV)		235.3 mV		NH1605/NH1607	235.3 mV
6. DO		0 ppm		3728	0 ppm

Calibrated by: Ricky Kneebone

Calibration date: 22-Jul-16

Next calibration due: 18-Jan-17

Oil / Water Interface Meter

Instrument Geotech Interface Meter (60M)
Serial No. 3912

airmet
Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments
Battery	Compartment	✓	
	Capacity	✓	9.1V
Probe	Cleaned/Decon.	✓	
	Operation	✓	
Connectors	Condition	✓	
		✓	
Tape Check	Cleaned	✓	
Connectors	Checked for cuts	✓	
Instrument Test	At surface level	✓	

Certificate of Calibration

This is to certify that the above instrument has been cleaned and tested.

Calibrated by: Chris Lynch

Calibration date: 11-Jul-16

Next calibration due: 09-Sep-16

Appendix J – Soil and water disposal dockets

Queensland Government

Waste Transport Certificate

Q 01222662

Part 1
This section is to be completed by the Generator or Storer of waste

Name, Description and Chemical Composition of the Waste: CONTAMINATED SOIL & WATER

U.N. Class: . Subsid Risk: . U.N. Number: —

Bulk/No of Packaging: 040 Type of Packaging: DRUMS Packaging Grp: —

Amount of Waste: 1000 ○ Litres ○ Cubic Metres ✓ Kilograms

Physical Nature: S Waste Code No: 5120

Name of Waste Generator: GHD GOLD COAST AIRPORT

Address where waste was generated: EASTERN AVENUE COOLANGATTA QLD Postcode:

Contact Name: BERNICE NG Phone No.: (07) 33163674 ABN/ACN:

Environmental Authority No (if applicable): Local Government Area: GOLD COAST

Nominated Disposal/Treatment/Storage Facility: CLEANAWAY CRESTMEAD

Name of Transporter Company: Cleanaway Crestmead

Address: Nationwide Oil Pty Ltd - Transpacific Technical Services, 10 Platinum St, Crestmead Q 4132, Ph 07 3803 5595, ABN 95 066 343 364 Postcode:

Vehicle No 1 Rego No.: 4ST6FE EPA Lic. No. EPPR[illegible] Vehicle No/Trailer Rego No.: ABN/ACN:

Environmental Authority No.: Environmental Authority No.:

Mode of Transport: ✓ Road ☐ Rail ☐ Air ☐ Sea

I declare that to the best of my knowledge and belief the above information is true and correct (Name and Position): GRANT DUFFY

If applicable I am acting as an agent for the Receiver ☐

Signature: Date: 24/08/2016

Part 2
To be completed by the Transporter

I acknowledge the receipt of the waste described in part 1. Discrepancy: ☐ Waste Type ☐ Volume received ☐ Other

If applicable I am acting as an agent for: ☐ Generator ✓ Receiver

Name: [illegible] Phone No.: (07) 3293 5858

Signature: Date: 24/08/2016

Part 3
To be completed by the Facility Receiving Waste

Name of Receiving Facility:

Address: Cleanaway Operations Pty Ltd
EHS Australia Pty Ltd
10 Platinum Street
Crestmead QLD 4132
EPA Lic No: EPPR00517813
Tel: 07 3489 4600
ABN: 88 001 576 889

Postcode:

ABN/ACN:

Disposal/Treatment Code: 4132 Physical Nature: S Waste Code No: 5120

Environmental Authority No.: Amount of Waste: 1000 ○ Litres ○ Cubic Metres ✓ Kilograms

Discrepancy: ☐ Waste Type ☐ Volume Received ☐ Transporter Details ☐ Other

If applicable I am acting as an agent for the Generator

I acknowledge the receipt of the waste described in part 1. (Name and Position): CHRIS [illegible] Phone No.: ( )

Signature: Date: 24/08/2016

WHITE COPY - TO BE FORWARDED TO EHP BY RECEIVER
PINK COPY - TO BE FORWARDED TO EHP WITH PARTS 1 & 2 COMPLETED, BY THE PERSON/COMPANY WHO COMPLETED PART 1
GREEN COPY - TO BE RETAINED BY THE PERSON/COMPANY WHO COMPLETED PART 1
YELLOW COPY - TO BE RETAINED BY THE PERSON/COMPANY WHO COMPLETED PART 3
BLUE COPY - TO BE RETAINED BY THE WASTE TRANSPORTER

PLEASE FORWARD EHP COPIES (WITHIN 7 DAYS) TO WASTE TRACKING, GPO BOX 2454, BRISBANE, QLD 4001. Pollution Hotline No. 1300 130 372

W 6894129537

MANUAL INVOICE / AGREEMENT SPECIFICS

TAX INVOICE NUMBER: Q 34961

☐ BRISBANE
PO Box 3394
Browns Plains LPO Q 4118
Telephone: (07) 3489 4600
Facsimile: (07) 3803 4290

☐ TOWNSVILLE
PO Box 7948
Garbutt Q 4814
Telephone: (07) 4774 4793
Facsimile: (07) 4774 4693

☐ ROCKHAMPTON
PO Box 5640
Red Hill Rockhampton Q 4701
Telephone: (07) 4927 5811
Facsimile: (07) 4922 5799

CLEANAWAY
Making a sustainable future possible

ABN 88 001 576 889
www.cleanaway.com.au
ERS Australia 1800 118 800

LOCATION

CUSTOMER NUMBER

NAME: CHD - COOD CHALT AIRPORT COOL

ADDRESS: 145 ANN ST

SUBURB: FORTITUDE VALLEY STATE: QLD POSTCODE: 4006

Customer Phone	Contact Name
33163674	BRANKE

Fax Number	Credit Code	ANZSIC Co

Service Date	Time	Representative	Truck Registration	Agreement	Licence No.	Transport No.
24.8.16			256 FCN			

Item Code	Svc	Description	Comments	Qty.	kg	Price	G.S.T.	Service F
		44 50L DRUMS @ $4.95				180.00	18.00	180.
Proper Shipping Name								
Waste Description AAA BBB UNCCCC D EEE F GGGG H Y								
		LA205E WHITE CAN		2		180.	18.	198.
Proper Shipping Name								
Waste Description AAA BBB UNCCCC D EEE F GGGG H Y								
Proper Shipping Name								
Waste Description AAA BBB UNCCCC D EEE F GGGG H Y								
Proper Shipping Name								
Waste Description - . - --- UN---- L --- A G110 D R								
Proper Shipping Name								
Waste Description 3 . - --- UN1263 L II- H F100 D R								
Proper Shipping Name						960	96	10.
Waste Description 9 . - --- UN3082 L III H J120 D R								
		TOTAL						$

Additional costs may apply if waste collected does not comply strictly with description. Refer Clause 5(b).

Representative Name: (Please Print) [illegible]

Signature:

Customer Name: (Please Print)

Order No: 313407

Signature:

Date:

SERVICE CHECKLIST

Overall:	Good	Poor	SEC:	Good	Poor
Branch Phone No.	☐	☐	Vacuum Pump	☐	☐
Machine Condition	☐	☐	Air Filter (rear)	☐	☐
Cleanliness	☐	☐	**Aqueous**		
Decals	☐	☐	Lid Lock	☐	☐
Red Sink			Lid Switch	☐	☐
Lamp Assembly	☐	☐	Control Box	☐	☐
Fuseable Link	☐	☐	Pump Seal	☐	☐

PAYMENT AT TIME OF SERVICE WOULD BE APPRECIATED
Charge my account for this transaction which will be paid strictly within 30 day

COMMENTS

PLEASE DETACH THIS PORTION AND RETURN WITH YOUR PAYMENT TO ERS

BILL TO

CUSTOMER NUMBER

Tax Invoice No: Q 34961

Cash ☐ EFT ☐ Credit Card ☐ Cheque ☐

Remit to: ERS AUSTRALIA PTY. LTD.
PO Box 3394 Browns Plains LPO QLD 4118

Invoices Due:

60269

GHD

180 Lonsdale Street
Melbourne, Victoria 3000
T: (03) 8687 8000 F: (03) 8687 8111 E: melmail@ghd.com.au

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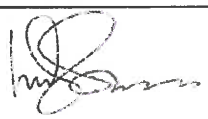
Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
DRAFT	B.Ng	L.Gedge				
DRAFT 2						01/09/2016
DRAFT 3						12/09/2016
DRAFT 4						05/10/2016
FINAL	B Ng I Bird T Hammond	L Gedge		Ian Gregson		7/10/2016

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Rural & Regional Affairs and Transport Legislation Committee
ANSWERS TO QUESTIONS ON NOTICE
Supplementary Budget Estimates 2016 - 2017
Infrastructure and Regional Development

Question no.: 173

Program: n/a
Division/Agency: Airservices Australia
Topic: PFCs Gold Coast Airport 2
Proof Hansard Page: Written

Senator Rhiannon, Lee asked:

A sampling strategy was then to be identified to clarify the extent of contamination off the Gold Coast aquifer.
a) Where is this up to?
b) Where is sampling being conducted in the area?
c) Is there a copy of the strategy available?

Answer:

See response to 172.

Rural & Regional Affairs and Transport Legislation Committee
ANSWERS TO QUESTIONS ON NOTICE
Supplementary Budget Estimates 2016 - 2017
Infrastructure and Regional Development

Question no.: 174

Program: n/a
Division/Agency: Airservices Australia
Topic: PFCs at Gold Coast Airport 3
Proof Hansard Page: Written

Senator Rhiannon, Lee asked:

Is there any early indication that contamination of the aquifer might be substantial?
a) If it is too early for such indications, what is the timeframe for receipt of the sampling results to inform those market gardeners, aquaculture and poultry/egg producers, including backyard producers, who might be affected?

Answer:

See response to 172.

Rural & Regional Affairs and Transport Legislation Committee
ANSWERS TO QUESTIONS ON NOTICE
Supplementary Budget Estimates 2016 - 2017
Infrastructure and Regional Development

Question no.: 175

Program: N/A
Division/Agency: Airservices Australia
Topic: Number of noise complaints lodged with Airservices regarding Archerfield, Bankstown, Jandakot, Moorabbin and Parafield Airports.
Proof Hansard Page: 118 (17 October 2016)

Senator McCarthy, Malrndirri asked:

Senator McCARTHY: I have a list that I want to go through with you. Let me know if you are able to answer these questions now or if you would like to take them on notice. How many noise complaints have been lodged with Airservices for these airports for the following years—
Ms Spence: I think an individual year basis is a level of detail that we would need to get from Airservices, but we are happy to take that on notice.
Mr Mrdak: We will take it on notice.
Senator McCARTHY: So can I give you the years: 1995, 2000, 2005, 2010, 2011, 2012, 2013, 2014 and 2015. Will you take all of that on notice?
Mr Mrdak: We will take that on notice.

Answer:

Airservices assumed responsibility for noise complaint handling in 1996 and the available data on noise complaints is presented in the table below.

In accordance with Aircraft Noise Ombudsman recommendations, Airservices reports on the number of complainants (that is, the number of individuals who contact Airservices Noise Complaints and Inquiry Service) rather than complaints.

Number of Complainants

	1995*	2000	2005	2010	2011	2012	2013	2014	2015
Archerfield		**	27	45	28	57	60	126	136
Bankstown		51	17	132	105	91	79	82	79
Jandakot		**	59	113	118	158	167	174	155
Moorabbin		**	20	191	237	180	155	152	134
Parafield		**	87	127	91	144	88	110	76

*Pre-dates Airservices complaints' service
**Data was not collected separately for this airport

Rural & Regional Affairs and Transport Legislation Committee
ANSWERS TO QUESTIONS ON NOTICE
Supplementary Budget Estimates 2016 - 2017
Infrastructure and Regional Development

Question no.: 176

Program: N/A
Division/Agency: Airservices Australia
Topic: Total movements at Melbourne, Brisbane and Perth Airports for the years 2010, 2013, 2014 and 2015.
Proof Hansard Page: Written (27 October 2016)

Senator Sterle, Glenn asked:

How many movements between 11pm and 6am occurred at each of the following airports in the following calendar years?
a) 2010
b) 2013
c) 2014
d) 2015
How many total movements occurred at each of the following airports in the following calendar years?
e) 2010
f) 2013
g) 2014
h) 2015
The airports are:
- Melbourne Airport
- Brisbane Airport
- Perth Airport

Answer:

Table 1: Movements between 11pm and 6am

	2010	**2013**	**2014**	**2015**
Melbourne	16072	16539	17302	18065
Brisbane	12175	13200	13527	12804
Perth	14123	15667	15784	14856

Table 2: Total movements

	2010	**2013**	**2014**	**2015**
Melbourne	205880	221920	228499	235380
Brisbane	188769	223835	226335	219979
Perth	124092	150758	145544	137748