Project Plan – Oceanography

1. Name and details of the Principal Participants:

Principal Participants are the Parties to the Formal Collaboration Agreement, including the Collaboration Delegate. They provide the core Antarctic science capability to deliver on the objectives of this agreement. They are directly involved in the AAPP governance including funding and resource allocation decisions to implement the collaborative Antarctic research partnership. Principal Participants are expected to collectively contribute significant cash and/or in-kind support for AAPP activities. The Principal Participants for this Project are:

The Commonwealth of Australia represented by the Australian Antarctic Division, a Division of the Department of Climate Change, Energy, the Environment and Water (ABN 63 573 932 849), 203 Channel Highway, Kingston, TAS 7050 ("AAD")

The Commonwealth of Australia represented by the Bureau of Meteorology (ABN 92 637 533 532), Head Office Melbourne, GPO Box 1289, Melbourne VIC 3001 ("BoM")

Commonwealth Scientific and Industrial Research Organisation (ABN 41 687 119 230), Castray Esplanade, Battery Point, TAS 7004 ("CSIRO")

University of Tasmania (ABN 30 764 374 782), Private Bag 3 Hobart TAS 7001 ("UTAS")

2. Names of the Associate Participants:

Associate Participants provide additional niche and specialist capability to implement the AAPP activities. Through contribution of their additional capability, they provide cash and/or in-kind support to the AAPP. In some instances, they may receive AAPP funds. Where this is the case, they will be required to sign an Associate Participant Agreement including Project Terms, the form of which will be endorsed by the Management Committee, prior to being entered into by the Associate Participant and Collaboration Delegate (at the direction of the Principal Participants). The Associate Participants for this Project are:

Geoscience Australia (ABN 80 091 799 039) ("GA")

Department of State Growth (ABN 36 388 980 563)

Integrated Marine Observing System (ABN 30 764 374 782) ("IMOS")

3. Project Commencement Date:

01/07/2019

4. Project Completion Date:

30/06/2029

5. Project Leader's name and contact details:

Benoit Legresy (CSIRO)
Commonwealth Scientific and Industrial Research Organisation
Castray Esplanade, Battery Point, TAS 7004, Australia
Benoit.Legresy@csiro.au

Annie Foppert (UTAS)
University of Tasmania
Institute for Marine and Antarctic Studies
20 Castray Esplanade, Hobart, TAS 7004, Australia
annie.foppert@utas.edu.au

6. Project Funds required:

Total funds required for the Oceanography project is $10,383,694 as per ANNEX 1.

A summary of eligible expenditure by projects for the life of the AAPP is provided in ANNEX 2 with the CSIRO payment schedule listed in ANNEX 3.

7. Other Contributions required:

In-kind staff contributions ((FTE/y) (per annum averages over 10 years):

UTAS: Maxim Nikurashin (0.2 FTE), Helen Phillips (0.1 FTE), Paul Spence (0.2 FTE), Nathan Bindoff (0.1 FTE), new appointments (0.3)

CSIRO: Bea Peña-Molino (0.3 FTE), Steve Rintoul (0.45 FTE), Esmee van Wijk (0.225 FTE), Benoit Legresy (0.3 FTE), Laura Herraiz Borreguero (0.2 FTE – from 1/7/22),mooring (0.225 FTE and hydrochemistry support (0.315 FTE). These FTEs are full time commitments to AAPP, with 50% of the funding from CSIRO and 50% from AAPP (as detailed in section 8.)

8. Justification for the Project Funds requested:

Salaries ($6,771,163):

- Postdoctoral Research Associate — Physical Oceanographer [5 FTE-years] With experience in analysis of ocean observations to lead investigations of the drivers of change in bottom water formation and the deep overturning circulation.
- Postdoctoral Research Associate – Physical Oceanographer [3 FTE-years] With ocean observation skills to investigate the transport of warm water to ice shelf cavities and ice shelf related waters flowing into the Southern Ocean. The position will analyse observations acquired through Antarctic coastal voyage.
- Postdoctoral Research Associate — Physical Oceanographer [5 FTE-years] To lead investigations of the sensitivity of the Southern Ocean circulation to changes in forcing, including the Antarctic Circumpolar Current, the overturning circulation and transport of warm water to ice shelf cavities.
- Postdoctoral Research Associate – Physical Oceanographer [3 FTE-years] With experience in ocean model analysis to lead investigations of the ocean heat transport to ice shelf cavities and its impacts on basal melt in the

Antarctic coastal regions. The position will integrate ocean model outputs with Antarctic voyage observations.

- Postdoctoral Research Associate — Physical Oceanographer [3 FTE-years] With expertise in the physics of subduction and water mass formation and their connection to sub-mesoscale dynamics and flow-topography interaction, including analysis of the swath altimeter satellite SWOT.
- Postdoctoral Research Associate — Physical Oceanographer [2 FTE-years] With expertise in the broader Antarctic Circumpolar Current dynamics.
- Research Scientists – Physical Oceanography [$3,392,879 worth of FTEs]. Co-investment in CSIRO Research Scientists (Bea Peña-Molino 3.0 FTE, Steve Rintoul 4.5 FTE, Esmee van Wijk 2.25 FTE, Benoit Legresy 3.0 FTE, Laura Herraiz Borreguero 2.0 FTE (from 1/7/22), mooring (2.25 FTE) and hydrochemistry support 3.15 FTE) to lead the physical oceanography effort and provide expertise in ocean dynamics; analysis of oceanographic data from ships, floats and satellites; remote sensing; quality control of float data; and collection of oceanographic observations.

Plant Equipment ($3,200,000):
$1,500,000 is needed over the lifetime of the project for ice-capable Argo floats (6 pa @ $25k = $150k pa, for 10 years; these funds will also cover the hull costs for the BGC-Argo sensor equipped floats – with the BGC-Argo sensors themselves funded via the BGC Project). $1,500,000 is needed over the lifetime of the project for deep Argo floats (3 pa @ $100k = $300k pa, for 5 years). $200,000 is needed to purchase an expendable spar buoy with meteorological instrumentation.

Research Operating ($412,530):
$218,994 is needed over the lifetime of the project for laboratory and voyage consumables. An additional $193,536 will be used towards duty at sea allowances payable under relevant EBAs.

9. How the proposed work aligns to the scientific plans of AAPP:

The project will deliver essential observations and understanding of the drivers of change in the physical environment of the Southern Ocean, as needed to assess the impact of Southern Ocean change on regional and global climate, biogeochemical cycles, marine ecosystems, and the stability of the East Antarctic Ice Sheet (i.e. the ASCI Grand Challenge). It targets five specific questions:

1. How will changes in ocean circulation and temperature affect East Antarctic ice shelves? The project will determine where and how ocean heat reaches East Antarctic ice shelves and provide improved understanding of the factors that regulate poleward ocean heat transport across the Southern Ocean to the ice shelf cavity.

2. How will Southern Ocean feedbacks (e.g. changes in ocean heat & carbon uptake, sea ice and freshwater) alter the pace of climate change? The project will assess how and why the ocean is changing with time, identify the processes responsible for heat and carbon uptake and their sensitivity to change in ocean

circulation/stratification, and work with the sea ice team to assess the contribution of changes in ocean circulation to change in sea ice.

3. What processes and teleconnections link the climates of Australia and Antarctica, and what do they tell us about future change? We will explore the role of teleconnections in driving variations in ocean circulation and water mass formation, and provide measurements of ocean heat content for assessment of SO influence on Australian climate.

4. How will the changing physics and chemistry of the Southern Ocean and Antarctica influence marine life? The project will deliver assessments of change in the physical environment (temperature, salinity, currents, stratification, upwelling) of the Southern Ocean, as needed by other AAPP projects.

5. What is the cause of persistent biases in climate models (e.g. clouds, sea ice) and how can these processes be better represented in climate models? The project will provide better understanding of how the surface ocean influences the lower atmosphere and sea ice.

10. Project Objectives and Outcomes:

Activities and deliverables:

Years 1 and 2:

- Field programs at Totten, Ross Gyre and Antarctic Circumpolar Current carried out in conjunction with overseas programs and already-approved *RV Investigator* voyages.
- Enhancement of the first Southern Ocean pilot array of Deep Argo floats.
- Published studies documenting and explaining an unanticipated recent "rebound" in salinity of Antarctic Bottom Water, following 50 years of freshening.
- New insights into how dynamical "hot spots" associated with flow-topography interactions and standing meanders influence the ACC and overturning circulation.

Years 3 and 4:

- New understanding of the local dynamics of the standing meander in the Macquarie Ridge region and assessment of its role for the ACC and overturning circulation gained from observations and regional and global ocean models
- New insights into the local circulation and processes regulating ocean heat transport to ice shelves and basal melt, water mass formation and biogeochemistry.
    - in the Denman glacier region using available observations and newly developed high-resolution regional model.
    - In the Amery ice shelf region using opportunistic cruise observations

Years 5 and 6:

- Develop new understanding of fine-scale oceanographic processes in the Southern Ocean through remote sensing (i.e. SWOT satellite), targeted in-situ field campaigns, and high-resolution ocean models.
- New insights into ocean – ice shelf interaction and its impacts on basal melt, water mass formation and biogeochemistry, gained from multi-disciplinary field programs near ice shelf fronts and adjoining continental shelf. Targets in might include Amery and Denman glacier/Shackleton ice shelves.
- Assessments of the nature and causes of change in the circulation of the Southern Ocean, based on broad-scale measurements, repeat hydrography, model sensitivity studies and insight gained from process experiments in the ACC.

Years 7-10:

- Assessment of the potential vulnerability to ocean heat transport of the Wilkes and Aurora Basins of the East Antarctic Ice Sheet, based on multi-disciplinary field programs to investigate ocean – ice shelf interaction at the poorly-observed Cook and Totten ice shelves.
- New understanding of the processes regulating ocean heat transport to ice shelves, from process studies of ocean heat transport from the open ocean to ice shelf cavities.
- Synthesis of Southern Ocean change, including identification of key physical drivers and assessment of impacts on regional and global climate, biogeochemical cycles, marine ecosystems, and the stability of the East Antarctic Ice Sheet, in conjunction with other AAPP programs.

11. Brief review of the science and intellectual property background, including Background IP and any relevant third party IP:

Background IP provided by AAPP partners (CSIRO, UTAS and IMOS) includes:

- High precision autonomous sensor and sampler observation systems for physical ocean properties, e.g. temperature, salinity, momentum, currents and waves, and the experience to achieve their quality control.
- Algorithms and experience for the decomposition and attribution of ocean circulation changes across physical drivers.
- Ocean and climate models and the ability to apply them to integrate, synthesize, interpret and project change in ocean circulation and climate.

Project participants acknowledge and agree that all project IP forms part of AAPP IP and will be owned and licensed in accordance with the Formal Collaborative Agreement as is outlined in the Project Terms (ANNEX 4).

12. Proposed methodology:

The project will address the Grand Challenge and overarching science questions with a combination of sustained observations, repeat measurements, process studies and model simulations. The research underpins other AAPP projects and involves strong collaborations with other programs in Australia and overseas. The research strategy is organised in four work packages.

Work Package 1: Change in Antarctic Bottom Water and the deep overturning circulation

Recent measurements of a surprising "rebound" in salinity of Antarctic Bottom Water, after 50+ years of freshening, underscores gaps in our understanding of the deep limb of the global overturning circulation. New Deep Argo floats allow near-continuous measurements of the deep ocean for the first time and, in combination with more traditional repeat hydrographic sections, promise to revolutionise our understanding of the deep ocean and its variability. We have formed an international team that has deployed the first pilot array of Deep Argo floats in the Southern Ocean (leveraging overseas investment of >$2M to date in the Australian sector). These first deployments have proven the concept; the array now needs to be completed. Measurements in dense water formation regions on the shelf are also needed, from repeat hydrography, ice-capable floats, moorings, instrumented seals and remote sensing (linked to sea ice). Models will be used to help identify the drivers of deep ocean change. Linked to ocean – ice shelf interaction and biogeochemistry programs.

Work Package 2: The evolving ocean inventory of heat and freshwater

Given that ocean heat content makes the dominant contribution to changes in the planetary energy budget, and that the Southern Ocean takes up more of the excess heat than any other ocean region, broad-scale, year-round observations are needed to track the evolving ocean inventory of heat and freshwater. Argo floats provide the only means to do this. In addition, process studies of air-sea interaction, subduction/water mass formation, and cross-front exchange are needed to better understand the mechanisms responsible for uptake and storage of heat and other climate-relevant properties, and their sensitivity to changes in forcing. A Lagrangian air-sea interaction experiment using a novel expendable spar buoy and other autonomous sensors will be carried out. This work package is linked to the Atmosphere and Biogeochemistry programs.

Work Package 3: Ocean heat transport to ice shelf cavities

New satellite observations show that a number of East Antarctic ice shelves – not just the Totten - have thinned more rapidly in the past decade. The distribution of change strongly suggests that increased ocean heat transport to the ice shelves is driving the thinning. But the processes that determine how much ocean heat reaches ice shelf cavities are not yet understood. Oceanographic observations do not exist near many East Antarctic ice shelves, preventing an assessment of their vulnerability to ocean heat flux.

The research program will include:

- Multi-disciplinary expeditions to ice shelf fronts and neighbouring continental shelf, including ship-based physics and biogeochemistry work to discover the pathways of warm water across the shelf, floats and moorings in key locations to provide year-round observations, autonomous underwater vehicles to provide high temporal and spatial resolution of ocean processes, sea ice sampling, autonomous sampling of the ice shelf cavity (in collaboration with SRI). Targets might include Amery/Prydz Bay (good test for

new ship), West/Shackleton Ice Shelves (logistically not too difficult, very few ocean measurements), Cook Ice Shelf (logistically hard, but no ocean measurements, and potentially another vulnerable region of East Antarctica), and Totten. Swath bathymetry in poorly-sampled regions is a high priority.

- High resolution modelling of the ice shelf and shelf break regions to simulate and quantify the pathways of warm water across the shelf and physical processes governing the exchange.
- Process studies of exchange across the shelf break at key locations, including sampling from ships, autonomous underwater instruments, and moorings, with the sampling plan and interpretation guided by high resolution model studies. Swath bathymetry in poorly-sampled regions is a high priority.
- Linked to Ice shelf, Sea Ice, Biogeochemistry and Geoscience research areas.

Work Package 4: Sensitivity of Southern Ocean circulation to changes in forcing
This activity is strongly linked to Work Packages 1 – 3, which together provide observations and analysis of the drivers of change in ocean circulation, stratification, and water mass formation. WP4 synthesises this work and seeks to identify and quantify the causes of observed changes, using a hierarchy of models to test the sensitivity to changes in forcing. In addition, WP4 aims to improve our dynamical understanding of the sensitivity of Southern Ocean circulation to changes in forcing. Recent advances have underscored the importance of interactions of the flow with topography for the Southern Ocean circulation (including the ACC, overturning and exchange across the Antarctic shelf break).

Specifically, WP4 will use a suite of simulations of varying resolution and complexity:

- Global eddy-resolving ocean model ACCESS-OM-0.1 developed by the Consortium for Ocean-Sea Ice Modeling in Australia (COSIMA) with corresponding wind perturbation experiments
- Regional, fine-resolution model explicitly resolving mesoscale eddies with length scales of order 10-100km and sub-mesoscale turbulence and internal waves with length scales of order 1-10km. This is a process-study model which will be used to study Southern Ocean circulation sensitivity to wind forcing and small-scale bathymetric features
- Idealized, channel and inter-hemispheric sector models to develop and test conceptual understanding of the Southern Ocean circulation and water-mass transformation and it sensitivity to changes in forcing, as well as to explore wider parameter range than that allowed by realistic models.

Work plan in first two years:
[Q1, Q2, … refer to the five science questions listed in section 9 of this project plan]

- Analysis of physical and biogeochemical change from 2018 RV Investigator voyage (Q1-5)
- Quantify change and variability in the Australian Antarctic Basin using the first Southern Ocean array of Deep Argo floats (Q1-3)
- Analysis of meander dynamics of the Antarctic Circumpolar Current, using RV Investigator voyage in Oct 2018; recovery of mooring on RV Investigator (March, 2020) (Q2)

- Publish paper on rebound of salinity in East Antarctic shelf and bottom waters (Q1-3)
- Deploy profiling ice floats on the Totten shelf from RSV Shirase (2019/20) (Q1)
- Publish results from international experiment studying the Ross Gyre (Q2)
- Quantify ocean heat and freshwater inventory in poorly-sampled regions under ice using profiling ice floats (partnership with IMOS) (Q1-3)

Timeline of major field programs and logistics required:
First two years (no AAD logistics available in first two years):

- Collaborate on RSV Shirase voyage to Totten (2019/20)
- Piggy-back on RV Investigator voyage to recover ACC mooring (approved, March 2020)
- Deploy Argo and Deep Argo floats from ships of opportunity

Years 3 to 4 (2021-23):

- Prydz Bay/Amery Ice Shelf multidisciplinary expedition (RV Investigator)
- I9S repeat hydrography (RV Investigator), including deployment of Autonomous Lagrangian Air-Sea Interaction Array (ALASIA) (moved to years 5 and 6)
- float deployments to quantify time and space evolution of ocean heat content, including under ice.

Years 5 to 6 (2023-25):

- West/Shackleton ocean – ice shelf interaction expedition (RSV Nuyina)
- ACC frontal dynamics experiment to coincide with SWOT swath altimeter mission (RV Investigator)
- I9S repeat hydrography (RV Investigator) through the MISO voyage
- float deployments to quantify time and space evolution of ocean heat content, including under ice.

Years 7 to 10 (2025-29):

- Cook Ice Shelf (RSV Nuyina) and Balleny/Macquarie Axis (RV Investigator) expedition
- process study of exchange across the Antarctic Slope Front (RSV Nuyina)
- SR3/Mertz/P11S repeat hydrography

13. Milestones, tasks, any proposed stop/go milestones in relation to deployment and (as applicable) recovery / maintenance of equipment:

Annual Milestones include:

- completion of the field programs listed in section 12
- research outputs from this work
- integration of outputs through synthesis and modelling

The Argo component depends on co-funding from IMOS, which has secure funding through to 30 June 2022, and anticipated through to 2030. If it is not received, these efforts will be reconsidered against other priorities and could either cease or replace other field programs.

Milestones will be established in project proposals and voyage/activity specific workplans, which will include stop/go progress assessments to inform adaptive project management.

All partners recognise that logistical arrangements are not the responsibility of a single agency and if any requests set out in this project plan indicate that logistical support will be provided by one or more partners, such logistical support requires administrative processes and approvals by the host agency. It is the responsibility of the Chief Investigators to ensure logistical arrangements are in place to deliver their research projects, including through applications to the AAS, MNF and international collaborators. The partners acknowledge that this plan is not directive and does not override the host agencies' decision regarding provision, or not, of logistical support.

14. Deliverables, in relation to availability of near-real-time and delayed mode data (as applicable); plus quality controlled data delivery:

Physical oceanographic data from oceanographic voyages and moorings

Quality-controlled physical oceanographic data from research vessel voyages will be made publicly available within 12 months of collection. The data will be delivered to national (e.g. the Australian Antarctic Data Centre and IMOS Australian Ocean Data Network (AODN) and international (e.g. Carbon and Climate Hydrographic Data Office (CCHDO)) data centres. Quality control procedures will follow international standards.

Profiling float data

Data from profiling floats will be available in real-time via the GTS. Quality-controlled delayed mode data will be available within 12 months.

Numerical simulations

Global ocean model ACCESS-OM-0.1 is developed as part of COSIMA model development effort and is available to this project for analysis and experiments. The initial configuration of the regional, fine-resolution model based on freely available MITgcm source code and open boundary conditions from ACCESS-OM-0.1 and the Southern Ocean State Estimation (SOSE) models has been developed. It will be further improved and wind sensitivity experiments carried out as part of this project. Idealized channel and sector models are available through previous projects and collaborations. High-resolution regional model of the Denman glacier region will be developed as part of the project in years 3 and 4.

15. Risk analysis and how identified risks will be managed:

A risk register has been set up to track project risks. Risks have been analysed to identify the qualitative and quantitative impact of the risks on the project so that appropriate steps can be taken to mitigate them. The risk register is reviewed at least annually with the 'live' risk register located on the AAPP Teams site.

16. Relevance and benefits, including alignment to the Australian Antarctic Strategy and 20 Year Action Plan explaining what will be provided to end-users and how they will benefit from the outcomes derived from the AAPP Project:

The research strategy directly addresses knowledge gaps identified in the Oceans and Marine Ice in the Southern Hemisphere theme of the Australian Antarctic Strategic Plan. Specifically, the project will identify and quantify drivers of change in the ocean inventory of heat, freshwater and carbon and in the circulation and ventilation of the Southern Ocean, including near the Antarctic margin where the ocean interacts with sea ice and floating ice shelves. This research is essential to address "the most pressing of our science needs, particularly around the role of Antarctica in the global climate system," as articulated in the Antarctic Strategy and 20 Year Action Plan. The research strategy is directly aligned with the ASCI priority to "support research that aims to understand the role of the Antarctic region in the global climate system and the implications on marine ecosystems".

The project research strategy has been targeted to address key themes of many national and international strategic plans.

The project will deliver to the National Innovation Agenda by delivering high quality research that addresses the national challenge of responding effectively to the risks and opportunities of climate change. By providing improved understanding of the nature, causes and consequences of Southern Ocean change, the project will help Australian decision-makers respond more effectively to the challenges of climate change. The project will also open up opportunities for international collaboration and development of new technologies like deep Argo.

The research to be carried out is directly targeted at the national Strategic Research Priorities, particularly Living in a Changing Environment – Identify vulnerabilities and boundaries to the adaptability of changing natural and human systems. The aim of the project is to determine how and why the Southern Ocean is changing, and the consequences for Australia and the rest of the globe.

The project is well-aligned with the National Marine Science Plan Grand Challenge in Climate Variability and Change. In particular, the project will deliver measurements of ocean change that contribute to the following Leverage points for effective action: marine environmental baselines, national marine system monitoring, and the adaptive capacity of marine systems.

The project delivers science that is essential to address the Dealing with Climate Change theme of Marine Nation 2025, and the Coasts and Oceans theme in Australian Climate Change Science – A National Framework. Knowledge of Southern Ocean change will also inform sustainable management strategies of fisheries in the Southern Ocean and southern Australia, as needed by the Climate Change theme of the National Fishing and Aquaculture RD&E Strategy 2010 and by the Building Ecosystem Resilience in a Changing Climate theme of Australia's Biodiversity Conservation Strategy 2010-2030.

The partners acknowledge a new Australian Antarctic Strategy and 20 Year Action Plan was released in 2022. Consistent with section 5.1 of the Formal Collaborative Agreement the AAPP seeks to enable science under the Australian Antarctic Strategy and 20 Year Action Plan. Upon release of the Strategy and Action Plan, the AAPP management committee will review alignment with the updated Strategy and Action Plan and advise researchers across all partner agencies of any inconsistencies, and the implications of any inconsistences, between this plan and the Strategy and Action Plan.

17. Special Conditions:

No variation to the project terms as per ANNEX 4.

ACKNOWLEDGEMENT

The Project Participants acknowledge and agree that, subject to the approval of the project as an AAPP Project, they will participate in and contribute to the AAPP Project under the leadership of the Principal Participants in accordance with this Project Plan and Project Terms.

Signed *University of Tasmania* by an authorised officer

Signature of officer

Name of officer

Office held

Signed *Commonwealth of Australia represented by the Bureau of Meteorology* by an authorised officer

Signature of officer

Name of officer

Office held

Signed *Commonwealth of Australia represented by the Australian Antarctic Division* by an authorised officer

Signature of officer

Name of officer

Office held

Signed *Commonwealth Scientific and Industrial Research Organisation* by an authorised officer

Signature of officer

Name of officer

Office held

Signed *Commonwealth of Australia represented by Geoscience Australia* by an authorised officer

Signature of officer

Name of officer

Office held

Signed *Integrated Marine Observing System* by an authorised officer

Signature of officer

Name of officer

Office held

Signed *Department of State Growth* by an authorised officer

Signature of officer

Name of officer

Office held

The Program Leader acknowledges and agrees that this project has been approved as an AAPP Project by the Management Committee.

Program Leader at the direction of the Management Committee

Signature of Program Leader

Name of Program Leader

Collaboration Delegate

Signature of Collaboration Delegate

Name of Collaboration Delegate

ANNEX 1: PROJECT BUDGET

5 May 2021 variation – revised as per Management Committee approval dated 5 May 2021.
Summary of variation(s):

1. Application budget versus revised budget.
2. Oceanography 'Labour – SWOT position' reduced to 3FTE years with addition of 2FTE ACC Analysis oceanographer position in years 6-7.

4 May 2022 variation – revised as per Management Committee approval dated 4 May 2022.
Summary of variation(s):

1. 'Labour' salaries updated to reflect extensions and promotions (across all Projects).

5 May 2023 variation – revised as per Management Committee approval dated 5 May 2023.
Summary of budget variation(s):

1. 'Labour' salaries updated to reflect new UTAS staff agreement, extensions and promotions (across all projects).

ELIGIBLE EXPENDITURE		Year 1 Application Budget	Year 1 Actuals	Year 2 Application Budget	Year 2 Actuals	Year 3 Application Budget	Year 3 Actuals	Year 4 Application Budget	Year 4 Revised Budget	Year 5 Application Budget	Year 5 Revised Budget	Year 6 Application Budget	Year 6 Revised Budget	Year 7 Application Budget	Year 7 Revised Budget	Year 8 Application Budget	Year 8 Revised Budget	Year 9 Application Budget	Year 9 Revised Budget	Year 10 Application Budget	Year 10 Revised Budget	TOTAL Application Budget	TOTAL Revised Budget
	FTE *Years	2019/20		2020/21		2021/22		2022/23		2023/24		2024/25		2025/26		2026/27		2027/28		2028/29			
Labour																							
Research Associate — Physical Oceanographer A dynamical oceanographer to lead investigations of the sensitivity of the Southern Ocean circulation to changes in forcing.	5.00	148,714	- 83,437	151,688	- 85,474	154,722	- 72,389	157,816	- 149,715	160,972	- 158,988	164,192	- 63,796	167,476		170,825						1,276,403	- 613,798
Research Associate Physical Oceanographer - Ice Shelf and Antarctic Shelf Interactions	3.00														- 167,476		- 170,825		- 174,242				- 512,542
Research Associate — Physical Oceanographer To lead investigations of the drivers of change in bottom water formation and the deep overturning circulation.	5.00		-		- 127,721	154,722	- 135,009	157,816	- 149,715	160,972	- 158,988	164,192	- 166,222	167,476		170,825		174,242		177,726	-	1,327,970	- 737,655
Research Associate - Physical Oceanographer Observations over the Antarctic Shelf	3.00														- 167,476		- 170,825		- 174,242				- 512,542
Research Associate — Physical Oceanographer With expertise in the physics of subduction and water mass formation.	3.00	148,714	0	151,688	-	154,722	-	157,816		160,972	- 139,688		- 148,134		- 171,874							773,911	- 459,696
Research Associate — Physical Oceanographer. ACC Analysis	2.00				-								- 164,192		- 167,476							-	- 331,667
Research Scientists – Physical Oceanography. Co-investment in CSIRO Research Scientists to lead the physical oceanography effort.	19.00	330,846	- 330,846	338,763	- 338,763	396,861	- 396,861	397,967	- 397,967	396,728	- 396,728	372,812	- 372,812	416,391	- 416,391	388,417	- 388,417	354,094	- 354,094			3,392,879	- 3,392,879
Total	40.00	628,273	- 414,283	642,139	- 551,958	861,025	- 604,258	871,415	- 697,397	879,645	- 854,392	701,196	- 915,156	751,342	- 1,090,691	730,067	- 730,067	528,335	- 702,577	177,726	-	6,771,163	- 6,560,779
Plant and Equipment																							
Ice-capable Argo floats (6 pa @ $25k = $150k pa, for 10 years, $1500k total)		300,000	-300,000			150,000	- 150,000	150,000	- 150,000	150,000	- 150,000	150,000	- 150,000	150,000	- 150,000	150,000	- 150,000	150,000	- 150,000	150,000	- 150,000	1,500,000	- 1,500,000
Deep Argo floats (3 pa @ $100k = $300k pa, for 5 years, $1500k total)		300,000	-300,000	300,000	- 300,000	300,000	- 300,000	300,000	- 300,000	300,000	- 300,000											1,500,000	- 1,500,000
Spar buoy with met instrumentation ($200k)		200,000	-200,000																			200,000	- 200,000
Total		800,000	- 800,000	300,000	- 300,000	450,000	- 450,000	450,000	- 450,000	450,000	- 450,000	150,000	- 150,000	150,000	- 150,000	150,000	- 150,000	150,000	- 150,000	150,000	- 150,000	3,200,000	- 3,200,000
Research Operating																							
Laboratory and voyage consumables		20,000	-20,000	20,400	- 20,400	20,808	- 20,808	21,224	- 21,224	21,649	- 21,649	22,082	- 22,082	22,523	- 22,523	22,974	- 22,974	23,433	- 23,433	23,902	- 23,902	218,994	- 218,995
Duty at Sea allowances payable under relevant EBAs		-	-	-		42,336	- 42,336	30,240	- 30,240	30,240	- 30,240	-		30,240	- 30,240	30,240	- 30,240	30,240	- 30,240	-		193,536	- 193,536
Total		20,000	- 20,000	20,400	- 20,400	63,144	- 63,144	51,464	- 51,464	51,889	- 51,889	22,082	- 22,082	52,763	- 52,763	53,214	- 53,214	53,673	- 53,673	23,902	- 23,902	412,530	- 412,531
TOTAL		1,448,273	- 1,234,283	962,539	- 872,358	1,374,169	- 1,117,402	1,372,879	- 1,198,861	1,381,533	- 1,356,281	873,277	- 1,087,238	954,105	- 1,293,454	933,280	- 933,281	732,009	- 906,250	351,628	- 173,902	10,383,694	- 10,173,310

ANNEX 2: EXPENDITURE SUMMARY

A summary of eligible expenditure by projects.

14 October 2020 variation – revised as per Management Committee approval dated 14 October 2020.
Summary of variation(s):

1. Biogeochemistry 'Research Operating' budget item addition of $10,000 per year from year 2 to year 10, total $90,000 (note that this is matched by CSIRO)
2. Ice Shelves 'Research Operating' budget items reallocated with no change in total research operating funds (see Project Plan – Ice Shelves Annex 1)
3. Sea Ice 'Plant and Equipment' budget item of $25,000 moved to 'Research Operating' budget item
4. Ice Cores 'Labour – Research' co-investment in CSIRO scientists reduced as the Palaeo-Atmospheric Composition was approved in August 2019 as a UTAS position with 50% co-investment from CSIRO. New budget line item 'Research Associate – Palaeo-atmos composition' created reflecting this change including correcting FTE
5. Ice Cores 'Research Operating' wording changed to reflect clause 8
6. Krill and ecosystems 'Research Operating' wording changed to reflect clause 8 (note that the funds for activities on the 20/21 SOLACE ($25,000) and TEMPO ($161,000) voyages were funded from year 1 (19/20) carry forward from this project and other projects, and the science management project.
7. Administration budget item reduced by $10,000 per year from year 2 to year 10, total $90,000 to fund Biogeochemistry 'Research Operating' (see point 1 above)
8. Other Eligible Expenditure 'Leased High Perf Laptops Replaced ~ 3 yrs' revised to 'Software/Licensing' with no change in budget

5 May 2021 variation – revised as per Management Committee approval dated 5 May 2021.
Summary of variation(s):

1. Application budget versus revised budget.
2. Ice Cores 'Labour - Technician Ice Core Analysis' 0.5FTE years 3-6 changed to 1FTE in years 3-4 only.
3. Ice Cores 'Research Operating' budget item additional of $80,300 in year 3 for air sample preparation lines for CO2 and N2O concentrations and isotopes on mass spec.
4. Oceanography 'Labour – SWOT position' reduced to 3FTE years with addition of 2FTE ACC Analysis oceanographer position in years 6-7.
5. Revised budget for 'Other Eligible Expenditure' items related to data management, general administration expenses, communications, management committee, visiting fellowships, publications, software/licensing, data workshops/conferences, and science conference sponsorship have been reduced by 30% in years 3-8 and 90% in year 2.

4 May 2022 variation – revised as per Management Committee approval dated 4 May 2022.
Summary of variation(s):

1. 'Labour' salaries updated to reflect extensions and promotions (across all Projects).

2. Ice Cores ‘Research Operating’ budget items additional of $15,000 in year 4 for operation and measurements of new mass spectrometer and freight of ice core samples.
3. Move of Year 2 unspent funds to Year 3 (Projects impacted are: Ice Cores; Ice Shelves; and Sea Ice).

5 May 2023 variation – revised as per Management Committee approval dated 5 May 2023. Summary of budget variation(s):

1. ‘Labour’ salaries updated to reflect new UTAS staff agreement, extensions and promotions (across all projects).
2. Ice Cores Technician - Ice Core Analysis position remaining budget to be held until after year 6 and may revert to 0.5 FTE over longer period.
3. Ice Cores ‘Research Operating’ budget changes with lab operating costs budget to continue to roll over unspent funds to later years in readiness for when we need surge capacity for campaigns of ice core processing in anticipation of greater volumes of MYIC ice returning. Field Camp allowance budget to be rolled into lab operating costs as no way to spend this since there is no comparable field allowance for UTAS employed staff under the staff agreement.
4. Ice Cores Research Associates - ice gas measurements and ice core atmospheric sciences moved to commence year 7 due to delays in returning ice.
5. Ice Shelves ‘Research Operating’ budget line items rolled into one: ‘Ice shelves operating budget, includes satellite imagery, data downloads, telemetry, ApRES units and ancillary costs, GPS units and ancillary costs, tower sites with power & telemetry solutions, tools and consumables, and allowance where relevant’. NCI budget line item to remain separate.
6. ‘Other Eligible Expenditure’ $50k budget item to fund additional BGC-ARGO float with sensors that will provide a multidisciplinary suite of timeseries observations ranging from physical, chemical, optical, biological and ecological.

ELIGIBLE EXPENDITURE SUMMARY	Year 1 actuals	Year 2 actuals	Year 3 actuals	Year 4 application budget	Year 4 revised budget	Year 5 application budget	Year 5 revised budget	Year 6 application budget	Year 6 revised budget	Year 7 application budget	Year 7 revised budget	Year 8 application budget	Year 8 revised budget	Year 9 application budget	Year 9 revised budget	Year 10 application budget	Year 10 revised budget	TOTAL application budget	TOTAL revised budget
	2019/20	2020/21	2021/22	2022/23		2023/24		2024/25		2025/26		2026/27		2027/28		2028/29			
Atmosphere																			
Labour - Research	189,975	350,228	370,347	418,795	397,902	321,945	313,195	164,192	329,185	167,476	214,842	170,825	177,030	174,242		177,726		2,649,530	2,342,703
Plant and Equipment																			
Research Operating							25,000					25,520	25,520					50,520	50,520
Total	**189,975**	**350,228**	**370,347**	**418,795**	**397,902**	**321,945**	**338,195**	**164,192**	**329,185**	**167,476**	**214,842**	**196,345**	**202,550**	**174,242**		**177,726**		**2,700,050**	**2,393,223**
Ice cores																			
Labour - Research	310,932	279,962	176,603	356,809	368,058	148,093	166,166	479,439	175,247	334,951	526,411	341,650	420,422	348,483	364,681		375,622	3,121,351	3,164,105
Plant and Equipment																			
Research Operating	33,641	53,282	112,582	52,852	91,264	53,909	53,909	54,987	54,987	56,087	56,087	45,947	45,947	46,866	46,866	47,804	47,804	501,068	596,369
Total	**344,573**	**333,244**	**289,185**	**409,661**	**459,322**	**202,002**	**220,075**	**534,426**	**230,234**	**391,038**	**582,498**	**387,597**	**466,369**	**395,349**	**411,547**	**47,804**	**423,426**	**3,622,419**	**3,760,474**
Ice shelves																			
Labour - Research	102,184	428,906	543,691	374,791	582,645	382,287	544,896	554,125	332,444	565,207	472,607	576,511	482,919	500,921	273,511	66,623		3,878,250	3,763,803
Plant and Equipment																			
Research Operating	25,189	51,934	175,767	183,672	268,715	64,946	69,441	71,245	76,031	82,670	77,552	84,323	79,103	86,010	75,165	87,730	76,668	1,005,428	975,565
Total	**127,373**	**480,840**	**719,459**	**558,464**	**851,360**	**447,233**	**614,337**	**625,369**	**408,475**	**647,877**	**550,159**	**660,834**	**562,022**	**586,930**	**348,676**	**154,353**	**76,668**	**4,883,677**	**4,739,368**
Oceanography																			
Labour - Research	414,283	551,958	604,258	871,415	697,397	879,645	854,392	701,196	915,156	751,342	1,090,691	730,067	730,067	528,335	702,577	177,726		6,771,163	6,560,779
Plant and Equipment	800,000	300,000	450,000	450,000	450,000	450,000	450,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	3,200,000	3,200,000
Research Operating	20,000	20,400	63,144	51,464	51,464	51,889	51,889	22,082	22,082	52,763	52,763	53,214	53,214	53,673	53,673	23,902	23,902	412,530	412,531
Total	**1,234,283**	**872,358**	**1,117,402**	**1,372,879**	**1,198,861**	**1,381,533**	**1,356,281**	**873,277**	**1,087,238**	**954,105**	**1,293,454**	**933,280**	**933,281**	**732,009**	**906,250**	**351,628**	**173,902**	**10,383,694**	**10,173,310**
Biogeochemistry																			
Labour - Research	596,533	593,902	783,818	902,739	801,787	922,812	916,059	820,245	955,255	838,796	1,103,297	686,953	830,336	352,344	235,256	119,430		6,935,138	6,816,244
Plant and Equipment	300,000	300,000																600,000	600,000
Research Operating	25,990	47,740	86,536	86,024	96,024	56,209	66,209	26,402	36,402	64,643	74,643	87,774	97,774	27,753	37,753	28,222	38,222	514,698	607,293
Total	**922,523**	**941,642**	**870,354**	**988,763**	**897,811**	**979,021**	**982,268**	**846,646**	**991,657**	**903,439**	**1,177,940**	**774,727**	**928,110**	**380,097**	**273,009**	**147,652**	**38,222**	**8,049,837**	**8,023,537**
Sea ice																			
Labour - Research	110,298	412,907	458,372	473,448	495,692	482,917	464,726	492,575	519,975	502,427	542,723	512,475	563,104	174,242	480,583			3,854,738	4,048,379
Plant and Equipment				5,000		5,000		5,000										25,000	
Research Operating		28,677	1,374	113,060	201,029	54,122	59,122	115,204	120,204	56,308	56,308	117,434	117,434	58,583	58,583	59,755	59,755	727,486	702,486
Total	**110,298**	**441,584**	**459,746**	**591,508**	**696,721**	**542,038**	**523,848**	**612,779**	**640,179**	**558,735**	**599,031**	**629,909**	**680,538**	**232,825**	**539,166**	**59,755**	**59,755**	**4,607,224**	**4,750,865**
Ecosystems/krill																			
Labour - Research	97,504	274,115	283,847	473,448	453,559	482,917	476,208	492,575	520,104	502,427	629,959	512,475	524,885	174,242	406,217	177,726	140,858	3,880,777	3,807,256
Plant and Equipment																			
Research Operating	6,453	250,039	55,846	63,672	70,250	64,946	64,946	66,245	66,245	67,570	67,570	68,921	68,921	70,300	70,300	71,706	71,706	656,983	792,277
Total	**103,958**	**524,154**	**339,693**	**537,120**	**523,809**	**547,863**	**541,154**	**558,820**	**586,349**	**569,996**	**697,529**	**581,396**	**593,806**	**244,541**	**476,517**	**249,432**	**212,564**	**4,537,760**	**4,599,532**
Scientific Program Management																			
Labour - Project Management	90,479	251,870	260,005	145,895	187,036	148,812	221,026	151,789	226,552	154,824	234,255	157,921	241,282	161,079	248,521	164,301	255,976	1,631,530	2,217,001
Operating - Data Management				45,900	32,130	46,818	32,773	47,754	33,428	48,709	34,096	49,684	34,779	50,677	50,677	51,691	51,691	386,234	269,574
Total	**90,479**	**251,870**	**260,005**	**191,795**	**219,166**	**195,630**	**253,799**	**199,543**	**259,980**	**203,534**	**268,351**	**207,605**	**276,061**	**211,757**	**299,198**	**215,992**	**307,667**	**2,017,764**	**2,486,575**
Travel and Accommodation																			
Travel and accommodation	16,263	-2,276	33,936	143,263	143,263	146,128	146,128	149,051	149,051	152,032	152,032	155,073	155,073	158,174	158,174	161,337	161,337	1,478,212	1,112,980
Total	**16,263**	**-2,276**	**33,936**	**143,263**	**143,263**	**146,128**	**146,128**	**149,051**	**149,051**	**152,032**	**152,032**	**155,073**	**155,073**	**158,174**	**158,174**	**161,337**	**161,337**	**1,478,212**	**1,112,980**
Administration																			
Administration (incl Admin Labour)	148,180	182,687	187,487	275,732	294,220	281,247	335,338	286,872	348,326	292,609	361,992	298,462	371,973	304,431	414,389	311,222	426,352	2,845,755	3,070,944
Total	**148,180**	**182,687**	**187,487**	**275,732**	**294,220**	**281,247**	**335,338**	**286,872**	**348,326**	**292,609**	**361,992**	**298,462**	**371,973**	**304,431**	**414,389**	**311,222**	**426,352**	**2,845,755**	**3,070,944**
Audit cost																			
Audit Cost			2,756	31,212			5,000	32,473			5,000	33,785			5,000	35,150	10,000	162,620	27,756
Total			**2,756**	**31,212**			**5,000**	**32,473**			**5,000**	**33,785**			**5,000**	**35,150**	**10,000**	**162,620**	**27,756**
Other Eligible Expenditure (Excl Research Operating)																			
Management Committee		10,000	10,000	31,836	30,000	32,473	30,000	33,122	30,000	33,785	30,000	34,461	30,000	35,150	30,000	35,853	30,000	328,492	230,000
Visiting Fellowships	4,819		4,984	50,938	28,000	51,957	28,000	52,996	35,000	54,056	35,000	55,137	35,000	56,240	50,000	57,364	20,000	525,587	240,803
Publications		16,742	33,560	53,060	31,500	54,122	31,500	55,204	35,000	56,308	35,000	57,434	35,000	58,583	55,000	59,755	55,000	547,486	328,302
Software/Licensing		5,274	5,666	21,067	14,747	21,067	14,747	21,067	14,747	21,067	14,747	21,067	14,747	21,067	21,067	21,067	21,067	210,666	126,809
Data Workshops/Conferences					50,000													101,000	50,000
Science Conference Sponsorship			18,534	53,040	37,128	54,101	37,871	55,183	38,628	56,286	39,400	57,412	40,188	58,560	58,560	59,732	59,732	446,314	330,042
Staff training	2,035	6,890	3,688	31,836	31,836	32,473	32,473	33,122	33,122	33,785	33,785	34,461	34,461	35,150	35,150	35,853	35,853	328,492	249,293
Scholarships & top-ups		7,973	39,896	48,000	108,000	66,000	144,000	57,000	120,000	36,000	78,000	12,000	24,000					252,000	521,869
Facilities running costs	180,000	183,600	187,272	191,017	191,017	194,838	194,838	198,735	198,735	202,709	202,709	206,763	206,763	210,899	210,899	215,117	215,117	1,970,950	1,970,950
Severance allocation																			108,000
Total	**186,855**	**230,478**	**303,600**	**480,795**	**522,228**	**507,029**	**513,429**	**506,429**	**505,232**	**493,996**	**468,641**	**478,735**	**420,159**	**475,648**	**460,676**	**484,740**	**436,769**	**4,710,986**	**4,048,067**
TOTAL	**3,474,758**	**4,606,809**	**4,953,971**	**5,999,988**	**6,204,663**	**5,551,671**	**5,829,850**	**5,389,878**	**5,535,905**	**5,334,837**	**6,371,470**	**5,337,748**	**5,589,943**	**3,896,002**	**4,292,602**	**2,396,791**	**2,326,663**	**49,999,998**	**49,294,633**

ANNEX 3: CSIRO PAYMENT SCHEDULE

The CSIRO payment schedule is shown below by project and is to be paid as two equal 6-monthly instalments.

14 October 2020 variation – revised as per Management Committee approval dated 14 October 2020.
Summary of variation(s):

1. Project 2 – Ice Cores 'Labour – Research' reduced as the Palaeo-Atmospheric Composition was approved in August 2019 as a UTAS position with 50% co-investment from CSIRO
2. Project 5 - Biogeochemistry 'Operating' budget item addition of $10,000 per year from year 2 to year 10, total $90,000 (note that this is matched by CSIRO)

AAPP-CSIRO PAYMENT SCHEDULE BY PROJECT	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	TOTAL
	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	
	$ Ex GST	$ Ex GST	$ Ex GST	$ Ex GST	$ Ex GST	$ Ex GST	$ Ex GST	$ Ex GST	$ Ex GST	$ Ex GST	**$ Ex GST**
Project 1- Atmosphere											
Labour - Research	94,896	97,573	100,329	103,163							**395,961**
TOTAL Project 1	**94,896**	**97,573**	**100,329**	**103,163**							***395,961***
Project 2 - Ice Cores											
Labour - Research	122,078	125,520	129,069	132,712							**509,379**
TOTAL Project 2	**122,078**	**125,520**	**129,069**	**132,712**							***509,379***
Project 4 - Oceans											
Labour - Research	330,846	338,763	396,861	397,967	396,728	372,812	416,391	388,417	354,094		**3,392,879**
Plant and Equipment - Research	800,000	300,000	450,000	450,000	450,000	150,000	150,000	150,000	150,000	150,000	**3,200,000**
Other Eligible Expenditure (incl Research Operating)											
Operating	20,000	20,400	20,808	21,224	21,649	22,082	22,523	22,974	23,433	23,902	**218,994**
Duty at Sea Allowance			42,336	30,240	30,240	0	30,240	30,240	30,240	0	**193,536**
TOTAL Project 4	**1,150,846**	**659,163**	**910,005**	**899,432**	**898,616**	**544,894**	**619,154**	**591,630**	**557,767**	**173,902**	***7,005,409***
Project 5 - Biogeochemistry											
Labour - Research	224,828	231,174	237,701	244,419	251,326	258,427	265,742	273,263	104,622		**2,091,503**
Plant and Equipment - Research	300,000	300,000									**600,000**
Other Eligible Expenditure (incl Research Operating)											
Operating	20,000	30,400	30,808	31,224	31,649	32,082	32,523	32,974	33,433	33,902	**308,994**
Duty at Sea Allowance	4,320	16,416	55,728	64,800	34,560	4,320	42,120	64,800	4,320	4,320	**295,704**
TOTAL Project 5	**549,148**	**577,990**	**324,237**	**340,443**	**317,535**	**294,829**	**340,385**	**371,037**	**142,375**	**38,222**	***3,296,202***
Total	**1,916,968**	**1,460,246**	**1,463,640**	**1,475,750**	**1,216,151**	**839,723**	**959,540**	**962,668**	**700,142**	**212,124**	**11,206,951**

ANNEX 4: PROJECT TERMS

1 INTERPRETATION AND DEFINITIONS

1.1 Unless otherwise defined in this Agreement, the words and expressions in this Agreement have the same meaning as those in the Australian Antarctic Program Partnership (**AAPP**) Formal Collaborative Agreement.

1.2 The interpretation rules set out in Schedule 1 of the Formal Collaborative Agreement apply to this Agreement.

1.3 In this Agreement:

(a) **Agreement** means these Project Terms and the approved Project Plan and includes the schedules and annexures to this Agreement;

(b) **Budget** means the budget for the AAPP Project as set out in the Project Plan;

(c) **Financial Statement** means a statement of all receipts, income, outgoings and expenditure received, derived or incurred in carrying out the AAPP Project in an Approved Form;

(d) **Final Report** means the final report required under clause 9.4 and as specified in clause 9.5;

(e) **Formal Collaborative Agreement** means the Australian Antarctic Program Partnership Formal Collaborative Agreement for the establishment and operation of AAPP;

(f) **Milestones** means the milestones set out in the Project Plan;

(g) **Principal Participant** means the Party leading the AAPP Project and named as the Principal Participant as specified in the Project Plan

(h) **Project Background IP** means the Background IP which Project Participants make available for the conduct of the AAPP Project;

(i) **Project Funds** means that part of the AAPP Funds that the Management Committee has determined will be made available to the Principal Participant for the conduct of the AAPP Project;

(j) **Project Commencement Date** means the commencement date for the AAPP Project as set out in the Project Plan or such other date as the Project Participants agree to in writing;

(k) **Project Completion Date** means the completion date for the AAPP Project as set out in the Project Plan or such other date as the Project Participants agree to in writing;

(l) **Project Contributions** means the money, assets, personnel, facilities and services to be contributed to the AAPP Project by a Project Participant as detailed in the Project Plan;

(m) **Project IP** means Intellectual Property arising from the conduct of the AAPP Project;

(n) **Project Leader** means the person who will lead the AAPP Project and identified as such in the Project Plan;

(o) **Project Objectives** means the objectives of the AAPP Project as detailed in the Project Plan;

(p) **Project Participants** means the Parties involved in the AAPP Project and identified as the Project Participants in the Project Plan (and for the purposes of this Agreement, includes the Principal Participant as the context requires);

(q) **Project Plan** means the Project Plan approved by the Management Committee and any variation subsequently agreed to it;

(r) **Progress Report** means a progress report as required under the Commonwealth Agreements;

(s) **Project Term** means the period referred to in clause 15.

(t) **Special Conditions** means any special or additional terms or conditions agreed by the Project Participants and set out in the Project Plan;

2 APPLICATION OF FORMAL COLLABORATIVE AGREEMENT

2.1 The Project Participants acknowledge that the approved AAPP Project forms part of the Activities under the Formal Collaborative Agreement and that it must be carried out in a manner that conforms to the Formal Collaborative Agreement.

2.2 The provisions of the Formal Collaborative Agreement that expressly or by necessary implication apply to the conduct of the Activities will apply to the conduct of the approved AAPP Project and to the Associate Participants, national collaborators, international collaborators and other funding parties as if they were Principal Participants under the Formal Collaborative Agreement.

3 SPECIAL CONDITIONS

3.1 In the event of any inconsistency between the provisions of this Agreement and the Special Conditions, the Special Conditions will prevail to the extent of the inconsistency.

4 TERM

4.1 The AAPP Project will commence on the Project Commencement Date and, subject to the terms of this Agreement, will terminate on the Project Completion Date.

5 PROJECT FUNDS AND CONTRIBUTIONS

5.1 Subject to clauses 5 and 20, the Collaboration Delegate must pay the Project Funds to the Principal Participant from the AAPP Funds in the manner set out in the Project Plan.

5.2 Each Project Participant must make its Contribution to the AAPP Project for the purpose of pursuing the AAPP Project in the manner set out in the Project Plan or as otherwise reasonably required to ensure the Milestones and Project Objectives are met.

5.3 The Principal Participant will enter into any agreements it deems necessary to secure contributions from third parties.

5.4 The Collaboration Delegate may, on direction of the Management Committee, withhold a payment to the Principal Participant under clause 5.1 if the Principal Participant is primarily responsible for a Milestone that has not been met or a Deliverable that has not been delivered until such time as the Milestone is met or the Deliverable is delivered to the reasonable satisfaction of the Management Committee.

5.5 If AAPP Funds are identified in the Financial Statement provided at the Project Completion Date as unexpended, those funds must be repaid to the Collaboration Delegate.

6 BACKGROUND INTELLECTUAL PROPERTY

6.1 Project Background IP remains in the ownership of the Project Participant making it available.

6.2 Each Project Participant agrees to make its Project Background IP available to the AAPP Project in accordance with clause 16 of the Formal Collaborative Agreement.

7 CONDUCT OF THE AAPP PROJECT

7.1 Each Project Participant will carry out its part of the AAPP Project diligently and in accordance with generally accepted professional, scientific and ethical principles and standards in the conduct of the AAPP Project.

7.2 The Project Participants will:

(a) cooperate with each other and the Project Leader; and

(b) use all reasonable endeavours to ensure;

the AAPP Project meets the Project Objectives, Milestones and Deliverables as specified in the Project Plan.

7.3 The Project Participants acknowledge that the AAPP Project forms part of the Activities and that the AAPP Project will be managed by the Project Leader through the Principal Participant, the Program Leader and the Management Committee.

8 COMPLIANCE

8.1 Each Project Participant will ensure that all applicable codes of conduct and guidelines in carrying out the AAPP Project including any codes and guidelines with respect to research involving humans or animals adopted by the National Health and Medical Research Council (including without limitation the National Statement on Ethical Conduct in Research involving humans and the Australian Code of

Practice for the care and use of animals for scientific purposes) and by the Office of the Gene Technology Regulator, are observed at all times.

8.2 Each Project Participant will, where necessary or appropriate, undertake research using a relevant ethics committee or committees constituted in accordance with the codes and guidelines referred to in clause 8.1, to oversee all ethical clearances which may be required under those codes and guidelines. In addition to usual approvals/ethics approvals:

- For all projects on Macquarie Island, the approval of the Tasmanian Government is also required;
- All projects within Antarctica and the Southern Ocean below 60S must comply with the requirements of the Australian Antarctic program for environmental and ethics approvals; and
- All projects on Australian sub Antarctic islands must comply with the relevant Government requirements. E.g. Macquarie Island Tasmanian Government and Heard and Macdonald Islands (Australian Government laws administered by AAD).

8.3 Each Project Participant must comply with all applicable acts, ordinances, rules, regulations and by-laws applicable to the conduct of the AAPP Project in its state or territory including but not limited to State/Territory legislation about working with children and vulnerable people, and will also comply with the Antarctic Treaty and its 4 international agreements including all Commonwealth legislation relating to Antarctica.

8.4 When requested by the Program Leader or Collaboration Delegate, each Project Participant must provide evidence of the matters referred to in this clause 8 to the Program Leader or Collaboration Delegate as requested.

9 REPORTING

9.1 The Principal Participant will ensure that the Project Leader prepares and provides to the Program Leader the Progress Reports annually or otherwise upon the dates required to enable the Collaboration Delegate to comply with the reporting requirements under the Commonwealth Agreement(s)) on the conduct of the AAPP Project and the Milestones and Deliverables set out in the Project Plan.

9.2 Each Progress Report will be in writing and in an Approved Form with a level of detail reasonably acceptable to the Management Committee and will include:

(a) the name of the AAPP Project and the Project Leader;

(b) a description of each Milestone and the date on which it was reached or the reasons why it was not reached;

(c) a report on the activities conducted by the Project Participants to achieve the Milestones and Deliverables;

(d) details of expenditure incurred to date;

(e) any knowledge or discoveries and contributions to end users, including Project IP, made since the last Quarterly Progress Report;

(f) any variation which the Project Participants would like to make to the AAPP Project's methodology or Milestones; and

(g) any further information reasonably requested by the Program Leader.

9.3 The Program Leader may reasonably require the Project Leader to provide interim reports. Such interim reports will be in an Approved Form and address matters specified by the Program Leader from time to time. Interim reports must be provided to the Program Leader within 30 Business Days of the Project Leader receiving a request from the Program Leader to provide such a report.

9.4 The Project Leader must within 30 Business Days of the Project Completion Date prepare and provide to the Program Leader a Final Report.

9.5 The Final Report will be in writing in a format and content to be agreed unanimously by the Management Committee and subject to requirements of the Commonwealth Agreement.

9.6 The Final Report will be the final Milestone of the AAPP Project.

9.7 The Final Report must be in an Approved Form and in a level of detail reasonably acceptable to the Management Committee.

9.8 A Project Participant must promptly give any information it holds in relation to the AAPP Project in the form reasonably requested:

(a) to the Project Leader as reasonably necessary to enable the Project Leader to meet the reporting obligations under this Agreement; and

(b) to the Program Leader as reasonably necessary to enable the obligations under the Formal Collaborative Agreement and the Funding Agreements to be met.

10 RECORDS AND ACCOUNTS

10.1 Each Project Participant will keep full and accurate accounting records of its expenditure of Project Funds and its Contributions to the AAPP Project and will provide copies of those records to the Program Leader on request.

10.2 The Management Committee or the Collaboration Delegate may appoint a qualified person to audit the records referred to in clause 10.1 and each Project Participant will give the person undertaking the audit access at all reasonable times to the records and will provide such information and explanations as the person desires for the purposes of the audit.

10.3 The Principal Participant will provide to the Program Leader, at the times Progress Reports are required to be provided under clause 9.1, a Financial Statement covering the period since the last Progress Report.

10.4 A final Financial Statement must be provided to the Program Leader at the same time as the Final Report.

11 VARIATION OF PROJECT

11.1 An AAPP Project may, following a request to vary the AAPP Project from the

Management Committee or from the Principal Participant to the Program Leader, be varied by the Program Leader issuing a Document in Writing to the Project Participants confirming the requested variation or a variation substantially in compliance with the requested variation.

12 OWNERSHIP OF PROJECT IP

12.1 The Project Participants acknowledge and agree that all Project IP forms part of AAPP IP and will be owned and licensed in accordance with the Formal Collaborative Agreement.

12.2 Not Used

12.3 Each Project Participant must ensure that all Project IP is disclosed to the Project Leader as soon as practicable after its creation.

13 INDEMNITY AND INSURANCE

13.1 The Project Participants must maintain adequate product liability, third party liability and other reasonable insurance cover, including professional indemnity insurance, for the conduct of the AAPP Project for the Term and for a reasonable run-off period after expiry of the Term.

13.2 Each Project Participant (the Indemnifier) hereby releases and indemnifies and agrees to keep released and indemnified the other Project Participants and their respective officers and employees agents and representatives (the Indemnified) from and against any Loss howsoever arising that the Indemnified may directly suffer, incur or sustain as a result of any breach of this Agreement by the Indemnifier or any unlawful or negligent act or omission of the Indemnifier or any of its officers employees agents or representatives arising out of the conduct of the AAPP Project.

13.3 The liability of the Indemnifier under clause 13.2 will be reduced having regard to the extent to which the Indemnified contributed to the Loss in respect of which it seeks indemnity.

13.4 The obligations under this clause 13 will survive expiration or earlier termination of this Agreement.

13.5 Clause 13.1 does not apply to a Project Participant which is an agency or instrumentality of the Commonwealth or a State or Territory which self-insures.

14 CONFIDENTIALITY

14.1 A Project Participant’s Confidential Information may only be:

(a) disclosed to another Project Participant's officers, employees and students who need access to the Confidential Information for the conduct of the AAPP Project and to another Project Participant’s financial or legal advisers provided that they are subject to a legal obligation to maintain the confidentiality of the Confidential Information; and

(b) must only be used for the purposes of the AAPP Project.

14.2 The obligations under this clause 14 will survive expiration or earlier termination of this Agreement.

14.3 Despite clause 14.1, a Party or a Minister may disclose a Project Participant's Confidential Information to Parliament, Cabinet or a Parliamentary or Cabinet committee or subcommittee.

15 TERM AND TERMINATION

15.1 This Agreement will commence on the Project Commencement Date and, subject to this clause 15, terminate on the earlier of:

(a) the Project Completion Date; or

(b) the termination of the Principal Participants Agreement.

15.2 The Management Committee may terminate the AAPP Project on 20 Business Days written notice to the Principal Participant if:

(a) a Milestone has not been met by the due date and is not met within 20 Business Days after the Program Leader gives written notice to the Principal Participant;

(b) a Deliverable has not been supplied by the due date and is not supplied within 20 Business Days after the Program Leader gives written notice to the Principal Participant; or

(c) in the reasonable opinion of the Management Committee, the Project Objectives are unlikely to be met.

15.3 If the AAPP Project is terminated under clause 15.2 and there are sufficient Project Funds, the Collaboration Delegate will reimburse each Project Participant from the Project Funds for its reasonable expenses, as agreed by the Management Committee, necessarily incurred because of the early termination of the AAPP Project.

15.4 A Project Participant who is reimbursed under clause 15.3 must take reasonable steps to mitigate the expenses it incurs.

15.5 The total amount paid to each Project Participant must be no more than the balance of the Project Funds payable to the Project Participant if the AAPP Project had not terminated.

15.6 If there are insufficient Project Funds to reimburse all expenses, each Project Participant will be reimbursed on a pro rata basis.

15.7 Termination of the AAPP Project for any reason is without prejudice to the continuing enforceability of any rights and obligations of the Project Participants existing at the termination date.

15.8 The obligations in relation to confidentiality, indemnities, Project IP and any other obligations that expressly or by implication are intended to survive the operation of this Agreement will continue beyond termination of this Agreement.

16 EXPULSION OF A PROJECT PARTICIPANT

16.1 The Management Committee may expel a Project Participant from an AAPP Project if Due Cause exists and is not remedied within 20 Business Days after the Program Leader gives written notice to the Project Participant.

16.2 In clause 16.1, 'Due Cause' means:

(a) not making Project Contributions;

(b) unauthorised use of Project IP, Project Background IP or Confidential Information;

(c) any other material breach of the Principal Participants Agreement or this Agreement in conducting the AAPP Project, including not meeting Milestones;

(d) a change or proposed change of personnel that is likely to adversely affect the Project Participant's participation in the AAPP Project; or

(e) not resolving to the Management Committee's reasonable satisfaction, a conflict of interest in relation to the AAPP Project.

16.3 A Project Participant who is expelled from an AAPP Project ceases to be a Project Participant from the date on which the expulsion takes effect under clause 16.1.

16.4 The expulsion of a Project Participant from an AAPP Project does not affect:

(a) the enforceability of other obligations of the Project Participant under the Formal Collaborative Agreement or other AAPP Projects;

(b) rights against the Project Participant accrued at that time or arising from the withdrawal or expulsion;

(c) the obligation on the Project Participant to supply its Project Background IP for the AAPP Project; or

(d) the obligations on the Project Participant in relation to confidentiality, indemnities, Project IP and any other obligations that expressly or by implication are intended to survive the operation of this Agreement.

16.5 The withdrawal or expulsion of a Project Participant from the AAPP Project does not relieve the other Project Participants of their obligations under this Agreement.

17 NOTICES

17.1 The addresses for service of Notices to the Project Participants are those set out in the Project Plan.

18 FURTHER ASSURANCES

18.1 Each Project Participant must do all things and execute all documents necessary to give effect to the provisions and intent of this Agreement.

19 NO AGENCY OR PARTNERSHIP

19.1 The Project Participants enter into this Agreement as independent contractors and nothing in this Agreement will result in a Project Participant being constituted as an agent or partner of another Project Participant.

20 GST

20.1 Unless otherwise expressly stated, all amounts payable under this Agreement are expressed to be exclusive of GST.

20.2 If GST is payable on a Taxable Supply, the amount payable for that Taxable Supply will be the amount expressed in this Agreement plus GST.

20.3 If GST is payable on a Taxable Supply made by one party to another party, then that other party will not be required to pay any amount to the first party in respect of that Taxable Supply unless it has first received a Tax Invoice.

20.4 For the purposes of this clause 20, the terms GST, Taxable Supply and Tax Invoice have the meaning given to those terms in the A New Tax System (Goods and Services Tax) Act 1999 (Cth).