Astronomy NCRIS: 2009/10 Business Plan

19th June 2009

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Executive Summary

Following the ANSOC process in September 2008 the path forward for the strategic options funds was clear: continued access to the Magellan telescopes and continued investment in the GMT DDP. The GMT DDP arrangements are formalised in the GMT Founders Agreement, to which AAL is a signatory. The contract for on-going access to the Magellan telescopes has also been finalised.

Australian access to Gemini continues at the 6.19% level and the AAT refurbishment project is progressing well. The AAT instrument project is also making progress but is behind schedule.

Activities at the Murchison Radio-astronomy Observatory (MRO) are also progressing well in preparation for ASKAP and MWA. Although the MWA project will need to be de-scoped, AAL has recently reviewed the MWA project and concluded that the project is still scientifically valuable and strategically important to Australian astronomy.

Material Changes

There have been several material changes to the Astronomy NCRIS relative to the Astronomy NCRIS Funding Agreement which have not been reported in previous business plans:

- AAT Instrument – The project completion date is now expected to be December 2012, this is 18 months later than envisioned in the Astronomy NCRIS Funding Agreement. The AAO will conduct a configuration review in June 2009 which is expected to bring a degree of certainty to the new project plan. The revised plan will also require an additional $1,300,000 which the AAO will contribute from its own funds.
- Magellan – DIISR agreed that AAL could use strategic options funding to extend Australian access to the Magellan telescopes until the end of 2011. Unfortunately, the sharp decline in the Australian dollar relative to the US dollar has significantly increased the cost of strategic options fund commitments. Therefore AAL has scaled back its commitment to Magellan access until the middle of 2011.
- MWA – The size of the MWA array will be significantly smaller than the 1024 tiles envisioned in the Astronomy NCRIS Funding Agreement. AAL is supporting the employment of a full-time project manager who will finalise a project plan for the de-scoped array.
- The Aspen Gemini instrument program has again been de-scoped with the Wide Field Multi-Object Spectrograph (WFMOS) project cancelled, and only the project to build the Gemini Planet Imager (GPI) instrument remaining.

Risks and their Mitigation

- US$ commitments – These have been substantially retired by a combination of purchasing US$ and hedging several large future payments. The Astronomy NCRIS has approximately US$1M of commitments that are not covered by the above mitigation techniques. The remaining NCRIS grant and expected interest earnings are sufficient for AAL to deliver upon its Astronomy NCRIS commitments regardless of future changes in the US$ exchange rate.

Status as of 19th June 2009

Astronomy Australia Limited (AAL)

AAL is on track to complete all of its major assignments for the 2008/09 financial year. The highest profile milestones were the Astronomy NCRIS Strategic Options process for the allocation of $5.285M and the publication of the Astronomy Roadmap to advise the Australian Government on future investment in Australian national astronomy facilities. The development of the Roadmap was instigated following a request by the Department of Innovation, Industry, Science and Research for AAL to consider the funding requirements of the Anglo-Australian Observatory in the context of Australian national astronomy facilities. The Roadmap recommended the continued operation of the Anglo-Australian Telescope until 2018 and on-going funding for the AAO's instrumentation group; both recommendations were supported in the May 2009 budget announcement by the Australian Government.

AAL continues to operate with 2 FTEs at offices provided by Swinburne University of Technology. AAL's 14 member organisations include all of the major Australian institutions with a research capability in optical/IR and radio astronomy. At AAL's 2008 Annual General Meeting nine of the members were represented directly and five of the members were represented by proxy.

Anglo-Australian Observatory

The future funding of the AAO is secure following the May 2009 Federal Budget. The Government will provide $36.5 million over four years to meet ongoing operational costs. This funding will ensure that from 1 July 2010 the Government will acquire the assets of the AATB (Anglo-Australian Telescope Board). The AAO will become a Federal executive agency created around a statutory position. It will have a charter to support all of Australia's optical/infrared national facilities (a role it already performs) and to maintain a world-class instrumentation program.

The refurbishment of the AAT is progressing well, with a substantial amount of work carried out over the past year. Particular highlights have been the replacement of the AAT's main drive encoders, the overhaul of the primary mirror elevator, and a new dome fire alarm system. Major works in progress include upgrades to the dome shutter maintenance platform, an overhaul of the standby generator and high-voltage switch gear, and the installation of new air-conditioning and refrigeration plant.

A new AAT instrument HERMES, a high-resolution spectrograph fed by the wide-field 2dF fibre system, is under development. HERMES' primary science driver is Galactic archaeology -- the unravelling of the history of the Milky Way by chemically fingerprinting a million stars and reconstructing the formation sequence of the Galaxy. A 3-channel VPH (Volume Phase Holographic) spectrograph concept has been selected. The instrument has been undergoing preliminary design in 2008/09. The design has been delayed by about 9 months and the project completion date is now pushed back 18 months. The cost of HERMES is now estimated as $7.2M, with $5.9M coming from NCRIS and $1.3M coming from the AAO's recurrent funding. The instrument is expected to be handed over for science commissioning by the end of December 2012.

Australian membership of the International Gemini Partnership

Australia continues to have 6.19% access to the two Gemini 8m telescopes as a member of the International Gemini Partnership. The Australian Gemini Office continues to coordinate the Australian usage of the 2 Gemini telescopes, the Keck 10m and Subaru 8.2m telescopes in Hawaii (via a time exchange with Gemini), and the Magellan 6.5m telescopes in Chile. During the past year a second Deputy Gemini Scientist has been recruited. Two Magellan Fellows are employed by the AAO, and seconded to the Carnegie Observatories in La Serena, Chile, where they provide observing support and carry out research as an in-kind contribution to the cost of Australian access to the Magellan telescopes initiated under MNRF, and continued under NCRIS.

The demand for observing time on the Gemini and Magellan telescopes remains healthy, with an oversubscription factor of 210% averaged over 2008. A total of 23 refereed papers based on Gemini data with Australian authors was published in 2008, up from 17 in 2007, while the first two papers based on Magellan data were also published. In the past 5 years, 30 Australian graduate students have used Gemini for their thesis and related research. The Near-infrared Integral Field Spectrograph (NIFS) instrument continues to be well-utilised, getting 11% of the queue time on Gemini North in 2008.

The Gemini Aspen instrumentation program has been de-scoped following the decision by the Gemini board in May 2009 to cancel the Wide Field Multi-Object Spectrograph (WFMOS). The Aspen instrumentation program now involves only the construction of the Gemini Planet Imager (GPI). GPI underwent its Critical Design Review in May 2008, which identified a number of design, operational and project management issues that needed to be addressed as part of proceeding to final construction. Completion of GPI is still on schedule for some time in 2011. Ground layer monitoring measurements on Mauna Kea for the Ground Layer Adaptive Optics (GLAO) project have now been completed. They show Mauna Kea to be well suited for the use of ground layer adaptive optics, with significant and consistent improvements in image quality expected in good to moderately poor seeing conditions.

MWA

At MWA Board meeting in July 2008, the MWA project was de-scoped due to project delays and financial considerations. A new project structure and project management team were installed. A new project milestone was adopted, that of a 32 antennas system that would demonstrate the end-to-end operation of the major elements of the MWA system. A project plan was submitted to AAL in February 2009, and a review of the MWA project was conducted in April 2009. The review found that a de-scoped array of 256 antennas will still be scientifically valuable and strategically important to Australian science, and recommended funding for Phase 2 (128 antennas) be released, and subject to satisfactory milestone performance, progression to 256 antennas, or greater. However the MWA project plan was not in a form that is suitable for progress monitoring by AAL, and release of funding will depend on the delivery of a set of clear and appropriate 3-monthly milestones which cover the 32 antennas system and Phase 2+ development. At the AAL board meeting in May 2009, the board agreed to underwrite the appointment of a project manager position at Curtin University to finalise the project plan. At time of writing, further USA funding will depend on the NSF review due to take place in June 2009.

During November 2008, a 32 antennas system was deployed on site, using an interim software correlator, and the first astronomical data was acquired. Progress was made in infrastructure installation and modification. Bench testing of the integrated system is underway. Field integration and commissioning is expected to commence in July/August 2009 and completed by the end of September 2009. Firm quotes have been obtained for the

tiles, beamformers, clock and correlators of a 512 tiles system, and preliminary quotes for the receivers and Real-Time Computer.

ASKAP

The ASKAP Theme within CSIRO comprises 15 Integrated Product Teams (IPTs). Six of these are "technical", two are "infrastructure", four are "support" and three are "SKA". The $14.6M NCRIS portion of ASKAP's budget is allocated to funding the Digital Systems IPT.

ASKAP has purchased the 36 prime-focus three-axis antennas from the 54th Research Institute of the China Electronics Technology Corporation and the first antenna is scheduled to arrive in November 2009. The first prototype phased array feed (PAF) has been tested on the Parkes Testbed Facility (PTF). The PTF is a newly-built 12-metre antenna near the 64-meter Parkes antenna for ASKAP testing. Results are promising, indicating the lowest system temperature of any wide-band PAF in the world. The Digital, Analogue and Computing systems have all recently held Preliminary Design Reviews that have confirmed the work to-date. The land tenure documents for the MRO are all complete for the Native Title Tribunal registration process for full site access.

The ASKAP digital design is now envisioned to be a fairly straightforward evolution of the Boolardy Engineering Test Array (BETA) design with upgraded Field-Programmable Gate Arrays (FPGAs) and so the ASKAP digital design review structure has changed pending the BETA system results. Previously it was viewed as a more parallel approach since the systems were thought to differ more significantly. In parallel, the Canadian partners will investigate approaches to increase power efficiency (systems based on, e.g. Application-Specific Integrated Circuits (ASICs)). This is a non-critical path activity. This and the delay in the fibre optic cable link installation by about 8 months are the only significant changes since the last report.

When the NCRIS agreement was signed the ASKAP completion date had not been determined, with only the start of commissioning specified as June 2011 for a 30 antennas system. The completion date for a full 36 antennas ASKAP has now been specified as December 2012 for "shared risks" science observations.

Giant Magellan Telescope Design Development Phase

GMT was given the highest priority in the ANSOC review of AAL's future options, and consequently AAL provided additional funds to reach a 5% share of the GMT Design Development Phase (DDP). Jointly, ANU and AAL have a 10% share of the DDP and hence two directors on the GMT Board. Matthew Colless represents AAL on the GMT Board.

In February 2009, the GMT Founders' Agreement (the constitution of the GMT Organisation) was signed by all 9 of the founding partners: AAL, ANU, Carnegie, Harvard, Smithsonian, U.Texas, Texas A&M, U.Arizona, and Korea (which joined the partnership at this point after securing funding for a 10% share in the project). In March 2009, the University of Chicago signalled its intention to become the 10th partner. The partners have now committed US$145M of the US$686M needed to design and construct GMT -- i.e. 21% of the total.

The GMT Project Office has been launched and is now ramping up its hiring to fill out the project team and complete the DDP by the second half of 2011. The first off-axis 8-metre mirror (one of seven making up the GMT primary mirror) has completed casting, figuring and grinding at the Steward Observatory Mirror Lab, and will shortly begin the final polishing

stage of its manufacture. A highly sophisticated optical testing system is under construction to verify its performance.

The initial call for expressions of interest in GMT first-generation instruments elicited 12 responses, including 3 from Australia. Two Australian proposals (GMTNIRS, led by ANU, and MANIFEST, led by AAO) have been selected for the call for proposals for concept studies.

Expected Progress and Milestones

Astronomy Australia Limited (AAL)

AAL will continue to maintain clear and open communications with the Australian astronomy community through a regularly updated website. Quarterly electronic newsletters, AAL's annual reports, reports to DIISR and other reports of importance to the astronomical community will be made available from this website. In addition, in July 2009 AAL, along with the NCA will lead a town hall meeting at the Annual meeting of the ASA about the Australian astronomical community's view on ESO membership.

Community input into individual projects is coordinated at the project level.

Period	Activities and Milestones
2009-10 Q1 (Jul09-Sep09)	• Quarterly newsletter published • Tenth board meeting held • AAL contract signed with Curtin University for a MWA Project Manager • 2008/09 Annual report published and made available on AAL website • 2008/09 Astronomy NCRIS progress report submitted to DIISR and made available on AAL website. • Poster presentation at the Annual Meeting of the ASA
2009-10 Q2 (Oct09-Dec09)	• Quarterly newsletter published • Eleventh board meeting held • 2009 Annual General Meeting held. • Appointment of 2 board members at the AGM
2009-10 Q3 (Jan10-Mar10)	• Quarterly newsletter published • Twelfth board meeting held
2009-10 Q4 (Apr10-Jun10)	• Quarterly newsletter published • Thirteenth board meeting held • 2010/11 Astronomy NCRIS business plan submitted to DIISR

Anglo-Australian Observatory

Strategic Facility Services (SFS) were commissioned in 2005 to develop a Long Term Maintenance Plan for the Anglo Australian Observatory at Siding Springs. The findings of the report found that a significant volume of items needed to be addressed within the next five years. These are items primarily related to Specialist Equipment associated with the telescope that are nearly 30 years old and are of aging technology which may not be effectively

supported in the future. The NCRIS funding for the infrastructure upgrade is to cover only the items identified as risk 1 and 2 within the AAT, as documented in SFS report.

Refurbishment of facilities

Period	Activities and Milestones
2009-10 Q1 (Jul09-Sep09)	• Upgrade telescope hydraulic system. • Replace the telescope dec drive system. • Replace dome crane control system.
2009-10 Q2 (Oct09-Dec09)	• Replace standby generator. • Replace the main high voltage electrical switch gear.
2009-10 Q3 (Jan10-Mar10)	• Replace the main UPS Stan inverter. • Replace the main dry air system.
2009-10 Q4 (Apr10-Jun10)	• Upgrade the control system for the dome windscreen. • Upgrade the dome shutter and brake control systems. • Replace the lift controls in Lift passenger lift n◦2.

Anglo-Australian Telescope Instrument

The current schedule for AAT instrumentation is the following: The 3-channel VPH spectrograph concept selected for HERMES will undergo an Instrument Configuration Review to be held in June 2009, with the Preliminary Design Review completed in September. Final Design will commence in 2009/10 Q2 and finish by 2010/11 Q1. Construction will commence in 2009/10 Q4 and finish by 2011/12 Q1. Integration and test will commence in 2010/11 Q4 and finish by 2011/12 Q3. Installation and test will commence in 2011/2012 Q4 and finish by 2012/13 Q2. The instrument is expected to be handed over for science commissioning by the end of December 2012. This plan, and the project milestones described below, may be subject to revision after the June 2009 configuration review. The plan is aggressive, and seeks to make up for time lost in finalising the instrument configuration by overlapping the final design, construction and integration phases.

Overlapping the design and construction phase allows the production of detailed fabrication drawings and procurement specifications to be started prior to the completion of the final design review. This will allow components to be purchased immediately on successful completion of the final design review.

Overlapping the construction and integration phases allows the assembly and unit testing of component assemblies to be started as soon as all of the parts are available.

Period	Activities and Milestones
2009-10 Q1 (Jul09-Sep09)	• Complete preliminary science requirements • Place order for detectors • Complete preliminary design • Deliver preliminary design report • Complete instrument preliminary design review
2009-10 Q2	• Commence instrument final design • Commence detector controller construction

(Oct09-Dec09)	• Start preparing assembly and test facility at the AAO • Place orders for large optics
2009-10 Q3 (Jan10-Mar10)	• Place orders for VPH and other long lead time optics
2009-10 Q4 (Apr10-Jun10)	• Commence production of fabrication drawings

Australian membership of the Gemini International Partnership

The Australian Gemini Office will continue to coordinate the Australian usage of 8-m class telescopes. It will provide support for usage of Gemini instruments and coordinate Australian usage of Science Verification Time. It will also promote opportunities with the Gemini and Magellan telescopes.

Period	Activities and Milestones
2009-10 Q1 (Jul09-Sep09)	• Support Australian involvement in 8m-class telescopes by: o managing the Australian time allocation process for 8m telescopes; o the Australian Gemini Scientist (AGS) and both Deputy Gemini Scientists (DGS's) performing specified Gemini support duties; o supporting Gemini instruments as required; o maintaining an up-to-date Australian Gemini Office (AusGO) web site. • Promoting Australian science, and new opportunities with the Gemini and Magellan telescopes, by arranging a special session at the Astronomical Society of Australia Annual Scientific Meeting in Melbourne. • AGS attends Gemini Operations Working Group meeting in UK, July 2009. • Recruit up to 3 Australian Gemini Undergraduate Summer Students (AGUSS) to spend Dec 2009 - Feb 2010 at Gemini South. • Unveil winning entry in the IYA Gemini School Astronomy Contest.
2009-10 Q2 (Oct09-Dec09)	• AusGO supports Australian involvement in 8m-class telescopes. • Coordinate Australian usage of FLAMINGOS-2 (a near-infrared multi-object spectrograph and imager) Science Verification time. • Coordinate AGUSS travel and projects with Gemini South. • Complete implementation of on-line database of all Australian 8m telescope proposals, to streamline reporting requirements.
2009-10 Q3 (Jan10-Mar10)	• AusGO supports Australian involvement in 8m-class telescopes. • Organise AGUSS final seminars via videoconference from Chile. • AGS attends Gemini Operations Working Group meeting in Hawaii, Jan 2010.
2009-10 Q4 (Apr10-Jun10)	• AusGO supports Australian involvement in 8m-class telescopes. • Coordinate Australian usage of GSAOI (near-infrared adaptive optics imager built by ANU) Science Verification time. • Prepare to host Operations Working Group and NGO staff meeting at AAO in Jul 2010.

Gemini instrumentation

Following the decision by the Gemini board in May 2009 to cancel the WFMOS project, the only Aspen instrumentation program remaining is the construction of the Gemini Planet Imager (GPI). Steps will need to be taken to ensure engagement of Australian astronomers in the GPI exoplanet survey.

The Gemini South Adaptive Optics Imager (GSAOI) was built by the Research School of Astronomy and Astrophysics at the Australian National University. Commissioning of the Gemini South Adaptive Optics Imager (GSAOI) is due to get underway late this year following delivery of the 50 Watt laser, and commissioning of the multi-conjugate adaptive optics system which feeds GSAOI.

MWA

At time of writing, the MWA NCRIS contract has not been signed. Therefore no formal milestones have been agreed. However AAL has been informed that operational verification of the 32 antennas demonstrator will take place during 2009/10 Q1. AAL will also aim to sign an NCRIS sub-contract for MWA during 2009/10 Q1.

ASKAP

A new version of the phased array feed (PAF) will be installed and tested in mid-2009 at the Parkes Testbed Facility (PTF). The new PAF will have an upgraded digital system to make testing more efficient. Full site access for project works are expected by September 2009 following the completion of the Native Title Tribunal registration process. By the end of CY2009, the first ASKAP antenna will be installed at the MRO along with infrastructure to support initial construction.

The Boolardy Engineering Test Array (BETA) is a six antenna system that will consist of the full production antenna and "BETA" electronics systems (that is, prototypes for the full ASKAP system). The BETA digital engineering system (denoted 'ES1') is the digital receiver, beamformer and correlator to be used during the prototyping phase at the ATNF and will be integrated into BETA antenna #1 when the antenna is accepted from its manufacturer. ES1 will serve as a test bed for proof-of-concept for the Digital Systems IPT and it will be the development platform for the firmware and software for the beamformer and correlator. ES1 will serve as the basic design for cost and power reduction for ES2 (the first ASKAP production digital electronics systems).

ASKAP technical developments undergo a comprehensive review process, initiated by a Concept Design Review (CoDR) and concluded by a Production Readiness Review (PRR). The two key reviews in-between are the Preliminary Design Review (PDR) and the Critical Design Review (CDR). These bring in international experts to assess the project and a successful review means that the development can proceed to its next level. The PDR assess that the architecture and general approach are adequate for the job and the CDR that the specific approach and technology are adequate.

Period	**Period Activities and Milestones - ASKAP**	
	Digital System	**ASKAP Overall**
09/10T1 1/7/09 – 31/10/09	• BETA Digital System Design passes Critical Design Review • BETA Digital System Engineering System (ES1) prototype under test at ATNF	• First foundation laid • Data/Signal Transport passes Preliminary Design Review • Phased Array Feeds (PAF)

		version 2 in-test at Parkes Testbed Facility (PTF) • Systems pass Preliminary Design Review
09/10T2 1/11/09 – 28/2/10	• ASKAP Digital System passes Preliminary Design Review • BETA Digital System (ES1) integration test with other IPTs systems • BETA Digital System manufacture commences	• First antenna on site and verified operational • Data/Signal Transport passes Critical Design Review • Analogue Systems passes Critical Design Review • Systems pass Critical Design Review • Fibre link installed and verified operational
09/10T3 1/3/10 – 30/6/10	• BETA digital system deployed and verified operational • Digital System installation at MRO (1st Antenna) • Digital System Integration test at MRO with all IPT's sub systems • ASKAP Digital Systems pass Critical Design Review	• Analogue Systems pass Preliminary Requirements Review
10/11	• Digital System installation of BETA 6 antennas sub systems at MRO • Full Digital System Integration test of full 6 antennas array • Full 36 antennas ASKAP Digital System manufacture commence	• BETA computing installed and verified operational • Complete full imaging simulation • BETA dedication for early science • A total of 12 antennas (including BETA) installed and operational
11/12	• 36 antennas ASKAP Digital System installed and verified operational • Full Digital System Integration test of full 36 antennas array • Full ASKAP Digital System commissioned & accepted for the ASKAP array	• BETA produces science results with the full array for the community on a regular basis. • 36 antennas ASKAP installed and operational • SKA site decision
12/13		• 36 antennas ASKAP complete and ready for shared-risks science operations by Dec 2012

Giant Magellan Telescope Design Development Phase

The GMT Project Office will be hiring to fill out the project team and aims to complete the DDP by the second half of 2011. GMT instrument concepts studies will start in early 2010.

Period	Activities and Milestones
2009-10 Q1	• Proposals for GMT instrument concept studies due 31 August.

(Jul09-Sep09)	
2009-10 Q2 (Oct09-Dec09)	• University of Chicago expected to sign GMT Founders' Agreement and commit funding.
2009-10 Q3 (Jan10-Mar10)	• Commencement of GMT instrument concept studies.
2009-10 Q4 (Apr10-Jun10)	• Completion of the first of the seven 8-metre mirror components of the GMT primary. • Staffing of GMT Project Office reaches its full complement.

Proposed governance, management, access and pricing arrangements

The governance arrangements during the period of this Annual Business Plan will be the same as described in section 4, 'Governance Arrangements' of the Project Plan. Specific items during this period will be:

- Retirement of two members from AAL's board of directors and election of two directors by the members of AAL. (Note: retiring directors are eligible to stand for re-election).
- Advice from the Australian Giant Magellan Telescope Advisory Committee (AGMTAC).
- Advice from the Australian Antarctic Astronomy Advisory Committee (AAAAC).
- Advice from the High Performance Computing Working Group (HPCWG).
- Advice from the European Southern Observatory Working Group (ESOWG).
- Advice from the Australian Gemini Steering Committee (AGSC) for Gemini and 8m issues.
- Management and reporting for currently active projects will be undertaken by the relevant party:
    - AAO - AAT refurbishment and AAT instrument
    - AAO - Australian Gemini Office (AusGO)
    - Australian Gemini Board Member - Australian Gemini Membership and Aspen Instrument Program
    - CSIRO – ASKAP

The access and pricing arrangements during the period covered by this Annual Business Plan will be the same as described in section 3, 'Access and Charging Arrangements' of the Project Plan. Briefly, the following principles will apply in relation to access to the facilities and charging for their use:

- Time assignment for the facilities will be merit-based in accordance with established application and peer-review procedures;
- Effective data management systems will be embedded within the facilities, with services including comprehensive on-line archives, pipeline data-reduction tools and researcher access to reduced data products and catalogues to be provided; and
- Access to the facilities will be provide free of charge (although some of the costs entailed in using the facilities – such as travel and accommodation costs – may be borne by users).

Proposed promotional activities

During the period of this Annual Business Plan, AAL will communicate with the Australian astronomical community through:

- quarterly electronic newsletters which provide clear and open communications to AAL's members;
- a regularly updated website which highlights major AAL news items
- presentations where appropriate at committee/staff/community meetings

In addition, some of the projects will also undertake their own promotional activities:

Financial projections (GST exclusive)

Change in cash balance

The Astronomy NCRIS transactions planned for 2009/10 will result in a reduction in the cash balance held by AAL across its Astronomy NCRIS accounts of $2,081,483 (see cash transactions list on following pages for details of receipts and payments):

NCRIS grants to be allocated (30th June 2009):	$11,333,856	(estimate)
Change:	($2,081,483)	(estimate)
NCRIS grants to be allocated (30th June 2010):	$9,252,374	(estimate)

Note: This amount does not include the projected balance of the NCRIS reserve listed below.

Interest projections

During 2009/10 AAL expects to earn approximately $225,000 in interest from the NCRIS grant. This interest estimate will fluctuate depending upon:

- Timing of the receipt of the 2009/10 NCRIS Grant from DIISR;
- Timing of payments to projects yet to be finalised;
- Interest rates available.

The AAL Board has allocated $10,000 of this interest to fund travel related to Antarctic astronomy activities and $19,858 towards the Magellan strategic options purchase. The remainder of this interest will be held in reserve to be allocated by the AAL Board to one or more of the current Astronomy NCRIS projects.

Balance of NCRIS reserve 30th June 2009:	$112,096	(estimate)
Balance of NCRIS reserve 30th June 2010:	$307,238	(estimate)

The major use of the reserve to-date has been the allocation of $1,500,000 to partially fund the operations of the Anglo-Australian Observatory during 2008/09. This short-fall in AAO operational funding was caused by the reduction in AAO funding by the UK.

2009/10 Astronomy NCRIS cash receipts and payments – grant allocations (GST exclusive)

Date	Facility	Item	Transaction Type	From / To	Receipts	Payments
1/07/2009	Gemini	Gemini operations	Payments - International Access	NSF (USA)		$1,123,108
1/07/2009	MIRA	MWA	Payments - Operating	Curtin Uni		$32,768
20/07/2009	Magellan	Magellan 2009B	Payments - International Access	Carnegie		$444,634
1/08/2009	MIRA	ASKAP	Payment - Capital	CSIRO		$1,500,000
1/08/2009	MIRA	MWA	Payment - Capital	TBD		$842,232
1/08/2009	AAO	AAT instrument	Payment - Capital	AATB		$280,000
1/08/2009	AAO	AAT refurbishment	Payments - Operating	AATB		$275,000
1/08/2009	Gemini	AusGO	Payments - Operating	AATB		$78,000
1/08/2009	Magellan	Magellan Fellows	Payments - International Access	AATB		$10,142
1/11/2009	AAO	AAT instrument	Payment - Capital	AATB		$1,300,000
1/11/2009	MIRA	MWA	Payment - Capital	TBD		$875,000
1/11/2009	AAO	AAT refurbishment	Payments - Operating	AATB		$275,000
1/11/2009	Gemini	AusGO	Payments - Operating	AATB		$78,000
1/11/2009	MIRA	MWA	Receipts	NCRIS	$400,000	
1/12/2009	Gemini	AusGO	Receipts	NCRIS	$324,000	
1/12/2009	Gemini	Gemini operations	Receipts	NCRIS	$324,995	
1/12/2009	AAO	AAT refurbishment	Receipts	NCRIS	$950,000	
1/12/2009	Options	Strategic Options	Receipts	NCRIS	$1,238,000	
1/12/2009	Gemini	Gemini operations	Receipts	NCRIS	$1,400,389	
1/12/2009	AAO	AAT instrument	Receipts	NCRIS	$1,600,000	
1/12/2009	MIRA	MWA	Receipts	NCRIS	$2,100,000	
1/12/2009	MIRA	ASKAP	Receipts	NCRIS	$4,170,023	
20/01/2010	Magellan	Magellan 2010A	Payments - International Access	Carnegie		$444,635
1/02/2010	MIRA	ASKAP	Payment - Capital	CSIRO		$1,500,000
1/02/2010	MIRA	MWA	Payment - Capital	TBD		$875,000
1/02/2010	AAO	AAT instrument	Payment - Capital	AATB		$630,000
1/02/2010	AAO	AAT refurbishment	Payments - Operating	AATB		$275,000
1/02/2010	Gemini	AusGO	Payments - Operating	AATB		$81,000
1/02/2010	Gemini	Gemini operations	Receipts	ARC	$900,000	

15/02/2010	Gemini	Aspen	Payments - International Access	NSF (USA)		$397,185
15/03/2010	Gemini	Gemini operations	Payments - International Access	NSF (USA)		$900,000
15/03/2010	Gemini	Gemini operations	Payments - International Access	NSF (USA)		$251,185
1/05/2010	MIRA	ASKAP	Payment - Capital	CSIRO		$1,500,000
1/05/2010	MIRA	MWA	Payment - Capital	TBD		$875,000
1/05/2010	AAO	AAT instrument	Payment - Capital	AATB		$290,000
1/05/2010	AAO	AAT refurbishment	Payments - Operating	AATB		$275,000
1/05/2010	Gemini	AusGO	Payments - Operating	AATB		$81,000
					$13,407,407	**$15,488,890**

2009/10 Astronomy NCRIS cash receipts and payments – AAL operations (GST exclusive)

Date	Facility	Item	Transaction Type	From / To	Receipts	Payments
1/07/2009	AAL	AAL Operations	Receipts	Members	$173,056	
1/12/2009	AAL	AAL Operations	Receipts	NCRIS	$249,593	
30/06/2010	AAL	AAL Operations	Payments - Operating	AAL		$249,593
30/06/2010	AAL	AAL Operations	Payments - Operating	AAL		$173,056
					$422,649	**$422,649**

2009/10 Astronomy NCRIS Reserve receipts and payments (GST exclusive)

Date	Facility	Item	Transaction Type	From / To	Receipts	Payments
1/08/2009	Magellan	Magellan Fellows	Payments - International Access	AATB		$19,858
1/08/2009	Meetings	Antarctic	Payments - Operating	UNSW		$10,000
30/06/2010	Reserve	NCRIS reserve	Receipts	Interest	$225,000	
					$225,000	**$29,858**