

STATEMENT OF SIGNIFICANCE OF THE HERITAGE COLLECTIONS

HELD AT THE PERTH OBSERVATORY

FOR

THE PERTH OBSERVATORY VOLUNTEER GROUP (INC)



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Plate measuring display bringing together people, objects, documents and stories.
Perth Observatory

DR JOANNA SASSOON

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• Contents

page

PART I.....	4
Contact with other similar collections to identify comparative collections	5
Functions of the Observatory	6
Significance of the Perth Observatory as an institution	9
History of the collection	10
Relationship between the building and its contents	18
Community comments.....	18
Condition of the collection	19
Comparative collections	19
Statement of significance for the entire collection	20
Key recommendations	23
Integrated cultural heritage.....	23
1. Buildings and landscape	23
2. Intangible cultural heritage.....	23
3. Administrative records	24
4. Digital data	25
5. Photographic plates	25
6. Preservation	25
7. Outreach	26
8. Interpretation/exhibitions	26
9. Volunteers.....	26
10. Photographic plates - digitisation	26
11. Library	27
PART II.....	29
International Astrographic Catalogue and Carte du Ceil	29
Wallal Solar eclipse.....	30
Perth catalogues 70, 75 and 83	30
Atlas Coelestis 1729	30
Timekeeping – Western Standard time	31
Contents of 1896 time capsule	32
WA’s first Close Coupled Digital camera, 1991	33
The Observatory Library	33
Globes.....	34

PART I

EXECUTIVE SUMMARY

Astronomy is an international and co-operative science that also engages with a wider general public and fosters the public imagination to participate in citizen science projects.

When operating as a scientific and research institution, the Perth Observatory was a significant node in the international network of observatories documenting the skies and conducting astronomical/astrophysical research. Perth's location and clear skies meant that the Observatory's role was internationally significant in that it was responsible for observing and cataloguing a large area of the southern skies. At its scientific closure, in 2013, the Perth Observatory was the last and longest continuously operating State Government observatory in Australia.

Over its life, the Observatory undertook a range of functions that embodied the development of the State, the Australian Federation and the state of international science. It operated a range of equipment which produced scientific and technical data which, when analysed, led to scientific discoveries and positional catalogues of its skies.

The Perth Observatory has operated at two sites – in Perth and Bickley – over its 120 plus years of operation. The Observatory now comprises a suite of heritage-listed buildings across these sites – the Perth site is now the headquarters of the National Trust, and the Bickley site contains the heritage collections including the large equipment (telescopes and domes), objects, research data, administrative documentation and a library. These collections gain their meanings and significance from the relationships between the sites, technologies, the functions, the data and the results and that they have remained intact and *in situ* since the closure of the Observatory. While the destruction of the two original telescope buildings in Perth has reduced the integrity of that site, the administration building remains intact. At Bickley the cluster of heritage buildings and collections are preserved together and *in situ* as is a time capsule of the contents and functions of the original Perth Observatory. The foundation stones of the Perth and Bickley observatories are embedded in the structure at Bickley. As such, the Perth Observatory is the only intact government observatory in Australia, and is used today for outreach and education.

The collections of the Perth Observatory are of international significance, remain *in situ* and are comprehensive evidence of a number of international scientific, colonial and State functions. The collections and buildings are well maintained and the volunteers are a highly professionally run and skilled group. However, one risk to the heritage collections is the intangible heritage – that is the knowledge and memories of the former employees that tie the site and the equipment together with the scientific data, historical functions and social environment that operated at the Observatory. The POVG understands the value of skilled volunteers, and the past employees' understandings of the scientific data, the operation of the telescopes, the roles and functions of the Observatory, the significance of the research programmes and their experiences of working at the Observatory. The knowledge and skills that resides with the volunteers needs to be documented, and this will then provide the connections that will bring the heritage collections alive and provide a databank for the interpretative work of presenting exhibitions for the future.

DESCRIPTION OF PROCESS UNDERTAKEN TO ASSESS AND PRODUCE THE REPORT

I spent 2 days on site at the Perth Observatory at Bickley. During the site visit I worked closely with Paul Jones, and I had a meeting with the active volunteers – Michael, Megan, Claire, Paul, Craig, Sue, Jo and Paul. I also spoke about the statement of significance work at a meeting of the Perth Observatory Volunteer Group.

I was given a number of documents including the partnership agreement between the POVG and the Department of Parks and Wildlife, significance assessments of individual telescopes held at the Observatory, contents of collections of the Sydney and Melbourne Observatories, a printout of the Mosaic database for the heritage collections held at the Perth Observatory, the recently completed Interpretation plan for the Bickley site by Hockings,¹ a letter to Minister Bill Marmon from Toner Stevenson, Curator of Sydney Observatory regarding the closure of Observatory (22 Feb 2013), correspondence between CALM (Ian Abbott) and international astronomical scientists regarding the research and education programmes at the Perth Observatory (1988) and a detailed spreadsheet which is a working listing the archival files.

I conducted other research including reading Toner Stevenson's PhD thesis *Measuring the stars and observing the less visible. Australia's participation in the Astrographic catalogue and Carte du Ciel*. University of Sydney, 2016.

CONTACT WITH OTHER SIMILAR COLLECTIONS TO IDENTIFY COMPARATIVE COLLECTIONS

Following my visit I made contact with Toner Stevenson of the Historic Houses Trust in Sydney and Dr Andrew Jacob, curator of the Sydney Observatory at the Powerhouse in Sydney but neither responded to my emails or returned my calls. I searched collections UNESCO Astronomical heritage portal, and conducted literature researches.

SUMMARY DESCRIPTION OF THE ORGANISATION AND ITS COLLECTION

When it opened in 1896, the Perth Observatory embodied a government commitment to finding, knowing and understanding its place in the world through surveying, timekeeping, seismology, weather and tide monitoring, as well as to conducting astronomical observations. The Observatory moved from its Perth buildings to its current site in Bickley in 1966 where it operated as a scientific research and education facility until 2013. In 1996, the administrative responsibility was transferred to the Department of Conservation and Land Management (known as CALM, now the Department of Parks and Wildlife), the position of Director (until 1985 this position was known as Government Astronomer) ceased to exist from 2013, and all funding for the astronomical research ceased in 2013. At this time all staff took voluntary redundancy and the Perth Observatory ceased as a scientific institution.

The Perth Observatory Volunteers Group (Inc) (POVG) took over the management of the Perth Observatory in 2015 under a community partnership agreement with the Department of Parks and Wildlife and now runs the Observatory as an outreach and education facility.

The buildings and the technical, object and documentary collections at the Observatory are an almost a complete time capsule of the operations of the Observatory from 1896. The Observatory owns a suite of equipment used to undertake its various functions including astronomical, time, climate and seismic measuring devices. It also owns the raw, intermediate and processed scientific data created as part of these functions, a supporting library of technical and journal literature and administrative records that go back to the commencement of the Observatory.

In addition to the buildings, the equipment, the scientific data and the administrative records, there is a wellspring of irreplaceable yet fragile intangible cultural heritage. This technical knowledge retained by former employees plays a vital role in transmitting information to tours about the discoveries and in understanding the scientific data. This intangible cultural heritage is at risk not only because of the age of the former employees but because of the legacy of the manner in which the Observatory was closed, its scientific functions ceased and redundancies implemented. Yet it is when there is interaction between the intangible cultural heritage and the collections of the Observatory that the history and functions of the Observatory come alive.

¹ Hocking Heritage Studio / Creative spaces. *Perth Observatory, Bickley interpretation plan*. March 2017

HISTORY AND SIGNIFICANCE OF THE ORGANISATION AND ITS COLLECTION

Astronomy is an international and co-operative science. Major international observatories form nodes in a network, and each is significant for its contribution to the global project of mapping the skies that its location affords. The Perth Observatory is highly significant internationally due to its geographical position, a stable government and clear skies. This, along with the recognised expertise and dedication of staff (both male and female), were key factors in the involvement of the Observatory in a number of significant international catalogue and research projects, including the early 20th century international project *International Astrographic Catalogue* and *Carte du Ciel*, mid century international partnerships with the Lowell Observatory in Arizona with funding from NASA, and the Hamburg Observatory with funding from the Volkswagen Foundation.

FUNCTIONS OF THE OBSERVATORY

The Perth Observatory was built during a time of significant expansion in Perth on the back of the influx of money due to the goldrush, and which is seen as a key period in the development of cultural, scientific and research institutions in Perth. The Premier John Forrest argued for its need in the mid 1890's and funding for the Observatory was granted in 1895 along with funding for other key cultural institutions including a Museum, Mint and Art Gallery. Charles Todd, Government Astronomer for South Australia gave advice to Forrest on the location and equipment required for an Observatory, and Todd's deputy William Cooke was appointed the first Government Astronomer in Western Australia in 1896.

Since it began operation in 1896, Perth Observatory has undertaken a number of key local functions of national and international importance that were seen as central pillars to a colonial/national/international, civil and cultured society and which also contributed to international scientific documentation and research projects. In order to carry out these functions, the Observatory acquired a large range of specialist and technical equipment from international sources and constructed its own items. This equipment was used to produce raw scientific data that contributed to significant national and international publications. A significant library of technical publications and international journals supported the research work, and its operations have been well documented and preserved in the administrative records. The Observatory recruited staff of an international calibre and built strong links with the Universities, State, and the Commonwealth and attracted funding, partnerships and equipment from international research organisations and other Observatories. A number of women were employed specifically to undertake the measurements and data analysis for the *International Astrographic Catalogue* as well as those that relocated from Germany during the compilation of the first Meridian catalogue.

- Surveying

Establishing the exact longitude and latitude is of the utmost significance for navigation and land-based surveying. The Observatory established the survey datum and the main trig stations, and was involved in the State border surveys and determining the positions and layouts of towns and features; The Government Astronomers also taught surveying and provided latitude, longitude and time for the 1922 Wallal Solar eclipse expedition. For a period, the centre of the Meridian Transit Circle at the Perth Observatory was the datum point for WA surveys.²

Collection includes:

- Theodolites (1900-), sextants (1860s-), levels.
- Longitude calculations 1890's– WA and between Canada, Australia and New Zealand, and almucantar stars for latitude stars at Esperance.

² State Heritage Register entry. www.inherit.stateheritage.wa.gov.au



Re-creation of Government Astronomers' Office, c1910, Bickley Observatory

- Timekeeping

Accurate time is of the most fundamental significance to navigation, communication, and astronomical research along with the functioning of a civil society. The Observatory was responsible for implementing the Western Australian *Standard Time Act 1895* which, as a pre-Federation initiative, was one of a network of acts that brought standard time across all of the Australia states and territories. The Observatory maintained, promulgated and broadcast Standard Time across the city and Fremantle, the State, and Indian Ocean region, and latterly it provided calibration services for stop watches used by the Police. The Perth Observatory also provided the 6 pips radio time service for the State.

Collection includes:

- 64 Time keeping items – includes master and slave clocks and the associated instructions and calculations on clock correction, chronographs, time-signaling devices including the Shortt Clock timing pip generator (documented as c1917 but it may be later) and a rubidium clock.
- Records including log books, time service records, clock correction calculations from 1907.



Clock that showed official time that once was outside the Observatory in Havelock Street



Part of the rubidium clock

- Meteorology and Tide Services

The Observatory measured the weather, produced weather forecasts and undertook climatic studies of the State (the first climate report was in 1903) until the commonwealth took over the function in 1908 and the records were transferred to the National Archives. The close association between the Meteorology Office and the Observatory continued, and between 1930 and 1967 the office of the Commonwealth Weather Bureau was officially stationed at the Perth Observatory. The Bureau moved to East Perth when the Observatory moved to Bickley.

Collection includes:

- 19 Meteorology items – includes barometers, barographs and records from the 12-year period from 1896 to 1908 when the Observatory undertook meteorology for Western Australia.
- Register of meteorological correspondence 1884-1907, Letterbooks (1882-), telegram transmission register, Pay records 1893-1896, meteorological observations (1898-).
- Calculations of tide measurements for Port Hedland and other ports around the State.

- Seismic measurements

Seismic activity was measured at the Perth site until the Observatory moved to Bickley in 1966 and the function was transferred to the Mundaring Geophysical Observatory although measurements continued at Bickley for a number of years. Seismological readings were recorded on a Milne-Shaw and Lamont seismographs in the Astrographic Dome building in Perth from 1899. Later, in the 1960s, this was supplemented with modern long period horizontal seismographs from Columbia University. This was one of the few recording stations in Australia and it has great significance for geophysical studies and was part of the British network of seismographs. The Observatory was also part of the International Geophysical Year (1957/1958).

Collection includes:

- 11 Seismology items – includes components of the two early seismometers, blueprints of the instrument, instructions on their use, records from 1916, recordings of earthquakes (1924-1953).

- Astronomy

Since its inception, the Observatory has contributed to significant national and international astronomical documentation and research projects. These include:

- Mapping a portion of the southern skies for the *International Astrographic Catalogue* and the *Carte du Ciel*
- Observations of Halley's comet 1910 and 1986
- Observations of the Wallal Solar Eclipse of 1922
- Catalogues of the southern skies *Perth 70, Perth 75, Perth 83*
- International research programmes with NASA, the Lowell Observatory and Hamburg Observatory

Major contributions and discoveries have included:

- Co-discovery of Uranus's ring system
- 30 Supernovae
- 10% of all ground based positions for Comet Halley
- Holding 2nd and 3rd place for the worldwide production of minor planet observations between 1973 and 1984
- 29 Minor Planet discoveries between 1970 and 1979
- Helped discover the super-earth exoplanet OGLE-2005-BLG-3901b

These catalogues and research projects used a range of telescopes and cameras. The raw data produced for these projects was meticulously logged, documented, preserved, analysed and published. The Perth Observatory is the only observatory in the world that has created and holds a hundred year record of the southern skies.

Collections include:

- 36 Astronomy equipment items - including telescopes, the Grubb Astrographic dome, Zeiss plate measuring machine, plate cameras and many other cameras.
- 19 Astronomy items – includes general observatory information such as leaflets, brochures, tour programs, slides of general astronomy for lectures.
- 94 Astronomy observations – largely collected data and reductions from observations

Outreach

Since its inception, the Observatory has seen that providing public information and education has been an important function, and public interest in its operations has been longstanding. The Observatory published tide tables for the North-west, astronomical tables for sunrise and sunset, and moonrise and moonset for public dissemination. The Observatory has conducted site visits and night viewings for almost all of its operational life and across both sites to show the public many celestial objects – and in 1910, the Observatory purchased a telescope specifically for public viewings of comet Halley. The Observatory currently conducts around 95 star viewing tours for around 4800 visitors, school tours, open days and an annual lecture, and gains most of its income from these activities. There is some site interpretation at Bickley using posters, plaques and walk trails.

Staff

Astronomy is a predominantly male profession, but in the early 20th century the Observatory employed a cadre women beyond the traditional administrative roles, most notably in the measuring and analysis of photographic plates and in observing the Meridian catalogues.

SIGNIFICANCE OF THE PERTH OBSERVATORY AS AN INSTITUTION

Since its inception, the Perth Observatory has been a significant cultural, scientific and educational institution in Western Australia. From its inception it performed a range of colonial functions – it was central to the documentation and maintenance of geographical and cultural order in the developing colony of Western Australia, it contributed to international astronomical documentation and research projects, and it continues its long commitment to public outreach. The history of the Perth Observatory has been one characterised by extraordinary scientific and technological achievements against a backdrop of a continuing lack of government funding and appreciation for

its functions and international significance. The international, national and local communities have rallied at times when the Observatory has been under threat of closure – including 1927/8, 1962, 1987 and 2013.

The research function of the Observatory needs to be understood in the context of the changing nature of astronomical science and its research questions, and as part of the continuum of technologies for astronomical research including the significant government investment in the Gravity Wave Centre at Gingin and the focus on radio astronomy with the Square Kilometre Array.

HISTORY OF THE COLLECTION

The contents of the Observatory (its collections) were acquired and used in the course of the daily operations of the Observatory – this includes the equipment used and its associated documentation, records created from observations, including logs, plates and reductions, and resultant publications. These operations were supported by a research library and documented in administrative files. With only a few exceptions, all the equipment, objects, documentation, furniture has direct provenance to the operations of the Observatory over its entire life.

There are many themes that can be seen through the history of the Observatory and its collections beyond science – the history of the way that Western Australia understood its place in the world, its history of shifting from imperial to broader networks of international relations through the sources of supply of equipment, the partnerships required to conduct astronomical science and the history of female employment.

The Observatory has been preserved *in situ* and is a time capsule for the operations post 1966, and for much of the operations since 1896. The heritage collections are interrelated and gain their meanings from their relationships to each other, the functions, scientific data and discoveries. Together these are representative of the status of astronomy as an international science, they show the development of scientific instruments, the historical and contemporary astronomical understandings and discoveries and the aesthetics of their era.

Telescopes and domes

- **Grubb Astrographic telescope (13 inch), 1896**
One of seven 19th century astrographic telescopes built for the International Astrographic Catalogue project, the only one known to be under its original dome and on its original mount though it now has an electric drive mechanism that replaced the mechanical gravity drive when it was transferred to the Bickley site in 1966. Perth became involved in the international in 1900 after Rio De Janeiro withdraw and the Astrographic telescope was used at the Perth site to produce the raw data for the *International Astrographic Catalogue* and a photographic map of the skies for the *Carte du Ciel*.
- **Transit circle (Meridian) telescope (1896)**
One of the original instruments for the Perth Observatory installed in 1899. Meridian observations for local time and accurate determination of geographical position – local time, longitude and latitude – timekeeping, navigation and surveying, and to determine star positions as part of the IAC and *Carte du Ciel*, geographic datum. In the 1960s, received a National Science Foundation of America grant for refurbishment. This telescope is on display in foyer at Bickley. The Meridian dome has to undergo asbestos removal.
- **Lowell telescope 24inch (c1970) US manufacture**
Telescope installed at Bickley in 1971 by the Lowell Observatory in Flagstaff USA and funded by a NASA grant and provided to Perth, it is on permanent loan through a MOU. The WA government funded the 15 metre platform and dome. It was used for the International Planetary Patrol Program which was an international network of observatories. This network of 6 was reduced in 1974 and Perth remained one of three international observatories that continued the IPPP until its suspension in 1976 when the work was

undertaken by space probes. This telescope was used as part of the discovery of the rings around Uranus and is valued for its history of the work with NASA and how it is representative of international connections.

○ **Perth Lowell Automated Telescope (PLAT)**

A redevelopment of the Lowell 24 inch telescope to make it fully automated. This was developed for two major research programmes and was the first generation of automated telescope in Australia that was designed to collect digital images and provide rapid data analysis. The telescope was fitted with stepper motors and an astronomical CCD camera (the first CCD camera in WA) to create digital images.



Transit circle Meridian telescope in foyer at Bickley



Zeiss plate measuring machine. Dr Craig Bowers, former Astronomer and Observatory historian.

○ **The University of Western Australia Telescope**

Installed at the Observatory in 1969 to create a tertiary connection for astronomical research in Western Australia. Originally built by the famous Grubb company, it moved from England in 1928 to Australia and was purchased by Mt Stomlo in 1952. It was used for site testing until 1965 after which it was donated to the University of Western Australia. It was used until 1998 after which it was removed and is stored at the Observatory in a garage.



Observatory domes from the Lowell telescope



Potential of the interior of domes as exhibition

spaces (to be designed for red light visibility)

- **Public viewing telescopes**
 - **Celestron telescope 14inch (c1980)** This telescope was used for public viewings and in the early days for remote photometric work, including during comet Halley.
 - **Calver telescope 12.5 inch (1910).** This was purchased in 1910 specifically to cater for visitor tours especially during the 1910 apparition of comet Halley.

Astronomical data

- **Glass negatives, photographic equipment and associated documentation**

Glass photographic negatives were considered the primary scientific data for nearly 120 years. There are many sizes from 3.5” to 9” plates, and all are very well documented. The most significant (early) negatives are stored in fireproof safes. These include plates that date from 1896, and the 1910 sightings of Halley’s Comet. Of particular note, these plates document the two major epochs of celestial mapping projects involving the Perth Observatory – the 1900’s *International Astrographic Catalogue* and the 1950’s reshoot of the *International Astrographic Catalogue*.

The glass negatives are documented in logbooks, the information is transcribed onto individual envelopes and the negatives are stored in boxes on open metal shelving. The most significant/oldest negatives are housed in fireproof safes.

There is a collection of cameras including a press graflex camera 1907, a 1973 photometer and a 1991 CCD camera.

Documentation and equipment associated with the production of the plates and data analysis include the cameras, observation logbooks from the night, registers of the plates, the Zeiss plate machine and associated equipment, paper reductions that were then used to measure the objects, plate check sheets, collection of plate constant calculations, subsequent calculations, and data analysis, listings of star positions, measurements of index star positions and transit logs.



Negatives in fireproof safe in tyvek enclosures



Negatives in open storage

○ **Digital records 1981-**

Astrographic data was created digitally from the early 1980's and stored on magnetic computer tapes and 5 ¼ and 8 inch diskettes. The collections of this digital data contains raw data, back-ups and data analysis. Many of the discs and tapes are labeled, but there has been no assessment as to their condition, and data. A few volunteers have the knowledge of the tape contents, how to run the computers to read the tapes, and to understand what data they hold and its value. It is estimated that 30-40% of the tapes are likely to be unreadable.



Digital records and the working computers



Working drawings of the buildings

○ **Other photographic data including**

- Harvard College Observatory Glass plates of the entire sky
- Films of many of the solar system planets taken during the IPPP, tins of sundry photographic negatives

Records

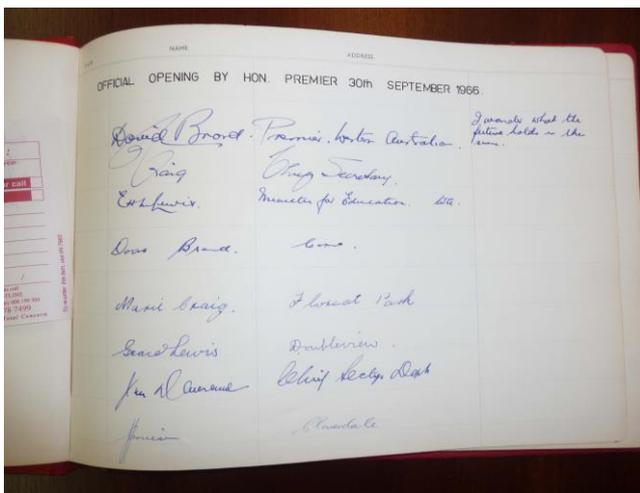
Working documents about the site

There is a large and working collection of plans and drawings of buildings and equipment housed in map cabinets and are regularly used for maintenance.

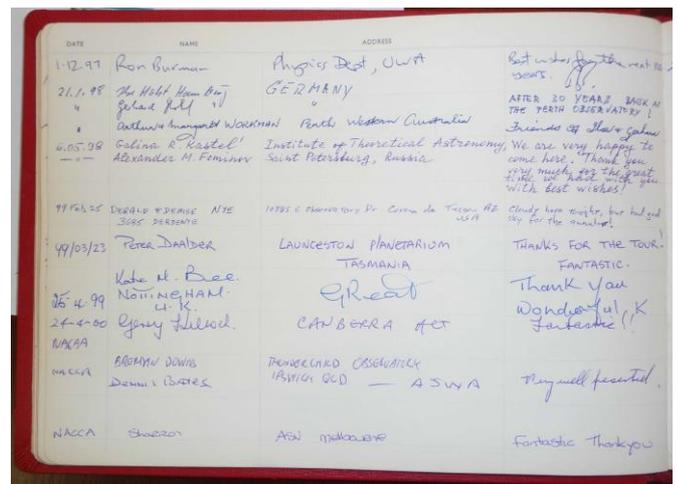
Administrative records

The Observatory holds the main series of correspondence files relating to the creation and administration of the Observatory from 1896 until to its State scientific closure. This large series includes administrative records created as part to managing the operations, equipment purchase, requisitions and maintenance, buildings and staff of the Observatory and conducting its scientific and outreach work. These series include

- **Letterbooks, mail registers, indexes and letter registers, account registers** are stored in a wooden cupboard in the photographic area which is in the centre of the building so it is buffered from extreme temperature. These are documented as individual items onto MOSAIC
- **The correspondence files** are boxed in highly acidic Marbig boxes with typed lists of their contents on front. They are currently stored in centre of building in old darkroom and so they buffered from heat and light. Most of these have been transferred to 4 drawer metal filing cabinets and, as part of this process, each file number, title and location in the cabinet is entered into a spreadsheet with other key information relating to its contents.
- **Requisitions** of equipment are stored in the documents store in the basement. These are seen as active records that contain information relevant to the current operations of equipment.
- **Personnel files**
- **Attendance/visitors book, 1956-**



Visitors book entry for official opening, Bickley. Entry for Premier David Brand 'I wonder what the future holds'



Visitors book entry, Bickley 1997- showing international visitors



Newspaper cuttings book



Archives awaiting appraisal and listing,
stored in the darkroom



Raw scientific data and published *International Astrographic Catalogue* in the documents room



Scientific data in non-fireproof safe

The image shows a page from a book titled "ZONE TRANSITS, Perth Observatory." The page is filled with handwritten data in a table format. The table has columns for "ALTIMETER END", "DATE", and various numerical values. The data is organized into sections for different transits (First, Second, Third, Fourth, Fifth, Sixth, Seventh) and includes corrections and remarks. The handwriting is in blue and red ink. The book is open, and the page is slightly aged.

Page from zone transits showing raw observations and corrections



Reductions for the *International Astrographic Catalogue* in green pamphlet boxes

Library

The Perth Observatory has collected books and other publications since its inception in 1896 and acquired publications and books from the mid nineteenth century. The Library ran an international exchange programme which has resulted in a world-class collection of international astronomical journals. This extensive astronomical library is held in a purpose-built room with fixed book shelves on three walls that hold the general reference books and compactus shelves in the centre of the room that hold the journals, reports and other publications from the worlds observatories. The original cards that document the exchange system have been preserved along with the original card catalogue for the Library. The library contents have recently been catalogued using the library database 'Readaware'. The library consists of:

- 2,136 books on general and specific aspects of astronomy and atlases;
- 2,714 journals, reports, contributions and other communications from observatories around the world.
- Holdings include most of the publications from the international observatories involved in the International Astrographic Catalogue project and sets of the *International Astrographic catalogue*.

Lantern slides, c1916

- Slides of instruments, the solar system, constellations and mythical figures used in lectures and educational talks.

- Handwritten notebook of talks and lectures.

Contents of time capsule from 1896

Including documents, coins, stamps, objects that show the state of science. Of specific interest is a signed list of the attendees at the opening.

Photographs

A collection of historical photographs of the site, its buildings, and people including black and white prints, negatives and colour slides.

General equipment and documentation

- 14 Calculation equipment items – includes old calculating machines, early computers
- 10 Furniture items – chairs, book cases, tables, and associated office equipment
- 9 Photography items – includes cameras, an x-ray tube
- 4 Electrical technology items – includes software on medium
- 22 working drawings– includes architectural drawings of the Perth Observatory and domes in West Perth and Bickley, drawings of modifications to buildings to house instruments
- 20 Newspaper items – a collection of newspapers that were published in the week of the opening of the Perth Observatory September 1896
- 21 Organization items – includes various Acts and regulations relevant to the function of the Observatory
- 40 Business items – includes accounting books, early letter books, mail books, visitor books colonial stamps and coins.

RELATIONSHIP BETWEEN THE BUILDING AND ITS CONTENTS

The Perth Observatory has operated at two sites – at Havelock Street, Perth and Walnut Road, Bickley. The original 1890's residence and offices at the Havelock Street site in Perth designed by George Temple Poole are on the State Heritage Register, the Register of the National Estate and are the current headquarters of the National Trust of WA, though its integrity has been compromised as the Astrographic and Meridian domes were demolished as part of the development of Dumas House in the 1960's. The observatories and administrative buildings at Bickley are on the State Heritage Register.

While both sites are on the State Heritage register, there is no formal connection between the Perth and Bickley sites of the Observatory, no evidence of the location of the original observation domes at the Perth site, and no significant onsite interpretation inside the Havelock Street building of its Observatory functions. The foundation stone for the Perth site sits alongside the foundation stone for the Bickley site.

The Observatory once operated the Time ball at the Round House in Fremantle and sent time signals via Wireless Hill in Melville for broadcast.

COMMUNITY COMMENTS

Volunteer comments

- All the volunteers value the location of the Observatory and its unique capacity to document the southern skies
- One volunteer particularly values the Lowell telescope for what it represents for international connections and the projects undertaken by NASA and the dedication of the scientists.
- One volunteer particularly values the timekeeping objects for what they say about historical functions of the Observatory and the significance of time

- Others value the knowledge of the individuals and recognize the need for oral histories of the key scientists and technicians to document their knowledge
- Most value the history of the science and astronomy conducted at the Observatory
- Many value the connections between the first Observatory at Havelock Street and would like to mark site of the old astrographic building in ground.
- Everyone sees that the Observatory is integral to the history of the State and conduit through which can be understood its history and culture
- Most value the significance of getting stories of the Observatory out – of science and role of telescopes as part of international science; of the constant battle to keep going against funding cuts
- One volunteer has a particular understanding of the historical heritage of the roses
- The volunteers and former employees recognize that the Observatory is highly valued as they saw the way national and international community supported the Observatory when it was under threat.
- The volunteers value the public interest in astronomy and have increased night viewing and established an objects exhibition area to show history of the Observatory and to educate about the science of astronomy.
- The visitors book shows international visitors on every page

CONDITION OF THE COLLECTION

The POVG has many skilled and interested members of all ages who undertake a wide range of jobs from conducting night tours to documenting all formats in the collection and maintaining equipment. Some, notably former employees, have specific technical and scientific skills that are vital to the documentation, maintenance and understanding of equipment and scientific data as well as to educating the volunteers who conduct the night tours. The condition of the collection is for the most part good, it is well documented and labeled and work is continuing to upgrade descriptive entries on the MOSAIC database. Part-time staff are employed to undertake maintenance and cleaning, and security is assisted with the caretaker living on site.

The Observatory holds a large inventory of equipment parts that are required for ongoing maintenance of the telescopes and domes in particular and the other technical and historical equipment. Some areas of the building are used to store obsolete office equipment – for example computers and faxes, and these are over-crowded. The basement document store, which includes some of the original furniture from the Observatory in Perth, is well secured and buffered but needs to be managed in line with OHS principles and some of the most important archival collections are stored on open shelves, are dusty and need protection. The catacombs below the building are used to house spare materials and some less valuable objects including disassembled heritage furniture.

The Observatory owns a thermo-hygraph but is not used currently to monitor the environment.

COMPARATIVE COLLECTIONS

Each observatory in Australia has its own history and characteristics but they were all constructed within an imperial and colonial understanding of exploration and science. Each major observatory undertook a similar range of functions and Sydney and Melbourne were founding participants in the *International Astrographic catalogue*. However, as the Observatories were closed, their collections have had different fates.

Adelaide: The Observatory was closed in 1948. The collection was distributed to the University of Adelaide and the State Records of SA and some records have been lost and destroyed. Stevenson notes a list of equipment.³

Melbourne: Melbourne Observatory was closed for research in 1945. The collections were distributed between the Royal Botanic Gardens Victoria, Museums Victoria, The Astronomical Society of Victoria, PROV, State Records of NSW and The Museum of Applied Arts and science. This is well documented by Barry Clark.⁴

Sydney: In 1982 the Sydney Observatory was closed and in 1986 the Sydney and Melbourne collections were transferred by agreement to Macquarie University. In 2006, 650 of the Sydney glass plates were digitized by Cambridge University and that collection has now been returned to the Powerhouse.⁵ The East Dome opened on the Sydney Observatory site in 2015, and houses the Melbourne Astrographic Telescope and the Sydney A Measuring machine.⁶

While the collections of the other major Observatories in Australia have been dispersed, the collections at the Perth Observatory remain intact and *in situ*.

STATEMENT OF SIGNIFICANCE FOR THE ENTIRE COLLECTION

By all standard criteria, the Perth Observatory is of international significance. Its collections of buildings and technical objects, the scientific data, research output, administrative records and the research library have remained intact and *in situ* and must remain so. Together the collections are an extraordinary multi-format time capsule of the functions of the Perth Observatory over its 120-year life and all the component that are interrelated remain, which means that together, they have additional meanings above those given to individual items. Once the intangible cultural heritage is captured through oral histories and film to bind the collections to the human relationships between technology, science and stories, the rich databank will provide an extraordinary evidence base from which to create public exhibitions and more integrated site interpretations.

Historical significance

The Perth Observatory is of international historical significance.

- From 1902 the Perth Observatory contributed to what have become some of the most historically significant international astronomical documentation projects, made significant discoveries and worked with key international partners.
- At its closure, the Perth Observatory was the longest running and the last state government Observatory in Australia.
- The key functions that the Observatory undertook to determine the location, time and boundaries of the State, are so significant that the history of the development of Western Australia can be written through the history of the Perth Observatory.

³ Stevenson, Toner. *Measuring the stars and observing the less visible. Australia's participation in the Astrographic catalogue and Carte du Ciel*. PhD, University of Sydney, 2016.

⁴ Barry A.J. Clark. *Melbourne Observatory: inventories of associated items, status of the site, and proposals for heritage conservation and development*. Melbourne: Astronomical Society of Victoria Inc., c2007

⁵ Bucciarelli, Beatrice. *Astrographic catalogue and Carte du Ciel plates. Transactions IAU, Vol XXVIB. Proc. IAU. XXVI General Assembly, August 2006*. doi:10.1017/S1743921308023727

https://www.cambridge.org/core/services/aop-cambridge-core/content/view/9C957626F98C89B4BE3F18ADC20D3AA0/S1743921308023727a.pdf/division_i_commission_8_working_group_astrographic_catalogue_and_carte_du_ciel_plates.pdf

⁶ Stevenson, Toner. *Measuring the stars and observing the less visible. Australia's participation in the Astrographic catalogue and Carte du Ciel*. PhD, University of Sydney, 2016.

- Its existence was argued for by key figures including John Forrest and its development can be seen in relation to the development of a contemporary suite of cultural and scientific institutions, and its staff gained national and international recognition for their work.
- The history of acquiring technology and staff shows the change from building colonial and imperial relationships to working in increasingly international partnerships.
- The functions carried out by the Observatory placed Western Australia on the map literally in terms of geographical and astronomical knowledge, and early data it created can now be used to review the history of climate change.
- Western Australia was placed on the map of international observatories soon after its establishment by virtue of its location and immediately became a significant international node in the network of the international astronomical science.

Aesthetic significance

- The Observatory houses a range of 19th and 20th century telescopes, domes and scientific equipment that show the changing designs in technology from classical to the modern.
- The Observatory residence and administration building at Havelock Street, Perth is a fine example of the work of the architect George Temple Poole, and is on the State Heritage Register.
- The Observatory buildings at Bickley are examples of mid 20th century design and are on the State Heritage Register.

Scientific significance

- The Observatory is *internationally significant* by virtue of its geographic position as the only site in the latitude/longitude region at the time to contribute to the documentation of the southern skies
- It has played an *internationally significant* role in key international documentation projects across epochs, and the equipment, raw data and publications that were used in these projects remains intact and in situ.
- It has played an *internationally significant* role in key international research projects and discoveries with international partners including NASA, The Lowell Observatory, Hamburg Observatory, the US Naval Observatory and Greenwich Observatory.
- The data produced for and the catalogues themselves, and data produced during the observations of specific events are *unique* and of *international significance*.
- The Perth Observatory performed *nationally significant* functions in that it maintained current calculations of latitude and longitude that fed into the accurate surveying of the state and its boundaries, and into centralised timekeeping.
- The clear skies of Perth meant the Observatory was reliable and productive as a scientific institution.
- The intangible heritage was vital to its operation including the international recognition of the dedication and quality of Observatory staff and their capacity to produce extraordinary data in an efficient and timely manner.

Social and spiritual

- The Observatory is valued internationally, nationally and locally by the scientific community who value its international status, research output and clear skies and as a consequence have visited the Perth Observatory.
- The general public have long cared for and visited the Observatory and continue to participate in citizen science projects.
- All these communities have fought for the survival of the Observatory when it has been under threat of closure or reductions in funding. These communities also value both sites where the Observatory operated and that it functioned as a scientific institution continuously for 120 years.

- The Havelock Street building is symbolic as the headquarters of the National Trust and the social and symbolic status that the NT accords to such a site.

Provenance

- The buildings, equipment and documentation were acquired and created as part of the daily operations of the Observatory.
- All equipment, documentation and literature (with the exception of some photographs and the occasional publication) have direct provenance to the operations of the Observatory. This includes substantial documentation about the purchase and maintenance of equipment which has been preserved for the current information value about equipment, rather than being seen merely as financial documentation of its acquisition.

Rarity/representative

- The Perth Observatory is the only site in Australia to be preserved completely, and *in situ* and as such it is *unique* in Australia and *extremely rare* worldwide.
- The technology, raw data, research outputs, the library and administrative records are preserved together and *in situ* in the buildings that are also well preserved.

Condition/completeness

- The collections of the Perth Observatory are substantially complete and remain *in situ*.
- While only the 19th century administrative and accommodation building remains at the Havelock Street site, the purpose built in 1960's buildings have integrity and as a cluster significant heritage value and have been adapted only for technical and scientific change.
- When the Observatory ceased to be a scientific institution, the contents of the buildings and its collections remained *in situ* unlike the other key observatories of Sydney and Melbourne which have been dispersed.
- The collections of objects are in good condition, the telescopes are well maintained and in good working order but most of the other equipment such as clocks and chronographs are not in current working order.
- The collections of equipment, documentation and the Library are substantially complete and well supported with administrative records.

Interpretative

- The Perth Observatory has *extremely high* interpretative potential for its range of public functions many of which are not well known yet would garner high public interest – the most notable amongst is documented functions that would attract historical interest is the history of time-keeping.
- It can draw on the relationships between its clusters of buildings and telescopes, the objects and documents and the intangible cultural heritage – the memories of the people who worked there including women. For example, the objects and documents can be used as the conduit the history of each of the functions, show the history of the technology used, explain the processes of the creation, analysis and publication of the data, and use the words and images of those who worked there.
- It also has the potential to move beyond the interpretation of its historical functions and work with Indigenous communities to bring cross-cultural perspectives to our understandings of the skies.

KEY RECOMMENDATIONS

The Perth Observatory is a site of national and international significance. A proposal to register the site and its collections on the UNESCO's Heritage and World Astronomy register has been submitted and I recommend this register entry be finalised.⁷

As part of the transition from a functioning scientific institution to a public outreach organization, a partnership agreement has been put in place with the Perth Observatory Volunteer Group. At present, the site is very well run and very well organized, there are some part time paid staff who manage the POVG operations, administer the tours and maintain and clean the Observatory and equipment. There is no paid staff member managing the heritage collection.

The Sydney Observatory no longer operates as a scientific institution but is valued sufficiently to be managed as part of the Powerhouse Museum (Museum of Applied Arts and Sciences). In Western Australia State and local authorities that have museums of considerably less significance and size, employ paid professional staff. The significance of the Observatory site and its value as a public outreach facility warrant paid professional management rather than relying on volunteers and the goodwill of former employees for the current excellent management.

The Observatory gains its international significance for its authenticity, rarity and completeness of its collections and buildings, and that they remain *in situ*. The current partnership agreement with the POVG covers the outreach functions, but it is my firm view that the State Government needs to take full responsibility for the management of the heritage aspects of the Observatory, and employ paid professional staff to manage the daily operations and co-ordinate the volunteers while considering the many options for the management of the site and its collections and during the development of exhibitions.

Recommendation: Employ a curatorial manager to oversee the heritage side of the operations.

INTEGRATED CULTURAL HERITAGE

The Observatory is part of a network of sites. The Observatory needs to restore connections between the two sites where the Observatory operated and build relationships with the National Trust, not least as it occupies the old Observatory building. It should also build relationships with sites where the Observatory has had historical connections including the Fremantle Time Ball and Wireless Hill Museum, City of Melville.

1. BUILDINGS AND LANDSCAPE

- **1.1 Conservation plan.** The Bickley Observatory site is listed on the State Heritage register. If there is no conservation plan for the site and buildings in place – including the landscape and heritage roses, then this needs to be commissioned.
- **1.2 Risk assessment.** The bushfire risk at Bickley Observatory is already well analysed and mitigated through DPaW. However there needs to be a risk assessment for other risks to the heritage collections at Bickley.

2. INTANGIBLE CULTURAL HERITAGE

The most vulnerable significant asset yet to be captured and preserved is the knowledge and memories of all the staff who worked at the Observatory including the astronomers, technical and administrative staff. This knowledge is vital to capture as part of documenting the human stories of the Observatory and binding the various functions and technologies together.

⁷ <http://www2.astronomicalheritage.net/>

The raw scientific data is vital to not only preserve but also to understand, document and preserve its meanings and significance. This data can be (and is in some cases in the Observatory) use in interpretative displays to explain the nature of astronomical science, and contextualise the equipment, how discoveries are made, and what a discovery looks like. This information is the most at risk because the knowledge of what it means resides in only a few former staff who can explain and document this.

Recommendations:

- **2.1 Oral history interviews.** Seek funding to employ a professional oral historian conduct long life histories of astronomers, other employees and with a specific focus on the Observatory. There are grants available from Lotteries and if you obtain one you may want to discuss a partnership with the National Library of Australia Oral History Branch. I would recommend Dr Criena Fitzgerald for this work.⁸
- **2.2 Film** former scientific and technical staff discussing the history of equipment, how the telescopes operated, what they were used for, their significance, and their meaning to the person talking. And then relate to the records that were created, how they were interpreted, what discoveries were made using this equipment.

3. ADMINISTRATIVE RECORDS

The partnership agreement between DPaW and POVG (Inc) does not identify responsibility for the administrative records of the Observatory, nor contain financial support for their oversight, preservation, management or access.

3.1 The status of and responsibility for these government records needs to be clarified with DPaW, and they need to be managed in accordance with the *State Records Act 2000*.

Recommendations for continuing work:

Listing the records.

- Listing of correspondence files, which is very detailed and valuable, is currently near completion. Once all correspondence files from around the building are centralized in filing cabinets and listed, this list would be best sorted into original file number order and the records stored in type 1 boxes in file number order.
- Produce a listing of all the archival series in the collections. This should include the different forms of scientific data which explains the context of the records, the way they were constructed, data they contain and how it was used (in conjunction with recommendation 2.2)

Retention and disposal decisions need to be considered carefully – for example, they take into account that what may appear at first sight to be financial records and requisitions, may contain vital information about the operations of equipment and sources of supply.

The permanent home of the records needs to be confirmed. In considering the status and responsibility of these records, they gain in their significance and value by virtue of their location at the Observatory. Once they have been housed in appropriate materials – acid free boxes and on static or compactus shelving, and there are sound handling and access policies in place, these records are unlikely to be at greater risk at the Observatory than being stored in other sites in metropolitan Perth, and gain from being *in situ* as they are regularly accessed for historical and technical information. It may be helpful to provide listings of the records to the State Records Office via DPaW for inclusion in the Register of State Archives.

⁸ The National Library of Australia astronomers oral history project did not interview key astronomers in WA.

Policies for public access. There needs to be a public access policy that facilitates access to this material and documents the recommended access regimes that are described in the register of restricted access materials outlined by the State Records Commission <http://sro.wa.gov.au/archive-collection/accessing-restricted-records/restricted-access-decisions>

Boxes and shelving for archives Await recommendations of preservation needs assessment.

Suggestion: Employ a professional archivist on a casual basis to provide ongoing oversight and advice relating to the management of the archives and to produce series descriptions of the records that are held.

4. DIGITAL DATA

There are computer tapes and boxes of computer discs stored in several parts of the building. These formats are physically vulnerable and are at significant risk of decay. At present, there is equipment that can be used to read the data and knowledge of the operations of this equipment.

- **4.1 Sort, document and appraise digital records** before the tapes and discs decay further, and while there is technical knowledge as to how to operate the computers and interpret the data.
- **4.2 Write and implement a digital preservation plan and strategy** for digital data that is deemed of long-term value. This should be undertaken in consultation with DPaW.

5. PHOTOGRAPHIC PLATES

c28,000 photographic plates are currently stored in two places – those deemed of highest significance are stored in fireproof safes, the others are store on open shelves and are in a stable condition.

- **5.1 Review the storage of the negatives** on the open shelves as part of a preservation needs assessment.

6. PRESERVATION

- **6.1 Apply for a Community Heritage Grant** for a preservation needs assessment for the heritage collections

Recommendations for continuing work

- Clean and dust lightly the shelves and records in the document storage,⁹ and make acid free boxes for non standard-sized records.¹⁰ Priorities for this work should be
 - Records/scientific held in the basement document store
 - Letterbooks, registers, newspaper cuttings books
- Review the priorities for conservation of all the rolled documents and specifically contents of the 1896 time capsule as part of the preservation needs assessment, or you can seek funds independently for this work by a professional paper conservator who is a member of the Australian Institute for the Conservation of Cultural Materials (AICCM).

⁹ Useful information on dusting records is here

<https://www.archives.gov/preservation/holdings-maintenance/dusting.html> and a range of supplies are available from Archival survival <http://www.archivalsurvival.com.au/>

¹⁰ Two useful videos for making phase boxes are at <https://www.youtube.com/watch?v=EDzZFUIHd0s> and <https://www.youtube.com/watch?v=Myuhluc-w>

7. OUTREACH

7.1 Illustrated popular history book of the Observatory. I recommend approaching DPaW with a publication proposal.

8. INTERPRETATION/EXHIBITIONS

There is significant interpretive potential for the site and its contents – for example:

- The exhibition area in the administrative building is currently underused as an interpretative space – this space could be used for an exhibition to orient the public to the diverse roles of the Observatory and create an exhibition about its role in timekeeping.
- The telescope domes could be used as exhibition spaces mindful that exhibitions need to be designed specifically for red light so as not to interfere with nighttime telescope use. Each dome could house an exhibition about the telescope it houses, its documentation, scientific discoveries and people.
- Develop exhibitions on the web which could introduce visitors to the varying functions of the Observatory, the key employees, discoveries, significant objects and projects. One example of a virtual exhibition is Virtual Carnamah <http://www.carnamah.com.au/virtual-museum> Another style for a scientific site is that of Bletchley Park in the UK <https://www.bletchleypark.org.uk/visit-us/exhibitions/online-exhibitions> and this is an excellent example of integrated the story of a multi-building site, the technology and the human stories.
- Interpretative signage at the Havelock Street site in conjunction with the National Trust, and at the time ball in Fremantle

8.1 Employ a curatorial manager to assist the Observatory through the process of professional exhibition development and design.

9. VOLUNTEERS

9.1 Apply for Churchill Fellowship for a volunteer to either to look at the way select scientific sites have completed public interpretation, or to visit sites to discuss the digitization of the glass negatives.

10. PHOTOGRAPHIC PLATES - DIGITISATION

The photographic plates are very well documented and are physically fairly stable. They are only available for international research to onsite visitors. The IAC plates held at the Perth Observatory are part of the unique, international 100 year old picture of the sky. When a functioning scientific institution, the Perth Observatory was represented on the IAU working group on Astrographic catalogue and Carte du Ciel plates.

10.1 Liaise with international organizations as part of planning to digitize the glass plates.

Detail

Before local plans for digitization of plates are implemented, that discussions concerning the digitization of these plates be undertaken with the IAU.¹¹ There are several international projects where astrographic data has also been digitized – for example the Smithsonian Astrophysical Observatory Telescope data centre Harvard College Observatory

¹¹ Bucciarelli, Beatrice. Astrographic catalogue and Carte du Ciel plates. *Transactions IAU, Vol XXVIB. Proc. IAU. XXVI General Assembly, August 2006.* doi:10.1017/S1743921308023727 https://www.cambridge.org/core/services/aop-cambridge-core/content/view/9C957626F98C89B4BE3F18ADC20D3AA0/S1743921308023727a.pdf/division_i_commission_8_working_group_astrographic_catalogue_and_carte_du_ciel_plates.pdf

Astronomical Plate Stacks Digitisation of glass negatives and associated logs¹² and international initiatives such as the International Virtual Observatory Alliance.¹³

As part of planning for the digitization of plates according to international standards for the creation of digital images and metadata standards, that there be a robust digital preservation plan in place.

11. LIBRARY

11.1 The Library should remain *in situ* until a conservation plan has been completed.

11.2 Light levels in the Library must be reduced to stop further damage to the publications. This could be done with window treatments or heavy curtains placed over the windows in the Library to protect the publications on the shelves from the lights. You could use the opportunity to commission an artwork/padded quilt that responds to the site or collection and hang this as a window treatment. You need to place the atlases in drawers and only expose them to light when they are being viewed.

Suggestion: That the holdings of the Observatory library be placed on the National Bibliographic Database.

PRIORITIES

SHORT TERM

6.1 Apply for a Community Heritage Grant for a preservation needs assessment for the heritage collections

3.1 The status of and responsibility for these government records needs to be clarified with DPaW, and they need to be managed in accordance with the *State Records Act 2000*.

11.2 Light levels in the Library be managed with window treatments or curtains be placed over the windows in the Library to protect the publications on the shelves from the lights, and to place the atlases in drawers and bring them out for viewings.

4.1 Sort, document and appraise digital records before the tapes and discs decay further, and while there is technical knowledge as to how to operate the computers and interpret the data.

4.2 Write and implement a digital preservation plan and strategy for digital data that is deemed of long-term value. This should be undertaken in consultation with DPaW.

2.1 Oral history interviews. This could be in the style of long life histories of astronomers, other employees and with a specific focus on the Observatory. There are grants available from Lotteries to employ professional oral historian.

2.2 Film former scientific and technical staff discussing the history of equipment, how the telescopes operated, what they were used for, their significance, and their meaning to the person talking. And then relate to the records that were created, how they were interpreted, what discoveries were made using this equipment.

MEDIUM TERM

¹² <http://tdc-www.harvard.edu/plates/>

¹³ <http://www.ivoa.net/>

8.1 Employ a curatorial manager to assist the Observatory through the process of professional exhibition development and design.

1.1 Conservation plan. The Bickley Observatory site is listed on the State Heritage register. If there is no conservation plan for the site and buildings in place – including the landscape and heritage roses, then this needs to be commissioned.

1.2 Risk assessment. The bushfire risk at Bickley Observatory is already well analysed and mitigated through DPaW. However there needs to be a risk assessment for other risks to the heritage collections at Bickley.

10.1 Liaise with international organizations as part of planning to digitize the glass plates.

9.1 Apply for Churchill Fellowship for a volunteer to either to look at the way select scientific sites have completed public interpretation, or to visit sites to discuss the digitization of the glass negatives.

LONG TERM

11.1 The Library should remain *in situ* until a conservation plan has been completed.

7.1 Illustrated popular history book of the Observatory. I recommend approaching DPaW with a publication proposal.

PART II

The Observatory performed an internationally significant function, and the current international significance of the Observatory comes from the way that it is preserved in situ and its collections and contents are comprehensive, complete and interrelated.

The clusters of objects used to perform the individual functions of the Observatory, the raw data that was created and analysed and the documents that show the administration of each function can all be seen as equally significant.

In an historical sense the objects and documentation used in the early colonial functions of timekeeping, surveying, tides and meteorological/seismological documentation are *nationally significant*.

In a scientific and historical sense, the objects used and documentation created during the major international mapping and research projects are of *international significance*.

The archival records – the scientific and administrative records are significant as a record of the operations of the Observatory and take their significance from the functions that they document.

Beyond these principles, there are some projects that have significance as discrete assemblages, and there are a few items that have their own significance aside from their being in the broader context.

INTERNATIONAL ASTROGRAPHIC CATALOGUE AND CARTE DU CEIL

The *International Astrographic Catalogue* (IAC) was the first large-scale international co-operation in Astronomy and the largest international scientific project in the 19th century. The project aimed to photograph the sky to the 11th magnitude with each Observatory taking plates, undertake astronomical measurements and calculations and publish the data in catalogues. A second set of plates was to be taken to the 13th magnitude for the *Carte du Ciel*. From the 1960's this data has been reworked and digitized and has been used to produce the AC2000. This is a good example of way in which historical data can be repurposed in the digital age.

Melbourne and Sydney Observatories were original partners in the IAC and Perth joined in 1902 after Rio de Janeiro withdrew. The impact of the depression led Melbourne and Sydney Observatories to pool their resources. As in other Australian observatories, the Perth Observatory employed a total of 11 women to undertake the measurements and calculations for the IAC, and this was unusual at the time in what has always been a gendered workforce. Only three of the catalogues from Melbourne were published prior to its closure in 1944, with the final volume being published in 1963. 53 volumes were produced by the Sydney Observatory and 28 volumes were produced from the Perth data. The first 4 volumes of the *Astrographic catalogue* were published 1911-1916, the next 21 were published between 1913-1921. About one third of the Perth plates were reduced at the Royal Observatory in Edinburgh and the final 3 volumes of information analysed by the Royal Observatory in Edinburgh were published 1948-52.

The assemblage of equipment and data that was purchased, created for and produced by the *International Astrographic Catalogue* project includes:

- Grubb telescope 1896, and dome
- Transit circle (Meridian) telescope 1896 and dome

- Perth Zone 944 photographic plates¹⁴
- 1906 ‘Greenwich micrometer’ (Stevenson p150 pic)
- Plate measuring sheets Paper reductions
- Log books of measurements
- Publications of the Astrographic catalogue – all zones
- Card correspondence, circulars, administrative records and ephemera including instruction manuals

This is the only complete set of the records and publications of the *International Astrographic Catalogue* and the *Carte du Ciel* that remain *in situ* in the southern hemisphere, albeit at Bickley whilst it was created from Havelock Street. While it is likely that there are sets held in other organizations in Australia, none remain *in situ* and none are noted on the National Bibliographic Database.¹⁵

Internationally, astronomers value very highly the work of the *International Astrographic Catalogue* and its unique documentation. It was restarted in the 1950’s -1970’s but the work was expensive at a time when resources were declining.

The assemblage of equipment used to create the data, the raw scientific data, the calculations and analysis, and the publications are *unique* and are of *international significance*

WALLAL SOLAR ECLIPSE

In 1922, an international group of scientists received national and international funding to travel to Wallal Station on the remote North West coast of Western Australia to observe a solar eclipse and test aspects of Einsteins theory of relativity. Teams from observatories and universities in Eastern Australia failed to obtain observations due to the weather, and so the observations from Wallal were the sole set of Australian observations. These Observations taken at Wallal of the 1922 Solar Eclipse confirmed aspects of Einstein’s theory of relativity.

By virtue of the international significance of the scientific discoveries that came out of the 1922 Wallal Expedition, and the way the expedition overcame the logistics of the remote location, the collection of correspondence files, scientific observations and journal articles relating to the expedition to observe the solar eclipse at Wallal Station, North West WA are of *international significance* and should be seen in association with other collections relating to this expedition held at University of WA, State Library of WA and State Records Office.

PERTH CATALOGUES 70, 75 AND 83

These catalogues are of significance for their detailed and unique documentation of the southern skies. These built on the earlier catalogues produced as part of the IAC and were subsequently used as the basis for future catalogues of the southern skies that were constructed using space telescopes. *These are of international significance*

ATLAS COELESTIS 1729

200 made, 10 known to exist.

This copy was donated by a direct descendant of Flamsteed and contains annotations by Capel Loft. It is highly valued by the Observatory and stored in a perspex box with 3pass curtain fitted cover to keep out light in the exhibition area and its cover is only removed when it is shown to visitors during tours. Security with such a valuable item is an issue, and it is a careful balance between

¹⁴ Perth is listed as creating 944 plates between 1902 and 1919.

https://archive.org/stream/Sky_and_Telescope_1998-06-pdf#page/n104/mode/1up/search/astrographic

¹⁵ Toner Marie Stevenson. *Measuring the stars and observing the less visible: Australia’s participation in the Astrographic Catalogue and Carte du Ciel*. PhD, Sydney University, 2015. <https://ses.library.usyd.edu.au/handle/2123/15762>

advertising its existence and the insurance and security risks that comes with public knowledge of its location. At present its existence is not in the broader public domain. A 1753 edition is held at the National Library of Australia.

This item is *very rare and internationally significant*.



Atlas Coelestis, 1729. Note display case and cover

TIMEKEEPING – WESTERN STANDARD TIME

The Observatory maintained and promulgated accurate time for the Western Standard Time zone. The Observatory sent time pips/signals via electrical wire to shipping in Fremantle, state railways, the post and telegraph system. The Observatory also controlled public clocks.

The Observatory holds a comprehensive collection of the time-keeping devices used to maintain and promulgate accurate time following the *Standard Time Act* 1895, and some of the remaining infrastructure to transmit the signals through an network of wires supported by towers.

Two items are, in themselves of *national significance*

- The Shortt Clock timing pip generator c1917 was used to generate electrical time signals – known as ‘the pips’. This object is of specific symbolic, social, aesthetic, historical and scientific interest in that it was the instrument that ensured that accurate time was known to the public.
- William Cook patented his design for a sun clock (heliograph) in about 1907. After he became NSW government astronomer, Cook patented an improved design and sold several hundred items and one is held in Museum Victoria.

This assemblage of timekeeping devices, the pip generator and the network of infrastructure is of *national significance* for its role in the maintenance and promulgation of Western Standard time which is central to the orderly functioning of a community.



Cooke's Sunclock



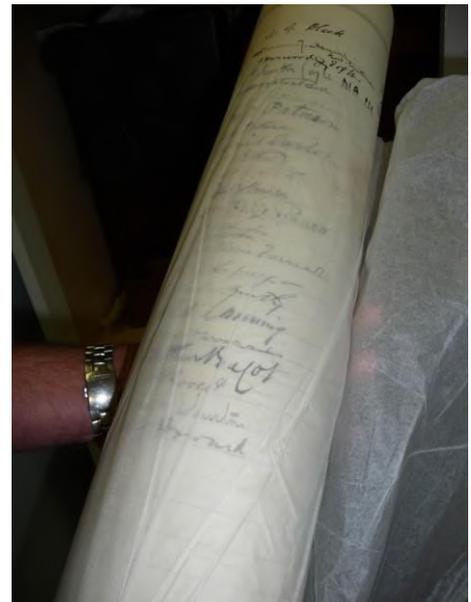
The automatic pip generator

CONTENTS OF 1896 TIME CAPSULE

A Time capsule was buried at the Havelock Street site in 1896. This assemblage of objects and documents was carefully selected to show a picture of the times for future generations, and includes a signed list of those who attended the opening of the first Perth Observatory. This is of *significance to the Observatory*.



Objects from the 1896 time capsule



List of attendees at the opening of the Observatory 1896

WA'S FIRST CLOSE COUPLED DIGITAL CAMERA, 1991

The first digital camera developed built in Western Australia for astronomical use was part of a system developed to automate the Perth-Lowell 61cm telescope. This camera was based on designs of a camera built at NASA's Jet Propulsion Laboratory and the California Institute for Technology for the Palomar Observatory 4m telescope. The camera was built by Andrew Williams in 1989, initially as an honours project and then in his PhD project which he developed an automated search for supernovae in late spiral galaxies. This camera is jointly owned by the Perth Observatory and UWA Physics Dept and represents a significant technological development in Western Australia based on international ideas, and is likely to be one of the earliest digital cameras in use in Western Australia.

This camera is State significance.

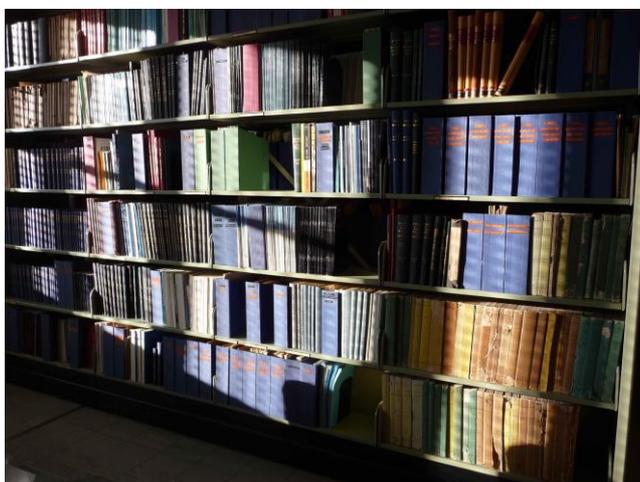


WA's first Close Coupled Digital camera, 1991

THE OBSERVATORY LIBRARY

Through its collections of books, journals and atlases, original card catalogues, cards that document the publications exchange system, the Observatory Library represents the international networks of the Observatory – some of which no longer exist. The Library rests as a complete archive of the place of the Observatory in the network of international astronomical research. This Library is also a time capsule of the literature that supported the research work of the Observatory and it remains *in situ* in its purpose built room. There is no other Observatory library that remains together or *in situ*.

This Library is of national significance.



Library, Perth Observatory. Showing problem with light

GLOBES

18" Celestial Globe, 1879 and 18" Terrestrial globe, c1879. W and AK Johnston, Edinburgh

These are noted in auction catalogues as exceedingly rare and valuable.



1879 Celestial and terrestrial globes. W and AK Johnston.