



River Murray International Dark Sky Reserve
Mid Murray Council
Astro Tourism Strategy

Final

Dr Claire Ellis
Holmes Dyer

27 August 2021

Contents

1. CONTEXT.....	2
2. OUR VISION	1
3. COMMUNITY ASPIRATIONS	3
4. PRIORITY COUNCIL WORK.....	4
4.1. DEVELOPING HARD INFRASTRUCTURE	4
4.2. DEVELOPING SOFT INFRASTRUCTURE	6
4.3. MAINTAINING QUALITY	8
4.4. GOVERNANCE STRUCTURE	8
DIRECT MANAGEMENT	9
ACTIONS	9
5. CASE STUDIES.....	11
6. SUMMARY OF ACTIONS.....	22

Proprietary Information Statement

The information contained in this document produced by Dr Claire Ellis / Holmes Dyer Pty Ltd is solely for the use of the Client identified on the coversheet for the purpose for which it has been prepared and Dr Claire Ellis / Holmes Dyer Pty Ltd takes no responsibility to any third party who may rely upon this document.

All rights reserved. No section or element of this document may be removed from this document, reproduced electronically stored or transmitted in any form without the written permission of Dr Claire Ellis / Holmes Dyer Pty Ltd.

1. Context

In November 2019, the River Murray International Dark Sky Reserve, located in the Mid Murray Region was awarded International Dark Sky Accreditation – similar to a World Heritage Listing for the stars. This accreditation is a significant achievement. It is Australia's only Dark Sky Reserve and one of only 15 in the world.

Since the Dark Sky Accreditation announcement, the local Mid Murray Landcare Group, tourism business owners, and the Mid Murray Council have experienced unprecedented interest from Australian and overseas scientists, environmentalists and tourists who want to visit the Region to star gaze and experience the darkest sky in the world.

In August 2020, a River Murray International Dark Sky Reserve Committee was formed in conjunction with Mid Murray Landcare SA. This committee has a diverse tourism, Local and State Government, education, environmental and astronomical based skillset and is in the process of developing a Strategic Plan. Mid Murray Landcare SA is the legal entity responsible for annual reporting and maintaining international Dark Sky Accreditation. This work includes darkness monitoring, on-going darkness research, light pollution education and reduction, and creating light demonstration areas.

The Committee also recognised that a more focused Astro-Tourism Strategic Plan is needed to identify and develop sustainable Astro-tourism businesses and tourism development in the Region.

This Strategy articulates the Council's work to support the growth of astro-tourism in the area and foster a collaborative approach with other key stakeholders including but not limited to Mid Murray Landcare SA, neighbouring Councils, business community, Murray River Lakes & Coorong Tourism Alliance, Destination Riverland,

Department of Environment and Water, South Australian Tourism Commission and Tourism Australia.

The Strategy focuses on priorities that will result in greater economic investment, jobs growth and deliver positive social contributions to the region. Managed growth will be undertaken in a way that preserves and strengthens the values and quality of the Dark Sky and wider environment. Based on the brief, the method used to develop this Strategy included the development of an Issues and Opportunities paper that was then workshopped with key stakeholders on the 13th May 2021 and included:

- A review of Mid Murray's existing business and tourism industry
- Opportunities to build on existing tourism experiences and infrastructure incorporating astro-tourism, including events
- Exploration of the role and responsibilities of the Mid Murray Council with respect to tasks and key partners and stakeholders, including Mid Murray Landcare SA and tourism organisations
- Consideration and discussion on the cultural, lifestyle and environmental factors unique to the Region

A draft Strategy was developed and workshopped again with key stakeholders on 23 August 2021, to discuss, enable agreement and finalisation of this document. This Strategy incorporates the views of stakeholders and outlines a clear direction for the council for next five (5) years to undertake growth in astro-tourism and deliver and measure economic improvements for the region. It includes targeted work around promoting and developing the facilities and infrastructure needed to highlight the Dark Sky for visitors and allow new and existing astro-tourism experiences to flourish. This includes visitor information



2. Our Vision

The River Murray International Dark Sky Reserve Strategic Plan 2020-25 states the River Murray International Dark Sky Reserve will protect and preserve this rural, non-polluted and naturally dark region from light pollution for current and future generations.

The vision for Mid Murray Council around Astro-tourism is:

To grow the value of the Dark Sky to achieve economic, social and environmental benefits for the businesses and community of Mid Murray.

The Council will do this by undertaking direct activities and also working closely with partners and stakeholders. By supporting the work of partners and growing collaboration, the Council will increase the awareness and understanding of the value of a Dark Sky and helping businesses, including research institutions, to have the Mid Murray area recognised across Australia and more widely as a premier location for Dark Sky viewing. Growth will require sensitivity to lighting and allied issues and Council planning and guidelines will put it at the forefront of sustainable management of a quality Dark Sky environment.

This work acknowledges the diverse range of interests around astro-tourism, all complementary, and notes each can exist independently, but jointly they will leverage off each other and create a stronger result. Different target markets include:

- Research and astronomy interests, including corporate, research and individual enthusiasts
- Casual visitors interested in enjoying and appreciating the Dark Sky spectacle and experiences as part of a wider set of travel
- Visitors interested in the associated benefits of the Dark Sky for the wider environment.

Strengths

- Work done to date

Weaknesses

- Little recognition from current tourism industry of potential
- No dedicated resources to drive actions to deliver outcomes around Astro-tourism.
- Need to expand the partners to include Mid Murray Landcare, nearby Councils, Regional Tourism Organisations, SATC
- No dedicated resources to drive planning and then activation of agreed tasks

Opportunities

- Overall increasing visual pollution means much of world's population including domestically can't see stars
- Capacity to leverage SA space business links and need to move current viewing location at Stockport
- Popularisation of astronomy (TV and social media) making sky watching appealing to wider audiences, less 'geeky'
- Changing technology – app so visitors can have self-guided help
- Visually very appealing and can drive social media

Threats

- Greater competition as more locations start to develop Dark Sky experiences, including SA sites (such as Arkaroola).
- 133 Dark Sky places globally.
- Other nearby locations creating night tours into area, with Mid Murray getting little advantage.
- Scarce Government resources with COVID and bushfires recovery needs competing for limited major tourism funds.
- Maintenance of accreditation requires annual reporting to show new actions undertaken to improve dark sky quality.

Why is it important for Mid Murray Council?

While astro-tourism may appear to be a small niche area, it can very rapidly grow and deliver major outcomes for the area and more widely. A Dark Sky is increasingly scarce globally, treasured by many, and is known to attract intrastate (with a high capacity for repeats), domestic interstate visitors and internationals. It supports the Regional Visitor Strategy markets identified for this region, including areas such as houseboats.

The Mid Murray, only 90-min from Adelaide, is the best location across Australia, and possibly the Southern Hemisphere, to have easily accessible high-quality Dark Sky tours. The proximity to other strong tourism destinations like Barossa Valley etc. provide an even greater capacity for growth.

It has the potential to deliver rapid growth and high yield through increased overnight stays and touring:

- Influencing visitors already travelling and with only limited interest in Dark Sky, to choose to stay overnight here (versus in another location) to enjoy an evening experience
- Attracting Dark Sky enthusiasts who seek out quality locations that have the infrastructure, support and experiences they need. As Australia's only accredited Dark Sky Reserve, this area should rapidly work to cement its position with accommodation, facilities and experiences (avoiding visitors travelling at night back to accommodation further afield)
- Having all visitors (including interstate and intrastate) recognise the value of getting a quality guide and good advice to enhance their experience. Create domestic high yield contemporary tours (which is a gap in the post-Covid market).

It leverages the strong educational tourism component that can lift visitation.

It helps drive a point of difference that is needed for Mid Murray to stand out from competitors. The 'brand' can add value to areas like arts/ food as well as the natural environment. It builds pride and interest within the local community and may create a strong local following with 'friends of' and retirees finding it of interest. Diversity of jobs is critical and there is already quite a strong private community of landholders engaged with the sector (including lease arrangements with overseas owned and remotely controlled telescopes etc).

There is a strong capacity for this type of tourism to be supported by sponsorship funding and resources from non-tourism origins (such as space-oriented and other corporate institutions, including research and educational institutions). The very significant wider benefits to the community that can be achieved by growing the 'astro-economy', such as via the space technology industry, will be also be supported by this targeted astro-tourism work.



3. Community

Aspirations

A River Murray International Dark Sky Reserve Astro-tourism Strategy will enable appropriate resourcing to be allocated to achieve clear and agreed tasks, that visibly connect and deliver Council identified community aspirations.

The Mid Murray Council Plan 2020-24 has recently been approved (Final 25 Nov 2020) and clarifies the Council purpose as 'Work collaboratively to strengthen and enrich our community'.

The Dark Sky project will support and contribute to a significant number of the strategic goals and key activities listed. The Council Plan notes the Dark Sky project will accelerate and leverage other strategic goals and activities including:

- Our Community
 - » The health, wellbeing and resilience of our community is enhanced
 - » Our region has appropriate open spaces and facilities to encourage sport, recreation and active lifestyles
- Our Environment
 - » Our natural environment and assets are preserved, protected and enhanced to ensure enjoyment by future generations
- Our Growth
 - » Develop our diverse tourism sector

In addition, the Dark Sky project is specifically mentioned in the Plan:

- Our cultural and natural environment assets are leveraged in a sustainable manner
- Develop a series of targeted nature-based tourism strategies and/or plans including, but not limited to an Astro-tourism strategy to leverage the River.



4. Priority Council Work

This Strategy identifies priority areas where Council can take a leadership role or provide significant support to help create momentum. It recognises the development of the Dark Sky economy is vital and has the capacity to significantly impact the long term economic and social wealth of our communities. To do this a significant suite of work is required to enable the Dark Sky to become a major economic driver for the area.

Although focussed on the tourism benefits of the Dark Sky project, it is acknowledged that the Dark Sky provides potential additional opportunities for broader economic development. For example, the Dark Sky also can support defence and space technologies and industries and any government structure should enable these broader opportunities to be pursued.

This Strategy recognises the need to undertake work quickly activated to create growth and progress in achievement of desired outcomes, but also the need to work on long term areas, linking stakeholders and activating initial steps. Progress should be evaluated annually, and tasks altered as required.

A series of different target markets are recognised, and all leverage each other and support the sustainable management of various levels of infrastructure. These have been summarised in the Marketing and Communications Plan in Appendix 1.

This Strategy also acknowledges the wider set of agreed goals and actions listed in the River Murray International Dark Sky Reserve Strategic Plan 2020-25 and will be undertaken with the following key partners:

- Dark Sky Reserve Accreditation Committee (DSRAC)
- Mid Murray Landcare
- Department of Environment and Water (DEW)
- Tourism industry including operators and South Australian Tourism Commission (SATC), Murray River, Lakes and Coorong Tourism Alliance (MRLCTA), Tourism Industry Council SA (TICSA)
- Progress associations and community groups

4.1. Developing Hard Infrastructure

Action 1.1: Develop a 'master plan' that shows primary agreed priority locations/ key nodes, highlights gaps and needs such as tourism facilities, and recognises localised issues (such as vehicle headlight issues, neighbour lighting) and internet needs etc. This must consider the different types of visitors and any specific factors.

- Work with stakeholders to identify a variety of locations to enable all visitor types to be catered for and effective growth and expansion of the Dark Sky concept as it grows.
- For each priority node and nearby viewing sites / site type, develop a plan of improvement and management or support the managers to undertake this activity (nearby light minimisation, toilets etc).
- Note some sites are public access and other sites are for controlled or limited use.
- Note the need for various sites due to different sky conditions/ visitor preferences etc.
- See the draft Table below that demonstrates initial considerations.

A core visitor hub should be prioritised around the existing strengths of Mannum (for overnight stays) and Cambrai and Meldanda for the visitor observatory/centre and possible planetarium, historic instrument and other associated new facilities.

Type of visitor	Needs	Site/s	Council Actions
Experts, academics, scientists & associated corporations	Dedicated spaces and viewing centre/s	Varied, often private property	Develop network of stakeholders and discuss siting major new research equipment in MMC
			Link into 'visiting expert talks'
Enthusiast amateurs with own equipment, including astro photographers	Dedicated sites/ platforms, carpark, toilets, power, internet/ wifi	Very dark areas, potentially controlled access with some fee, several sites	Encourage engagement in Dark Sky Reserve via FB/ social media and other possibilities and build network
Commercial guided trips	Visitor observatory/centre and possible planetarium, dedicated sites, power, internet/ wifi, control of car/ headlights. Potentially controlled access to site (locked key)	Very dark areas, potentially controlled access with some fee, several sites	Support links to private landholders who can provide exclusive or managed site access if needed. Work with tourism to grow number of businesses interested in delivering some component of Dark Sky experiences
Visitors with casual interest	Platforms close to accommodation hubs allowing binocular viewing	Initially prioritise at key viewing sites near Mannum, Cambrai	Support astro-tourism operators and encourage and support collective marketing of products and experiences
Visitors with casual interest	A range of guided tours combined with other features such as night-time wildlife viewing and traditional owners' stories	Ngaut Ngaut, Swan Reach CP, Private property	Support DEW to provide further support to Traditional Owners based on their needs
Visitors with casual interest	Visitor observatory/centre and possible planetarium,		Clarify a site, develop a business model and work with key stakeholders to gather support and funding
	Growth of Dark Sky appropriate accommodation nearby and other service facilities	Mannum / Cambrai area	Support existing and new tourism investors to expand or build new accommodation and other services for Dark Sky visitors
Schools/ educational	Visitor observatory/centre and possible planetarium, and allied facilities	Meldanda	Facilitate ownership change at location and new management structure and rapidly develop business case and bid for funding a major project build

Action 1.2: Advocate and support the development of feasibility / business cases around major new research equipment to be located within the Dark Sky Reserve.

- Develop Council's ability to lead and drive positive results around supporting:
 - » Private landholder installations.
 - » Major research institution's/ corporation's infrastructure needs.
 - » Possible extension/links with the Stockport site and the work of the Astronomical Society of South Australia (ASSA).
- Clarify targeted site and ownership issues and build a business case for a visitor observatory/centre and possible planetarium.
 - » Work with Landcare to negotiate a new agreement and long-term certainty for the Meldanda site.
 - If Meldanda is not feasible, identify a new site.
 - » Build business case for establishment of a visitor observatory/centre and possible planetarium with a financially sustainable management model.
- Support applications for grants (by Council or by other stakeholders) to source funds and resources to expand astro-tourism research and facilities. Examples of work include:
 - » Facilitating stakeholder inputs to identify appropriate sites and issues/ opportunities
 - » Build a suite of information to support grants and advocacy work including context information on the vision and work of the Dark Sky initiative.
 - » Enable historical equipment to be conveniently housed for visitors (see 2.3).

Action 1.3: Respond to stakeholder needs and create policy and approaches that foster the growth of astro-tourism

- Support private investors seeking to build appropriate new developments to support visitation (accommodation etc)
- Support DEW and SATC as lead agencies to enable Ngaut Ngaut to continue to build its capacity to deliver indigenous star gazing tours and associated visitor experiences, including via grant bids/ mentoring support etc.
- Ensure signage and wayfinding enables easy access to sites and experiences (including at night).
- Help manage neighbouring light issues at key sites and wider promotion of low lighting with communities.
- Ensure power supply for key sites and high-speed internet connections are possible (many telescopes are managed remotely).
- Review wifi coverage and power to sites.
- Develop access and site plans at key locations including car parking, toilets, ability to manage entrance to some sites, controlled headlight etc.

4.2. Developing Soft Infrastructure

This section summarises a more detailed Marketing and Communications Plan (see attachment) that is essential to activate rapidly to support the coordinated growth of the sector.

Action 2.1: Promote the Brand, awareness and appreciation of the Dark Sky (to grow visitation) by activating the Marketing and Communications Plan that shows more detail (see attachment 1) including:

- Develop storytelling content and imagery to add to Visitor Information Centre website featuring Dark Sky experiences, appealing to each of the key target markets and showcasing tourism operators in this area.
- Support the work of the tourism industry to connect through various distribution channels including use of famils to grow awareness. Build storytelling and leverage South Australia's Brand 'A Curious place' to connect with visitors.
- Explore live streaming opportunities and partnerships, such as:

- » South Australian Museum – live stream the Reserve’s night sky on the outside of the museum building in Adelaide. This would give those unable to visit the Reserve a unique chance to experience the exceptional darkness via the internet. This will require a highspeed internet connection, which is currently lacking in the region.
- » SA Space Agency – once observatory facilities were in place, live stream to the visitor area of the Agency at Lot 14. This would add value to the Agency’s displays as well as promoting the Reserve and attracting more visitation to the Reserve.
- Build social media channels to promote the Dark Sky. Consider possible layers of work, such as:
- A FB site for ‘Friends of ...’ allowing the growth of champions and ambassadors to drive visitation and interest through a long term engagement in area, promoting sharing of learning and growing local capacity to explain and talk about the Dark Sky, and knowledge of upcoming events (manmade and astro oriented).
- Encourage ‘general visitor’ user generated imagery and sharing.

Action 2.2: Support the work of tourism entities to develop industry capability and rapidly build the visitor experience. This includes creating a network of astro tourism experience deliverers and developing case studies and tools that focus on growing yield and local jobs, including improving:

- The variety of Dark Sky experiences available and capacity to offer consistently year-round.
- Options for daytime activities for visitors.
- Dark Sky visitors servicing (shuttle services to decrease night time driving, Dark Sky friendly accommodation allowing late checkout, ‘quiet mornings’, featuring glass roofed bedrooms, viewing balconies, and hospitality options such as picnic dinners, all day breakfast and promoting / packaging with tours etc).
- Place branding – accommodation rooms are relabelled with constellation names etc; menus and beverages in bakeries, cafes and pubs etc featuring a Dark Sky theme. Branded merchandise is available for sale
- Support for festival and event managers wishing to connect to the Dark Sky initiatives /develop new events around Dark Sky Reserve. Include supporting existing work around events that link with major initiatives such as National Science Week
- Review council Public Art purchase criteria and lobby and apply for grants to develop significant new works able to link area to the Dark Sky Reserve (possibly including silo art).
- Build links with adjacent RTOs and more widely to ensure appropriate touring routes and itineraries include the Dark Sky and create new local itineraries/ maps that feature key astronomical oriented attractions.

Action 2.3: Build a diverse range of partnerships to reach existing and potential markets. Foster engagement and support from a diverse set of stakeholders to grow the potential range of benefits from the Reserve status.

- Work with Progress Associations, Chamber of Commerce and other associations to ensure all are aware of the Dark Sky initiatives, the Reserve’s value and potential value to the area, and work with them to identify ways each can enhance and support the Dark Sky initiatives.
- Support a network of local enthusiasts and stakeholders to identify opportunities, issues and provide a local network for each other (operators sourcing expert guides or presenters; suitable private property locations etc).
- Highlight opportunities and grow relationships with commercial suppliers/manufacturers of astronomical instruments for private and professional use. RMIDSR could host instruments from those companies as a base for sales related demonstrations and for demonstrations associated with public events. Continue to explore sponsorship arrangements.
- Work closely with existing partners and stakeholders and support the review of roles and responsibilities /governance /committee structures to avoid burnout, support succession planning and ensure capacity and capability to grow and strengthen is supported as this sector grows and work requirements may substantively increase (such as Dark Sky Committee etc).

- Support the Dark Sky Reserve Accreditation Committee’s work to grow educational tourism and encourage astronomy and associated Dark Sky topics to be included in the curriculum. Support others to enable the provision of appropriate accommodation and facilities for school and educational groups.

4.3. Maintaining Quality

Action 3.1: Continue to develop Council lighting policies and dissemination of information to ensure the quality of Dark Sky is maintained and enhanced into the future. This includes showcasing the reasons, working with the community and advocating and lobbying with wider stakeholders.

- Work with key proponents and develop ‘ambassador’ properties that showcase contemporary and appealing Dark Sky friendly systems, positioning the council at the forefront for Australia. Activate interest with other parts of Government, architects, builders and other interested players.
- Showcase local work in sky quality metering and other areas that demonstrates our globally leading role.
- Develop shared stakeholder work to ensure appropriate solutions for:
 - » Road / street lighting and intersections (particularly around key sites).
 - » Ferries and port lighting across Murray River.
- Build community awareness and pride and interest in supporting the Dark Sky quality.
- Develop regulations and planning policy (i.e. Dark Sky Overlay or similar) aligned to Dark Sky needs.

4.4. Governance Structure

As identified a large number of groups have an interest in the success of the Dark Sky Project. These groups comprise different membership and management structures with memberships that are both voluntary and remunerated. Some include employees.

The various groups collectively have a suite of diverse interests with each group typically having a specific interest. This includes but is not limited to, astronomy, environmental management, economic development and tourism. These groups have individually worked very diligently to date in achieving the reserve status of the River Murray International Dark Sky Reserve, the provision of both hard and soft infrastructure and in just bringing the Dark Sky project to where it currently stands. This has required significant commitment by individuals and ongoing the risk is that this will prove onerous particularly for those who are acting in a voluntary part time capacity.

The work on this strategy to date has highlighted the need for a more structured approach to the management and governance of the Dark Sky project, if it is to be actively pursued. Specifically, the project would benefit from a structured approach to both hard and soft infrastructure provision, the maintenance of quality, marketing, land management, project funding and general activity coordination.

The Council has an interest in the success of the Dark Sky initiatives. Unlike the other groups with key interests, the Council’s interest is very broad ranging. Importantly, Local Government has the capacity to provide for the coordinated governance required.

It is within Council’s remit specifically to promote its area to provide an attractive climate and locations for the development of business, commerce, industry and tourism.

To this end, the Council can be seen as having at its heart service and facility provision, broad ranging community betterment. The full potential of this project if achieved will provide significant benefits to the Mid-Murray Community both direct and indirect including:

- Community Pride
- Job Creation
- Educational benefits
- Economic stimulation via tourism
- Increased demand for (and therefore provision of) general services

The Act, then confers powers upon the Council to enable it to achieve its duties. Many of these functions recognise the Council's typically broad set of interests and place it well to coordinate and/or oversight key multi-dimensional projects such as the Dark Sky project.

An action for the Dark Sky Project is to determine and implement an enduring and enabling governance structure moving forward.

Based on inherent and broad ranging interest of the Council, its community betterment role and its endurance (i.e. the Council by statute is an enduring in perpetuity and accountable entity), a governance structure underpinned by Council is considered to be logical. Within this framework, two key structures were considered, one directly with Council and the second via a legal subsidiary. Both approaches could enable active participation by all of the existing interested parties and would provide an umbrella under which each could develop and implement its own interests. However, noting the importance of moving this project forward, the size of the Council and the complexity and costs involved in establishing a subsidiary, a governance structure overseen by Council committee is put forward in this strategy.

Direct Management

Direct management by the Council that would enable representation and input from other key stakeholders could take the form of a specifically constituted Committee of the Council to oversight the Dark Sky Project.

Under this model, the Council could establish a sub-committee with a membership inclusive of representatives of any or all of the key stakeholders and/or technical experts along with Council's own representatives. The Committee has the support of the Council in terms of resourcing and management and the Committee itself can be responsible for implementation of the Strategy and the coordination of activities to ensure that the Dark Sky Project progresses in a holistic manner. The key benefit of this structure is that it formalises and elevates the Dark Sky Project and can ensure it is resourced such that the Project is actively driven forward in a timely manner. It is likely that Council would need to dedicate specific staff resources to service this Committee. The broad membership will ensure that each facet of the strategy is integrated for implementation and will reduce the likelihood of gaps and duplication in the provision of hard and soft infrastructure, and mixed message marketing.

This formal structure also enables the Council to support the Committee with financial management and reporting arrangements. As a sphere of Government, the Committee could use the Council to negotiate and liaise with other spheres of Government, noting key government departments have a preference for dealing with a single coordinating body. In addition, the Committee could make recommendations to the Council where there is an intersect with other Council functions such as application of Planning and Design Code policy, and matters such as the preparation of by-laws etc.

Within this structure key stakeholder interest groups could still have their own roles and responsibilities and ideas and actions could be fed up and down, to and from the committee from key stakeholder groups.

The scope for the Committee and membership would be determined by Council but could include:

- Responsibility for implementation of the Dark Sky Astro-tourism Strategy
- Pursuit of other endeavours associated with the Dark Sky
- Management of assigned or all aspects of the Dark Sky reserve.

Actions

Action 4.1: Council to establish a governing Committee pursuant to Section 41 of the Local Government Act, 1999.

Action 4.1.1: Determine Scope and Purpose, Functions and Duties and Develop Procedures, Membership, initial 12 month work plan and reporting.

Action 4.1.2: Consider and allocate appropriate resources.

Action 4.1.3: Prepare a 5 year programme.

Action 4.2: Council to pursue a Dark Sky Overlay (or similar) in planning system.

Action 4.3: Council to identify other regularly mechanisms to protect the Dark Sky

Action 4.4: Council to explore opportunities and benefits wider than the visitor economy to pursue in relations to Dark Sky

5. Case Studies

As the interest in sky viewing and number of locations growing their visitation around sky viewing expands it is critical to understand the point of difference and focus needed for Mid Murray to be successful.

At a global scale the Dark Sky Reserves and Parks are growing. The focus tends to be split across two approaches, those (such as Germany) looking to understand and limit light pollution and promote the understanding of sustainability and energy reduction and those such as Lowell Observatory in Arizona that have grown tourism around a strong academic and citizen science interest in the sky.

This focus is on the second approach.

South Australia

Astronomical Society of SA (<https://www.assa.org.au/facilities>) lists the following options:

- Stockport Observatory is located approximately 80kms north of Adelaide. Stockport Observatory houses three permanently mounted telescopes as well as some small portable ones. The telescopes are used for projects within the Society and to show visitors the beauty of astronomical objects in the southern skies. In addition to the main observatory buildings, the Stockport site also contains three telescope pads (all with power), a furnished hut with sleeping accommodation and amenities, a large shed seating around 30 people for lectures and slide shows, a BBQ area, shower and toilet facilities, and an off-site car park.

Note – We are seeking to relocate the telescopes to Meldanda due to the increase in light at Stockport. Mid Murray Landcare SA has four large portable telescopes available for school and community use currently.

- The Heights Observatory is a joint facility operated with The Heights School. The facility is located in metropolitan Adelaide, approximately 15km north-east of the city and is used primarily by school students to gain hands-on experience with their Astronomy studies and to show the public the night sky. The Heights Observatory consists of two observatory buildings and has two large permanently mounted telescopes and a variety of other visual and imaging equipment. The Society holds public viewing nights during summer. There is no need to book - just turn up on the night at the advertised starting time (8:00pm, or 8:30pm during daylight savings).
- ASSA runs observing nights south of Adelaide for members once a month. These are held at Tooperang Hall approximately 60km south of Adelaide on the Meadows to Goolwa Road. A variety of portable telescopes are used at these sessions. Members are encouraged to bring their own equipment, although this is not necessary.
- Adelaide's planetarium is situated at the University of South Australia at the Mawson Lakes Campus. An artificial night sky is projected on to the interior surface of the 8-metre dome and offers many advantages over star gazing outdoors. Outdoor observers may have to contend with the cold, cloud cover, unwanted light pollution from city lights or the Moon. In the air-conditioned dome which seats 45 people in specially designed chairs, the audience can view all parts of the changing sky with ease and in comfort. The planetarium is open to the public on the first and third Saturday of the month at 1pm or 2.45pm or at other times by appointment. Booking essential.



New South Wales

Seeing Stars: 10 Great Astro-Tourism Experiences in NSW, 22 August 2019 by Amy Gainsborough:

If your interests run to stars, supernovae, constellations and ‘cannibal’ galaxies (a thing, apparently), you are going to love New South Wales’s astro-tourism experiences—from the country’s largest optical telescopes and the world’s biggest ‘virtual solar system drive’ to quirky astro-themed accommodation.

The State strengthened its position as Australia’s astro-tourism capital with the certification of the country’s first Dark Sky Park at Warrumbungle National Park by the International Dark-Sky Association (IDA). The certification recognises the exceptional quality of the park’s nocturnal environment, which has made it a magnet for professional and amateur astronomers.

From the capital of astronomy at Coonabarabran to Outback stargazing at Broken Hill, here are 10 out-of-this-world astro-experiences in NSW.

1. Coonabarabran is known as the astronomy capital of Australia: launching pad for both Siding Spring, Australia’s premier optical and infrared observatory, and the Warrumbungle National Park. The observatory has several telescopes, including the world-famous Anglo-Australian Telescope, which has a 3.9m-diameter mirror, and a visitor centre with a small astronomy exhibition.
2. Marvel at the world’s largest virtual solar system drive, a daytime experience featuring 3D planet models along prescribed routes, imitating a scale model of the solar system. There are five drives, departing from Dubbo, Birriwa, Merriwa, Tamworth and Bellata, finishing at Siding Spring Observatory, aka the Sun.
3. The Bathurst Observatory Research Facility offers great live views of some of the wonders of our solar system, along with special solar telescope tours to view the sun. In 2019, the observatory was moved to a new site at Billywillinga near Bathurst, so check the website for future tour dates, prices and times.
4. Enjoy astronomy-themed experiences across the State, such as sleeping under the stars in astro-accommodation at Skywatch Observatory Domestays in Coonabarabran or playing astro-mini golf at Dubbo Observatory.
5. Stargaze above the vines at the Mudgee Observatory, located a 15-minute drive outside the food and wine town of Mudgee in Central NSW. The observatory has several telescopes as well as a theatre and flat-screen planetarium that shows features on the night sky and space missions.
6. Located just behind Taronga Western Plains Zoo, Dubbo Observatory has five powerful telescopes to view the night sky, including a 14-inch Meade LX200-GPS (that will mean something to somebody). There are solar-viewing shows during the day and stargazing sessions at 7pm during Winter (twice nightly in the school holidays).
7. The NSW State Heritage-registered Linden Observatory in the Blue Mountains celebrates the work of Ken Beames, one of Australia’s most famous telescope manufacturers. The observatory is operated by amateur astronomers and is used as a centre for astronomical education. Group bookings and viewing nights available upon request.
8. The visitors centre at Parkes Observatory is open every day, giving visitors the opportunity to view the iconic ‘Dish’ first-hand. The observatory played a crucial role in the Apollo 11 Moon landing, receiving and broadcasting live images from the mission.
9. Every October long weekend, Siding Spring Observatory hosts StarFest, an open-day event celebrating all things astronomy. Visitors can tour the telescopes, hear talks by world renowned astronomers and learn more about Australia’s premier astronomical research facility.
10. The vast desert plains of Outback NSW provide the perfect blank canvas for stargazing. Outback Astronomy in Broken Hill offers nightly tours (weather dependent) for novice stargazers. The 60-minute tour gives participants an introduction to famous stars, constellations and nebulae during a virtual ‘cruise’ across the Milky Way.

Additional notes:

The Warrumbungles Observatory NSW sells tickets to nightly shows described as follows:

'The 90-minute show at the Warrumbungle Observatory includes an astronomy presentation while sitting under the stars and looking through telescopes at the planets, stars and galaxies. Learn how to navigate around the night sky, observe through up to four telescopes, including the new 20-inch telescope, and have the opportunity to take a photo of a colourful nebula with your canon or nikon SLR camera. Bookings are essential'

Siding Spring Observatory

Siding Spring Observatory (SSO), on the edge of the Warrumbungle National Park near Coonabarabran, NSW, is Australia's premier optical and infrared astronomical observatory.

Since opening in 1964, The Australian National University has operated the observatory site hosting research telescopes and carrying out varied research, from probing the depths of the cosmos in search of "Dark Energy" to searching the Milky Way for other planets and signs of life. Nearly every night there's something new being done, and new discoveries being made.

World's Largest Virtual Solar System Drive

Launch into Coonabarabran, Central NSW, on the World's Largest Virtual Solar System Drive and explore the planets as it you were hurtling through space. Journey through the Solar System and picturesque countryside on one or all of the five drives that lead to Australia's largest optical astronomy centre (which you will find the sun), Siding Spring Observatory is one of the country's largest centres for optical astronomy research. Stop and visit each sign to learn fascinating facts about the universe along the way.

The colourful three-dimensional planets on the billboards are scaled in size relative to the huge observatory dome, and the location of the billboards are scaled in distance, just as you'd find the planets in outer space - only 38 million times smaller!

The World's Largest Virtual Solar System Drive is a daytime experience. Visitors are encouraged to stop at each planet in a safe manner, taking care when pulling off and back onto the roadway.

The Tamworth Regional Astronomy and Science Centre

A state-of-the-art astronomy facility is being constructed in Tamworth. Located in 'big sky country', the centre will become a fast growing astro-tourism attraction.

The proposed Tamworth Regional Astronomy and Science Centre will include a large observatory with a roll-off roof to house:

- Multiple medium to large telescopes
- Multi-functional space for the display of instruments and educational instruction

The Centre will provide an opportunity for amateur and professional astronomers to carry out international quality research and be available for school, university and public education.

It will offer local, regional, state, national and international visitors the opportunity to view, use and learn about the local spectacular clear dark skies.

Unlike other astronomy facilities, this project offers the integration of observatories, a planetarium and a multi-purpose science centre where students and visitors can have a hands-on astro-science experience. The Centre is supported by a very active Tamworth Regional Astronomy Club (TRAC) who have an extensive mix of executive members from the science and astronomy field, and strong connections to leading Australian and international researchers and astronomers.

The Centre will include:

- A large observatory with a roll-off roof to house multiple medium to large telescopes
- Planetarium for presentations/lectures
- Multi-functional space for the display of instruments and educational instruction
- A small observatory with a roll-off roof to house a rare historic Hewitt Camera telescope
- Ancillary services such as an amenity building, car park and utility infrastructure

Northern Territory

Earth Sanctuary, Alice Springs

With thousands of visible stars, Central Australia offers some of the best night skies in the world. Earth Sanctuary's award-winning astronomy tour offers a wonderful experience to anyone who is keen to know more about our home galaxy and beyond:

We currently operate 3 Different Astronomy Tours and stay tuned for overnight program in our new Space Domes:

1. Public Tours

Our award-winning public programs operate five times a week and seven days a week during school holidays. All dates can be found on our bookings calendar which will also supply all the information you need to arrive safely at the Earth Sanctuary Space Observatory. Our stunning observatory is situated on an ancient sand dune 15 minutes south of Alice Springs. Here you'll explore the Southern night sky with an experienced sky guide, laser pointer and telescope. All shows are family friendly and guests up to 200 are welcome with self-drive and bus options also available.

Best time to see the night sky! This astronomy calendar of celestial events (see below) contains dates for notable celestial events including moon phases, meteor showers, eclipses, oppositions, conjunctions, and other interesting events through 2018. When you're ready to book, simply click the Book Now tab and find a date that we are running a public tour or inquire about running a private tour on your selected date.

2. Private Astronomy Tours - Big Scope Space Adventures

These tours can run throughout the week and are more flexible to operate. Please call for inquiries and bookings. Book a private viewing session through our large telescope and explore the night sky as you look at many celestial wonders with your personal sky guide. Contact our bookings team for more info and gear up for an exclusive and intimate experience with the cosmos. Tour also includes a laser guided narrative of the Southern Night Sky with star navigation and orientation.

Total Ticket Price \$400, Up to 4 adults allowed. Children are free. Platter of light nibbles and first drink complimentary.

3. Dark Sky Nights - Drinks and Canapes

As opposed to our public astronomy nights, we operate this tour just one night per month as we have selected the best viewing experience possible with respect to celestial views.

Your magical night starts sipping champagne or complimentary standard beverage. Be sure to try our very own beverage fused with a local delicacy, the quandong (bush peach) also available at the bar. As the night rolls on enjoy a selection of our bush tucker canapés on our sand dune while viewing the endless desert expanse. Our star guide will then surf the galaxy with you and explore the Milky Way, Constellations and Planets. Our guides will then invite you into our Space Observatory to enjoy the views through our Deep Sky Telescope.

Queensland

Winton is a Dark Sky Sanctuary, the highest level of classification and due to their remote and isolated positioning are less focussed on high levels of visitation.



Global Examples

Looking at the International Dark Sky Reserves, many have only recently been formed and are just getting organised. This summary concentrates on the longer running ones to review issues and opportunities.

Brecon Beacons in Wales

- We have 33,000 residents in the National Park and, according to the latest statistics, attract just over 5.38 million visitor days each year. Of this, we have had over 6,235 directly involved in stargazing activities in the last year, double that recorded in 2018 and an overall 76% increase in activity since 2017. Most visitors are from the UK and overnight stays has increased by 3.6% in the past year. This is a real boost for the local businesses as tourism has previously been dominated by people traveling just for one day and therefore not investing in all areas of our tourism economy.
- We continue to run five stargazing events each year from our main visitor centre. We increased attendance at these to over 700 and they continue to grow in popularity.
- 2015 members of the public have used the observatory and auxiliary telescopes to enjoy the night skies and to take photographs of the Milky Way and other objects. That is an 80% increase since 2018!
- Specific additional highlights this year have included:
 - » We have secured £95,000 in EU funding to create 6 new community-based stargazing events which feature observing, nighttime wildlife and learning about the importance of the night sky. A new guide to stargazing will also be produced as part of this project.
 - » Abergavenny and Usk Astronomical Societies led stargazing activities at the region's largest music festival – the Green Man which attracts 25,000 attendees. We have also now been invited to be a part of the annual Hay Festival which attracts a global audience of over 273,000 people.
 - » New stargazing events have been developed by the Llyswen

community and also we have successfully continued our collaboration with our national heritage organisation Cadw, the latter bringing together the night sky with some of the area's most iconic landscape features.

- » We have worked with our national tourism agency, Visit Wales, to promote our dark skies and they have commissioned a video to market our night sky. Outreach work has continued focusing on inspiring local Scout and Brownie groups plus primary school children and giving them the opportunity to gain the astronomy badges.
- We continue to run our Dark Sky Ambassador Course with businesses and now have over 80 qualified ambassadors.

Aoraki Mackenzie, NZ International Dark Sky Reserve

Aoraki/Mt. Cook National Park and the Mackenzie Basin of New Zealand's South Island. Outdoor lighting controls were first put into place in the area during the early 1980s. They have not only helped minimize light pollution for the nearby Mt. John Observatory, but also conserve energy, protect wildlife and make the area a popular stargazing destination for tourists. The natural night has played a critical role in the areas history as its first residents, the Māori, not only used the night sky to navigate to the island but also integrated astronomy and star lore into their culture and daily lives. The reserve seeks to honour that history by keeping the night sky a protected and integral part of the areas natural and cultural landscape. It is a perfect place to protect and honour those traditions as the reserve's Mackenzie Basin has the clearest, darkest and the most spectacular night sky in New Zealand.

Designated in 2012 growth in regional tourism is reported with a steady increase in tourism nights in the region from around 500,000 in July 2014 to around 900,000 in July 2019.

Mt Cook Lakeside Retreat - Stargazing has continued to be popular with our guests in the past year. Our stargazing experience includes telescope viewing and astrophotography at Pukaki Observatory. Around 40% of our guests are interested in this activity and an estimated 10% of guests chose to come to the Mackenzie for stargazing and potentially viewing the Aurora Australis.

Skyscape 2019 SkyScape is a unique accommodation experience of sleeping under the stars, in a bedroom built predominately of glass, including the roof!

Dark Sky Project Rehua is a key facility in the Mackenzie region, ensuring the hundreds of thousands of people who transit through Takapō can enjoy the lakefront dining both day and night, and an astronomy experience in any weather conditions. The new 1140sqm building on the Takapō lakefront, offering the world's first indoor, multimedia experience that combines Māori astronomy and science.

Our building includes a large observatory dome, which houses the 125-year-old Brashear Telescope.

Silverriver stargazing astrophotography tours boasts nearly zero light pollution, allowing ultimate shooting conditions. Another treat to those interested in learning how to shoot the night sky; Tours are capped at four people, maximising the learning opportunity for each, regardless of their experience. All tour includes teachings on how to take the images and then how to process them afterwards to get the best result. These tours are aimed at photographers wanting to try Astrophotography.

Lakestone Lodge offer a small private Night Sky Experience for lodge guests only. Maximum 8 guests at a time. Relax in a perfectly positioned hammock so you are looking directly at the wonders above. Enjoy a hot mulled wine or hot chocolate A blanket and hand warmers are provided as sometimes winter temperatures can drop well below freezing.

Sir Edmund Hillary Alpine Centre, Big Sky Stargazing offers a full hour using the naked eye, astro-binoculars and state of the art 14" and 11" astronomy telescopes. The tour is delivered either from an outdoor viewing platform at our Stargazing building set alone under a massive night sky, or if the weather is unfavourable then your guide leads you through a 'live' orientation of our southern night sky indoors, reclined in comfortable seats of New Zealand's first 360 digital Dome Planetarium theatre.

[Namibia's NamibRand Nature Reserve](#)

Located on one of Africa's largest private nature reserves, it lies in one of the naturally darkest (yet accessible) places on Earth. It was established to help protect and conserve the unique ecology and wildlife of the southwest Namib Desert, and its

mission now includes preservation of the area's starry night skies.

A local sustainability centre also operates at the site and runs environmental education programs that teach about the Earth and sky. Overnight guests, usually groups of schoolchildren have the opportunity to sleep in "open air" units where they can view the night sky from the comfort of their beds. The NaDEET Centre's programs are open to all Namibians, and visitors from around the world.'

The 2019 Annual Report focuses on light minimisation work but notes two new lodges planned:

- The Wolwedans Collection is planning to add a 'Starbed' activity to their range of offerings. While not a stand-alone lodge, the concept is to offer guests an overnight activity to sleep in beds on open platforms with an unobstructed view of the night sky.
- The Natural Selection Safaris lodge will provide an additional 16 beds for visitors to the Reserve and will feature an extra outside deck specifically for sleeping under the stars.

[Flagstaff, Northern Arizona](#)

Flagstaff is the world's first International Dark Sky Place, receiving its designation in 2001. The City of Flagstaff and the northern Arizona region have achieved worldwide recognition for innovative leadership in the protection of dark skies. Beginning with Ordinance 400 in 1958 that addressed searchlights, over a half-century of policy decisions and implementations have fostered an astronomy industry that now includes Lowell Observatory, the U.S. Naval Observatory, the Navy Prototype Optical Interferometer, the National Undergraduate Research Observatory, the U.S. Geological Survey Astrogeology Center, and the new Discovery Channel Telescope. Public support for protection of the night sky for both general enjoyment and professional deep space research has become an established element of community and regional identity. A substantial part of its work is around zoning and compliance to ensure standards are maintained and improvements made.

The Lowell Observatory built in 1894, was the home to many discoveries including Pluto, the expanding nature of the universe, moon mapping for the Apollo program to the moon, the rings of Uranus, atmosphere of Pluto, and scores of others and become a recognized as a Registered National Historic Landmark by the National Park Service.

Most of Lowell's current research telescopes are now located at observing sites outside of Flagstaff, but Mars Hill remains the hub of observatory activity and the destination of nearly 100,000 visitors annually. Lowell owns 750 acres atop this tree-covered terrain, with staff offices, historic telescope domes, and visitor services. The observatory is currently in Phase 1B of reopening with the Giovale Open Deck Observatory, 24-inch Clark Refractor (currently in hibernation for winter), and 24-inch Dyer Telescope open to guests for Premium Access, by reservation only.

A USD37.5m Astronomy Discovery Centre is planned to open in 2023. The new 35,000-square-foot Centre will include key destination features:

- Youth and Family Exhibits
- Universe Theatre
- Richard F. Caris Dark Sky Planetarium

Additional new amenities will include a café, expanded gift shop, additional bathrooms, and ample parking to make our guests' visits more enjoyable.

The Giovale Open Deck Observatory

Recently opened the proponents of this development expect the visitor numbers to approach 200 000 additional visitations to Lowell over the ten-year period to 2030.

Guests can learn about astronomy from the engaging exhibits of the Giovale Open Deck Observatory, both day and night.

During the day, while the observatory is in its closed position, guests can access these exhibits:

- A series of six plinths that reveal sightlines to the locations of sunrise and sunset on the days of the annual equinoxes and solstices
- A giant interactive planisphere, which can be adjusted to show the constellations in the sky at a specific date and time
- The appearance of the sky during broad daylight and at twilight
- The Sun and the Moon, both of which are visible during the day
- Tools of astronomy: how telescopes work to gather and focus light, including porthole windows to the six telescopes inside the telescope hangar
- Science-related quotes and equations that encircle the whole complex

- A donor wall accented with beautiful astrophotography.

During the night, while the observatory is in its open position, guests can access these exhibits:

- The APS Spectrum Exhibit, an interactive presentation about how astronomers use spectra to determine the compositions of and distances to celestial objects
- A giant interactive planisphere, which can be adjusted to show the constellations in the sky at a specific date and time
- The 110 Messier Objects, representing some of the best wonders to see in the night sky (inside the Astro Lab)
- How to preserve dark skies in Arizona and beyond (inside the Astro Lab)



Tourism Champions Case Study

BIG BEND BYNIGHT, SWAN REACH, MURRAY RIVER



ABOUT BIG BEND BY NIGHT

Established by David LeBrun and his daughter, Mardi in 1999, Big Bend By Night is a nature based tourism business run on the family farm in Swan Reach.

The business offers a range of experiences from nocturnal wildlife tours to outback pub tours and shearing shed shows.

Big Bend By Night have helped to grow tourism in their region by consistently bringing people into the area.

BUSINESS GROWTH

Originally started offering nocturnal wildlife tours to Unforgettable Houseboats' customers and averaged 2-3 bookings per month of around 12 people each.

Developed a partnership with Captain Cook Cruises (now Sealink) in 2000 which has seen some of their tours and attractions added to the Murray Princess's itinerary.

Visitor numbers have increased by approx. 20 per cent each year. The business now welcomes approximately 10,000 people per year on their tours.

In addition to providing full-time employment for Mardi and her parents (David and Janet), the business employs one part-time tour guide in Mannum and casual staff.

The business has four chauffeured vehicles to take guests on different tours and also offers meal options such as a bush tucker breakfast and sunset dinner tour.

CHALLENGES

During times of flood the river can pose challenges to picking guests up from the main river to take them to their farming property. Big Bend By Night have contingencies in place and hire boats from other operators to ferry their guests over the flooded wetlands.

THE FUTURE

Continue to grow the business by marketing the Shearing Shed Show to bus groups and the self-drive market.

Double guest numbers to 20,000 per year by 2022.

COMMUNITY IMPACT

Big Bend By Night offers casual employment to local shearers for the weekly shearing show and local drivers to take customers on tours. They currently have four casual drivers on the books and also offer educational shearing shows to school groups twice a week through Murray River Educational Nature Tours.

Buys from local suppliers including Male's Meats, Tabe's Auto Centre, IGA and Foodland at Mannum and Swan Reach Tyres and Mechanical and have tours that specifically target taking people to Sedan, Sutherlands and Mt Mary Hotels.

Offers work experience to local high school students and also offers tours to volunteer and disadvantaged groups, such as Canteen, for reduced rates.

"When we first started our business we went to a lot of workshops organised by the South Australian Tourism Commission which were fantastic. They put us on the right track, gave us all the templates we needed and really got us to where we are now."

"People love Big Bend By Night and we love sharing the native wildlife experience with our guests – so a day of work doesn't feel like work, which I think that is the best job you can have."

Mardi LeBrun, Co-Owner,

Big Bend By Night

SOUTH AUSTRALIAN TOURISM COMMISSION COLLABORATION

Big Bend By Night have attended a number of SATC run workshops and training sessions with both David and Mardi having served on the regional committee.

Also work closely with the SATC's Destination Development team to promote the region and their offering.



For more information, visit tourism.sa.gov.au

[Earth Sanctuary event calendar \(source: website\)](#)

Public Astronomy Tours

This astronomy calendar of celestial events below contains dates for notable celestial events including moon phases, meteor showers, eclipses, oppositions, conjunctions, and other interesting events through 2018. When you're ready to book, simply click the Book Now tab and find a date that we are running a public tour or inquire about running a private tour on your selected date.

- September 22 - September Equinox. The September equinox occurs at 13:31 UTC. The Sun will shine directly on the equator and there will be nearly equal amounts of day and night throughout the world. This is also the first day of fall (autumnal equinox) in the Northern Hemisphere and the first day of spring (vernal equinox) in the Southern Hemisphere.
- October 1 - Full Moon. The Moon will be located on the opposite side of the Earth as the Sun and its face will be fully illuminated. This phase occurs at 21:06 UTC. This full moon was known by early Native American tribes as the Full Hunters Moon because at this time of year the leaves are falling, and the game is fat and ready to hunt. This moon has also been known as the Travel Moon and the Blood Moon. This moon is also known as the Harvest Moon. The Harvest Moon is the full moon that occurs closest to the September equinox each year.
- October 1 - Mercury at Greatest Eastern Elongation. The planet Mercury reaches greatest eastern elongation of 25.8 degrees from the Sun. This is the best time to view Mercury since it will be at its highest point above the horizon in the evening sky. Look for the planet low in the western sky just after sunset.
- October 7 - Draconids Meteor Shower. The Draconids is a minor meteor shower producing only about 10 meteors per hour. It is produced by dust grains left behind by comet 21P Giacobini-Zinner, which was first discovered in 1900. The Draconids is an unusual shower in that the best viewing is in the early evening instead of early morning like most other showers. The shower runs annually from October 6-10 and peaks this year on the the night of the 7th. The second quarter moon will ensure dark skies in the early evening for what should be a good show. Best viewing will be in the early evening from a dark location far away from city lights. Meteors will radiate from the constellation Draco, but can appear anywhere in the sky.
- October 13 - Mars at Opposition. The red planet will be at its closest approach to Earth and its face will be fully illuminated by the Sun. It will be brighter than any other time of the year and will be visible all night long. This is the best time to view and photograph Mars. A medium- sized telescope will allow you to see some of the dark details on the planet's orange surface.
- October 16 - New Moon. The Moon will be located on the same side of the Earth as the Sun and will not be visible in the night sky. This phase occurs at 19:32 UTC. This is the best time of the month to observe faint objects such as galaxies and star clusters because there is no moonlight to interfere.
- October 21, 22 - Orionids Meteor Shower. The Orionids is an average shower producing up to 20 meteors per hour at its peak. It is produced by dust grains left behind by comet Halley, which has been known and observed since ancient times. The shower runs annually from October 2 to November 7. It peaks this year on the night of October 21 and the morning of October 22. The waxing crescent moon will set before midnight leaving dark skies for what should be a good show. Best viewing will be from a dark location after midnight. Meteors will radiate from the constellation Orion, but can appear anywhere in the sky.
- October 31 - Full Moon, Blue Moon. The Moon will be located on the opposite side of the Earth as the Sun and its face will be fully illuminated. This phase occurs
- November 4, 5 - Taurids Meteor Shower. The Taurids is a long-running minor meteor shower producing only about 5-10 meteors per hour. It is unusual in that it consists of two separate streams. The first is produced by dust grains left behind by Asteroid 2004 TG10. The second stream is produced by debris left behind by Comet 2P Encke. The shower runs annually from September 7 to December 10. It peaks this year on the night of November 4. The first quarter moon will block out all but the brightest meteors this

year. If you are patient, you may still be able to catch a few good ones. Best viewing will be just after midnight from a dark location far away from city lights. Meteors will radiate from the constellation Taurus, but can appear anywhere in the sky.

- November 10 - Mercury at Greatest Western Elongation. The planet Mercury reaches greatest western elongation of 19.1 degrees from the Sun. This is the best time to view Mercury since it will be at its highest point above the horizon in the morning sky. Look for the planet low in the eastern sky just before sunrise.
- November 15 - New Moon. The Moon will be located on the same side of the Earth as the Sun and will not be visible in the night sky. This phase occurs at 05:08 UTC. This is the best time of the month to observe faint objects such as galaxies and star clusters because there is no moonlight to interfere.
- November 17, 18 - Leonids Meteor Shower. The Leonids is an average shower, producing up to 15 meteors per hour at its peak. This shower is unique in that it has a cyclonic peak about every 33 years where hundreds of meteors per hour can be seen. That last of these occurred in 2001. The Leonids is produced by dust grains left behind by comet Tempel-Tuttle, which was discovered in 1865. The shower runs annually from November 6-30. It peaks this year on the night of the 17th and morning of the 18th. The crescent moon will set early in the evening leaving dark skies for what should be an excellent show. Best viewing will be from a dark location after midnight. Meteors will radiate from the constellation Leo, but can appear anywhere in the sky.
- November 30 - Full Moon. The Moon will be located on the opposite side of the Earth as the Sun and its face will be fully illuminated. This phase occurs at 09:32 UTC. This full moon was known by early Native American tribes as the Full Beaver Moon because this was the time of year to set the beaver traps before the swamps and rivers froze. It has also been known as the Frosty Moon and the Hunter's Moon.
- November 30 - Penumbral Lunar Eclipse. A penumbral lunar eclipse occurs when the Moon passes through the Earth's partial shadow, or penumbra. During this type of

eclipse, the Moon will darken slightly but not completely. The eclipse will be visible throughout most of North America, the Pacific Ocean, and north-eastern Asia including Japan. (NASA Map and Eclipse Information)

- December 13, 14 - Geminids Meteor Shower. The Geminids is the king of the meteor showers. It is considered by many to be the best shower in the heavens, producing up to 120 multi-coloured meteors per hour at its peak. It is produced by debris left behind by an asteroid known as 3200 Phaethon, which was discovered in 1982. The shower runs annually from
- December 7-17. It peaks this year on the night of the 13th and morning of the 14th. The morning of the 15th could also be nearly as active this year. The nearly new moon will ensure dark skies for what should be an excellent show. Best viewing will be from a dark location after midnight. Meteors will radiate from the constellation Gemini, but can appear anywhere in the sky.
- December 14 - New Moon. The Moon will be located on the same side of the Earth as the Sun and will not be visible in the night sky. This phase occurs at 16:18 UTC. This is the best time of the month to observe faint objects such as galaxies and star clusters because there is no moonlight to interfere.
- December 14 - Total Solar Eclipse. A total solar eclipse occurs when the moon completely blocks the Sun, revealing the Sun's beautiful outer atmosphere known as the corona. The path of totality will only be visible in parts of southern Chile and southern Argentina. A partial eclipse will be visible in most parts of southern South America, the south-eastern Pacific Ocean and the southern Atlantic Ocean. (NASA Map and Eclipse Information) (NASA Interactive Google Map)
- December 21 - December Solstice. The December solstice occurs at 10:02 UTC. The South Pole of the earth will be tilted toward the Sun, which will have reached its southernmost position in the sky and will be directly over the Tropic of Capricorn at 23.44 degrees south latitude. This is the first day of winter (winter solstice) in the Northern Hemisphere and the first day of summer

(summer solstice) in the Southern Hemisphere.

- December 21 - Rare Conjunction of Jupiter and Saturn. A conjunction of Jupiter and Saturn will take place on December 21. This rare conjunction of these two planets is known as a great conjunction. The last great conjunction occurred in the year 2000. The two bright planets will appear only 7 arc minutes of each other in the night sky. They will be so close that they will appear to make a bright double planet. Look to the west just after sunset for this impressive and rare planetary pair.
- December 21, 22 - Ursids Meteor Shower. The Ursids is a minor meteor shower producing about 5-10 meteors per hour. It is produced by dust grains left behind by comet Tuttle, which was first discovered in 1790. The shower runs annually from December

17-25. It peaks this year on the night of the 21st and morning of the 22nd. The first quarter moon should set just after midnight leaving dark skies for what could be a good show. Best viewing will be just after midnight from a dark location far away from city lights. Meteors will radiate from the constellation Ursa Minor but can appear anywhere in the sky.

- December 30 - Full Moon. The Moon will be located on the opposite side of the Earth as the Sun and its face will be fully illuminated. This phase occurs at 03:30 UTC. This full moon was known by early Native American tribes as the Full Cold Moon because this is the time of year when the cold winter air settles in and the nights become long and dark. This moon has also been known as the Full Long Nights Moon and the Moon Before Yule.

6. Summary of Actions

	Action	Responsibilities	Timeline and KPIs
Developing Hard Infrastructure	Action 1.1: Develop a 'master plan' that shows locations, highlights future gaps and needs (such as headlight issues, neighbour lighting; internet needs etc) for each type of visitor and specific issues	MMC, with all stakeholders	Year 1-3 Simple Master plan accepted by all stakeholders and used as planning tool Year 4-5 Master plan maintained, used and extended as needed
	Action 1.2: Advocate and support the development of feasibility / business cases around major new research equipment	MMC, DSRAC	Year 1-3 Develop facts and business case basics and present to Govt Year 4-5 Interest from Govt and others in supporting location as major astronomical base. Planning initiated.
	Action 1.3: Respond to stakeholder needs and foster the growth of astro-tourism facilities and services including tourism needs around accommodation, transport etc.	MMC, DSRAC	Year 1-3 Positive feedback from Dark Sky Reserve Accreditation Ctee and plans and expansion by tourism operators measurable. Year 4-5 Improved viewing/ infrastructure at key sites and visitation options increased.
Developing Soft Infrastructure	Action 2.1: Promote the Brand, awareness and appreciation of the Dark Sky	MMC supported by MRLCTA, SATC, DSRAC	Year 1-3 VIC website has new pages, social media engagement active Year 4-5 Number of digital links with Adelaide and wider based entities
	Action 2.2: Support the work of tourism entities to develop industry capability and rapidly build the visitor experience.	MMC supported SATC, MRLCTA and TICSa and others	Year 1-3 Increased engagement by operators and visitors in Dark Sky Year 4-5 Local job creation and yield improved
	Action 2.3: Foster stakeholder engagement and support from a diverse set of stakeholders	MMC, Mid Murray Landcare, DSRAC and others	Year 1-3 Strong network exists for Dark Sky across diverse set of partners. Increasingly self-sustaining network Year 4-5 Highly active with little request for support from MMC

Maintaining Quality	Action 3.1: Continue to develop lighting policies and work to maintain or improve Dark Sky quality	MMC, DSRAC	Year 1-5 Annual monitoring shows no change / improvement. Positive feedback from tourism operators and Dark Sky Reserve Accreditation Ctee
Establish formal Governance Structure	Action 4.1 Council to establish a governing Committee pursuant to Section 41 of the Local Government Act, 1999.	Council (but potentially in consultation with key stakeholders)	Year 1
	Action 4.1.1: Determine Scope and Purpose, Functions and Duties and Develop Procedures, Membership, initial 12 month work plan and reporting.		Committee or Subsidiary formally established by Council resolution and, if Subsidiary, Ministerial approval achieved.
	Action 4.1.2: Consider and allocate appropriate resources.		Resourcing established
	Action 4.1.3: Prepare a 5 year programme.		Committee/Subsidiary is operating
	Action 4.2: Council to pursue a Dark Sky Overlay (or similar) in planning system.		
	Action 4.3: Council to identify other regularly mechanisms to protect the Dark Sky		
	Action 4.4: Council to explore opportunities and benefits wider than the visitor economy to pursue		

Action 4.1: Council to establish a governing Committee pursuant to Section 41 of the Local Government Act, 1999.

Action 4.1.1: Determine Scope and Purpose, Functions and Duties and Develop Procedures, Membership, initial 12 month work plan and reporting.

Action 4.1.2: Consider and allocate appropriate resources.

Action 4.1.3: Prepare a 5 year programme.

Action 4.2: Council to pursue a Dark Sky Overlay (or similar) in planning system.

Action 4.3: Council to identify other regularly mechanisms to protect the Dark Sky

Action 4.4 Council to explore opportunities and benefits wider than the visitor economy to pursue in relations to Dark Sky

Appendix 1. Astro-tourism Marketing and Communications Plan

Astro-tourism Marketing and Communications Plan

This Plan has been developed to guide the first two years of activation of the Astro tourism Strategy. Marketing and communications around the Mid Murray Dark Sky Reserve needs to be undertaken in a coordinated and consistent way to support the other actions in the Astro-tourism Strategy as well as leverage the wider visitor economy marketing work undertaken for the area.

This Plan provides a simple and practical core list of actions and should be supplemented by the development of a detailed task list. It has been designed to support and complement the work of the Murray River, Lakes & Coorong Tourism Alliance (MRLCTA), that is responsible for the holistic development of tourism, including marketing, promotion and advocacy in the Murray River, Lakes & Coorong region.

The last few years have seen massive changes in Australia's tourism industry, impacted by droughts, bushfires and then the global COVID-19 pandemic. The industry is in a very dynamic period making adjustments during this recovery period. Hence this Plan should be seen as a living document, to be reviewed and updated regularly.

Identify and develop new visitor markets

Primary target markets

Three primary target markets are listed below, and each will grow more rapidly if all three are managed and supported for growth. For instance, the growth in visitors seeking an easy and introductory Dark Sky tour, will grow the quality and volume of accommodation and hospitality services and facilities, making trips by visiting researchers more likely to include a base in the Mid Murray rather than shuttle in and out from Adelaide.

A growth in the scientific and research target market will create more awareness, respect and appreciation of the Dark Sky. More accessible information will make it easier for tourism guides to rapidly gain skills and information and be able to promote the unique qualities of the region to visitors. Additional flow ons like the development of a visitor observatory/centre and possible planetarium and provision of historical equipment and demonstration telescopes will make many more attractions for visitors, including day attractions.

Specialists

- This includes researchers, private, academic and commercial as well as serious hobbyists. These visitors have their own gear and networks to access private viewing locations, telescopes and private astronomical viewing stations.
- Already linked into significant astronomy websites and information networks, know the sky calendar and generally have a pre-organised well-planned trip.
- The intrastate market is small but steady with researchers and hobbyists already undertaking trips.
- The international market is considered to be relatively small, but important with northern hemisphere astronomers seeking access to southern sky viewing locations. Mid Murray's reputation as a place taking long term actions to maintain low light and commitment to develop high quality and innovative viewing options, provides an opportunity to grow the international market. Also, the international airport in Adelaide, only 1.5 hours drive away makes it the most accessible high quality location and gives a clear competitive position.
- The local astronomy property owners are key to driving further connections and visitation within this target market.

Visitors

- Have little prior experience and the trip is not usually organised around Dark Sky viewing, but rather it is usually 'Free and Independent Travellers' (FIT)/ casual viewers/ those with some interest already travelling through area and interested in a new experience/ evening activity
- This market uses commercial guides to ensure they get the experience and are interested in seeing and understanding more and willing to pay for guides
- Interested in understanding the Dark Sky through other core experience areas like Ngaut Ngaut or environmental (nighttime wildlife), evening photography tours.

- Have high needs in terms of visitor information, the need to provide opportunities at a range of towns through the area, and range of support to make viewing easy. There needs to be a diversity of choices in terms of varying length, price points, depth of knowledge sought, comfort level etc.
- The majority of interstate visitors are likely to be residents of Victoria and NSW, in line with current visitor patterns, with lower numbers originating in the other Australian states.
- High potential to create a must do for the international market coming to South Australia, particularly Asians, many of whom are not able to observe stars and the Dark Sky in their home location.

Educational Groups (largely schools but may include clubs etc.)

- Coming in pre-organised groups to learn and better understand the sky.
- May be tied to curriculum and learning or wider scout/ outdoor education groups.

Secondary visitor target markets

Two additional target markets have been identified that also have potential for significant growth:

- The event market has the potential to be significant, but this will take time to build as the location is not already high in terms of its tourism services and facilities.
- There is a range of 'corporate' or 'business travel' that is likely to expand. This includes specific interests associated with astronomy and space development. It also includes businesses and others such as levels of government associated with the improvement and maintenance of Dark Sky quality. Becoming Australia's showcase location for management could build a strong allied interest around builders, architects and other parts of Government, including environmentally friendly and sustainability areas.

Marketing activation

Develop an integrated marketing approach, with a heavy focus on digital. This will promote the Brand, awareness and appreciation of the Dark Sky (to grow visitation)

Action: Develop a greater digital presence including website and use image rich stories

The development of a Dark Sky Reserve website is seen as a key marketing tool both locally and nationally to attract newcomers to the hobby and tourists to the area. It is logical to have a central website that covers star gazing opportunities (Dark Sky annual calendar), details of commercial tour operators, Dark Sky friendly accommodation and cafes, suggested travel itineraries and the location of viewing locations. The website should also be a reliable source of information generally and have links to more specialised websites as needed. Note this may support the RMDSR website that could continue around the accreditation and reserve aspects or replace the RMDSR website creating one larger more comprehensive website.

- Provide good visitor information services around the Dark Sky offerings, including signage and wayfinding.
- Build a strong annual sky event calendar and tip sheet on solar happenings (like Alice Springs Earth Sanctuary tours- see Attachment 2) to promote bookings. Create links to Council, regional and state websites.
- Expand website and content and imagery available based on visitor and operator feedback (annual night event calendar; fact sheets 'how to...'; video clips). Principally use input from tourism operators to drive requirements. Highlight opportunities that grow yield and local jobs (overnight stays, tours etc).
- Develop collaborative marketing approaches with local industry cluster and wider stakeholders
 - » Drive user generated content (from researchers as well as visitors)
 - » Build storytelling and leverage South Australia's Brand 'A Curious Place' to connect with visitors.
 - » Support the work of the tourism industry to connect through various distribution channels (wholesalers/ packaging etc) including use of famils to grow awareness.
 - » Add stories to RMDSR Committee website
- Broaden the reach to new audiences through techniques such as exploring live streaming opportunities and partnerships

- » South Australian Museum – live stream the Reserve’s night sky on the outside of the museum building in Adelaide. This would give those unable to visit the Reserve a unique chance to experience the exceptional darkness via the internet. This will require a highspeed internet connection, which is currently lacking in the region.
- » SA Space Agency – once observatory facilities were in place, live stream to the visitor area of the Agency at Lot 14. This would add value to the Agency’s displays as well as promoting the Reserve and attracting more visitation to the Reserve
- Develop Viewing Tips and location advice that are readily available on the website, at the Visitor Centre and from local shops, boat hire facilities and accommodation etc. These should be both hard copy and digital and provide location tips around good viewing sites (recognising site characteristics and suitability vary on different evenings), viewing etiquette guidelines (respecting private property, don’t ruin other people’s night vision) and tips on how to photograph etc. These should also be important marketing tools, helping people see the value of using a local guide / tour to get the best from the evening viewing and the ability to access non-public sites.

Action: Utilise Social Media

Utilise social media by having a presence on networks such as Facebook and Instagram. Link to existing networks of professionals and amateurs and encourage appropriate postings by experts to add value. Ideas include

- A FB site for ‘Friends of ...’ allowing the growth of champions and ambassadors to drive visitation and interest through a long term engagement in area, promoting sharing of learning and growing local capacity to explain and talk about the Dark Sky, and knowledge of upcoming events (manmade and astro oriented).
- Encourage ‘general visitor’ user generated imagery and sharing.
- Identify and engage some Brand ambassadors to promote the Dark Sky. These may be well known astronomers or public figures interested in the Dark Sky.

Strengthen the experience

Facilitate product development opportunities to meet target market needs

Action: Work with MRLCTA and existing tourism operators to strengthen the Dark Sky tourism experiences to meet target market needs. Ensure the range of facilities and services needed are provided (accommodation, tours, hospitality etc). Increase the collective marketing voice and provide easy online bookable product. This is fundamental to a positive experience, particularly for the interstate and international tourist.

Action: Grow the school and youth market to build the visitor economy growth

Work at Meldanda to create easy bookable options for visitation and explore opportunities around school trips and school holiday education programs etc.

Build partnerships

Develop a diverse range of partners and stakeholders able to support the growth of the astro-tourism industry

Action: Work with SATC to raise profile of Dark Sky Reserve

Undertake a product presentation and briefing to relevant managers in SATC as new product emerges. This then enables SATC to identify appropriate avenues to promote the Dark Sky Reserve.

Action: Support development of events that attracts a diverse range of visitors.

For instance, an on-going series of talks by prominent astronomers, scientists and dark sky experts held at readily accessible locations inside the Reserve (local hotels or sports clubs) could create a suite of informal events exploring the latest research in simple language and encouraging engagement by community in the Dark Sky preservation. It could encourage wide ranging areas of interest. Building opportunities around existing events such as National Science Week is also desirable

Action: Engage with Volunteers

- Support community connections to astro-tourism niche including support of local volunteering and event support (specifically engage with second homeowners, retirees etc)
 - » Encourage community to engage and support the RMDSR Committee to develop a volunteer guide training program. Passionate and knowledgeable local volunteers able to help events or at key visitor locations will be essential.
 - » Event management support guide
- Integrate the concept of the Dark Sky into the ‘place brand’ to grow the awareness for all visitors to area (and potential) of the Mid Murray as a high-quality Dark Sky location
 - » Work with wider business community to explore options.
 - » Build a public art strategy that interprets and connect to the sky (distance between planets, sun dials etc)

Action area	Action	Two year goal
Identify Target Markets	Build knowledge of needs of each target market	Industry successfully engages and attracts visitors across all 3 target markets
Marketing activation	Build digital and traditional marketing	New website developed with links to other partners
	Utilise social media	Image rich content is attracting new visitors
Strengthen the experience	Work with industry to increase experience, services and facilities available	More product is clearly Dark Sky aligned and collectively working to attract markets. Investor interest in Dark Sky associated products and services exists.
	Grow school and youth market	Meldanda building capacity as core school site
Build partnerships	Work with SATC to raise profile	SATC profile Reserve as key place to visit for Dark Sky
	Support events linked with Dark Sky	One event planned
	Engage with volunteers	Community awareness and interest growing and