**Minister for Water; Fisheries; Forestry; Innovation and ICT; Science**

Our Ref: 75-06091
Your ref: 2018-007

Dr Megan Clark AC
Head
Australian Space Agency
GPO Box 9839
CANBERRA ACT 2601

Dear Dr Clark

Thank you for your recent letter relating to space industry opportunities in Western Australia, and for the opportunity to meet recently here in Perth.

In response, I am very pleased to provide the attached proposal *Western Australia: Australia's launchpad for a successful space industry* which has been prepared taking into account information from the ACIL Allen review of Western Australia's space industry capability, the Commonwealth's own Expert Review Group review of Australia's space industry capability which you led, and significant local industry and stakeholder engagement.

It is supported by the Chief Scientist of Western Australia, Professor Peter Klinken AC.

The proposal identifies a number of pragmatic and practical space-related activities which are closely aligned to the Australian Space Agency's own priorities, and which take advantage of Western Australia's own particular strengths and advantages.

These include:

- a common-user mission control facility;
- ground stations and terrestrial data links;
- Space Situational Awareness (SSA); and
- robotics and AI.

I believe that these activities will make a valuable contribution to the development of Australia's space industry and will deliver downstream benefits to the Western Australian economy.

The proposals include the construction of an additional dish at the European Space Agency's (ESA) New Norcia site, which you specifically raised in your letter.

Western Australia supports the broad proposal from ESA to expand its New Norcia facility and has met with ESA officials several times. I understand that the Australian Space Agency has

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had more recent engagement with ESA on the New Norcia facility and will be more familiar with the latest ESA proposal's financial aspects.

You will note that some of the space industry activities in the proposal have a specific request for Commonwealth funding. These represent a starting point for discussions on how Western Australia and the Commonwealth might co-invest in these particular activities. A proposal to partner with ESA to fund the additional dish at New Norcia is included.

The State Government recognises the need for both Commonwealth and State co-investment in space industry activities. At this stage, however, the State Government's funding contribution outlined in the attached proposal is indicative only as a funding submission is currently being progressed through the appropriate budget processes.

In conclusion, I appreciate the time and effort taken by you and your staff in engaging with Western Australia and the other states and territories on space industry matters, and look forward to a productive ongoing relationship that will deliver clear benefits to Australia's growing space economy.

Yours sincerely

Hon Dave Kelly MLA
**MINISTER FOR SCIENCE**

31 AUG 2018

GOVERNMENT OF
WESTERN AUSTRALIA

# Western Australia: Australia's launchpad for a successful space industry

August 2018

# 1 Statement from the Minister and Chief Scientist

The establishment of the Australian Space Agency is a milestone for the nation.

The global space economy is worth around $450 billion and is growing rapidly. The industry has the potential to grow significantly in Australia, creating jobs and supporting economic development. The newly established Australian Space Agency will play a critical role in facilitating this growth.

As the *Space Industry Capability in Western Australia* review detailed, Western Australia has strong capabilities and opportunities in the space sector. The advantages and expertise identified during the review align strongly with the priority areas and objectives of the newly formed Australian Space Agency.

Western Australia has been involved in the space industry for nearly 60 years and is involved in major projects such as the European Space Agency's (ESA) ground station at New Norcia, a range of commercial space communications stations, the Pawsey Supercomputing Centre, and the International Centre for Radio Astronomy Research (ICRAR). Western Australia is already home to over 74 companies operating in space and space-related services. Western Australia's key industry sectors of mining, oil and gas and agriculture are all underpinned by the space industry.

For these reasons, it is in the nation's interest that the Australian Space Agency is headquarted in Western Australia. Having a West Australian home will link the Australian Space Agency with an industry that has the expertise, infrastructure and geographical advantages to thrive.

International collaboration will be critical and a Western Australian home will place the Australian Space Agency in the same time zone as 60 per cent of the world's population. Perth is linked to Europe through direct flights and Western Australia is the only Australian state that has overlapping business hours with Europe.

The newly formed Australian Space Agency is currently developing operational plans for the Agency and investment plans for the sector. As these plans continue to develop, the McGowan Government will update and finalise our proposals to the Agency.

The McGowan Government looks forward to continued collaboration with the Federal Government and officials from the Australian Space Agency to support the development of the space sector. Western Australia is ready to assist and support the Australian Space Agency in its mission.

**Hon Dave Kelly MLA**
Minister for Science

**Professor Peter Klinken AC**
Chief Scientist of Western Australia

# 2 Why is Western Australia the best location for the Australian Space Agency?

Western Australia's unique attributes, as described in this submission, make it the best place to locate the headquarters of the Australian Space Agency. Western Australia is also the best location in a purely practical sense, with good transport connections to Europe, Asia and the rest of Australia, extensive office facilities and other infrastructure, and a high quality standard of living that attracts employees.

The Western Australian Government has a number of suitable assets that could be used as the home of the Australian Space Agency. The Government is willing to work collaboratively with the Agency to identify the most suitable location to enable it to maximise its engagement with and connection to Western Australia's world class research sector and burgeoning space industry.

## 2.1 Alignment with Australian Space Agency priorities

A recent review of Western Australia's space industry capability by ACIL Allen consultants clearly articulates a range of advantages and opportunities that closely align with the initial priority areas for the Australian Space Agency, as identified by the Expert Reference Group's review.

The priority areas identified are:

- communications technologies, services and ground stations;
- Space Situational Awareness (SSA) and debris monitoring;
- Positioning, Navigation and Timing (PNT) infrastructure;
- Earth Observation (EO) services;
- research and development;
- remote asset management; and
- developing a strategy to position Australia as an international leader in specialised space capabilities.

All the proposals identified later in this submission align with one or more of the Australian Space Agency's priority areas.

## 2.2 Location

Western Australia's location and geographic 'attributes' are ideal for a wide range of space activities that require its latitude and longitude, radio quiet, an arid climate and low population density.

These activities include SSA and facilities that contribute to global coverage of space assets, including tracking of satellite and deep space launches. They also provide maximum access to Global Navigational Satellite System (GNSS) constellations.

Western Australia also shares a time zone of plus/minus two hours with 60 per cent of the world's population in those countries with the greatest promise for economic growth in the 'Asian Century'. This means that Western Australia is perfectly positioned to take advantage of this growing market for space activities such as communications.

## 2.3 Existing capabilities and strengths

Western Australia also has substantial existing space industry capabilities, including in the development and use of a wide range of space-derived applications. These capabilities exist within our universities, research organisations and industry. Western Australia is home to over 74 companies operating in space and space-related services.

Good opportunities for competitive advantage lie in areas such as agriculture, mining, offshore oil and gas, remote operations and robotics. There is great potential for economic growth, with jobs and business opportunities likely to be found in these areas.

## 2.4 Infrastructure

Western Australia has important existing space-related infrastructure.

This includes respected universities, ICRAR, the Pawsey Supercomputing Centre, CSIRO and the Murchison Radioastronomy Observatory which hosts the Australian Square Kilometre Array Pathfinder (ASKAP) and Murchison Widefield Array (MWA) telescopes, as well as satellite and deep space communication facilities operated by ESA at New Norcia and the Swedish Space Corporation (SSC) at the Western Australian Space Centre.

## 2.5 Collaborations

Western Australia's space industry stakeholders have a strong track-record of domestic and international collaboration. International partners such as ESA and SSC have a direct presence in Western Australia, and partners such as the United States' National Aeronautics and Space Administration (NASA) and the Japan Aerospace Exploration Agency (JAXA) have relationships with local organisations.

The international Square Kilometre Array (SKA) radio astronomy, which is a significant international partnership project, will be co-located in Western Australia.

Additionally, links between our universities and other industry players in other parts of Australia and internationally are strong.

# 3 Proposals and *WA SpaceHub*

## 3.1 Proposals

A number of solid space industry proposals for Western Australia have been identified in consultation with a range of local space industry stakeholders.

These proposals build upon the State's advantages and represent early opportunities to maximise returns in a number of areas identified in the Australian Space Agency's list of initial priorities.

The map at **Attachment A** provides an overview of the most significant of these projects.


## 3.2 Coordination

There is potential to coordinate activities through the *WA SpaceHub*, an overarching framework overseen by the Chief Scientist of Western Australia and supported by the Department of Jobs, Tourism, Science and Innovation.

*WA SpaceHub* will provide:

- a single point of coordination and focus for space industry activities in Western Australia;
- a focus for the promotion of education, engagement and inspiration, working in collaboration with other education/outreach stakeholders such as Scitech and ICRAR; and
- a conduit for direct linkages between the space industry in Western Australia, the Western Australian Government and the Australian Space Agency.

It is proposed that the Western Australian Space Industry Steering Group, chaired by the Chief Scientist, be repurposed and reconstituted to provide a broader space industry perspective with an advisory role for *WA SpaceHub*.

### 3.3 Funding

It is proposed that the activities described in this submission be funded through a mix of Commonwealth, Western Australian State Government, and industry funding.

This proposal is built around a Commonwealth investment of $9 million and a proposed Western Australian investment, which is currently being progressed through the budget process, of $6 million over four years (plus $1 million in existing funding), as well as in-kind land and office accommodation.

There is also significant potential for additional investment from a broad range of industry stakeholders, and this can be pursued once a firmer understanding of the Australian Space Agency's investment plan is available.

A summary of possible funding options is provided at **Attachment B**.

# 4 Australian Mission Control Centre

## 4.1 Overview

Western Australia's geographical position could provide the basis to establish an 'Australian Mission Control Centre' in Western Australia. This would take advantage of location, infrastructure, radio quiet and proximity to existing (and future) ground stations and provide services to a range of organisations and projects.

Key partners could include the ESA, NASA, SSC and others.

This project could leverage the existing infrastructure and expertise held in organisations such as ICRAR, the Pawsey Supercomputing Centre, CSIRO and the universities.

This opportunity to establish, under the auspices of the Australian Space Agency, an Australian Mission Control Centre, will serve the Indo-Pacific region with four important objectives:

- to support deep space missions of major international agencies, as a critical partner and collaborator assisting in the advance of human endeavour in exploration and science;
- to support Australian built satellites and missions, which require ground-station support, and for which no national facility currently exists as well as supporting global open access missions, and those in which Australia is a partner;
- to provide a commercial service to international organisations, requiring reliable government sanctioned ground-station support capabilities; and
- to provide emergency ground-station support to EO satellites including the international Disaster Monitoring Constellation, for immediate on-demand imaging of crisis events on our region (for example, bushfires and floods).

The Australian Mission Control Centre will also play a significant role in inspiring the Australian community in space-related areas, and will assist in both promoting and facilitating interest in STEM (science, technology, engineering and mathematics) education and career choices. As a major focus for space industry activity in Western Australia, this Centre will have strong links with other organisations such as Scitech, ICRAR and the Pawsey Supercomputing Centre. It will also work closely with other stakeholders in coordinating outreach activities such as Astrofest, Data Science Week and National Science Week.

## 4.2 Alignment

This activity aligns with the following Australian Space Agency priority areas:

- communications technologies, services and ground stations;
- PNT infrastructure;
- EO services; and
- developing a strategy to position Australia as an international leader in specialised space capabilities.

## 4.3 Funding

Commonwealth funding of $2 million is sought to establish the data centre associated with the Australian Mission Control Centre.

Subject to budget processes, Western Australia could provide $0.5 million per annum in ongoing operational funding with significant potential for co-investment with other stakeholders, including potential 'clients'. Western Australia is also willing to contribute land and/or office accommodation.

# 5 European Space Agency (ESA) Second Dish

## 5.1 Overview

ESA's New Norcia tracking station, some 105 kilometres (km) from central Perth, is part of ESA's ESTRACK network and is one of three stations worldwide with 35 metre (m) tracking dishes that support various ESA manned and unmanned satellite and deep space missions. The facility also hosts a smaller 4.5 m dish.

ESA has proposed the construction of an additional 35 m dish at New Norcia to provide the additional capacity needed to support a range of deep space activities in the coming decade.

ESA has indicated that it is seeking support from the Australian Government for this proposal. The development would be achieved through genuine partnership between ESA and Australia, which would lead to Australia having greater involvement and deriving greater benefit from the facility.

The proposal by ESA to construct a second large tracking dish at its New Norcia site will increase Australia's participation in international space missions and create jobs and business opportunities and should be strongly supported.

## 5.2 Alignment

This activity aligns with the following Australian Space Agency priority areas:

- communications technologies, services and ground stations; and
- developing a strategy to position Australia as an international leader in specialised space capabilities.

## 5.3 Funding

Commonwealth investment of $4 million is sought, with a possible Western Australian investment of $1 million which is being pursued through budget processes.

# 6 Robotics and Artificial Intelligence (AI) Innovation Hub and Test Facility

## 6.1 Overview

Robotics, automation and AI underpin much of the space industry and there is the opportunity to bring some of the various industries involved in this type of research and development (including mining, agriculture, and oil and gas) together to create an innovation hub and test facility. The Western Australian Government is prepared to co-invest with the Commonwealth in a new robotics and artificial intelligence innovation hub.

Western Australia is a global leader in automation, with particular strength in the mining industry. This includes Rio Tinto's AutoHaul program, which will deliver the world's first fully autonomous, long-distance heavy haul rail network. Western Australia's three largest mining companies have a combined total of more than 160 autonomous haulage trucks operating in the State's north, and Western Australia is working to establish the nation's first accredited courses in automation through a partnership with Rio Tinto and South Metropolitan TAFE.

In addition, the Royal Automobile Club of Western Australia (RAC) led Australia's first automated vehicle street trial in Perth. In 2016, RAC launched a fully autonomous, electric shuttle, and to date has completed more than 12 919 km in fully autonomous mode.

Aggregating these industries will facilitate the development of a critical mass. An innovation hub and common-user test facility could be used to develop and test a wide range of robotic applications, including technology that could be utilised in future mars moon missions.

## 6.2 Alignment

This activity aligns with the following Australian Space Agency priority areas:

- research and development;
- remote asset management; and
- developing a strategy to position Australia as an international leader in specialised space capabilities.

## 6.3 Funding

A Western Australian investment of $1 million over four years is being considered through the existing New Industries Fund (NIF) program. Commonwealth co-investment of $1 million is sought to contribute to research and development, particularly around remote assets.

# 7 Terrestrial Communications Infrastructure

## 7.1 Overview

Several space industry stakeholders, including international partners, have identified the need for better terrestrial communications (optical fibre) in Western Australia's Mid-West region to support existing and future ground stations.

For example, the existing optical fibre link between SSC's Western Australian Space Centre near the township of Mingenew and Perth are slow and have insufficient capacity. Industry stakeholders have advised that fibre links in the order of 10 Gigabits (Gbps) (expandable to 100 Gbps) connecting Perth, the ESA New Norcia site and the Western Australian Space Centre will be necessary in the future.

Increasing the capacity and speed of the existing fibre network and extending the high capacity fibre backbone is essential to support the existing network of ground stations, and to attract additional ground stations.

The increased optical fibre links also have the potential to benefit other regional industries, for example, mining and agriculture.

## 7.2 Alignment

This activity aligns with the following Australian Space Agency priority areas:

- communications technologies, services and ground stations;
- PNT infrastructure;
- EO services; and
- developing a strategy to position Australia as an international leader in specialised space capabilities.

## 7.3 Funding

Discussion about potential infrastructure opportunities have already been held with the Department of Primary Industries and Resource Development and the WA SuperNet proponents, with the potential for $3 million of additional funding through Western Australia's budget process.

Commonwealth funding of $2 million is being sought, plus there may be potential to seek additional funding from regional infrastructure. Investment from a range of space industry stakeholders may also be possible.

# 8 Space Situational Awareness (SS)

## 8.1 Overview

There is potential to develop an Australia sovereign civil SSA capability, utilising and building upon Western Australia's existing expertise and activities.

A number of SSA projects are already underway in Western Australia, including a C-band space surveillance radar, space surveillance telescope and optical telescope with laser ranging capability near Exmouth, and the Falcon optical telescope at Gingin north of Perth.

Western Australia's SSA capability has the potential to evolve, both in an expansion of existing technologies and through the development and adaption of new technologies.

Curtin University, which manages the Desert Fireball Network, recently signed an agreement with Lockheed Martin to develop technology to provide a real-time view of satellites and other space debris and objects in orbit around Earth.

The Curtin University node of ICRAR is collaborating with Silentium Defence to develop a passive space surveillance radar using the MWA radio telescope. This project is being supported by funding from the Commonwealth's Defence Innovation Hub.

## 8.2 Alignment

This activity aligns with the following Australian Space Agency priority areas:

- communications technologies, services and ground stations;
- SSA and debris monitoring;
- PNT infrastructure;
- research and development; and
- developing a strategy to position Australia as an international leader in specialised space capabilities.

## 8.3 Funding

No specific Commonwealth funding is sought at this stage, noting that the existing partnerships in Western Australia are already funded.

# 9 Other opportunities

Other opportunities of merit include:

- establishment of a local space industry research and development centre of excellence, which could be managed as an offshoot of the WA SpaceHub;
- establishment of a laser communications hub, focussing on a permanent ground station to build upon existing research and development and supported by the upgrades to terrestrial communications services described earlier;
- providing greater support for space industry-related start-ups and innovators, possibly through existing local facilities such as Spacecubed, CORE Innovation Hub and FLUX, with the potential for a space business incubation hub and space engineering 'sandbox';
- better utilisation of Western Australia's capacity in providing legal and financial services to the space industry;
- development of a network of qualified and approved Launch Safety Officers (under the *Space Activities Act 1998*) to support a variety of small-scale rocket launches; and
- potential for the development of a commercial launch capability in the north of Western Australia with access to existing road, air and maritime transport infrastructure.

# 10 Governance of the Australian Space Agency

Western Australia believes that ongoing involvement of the states and territories is essential to the success of the Australian Space Agency.

In particular, Western Australia is very interested in having an ongoing role in the strategic direction of the Australian Space Agency.

Serious consideration should be given to establishing a forum of state and territory representatives to provide strategic advice to the ongoing operations of the Australian Space Agency.

Representation on this forum would be a matter for each individual state and territory and might consist of Chief Scientists, state or territory government industry advocates or senior public servants. The potential to have this process linked to Council of Australian Governments (COAG) process should also be considered.

# 11 Conclusion and Path Ahead

As described in this submission, Western Australia has many distinct space industry capability advantages, and has a number of strong space industry projects with industry support which will support the Australian Space Agency's priorities.

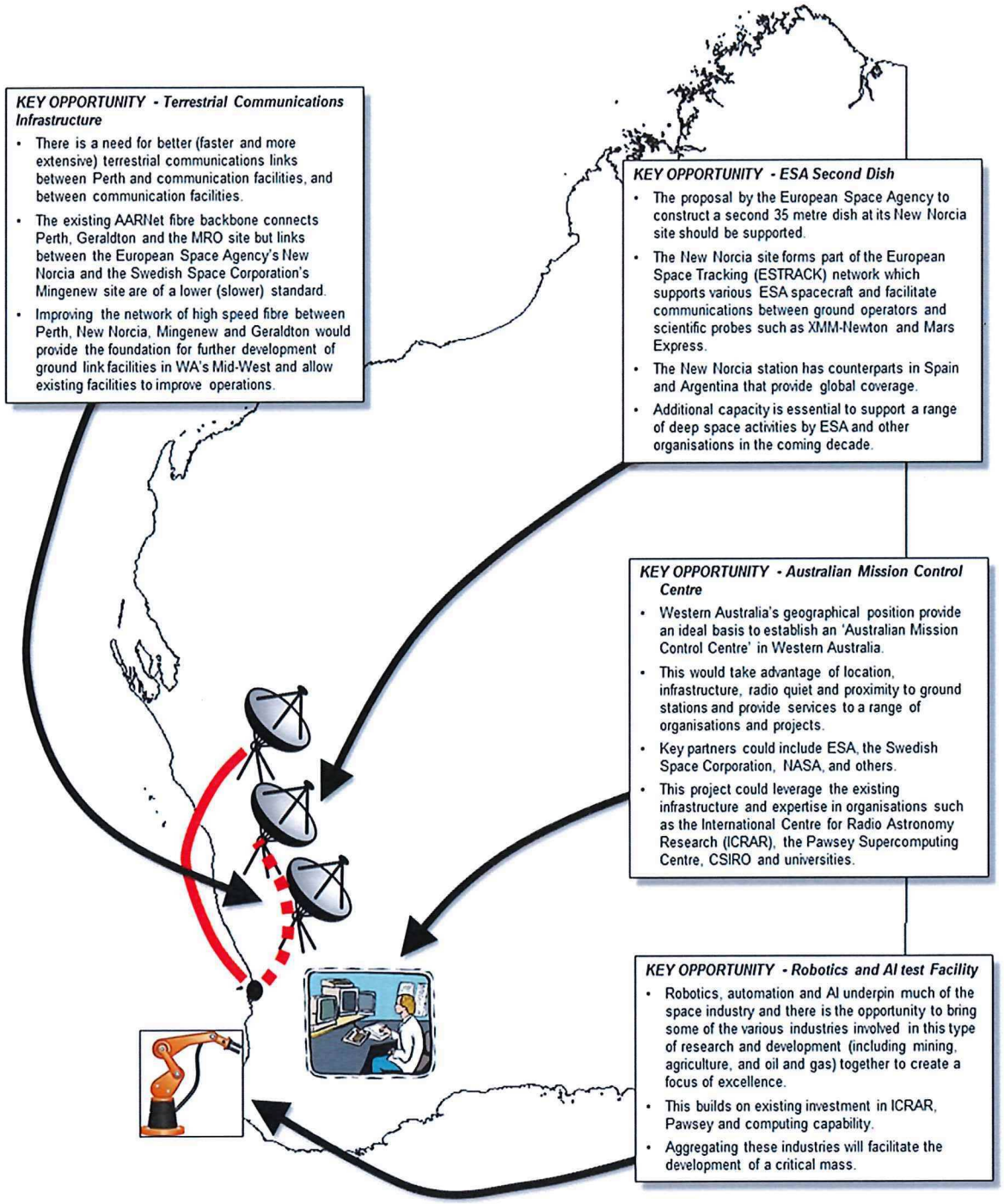
In conclusion, Western Australia is well positioned to contribute to (and benefit from) the many space industry opportunities that will arise in the coming decades, and is in an ideal positioned to host the headquarters of the Australian Space Agency.

The Western Australian Government encourages the Australian Space Agency to make Western Australia its permanent home so that the benefits of Australia's growing space industry to Australia as a whole can be maximised.

The Western Australian Government will continue to collaborate with the Australian Space Agency as it becomes fully established in the coming months.

As greater clarity on the operational plans and investment strategy for the Agency becomes available, the Western Australian Government will continue to further develop and refine the proposed industry investment opportunities in consultation with industry stakeholders.

# Attachment A - Map of Significant Proposals



# Attachment B - Summary of Proposal for Investment

| Activity | Commonwealth Contribution | State Contribution | Comments |
|---|---|---|---|
| Australian Mission Control Centre | Financial: $2 million upfront for establishment of a data centre.<br>In-kind: Possible contributions via collaborations by CSIRO and others. | Financial: Possible $0.5 million annual contribution over two years to ongoing operational being pursued through budget process with potential for additional partnerships with universities and others (e.g. Scitech).<br>In-kind: Land and/or office accommodation. | Potential for the Commonwealth to seek ESA funding of $500 000 per annum to support operations of the Australian Mission Control Centre through negotiations relating to support for the second new dish (see below).<br>Partnerships with other WA, national (e.g CSIRO) and international organisations (e.g. NASA, JAXA) would also be sought. |
| Construction of additional ESA dish at New Norcia | Financial: $4 million upfront.<br>In-kind: Nil. | Financial: $1 million being pursued through budget process.<br>In-kind: Nil | The Commonwealth is currently in discussions with ESA about a second 35m dish. CSIRO is in discussions with ESA on a contract for management and operation of the New Norcia facility.<br>Negotiations on the new dish should extend to the proposed Mission Control Centre. |
| Robotics/AI development and test facility | Financial: $1 million over 4 years<br>In-kind: Nil. | Financial: $1 million over four years to support the 'innovation hub' model using the New Industries Fund.<br>In-kind: Land and/or potential use of existing assets for co-working shared space. | Matched funding from the Commonwealth and State of $1m each will seek to leverage industry contributions and partnerships to support the ongoing operations of the facility.<br>The NERA and METS Ignited Industry Growth Centres (Commonwealth funded) are currently developing a proposal, largely around the oil and gas sector that will have application. A facility that supports a range of sectors, including space, is desirable. |
| Upgraded terrestrial telecommunications infrastructure | Financial: $2 million upfront and/or the potential to leverage Commonwealth regional infrastructure funding.<br>In-kind: Nil. | Financial: $3 million being pursued through budget process<br>In-kind: Nil. | Significant potential to leverage Commonwealth regional infrastructure funding and industry investment (e.g. Optus, TPG).<br>DPIRD is already in discussion with others including the Commonwealth and the WA SuperNet proponents. The WA SuperNet proponents are also in discussions with potential industry partners. |
| *Totals* | *Financial: $9 million.*<br>*In-kind: Potential for use of METS Ignited support.* | *Financial: $6 million to be pursued through budget processes, plus $1m over 4 years from existing funding.*<br>*In-kind: Land, office accommodation and co-working spaces.* | |