

## Australian SKA Pathfinder Radio Telescope, Western Australia

- 2.1 The Australian Square Kilometre Array (SKA) Pathfinder Radio Telescope (ASKAP), Western Australia project proposes to establish the world's most effective survey radio telescope intended for international research in cosmology, transient radio sources, pulsar astronomy and the structure and magnetic field of our galaxy. The estimated cost of the project is \$111 million (excluding GST). The ASKAP will be delivered by the CSIRO.<sup>1</sup>
- 2.2 The proposed works are to be located in Western Australia. The ASKAP will be sited at the Murchison Radio-Astronomy Observatory (MRO) which is to be located approximately 315km north-east of Geraldton on Boolardy Station, 40 km north of Boolardy homestead precinct. A MRO Support Facility (MSF) is to be located in Geraldton. Existing radioastronomy facilities in Parkes, NSW will also be utilised to support the project.
- 2.3 The ASKAP was referred to the Committee for inquiry on 25 June 2008.

### Conduct of the inquiry

- 2.4 The inquiry was advertised in local and national newspapers and submissions sought from those with a direct interest in the project.

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<sup>1</sup> The Commonwealth Scientific and Industrial Research Organisation is commonly known as the CSIRO and will be referred to as such in this report.

The Committee received sixteen submissions, one supplementary submission and a confidential supplementary submission regarding the project costs. A list of submissions can be found at Appendix A.

- 2.5 Due to the remote location of the proposed site, the Committee did not undertake a site inspection. In lieu of the site inspection, the Committee received a detailed briefing on the proposed site as part of the public hearing held on 1 October 2008 in Geraldton. The Committee also held two in-camera hearings on this day. A list of witnesses can be found at Appendix B.
- 2.6 The transcript of the public hearing as well as submissions to the inquiry are available on the Committee's website.<sup>2</sup> Plans for the proposed works are detailed in Submission 1: CSIRO.

## Need for works

- 2.7 The CSIRO submission states that the need for the proposed works has been driven by a range of science objectives to contribute to the development of the study of astronomy in Australia, namely:
- understanding the evolution of gas and galaxies;
  - understanding the origins and evolution of magnetic fields;
  - revolutionising our knowledge of the transient radio sky; and
  - obtaining a deep understanding of the Galaxy in which we live.<sup>3</sup>
- 2.8 Successful establishment of the ASKAP will also contribute to Australia's bid to host the international square kilometre array (SKA) project which is:
- a proposed AUD\$1.8 billion next-generation radio telescope project under development by scientists from 50 institutions across 19 countries (Australia, New Zealand, and countries in Europe, Asia, Africa, and the Americas). Notionally, the funding for SKA is anticipated to flow in equal portions from Europe, USA and the rest of the world. The SKA will be one of the largest scientific projects ever undertaken anywhere in the world.<sup>4</sup>

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2 <[www.aph.gov.au/pwc](http://www.aph.gov.au/pwc)>.

3 Submission 1, CSIRO, p. 5.

4 Submission 1, CSIRO, p. 5.

- 2.9 Australia and South Africa have been shortlisted to host the SKA and the Australian and Western Australian Governments have undertaken to work towards a successful bid for Australia to host the SKA. It was put to the Committee that successful operation of ASKAP will strengthen Australia's bid for the SKA.<sup>5</sup>
- 2.10 Aside from the direct benefits to the science of astronomy, the wider benefits to Australia are identified as:
- cultural and scientific value through the advancement of fundamental knowledge about the Universe;
  - educational value through the inspiration provided by hosting and involvement with an iconic international scientific project. The telescope will be available for classroom experiments as the Parkes radio telescope currently is through the Pulse@Parkes program;
  - industrial value through the opportunities for Australian industries to collaborate in leading developments in information and knowledge processing technologies, and radio science areas with commercial spin-off potential; and
  - national, and regional value through the employment and infrastructure provision in remote areas of Australia that could support communities for the expected greater than 30 year lifetime of ASKAP and 50 year lifetime of the SKA facility.<sup>6</sup>
- 2.11 The Committee received assurances that the development of infrastructure and technologies associated with scientific projects of this nature has shown tangible economic and commercial benefits returned to Australia. The CSIRO also noted that without continuing competitiveness in radioastronomy, Australia may lose capacity not only in international astronomy but in innovative information and communication technology domains.<sup>7</sup>
- 2.12 Therefore, the Committee supports the development of the ASKAP project as part of the continued development of radioastronomy in Australia. The Committee finds that there is need for the proposed works.

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5 Submission 1, CSIRO, p. 4.

6 Submission 1, CSIRO, pp. 4-5.

7 Dr B. Boyle, Dr D. DeBoer and Dr A. Zelinsky, CSIRO, Proof Transcript of Evidence, 1 October 2008, pp. 12-15. Submission 8, Cray Australia, p. 2.

## Scope of works

2.13 The proposed scope of works is detailed in Submission 1: CSIRO.<sup>8</sup> The project will provide the infrastructure necessary for the operation of the ASKAP. In short, the project proposes the following works:

- the *antenna array*, consisting of up to 36 parabolic antennas, mounted on concrete footings, and distributed over the Murchison Radio-astronomy Observatory (MRO) site. Each antenna has a 12 metre diameter reflector. Each antenna site will be provided with lightning protection in the form of an earth mat and will be provided with in-ground power and data connection. The antennas will be equipped with sophisticated phased array feed receivers at the focus of the dish reflector, and beamformer and other electronics in the antenna pedestal;
- a *central compound*, located within the MRO site, containing a control building, site services and areas for storage;
- a *remote power generation facility*, adjacent to the central compound;
- renovated facilities within the *Boolarly Station homestead precinct* to provide accommodation, working, and recreational facilities for additional staff and visitors to the MRO. The facilities will provide for after-hours remote monitoring of the equipment at the MRO;
- an *MRO Support Facility (MSF)* located at the Geraldton Universities Centre in Geraldton-Greenough, WA. This facility will contain a telescope control room, computer room, monitoring and processing equipment, electrical and mechanical workshops, office and meeting space and amenities. The building will also include an education/outreach centre;
- *access and services infrastructure*, including access corridors at the MRO, fencing, power reticulation, data and communications cabling, water and waste water management;
- high bandwidth *optic-fibre cabling* connecting the MRO to the MSF to provide essential data connectivity; and
- *radio telescope infrastructure in NSW* to connect to ASKAP in Western Australia to achieve high resolution pictures of the sky and to demonstrate cross-continent connectivity at astronomically useful data rates.<sup>9</sup>

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8 The submission is available on the Committee's website or by contacting the committee secretariat.

9 Submission 1, CSIRO, p. 12.

- 2.14 The Committee has assessed the scope of works and finds them suitable to provide the facilities necessary to meet the needs of the ASKAP project.
- 2.15 The Committee notes that an education and outreach centre is planned as part of the project in recognition of the tourist and educational interest expected to be generated by the project. The Committee further notes that the CSIRO is already running a radio science program in Geraldton schools and will expand this as part of ASKAP.<sup>10</sup> The Committee commends the CSIRO for these initiatives.

## Cost of works

- 2.16 The total out-turn cost of the proposed works is scheduled to be \$111 million (excluding GST). The Committee received cost plans for the project and held an in-camera hearing with the CSIRO on the detailed project costs.
- 2.17 The Committee is satisfied that the costings for the project provided to it are adequate and suitable contingency planning is in place to ensure the completion of the overall project. The Committee was also assured that budget planning has adequately taken into account the risks associated with construction in a remote location.

## Project issues

### Support for the proposal

- 2.18 The Committee received submissions from a range of groups supporting the proposal.

### Regional outcomes

- 2.19 The Shire of Murchison, the City of Geraldton-Greenough, and the Mid-West Development Commission all expressed support for the proposal. These organisations particularly noted the capacity for economic diversification that ASKAP will bring to the region and the contribution ASKAP will make to the region's 'Smart Mid West' and 'Smart City' focus.<sup>11</sup>

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<sup>10</sup> Submission 1, CSIRO, p. 9.

<sup>11</sup> Submission 6, Shire of Murchison; Submission 12, Mid West Development Commission; Submission 16, City of Geraldton-Greenough.

- 2.20 The Committee also received a submission from an individual, Mr A. A. Brooker, expressing his support, as a community member and retired headmaster, for the education contribution that will be made by the ASKAP and the SKA. Mr Brooker noted:

With my educational background, I am in the position to celebrate the educational inspiration made available to our young people by the existence in our region of scientific projects such as ASKAP, SKA and the Murchison Wide-field Array (MWA). I applaud the start made by the CSIRO in ensuring that local students are included in these exciting developments.<sup>12</sup>

- 2.21 The CSIRO identified a range of regional impacts, including employment opportunities (discussed below), positive impact on local economies, tourism and education.<sup>13</sup>
- 2.22 The Committee is pleased to note the level of regional support for this project and commends the CSIRO on its level of engagement with the local region, in particular with local schools. The Committee urges the CSIRO to continue its focus on enhancing the benefits of the project in the local region.

### Scientific support

- 2.23 The Committee received a number of submissions representing the international support for the scientific benefits of the proposed project.<sup>14</sup> It was also put to the Committee that the project has the potential to attract world-class scientists to Australia.
- 2.24 Professor Stavely-Smith, representing Astronomy Australia, told the Committee that while the numbers of high-profile scientists returning to Australia would be small, they

...are the nuclei of groups of young people. They are very important in attracting postdocs and students, and I think they are very important for future student training.<sup>15</sup>

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12 Submission 14, Mr A.A. Brooker.

13 Submission 1, CSIRO, p. 9.

14 Submission 9, ASKAP Science Working Group; Submission 11, Australia Telescope Steering Committee; Submission 13, Astronomy Australia Ltd; Submission 15, Association of Canadian Universities for Research in Astronomy.

15 Prof. Stavely-Smith, Astronomy Australia, Proof Transcript of Evidence, 1 October 2008, p. 28.

- 2.25 Professor Stavely-Smith also noted that there are currently two Federation Fellows<sup>16</sup> in astronomy and this project is of such importance that it has the potential to attract more applications to this fellowship program.<sup>17</sup>
- 2.26 The project clearly has significant scientific merit, not only in regards to the advancement of astronomy, but also in the potential to retain and attract leading astronomers to Australia.

### Employment opportunities

- 2.27 The CSIRO told the Committee that there were employment opportunities expected from the project, particularly in the construction phase. The Committee has been unable to quantify these opportunities, but understands that ongoing employment opportunities will be limited due to the highly specialised nature of the project.
- 2.28 The Committee was particularly interested in what employment opportunities would be available to local Indigenous people. The CSIRO confirmed that it has been actively working with the Watjarri Yamatji people to identify employment opportunities and undertook at the hearing to investigate employment models that have been operating successfully in other industries.<sup>18</sup>
- 2.29 While the employment opportunities for non-specialist staff are limited, the Committee received evidence that the project may generate wider avenues for employment and business creation.
- 2.30 For example, the Mid-West Development Commission noted that as well as some employment and training opportunities for Indigenous people directly on the project, there are also synergies with the 'Mid West Indigenous Arts Strategy.' It states:

The juxtaposition between the Indigenous explanation of the skies (through Dreamtime stories) and that of the scientific community through the world's most powerful radio-

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16 Federation Fellowships are offered by the Australian Research Council and aim to attract researchers of international standing to build and promote Australia's research capability. Funding of up to \$1 780 000 over five years is offered to successful applicants by way of salary support and start-up project funding.

17 Prof. Stavely-Smith, Astronomy Australia, Proof Transcript of Evidence, 1 October 2008, p. 29.

18 Submission 1, CSIRO, p. 9; Dr M. Storey, Proof Transcript of Evidence, 1 October 2008, p. 14.

telescope presents a unique and exciting opportunity to progress Indigenous art to another level.<sup>19</sup>

- 2.31 The Committee agrees that there is scope to develop employment and business opportunities that harness tourism and educational interest in the project. Given that long-term local employment opportunities directly related to the project are limited, the Committee encourages the CSIRO to continue to work with local communities to identify and implement other related employment opportunities.

## Risks to the project

### Land acquisition

- 2.32 Boolardy Station in Western Australia will be acquired to host the ASKAP. Boolardy Station is approximately 315 kilometres north east of Geraldton. The area to be utilised for the project is to be known as the Murchison Radio-astronomy Observatory (MRO). The ASKAP will be sited approximately 40 kilometres north of Boolardy Homestead which will serve as accommodation for staff and visitors to the MRO. An optic-fibre link will also be laid between the MRO and Geraldton.
- 2.33 Because the siting of the project is essential to its success, the Committee was concerned to assure itself that the land acquisition process was not going to pose risks to the project delivery. There are three distinct issues impacting on the land acquisition:
- Western Australian State Government support;
  - CSIRO compliance with the *Lands Acquisition Act 1989*; and
  - the need for a Indigenous Land Use Agreement.

### State support

- 2.34 The CSIRO will be acquiring the land with the support of the Western Australian (WA) State Government. Tenure, access and management of the land will be provided through the following agreed actions:
- the CSIRO should purchase the Boolardy Station pastoral lease from the current lease-holder and operate it as a pastoral lease, thereby establishing management control over all the land immediately surrounding the MRO for

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<sup>19</sup> Submission 12, Mid West Development Commission, p. 6.



the purposes of controlling the RFI that is emitted by pastoral activities;

- the CSIRO should surrender the MRO out of the Boolardy pastoral lease back to the Western Australian Government;
- the Western Australian Government should then lease the MRO to CSIRO for radio-astronomy purposes, including the construction and operation of the ASKAP Project;
- the CSIRO, the Commonwealth and the Western Australian Government should negotiate and agree an Indigenous Land Use Agreement (ILUA) with the Native Title Claimants whose claim covers the land surrounding and including the MRO, for the continuation of access rights by all parties to the MRO.<sup>20</sup>

2.35 Following the CSIRO's acquisition of the lease:

...it will relinquish, or surrender, back to the state that portion of it which is the MRO, whereupon the state will then lease it back to the CSIRO for a peppercorn rent for radioastronomy purposes.<sup>21</sup>

2.36 Negotiations were halted by the 2008 WA State Election. At the time of the public hearing, a new WA Government had just taken office and had yet to announce its position on the project. State government officials indicated:

...but at this point in time my department has not received any new instruction or direction from the incoming government as to the positions it wishes to take in the future with respect to this project, although neither has my department received any direction or advice that there is going to be any change of approach.<sup>22</sup>

2.37 Officers also indicated that they were still working towards the lease agreement with the WA Government being finalised by June 2009.<sup>23</sup>

2.38 When finalising this report, the Committee was made aware that the new WA Government has indicated its full support for the project to proceed.

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20 Submission 4, Department of Industry and Resources (Western Australia), p. 7.

21 Mr B. Robins, WA Department of Industry and Resources, Proof Transcript of Evidence, 1 October 2008, p. 22.

22 Mr B. Robins, WA Department of Industry and Resources, Proof Transcript of Evidence, 1 October 2008, p. 20.

23 Mr B. Robins, WA Department of Industry and Resources, Proof Transcript of Evidence, 1 October 2008, p. 24.

### Compliance with the *Lands Acquisition Act 1989*

- 2.39 Although the WA Government will ultimately own the land and lease it to the CSIRO for radio astronomy purposes, in undertaking to initially acquire the land, the CSIRO must comply with the Commonwealth *Lands Acquisition Act 1989* (the LAA). The LAA provides for the procedures that must be undertaken by Commonwealth agencies acquiring land.
- 2.40 When asked if it had complied with all obligations under the LAA the CSIRO responded:
- They will be. We are in dialogue with the Department of Finance and Deregulation and working with them and the Australian Government Solicitor to make sure that we do comply with the act.<sup>24</sup>
- 2.41 Despite the central importance of the land acquisition to the project's success<sup>25</sup>, the Committee is concerned that the CSIRO was not able to provide greater assurances that it had complied fully with the LAA at an earlier stage.

### Indigenous Land Use Agreement

- 2.42 In order to fully comply with agreements put in place with the Commonwealth and State Governments, the LAA and the *Native Title Act 1993*, the CSIRO needs to put in place an Indigenous Land Use Agreement (ILUA) with native title claimants among the local Watjarri Yamatji people.
- 2.43 The Committee received two submissions from native title claim groups and heard from representatives of both groups at an in-camera hearing in Geraldton on 1 October 2008. These hearings were held in-camera because the ILUA negotiations were still active at the time of this inquiry.
- 2.44 Evidence received at the in-camera hearing indicated that there was significant goodwill on behalf of the Watjarri Yamatji in regards to the ILUA negotiation, including concluding these negotiations as expeditiously as possible. However, this confidential evidence also suggested that there are a number of issues yet to be resolved that may significantly impact on negotiation timeframes.

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24 Mr R. Stevens, CSIRO, Proof Transcript of Evidence, 1 October 2008, p. 18.

25 Submission 1, CSIRO, p. 12.

- 2.45 Although the native title claim groups have publicly indicated their support for the proposed project,<sup>26</sup> any delay in finalising an ILUA may pose significant risks to any contractual obligations that the CSIRO enters into prior to land negotiations being finalised.

#### Committee concerns

- 2.46 Since the time of referral to this Committee in June 2008, there have been significant delays in land negotiation, largely as a result of the WA State Election, held in October 2008.
- 2.47 Although the CSIRO states there is a 'fallback' option in New South Wales if Boolardy Station cannot be secured, neither its submission nor evidence presented at the public hearing confirmed if this site was feasible.<sup>27</sup> Given that, at the time of the public hearing, the CSIRO reiterated its stated intention to issue construction contracts by the end of 2008<sup>28</sup>, negotiations for a new site at this stage would be unrealistic.
- 2.48 Clearly, there are significant advantages to ASKAP being sited in Western Australia due to the isolation and therefore radio-quiet conditions of the proposed site. However, there needs to be more certainty regarding the land acquisition prior to any contracts being let.
- 2.49 The Committee is concerned that should construction contracts be let prior to land acquisition negotiations being finalised, the CSIRO will be exposed to significant risks in not be able to fulfil contractual obligations.
- 2.50 Therefore, the Committee is recommending that, prior to CSIRO entering into any contracts for the ASKAP, that the Department of Finance and Deregulation is satisfied that there is compliance with the *Lands Acquisition Act 1989*. The Committee understands that compliance with the LAA runs parallel with the finalisation of an Indigenous Land Use Agreement.

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26 Submission 2, Watjarri Yamatji Native Title Claim Working Group; Submission 3, Yamatji Land and Sea Council.

27 Dr B. Boyle, CSIRO, Proof Transcript of Evidence, 1 October 2008, p. 18.

28 Dr B. Boyle, CSIRO, Proof Transcript of Evidence, 1 October 2008, p. 16.

### **Recommendation 1**

**The Committee recommends that the CSIRO not enter into any contracts for the ASKAP project until all land negotiations are completed and the Department of Finance and Deregulation is satisfied that there has been compliance with the *Lands Acquisition Act 1989*.**

### **Committee comment**

- 2.51 Overall the Committee is satisfied that this project has merit in terms of need, scope and cost.
- 2.52 The Committee is, however, concerned that all land negotiations be finalised prior to contracts being let for the main construction works to minimise risks to the CSIRO regarding contract non-compliance should land acquisition be delayed.
- 2.53 Nonetheless, having examined the purpose, need, use, revenue and public value of the work, the Committee considers that it is expedient that the proposed works proceed.

### **Recommendation 2**

**The Committee recommends that the House of Representatives resolve, pursuant to Section 18 (7) of the *Public Works Committee Act 1969*, that it is expedient to carry out the following proposed work: Australian Square Kilometre Array Pathfinder Telescope, Western Australia.**