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Project JP3029 Phase 2 – Defence Space Surveillance Telescope Facilities Project

2.1 The Department of Defence (Defence) seeks approval from the Committee to provide facilities and supporting infrastructure necessary for the operations of the new Space Surveillance Telescope.

2.2 The Space Surveillance Telescope will develop an Australian Defence Force (ADF) space surveillance capability, enhance the global surveillance capability and provide an increased ability to track space debris. The telescope will also demonstrate an increased Australian and US commitment to closer space cooperation, and provides further practical expression to the 2010 Space Situational Awareness partnership.[1]

2.3 The proposed facilities and infrastructure works to support the telescope will be undertaken at the Harold E Holt Naval Communications Station base area, near Exmouth, Western Australia.[2]

2.4 The estimated cost of the project is $63.0 million, excluding GST.

2.5 The project was referred to the Committee on 23 September 2014.

Conduct of the inquiry

2.6 Following referral, the inquiry was publicised on the Committee's website and via media release.

2.7 The Committee received one submission and three supplementary submissions from Defence. A list of submissions can be found at Appendix A.

2.8 The Committee conducted an inquiry briefing and inspection, and public and in-camera hearings, at Harold E Holt Naval Communications Station,

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1 Department of Defence (Defence), submission 1, pp. 9-10.

2 Defence, submission 1, p. 10.

Exmouth, WA, on 4 November 2014. A transcript of the public hearing and the public submissions to the inquiry are available on the Committee's website.[3]

Need for the works

2.9 Military forces around the world are increasingly reliant on space-based capabilities for communications, positioning, timing and surveillance. However, space is becoming increasingly congested with active satellites and discarded space junk. Currently, the United States tracks approximately 17,000 objects in orbit, with an estimated half a million additional objects too small to track. Maintaining an awareness of the position and trajectory of these objects is important when the relative speed of closure between objects can be as high as 14 kilometres per second. At such speeds, even objects smaller than one centimetre in diameter can cause serious damage to operational satellites or manned space missions. The vulnerability of a space asset to a collision with even a minute piece of space junk makes space situational awareness an absolute necessity to successful operations in the space domain.[4]

2.10 Space situational awareness provides the operators of space-based capabilities the ability to anticipate the influence of other space objects and take action to ensure continued and unimpeded operation of space vehicles. This can include manoeuvring spacecraft to reduce the probability of a collision with another object in orbit. With the very long lead times and huge costs often associated with placing satellites into orbit, the capability to predict and avoid potential collisions is extremely valuable. From a military perspective, commanders and decision makers use space situational awareness to leverage the capabilities of space-based systems while exploiting the associated vulnerabilities of an adversary. Space situational awareness is provided through the tracking, classification and identification of space-based objects.[5]

2.11 Currently, the ADF possesses very limited capability to obtain knowledge of space-based threats, relying heavily on the United States for space situational awareness. In order to develop an ADF space surveillance and situational awareness capability, the Australian and United States governments have agreed to the establishment of a surveillance capability in Australia. Most recently, this has been given practical expression through a decision to relocate a US space surveillance telescope to

3 <www.aph.gov.au/pwc>

4 Defence, submission 1, p. 1.

5 Defence, submission 1, pp. 1-2.

Australia, to be accommodated in facilities specifically designed and constructed to suit the purpose.[6]

2.12 During the 2012 Australia-US dialogue, a joint commitment was made to work towards the relocation of a highly advanced optical space surveillance telescope to Australia. This intention was given added emphasis in the 2013 Defence White Paper, where it was observed that space surveillance was of increasing significance and importance in defence and national security. A memorandum of understanding to relocate the telescope to the Harold E Holt Naval Communications Station area from the United States was signed on 20 November 2013.[7]

2.13 The funding for the telescope and the facilities will be split between the US and Australia, with the:

> … United States to provide the telescope itself and fund its relocation, while Australia will provide funding for the [facilities] solution. Sustainment and support costs will be shared.[8]

2.14 The telescope is expected to be operational in Australia by September 2017 for southern hemisphere observations, when it would begin contributing to the US Global Space Surveillance Network.[9] This leads to an accelerated facilities delivery schedule in readiness to receive and house the telescope, and for its subsequent testing and demonstration activities.[10]

2.15 The Committee is satisfied that the need for the works exists.

Options considered

2.16 Defence's submission stated that the development of an ADF space situational awareness capability would be streamlined by building on the existing security alliance with the US. The establishment of US assets in Australia for shared operation makes use of existing US technology, allowing the ADF to rapidly acquire a space surveillance capability whilst avoiding the time and cost premiums associated with developing an independent ADF capability. Relocating US assets to Australia also addresses the limited coverage currently available in the southern hemisphere. This outcome could not be achieved by placing ADF personnel in existing US facilities, which would also offer little towards the development of a sustained Australian capability.[11]

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6 Defence, submission 1, p. 2.

7 Defence, submission 1, pp. 2-3.

8 Brigadier Darren Naumann, Defence, transcript of evidence, 4 November 2014, p. 1.

9 Brigadier Darren Naumann, Defence, transcript of evidence, 4 November 2014, p. 2.

10 Defence, submission 1, p. 3.

11 Defence, submission 1, p. 4.

2.17 Defence identified a number of siting options in Australia for the telescope, discarding those not on Defence land due to potential access issues and those considered to be too remote.[12] The sites assessed included:

- Exmouth, including Harold E Holt Naval Communications Station;
- RAAF Learmonth, in Western Australia;
- the Australian Defence Satellite Communications Station at Kojarena, in Western Australia, which is near Geraldton, in Western Australia;
- the Laverton Jindalee Operational Radar Network (JORN) receiver site, in Western Australia;
- Pine Gap, in the Northern Territory;
- the Alice Springs JORN receiver site, in the Northern Territory;
- Woomera, in South Australia;
- the Mobile Laser Ranging System 4 (MOBLAS 4) satellite ranging station at Yatharagga, Western Australia;
- Gingin, Western Australia; and
- the Murchison Radio-astronomy Observatory, Boolardy, Western Australia.[13]

2.18 Defence conducted site visits with the US in March 2012, and assessed the options against various criteria, including:

- astro-climate;
- temperature;
- wind speed;
- humidity;
- cloud cover; and
- cyclone vulnerability.[14]

2.19 Defence then identified three potential locations in Australia that were within Defence areas and remote from the possibility of light interference during the telescope's operational life:

- the Jindalee 'Over the Horizon Radar' receiver site near Alice Springs, Northern Territory;
- the Australian Defence Satellite Communications System site, Geraldton, Western Australia; and

12 Wing Commander Stuart Briese, Defence, transcript of evidence, 4 November 2014, p. 2.

13 Wing Commander Stuart Briese, Defence, transcript of evidence, 4 November 2014, p. 2.

14 Wing Commander Stuart Briese, Defence, transcript of evidence, 4 November 2014, p. 2.

- the Harold E Holt Naval Communications Station near Exmouth, Western Australia.[15]

2.20 Technical assessments of these strategic level siting options were then undertaken, and it was determined that the Harold E Holt Naval Communications Station offered the best geographical location and weather conditions to enable the telescope to obtain the maximum possible quantity of useful data.[16]

2.21 The geographic location of Harold E Holt Naval Communications Station was a significant factor in its selection:

> … the strategic concern of actually getting the data we needed from the telescope was very heavily weighted. This site offers a site that is far enough north to see a large part of the geostationary orbit belt yet is far enough south to be out of the monsoonal cloud band. Likewise, it is far enough west to see the part of the geostationary orbit belt we are most interested in, because it contains a large number of satellites belonging to countries of military interest to Australia, the US and our allies. So it really was, from that point of view, strategically the ideal site.[17]

2.22 Two operational siting options within the Harold E Holt Naval Communications Station were then identified and considered, one accessed from Borefield Well 18 and one accessed from Borefield Well 16. The basic requirement was that the site would need to be away from the base administrative centre and developed areas to avoid light interference, but proximate enough to base services for beneficial cost and environmental factors. The Borefield Well 16 option was not considered viable for long term access to the site due to the steeply graded landscape. As a result, the site accessed from Borefield Well 18 was selected as the preferred site within Harold E Holt Naval Communications Station for its comparatively easy access.[18]

2.23 Due to the specialised and unique nature of the capability, and the premise that it is a replication of the US space surveillance telescope capability in New Mexico, there was only one facility option available to develop.[19] Accordingly:

> The design of the facility is essentially being replicated as far as possible from the existing space surveillance telescope in New

15 Defence, submission 1, p. 4.

16 Defence, submission 1, pp. 4-5.

17 Wing Commander Stuart Briese, Defence, transcript of evidence, 4 November 2014, p. 2.

18 Defence, submission 1, p. 5.

19 Defence, submission 1, p. 5.

> Mexico USA, with some modifications to make it compliant with the Australian standards and adapted to suit the climatic conditions of Australia's north-west cape.[20]

2.24 There are significant climate differences between New Mexico and Exmouth that impact the design of the facility:

> The difference between the driving factors at the New Mexico site and here at Exmouth are definitely the higher temperatures and the humidity. What drives that is the capacity of the chiller and chiller system. In order to mitigate the difference between the day-time and night-time temperatures we look at what that delta is on a given night, and we project what the dome has to [cool] down to on that night. We set up the chiller system to bring down that projected temperature. That requires a low-temperature chiller to get us to the extreme points of the variations at night times in order to accommodate the extreme points of that. Normally, a facility would have a single chilled-water circulation system. We have added what is called a low-temp chiller to make sure that we accommodate that load.
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> The higher humidity at this site also requires additional cooling to bring the relative humidity down to the point where it is going to be for the ambient night-time temperature. Again, the goal of the facility is to accommodate whatever the humidity is going to be, and whatever the night-time temperature will be when they open up the telescope observatory.[21]

2.25 The potential for severe weather events at Exmouth such as cyclones also influences the design of the facility and its ability to operate:

> … [In New Mexico] what they would have which is similar to a cyclone is a snow event. If a snow event comes around for them they would have to hunker down, so to speak, and take the wind load, the snow load and the ice load on that facility. In comparison, at Exmouth we are going to have to, again, hunker down and take the wind load and the water load.
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> So, under normal operations, when you see an oncoming storm—whether it is a snow storm, a cyclone or something like that—you basically shut the operations down for that period. You cannot operate during those conditions…[22]

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20 Brigadier Darren Naumann, Defence, transcript of evidence, 4 November 2014, p. 1.

21 Mr Jose Teran, Defence, transcript of evidence, p. 3.

22 Mr Jose Teran, Defence, transcript of evidence, p. 3.

2.26 Defence advised that adapting the facility to the Exmouth conditions had taken slightly longer than initially expected. However, the slight delay in the availability of the telescope has eased this time constraint.[23]

2.27 The Committee found that Defence has considered multiple options to deliver the project and has selected the most suitable option.

Scope of the works

2.28 The proposed facility to accommodate the telescope would comprise the dome enclosure structure (the observatory), an operations support centre (connecting to the dome structure) and multiple equipment structures (for supporting services).[24]

2.29 The enclosure houses the telescope. The structure is designed to exacting standards that ensure the stability of the telescope. In the closed position, the enclosure protects the telescope and its instruments against adverse weather conditions. In the open position, the enclosure allows the telescope a free field of view by means of a large slit in the structure. The enclosure is connected directly to the support building. The enclosure base serves as a foundation and stationary floor for the rotating enclosure and also provides for storage and an equipment room. Due to the requirement to minimise vibration, the connected dome and support building requires significant foundation and concrete slab works.[25]

2.30 The support building comprises three functional areas for telescope related activities, utilities infrastructure and personnel related functions.[26]

2.31 The equipment buildings house large mechanical and electrical equipment that support the enclosure and support building, and will be set at a distance from this building. Defence's initial submission indicated that there may be more than one equipment building.[27] This was confirmed at the public hearing.[28] Defence advised:

> For the main building, there are two parts in it. There is the normal facility which contains the power facilities; there is also a second part, which is the air conditioning section. There are two water tanks and then three smaller facilities comprising the emergency

23 Brigadier Darren Naumann, Defence, transcript of evidence, 4 November 2014, p. 3.

24 Defence, submission 1, p. 10.

25 Defence, submission 1, p. 11.

26 Defence, submission 1, p. 11.

27 Defence, submission 1, p. 11.

28 Brigadier Darren Naumann, Defence, transcript of evidence, 4 November 2014, p. 5.

> generator, the fuel tank and the [high voltage] transformer. That is a total of six facilities.[29]

2.32 Other scope elements include:

- an access track to connect the proposed site to the existing base road and track network;
- the establishment of a communications link back to the base, for security observation and for data distribution as required from the existing base infrastructure;
- connection to existing base high voltage power, water and sewerage services, with provision for stored fire services water on site;
- installation of uninterrupted back-up power supply for operational continuity and protection of sensitive equipment;
- security fencing, with sufficient enclosed area to allow cranes and construction traffic to be manoeuvred on the site; and
- car parking for five vehicles.[30]

2.33 Subject to Parliamentary approval of the project, construction is expected to commence by mid-2015, and be completed by late 2016.[31]

2.34 The Committee finds that the proposed scope of works is suitable for the works to meet its purpose.

Cost of the works

2.35 The estimated cost of the project is $63.0 million, excluding GST.

2.36 Defence provided further detail on the project costs in the confidential submissions and during the in-camera hearing.

2.37 The Committee considers that the cost estimates for the project have been adequately assessed by Defence and the Committee is satisfied that the proposed expenditure is cost effective. As the project will not be revenue generating the Committee makes no comment in relation to this matter.

Committee comments

2.38 During its inspection of the proposed site, the Committee observed the remoteness of the Harold E Holt Naval Communications Station and the rocky terrain that limits access to the site.

2.39 The Committee notes that the local community has been consulted regarding the project, and expects this consultation to continue as

29 Mr David Mitchell, Defence, transcript of evidence, p. 5.

30 Defence, submission 1, pp. 11-12.

31 Brigadier Darren Naumann, Defence, transcript of evidence, 4 November 2014, p. 2.

construction occurs and the telescope is delivered.[32] The Committee also notes that there is likely to be a positive economic benefit to the community during the construction phase of the project.

2.40 The Committee accepts that there is likely to be minimal impact on local roads during the construction, and is satisfied that Defence will follow the appropriate state government requirements for managing and escorting large oversized loads, particularly associated with the delivery of the telescope, through community areas.[33]

2.41 The Committee notes Defence's consideration of bushfire protection, including the appropriateness of the materials used in the construction of the facility and a 35-metre setback to reduce bushfire risk.[34]

2.42 During the in-camera hearing, Defence assured the Committee that it has appropriately assessed the project costs and risks, and will continue to manage these elements throughout the project.

2.43 The Committee did not identify any issues of concern with Defence's proposal and is satisfied that the project has merit in terms of need, scope and cost.

2.44 The Committee reminds Defence that it must notify it of any changes to the project scope, time and cost. The Committee also requires that a post-implementation report be provided within three months of completion of the project. A report template can be found on the Committee's website.

2.45 Having regard to its role and responsibilities contained in the *Public Works Committee Act 1969*, the Committee is of the view that this project signifies value for money for the Commonwealth and constitutes a project which is fit for purpose, having regard to the established need.

Recommendation 1

2.46 **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: Project JP3029 Phase 2 – Defence Space Surveillance Telescope Facilities Project.**

32 See submission 1.2; transcript of evidence, 4 November 2014, p. 7.

33 See transcript of evidence, 4 November 2014, pp. 5-6.

34 See transcript of evidence, 4 November 2014, pp. 8-9.