Schedule 5 – Description of the Project

The Project consists of a group of radio-astronomy projects, and ancillary works and activities, including radio science studies, to be developed, operated or undertaken on the MRO. At the date of this agreement it is intended that the Project will include the following radio-astronomy projects:

(a) ASKAP;

(b) PrepSKA;

(c) the Murchison Widefield Array project;

(d) the Cosmological Reionisation Experiment; and

(e) the Precision Array to Probe the Epoch of Reionisation project.

The Project will also include any other radio-astronomy and ancillary works and activities to be developed, operated or undertaken within the MRO as determined by CSIRO in consultation with the Australian SKA Coordination Committee from time to time.

Each of the projects named above are indicatively described in further detail below.

1. The Australian Square Kilometre Array Pathfinder project

The ASKAP project is a next-generation radio telescope. When complete, ASKAP will be one of the world's leading radio telescopes. The ASKAP project will be managed by CSIRO Australia Telescope National Facility.

The ASKAP will comprise an array of up to 36 parabolic dishes, mounted on concrete footings and distributed over the MRO. Each antenna will be 12 metres in diameter and able to sweep out an area of diameter 17 metres. There will be landscaping and erosion mitigation management surrounding each antenna and each antenna may be fenced in order to keep cattle away.

The ASKAP antenna array will be supported by a central compound containing a control building, as well as equipment, services and areas for storage required to support telescope maintenance. The central compound will be 6.25 ha and will be fenced to prevent access by stock and feral animals. A remote power generation facility will be located adjacent to the central compound. Other service infrastructure required on the MRO for ASKAP include power reticulation, inground data and communications cabling, water and waste water management. Approximately 36 km of access corridors will be required on the MRO to connect the ASKAP antennas and other ASKAP sites. ASKAP will occupy approximately 0.2% of the MRO.

2. The Murchison Widefield Array project

The Murchison Widefield Array (**MWA**) will be a radio interferometric telescope, operating on the MRO.

The MWA will consist of up to 512 'tiles', distributed over an area of approximately 2 km diameter. Each 'tile' consists of 16 radio antennas clipped to a square of steel mesh, approximately 3 m x 3 m in size. The steel mesh lies on the surface of the ground, without any need for anchors that penetrate the surface of the ground. The antennas have no moving parts and have a low impact upon the environment.

The tiles are connected to radio receivers. Sixty four of these receivers will be deployed for the MWA. The receivers will be housed in boxes approximately 1 x 0.6 x 0.6 m in height/width/length which will sit on concrete blocks in the field. The 64 receivers send data back to a central processing facility via cables. The MWA will share processing facilities, resources and buildings with ASKAP.

3. The Precision Array to Probe the Epoch of Reionisation project

The Precision Array to Probe the Epoch of Reionisation project (**PAPER**) is funded by the US National Science Foundation and led by a team from University of California, Berkeley.

PAPER's antenna elements are based on a 'sleeved dipole' which are mounted above wire mesh ground planes with PVC legs. The antennas will be moved into place via a cart and secured into the earth via stakes or cement blocks. A centrally located equipment hut, with associated generator and fuel tank, will house the relevant electronics. Radio-frequency and power connection of the antennas will be done via coaxial cable laid overground without trenching.

The PAPER team plans annual campaigns with an enlarged antenna array each year. The antennas will be deployed over approximately 1 square kilometre on the MRO with up to 256 antennas possibly deployed by 2011.

4. The Cosmological Reionisation Experiment

The Cosmological Reionisation Experiment (**CoRE**) aims to measure the sky spectrum with a novel, purpose-built log-spiral antenna.

The CoRE antenna is a single antenna built on wooden legs. The CoRE antenna will be stored in one of the buildings on the MRO site. When being used it will be moved from storage and placed onto the relevant area of the MRO and then re-stored at the conclusion of the experiment.

5. PrepSKA

PrepSKA is a project to conduct various preparatory studies for the SKA. It is an international collaboration initially involving 24 organisations from 12 countries (including Australia) and is partially funded by the European Union's *7th Framework Programme for Research and Technological Development*. PrepSKA starts in April 2008 and runs until 2011.

PrepSKA is a preparatory study that aims to address a number of issues surrounding the development of the SKA, including: the design for, and cost of, the SKA; where the SKA will be located; the legal framework and governance structure under which SKA will operate; how SKA will be funded; and the socio-economic impact of the SKA. PrepSKA will integrate research and development work from around the globe in order to develop an implementation plan for SKA that will form the basis of a funding proposal to governments to start the development of the SKA.

Given the breadth of the PrepSKA project many PrepSKA activities do not concern, or will not take place on, the MRO. However, some activities will be required to be conducted on the MRO as part of PrepSKA.

These may include:

(a) placing items of SKA-related equipment on site for environmental conditioning experiments on the MRO;

(b) placing a small-scale SKA technology demonstrator experiment on the MRO;

(c) undertaking site surveys to determine the suitability of the MRO for the SKA, including surveying and geotechnical studies, heritage survey work, radio-frequency monitoring work, and ionospheric and tropospheric monitoring; and

(d) visits to the MRO by PrepSKA personnel.