







SKA1-LOW CONFIGURATION COORDINATES

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TABLE OF CONTENTS

1	PURPOSE	5
2	CONTEXT	5
3	REFERENCES	5
4	SCOPE.....	5
5	ASSUMPTIONS	6
6	DESCRIPTION	6
	APPENDIX I	9

LIST OF FIGURES

Figure 1: Configuration of the 36 Outer Stations, 12 on each arm	7
Figure 2: A view of the SKA1-low Central Area (dotted circle).....	8

LIST OF TABLES

Table 1: WGS84 Positions of Centre and SKA1-low Outer Stations	9
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1 Purpose

This document is a step towards a full definition of the SKA1-low configuration, including coordinates. Its purposes are to enable:

- Heritage, environmental and geotechnical surveys of the ground area occupied by the antennas and infrastructure to be carried out. (Note that a topological survey has already been carried out);
- A more detailed layout of servicing routes (power and fibre), roads, buildings and other infrastructure to be carried out, particularly for the outer stations of the configuration.

Clearly this does not enable all the detailed infrastructure design to be done but it does provide useful constraints.

In the first half of 2016 it is intended to update this document, or replace it, to include all SKA1-low coordinates.

This document will be an Applicable Document in the Level 1 Requirements Specification for SKA1.

2 Context

The context is on-going work on designing an SKA1-low configuration that is optimised for the priority science. The document is primarily based on science and calibration requirements for SKA1-low. As a result of discussions carried out over the past year and analysis documents written (see Section 6), it is apparent that commitments to this level of definition can be made with an acceptable level of risk. Further work will yield definitions of the exact configuration with the region around the core of the array and the configuration of antennas within the outer stations.

3 References

The following documents are referenced in this document. In the event of conflict between the contents of the referenced documents and this document, this document shall take precedence.

- [1] SKA1 System Baseline Design, P.E. Dewdney, W. Turner, R. Millenaar, R. McCool, J. Lazio, T. J. Cornwell, SKA Document SKA-TEL-SKO-DD-001, Mar 12, 2013.
- [2] SKA1 Array Configurations, R. Braun and P. E. Dewdney, SKA Document SKA-OFF.AG.CNF-SKO-TN-001, May 16, 2014.
- [3] NIMA TR8350.2, Department of Defence World Geodetic System 1984, 3rd Edition Amendment 1, 3 January 2000.

4 Scope

This document defines the following aspects of the SKA1-low configuration:

1. A circular area (SKA1-low “Central Area”) around the core of the SKA1-low array, within which the central part of the array will lie.
2. The locations of Outer Stations, which lie outside the SKA1-low Central Area.

Neither the detailed configuration of antennas nor the number of antennas contained in items 1 and 2 are defined in this document.

5 Assumptions

The following assumptions are made herein:

1. The SKA1-low Central Area will be circular with a radius of 1700 m.
2. The Outer Stations will have a maximum diameter of 100 m.
3. The maximum number of antenna elements contained at an Outer Station location is 1730.
4. The minimum number of antenna elements contained at an Outer Station location is 256.
5. The total number of antenna elements in the SKA1-low system is 131,072.

6 Description

Reference [1] contains an initial rough outline of outer station positions for SKA1-low. These were further refined in [2]. The positions in [2] underwent scrutiny in Australia, which resulted in a change in the location for the core that is flood-free and provides protection from potential ASKAP RFI. The locations of the Outer Stations 16 – 36, have also been checked for major terrain features at that time. The Outer Station locations 1 – 15 are similar to those that had been studied previously in [2], but differ in detail since they must now interface to the re-baselined core.

Adjustments in the positions of some of the Outer Stations are expected, as more detailed surveys and more detailed servicing plans are developed and carried out in 2016. Any proposed changes will be documented, recorded and assessed for incorporation in the project or rejected in a subsequent Engineering Change Proposal (ECP). This work, if necessary, will be undertaken in parallel the work needed to finalise the design of the array configuration in the SKA1-low Central Area and Outer Stations.

Figure 1 found on the following page, is a map of the entire set of locations defined in this document. The longitudes and latitudes of the centre of the array and the Outer Stations are given in Appendix I.

Figure 2 found on the following pages, is a more detailed view of the map contained in Figure 1, showing the SKA1-low Central Area.

It is expected that these maps will be overlaid by a map showing the locations of infrastructure items to yield a complete area on the ground over which the surveys noted in Section 1 will be carried out.

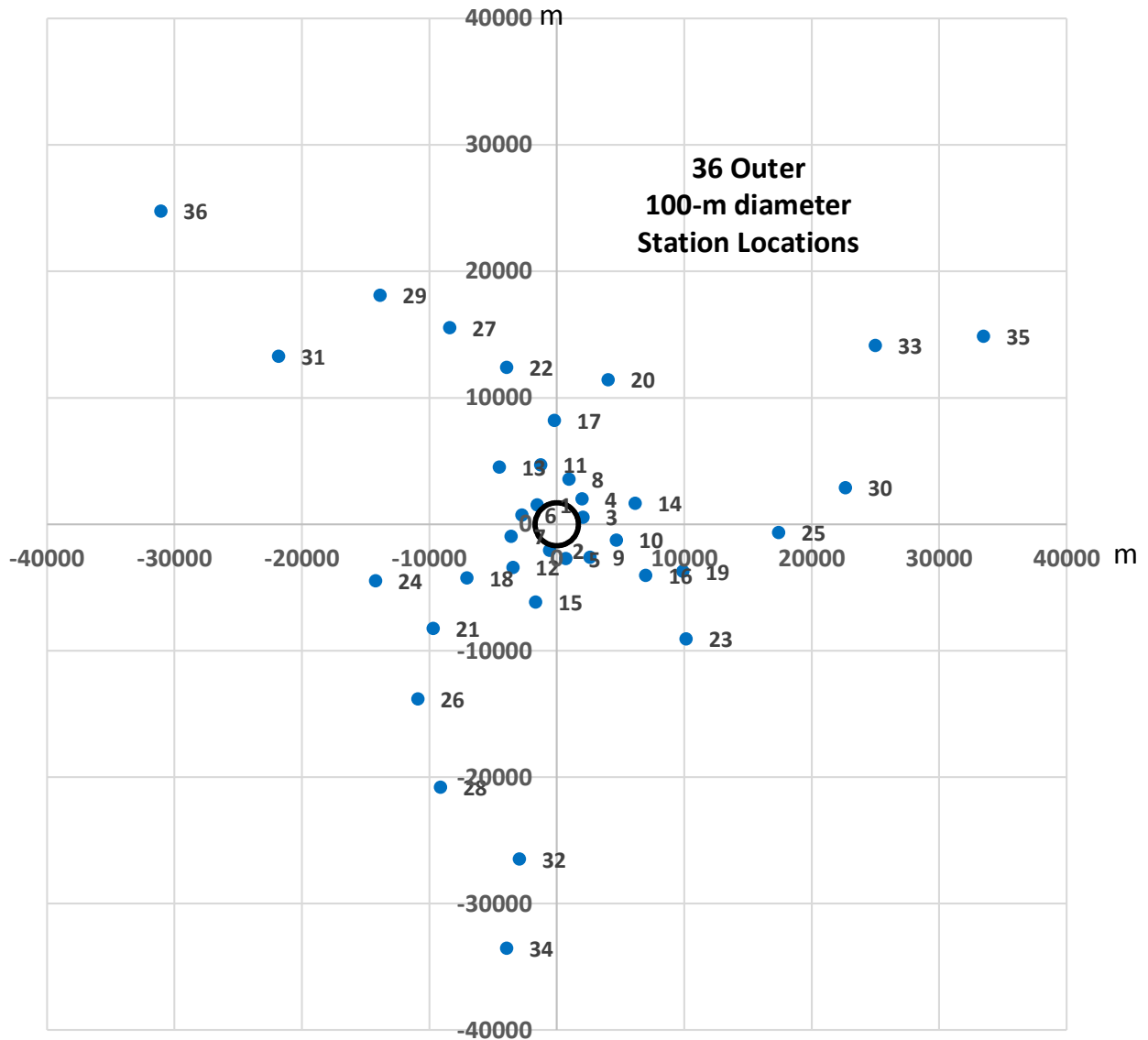


Figure 1: Configuration of the 36 Outer Stations, 12 on each arm

Notes:

- i. The circle at the centre is the SKA1-low Central Area.
- ii. Top is north, right is east.
- iii. The scale is metres.
- iv. Only 36 Outer Station location are shown. They may be more within the Central Area but these are not defined in this document.

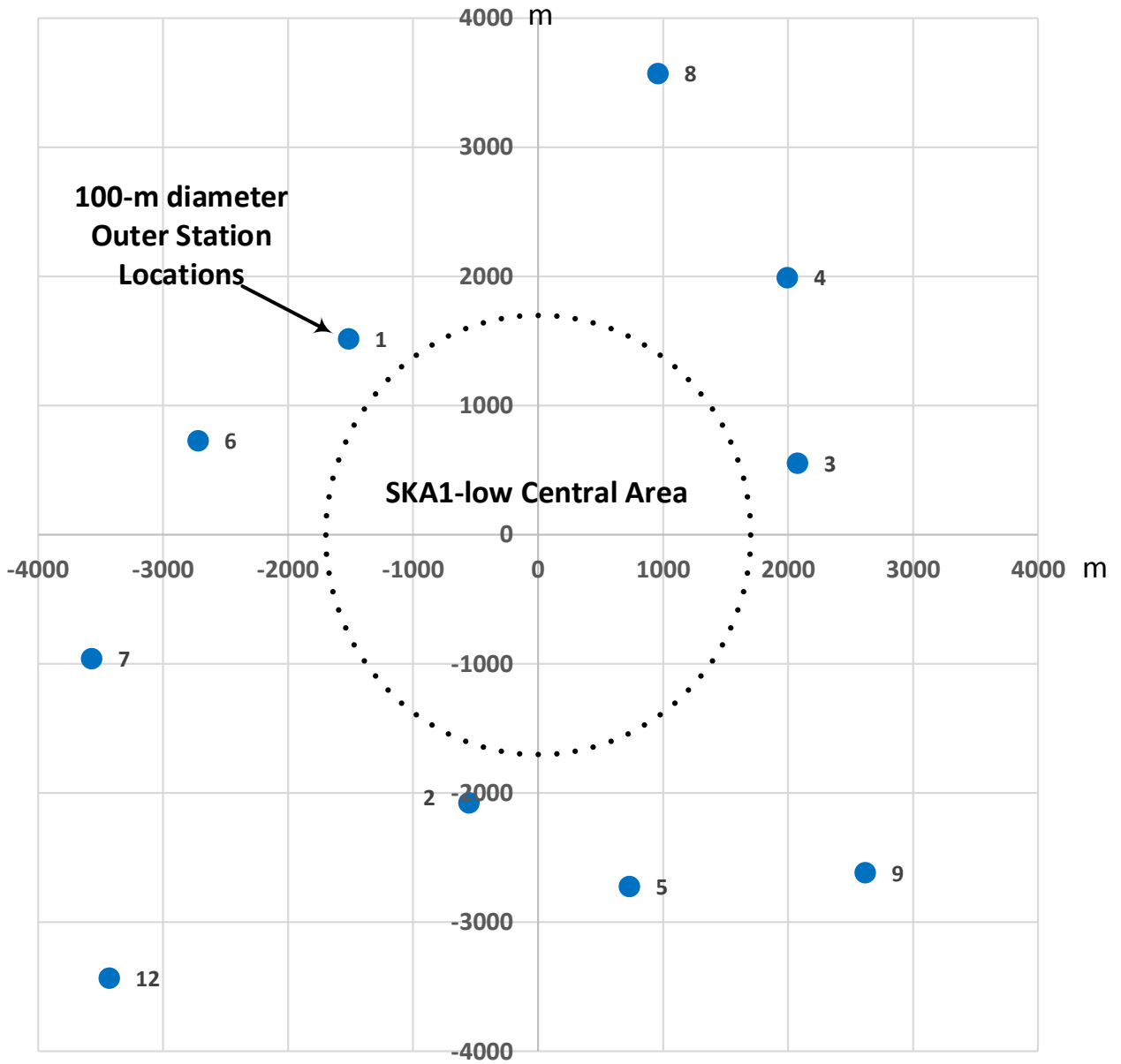


Figure 2: A view of the SKA1-low Central Area (dotted circle)

Notes:

- i. Top is north, right is east.
- ii. The scale is metres.
- iii. Blue dots are Outer Stations (refer to Figure 1)

Appendix I

Error! Reference source not found. below contains the WGS84¹ referenced set of locations for the SKA1-low Outer Stations, as illustrated in Figure 1 in the main text above.

Centre	116.7644482	-26.82472208
1	116.7491797	-26.81102098
2	116.7588582	-26.84344023
3	116.7853107	-26.81970614
4	116.7844836	-26.80674243
5	116.7717852	-26.84928846
6	116.7370678	-26.81813825
7	116.7285129	-26.83335554
8	116.7740734	-26.79248364
9	116.7907593	-26.84832051
10	116.8116119	-26.83604987
11	116.7518181	-26.78241122
12	116.7299145	-26.85569231
13	116.7191563	-26.78406519
14	116.8263363	-26.80982597
15	116.747852	-26.88025298
16	116.8348215	-26.86126621
17	116.7626524	-26.75058738
18	116.6935772	-26.86318028
19	116.8640443	-26.85834223
20	116.8050884	-26.72161848
21	116.6668311	-26.89899698
22	116.7249138	-26.7127388
23	116.8667572	-26.90649232
24	116.621399	-26.86517382
25	116.9397068	-26.83049082
26	116.664255	-26.946512
27	116.6800379	-26.68453449
28	116.6724647	-27.01235007
29	116.6251897	-26.66137532
30	116.9922138	-26.79850822
31	116.5452543	-26.70465545
32	116.7349805	-27.06371541
33	117.0156868	-26.69695418
34	116.7247807	-27.1274121
35	117.1009213	-26.69020697
36	116.4526286	-26.60101576

¹ WGS84 is an Earth-centred, Earth-fixed terrestrial reference system and geodetic datum [3].