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January 28, 2024

Robert Frank  
Utility Financial Analyst, Public  
Utilities Division  
North Dakota Public Service  
Commission  
600 E Boulevard Ave, Dept 408  
Bismarck, ND 58505-0480

### Detailed Shadow Flicker Modeling Results for Oliver Wind IV Energy Center

Dear Mr. Frank,

Per your request and as a supplement to Appendix B03, Shadow Flicker Assessment for the Oliver Wind IV Energy Center, the following information is provided as Exhibit 21:

- 1) Detailed hourly model output by receptor, including alternate turbine locations.
- 2) Detailed hourly model output by receptor in graphical format, including alternate turbine locations.
- 3) Detailed hourly model output by receptor in larger graphical format for the receptor locations with shadow flicker impacts of 20 hours or greater, including alternate turbine locations.
- 4) Aerial photograph showing the obstructions (trees and buildings) not considered in the shadow flicker assessment near Receptor 101.

Sincerely,

Mary Kaplan  
Air Quality Meteorologist  
AECOM  
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E: Mary.Kaplan@aecom.com

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**PU-23-317** Filed: 2/7/2024 Pages: 103 **62**  
**Exhibit 21 - Detailed Shadow Flicker Modeling Results**

Oliver Wind IV, LLC

**PU-23-318** Filed: 2/7/2024 Pages: 103  
**Exhibit 21 - Detailed Shadow Flicker Modeling Results**

Oliver Wind IV, LLC



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Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

### Assumptions for shadow calculations

Reference year for calendar

2023

Shadow receptor: R010 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (10)

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

| Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  |
|------|------|------|------|------|------|------|------|------|------|------|------|
| 0.54 | 0.52 | 0.61 | 0.58 | 0.64 | 0.67 | 0.75 | 0.72 | 0.67 | 0.53 | 0.42 | 0.45 |

Operational time

| N   | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW | NW  | NNW | Sum   |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| 376 | 314 | 339 | 425 | 445 | 474 | 693 | 570 | 488 | 386 | 872 | 609 | 772 | 651 | 677 | 667 | 8,758 |

|                     | January        | February       | March          | April          | May            | June           | July           | August         | September      | October        | November       | December       |
|---------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 1                   | 08:31<br>17:04 | 08:11<br>17:44 | 07:27<br>18:26 | 07:26<br>20:10 | 06:30<br>20:52 | 05:53<br>21:30 | 05:51<br>21:44 | 06:21<br>21:20 | 07:01<br>20:29 | 07:41<br>19:28 | 08:25<br>18:30 | 08:08<br>16:57 |
| 2                   | 08:31<br>17:04 | 08:10<br>17:46 | 07:25<br>18:27 | 07:24<br>20:11 | 06:29<br>20:53 | 05:52<br>21:31 | 05:52<br>21:44 | 06:22<br>21:19 | 07:02<br>20:27 | 07:42<br>19:26 | 08:26<br>18:28 | 08:09<br>16:56 |
| 3                   | 08:31<br>17:05 | 08:09<br>17:47 | 07:23<br>18:29 | 07:22<br>20:13 | 06:27<br>20:54 | 05:52<br>21:32 | 05:52<br>21:43 | 06:23<br>21:18 | 07:04<br>20:25 | 07:44<br>19:24 | 08:28<br>18:26 | 08:10<br>16:56 |
| 4                   | 08:31<br>17:06 | 08:07<br>17:49 | 07:21<br>18:30 | 07:20<br>20:14 | 06:25<br>20:56 | 05:51<br>21:33 | 05:53<br>21:43 | 06:25<br>21:16 | 07:05<br>20:23 | 07:45<br>19:22 | 08:29<br>18:25 | 08:11<br>16:55 |
| 5                   | 08:30<br>17:07 | 08:06<br>17:50 | 07:19<br>18:32 | 07:18<br>20:16 | 06:24<br>20:57 | 05:51<br>21:33 | 05:54<br>21:43 | 06:26<br>21:15 | 07:06<br>20:21 | 07:46<br>19:20 | 08:31<br>18:23 | 08:13<br>16:55 |
| 6                   | 08:30<br>17:08 | 08:05<br>17:52 | 07:17<br>18:33 | 07:16<br>20:17 | 06:22<br>20:58 | 05:50<br>21:34 | 05:54<br>21:43 | 06:27<br>21:13 | 07:08<br>20:19 | 07:48<br>19:18 | 08:32<br>18:22 | 08:14<br>16:55 |
| 7                   | 08:30<br>17:10 | 08:03<br>17:53 | 07:15<br>18:34 | 07:14<br>20:18 | 06:21<br>21:00 | 05:50<br>21:35 | 05:55<br>21:42 | 06:28<br>21:12 | 07:09<br>20:17 | 07:49<br>19:16 | 08:34<br>18:21 | 08:15<br>16:55 |
| 8                   | 08:30<br>17:11 | 08:02<br>17:55 | 07:13<br>18:36 | 07:12<br>20:20 | 06:19<br>21:01 | 05:49<br>21:36 | 05:56<br>21:42 | 06:30<br>21:10 | 07:10<br>20:15 | 07:50<br>19:14 | 08:35<br>18:19 | 08:16<br>16:54 |
| 9                   | 08:30<br>17:12 | 08:00<br>17:56 | 07:12<br>18:37 | 07:10<br>20:21 | 06:18<br>21:02 | 05:49<br>21:37 | 05:57<br>21:41 | 06:31<br>21:09 | 07:12<br>20:13 | 07:52<br>19:13 | 08:37<br>18:18 | 08:17<br>16:54 |
| 10                  | 08:29<br>17:13 | 07:59<br>17:58 | 07:10<br>18:39 | 07:08<br>20:23 | 06:16<br>21:04 | 05:48<br>21:37 | 05:57<br>21:41 | 06:32<br>21:07 | 07:13<br>20:11 | 07:53<br>19:11 | 08:38<br>18:17 | 08:18<br>16:54 |
| 11                  | 08:29<br>17:14 | 07:57<br>18:00 | 07:08<br>18:40 | 07:06<br>20:24 | 06:15<br>21:05 | 05:48<br>21:38 | 05:58<br>21:40 | 06:34<br>21:06 | 07:14<br>20:09 | 07:55<br>19:09 | 08:40<br>18:15 | 08:19<br>16:54 |
| 12                  | 08:28<br>17:15 | 07:56<br>18:02 | 08:06<br>18:42 | 07:04<br>20:25 | 06:14<br>21:06 | 05:48<br>21:39 | 05:59<br>21:40 | 06:35<br>21:04 | 07:16<br>20:07 | 07:56<br>19:07 | 08:41<br>18:14 | 08:20<br>16:54 |
| 13                  | 08:28<br>17:17 | 07:54<br>18:01 | 08:04<br>19:43 | 07:02<br>20:27 | 06:12<br>21:08 | 05:48<br>21:39 | 06:00<br>21:39 | 06:36<br>21:03 | 07:17<br>20:05 | 07:57<br>19:05 | 08:43<br>18:13 | 08:21<br>16:54 |
| 14                  | 08:27<br>17:18 | 07:53<br>18:03 | 08:02<br>19:45 | 07:00<br>20:28 | 06:11<br>21:09 | 05:48<br>21:40 | 06:01<br>21:39 | 06:37<br>21:01 | 07:18<br>20:03 | 07:59<br>19:03 | 08:44<br>18:12 | 08:22<br>16:54 |
| 15                  | 08:27<br>17:19 | 07:51<br>18:04 | 08:00<br>19:46 | 06:59<br>20:30 | 06:10<br>21:10 | 05:47<br>21:40 | 06:02<br>21:38 | 06:39<br>20:59 | 07:19<br>20:01 | 08:00<br>19:01 | 08:46<br>18:10 | 08:23<br>16:54 |
| 16                  | 08:26<br>17:21 | 07:49<br>18:06 | 07:58<br>19:47 | 06:57<br>20:31 | 06:08<br>21:12 | 05:47<br>21:41 | 06:03<br>21:37 | 06:40<br>20:58 | 07:21<br>19:59 | 08:02<br>18:57 | 08:47<br>18:09 | 08:23<br>16:54 |
| 17                  | 08:26<br>17:22 | 07:48<br>18:07 | 07:56<br>19:49 | 06:55<br>20:32 | 06:07<br>21:13 | 05:47<br>21:41 | 06:04<br>21:36 | 06:41<br>20:56 | 07:22<br>19:57 | 08:03<br>18:55 | 08:49<br>18:08 | 08:24<br>16:55 |
| 18                  | 08:25<br>17:23 | 07:46<br>18:09 | 07:54<br>19:50 | 06:53<br>20:34 | 06:06<br>21:14 | 05:47<br>21:42 | 06:05<br>21:35 | 06:43<br>20:54 | 07:23<br>19:55 | 08:04<br>18:54 | 08:50<br>18:07 | 08:25<br>16:55 |
| 19                  | 08:24<br>17:25 | 07:45<br>18:10 | 07:52<br>19:52 | 06:51<br>20:35 | 06:05<br>21:15 | 05:47<br>21:42 | 06:06<br>21:35 | 06:44<br>20:53 | 07:25<br>19:53 | 08:06<br>18:52 | 08:52<br>18:06 | 08:26<br>16:55 |
| 20                  | 08:23<br>17:26 | 07:43<br>18:12 | 07:50<br>19:53 | 06:49<br>20:36 | 06:04<br>21:17 | 05:48<br>21:43 | 06:07<br>21:34 | 06:45<br>20:51 | 07:26<br>19:51 | 08:07<br>18:50 | 08:53<br>18:05 | 08:26<br>16:55 |
| 21                  | 08:23<br>17:28 | 07:41<br>18:13 | 07:48<br>19:55 | 06:47<br>20:38 | 06:03<br>21:18 | 05:48<br>21:43 | 06:08<br>21:33 | 06:47<br>20:49 | 07:27<br>19:49 | 08:09<br>18:48 | 08:54<br>18:04 | 08:27<br>16:56 |
| 22                  | 08:22<br>17:29 | 07:39<br>18:15 | 07:46<br>19:56 | 06:46<br>20:39 | 06:02<br>21:19 | 05:48<br>21:43 | 06:09<br>21:32 | 06:48<br>20:47 | 07:29<br>19:47 | 08:10<br>18:46 | 08:56<br>18:03 | 08:27<br>16:56 |
| 23                  | 08:21<br>17:31 | 07:38<br>18:17 | 07:44<br>19:57 | 06:44<br>20:41 | 06:01<br>21:20 | 05:48<br>21:43 | 06:10<br>21:31 | 06:49<br>20:45 | 07:30<br>19:45 | 08:12<br>18:45 | 08:57<br>18:02 | 08:28<br>16:57 |
| 24                  | 08:20<br>17:32 | 07:36<br>18:18 | 07:42<br>19:59 | 06:42<br>20:42 | 06:00<br>21:21 | 05:48<br>21:44 | 06:11<br>21:30 | 06:51<br>20:44 | 07:31<br>19:43 | 08:13<br>18:43 | 08:59<br>18:01 | 08:28<br>16:57 |
| 25                  | 08:19<br>17:33 | 07:34<br>18:20 | 07:40<br>20:00 | 06:40<br>20:43 | 05:59<br>21:22 | 05:49<br>21:44 | 06:13<br>21:29 | 06:52<br>20:42 | 07:33<br>19:41 | 08:15<br>18:41 | 09:00<br>18:01 | 08:29<br>16:58 |
| 26                  | 08:18<br>17:35 | 07:32<br>18:21 | 07:38<br>20:02 | 06:39<br>20:45 | 05:58<br>21:24 | 05:49<br>21:44 | 06:14<br>21:28 | 06:53<br>20:40 | 07:34<br>19:38 | 08:16<br>18:39 | 09:01<br>18:00 | 08:29<br>16:59 |
| 27                  | 08:17<br>17:36 | 07:30<br>18:23 | 07:36<br>20:03 | 06:37<br>20:46 | 05:57<br>21:25 | 05:49<br>21:44 | 06:15<br>21:26 | 06:55<br>20:38 | 07:35<br>19:36 | 08:18<br>18:38 | 09:03<br>18:00 | 08:30<br>16:59 |
| 28                  | 08:16<br>17:38 | 07:29<br>18:24 | 07:34<br>20:04 | 06:35<br>20:48 | 05:56<br>21:26 | 05:50<br>21:44 | 06:16<br>21:25 | 06:56<br>20:36 | 07:37<br>19:34 | 08:19<br>18:36 | 09:04<br>18:00 | 08:30<br>17:00 |
| 29                  | 08:15<br>17:39 | 07:27<br>18:26 | 07:32<br>20:06 | 06:34<br>20:49 | 05:55<br>21:27 | 05:50<br>21:44 | 06:17<br>21:24 | 06:57<br>20:34 | 07:38<br>19:32 | 08:20<br>18:34 | 09:05<br>18:00 | 08:30<br>17:01 |
| 30                  | 08:14<br>17:41 | 07:25<br>18:27 | 07:30<br>20:07 | 06:32<br>20:50 | 05:54<br>21:28 | 05:51<br>21:44 | 06:18<br>21:23 | 06:58<br>20:32 | 07:39<br>19:30 | 08:22<br>18:33 | 09:07<br>18:00 | 08:30<br>17:02 |
| 31                  | 08:12<br>17:43 | 07:23<br>18:29 | 07:28<br>20:09 | 05:54<br>21:29 | 05:54<br>21:29 | 05:54<br>21:22 | 06:20<br>20:30 | 07:00<br>18:31 | 07:00<br>18:31 | 08:23<br>18:31 | 09:08<br>18:00 | 08:30<br>17:02 |
| Potential sun hours | 277            | 286            | 367            | 406            | 466            | 475            | 481            | 443            | 380            | 339            | 282            | 266            |
| Total, worst case   |                |                |                |                |                |                |                |                |                |                |                |                |
| Sun reduction       |                |                |                |                |                |                |                |                |                |                |                |                |
| Oper. time red.     |                |                |                |                |                |                |                |                |                |                |                |                |
| Wind dir. red.      |                |                |                |                |                |                |                |                |                |                |                |                |
| Total reduction     |                |                |                |                |                |                |                |                |                |                |                |                |
| Total, real         |                |                |                |                |                |                |                |                |                |                |                |                |

Table layout: For each day in each month the following matrix apply

|              |                      |                                 |                                  |
|--------------|----------------------|---------------------------------|----------------------------------|
| Day in month | Sun rise (hh:mm)     | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|              | Sun set (hh:mm)      | Last time (hh:mm) with flicker  | (WTG causing flicker last time)  |
|              | Minutes with flicker |                                 |                                  |

Project:

Oliver IV Array 012 8/26/2023

Licensed user:

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+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: R011 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (11)

## Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Reference year for calendar

2023

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

|                     | January        | February       | March          | April          | May            | June           | July           | August         | September      | October        | November       | December       |
|---------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 1                   | 08:31<br>17:03 | 08:11<br>17:44 | 07:27<br>18:26 | 07:26<br>20:10 | 06:30<br>20:52 | 05:53<br>21:30 | 05:51<br>21:44 | 06:21<br>21:20 | 07:01<br>20:29 | 07:41<br>19:28 | 08:25<br>18:30 | 08:08<br>16:57 |
| 2                   | 08:31<br>17:04 | 08:10<br>17:46 | 07:25<br>18:27 | 07:24<br>20:11 | 06:29<br>20:53 | 05:52<br>21:31 | 05:52<br>21:44 | 06:22<br>21:19 | 07:02<br>20:27 | 07:42<br>19:26 | 08:26<br>18:28 | 08:09<br>16:56 |
| 3                   | 08:31<br>17:05 | 08:09<br>17:47 | 07:23<br>18:29 | 07:22<br>20:13 | 06:27<br>20:54 | 05:52<br>21:32 | 05:52<br>21:43 | 06:23<br>21:18 | 07:04<br>20:25 | 07:43<br>19:24 | 08:28<br>18:26 | 08:10<br>16:56 |
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| 5                   | 08:30<br>17:07 | 08:06<br>17:50 | 07:19<br>18:32 | 07:18<br>20:16 | 06:24<br>20:57 | 05:51<br>21:33 | 05:54<br>21:43 | 06:26<br>21:15 | 07:06<br>20:21 | 07:46<br>19:20 | 07:31<br>18:23 | 08:13<br>16:55 |
| 6                   | 08:30<br>17:08 | 08:05<br>17:52 | 07:17<br>18:33 | 07:16<br>20:17 | 06:22<br>20:58 | 05:50<br>21:34 | 05:54<br>21:43 | 06:27<br>21:13 | 07:08<br>20:19 | 07:48<br>19:18 | 07:32<br>18:22 | 08:14<br>16:55 |
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| 8                   | 08:30<br>17:11 | 08:02<br>17:55 | 07:13<br>18:36 | 07:12<br>20:20 | 06:19<br>21:01 | 05:49<br>21:36 | 05:56<br>21:42 | 06:30<br>21:10 | 07:10<br>20:15 | 07:50<br>19:14 | 07:35<br>18:19 | 08:16<br>16:54 |
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| 10                  | 08:29<br>17:13 | 07:59<br>17:58 | 07:10<br>18:39 | 07:08<br>20:23 | 06:16<br>21:04 | 05:48<br>21:37 | 05:57<br>21:41 | 06:32<br>21:07 | 07:13<br>20:11 | 07:53<br>19:11 | 07:38<br>18:17 | 08:18<br>16:54 |
| 11                  | 08:29<br>17:14 | 07:57<br>18:00 | 07:08<br>18:40 | 07:06<br>20:24 | 06:15<br>21:05 | 05:48<br>21:38 | 05:58<br>21:40 | 06:34<br>21:06 | 07:14<br>20:09 | 07:54<br>19:09 | 07:40<br>18:15 | 08:19<br>16:54 |
| 12                  | 08:28<br>17:15 | 07:56<br>18:02 | 08:06<br>18:42 | 07:04<br>20:25 | 06:14<br>21:06 | 05:48<br>21:39 | 05:59<br>21:40 | 06:35<br>21:04 | 07:16<br>20:07 | 07:56<br>19:07 | 07:41<br>18:14 | 08:20<br>16:54 |
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| 14                  | 08:27<br>17:18 | 07:53<br>18:03 | 08:02<br>19:45 | 07:00<br>20:28 | 06:11<br>21:09 | 05:48<br>21:40 | 06:01<br>21:38 | 06:37<br>21:01 | 07:18<br>20:03 | 07:59<br>19:03 | 07:44<br>18:12 | 08:22<br>16:54 |
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| 16                  | 08:26<br>17:21 | 07:49<br>18:06 | 07:58<br>19:47 | 06:57<br>20:31 | 06:08<br>21:12 | 05:47<br>21:41 | 06:03<br>21:37 | 06:40<br>20:58 | 07:21<br>19:59 | 08:02<br>18:57 | 07:47<br>18:09 | 08:23<br>16:54 |
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| 18                  | 08:25<br>17:23 | 07:46<br>18:09 | 07:54<br>19:50 | 06:53<br>20:34 | 06:06<br>21:14 | 05:47<br>21:42 | 06:05<br>21:35 | 06:43<br>20:54 | 07:23<br>19:55 | 08:04<br>18:53 | 07:50<br>18:07 | 08:25<br>16:55 |
| 19                  | 08:24<br>17:25 | 07:44<br>18:10 | 07:52<br>19:52 | 06:51<br>20:35 | 06:05<br>21:15 | 05:47<br>21:42 | 06:06<br>21:35 | 06:44<br>20:52 | 07:25<br>19:53 | 08:06<br>18:52 | 07:52<br>18:06 | 08:26<br>16:55 |
| 20                  | 08:23<br>17:26 | 07:43<br>18:12 | 07:50<br>19:53 | 06:49<br>20:36 | 06:04<br>21:17 | 05:48<br>21:43 | 06:07<br>21:34 | 06:45<br>20:51 | 07:26<br>19:51 | 08:07<br>18:50 | 07:53<br>18:05 | 08:26<br>16:55 |
| 21                  | 08:23<br>17:28 | 07:41<br>18:13 | 07:48<br>19:55 | 06:47<br>20:38 | 06:03<br>21:18 | 05:48<br>21:43 | 06:08<br>21:33 | 06:47<br>20:49 | 07:27<br>19:49 | 08:09<br>18:48 | 07:54<br>18:04 | 08:27<br>16:56 |
| 22                  | 08:22<br>17:29 | 07:39<br>18:15 | 07:46<br>19:56 | 06:46<br>20:39 | 06:02<br>21:19 | 05:48<br>21:43 | 06:09<br>21:32 | 06:48<br>20:47 | 07:29<br>19:47 | 08:10<br>18:46 | 07:56<br>18:03 | 08:27<br>16:56 |
| 23                  | 08:21<br>17:31 | 07:38<br>18:17 | 07:44<br>19:57 | 06:44<br>20:41 | 06:01<br>21:20 | 05:48<br>21:43 | 06:10<br>21:31 | 06:49<br>20:45 | 07:30<br>19:45 | 08:12<br>18:45 | 07:57<br>18:02 | 08:28<br>16:57 |
| 24                  | 08:20<br>17:32 | 07:36<br>18:18 | 07:42<br>19:59 | 06:42<br>20:42 | 06:00<br>21:21 | 05:48<br>21:44 | 06:11<br>21:30 | 06:51<br>20:44 | 07:31<br>19:43 | 08:13<br>18:43 | 07:59<br>18:01 | 08:28<br>16:57 |
| 25                  | 08:19<br>17:33 | 07:34<br>18:20 | 07:40<br>20:00 | 06:40<br>20:43 | 05:59<br>21:22 | 05:49<br>21:44 | 06:13<br>21:29 | 06:52<br>20:42 | 07:33<br>19:40 | 08:15<br>18:41 | 08:00<br>18:01 | 08:29<br>16:58 |
| 26                  | 08:18<br>17:35 | 07:32<br>18:21 | 07:38<br>20:02 | 06:39<br>20:45 | 05:58<br>21:24 | 05:49<br>21:44 | 06:14<br>21:28 | 06:53<br>20:40 | 07:34<br>19:38 | 08:16<br>18:39 | 08:01<br>18:00 | 08:29<br>16:59 |
| 27                  | 08:17<br>17:36 | 07:30<br>18:23 | 07:36<br>20:03 | 06:37<br>20:46 | 05:57<br>21:25 | 05:49<br>21:44 | 06:15<br>21:26 | 06:55<br>20:38 | 07:35<br>19:36 | 08:17<br>18:38 | 08:03<br>18:00 | 08:29<br>16:59 |
| 28                  | 08:16<br>17:38 | 07:29<br>18:24 | 07:34<br>20:04 | 06:35<br>20:48 | 05:56<br>21:26 | 05:50<br>21:44 | 06:16<br>21:25 | 06:56<br>20:36 | 07:37<br>19:34 | 08:19<br>18:36 | 08:04<br>18:00 | 08:30<br>17:00 |
| 29                  | 08:15<br>17:39 | 07:28<br>18:24 | 07:32<br>20:06 | 06:34<br>20:49 | 05:55<br>21:27 | 05:50<br>21:44 | 06:17<br>21:24 | 06:57<br>20:34 | 07:38<br>19:32 | 08:20<br>18:34 | 08:05<br>18:00 | 08:30<br>17:01 |
| 30                  | 08:14<br>17:41 | 07:27<br>18:27 | 07:30<br>20:07 | 06:32<br>20:50 | 05:54<br>21:28 | 05:51<br>21:44 | 06:18<br>21:23 | 06:58<br>20:32 | 07:39<br>19:30 | 08:22<br>18:33 | 08:07<br>18:00 | 08:30<br>17:01 |
| 31                  | 08:12<br>17:43 | 07:25<br>18:29 | 07:28<br>20:09 | 06:30<br>21:29 | 05:53<br>21:29 | 05:54<br>21:44 | 06:20<br>21:22 | 07:00<br>20:30 | 08:23<br>18:31 | 08:23<br>18:31 | 08:30<br>18:31 | 08:30<br>17:02 |
| Potential sun hours | 277            | 286            | 367            | 406            | 466            | 475            | 481            | 443            | 380            | 339            | 282            | 266            |
| Total, worst case   |                |                |                |                |                |                |                |                |                |                |                |                |
| Sun reduction       |                |                |                |                |                |                |                |                |                |                |                |                |
| Oper. time red.     |                |                |                |                |                |                |                |                |                |                |                |                |
| Wind dir. red.      |                |                |                |                |                |                |                |                |                |                |                |                |
| Total reduction     |                |                |                |                |                |                |                |                |                |                |                |                |
| Total, real         |                |                |                |                |                |                |                |                |                |                |                |                |

Table layout: For each day in each month the following matrix apply

|              |                      |                                 |                                  |
|--------------|----------------------|---------------------------------|----------------------------------|
| Day in month | Sun rise (hh:mm)     | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|              | Sun set (hh:mm)      | Last time (hh:mm) with flicker  | (WTG causing flicker last time)  |
|              | Minutes with flicker |                                 |                                  |



Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM  
US-01824-3627 Chelmsford  
+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: R012 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (12)

### Assumptions for shadow calculations

Reference year for calendar

2023

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

|      |      |      |      |      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|------|------|------|------|
| Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  |
| 0.54 | 0.52 | 0.61 | 0.58 | 0.64 | 0.67 | 0.75 | 0.72 | 0.67 | 0.53 | 0.42 | 0.45 |

Operational time

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| N   | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW | NW  | NNW | Sum   |
| 376 | 314 | 339 | 425 | 445 | 474 | 693 | 570 | 488 | 386 | 872 | 609 | 772 | 651 | 677 | 667 | 8,758 |

|                     | January        | February       | March          | April          | May            | June           | July           | August         | September      | October        | November       | December       |
|---------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 1                   | 08:31<br>17:04 | 08:11<br>17:44 | 07:27<br>18:26 | 07:26<br>20:10 | 06:30<br>20:52 | 05:53<br>21:30 | 05:51<br>21:44 | 06:21<br>21:20 | 07:01<br>20:29 | 07:41<br>19:28 | 08:25<br>18:30 | 08:08<br>16:57 |
| 2                   | 08:31<br>17:05 | 08:10<br>17:47 | 07:25<br>18:29 | 07:24<br>20:13 | 06:29<br>20:54 | 05:52<br>21:32 | 05:52<br>21:43 | 06:22<br>21:18 | 07:02<br>20:25 | 07:42<br>19:24 | 08:26<br>18:27 | 08:09<br>16:56 |
| 3                   | 08:31<br>17:05 | 08:09<br>17:46 | 07:23<br>18:27 | 07:22<br>20:11 | 06:27<br>20:53 | 05:52<br>21:31 | 05:52<br>21:44 | 06:23<br>21:19 | 07:04<br>20:27 | 07:44<br>19:26 | 08:28<br>18:28 | 08:10<br>16:56 |
| 4                   | 08:31<br>17:06 | 08:07<br>17:49 | 07:21<br>18:30 | 07:20<br>20:14 | 06:26<br>20:56 | 05:51<br>21:33 | 05:53<br>21:43 | 06:25<br>21:16 | 07:05<br>20:23 | 07:45<br>19:22 | 08:29<br>18:25 | 08:11<br>16:56 |
| 5                   | 08:30<br>17:07 | 08:06<br>17:50 | 07:19<br>18:32 | 07:18<br>20:16 | 06:24<br>20:57 | 05:51<br>21:33 | 05:54<br>21:43 | 06:26<br>21:15 | 07:06<br>20:21 | 07:46<br>19:20 | 07:31<br>18:24 | 08:13<br>16:55 |
| 6                   | 08:30<br>17:09 | 08:05<br>17:52 | 07:17<br>18:33 | 07:16<br>20:17 | 06:22<br>20:58 | 05:50<br>21:34 | 05:54<br>21:43 | 06:27<br>21:13 | 07:08<br>20:19 | 07:48<br>19:18 | 07:32<br>18:22 | 08:14<br>16:55 |
| 7                   | 08:30<br>17:10 | 08:03<br>17:53 | 07:15<br>18:35 | 07:14<br>20:18 | 06:21<br>21:00 | 05:50<br>21:35 | 05:55<br>21:42 | 06:28<br>21:12 | 07:09<br>20:17 | 07:49<br>19:16 | 07:34<br>18:21 | 08:15<br>16:55 |
| 8                   | 08:30<br>17:11 | 08:02<br>17:55 | 07:13<br>18:36 | 07:12<br>20:20 | 06:19<br>21:01 | 05:49<br>21:36 | 05:56<br>21:42 | 06:30<br>21:10 | 07:10<br>20:15 | 07:50<br>19:15 | 07:35<br>18:19 | 08:16<br>16:54 |
| 9                   | 08:30<br>17:12 | 08:00<br>17:57 | 07:12<br>18:37 | 07:10<br>20:21 | 06:18<br>21:02 | 05:49<br>21:37 | 05:57<br>21:41 | 06:31<br>21:09 | 07:12<br>20:13 | 07:52<br>19:13 | 07:37<br>18:17 | 08:17<br>16:54 |
| 10                  | 08:29<br>17:13 | 07:59<br>17:58 | 07:10<br>18:39 | 07:08<br>20:23 | 06:17<br>21:04 | 05:49<br>21:37 | 05:58<br>21:41 | 06:32<br>21:07 | 07:13<br>20:11 | 07:53<br>19:11 | 07:38<br>18:17 | 08:18<br>16:54 |
| 11                  | 08:29<br>17:14 | 07:57<br>18:00 | 07:08<br>18:40 | 07:06<br>20:24 | 06:15<br>21:05 | 05:48<br>21:38 | 05:58<br>21:40 | 06:34<br>21:06 | 07:14<br>20:09 | 07:55<br>19:09 | 07:40<br>18:15 | 08:19<br>16:54 |
| 12                  | 08:28<br>17:16 | 07:56<br>18:00 | 08:06<br>18:42 | 07:04<br>20:25 | 06:14<br>21:06 | 05:48<br>21:39 | 05:59<br>21:40 | 06:35<br>21:04 | 07:16<br>20:07 | 07:56<br>19:07 | 07:41<br>18:14 | 08:20<br>16:54 |
| 13                  | 08:28<br>17:17 | 07:54<br>18:01 | 08:04<br>19:43 | 07:02<br>20:27 | 06:12<br>21:08 | 05:48<br>21:39 | 06:00<br>21:39 | 06:36<br>21:03 | 07:17<br>20:05 | 07:57<br>19:05 | 07:43<br>18:13 | 08:21<br>16:54 |
| 14                  | 08:27<br>17:18 | 07:53<br>18:03 | 08:02<br>19:45 | 07:01<br>20:28 | 06:11<br>21:09 | 05:48<br>21:40 | 06:01<br>21:38 | 06:38<br>21:01 | 07:18<br>20:03 | 07:59<br>19:03 | 07:44<br>18:12 | 08:22<br>16:54 |
| 15                  | 08:27<br>17:19 | 07:51<br>18:04 | 08:00<br>19:46 | 06:59<br>20:30 | 06:10<br>21:10 | 05:48<br>21:40 | 06:02<br>21:38 | 06:39<br>20:59 | 07:20<br>20:01 | 08:00<br>19:01 | 07:46<br>18:10 | 08:23<br>16:54 |
| 16                  | 08:26<br>17:21 | 07:49<br>18:06 | 07:58<br>19:48 | 06:57<br>20:31 | 06:09<br>21:12 | 05:48<br>21:41 | 06:03<br>21:37 | 06:40<br>20:58 | 07:21<br>19:59 | 08:02<br>18:57 | 07:47<br>18:09 | 08:23<br>16:54 |
| 17                  | 08:26<br>17:22 | 07:48<br>18:07 | 07:56<br>19:49 | 06:55<br>20:32 | 06:07<br>21:13 | 05:47<br>21:41 | 06:04<br>21:36 | 06:41<br>20:56 | 07:22<br>19:57 | 08:03<br>18:55 | 07:49<br>18:08 | 08:24<br>16:55 |
| 18                  | 08:25<br>17:23 | 07:46<br>18:09 | 07:54<br>19:50 | 06:53<br>20:34 | 06:06<br>21:14 | 05:47<br>21:42 | 06:05<br>21:35 | 06:43<br>20:54 | 07:24<br>19:55 | 08:04<br>18:54 | 07:50<br>18:07 | 08:25<br>16:55 |
| 19                  | 08:24<br>17:25 | 07:45<br>18:10 | 07:52<br>19:52 | 06:51<br>20:35 | 06:05<br>21:15 | 05:48<br>21:42 | 06:06<br>21:35 | 06:44<br>20:53 | 07:25<br>19:53 | 08:06<br>18:52 | 07:52<br>18:06 | 08:26<br>16:55 |
| 20                  | 08:23<br>17:26 | 07:43<br>18:12 | 07:50<br>19:53 | 06:49<br>20:36 | 06:04<br>21:17 | 05:48<br>21:43 | 06:07<br>21:34 | 06:45<br>20:51 | 07:26<br>19:51 | 08:07<br>18:50 | 07:53<br>18:05 | 08:26<br>16:56 |
| 21                  | 08:23<br>17:28 | 07:41<br>18:14 | 07:48<br>19:55 | 06:48<br>20:38 | 06:03<br>21:18 | 05:48<br>21:43 | 06:08<br>21:33 | 06:47<br>20:49 | 07:27<br>19:49 | 08:09<br>18:48 | 07:54<br>18:04 | 08:27<br>16:56 |
| 22                  | 08:22<br>17:29 | 07:39<br>18:15 | 07:46<br>19:56 | 06:46<br>20:39 | 06:02<br>21:19 | 05:48<br>21:43 | 06:09<br>21:32 | 06:48<br>20:47 | 07:29<br>19:47 | 08:10<br>18:46 | 07:56<br>18:03 | 08:27<br>16:56 |
| 23                  | 08:21<br>17:31 | 07:38<br>18:17 | 07:44<br>19:57 | 06:44<br>20:41 | 06:01<br>21:20 | 05:48<br>21:43 | 06:10<br>21:31 | 06:49<br>20:45 | 07:30<br>19:45 | 08:12<br>18:45 | 07:57<br>18:02 | 08:28<br>16:57 |
| 24                  | 08:20<br>17:32 | 07:36<br>18:18 | 07:42<br>19:59 | 06:42<br>20:42 | 06:00<br>21:21 | 05:48<br>21:44 | 06:11<br>21:30 | 06:51<br>20:44 | 07:31<br>19:43 | 08:13<br>18:43 | 07:59<br>18:02 | 08:28<br>16:57 |
| 25                  | 08:19<br>17:34 | 07:34<br>18:20 | 07:40<br>20:00 | 06:40<br>20:43 | 05:59<br>21:22 | 05:49<br>21:44 | 06:13<br>21:29 | 06:52<br>20:42 | 07:33<br>19:41 | 08:15<br>18:41 | 08:00<br>18:01 | 08:29<br>16:58 |
| 26                  | 08:18<br>17:35 | 07:32<br>18:21 | 07:38<br>20:02 | 06:39<br>20:45 | 05:58<br>21:24 | 05:49<br>21:44 | 06:14<br>21:28 | 06:53<br>20:40 | 07:34<br>19:39 | 08:16<br>18:39 | 08:01<br>18:00 | 08:29<br>16:59 |
| 27                  | 08:17<br>17:37 | 07:30<br>18:23 | 07:36<br>20:03 | 06:37<br>20:46 | 05:57<br>21:25 | 05:49<br>21:44 | 06:15<br>21:26 | 06:55<br>20:38 | 07:35<br>19:36 | 08:18<br>18:38 | 08:03<br>18:00 | 08:29<br>16:59 |
| 28                  | 08:16<br>17:38 | 07:29<br>18:24 | 07:34<br>20:05 | 06:35<br>20:48 | 05:56<br>21:26 | 05:50<br>21:44 | 06:16<br>21:25 | 06:56<br>20:36 | 07:37<br>19:34 | 08:19<br>18:36 | 08:04<br>18:00 | 08:30<br>17:00 |
| 29                  | 08:15<br>17:40 | 07:28<br>18:24 | 07:32<br>20:06 | 06:34<br>20:49 | 05:55<br>21:27 | 05:50<br>21:44 | 06:17<br>21:24 | 06:57<br>20:34 | 07:38<br>19:32 | 08:20<br>18:34 | 08:05<br>18:00 | 08:30<br>17:01 |
| 30                  | 08:14<br>17:41 | 07:27<br>18:25 | 07:30<br>20:07 | 06:32<br>20:50 | 05:54<br>21:28 | 05:51<br>21:44 | 06:19<br>21:23 | 06:59<br>20:32 | 07:39<br>19:30 | 08:22<br>18:33 | 08:07<br>18:00 | 08:30<br>17:02 |
| 31                  | 08:12<br>17:43 | 07:25<br>18:26 | 07:28<br>20:09 | 05:54<br>21:29 | 05:54<br>21:29 | 05:54<br>21:29 | 06:20<br>21:22 | 07:00<br>20:30 | 08:23<br>18:31 | 08:30<br>18:31 | 08:30<br>18:31 | 08:30<br>17:02 |
| Potential sun hours | 277            | 286            | 367            | 406            | 466            | 475            | 481            | 443            | 380            | 339            | 282            | 266            |
| Total, worst case   |                |                |                |                |                |                |                |                |                |                |                |                |
| Sun reduction       |                |                |                |                |                |                |                |                |                |                |                |                |
| Oper. time red.     |                |                |                |                |                |                |                |                |                |                |                |                |
| Wind dir. red.      |                |                |                |                |                |                |                |                |                |                |                |                |
| Total reduction     |                |                |                |                |                |                |                |                |                |                |                |                |
| Total, real         |                |                |                |                |                |                |                |                |                |                |                |                |

Table layout: For each day in each month the following matrix apply

|              |                      |                                 |                                  |
|--------------|----------------------|---------------------------------|----------------------------------|
| Day in month | Sun rise (hh:mm)     | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|              | Sun set (hh:mm)      | Last time (hh:mm) with flicker  | (WTG causing flicker last time)  |
|              | Minutes with flicker |                                 |                                  |

Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM  
US-01824-3627 Chelmsford  
+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: R013 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (13)

## Assumptions for shadow calculations

Reference year for calendar

2023

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

| Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  |
|------|------|------|------|------|------|------|------|------|------|------|------|
| 0.54 | 0.52 | 0.61 | 0.58 | 0.64 | 0.67 | 0.75 | 0.72 | 0.67 | 0.53 | 0.42 | 0.45 |

Operational time

| N   | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW | NW  | NNW | Sum   |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| 376 | 314 | 339 | 425 | 445 | 474 | 693 | 570 | 488 | 386 | 872 | 609 | 772 | 651 | 677 | 667 | 8,758 |

|                     | January       | February | March | April | May   | June  | July  | August | September | October | November | December     |               |
|---------------------|---------------|----------|-------|-------|-------|-------|-------|--------|-----------|---------|----------|--------------|---------------|
| 1   08:30           | 16:14 (72)    | 08:11    | 07:27 | 07:26 | 06:30 | 05:53 | 05:51 | 06:21  | 07:01     | 07:41   | 08:25    | 08:08        | 16:07 (72)    |
| 2   17:04           | 22 16:36 (72) | 17:44    | 18:26 | 20:10 | 20:52 | 21:30 | 21:44 | 21:20  | 20:29     | 19:28   | 18:30    | 16:57        | 10 16:17 (72) |
| 3   08:31           | 16:14 (72)    | 08:10    | 07:25 | 07:24 | 06:29 | 05:52 | 05:52 | 06:22  | 07:02     | 07:42   | 08:26    | 08:09        | 16:05 (72)    |
| 4   17:04           | 23 16:37 (72) | 17:46    | 18:27 | 20:11 | 20:53 | 21:31 | 21:44 | 21:19  | 20:27     | 19:26   | 18:28    | 16:56        | 14 16:19 (72) |
| 5   08:31           | 16:15 (72)    | 08:09    | 07:23 | 07:22 | 06:27 | 05:52 | 05:52 | 06:23  | 07:04     | 07:43   | 08:28    | 08:10        | 16:04 (72)    |
| 6   17:05           | 23 16:38 (72) | 17:47    | 18:29 | 20:13 | 20:54 | 21:32 | 21:43 | 21:18  | 20:25     | 19:24   | 18:26    | 16:56        | 16 16:20 (72) |
| 7   08:30           | 16:15 (72)    | 08:07    | 07:21 | 07:20 | 06:25 | 05:51 | 05:53 | 06:25  | 07:05     | 07:45   | 08:29    | 08:11        | 16:04 (72)    |
| 8   17:06           | 22 16:37 (72) | 17:49    | 18:30 | 20:14 | 20:56 | 21:33 | 21:43 | 21:16  | 20:23     | 19:22   | 18:25    | 16:55        | 17 16:21 (72) |
| 9   08:30           | 16:16 (72)    | 08:06    | 07:19 | 07:18 | 06:24 | 05:51 | 05:54 | 06:26  | 07:06     | 07:46   | 08:31    | 08:13        | 16:04 (72)    |
| 10   17:07          | 22 16:38 (72) | 17:50    | 18:32 | 20:16 | 20:57 | 21:33 | 21:43 | 21:15  | 20:21     | 19:20   | 18:24    | 16:55        | 19 16:23 (72) |
| 11   08:30          | 16:17 (72)    | 08:05    | 07:17 | 07:16 | 06:22 | 05:50 | 05:54 | 06:27  | 07:08     | 07:48   | 08:32    | 08:14        | 16:04 (72)    |
| 12   17:09          | 21 16:38 (72) | 17:52    | 18:33 | 20:17 | 20:58 | 21:34 | 21:43 | 21:13  | 20:19     | 19:18   | 18:22    | 16:55        | 19 16:23 (72) |
| 13   08:30          | 16:18 (72)    | 08:03    | 07:15 | 07:14 | 06:21 | 05:50 | 05:55 | 06:28  | 07:09     | 07:49   | 08:34    | 08:15        | 16:04 (72)    |
| 14   17:10          | 20 16:38 (72) | 17:53    | 18:34 | 20:18 | 21:00 | 21:35 | 21:42 | 21:12  | 20:17     | 19:16   | 18:21    | 16:55        | 20 16:24 (72) |
| 15   08:30          | 16:18 (72)    | 08:02    | 07:13 | 07:12 | 06:19 | 05:49 | 05:56 | 06:30  | 07:10     | 07:50   | 08:35    | 08:16        | 16:04 (72)    |
| 16   17:11          | 19 16:37 (72) | 17:55    | 18:36 | 20:20 | 21:01 | 21:36 | 21:42 | 21:10  | 20:15     | 19:14   | 18:19    | 16:54        | 21 16:25 (72) |
| 17   08:29          | 16:20 (72)    | 08:00    | 07:11 | 07:10 | 06:18 | 05:49 | 05:57 | 06:31  | 07:12     | 07:52   | 08:37    | 08:17        | 16:04 (72)    |
| 18   17:12          | 18 16:38 (72) | 17:56    | 18:37 | 20:21 | 21:02 | 21:37 | 21:41 | 21:09  | 20:13     | 19:13   | 18:18    | 16:54        | 21 16:25 (72) |
| 19   08:29          | 16:20 (72)    | 07:59    | 07:10 | 07:08 | 06:17 | 05:49 | 05:57 | 06:32  | 07:13     | 07:53   | 08:38    | 08:18        | 16:04 (72)    |
| 20   17:13          | 17 16:37 (72) | 17:58    | 18:39 | 20:23 | 21:04 | 21:37 | 21:41 | 21:07  | 20:11     | 19:11   | 18:17    | 16:54        | 22 16:26 (72) |
| 21   08:29          | 16:22 (72)    | 07:57    | 07:08 | 07:06 | 06:15 | 05:48 | 05:58 | 06:34  | 07:14     | 07:54   | 08:40    | 08:19        | 16:04 (72)    |
| 22   17:14          | 15 16:37 (72) | 18:00    | 18:40 | 20:24 | 21:05 | 21:38 | 21:40 | 21:06  | 20:09     | 19:09   | 18:15    | 16:54        | 23 16:27 (72) |
| 23   08:28          | 16:23 (72)    | 07:56    | 08:06 | 07:04 | 06:14 | 05:48 | 05:59 | 06:35  | 07:16     | 07:56   | 08:41    | 08:20        | 16:04 (72)    |
| 24   17:16          | 13 16:36 (72) | 18:00    | 18:42 | 20:25 | 21:06 | 21:39 | 21:40 | 21:04  | 20:07     | 19:07   | 18:14    | 16:54        | 23 16:27 (72) |
| 25   08:28          | 16:26 (72)    | 07:54    | 08:04 | 07:02 | 06:12 | 05:48 | 06:00 | 06:36  | 07:17     | 07:57   | 08:43    | 08:21        | 16:04 (72)    |
| 26   17:17          | 9 16:35 (72)  | 18:01    | 19:43 | 20:27 | 21:08 | 21:39 | 21:39 | 21:03  | 20:05     | 19:05   | 18:13    | 16:54        | 23 16:27 (72) |
| 27   08:27          | 16:28 (72)    | 07:53    | 08:02 | 07:00 | 06:11 | 05:48 | 06:01 | 06:37  | 07:18     | 07:59   | 08:44    | 08:22        | 16:05 (72)    |
| 28   17:18          | 5 16:33 (72)  | 18:03    | 19:45 | 20:28 | 21:09 | 21:40 | 21:38 | 21:01  | 20:03     | 19:03   | 18:12    | 16:54        | 22 16:27 (72) |
| 29   08:27          |               | 07:51    | 08:00 | 06:59 | 06:10 | 05:48 | 06:02 | 06:39  | 07:19     | 08:00   | 08:46    | 08:23        | 16:05 (72)    |
| 30   17:19          |               | 18:04    | 19:46 | 20:29 | 21:10 | 21:40 | 21:38 | 20:59  | 20:01     | 19:01   | 18:10    | 16:54        | 22 16:27 (72) |
| 31   08:26          |               | 07:49    | 07:58 | 06:57 | 06:09 | 05:47 | 06:03 | 06:40  | 07:21     | 08:02   | 08:47    | 08:23        | 16:06 (72)    |
| 32   17:21          |               | 18:06    | 19:47 | 20:31 | 21:12 | 21:41 | 21:37 | 20:58  | 19:59     | 18:57   | 17:09    | 16:54        | 22 16:27 (72) |
| 33   08:26          |               | 07:48    | 07:56 | 06:55 | 06:07 | 05:47 | 06:04 | 06:41  | 07:22     | 08:03   | 08:49    | 08:24        | 16:06 (72)    |
| 34   17:22          |               | 18:07    | 19:49 | 20:32 | 21:13 | 21:41 | 21:36 | 20:56  | 19:57     | 18:55   | 17:08    | 16:55        | 21 16:27 (72) |
| 35   08:25          |               | 07:46    | 07:54 | 06:53 | 06:06 | 05:47 | 06:05 | 06:43  | 07:23     | 08:04   | 08:50    | 08:25        | 16:06 (72)    |
| 36   17:23          |               | 18:09    | 19:50 | 20:34 | 21:14 | 21:42 | 21:35 | 20:54  | 19:55     | 18:54   | 17:07    | 16:55        | 22 16:28 (72) |
| 37   08:24          |               | 07:44    | 07:52 | 06:51 | 06:05 | 05:47 | 06:06 | 06:44  | 07:25     | 08:06   | 08:52    | 08:26        | 16:07 (72)    |
| 38   17:25          |               | 18:10    | 19:52 | 20:35 | 21:15 | 21:42 | 21:35 | 20:52  | 19:53     | 18:52   | 17:06    | 16:55        | 21 16:28 (72) |
| 39   08:23          |               | 07:43    | 07:50 | 06:49 | 06:04 | 05:48 | 06:07 | 06:45  | 07:26     | 08:07   | 08:53    | 08:26        | 16:07 (72)    |
| 40   17:26          |               | 18:12    | 19:53 | 20:36 | 21:16 | 21:43 | 21:34 | 20:51  | 19:51     | 18:50   | 17:05    | 16:56        | 21 16:28 (72) |
| 41   08:23          |               | 07:41    | 07:48 | 06:47 | 06:03 | 05:48 | 06:08 | 06:47  | 07:27     | 08:09   | 08:54    | 08:27        | 16:08 (72)    |
| 42   17:28          |               | 18:13    | 19:55 | 20:38 | 21:18 | 21:43 | 21:33 | 20:49  | 19:49     | 18:48   | 17:04    | 16:56        | 21 16:29 (72) |
| 43   08:22          |               | 07:39    | 07:46 | 06:46 | 06:02 | 05:48 | 06:09 | 06:48  | 07:29     | 08:10   | 08:56    | 08:27        | 16:08 (72)    |
| 44   17:29          |               | 18:15    | 19:56 | 20:39 | 21:19 | 21:43 | 21:32 | 20:47  | 19:47     | 18:46   | 17:03    | 16:56        | 21 16:29 (72) |
| 45   08:21          |               | 07:38    | 07:44 | 06:44 | 06:01 | 05:48 | 06:10 | 06:49  | 07:30     | 08:12   | 08:57    | 08:28        | 16:09 (72)    |
| 46   17:31          |               | 18:17    | 19:57 | 20:41 | 21:20 | 21:43 | 21:31 | 20:45  | 19:45     | 18:45   | 17:02    | 16:57        | 21 16:30 (72) |
| 47   08:20          |               | 07:36    | 07:42 | 06:42 | 06:00 | 05:48 | 06:11 | 06:51  | 07:31     | 08:13   | 08:59    | 08:28        | 16:09 (72)    |
| 48   17:32          |               | 18:18    | 19:59 | 20:42 | 21:21 | 21:44 | 21:30 | 20:44  | 19:43     | 18:43   | 17:01    | 16:57        | 21 16:30 (72) |
| 49   08:19          |               | 07:34    | 07:40 | 06:40 | 05:59 | 05:49 | 06:13 | 06:52  | 07:33     | 08:15   | 08:00    | 08:29        | 16:10 (72)    |
| 50   17:33          |               | 18:20    | 20:00 | 20:43 | 21:22 | 21:44 | 21:29 | 20:42  | 19:41     | 18:41   | 17:01    | 16:58        | 21 16:31 (72) |
| 51   08:18          |               | 07:32    | 07:38 | 06:39 | 05:58 | 05:49 | 06:14 | 06:53  | 07:34     | 08:16   | 08:01    | 08:29        | 16:10 (72)    |
| 52   17:35          |               | 18:21    | 20:02 | 20:45 | 21:23 | 21:44 | 21:28 | 20:40  | 19:38     | 18:39   | 17:00    | 16:59        | 21 16:31 (72) |
| 53   08:17          |               | 07:30    | 07:36 | 06:37 | 05:57 | 05:49 | 06:15 | 06:55  | 07:35     | 08:17   | 08:03    | 08:29        | 16:10 (72)    |
| 54   17:36          |               | 18:23    | 20:03 | 20:46 | 21:25 | 21:44 | 21:26 | 20:38  | 19:36     | 18:38   | 16:59    | 16:59        | 22 16:32 (72) |
| 55   08:16          |               | 07:29    | 07:34 | 06:35 | 05:56 | 05:50 | 06:16 | 06:56  | 07:37     | 08:19   | 08:04    | 08:30        | 16:11 (72)    |
| 56   17:38          |               | 18:24    | 20:04 | 20:48 | 21:26 | 21:44 | 21:25 | 20:36  | 19:34     | 18:36   | 16:59    | 17:00        | 21 16:32 (72) |
| 57   08:15          |               |          | 07:32 | 06:34 | 05:55 | 05:50 | 06:17 | 06:57  | 07:38     | 08:20   | 08:05    | 08:30        | 16:12 (72)    |
| 58   17:40          |               |          | 20:06 | 20:49 | 21:27 | 21:44 | 21:24 | 20:34  | 19:32     | 18:34   | 16:58    | 17:01        | 22 16:34 (72) |
| 59   08:14          |               |          | 07:30 | 06:32 | 05:54 | 05:51 | 06:18 | 06:58  | 07:39     | 08:22   | 08:07    | 08:30        | 16:12 (72)    |
| 60   17:41          |               |          | 20:07 | 20:50 | 21:28 | 21:44 | 21:23 | 20:32  | 19:30     | 18:33   | 16:57    | 7 16:15 (72) | 22 16:34 (72) |
| 61   08:12          |               |          | 07:28 |       | 05:54 |       | 06:20 | 07:00  |           | 08:23   |          | 08:30        | 16:13 (72)    |
| 62   17:43          |               |          | 20:09 |       | 21:29 |       | 21:22 | 20:30  |           | 18:31   |          | 17:02        | 22 16:35 (72) |
| Potential sun hours | 277           | 286      | 367   | 406   | 466   | 475   | 481   | 443    | 380       | 339     | 282      | 266          |               |
| Total, worst case   | 249           |          |       |       |       |       |       |        |           |         |          | 634          |               |
| Sun reduction       | 0.54          |          |       |       |       |       |       |        |           |         | 0.42     | 0.45         |               |
| Oper. time red.     | 1.00          |          |       |       |       |       |       |        |           |         | 1.00     | 1.00         |               |
| Wind dir. red.      | 0.62          |          |       |       |       |       |       |        |           |         | 0.62     | 0.62         |               |
| Total reduction     | 0.34          |          |       |       |       |       |       |        |           |         | 0.26     | 0.28         |               |
| Total, real         | 83            |          |       |       |       |       |       |        |           |         | 2        | 177          |               |

Table layout: For each day in each month the following matrix apply

| Day in month | Sun rise (hh:mm) | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|--------------|------------------|---------------------------------|----------------------------------|
|              | Sun set (hh:mm)  | Minutes with flicker            | Last time (hh:mm) with flicker   |
|              |                  |                                 | (WTG causing flicker last time)  |



Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: R015 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 90.0° (14)

## Assumptions for shadow calculations

Reference year for calendar

2023

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

| Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  |
|------|------|------|------|------|------|------|------|------|------|------|------|
| 0.54 | 0.52 | 0.61 | 0.58 | 0.64 | 0.67 | 0.75 | 0.72 | 0.67 | 0.53 | 0.42 | 0.45 |

Operational time

| N   | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW | NW  | NNW | Sum   |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| 376 | 314 | 339 | 425 | 445 | 474 | 693 | 570 | 488 | 386 | 872 | 609 | 772 | 651 | 677 | 667 | 8,758 |

|                     | January | February |    | March      | April | May   | June  | July  | August | September | October |    | November   |            | December |
|---------------------|---------|----------|----|------------|-------|-------|-------|-------|--------|-----------|---------|----|------------|------------|----------|
| 1                   | 08:30   | 08:11    |    | 07:27      | 07:26 | 06:30 | 05:53 | 05:51 | 06:21  | 07:01     | 07:41   |    | 08:25      | 17:53 (72) | 08:08    |
|                     | 17:04   | 17:44    |    | 18:26      | 20:10 | 20:52 | 21:30 | 21:44 | 21:20  | 20:29     | 19:28   | 13 | 18:06 (72) | 16:57      |          |
| 2                   | 08:30   | 08:10    |    | 07:25      | 07:24 | 06:29 | 05:52 | 05:52 | 06:22  | 07:02     | 07:42   |    | 08:26      | 17:54 (72) | 08:09    |
|                     | 17:04   | 17:46    |    | 18:27      | 20:11 | 20:53 | 21:31 | 21:44 | 21:19  | 20:27     | 19:26   | 11 | 18:28      | 18:05 (72) | 16:56    |
| 3                   | 08:30   | 08:09    |    | 07:23      | 07:22 | 06:27 | 05:52 | 05:52 | 06:23  | 07:04     | 07:43   |    | 08:28      | 17:54 (72) | 08:10    |
|                     | 17:05   | 17:47    |    | 18:29      | 20:13 | 20:54 | 21:32 | 21:43 | 21:18  | 20:25     | 19:24   | 8  | 18:02 (72) | 16:56      |          |
| 4                   | 08:30   | 08:07    |    | 07:21      | 07:20 | 06:25 | 05:51 | 05:53 | 06:25  | 07:05     | 07:45   |    | 08:29      | 17:56 (72) | 08:11    |
|                     | 17:06   | 17:49    |    | 18:30      | 20:14 | 20:56 | 21:32 | 21:43 | 21:16  | 20:23     | 19:22   | 5  | 18:01 (72) | 16:55      |          |
| 5                   | 08:30   | 08:06    |    | 07:19      | 07:18 | 06:24 | 05:51 | 05:54 | 06:26  | 07:06     | 07:46   |    | 07:31      | 16:57 (72) | 08:13    |
|                     | 17:07   | 17:50    |    | 18:32      | 20:16 | 20:57 | 21:33 | 21:43 | 21:15  | 20:21     | 19:20   | 3  | 17:24      | 17:00 (72) | 16:55    |
| 6                   | 08:30   | 08:05    |    | 07:17      | 07:16 | 06:22 | 05:50 | 05:54 | 06:27  | 07:08     | 07:48   |    | 07:32      |            | 08:14    |
|                     | 17:09   | 17:52    |    | 18:33      | 20:17 | 20:58 | 21:34 | 21:43 | 21:13  | 20:19     | 19:18   |    | 17:22      |            | 16:55    |
| 7                   | 08:30   | 08:03    |    | 17:28 (72) | 07:15 | 07:14 | 06:21 | 05:50 | 05:55  | 06:28     | 07:09   |    | 07:49      | 07:34      | 08:15    |
|                     | 17:10   | 17:53    | 2  | 17:30 (72) | 18:34 | 20:18 | 21:00 | 21:35 | 21:42  | 21:12     | 20:17   |    | 19:16      | 17:21      | 16:55    |
| 8                   | 08:30   | 08:02    |    | 17:26 (72) | 07:13 | 07:12 | 06:19 | 05:49 | 05:56  | 06:30     | 07:10   |    | 07:50      | 07:35      | 08:16    |
|                     | 17:11   | 17:55    | 5  | 17:31 (72) | 18:36 | 20:20 | 21:01 | 21:36 | 21:42  | 21:10     | 20:15   |    | 19:14      | 17:19      | 16:54    |
| 9                   | 08:29   | 08:00    |    | 17:26 (72) | 07:11 | 07:10 | 06:18 | 05:49 | 05:57  | 06:31     | 07:12   |    | 07:52      | 07:37      | 08:17    |
|                     | 17:12   | 17:56    | 7  | 17:33 (72) | 18:37 | 20:21 | 21:02 | 21:37 | 21:41  | 21:09     | 20:13   |    | 19:13      | 17:18      | 16:54    |
| 10                  | 08:29   | 07:59    |    | 17:24 (72) | 07:10 | 07:08 | 06:17 | 05:49 | 05:57  | 06:32     | 07:13   |    | 07:53      | 07:38      | 08:18    |
|                     | 17:13   | 17:58    | 10 | 17:34 (72) | 18:39 | 20:23 | 21:04 | 21:37 | 21:41  | 21:07     | 20:11   |    | 19:11      | 17:17      | 16:54    |
| 11                  | 08:29   | 07:57    |    | 17:23 (72) | 07:08 | 07:06 | 06:15 | 05:48 | 05:58  | 06:34     | 07:14   |    | 07:54      | 07:40      | 08:19    |
|                     | 17:14   | 18:00    | 13 | 17:36 (72) | 18:40 | 20:24 | 21:05 | 21:38 | 21:40  | 21:06     | 20:09   |    | 19:09      | 17:15      | 16:54    |
| 12                  | 08:28   | 07:56    |    | 17:23 (72) | 08:06 | 07:04 | 06:14 | 05:48 | 05:59  | 06:35     | 07:16   |    | 07:56      | 07:41      | 08:20    |
|                     | 17:16   | 18:00    | 15 | 17:38 (72) | 18:42 | 20:25 | 21:06 | 21:39 | 21:40  | 21:04     | 20:07   |    | 19:07      | 17:14      | 16:54    |
| 13                  | 08:28   | 07:54    |    | 17:22 (72) | 08:04 | 07:02 | 06:12 | 05:48 | 06:00  | 06:36     | 07:17   |    | 07:57      | 07:43      | 08:21    |
|                     | 17:17   | 18:01    | 17 | 17:39 (72) | 19:43 | 20:27 | 21:08 | 21:39 | 21:39  | 21:03     | 20:05   |    | 19:05      | 17:13      | 16:54    |
| 14                  | 08:27   | 07:53    |    | 17:23 (72) | 08:02 | 07:00 | 06:11 | 05:48 | 06:01  | 06:37     | 07:18   |    | 07:59      | 07:44      | 08:22    |
|                     | 17:18   | 18:03    | 18 | 17:41 (72) | 19:45 | 20:28 | 21:09 | 21:40 | 21:38  | 21:01     | 20:03   |    | 19:03      | 17:12      | 16:54    |
| 15                  | 08:27   | 07:51    |    | 17:22 (72) | 08:00 | 06:59 | 06:10 | 05:48 | 06:02  | 06:39     | 07:20   |    | 08:00      | 07:46      | 08:23    |
|                     | 17:19   | 18:04    | 21 | 17:43 (72) | 19:46 | 20:29 | 21:10 | 21:40 | 21:38  | 20:59     | 20:01   |    | 19:01      | 17:10      | 16:54    |
| 16                  | 08:26   | 07:49    |    | 17:21 (72) | 07:58 | 06:57 | 06:09 | 05:47 | 06:03  | 06:40     | 07:21   |    | 08:02      | 07:47      | 08:23    |
|                     | 17:21   | 18:06    | 23 | 17:44 (72) | 19:47 | 20:31 | 21:12 | 21:41 | 21:37  | 20:58     | 19:59   | 10 | 18:14 (72) | 17:09      | 16:54    |
| 17                  | 08:26   | 07:48    |    | 17:21 (72) | 07:56 | 06:55 | 06:07 | 05:47 | 06:04  | 06:41     | 07:22   |    | 08:03      | 18:01 (72) | 07:49    |
|                     | 17:22   | 18:07    | 24 | 17:45 (72) | 19:49 | 20:32 | 21:13 | 21:41 | 21:36  | 20:56     | 19:57   | 17 | 18:18 (72) | 17:08      | 08:24    |
| 18                  | 08:25   | 07:46    |    | 17:22 (72) | 07:54 | 06:53 | 06:06 | 05:47 | 06:05  | 06:43     | 07:23   |    | 08:04      | 17:58 (72) | 07:50    |
|                     | 17:23   | 18:09    | 26 | 17:48 (72) | 19:50 | 20:34 | 21:14 | 21:42 | 21:35  | 20:54     | 19:55   | 21 | 18:19 (72) | 17:07      | 08:25    |
| 19                  | 08:24   | 07:44    |    | 17:22 (72) | 07:52 | 06:51 | 06:05 | 05:48 | 06:06  | 06:44     | 07:25   |    | 08:06      | 17:57 (72) | 07:52    |
|                     | 17:25   | 18:10    | 27 | 17:49 (72) | 19:52 | 20:35 | 21:15 | 21:42 | 21:35  | 20:52     | 19:53   | 24 | 18:21 (72) | 17:06      | 16:55    |
| 20                  | 08:23   | 07:43    |    | 17:22 (72) | 07:50 | 06:49 | 06:04 | 05:48 | 06:07  | 06:45     | 07:26   |    | 08:07      | 17:55 (72) | 07:53    |
|                     | 17:26   | 18:12    | 29 | 17:51 (72) | 19:53 | 20:36 | 21:16 | 21:43 | 21:34  | 20:51     | 19:51   | 26 | 18:21 (72) | 17:05      | 08:26    |
| 21                  | 08:23   | 07:41    |    | 17:22 (72) | 07:48 | 06:48 | 06:03 | 05:48 | 06:08  | 06:47     | 07:27   |    | 08:09      | 17:54 (72) | 07:54    |
|                     | 17:28   | 18:14    | 30 | 17:52 (72) | 19:55 | 20:38 | 21:18 | 21:43 | 21:33  | 20:49     | 19:49   | 28 | 18:22 (72) | 17:04      | 16:56    |
| 22                  | 08:22   | 07:39    |    | 17:24 (72) | 07:46 | 06:46 | 06:02 | 05:48 | 06:09  | 06:48     | 07:29   |    | 08:10      | 17:53 (72) | 07:56    |
|                     | 17:29   | 18:15    | 28 | 17:52 (72) | 19:56 | 20:39 | 21:19 | 21:43 | 21:32  | 20:47     | 19:47   | 30 | 18:23 (72) | 17:03      | 08:27    |
| 23                  | 08:21   | 07:38    |    | 17:24 (72) | 07:44 | 06:44 | 06:01 | 05:48 | 06:10  | 06:49     | 07:30   |    | 08:12      | 17:53 (72) | 07:57    |
|                     | 17:31   | 18:17    | 27 | 17:51 (72) | 19:57 | 20:41 | 21:20 | 21:43 | 21:31  | 20:45     | 19:45   | 28 | 18:21 (72) | 17:02      | 16:58    |
| 24                  | 08:20   | 07:36    |    | 17:25 (72) | 07:42 | 06:42 | 06:00 | 05:48 | 06:11  | 06:51     | 07:31   |    | 08:13      | 17:52 (72) | 07:59    |
|                     | 17:32   | 18:18    | 25 | 17:50 (72) | 19:59 | 20:42 | 21:21 | 21:44 | 21:30  | 20:44     | 19:43   | 28 | 18:20 (72) | 17:01      | 16:57    |
| 25                  | 08:19   | 07:34    |    | 17:26 (72) | 07:40 | 06:40 | 05:59 | 05:49 | 06:13  | 06:52     | 07:33   |    | 08:15      | 17:51 (72) | 08:00    |
|                     | 17:34   | 18:20    | 22 | 17:48 (72) | 20:00 | 20:43 | 21:22 | 21:44 | 21:29  | 20:42     | 19:41   | 27 | 18:18 (72) | 17:01      | 08:29    |
| 26                  | 08:18   | 07:32    |    | 17:28 (72) | 07:38 | 06:39 | 05:58 | 05:49 | 06:14  | 06:53     | 07:34   |    | 08:16      | 17:52 (72) | 08:01    |
|                     | 17:35   | 18:21    | 18 | 17:46 (72) | 20:02 | 20:45 | 21:23 | 21:44 | 21:28  | 20:40     | 19:38   | 24 | 18:16 (72) | 17:00      | 08:29    |
| 27                  | 08:17   | 07:30    |    | 17:31 (72) | 07:36 | 06:37 | 05:57 | 05:49 | 06:15  | 06:55     | 07:35   |    | 08:17      | 17:51 (72) | 08:03    |
|                     | 17:37   | 18:23    | 12 | 17:43 (72) | 20:03 | 20:46 | 21:25 | 21:44 | 21:26  | 20:38     | 19:36   | 23 | 18:14 (72) | 16:59      | 08:29    |
| 28                  | 08:16   | 07:29    |    | 07:34      | 06:35 | 05:56 | 05:50 | 06:16 | 06:56  | 07:37     | 08:19   |    | 17:51 (72) | 08:04      | 16:59    |
|                     | 17:38   | 18:24    |    | 20:04      | 20:48 | 21:26 | 21:44 | 21:25 | 20:36  | 19:34     | 18:36   | 22 | 18:13 (72) | 16:59      | 08:30    |
| 29                  | 08:15   |          |    | 07:32      | 06:34 | 05:55 | 05:50 | 06:17 | 06:57  | 07:38     | 08:20   |    | 17:51 (72) | 08:05      | 17:00    |
|                     | 17:40   |          |    | 20:06      | 20:49 | 21:27 | 21:44 | 21:24 | 20:34  | 19:32     | 18:34   | 19 | 18:10 (72) | 16:58      | 08:30    |
| 30                  | 08:14   |          |    | 07:30      | 06:32 | 05:54 | 05:51 | 06:18 | 06:58  | 07:39     | 08:22   |    | 17:52 (72) | 08:07      | 17:01    |
|                     | 17:41   |          |    | 20:07      | 20:50 | 21:28 | 21:44 | 21:23 | 20:32  | 19:30     | 18:33   | 17 | 18:09 (72) | 16:57      | 17:02    |
| 31                  | 08:12   |          |    | 07:28      |       | 05:54 |       | 06:20 | 07:00  |           | 08:23   |    | 17:53 (72) |            | 08:30    |
|                     | 17:43   |          |    | 20:09      |       | 21:29 |       | 21:22 | 20:30  |           | 18:31   | 15 | 18:08 (72) |            | 17:02    |
| Potential sun hours | 277     | 286      |    | 367        | 406   | 466   | 475   | 481   | 443    | 380       | 339     |    | 282        |            | 266      |
| Total, worst case   |         | 399      |    |            |       |       |       |       |        |           |         |    | 40         |            |          |
| Sun reduction       |         | 0.52     |    |            |       |       |       |       |        |           |         |    | 0.42       |            |          |
| Oper. time red.     |         | 1.00     |    |            |       |       |       |       |        |           |         |    | 1.00       |            |          |
| Wind dir. red.      |         | 0.65     |    |            |       |       |       |       |        |           |         |    | 0.65       |            |          |
| Total reduction     |         | 0.34     |    |            |       |       |       |       |        |           |         |    | 0.27       |            |          |
| Total, real         |         | 136      |    |            |       |       |       |       |        |           |         |    | 11         |            |          |

Table layout: For each day in each month the following matrix apply

| Day in month | Sun rise (hh:mm) | Sun set (hh:mm) | Minutes with flicker | First time (hh:mm) with flicker | Last time (hh:mm) with flicker | (WTG causing flicker first time) | (WTG causing flicker last time) |
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|

Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: R016 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (15)

## Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Reference year for calendar

2023

| Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  |
|------|------|------|------|------|------|------|------|------|------|------|------|
| 0.54 | 0.52 | 0.61 | 0.58 | 0.64 | 0.67 | 0.75 | 0.72 | 0.67 | 0.53 | 0.42 | 0.45 |

Operational time

| N   | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW | NW  | NNW | Sum   |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| 376 | 314 | 339 | 425 | 445 | 474 | 693 | 570 | 488 | 386 | 872 | 609 | 772 | 651 | 677 | 667 | 8,758 |

|                     |       | January | February | March | April |            | May   | June  | July  | August |               | September     |       | October | November | December |
|---------------------|-------|---------|----------|-------|-------|------------|-------|-------|-------|--------|---------------|---------------|-------|---------|----------|----------|
| 1                   | 08:30 | 08:11   | 07:27    | 07:26 |       | 06:30      | 05:53 | 05:51 | 06:21 |        | 07:01         | 19:52 (71)    | 07:41 | 08:25   | 08:08    |          |
|                     | 17:04 | 17:44   | 18:26    | 20:10 |       | 20:52      | 21:30 | 21:44 | 21:20 |        | 20:28         | 12 20:04 (71) | 19:28 | 18:30   | 16:57    |          |
| 2                   | 08:30 | 08:10   | 07:25    | 07:24 |       | 06:29      | 05:52 | 05:52 | 06:22 |        | 07:02         | 19:52 (71)    | 07:42 | 08:26   | 08:09    |          |
|                     | 17:04 | 17:46   | 18:27    | 20:11 |       | 20:53      | 21:31 | 21:43 | 21:19 |        | 20:27         | 10 20:02 (71) | 19:26 | 18:28   | 16:56    |          |
| 3                   | 08:30 | 08:09   | 07:23    | 07:22 |       | 06:27      | 05:52 | 05:52 | 06:23 |        | 07:04         | 19:53 (71)    | 07:43 | 08:28   | 08:10    |          |
|                     | 17:05 | 17:47   | 18:29    | 20:13 |       | 20:54      | 21:32 | 21:43 | 21:17 |        | 20:25         | 8 20:01 (71)  | 19:24 | 18:26   | 16:56    |          |
| 4                   | 08:30 | 08:07   | 07:21    | 07:20 |       | 06:25      | 05:51 | 05:53 | 06:25 |        | 07:05         | 19:54 (71)    | 07:45 | 08:29   | 08:11    |          |
|                     | 17:06 | 17:49   | 18:30    | 20:14 |       | 20:56      | 21:32 | 21:43 | 21:16 |        | 20:23         | 5 19:59 (71)  | 19:22 | 18:25   | 16:55    |          |
| 5                   | 08:30 | 08:06   | 07:19    | 07:18 |       | 06:24      | 05:51 | 05:54 | 06:26 |        | 07:06         | 19:55 (71)    | 07:46 | 07:31   | 08:12    |          |
|                     | 17:07 | 17:50   | 18:31    | 20:16 |       | 20:57      | 21:33 | 21:43 | 21:15 |        | 20:21         | 2 19:57 (71)  | 19:20 | 17:23   | 16:55    |          |
| 6                   | 08:30 | 08:05   | 07:17    | 07:16 |       | 06:22      | 05:50 | 05:54 | 06:27 |        | 07:08         |               | 07:48 | 07:32   | 08:14    |          |
|                     | 17:08 | 17:52   | 18:33    | 20:17 |       | 20:58      | 21:34 | 21:42 | 21:13 |        | 20:19         |               | 19:18 | 17:22   | 16:55    |          |
| 7                   | 08:30 | 08:03   | 07:15    | 07:14 |       | 06:21      | 05:50 | 05:55 | 06:28 |        | 07:09         |               | 07:49 | 07:34   | 08:15    |          |
|                     | 17:10 | 17:53   | 18:34    | 20:18 |       | 21:00      | 21:35 | 21:42 | 21:12 |        | 20:17         |               | 19:16 | 17:21   | 16:55    |          |
| 8                   | 08:30 | 08:02   | 07:13    | 07:12 |       | 06:19      | 05:49 | 05:56 | 06:30 |        | 07:10         |               | 07:50 | 07:35   | 08:16    |          |
|                     | 17:11 | 17:55   | 18:36    | 20:20 |       | 21:01      | 21:36 | 21:42 | 21:10 |        | 20:15         |               | 19:14 | 17:19   | 16:54    |          |
| 9                   | 08:29 | 08:00   | 07:11    | 07:10 |       | 06:18      | 05:49 | 05:57 | 06:31 |        | 07:12         |               | 07:52 | 07:37   | 08:17    |          |
|                     | 17:12 | 17:56   | 18:37    | 20:21 | 3     | 20:00 (71) | 21:02 | 21:36 | 21:41 | 21:09  | 20:13         |               | 19:12 | 17:18   | 16:54    |          |
| 10                  | 08:29 | 07:59   | 07:10    | 07:08 |       | 19:55 (71) | 06:16 | 05:49 | 05:57 | 06:32  | 07:13         |               | 07:53 | 07:38   | 08:18    |          |
|                     | 17:13 | 17:58   | 18:39    | 20:22 | 6     | 20:01 (71) | 21:04 | 21:37 | 21:41 | 21:07  | 20:11         |               | 19:11 | 17:17   | 16:54    |          |
| 11                  | 08:29 | 07:57   | 07:08    | 07:06 |       | 19:53 (71) | 06:15 | 05:48 | 05:58 | 06:34  | 07:14         |               | 07:54 | 07:40   | 08:19    |          |
|                     | 17:14 | 18:00   | 18:40    | 20:24 | 10    | 20:03 (71) | 21:05 | 21:38 | 21:40 | 21:06  | 20:09         |               | 19:09 | 17:15   | 16:54    |          |
| 12                  | 08:28 | 07:56   | 08:06    | 07:04 |       | 19:53 (71) | 06:14 | 05:48 | 05:59 | 06:35  | 07:16         |               | 07:56 | 07:41   | 08:20    |          |
|                     | 17:15 | 18:00   | 18:42    | 20:25 | 12    | 20:05 (71) | 21:06 | 21:39 | 21:40 | 21:04  | 20:07         |               | 19:07 | 17:14   | 16:54    |          |
| 13                  | 08:28 | 07:54   | 08:04    | 07:02 |       | 19:52 (71) | 06:12 | 05:48 | 06:00 | 06:36  | 07:17         |               | 07:57 | 07:43   | 08:21    |          |
|                     | 17:17 | 18:01   | 19:43    | 20:27 | 14    | 20:06 (71) | 21:08 | 21:39 | 21:39 | 21:02  | 20:05         |               | 19:05 | 17:13   | 16:54    |          |
| 14                  | 08:27 | 07:53   | 08:02    | 07:00 |       | 19:52 (71) | 06:11 | 05:48 | 06:01 | 06:37  | 07:18         |               | 07:59 | 07:44   | 08:22    |          |
|                     | 17:18 | 18:03   | 19:45    | 20:28 | 15    | 20:07 (71) | 21:09 | 21:40 | 21:38 | 21:01  | 20:03         |               | 19:03 | 17:12   | 16:54    |          |
| 15                  | 08:27 | 07:51   | 08:00    | 06:59 |       | 19:51 (71) | 06:10 | 05:48 | 06:02 | 06:39  | 07:19         |               | 08:00 | 07:46   | 08:22    |          |
|                     | 17:19 | 18:04   | 19:46    | 20:29 | 17    | 20:08 (71) | 21:10 | 21:40 | 21:38 | 20:59  | 20:01         |               | 19:01 | 17:10   | 16:54    |          |
| 16                  | 08:26 | 07:49   | 07:58    | 06:57 |       | 19:51 (71) | 06:09 | 05:47 | 06:03 | 06:40  | 07:21         |               | 08:01 | 07:47   | 08:23    |          |
|                     | 17:21 | 18:06   | 19:47    | 20:31 | 19    | 20:10 (71) | 21:11 | 21:41 | 21:37 | 20:58  | 19:59         |               | 18:57 | 17:09   | 16:54    |          |
| 17                  | 08:25 | 07:48   | 07:56    | 06:55 |       | 19:51 (71) | 06:07 | 05:47 | 06:04 | 06:41  | 07:22         |               | 08:03 | 07:49   | 08:24    |          |
|                     | 17:22 | 18:07   | 19:49    | 20:32 | 20    | 20:11 (71) | 21:13 | 21:41 | 21:36 | 20:56  | 19:57         |               | 18:55 | 17:08   | 16:55    |          |
| 18                  | 08:25 | 07:46   | 07:54    | 06:53 |       | 19:52 (71) | 06:06 | 05:47 | 06:05 | 06:43  | 07:23         |               | 08:04 | 07:50   | 08:25    |          |
|                     | 17:23 | 18:09   | 19:50    | 20:34 | 21    | 20:13 (71) | 21:14 | 21:42 | 21:35 | 20:54  | 19:55         |               | 18:53 | 17:07   | 16:55    |          |
| 19                  | 08:24 | 07:44   | 07:52    | 06:51 |       | 19:52 (71) | 06:05 | 05:47 | 06:06 | 06:44  | 07:25         |               | 08:06 | 07:51   | 08:25    |          |
|                     | 17:25 | 18:10   | 19:52    | 20:35 | 22    | 20:14 (71) | 21:15 | 21:42 | 21:34 | 20:52  | 19:53         |               | 18:52 | 17:06   | 16:55    |          |
| 20                  | 08:23 | 07:43   | 07:50    | 06:49 |       | 19:52 (71) | 06:04 | 05:48 | 06:07 | 06:45  | 07:26         |               | 08:07 | 07:53   | 08:26    |          |
|                     | 17:26 | 18:12   | 19:53    | 20:36 | 20    | 20:12 (71) | 21:16 | 21:42 | 21:34 | 20:51  | 19:51         |               | 18:50 | 17:05   | 16:56    |          |
| 21                  | 08:22 | 07:41   | 07:48    | 06:47 |       | 19:53 (71) | 06:03 | 05:48 | 06:08 | 06:47  | 07:27         | 20:03 (71)    | 08:09 | 07:54   | 08:27    |          |
|                     | 17:28 | 18:13   | 19:55    | 20:38 | 18    | 20:11 (71) | 21:18 | 21:43 | 21:33 | 20:49  | 7 20:10 (71)  | 19:49         | 18:48 | 17:04   | 16:56    |          |
| 22                  | 08:22 | 07:39   | 07:46    | 06:46 |       | 19:54 (71) | 06:02 | 05:48 | 06:09 | 06:48  | 07:29         | 20:00 (71)    | 08:10 | 07:56   | 08:27    |          |
|                     | 17:29 | 18:15   | 19:56    | 20:39 | 15    | 20:09 (71) | 21:19 | 21:43 | 21:32 | 20:47  | 14 20:14 (71) | 19:47         | 18:46 | 17:03   | 16:56    |          |
| 23                  | 08:21 | 07:37   | 07:44    | 06:44 |       | 19:57 (71) | 06:01 | 05:48 | 06:10 | 06:49  | 07:30         | 19:58 (71)    | 08:12 | 07:57   | 08:28    |          |
|                     | 17:31 | 18:17   | 19:57    | 20:41 | 10    | 20:07 (71) | 21:20 | 21:43 | 21:31 | 20:45  | 17 20:15 (71) | 19:45         | 18:45 | 17:02   | 16:57    |          |
| 24                  | 08:20 | 07:36   | 07:42    | 06:42 |       | 06:00      | 05:48 | 06:11 | 06:51 | 06:51  | 07:31         | 19:56 (71)    | 08:13 | 07:58   | 08:28    |          |
|                     | 17:32 | 18:18   | 19:59    | 20:42 |       | 21:21      | 21:43 | 21:30 | 20:43 | 20     | 20:16 (71)    | 19:42         | 18:43 | 17:01   | 16:57    |          |
| 25                  | 08:19 | 07:34   | 07:40    | 06:40 |       | 05:59      | 05:49 | 06:13 | 06:52 |        | 07:33         | 19:55 (71)    | 08:14 | 08:00   | 08:29    |          |
|                     | 17:33 | 18:20   | 20:00    | 20:43 |       | 21:22      | 21:44 | 21:29 | 20:42 | 21     | 20:16 (71)    | 19:40         | 18:41 | 17:01   | 16:58    |          |
| 26                  | 08:18 | 07:32   | 07:38    | 06:39 |       | 05:58      | 05:49 | 06:14 | 06:53 |        | 07:34         | 19:55 (71)    | 08:16 | 08:01   | 08:29    |          |
|                     | 17:35 | 18:21   | 20:02    | 20:45 |       | 21:23      | 21:44 | 21:27 | 20:40 | 21     | 20:16 (71)    | 19:38         | 18:39 | 17:00   | 16:59    |          |
| 27                  | 08:17 | 07:30   | 07:36    | 06:37 |       | 05:57      | 05:49 | 06:15 | 06:55 |        | 07:35         | 19:53 (71)    | 08:17 | 08:03   | 08:29    |          |
|                     | 17:36 | 18:23   | 20:03    | 20:46 |       | 21:24      | 21:44 | 21:26 | 20:38 | 21     | 20:14 (71)    | 19:36         | 18:38 | 16:59   | 16:59    |          |
| 28                  | 08:16 | 07:28   | 07:34    | 06:35 |       | 05:56      | 05:50 | 06:16 | 06:56 |        | 07:37         | 19:53 (71)    | 08:19 | 08:04   | 08:30    |          |
|                     | 17:38 | 18:24   | 20:04    | 20:47 |       | 21:26      | 21:44 | 21:25 | 20:36 | 19     | 20:12 (71)    | 19:34         | 18:36 | 16:59   | 17:00    |          |
| 29                  | 08:15 |         | 07:32    | 06:34 |       | 05:55      | 05:50 | 06:17 | 06:57 |        | 07:38         | 19:52 (71)    | 08:20 | 08:05   | 08:30    |          |
|                     | 17:39 |         | 20:06    | 20:49 |       | 21:27      | 21:44 | 21:24 | 20:34 | 18     | 20:10 (71)    | 19:32         | 18:34 | 16:58   | 17:01    |          |
| 30                  | 08:13 |         | 07:30    | 06:32 |       | 05:54      | 05:51 | 06:18 | 06:58 |        | 07:39         | 19:52 (71)    | 08:22 | 08:06   | 08:30    |          |
|                     | 17:41 |         | 20:07    | 20:50 |       | 21:28      | 21:44 | 21:23 | 20:32 | 17     | 20:09 (71)    | 19:30         | 18:33 | 16:57   | 17:02    |          |
| 31                  | 08:12 |         | 07:28    |       |       | 05:54      |       | 06:20 | 07:00 |        | 19:52 (71)    |               | 08:23 |         | 08:30    |          |
|                     | 17:43 |         | 20:09    |       |       | 21:29      |       | 21:21 | 20:30 | 15     | 20:07 (71)    |               | 18:31 |         | 17:02    |          |
| Potential sun hours | 278   | 286     | 367      | 406   |       | 466        |       | 475   | 481   | 443    |               | 380           |       | 339     | 282      | 266      |
| Total, worst case   |       |         |          | 222   |       |            |       |       |       | 190    |               | 37            |       |         |          |          |
| Sun reduction       |       |         |          | 0.58  |       |            |       |       |       | 0.72   |               | 0.67          |       |         |          |          |
| Oper. time red.     |       |         |          | 1.00  |       |            |       |       |       | 1.00   |               | 1.00          |       |         |          |          |
| Wind dir. red.      |       |         |          | 0.68  |       |            |       |       |       | 0.68   |               | 0.68          |       |         |          |          |
| Total reduction     |       |         |          | 0.39  |       |            |       |       |       | 0.49   |               | 0.45          |       |         |          |          |
| Total, real         |       |         |          | 87    |       |            |       |       |       | 92     |               | 17            |       |         |          |          |

Table layout: For each day in each month the following matrix apply

| Day in month | Sun rise (hh:mm) | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|--------------|------------------|---------------------------------|----------------------------------|
|              | Sun set (hh:mm)  | Minutes with flicker            | Last time (hh:mm) with flicker   |
|              |                  |                                 | (WTG causing flicker last time)  |



Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

## Assumptions for shadow calculations

Reference year for calendar

2023

Shadow receptor: R019 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 90.0° (18)

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

| Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  |
|------|------|------|------|------|------|------|------|------|------|------|------|
| 0.54 | 0.52 | 0.61 | 0.58 | 0.64 | 0.67 | 0.75 | 0.72 | 0.67 | 0.53 | 0.42 | 0.45 |

Operational time

| N   | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW | NW  | NNW | Sum   |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| 376 | 314 | 339 | 425 | 445 | 474 | 693 | 570 | 488 | 386 | 872 | 609 | 772 | 651 | 677 | 667 | 8,758 |

|                     | January | February | March | April | May   | June  | July  | August | September | October | November | December |
|---------------------|---------|----------|-------|-------|-------|-------|-------|--------|-----------|---------|----------|----------|
| 1                   | 08:30   | 08:11    | 07:27 | 07:26 | 06:30 | 05:53 | 05:51 | 06:21  | 07:01     | 07:41   | 08:25    | 08:08    |
|                     | 17:04   | 17:44    | 18:26 | 20:10 | 20:52 | 21:30 | 21:44 | 21:20  | 20:28     | 19:28   | 18:30    | 16:57    |
| 2                   | 08:30   | 08:10    | 07:25 | 07:24 | 06:29 | 05:52 | 05:52 | 06:22  | 07:02     | 07:42   | 08:26    | 08:09    |
|                     | 17:05   | 17:46    | 18:27 | 20:11 | 20:53 | 21:31 | 21:43 | 21:19  | 20:27     | 19:26   | 18:28    | 16:56    |
| 3                   | 08:30   | 08:09    | 07:23 | 07:22 | 06:27 | 05:52 | 05:52 | 06:23  | 07:04     | 07:43   | 08:28    | 08:10    |
|                     | 17:05   | 17:47    | 18:29 | 20:13 | 20:54 | 21:32 | 21:43 | 21:18  | 20:25     | 19:24   | 18:27    | 16:56    |
| 4                   | 08:30   | 08:07    | 07:21 | 07:20 | 06:26 | 05:51 | 05:53 | 06:25  | 07:05     | 07:45   | 08:29    | 08:11    |
|                     | 17:06   | 17:49    | 18:30 | 20:14 | 20:56 | 21:32 | 21:43 | 21:16  | 20:23     | 19:22   | 18:25    | 16:56    |
| 5                   | 08:30   | 08:06    | 07:19 | 07:18 | 06:24 | 05:51 | 05:54 | 06:26  | 07:06     | 07:46   | 07:31    | 08:13    |
|                     | 17:08   | 17:50    | 18:32 | 20:16 | 20:57 | 21:33 | 21:43 | 21:15  | 20:21     | 19:20   | 17:24    | 16:55    |
| 6                   | 08:30   | 08:05    | 07:17 | 07:16 | 06:22 | 05:50 | 05:54 | 06:27  | 07:08     | 07:48   | 07:32    | 08:14    |
|                     | 17:09   | 17:52    | 18:33 | 20:17 | 20:58 | 21:34 | 21:42 | 21:13  | 20:19     | 19:18   | 17:22    | 16:55    |
| 7                   | 08:30   | 08:03    | 07:15 | 07:14 | 06:21 | 05:50 | 05:55 | 06:28  | 07:09     | 07:49   | 07:34    | 08:15    |
|                     | 17:10   | 17:53    | 18:34 | 20:18 | 21:00 | 21:35 | 21:42 | 21:12  | 20:17     | 19:16   | 17:21    | 16:55    |
| 8                   | 08:30   | 08:02    | 07:13 | 07:12 | 06:19 | 05:49 | 05:56 | 06:30  | 07:10     | 07:50   | 07:35    | 08:16    |
|                     | 17:11   | 17:55    | 18:36 | 20:20 | 21:01 | 21:36 | 21:42 | 21:10  | 20:15     | 19:14   | 17:19    | 16:54    |
| 9                   | 08:29   | 08:00    | 07:11 | 07:10 | 06:18 | 05:49 | 05:57 | 06:31  | 07:12     | 07:52   | 07:37    | 08:17    |
|                     | 17:12   | 17:57    | 18:37 | 20:21 | 21:02 | 21:37 | 21:41 | 21:09  | 20:13     | 19:13   | 17:18    | 16:54    |
| 10                  | 08:29   | 07:59    | 07:10 | 07:08 | 06:17 | 05:49 | 05:58 | 06:32  | 07:13     | 07:53   | 07:38    | 08:18    |
|                     | 17:13   | 17:58    | 18:39 | 20:23 | 21:04 | 21:37 | 21:41 | 21:07  | 20:11     | 19:11   | 17:17    | 16:54    |
| 11                  | 08:29   | 07:57    | 07:08 | 07:06 | 06:15 | 05:48 | 05:58 | 06:34  | 07:14     | 07:54   | 07:40    | 08:19    |
|                     | 17:14   | 18:00    | 18:40 | 20:24 | 21:05 | 21:38 | 21:40 | 21:06  | 20:09     | 19:09   | 17:15    | 16:54    |
| 12                  | 08:28   | 07:56    | 08:06 | 07:04 | 06:14 | 05:48 | 05:59 | 06:35  | 07:16     | 07:56   | 07:41    | 08:20    |
|                     | 17:16   | 18:00    | 18:42 | 20:25 | 21:06 | 21:39 | 21:40 | 21:04  | 20:07     | 19:07   | 17:14    | 16:54    |
| 13                  | 08:28   | 07:54    | 08:04 | 07:02 | 06:12 | 05:48 | 06:00 | 06:36  | 07:17     | 07:57   | 07:43    | 08:21    |
|                     | 17:17   | 18:01    | 19:43 | 20:27 | 21:08 | 21:39 | 21:39 | 21:03  | 20:05     | 19:05   | 17:13    | 16:54    |
| 14                  | 08:27   | 07:53    | 08:02 | 07:00 | 06:11 | 05:48 | 06:01 | 06:38  | 07:18     | 07:59   | 07:44    | 08:22    |
|                     | 17:18   | 18:03    | 19:45 | 20:28 | 21:09 | 21:40 | 21:38 | 21:01  | 20:03     | 19:03   | 17:12    | 16:54    |
| 15                  | 08:27   | 07:51    | 08:00 | 06:59 | 06:10 | 05:48 | 06:02 | 06:39  | 07:20     | 08:00   | 07:46    | 08:22    |
|                     | 17:19   | 18:04    | 19:46 | 20:29 | 21:10 | 21:40 | 21:38 | 20:59  | 20:01     | 19:01   | 17:10    | 16:54    |
| 16                  | 08:26   | 07:49    | 07:58 | 06:57 | 06:09 | 05:48 | 06:03 | 06:40  | 07:21     | 08:02   | 07:47    | 08:23    |
|                     | 17:21   | 18:06    | 19:47 | 20:31 | 21:11 | 21:41 | 21:37 | 20:58  | 19:59     | 18:57   | 17:09    | 16:54    |
| 17                  | 08:25   | 07:48    | 07:56 | 06:55 | 06:07 | 05:48 | 06:04 | 06:41  | 07:22     | 08:03   | 07:49    | 08:24    |
|                     | 17:22   | 18:07    | 19:49 | 20:32 | 21:13 | 21:41 | 21:36 | 20:56  | 19:57     | 18:55   | 17:08    | 16:55    |
| 18                  | 08:25   | 07:46    | 07:54 | 06:53 | 06:06 | 05:48 | 06:05 | 06:43  | 07:23     | 08:04   | 07:50    | 08:25    |
|                     | 17:23   | 18:09    | 19:50 | 20:34 | 21:14 | 21:42 | 21:35 | 20:54  | 19:55     | 18:54   | 17:07    | 16:55    |
| 19                  | 08:24   | 07:44    | 07:52 | 06:51 | 06:05 | 05:48 | 06:06 | 06:44  | 07:25     | 08:06   | 07:51    | 08:25    |
|                     | 17:25   | 18:10    | 19:52 | 20:35 | 21:15 | 21:42 | 21:34 | 20:52  | 19:53     | 18:52   | 17:06    | 16:55    |
| 20                  | 08:23   | 07:43    | 07:50 | 06:49 | 06:04 | 05:48 | 06:07 | 06:45  | 07:26     | 08:07   | 07:53    | 08:26    |
|                     | 17:26   | 18:12    | 19:53 | 20:36 | 21:16 | 21:42 | 21:34 | 20:51  | 19:51     | 18:50   | 17:05    | 16:56    |
| 21                  | 08:22   | 07:41    | 07:48 | 06:48 | 06:03 | 05:48 | 06:08 | 06:47  | 07:27     | 08:09   | 07:54    | 08:27    |
|                     | 17:28   | 18:14    | 19:55 | 20:38 | 21:18 | 21:43 | 21:33 | 20:49  | 19:49     | 18:48   | 17:04    | 16:56    |
| 22                  | 08:22   | 07:39    | 07:46 | 06:46 | 06:02 | 05:48 | 06:09 | 06:48  | 07:29     | 08:10   | 07:56    | 08:27    |
|                     | 17:29   | 18:15    | 19:56 | 20:39 | 21:19 | 21:43 | 21:32 | 20:47  | 19:47     | 18:46   | 17:03    | 16:56    |
| 23                  | 08:21   | 07:38    | 07:44 | 06:44 | 06:01 | 05:48 | 06:10 | 06:49  | 07:30     | 08:12   | 07:57    | 08:28    |
|                     | 17:31   | 18:17    | 19:57 | 20:41 | 21:20 | 21:43 | 21:31 | 20:45  | 19:45     | 18:45   | 17:02    | 16:57    |
| 24                  | 08:20   | 07:36    | 07:42 | 06:42 | 06:00 | 05:48 | 06:11 | 06:51  | 07:31     | 08:13   | 07:59    | 08:28    |
|                     | 17:32   | 18:18    | 19:59 | 20:42 | 21:21 | 21:43 | 21:30 | 20:44  | 19:43     | 18:43   | 17:02    | 16:57    |
| 25                  | 08:19   | 07:34    | 07:40 | 06:40 | 05:59 | 05:49 | 06:13 | 06:52  | 07:33     | 08:14   | 08:00    | 08:29    |
|                     | 17:34   | 18:20    | 20:00 | 20:43 | 21:22 | 21:44 | 21:29 | 20:42  | 19:40     | 18:41   | 17:01    | 16:58    |
| 26                  | 08:18   | 07:32    | 07:38 | 06:39 | 05:58 | 05:49 | 06:14 | 06:53  | 07:34     | 08:16   | 08:01    | 08:29    |
|                     | 17:35   | 18:21    | 20:02 | 20:45 | 21:23 | 21:44 | 21:28 | 20:40  | 19:38     | 18:39   | 17:00    | 16:59    |
| 27                  | 08:17   | 07:30    | 07:36 | 06:37 | 05:57 | 05:49 | 06:15 | 06:55  | 07:35     | 08:17   | 08:03    | 08:29    |
|                     | 17:37   | 18:23    | 20:03 | 20:46 | 21:24 | 21:44 | 21:26 | 20:38  | 19:36     | 18:38   | 16:59    | 16:59    |
| 28                  | 08:16   | 07:29    | 07:34 | 06:35 | 05:56 | 05:50 | 06:16 | 06:56  | 07:37     | 08:19   | 08:04    | 08:30    |
|                     | 17:38   | 18:24    | 20:04 | 20:47 | 21:26 | 21:44 | 21:25 | 20:36  | 19:34     | 18:36   | 16:59    | 17:00    |
| 29                  | 08:15   |          | 07:32 | 06:34 | 05:55 | 05:50 | 06:17 | 06:57  | 07:38     | 08:20   | 08:05    | 08:30    |
|                     | 17:40   |          | 20:06 | 20:49 | 21:27 | 21:44 | 21:24 | 20:34  | 19:32     | 18:34   | 16:58    | 17:01    |
| 30                  | 08:13   |          | 07:30 | 06:32 | 05:54 | 05:51 | 06:19 | 06:59  | 07:39     | 08:22   | 08:06    | 08:30    |
|                     | 17:41   |          | 20:07 | 20:50 | 21:28 | 21:44 | 21:23 | 20:32  | 19:30     | 18:33   | 16:57    | 17:02    |
| 31                  | 08:12   |          | 07:28 |       | 05:54 |       | 06:20 | 07:00  |           | 08:23   |          | 08:30    |
|                     | 17:43   |          | 20:09 |       | 21:29 |       | 21:21 | 20:30  |           | 18:31   |          | 17:02    |
| Potential sun hours | 278     | 286      | 367   | 406   | 466   | 475   | 481   | 443    | 380       | 339     | 283      | 266      |
| Total, worst case   |         |          |       |       |       |       |       |        |           |         |          |          |
| Sun reduction       |         |          |       |       |       |       |       |        |           |         |          |          |
| Oper. time red.     |         |          |       |       |       |       |       |        |           |         |          |          |
| Wind dir. red.      |         |          |       |       |       |       |       |        |           |         |          |          |
| Total reduction     |         |          |       |       |       |       |       |        |           |         |          |          |
| Total, real         |         |          |       |       |       |       |       |        |           |         |          |          |

Table layout: For each day in each month the following matrix apply

| Day in month | Sun rise (hh:mm) | Sun set (hh:mm) | Minutes with flicker | First time (hh:mm) with flicker | Last time (hh:mm) with flicker | (WTG causing flicker first time) | (WTG causing flicker last time) |
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|

Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: R020 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 90.0° (19)

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Reference year for calendar

2023

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 8,758

|                     | January        | February       | March          | April          | May            | June           | July           | August         | September      | October        | November       | December       |
|---------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 1                   | 08:30<br>17:04 | 08:11<br>17:44 | 07:27<br>18:26 | 07:26<br>20:10 | 06:30<br>20:52 | 05:53<br>21:30 | 05:51<br>21:44 | 06:21<br>21:20 | 07:01<br>20:28 | 07:41<br>19:28 | 08:25<br>18:30 | 08:08<br>16:57 |
| 2                   | 08:30<br>17:05 | 08:10<br>17:46 | 07:25<br>18:27 | 07:24<br>20:11 | 06:29<br>20:53 | 05:52<br>21:31 | 05:52<br>21:43 | 06:22<br>21:19 | 07:02<br>20:27 | 07:42<br>19:26 | 08:26<br>18:28 | 08:09<br>16:56 |
| 3                   | 08:30<br>17:05 | 08:09<br>17:47 | 07:23<br>18:29 | 07:22<br>20:13 | 06:27<br>20:54 | 05:52<br>21:32 | 05:52<br>21:43 | 06:23<br>21:18 | 07:04<br>20:25 | 07:43<br>19:24 | 08:28<br>18:27 | 08:10<br>16:56 |
| 4                   | 08:30<br>17:06 | 08:07<br>17:49 | 07:21<br>18:30 | 07:20<br>20:14 | 06:26<br>20:56 | 05:51<br>21:32 | 05:53<br>21:43 | 06:25<br>21:16 | 07:05<br>20:23 | 07:45<br>19:22 | 08:29<br>18:25 | 08:11<br>16:56 |
| 5                   | 08:30<br>17:08 | 08:06<br>17:50 | 07:19<br>18:32 | 07:18<br>20:16 | 06:24<br>20:57 | 05:51<br>21:33 | 05:54<br>21:43 | 06:26<br>21:15 | 07:06<br>20:21 | 07:46<br>19:20 | 08:31<br>18:24 | 08:13<br>16:55 |
| 6                   | 08:30<br>17:09 | 08:05<br>17:52 | 07:17<br>18:33 | 07:16<br>20:17 | 06:22<br>20:58 | 05:50<br>21:34 | 05:54<br>21:42 | 06:27<br>21:13 | 07:08<br>20:19 | 07:48<br>19:18 | 08:32<br>18:22 | 08:14<br>16:55 |
| 7                   | 08:30<br>17:10 | 08:03<br>17:53 | 07:15<br>18:34 | 07:14<br>20:18 | 06:21<br>21:00 | 05:50<br>21:35 | 05:55<br>21:42 | 06:28<br>21:12 | 07:09<br>20:17 | 07:49<br>19:16 | 08:34<br>18:21 | 08:15<br>16:55 |
| 8                   | 08:30<br>17:11 | 08:02<br>17:55 | 07:13<br>18:36 | 07:12<br>20:20 | 06:19<br>21:01 | 05:49<br>21:36 | 05:56<br>21:42 | 06:30<br>21:10 | 07:10<br>20:15 | 07:50<br>19:14 | 08:35<br>18:19 | 08:16<br>16:54 |
| 9                   | 08:29<br>17:12 | 08:00<br>17:57 | 07:11<br>18:37 | 07:10<br>20:21 | 06:18<br>21:02 | 05:49<br>21:37 | 05:57<br>21:41 | 06:31<br>21:09 | 07:12<br>20:13 | 07:52<br>19:13 | 08:37<br>18:18 | 08:17<br>16:54 |
| 10                  | 08:29<br>17:13 | 07:59<br>17:58 | 07:10<br>18:39 | 07:08<br>20:23 | 06:17<br>21:04 | 05:49<br>21:37 | 05:58<br>21:41 | 06:32<br>21:07 | 07:13<br>20:11 | 07:53<br>19:11 | 08:38<br>18:17 | 08:18<br>16:54 |
| 11                  | 08:29<br>17:14 | 07:57<br>18:00 | 07:08<br>18:40 | 07:06<br>20:24 | 06:15<br>21:05 | 05:48<br>21:38 | 05:58<br>21:40 | 06:34<br>21:06 | 07:14<br>20:09 | 07:54<br>19:09 | 08:40<br>18:15 | 08:19<br>16:54 |
| 12                  | 08:28<br>17:16 | 07:56<br>18:00 | 08:06<br>18:42 | 07:04<br>20:25 | 06:14<br>21:06 | 05:48<br>21:39 | 05:59<br>21:40 | 06:35<br>21:04 | 07:16<br>20:07 | 07:56<br>19:07 | 08:41<br>18:14 | 08:20<br>16:54 |
| 13                  | 08:28<br>17:17 | 07:54<br>18:01 | 08:04<br>19:43 | 07:02<br>20:27 | 06:12<br>21:08 | 05:48<br>21:39 | 06:00<br>21:39 | 06:36<br>21:02 | 07:17<br>20:05 | 07:57<br>19:05 | 08:42<br>18:13 | 08:21<br>16:54 |
| 14                  | 08:27<br>17:18 | 07:53<br>18:03 | 08:02<br>19:45 | 07:00<br>20:28 | 06:11<br>21:09 | 05:48<br>21:40 | 06:01<br>21:38 | 06:38<br>21:01 | 07:18<br>20:03 | 07:59<br>19:03 | 08:44<br>18:12 | 08:22<br>16:54 |
| 15                  | 08:27<br>17:19 | 07:51<br>18:04 | 08:00<br>19:46 | 06:59<br>20:29 | 06:10<br>21:10 | 05:48<br>21:40 | 06:02<br>21:38 | 06:39<br>20:59 | 07:19<br>20:01 | 08:00<br>19:01 | 08:46<br>18:10 | 08:22<br>16:54 |
| 16                  | 08:26<br>17:21 | 07:49<br>18:06 | 07:58<br>19:47 | 06:57<br>20:31 | 06:09<br>21:11 | 05:48<br>21:41 | 06:03<br>21:37 | 06:40<br>20:58 | 07:21<br>19:59 | 08:02<br>18:57 | 08:47<br>18:09 | 08:23<br>16:54 |
| 17                  | 08:25<br>17:22 | 07:48<br>18:07 | 07:56<br>19:49 | 06:55<br>20:32 | 06:07<br>21:13 | 05:47<br>21:41 | 06:04<br>21:36 | 06:41<br>20:56 | 07:22<br>19:57 | 08:03<br>18:55 | 08:49<br>18:08 | 08:24<br>16:55 |
| 18                  | 08:25<br>17:23 | 07:46<br>18:09 | 07:54<br>19:50 | 06:53<br>20:34 | 06:06<br>21:14 | 05:48<br>21:42 | 06:05<br>21:35 | 06:43<br>20:54 | 07:23<br>19:55 | 08:04<br>18:54 | 08:50<br>18:07 | 08:25<br>16:55 |
| 19                  | 08:24<br>17:25 | 07:44<br>18:10 | 07:52<br>19:52 | 06:51<br>20:35 | 06:05<br>21:15 | 05:48<br>21:42 | 06:06<br>21:34 | 06:44<br>20:52 | 07:25<br>19:53 | 08:06<br>18:52 | 08:51<br>18:06 | 08:25<br>16:55 |
| 20                  | 08:23<br>17:26 | 07:43<br>18:12 | 07:50<br>19:53 | 06:49<br>20:36 | 06:04<br>21:16 | 05:48<br>21:42 | 06:07<br>21:34 | 06:45<br>20:51 | 07:26<br>19:51 | 08:07<br>18:50 | 08:52<br>18:05 | 08:26<br>16:56 |
| 21                  | 08:22<br>17:28 | 07:41<br>18:14 | 07:48<br>19:55 | 06:48<br>20:38 | 06:03<br>21:18 | 05:48<br>21:43 | 06:08<br>21:33 | 06:47<br>20:49 | 07:27<br>19:49 | 08:09<br>18:48 | 08:54<br>18:04 | 08:27<br>16:56 |
| 22                  | 08:22<br>17:29 | 07:39<br>18:15 | 07:46<br>19:56 | 06:46<br>20:39 | 06:02<br>21:19 | 05:48<br>21:43 | 06:09<br>21:32 | 06:48<br>20:47 | 07:29<br>19:47 | 08:10<br>18:46 | 08:56<br>18:03 | 08:27<br>16:56 |
| 23                  | 08:21<br>17:31 | 07:38<br>18:17 | 07:44<br>19:57 | 06:44<br>20:41 | 06:01<br>21:20 | 05:48<br>21:43 | 06:10<br>21:31 | 06:49<br>20:45 | 07:30<br>19:45 | 08:12<br>18:45 | 08:57<br>18:02 | 08:28<br>16:57 |
| 24                  | 08:20<br>17:32 | 07:36<br>18:18 | 07:42<br>19:59 | 06:42<br>20:42 | 06:00<br>21:21 | 05:48<br>21:43 | 06:11<br>21:30 | 06:51<br>20:44 | 07:31<br>19:43 | 08:13<br>18:43 | 08:59<br>18:02 | 08:28<br>16:57 |
| 25                  | 08:19<br>17:34 | 07:34<br>18:20 | 07:40<br>20:00 | 06:40<br>20:43 | 05:59<br>21:22 | 05:49<br>21:44 | 06:13<br>21:29 | 06:52<br>20:42 | 07:33<br>19:40 | 08:14<br>18:41 | 09:00<br>18:01 | 08:29<br>16:58 |
| 26                  | 08:18<br>17:35 | 07:32<br>18:21 | 07:38<br>20:02 | 06:39<br>20:45 | 05:58<br>21:23 | 05:49<br>21:44 | 06:14<br>21:28 | 06:53<br>20:40 | 07:34<br>19:38 | 08:16<br>18:39 | 09:01<br>18:00 | 08:29<br>16:59 |
| 27                  | 08:17<br>17:37 | 07:30<br>18:23 | 07:36<br>20:03 | 06:37<br>20:46 | 05:57<br>21:24 | 05:49<br>21:44 | 06:15<br>21:26 | 06:55<br>20:38 | 07:35<br>19:36 | 08:17<br>18:38 | 09:03<br>18:03 | 08:29<br>16:59 |
| 28                  | 08:16<br>17:38 | 07:29<br>18:24 | 07:34<br>20:04 | 06:35<br>20:47 | 05:56<br>21:26 | 05:50<br>21:44 | 06:16<br>21:25 | 06:56<br>20:36 | 07:37<br>19:34 | 08:19<br>18:36 | 09:05<br>18:04 | 08:30<br>17:00 |
| 29                  | 08:15<br>17:40 |                | 07:32<br>20:06 | 06:34<br>20:49 | 05:55<br>21:27 | 05:50<br>21:44 | 06:17<br>21:24 | 06:57<br>20:34 | 07:38<br>19:32 | 08:20<br>18:34 | 09:06<br>18:05 | 08:30<br>17:01 |
| 30                  | 08:13<br>17:41 |                | 07:30<br>20:07 | 06:32<br>20:50 | 05:54<br>21:28 | 05:51<br>21:44 | 06:19<br>21:23 | 06:59<br>20:32 | 07:39<br>19:30 | 08:22<br>18:33 | 09:07<br>18:06 | 08:30<br>17:02 |
| 31                  | 08:12<br>17:43 |                | 07:28<br>20:09 | 05:54<br>21:29 | 05:54<br>21:29 | 05:54<br>21:21 | 06:20<br>20:30 | 07:00<br>18:31 |                | 08:23<br>18:31 | 09:08<br>18:07 | 08:30<br>17:02 |
| Potential sun hours | 278            | 286            | 367            | 406            | 466            | 475            | 481            | 443            | 380            | 339            | 283            | 266            |
| Total, worst case   |                |                |                |                |                |                |                |                |                |                |                |                |
| Sun reduction       |                |                |                |                |                |                |                |                |                |                |                |                |
| Oper. time red.     |                |                |                |                |                |                |                |                |                |                |                |                |
| Wind dir. red.      |                |                |                |                |                |                |                |                |                |                |                |                |
| Total reduction     |                |                |                |                |                |                |                |                |                |                |                |                |
| Total, real         |                |                |                |                |                |                |                |                |                |                |                |                |

Table layout: For each day in each month the following matrix apply

|              |                      |                                 |                                  |
|--------------|----------------------|---------------------------------|----------------------------------|
| Day in month | Sun rise (hh:mm)     | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|              | Sun set (hh:mm)      | Last time (hh:mm) with flicker  | (WTG causing flicker last time)  |
|              | Minutes with flicker |                                 |                                  |



Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM  
US-01824-3627 Chelmsford  
+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

### Assumptions for shadow calculations

Reference year for calendar

Shadow receptor: R024 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (23)

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

|                     | January       | February | March | April | May   | June  | July  | August | September | October | November | December   |               |
|---------------------|---------------|----------|-------|-------|-------|-------|-------|--------|-----------|---------|----------|------------|---------------|
| 1   08:30           | 16:13 (67)    | 08:11    | 07:27 | 07:26 | 06:30 | 05:53 | 05:52 | 06:21  | 07:01     | 07:41   | 08:25    | 08:08      | 15:58 (67)    |
| 2   17:04           | 24 16:37 (67) | 17:44    | 18:26 | 20:10 | 20:52 | 21:30 | 21:44 | 21:20  | 20:29     | 19:28   | 18:30    | 16:57      | 29 16:27 (67) |
| 3   08:30           | 16:13 (67)    | 08:10    | 07:25 | 07:24 | 06:29 | 05:53 | 05:52 | 06:22  | 07:03     | 07:42   | 08:26    | 08:09      | 15:59 (67)    |
| 4   17:05           | 25 16:38 (67) | 17:46    | 18:27 | 20:11 | 20:53 | 21:31 | 21:43 | 21:19  | 20:27     | 19:26   | 18:28    | 16:57      | 29 16:28 (67) |
| 5   08:30           | 16:12 (67)    | 08:09    | 07:23 | 07:22 | 06:27 | 05:52 | 05:53 | 06:24  | 07:04     | 07:44   | 08:28    | 08:10      | 15:59 (67)    |
| 6   17:06           | 26 16:38 (67) | 17:47    | 18:29 | 20:13 | 20:54 | 21:32 | 21:43 | 21:18  | 20:25     | 19:24   | 18:27    | 16:56      | 29 16:28 (67) |
| 7   08:30           | 16:13 (67)    | 08:07    | 07:21 | 07:20 | 06:26 | 05:51 | 05:53 | 06:25  | 07:05     | 07:45   | 08:29    | 08:11      | 15:59 (67)    |
| 8   17:07           | 26 16:39 (67) | 17:49    | 18:30 | 20:14 | 20:56 | 21:32 | 21:43 | 21:16  | 20:23     | 19:22   | 18:25    | 16:56      | 30 16:29 (67) |
| 9   08:30           | 16:13 (67)    | 08:06    | 07:19 | 07:18 | 06:24 | 05:51 | 05:54 | 06:26  | 07:06     | 07:46   | 07:31    | 08:13      | 15:59 (67)    |
| 10   17:08          | 27 16:40 (67) | 17:50    | 18:32 | 20:16 | 20:57 | 21:33 | 21:43 | 21:15  | 20:21     | 19:20   | 17:24    | 16:55      | 30 16:29 (67) |
| 11   08:30          | 16:14 (67)    | 08:05    | 07:17 | 07:16 | 06:23 | 05:50 | 05:55 | 06:27  | 07:08     | 07:48   | 07:32    | 08:14      | 16:00 (67)    |
| 12   17:09          | 28 16:42 (67) | 17:52    | 18:33 | 20:17 | 20:58 | 21:34 | 21:42 | 21:13  | 20:19     | 19:19   | 17:22    | 16:55      | 29 16:29 (67) |
| 13   08:30          | 16:15 (67)    | 08:03    | 07:15 | 07:14 | 06:21 | 05:50 | 05:55 | 06:29  | 07:09     | 07:49   | 07:34    | 08:15      | 16:00 (67)    |
| 14   17:10          | 28 16:43 (67) | 17:54    | 18:35 | 20:18 | 21:00 | 21:35 | 21:42 | 21:12  | 20:17     | 19:17   | 17:21    | 16:55      | 28 16:28 (67) |
| 15   08:30          | 16:14 (67)    | 08:02    | 07:13 | 07:12 | 06:20 | 05:49 | 05:56 | 06:30  | 07:10     | 07:50   | 07:35    | 08:16      | 16:01 (67)    |
| 16   17:11          | 30 16:44 (67) | 17:55    | 18:36 | 20:20 | 21:01 | 21:36 | 21:42 | 21:10  | 20:15     | 19:15   | 17:19    | 16:55      | 27 16:28 (67) |
| 17   08:29          | 16:15 (67)    | 08:00    | 07:12 | 07:10 | 06:18 | 05:49 | 05:57 | 06:31  | 07:12     | 07:52   | 07:37    | 08:17      | 16:01 (67)    |
| 18   17:12          | 30 16:45 (67) | 17:57    | 18:38 | 20:21 | 21:02 | 21:37 | 21:41 | 21:09  | 20:13     | 19:13   | 17:18    | 16:54      | 27 16:28 (67) |
| 19   08:29          | 16:15 (67)    | 07:59    | 07:10 | 07:08 | 06:17 | 05:49 | 05:58 | 06:32  | 07:13     | 07:53   | 07:38    | 08:18      | 16:02 (67)    |
| 20   17:13          | 30 16:45 (67) | 17:58    | 18:39 | 20:23 | 21:04 | 21:37 | 21:41 | 21:07  | 20:11     | 19:11   | 17:17    | 16:54      | 26 16:28 (67) |
| 21   08:29          | 16:16 (67)    | 07:57    | 07:08 | 07:06 | 06:15 | 05:48 | 05:59 | 06:34  | 07:14     | 07:55   | 07:40    | 08:19      | 16:02 (67)    |
| 22   17:14          | 30 16:46 (67) | 18:00    | 18:40 | 20:24 | 21:05 | 21:38 | 21:40 | 21:06  | 20:09     | 19:09   | 17:15    | 16:54      | 25 16:27 (67) |
| 23   08:28          | 16:16 (67)    | 07:56    | 08:06 | 07:04 | 06:14 | 05:48 | 05:59 | 06:35  | 07:16     | 07:56   | 07:41    | 08:20      | 16:03 (67)    |
| 24   17:16          | 30 16:46 (67) | 18:00    | 18:42 | 20:25 | 21:06 | 21:39 | 21:40 | 21:04  | 20:07     | 19:07   | 17:14    | 16:54      | 24 16:27 (67) |
| 25   08:28          | 16:17 (67)    | 07:54    | 08:04 | 07:03 | 06:13 | 05:48 | 06:00 | 06:36  | 07:17     | 07:57   | 07:43    | 08:21      | 16:03 (67)    |
| 26   17:17          | 29 16:46 (67) | 18:01    | 19:43 | 20:27 | 21:08 | 21:39 | 21:39 | 21:03  | 20:05     | 19:05   | 17:13    | 16:54      | 24 16:27 (67) |
| 27   08:27          | 16:17 (67)    | 07:53    | 08:02 | 07:01 | 06:11 | 05:48 | 06:01 | 06:38  | 07:18     | 07:59   | 07:44    | 08:22      | 16:04 (67)    |
| 28   17:18          | 29 16:46 (67) | 18:03    | 19:45 | 20:28 | 21:09 | 21:40 | 21:38 | 21:01  | 20:03     | 19:03   | 17:12    | 16:54      | 23 16:27 (67) |
| 29   08:27          | 16:17 (67)    | 07:51    | 08:00 | 06:59 | 06:10 | 05:48 | 06:02 | 06:39  | 07:20     | 08:00   | 07:46    | 08:22      | 16:05 (67)    |
| 30   17:20          | 29 16:46 (67) | 18:04    | 19:46 | 20:30 | 21:10 | 21:40 | 21:38 | 20:59  | 20:01     | 19:01   | 17:11    | 16:54      | 23 16:28 (67) |
| 31   08:26          | 16:19 (67)    | 07:49    | 07:58 | 06:57 | 06:09 | 05:48 | 06:03 | 06:40  | 07:21     | 08:02   | 07:47    | 08:23      | 16:05 (67)    |
| 32   17:21          | 28 16:47 (67) | 18:06    | 19:48 | 20:31 | 21:11 | 21:41 | 21:37 | 20:58  | 19:59     | 18:57   | 17:09    | 16:55      | 22 16:27 (67) |
| 33   08:25          | 16:19 (67)    | 07:48    | 07:56 | 06:55 | 06:08 | 05:48 | 06:04 | 06:42  | 07:22     | 08:03   | 07:49    | 08:24      | 16:05 (67)    |
| 34   17:22          | 28 16:47 (67) | 18:07    | 19:49 | 20:32 | 21:13 | 21:41 | 21:36 | 20:56  | 19:57     | 18:55   | 17:08    | 16:54      | 22 16:27 (67) |
| 35   08:25          | 16:19 (67)    | 07:46    | 07:54 | 06:53 | 06:06 | 05:48 | 06:05 | 06:43  | 07:24     | 08:04   | 07:50    | 16:02 (67) | 16:06 (67)    |
| 36   17:24          | 28 16:47 (67) | 18:09    | 19:50 | 20:34 | 21:14 | 21:42 | 21:35 | 20:54  | 19:55     | 18:54   | 17:07    | 16:54      | 22 16:28 (67) |
| 37   08:24          | 16:20 (67)    | 07:44    | 07:52 | 06:51 | 06:05 | 05:48 | 06:06 | 06:44  | 07:25     | 08:06   | 07:51    | 16:01 (67) | 16:07 (67)    |
| 38   17:25          | 26 16:46 (67) | 18:11    | 19:52 | 20:35 | 21:15 | 21:42 | 21:34 | 20:52  | 19:53     | 18:52   | 17:06    | 16:54      | 22 16:29 (67) |
| 39   08:23          | 16:21 (67)    | 07:43    | 07:50 | 06:49 | 06:04 | 05:48 | 06:07 | 06:46  | 07:26     | 08:07   | 07:53    | 16:00 (67) | 16:07 (67)    |
| 40   17:26          | 25 16:46 (67) | 18:12    | 19:53 | 20:36 | 21:16 | 21:42 | 21:34 | 20:51  | 19:51     | 18:50   | 17:05    | 16:54      | 21 16:28 (67) |
| 41   08:23          | 16:23 (67)    | 07:41    | 07:48 | 06:48 | 06:03 | 05:48 | 06:08 | 06:47  | 07:28     | 08:09   | 07:54    | 15:59 (67) | 16:08 (67)    |
| 42   17:28          | 24 16:47 (67) | 18:14    | 19:55 | 20:38 | 21:18 | 21:43 | 21:33 | 20:49  | 19:49     | 18:48   | 17:04    | 16:54      | 21 16:29 (67) |
| 43   08:22          | 16:24 (67)    | 07:39    | 07:46 | 06:46 | 06:02 | 05:48 | 06:09 | 06:48  | 07:29     | 08:10   | 07:56    | 15:59 (67) | 16:08 (67)    |
| 44   17:29          | 22 16:46 (67) | 18:15    | 19:56 | 20:39 | 21:19 | 21:43 | 21:32 | 20:47  | 19:47     | 18:46   | 17:03    | 16:54      | 21 16:29 (67) |
| 45   08:21          | 16:25 (67)    | 07:38    | 07:44 | 06:44 | 06:01 | 05:48 | 06:11 | 06:49  | 07:30     | 08:12   | 07:57    | 15:58 (67) | 16:09 (67)    |
| 46   17:31          | 21 16:46 (67) | 18:17    | 19:58 | 20:41 | 21:20 | 21:43 | 21:31 | 20:45  | 19:45     | 18:45   | 17:03    | 16:54      | 21 16:30 (67) |
| 47   08:20          | 16:26 (67)    | 07:36    | 07:42 | 06:42 | 06:00 | 05:49 | 06:12 | 06:51  | 07:31     | 08:13   | 07:59    | 15:58 (67) | 16:09 (67)    |
| 48   17:32          | 19 16:45 (67) | 18:18    | 19:59 | 20:42 | 21:21 | 21:43 | 21:30 | 20:44  | 19:43     | 18:43   | 17:02    | 16:54      | 21 16:30 (67) |
| 49   08:19          | 16:27 (67)    | 07:34    | 07:40 | 06:41 | 05:59 | 05:49 | 06:13 | 06:52  | 07:33     | 08:15   | 08:00    | 15:57 (67) | 16:09 (67)    |
| 50   17:34          | 16 16:43 (67) | 18:20    | 20:00 | 20:43 | 21:22 | 21:44 | 21:29 | 20:42  | 19:41     | 18:41   | 17:01    | 16:54      | 21 16:30 (67) |
| 51   08:18          | 16:29 (67)    | 07:32    | 07:38 | 06:39 | 05:58 | 05:49 | 06:14 | 06:53  | 07:34     | 08:16   | 08:01    | 15:58 (67) | 16:10 (67)    |
| 52   17:35          | 13 16:42 (67) | 18:21    | 20:02 | 20:45 | 21:23 | 21:44 | 21:28 | 20:40  | 19:39     | 18:40   | 17:00    | 16:54      | 22 16:32 (67) |
| 53   08:17          | 16:33 (67)    | 07:30    | 07:36 | 06:37 | 05:57 | 05:50 | 06:15 | 06:55  | 07:35     | 08:17   | 08:03    | 15:57 (67) | 16:10 (67)    |
| 54   17:37          | 6 16:39 (67)  | 18:23    | 20:03 | 20:46 | 21:25 | 21:44 | 21:26 | 20:38  | 19:37     | 18:38   | 16:59    | 16:26 (67) | 22 16:32 (67) |
| 55   08:16          | 17:38         | 07:29    | 07:34 | 06:35 | 05:56 | 05:50 | 06:16 | 06:56  | 07:37     | 08:19   | 08:04    | 15:57 (67) | 16:10 (67)    |
| 56   17:40          | 17:40         | 18:24    | 20:05 | 20:48 | 21:26 | 21:44 | 21:25 | 20:36  | 19:35     | 18:36   | 16:59    | 16:26 (67) | 22 16:32 (67) |
| 57   08:15          | 17:40         | 07:32    | 07:36 | 06:34 | 05:55 | 05:51 | 06:17 | 06:57  | 07:38     | 08:20   | 08:05    | 15:58 (67) | 16:11 (67)    |
| 58   17:41          | 30 17:41      | 20:06    | 20:49 | 21:27 | 21:27 | 21:44 | 21:24 | 20:34  | 19:32     | 18:35   | 16:58    | 16:27 (67) | 22 16:33 (67) |
| 59   08:13          | 17:41         | 07:30    | 07:32 | 06:32 | 05:55 | 05:51 | 06:19 | 06:59  | 07:39     | 08:22   | 08:06    | 15:58 (67) | 16:12 (67)    |
| 60   17:43          | 31 17:43      | 20:07    | 20:50 | 21:28 | 21:28 | 21:44 | 21:23 | 20:32  | 19:30     | 18:33   | 16:58    | 16:27 (67) | 23 16:35 (67) |
| 61   08:12          | 17:43         | 07:28    | 07:28 | 06:28 | 05:54 | 05:54 | 06:20 | 07:00  | 07:30     | 08:23   | 08:08    | 15:57 (67) | 16:12 (67)    |
| 62   17:43          | 278           | 286      | 367   | 406   | 466   | 475   | 481   | 442    | 380       | 339     | 283      | 266        | 752           |
| Potential sun hours | 278           | 286      | 367   | 406   | 466   | 475   | 481   | 442    | 380       | 339     | 283      | 266        | 752           |
| Total, worst case   | 677           |          |       |       |       |       |       |        |           |         |          |            | 752           |
| Sun reduction       | 0.54          |          |       |       |       |       |       |        |           |         |          |            | 0.45          |
| Oper. time red.     | 1.00          |          |       |       |       |       |       |        |           |         |          |            | 1.00          |
| Wind dir. red.      | 0.62          |          |       |       |       |       |       |        |           |         |          |            | 0.62          |
| Total reduction     | 0.34          |          |       |       |       |       |       |        |           |         |          |            | 0.28          |
| Total, real         | 227           |          |       |       |       |       |       |        |           |         |          |            | 210           |

Table layout: For each day in each month the following matrix apply

|              |                      |                                 |                                  |
|--------------|----------------------|---------------------------------|----------------------------------|
| Day in month | Sun rise (hh:mm)     | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|              | Sun set (hh:mm)      | Last time (hh:mm) with flicker  | (WTG causing flicker last time)  |
|              | Minutes with flicker |                                 |                                  |

Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: R025 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 90.0° (24)

Assumptions for shadow calculations

Reference year for calendar

2023

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

|                     | January | February   | March      | April      | May        | June       | July  | August | September | October | November | December |            |            |            |            |            |            |
|---------------------|---------|------------|------------|------------|------------|------------|-------|--------|-----------|---------|----------|----------|------------|------------|------------|------------|------------|------------|
| 1                   | 08:30   | 08:11      | 16:40 (67) | 07:27      | 07:26      | 06:30      | 05:53 | 05:52  | 06:21     | 07:01   | 07:41    | 08:25    | 08:08      | 16:15 (67) |            |            |            |            |
|                     | 17:04   | 17:44      | 22         | 17:02 (67) | 18:26      | 20:10      | 20:52 | 21:30  | 21:44     | 21:20   | 20:29    | 19:28    | 18:30      | 16:57      | 16         | 16:31 (67) |            |            |
| 2                   | 08:30   | 08:10      | 17:46      | 21         | 17:01 (67) | 07:25      | 07:24 | 06:29  | 05:53     | 05:52   | 06:22    | 07:03    | 07:42      | 08:26      | 08:09      | 16:16 (67) |            |            |
|                     | 17:05   | 17:46      | 21         | 17:02 (67) | 18:27      | 20:11      | 20:53 | 21:31  | 21:43     | 21:19   | 20:27    | 19:26    | 18:28      | 16:57      | 15         | 16:31 (67) |            |            |
| 3                   | 08:30   | 16:37 (67) | 08:09      | 16:42 (67) | 07:23      | 07:22      | 06:27 | 05:52  | 05:53     | 06:24   | 07:04    | 07:44    | 08:28      | 08:10      | 16:17 (67) |            |            |            |
|                     | 17:06   | 1          | 16:38 (67) | 17:47      | 18         | 17:00 (67) | 18:29 | 20:13  | 20:54     | 21:32   | 21:43    | 21:18    | 20:25      | 19:24      | 18:27      | 16:56      | 13         | 16:30 (67) |
| 4                   | 08:30   | 16:37 (67) | 08:07      | 16:45 (67) | 07:21      | 07:20      | 06:26 | 05:51  | 05:53     | 06:25   | 07:05    | 07:45    | 08:29      | 08:11      | 16:18 (67) |            |            |            |
|                     | 17:07   | 2          | 16:39 (67) | 17:49      | 14         | 16:59 (67) | 18:30 | 20:14  | 20:56     | 21:32   | 21:43    | 21:16    | 20:23      | 19:22      | 18:25      | 16:56      | 11         | 16:29 (67) |
| 5                   | 08:30   | 16:36 (67) | 08:06      | 16:48 (67) | 07:19      | 07:18      | 06:24 | 05:51  | 05:54     | 06:26   | 07:06    | 07:46    | 07:31      | 08:13      | 16:19 (67) |            |            |            |
|                     | 17:08   | 4          | 16:40 (67) | 17:50      | 7          | 16:55 (67) | 18:32 | 20:16  | 20:57     | 21:33   | 21:43    | 21:15    | 20:21      | 19:20      | 17:24      | 16:55      | 10         | 16:29 (67) |
| 6                   | 08:30   | 16:36 (67) | 08:05      | 07:17      | 07:16      | 06:23      | 05:50 | 05:55  | 06:27     | 07:08   | 07:48    | 07:32    | 08:14      | 16:21 (67) |            |            |            |            |
|                     | 17:09   | 6          | 16:42 (67) | 17:52      | 20:17      | 18:33      | 20:17 | 20:58  | 21:34     | 21:42   | 21:13    | 20:19    | 19:19      | 17:22      | 16:55      | 8          | 16:29 (67) |            |
| 7                   | 08:30   | 16:36 (67) | 08:03      | 07:15      | 07:14      | 06:21      | 05:50 | 05:55  | 06:29     | 07:09   | 07:49    | 07:34    | 08:15      | 16:22 (67) |            |            |            |            |
|                     | 17:10   | 7          | 16:43 (67) | 17:54      | 18:35      | 20:18      | 21:00 | 21:35  | 21:42     | 21:12   | 20:17    | 19:17    | 17:21      | 16:55      | 7          | 16:29 (67) |            |            |
| 8                   | 08:30   | 16:35 (67) | 08:02      | 07:13      | 07:12      | 06:20      | 05:49 | 05:56  | 06:30     | 07:10   | 07:50    | 07:35    | 16:16 (67) | 08:16      | 16:23 (67) |            |            |            |
|                     | 17:11   | 9          | 16:44 (67) | 17:55      | 18:36      | 20:20      | 21:01 | 21:36  | 21:42     | 21:10   | 20:15    | 19:15    | 17:19      | 11         | 16:27 (67) | 16:55      | 5          | 16:28 (67) |
| 9                   | 08:29   | 16:35 (67) | 08:00      | 07:12      | 07:10      | 06:18      | 05:49 | 05:57  | 06:31     | 07:12   | 07:52    | 07:37    | 16:14 (67) | 08:17      | 16:24 (67) |            |            |            |
|                     | 17:12   | 10         | 16:45 (67) | 17:57      | 18:38      | 20:21      | 21:02 | 21:36  | 21:41     | 21:09   | 20:13    | 19:13    | 17:18      | 16         | 16:30 (67) | 16:54      | 4          | 16:28 (67) |
| 10                  | 08:29   | 16:34 (67) | 07:59      | 07:10      | 07:08      | 06:17      | 05:49 | 05:58  | 06:32     | 07:13   | 07:53    | 07:38    | 16:13 (67) | 08:18      | 16:26 (67) |            |            |            |
|                     | 17:13   | 12         | 16:46 (67) | 17:58      | 18:39      | 20:23      | 21:04 | 21:37  | 21:41     | 21:07   | 20:11    | 19:11    | 17:17      | 19         | 16:32 (67) | 16:54      | 2          | 16:28 (67) |
| 11                  | 08:29   | 16:34 (67) | 07:57      | 07:08      | 07:06      | 06:15      | 05:48 | 05:59  | 06:34     | 07:14   | 07:55    | 07:40    | 16:11 (67) | 08:19      | 16:54      |            |            |            |
|                     | 17:14   | 14         | 16:48 (67) | 18:00      | 18:40      | 20:24      | 21:05 | 21:38  | 21:40     | 21:06   | 20:09    | 19:09    | 17:15      | 22         | 16:33 (67) | 16:54      |            |            |
| 12                  | 08:28   | 16:34 (67) | 07:56      | 18:06      | 17:04      | 06:14      | 05:48 | 05:59  | 06:35     | 07:16   | 07:56    | 07:41    | 16:10 (67) | 08:20      | 16:54      |            |            |            |
|                     | 17:16   | 14         | 16:48 (67) | 18:00      | 18:42      | 20:25      | 21:06 | 21:39  | 21:40     | 21:04   | 20:07    | 19:07    | 17:14      | 24         | 16:34 (67) | 16:54      |            |            |
| 13                  | 08:28   | 16:34 (67) | 07:54      | 18:04      | 17:03      | 06:13      | 05:48 | 06:00  | 06:36     | 07:17   | 07:57    | 07:43    | 16:10 (67) | 08:21      | 16:54      |            |            |            |
|                     | 17:17   | 16         | 16:50 (67) | 18:01      | 19:43      | 20:27      | 21:08 | 21:39  | 21:39     | 21:03   | 20:05    | 19:05    | 17:13      | 25         | 16:35 (67) | 16:54      |            |            |
| 14                  | 08:27   | 16:34 (67) | 07:53      | 18:02      | 17:01      | 06:11      | 05:48 | 06:01  | 06:38     | 07:18   | 07:59    | 07:44    | 16:09 (67) | 08:22      | 16:54      |            |            |            |
|                     | 17:18   | 17         | 16:51 (67) | 18:03      | 19:45      | 20:28      | 21:09 | 21:40  | 21:38     | 21:01   | 20:03    | 19:03    | 17:12      | 27         | 16:36 (67) | 16:54      |            |            |
| 15                  | 08:27   | 16:33 (67) | 07:51      | 18:00      | 16:59      | 06:10      | 05:48 | 06:02  | 06:39     | 07:20   | 08:00    | 07:46    | 16:09 (67) | 08:22      | 16:54      |            |            |            |
|                     | 17:20   | 19         | 16:52 (67) | 18:04      | 19:46      | 20:30      | 21:10 | 21:40  | 21:38     | 20:59   | 20:01    | 19:01    | 17:11      | 28         | 16:37 (67) | 16:54      |            |            |
| 16                  | 08:26   | 16:34 (67) | 07:49      | 17:58      | 16:57      | 06:09      | 05:48 | 06:03  | 06:40     | 07:21   | 08:02    | 07:47    | 16:08 (67) | 08:23      | 16:54      |            |            |            |
|                     | 17:21   | 21         | 16:55 (67) | 18:06      | 19:48      | 20:31      | 21:11 | 21:41  | 21:37     | 20:58   | 19:59    | 18:57    | 17:09      | 29         | 16:37 (67) | 16:55      |            |            |
| 17                  | 08:25   | 16:33 (67) | 07:48      | 17:56      | 16:55      | 06:08      | 05:48 | 06:04  | 06:42     | 07:22   | 08:03    | 07:49    | 16:09 (67) | 08:24      | 16:55      |            |            |            |
|                     | 17:22   | 23         | 16:56 (67) | 18:07      | 19:49      | 20:32      | 21:13 | 21:41  | 21:36     | 20:56   | 19:57    | 18:55    | 17:08      | 29         | 16:38 (67) | 16:55      |            |            |
| 18                  | 08:25   | 16:33 (67) | 07:46      | 17:54      | 16:53      | 06:06      | 05:48 | 06:05  | 06:43     | 07:24   | 08:04    | 07:50    | 16:08 (67) | 08:25      | 16:55      |            |            |            |
|                     | 17:24   | 24         | 16:57 (67) | 18:09      | 19:50      | 20:34      | 21:14 | 21:42  | 21:35     | 20:54   | 19:55    | 18:54    | 17:07      | 29         | 16:37 (67) | 16:55      |            |            |
| 19                  | 08:24   | 16:33 (67) | 07:44      | 17:52      | 16:51      | 06:05      | 05:48 | 06:06  | 06:44     | 07:25   | 08:06    | 07:51    | 16:09 (67) | 08:25      | 16:55      |            |            |            |
|                     | 17:25   | 25         | 16:58 (67) | 18:11      | 19:52      | 20:35      | 21:15 | 21:42  | 21:34     | 20:52   | 19:53    | 18:52    | 17:06      | 29         | 16:38 (67) | 16:55      |            |            |
| 20                  | 08:23   | 16:33 (67) | 07:43      | 17:50      | 16:49      | 06:04      | 05:48 | 06:07  | 06:46     | 07:26   | 08:07    | 07:53    | 16:09 (67) | 08:26      | 16:55      |            |            |            |
|                     | 17:26   | 27         | 17:00 (67) | 18:12      | 19:53      | 20:36      | 21:16 | 21:42  | 21:34     | 20:51   | 19:51    | 18:50    | 17:05      | 30         | 16:39 (67) | 16:56      |            |            |
| 21                  | 08:23   | 16:34 (67) | 07:41      | 17:48      | 16:48      | 06:03      | 05:48 | 06:08  | 06:47     | 07:28   | 08:09    | 07:54    | 16:09 (67) | 08:27      | 16:56      |            |            |            |
|                     | 17:28   | 28         | 17:02 (67) | 18:14      | 19:55      | 20:38      | 21:18 | 21:43  | 21:33     | 20:49   | 19:49    | 18:48    | 17:04      | 30         | 16:39 (67) | 16:56      |            |            |
| 22                  | 08:22   | 16:34 (67) | 07:39      | 17:46      | 16:46      | 06:02      | 05:48 | 06:09  | 06:48     | 07:29   | 08:10    | 07:56    | 16:10 (67) | 08:27      | 16:56      |            |            |            |
|                     | 17:29   | 30         | 17:04 (67) | 18:15      | 19:56      | 20:39      | 21:19 | 21:43  | 21:32     | 20:47   | 19:47    | 18:46    | 17:03      | 29         | 16:39 (67) | 16:57      |            |            |
| 23                  | 08:21   | 16:35 (67) | 07:38      | 17:44      | 16:44      | 06:01      | 05:48 | 06:11  | 06:49     | 07:30   | 08:12    | 07:57    | 16:10 (67) | 08:28      | 16:57      |            |            |            |
|                     | 17:31   | 29         | 17:04 (67) | 18:17      | 19:58      | 20:41      | 21:20 | 21:43  | 21:31     | 20:45   | 19:45    | 18:45    | 17:03      | 27         | 16:37 (67) | 16:57      |            |            |
| 24                  | 08:20   | 16:35 (67) | 07:36      | 17:42      | 16:42      | 06:00      | 05:49 | 06:12  | 06:51     | 07:31   | 08:13    | 07:59    | 16:11 (67) | 08:28      | 16:58      |            |            |            |
|                     | 17:32   | 30         | 17:05 (67) | 18:18      | 19:59      | 20:42      | 21:21 | 21:43  | 21:30     | 20:44   | 19:43    | 18:43    | 17:02      | 26         | 16:37 (67) | 16:58      |            |            |
| 25                  | 08:19   | 16:34 (67) | 07:34      | 17:40      | 16:41      | 05:59      | 05:49 | 06:13  | 06:52     | 07:33   | 08:15    | 08:00    | 16:11 (67) | 08:29      | 16:58      |            |            |            |
|                     | 17:34   | 30         | 17:04 (67) | 18:20      | 20:00      | 20:43      | 21:22 | 21:44  | 21:29     | 20:42   | 19:41    | 18:41    | 17:01      | 24         | 16:35 (67) | 16:58      |            |            |
| 26                  | 08:18   | 16:35 (67) | 07:32      | 17:38      | 16:39      | 05:58      | 05:49 | 06:14  | 06:53     | 07:34   | 08:16    | 08:01    | 16:12 (67) | 08:29      | 16:59      |            |            |            |
|                     | 17:35   | 29         | 17:04 (67) | 18:21      | 20:02      | 20:45      | 21:23 | 21:44  | 21:28     | 20:40   | 19:39    | 18:40    | 17:00      | 23         | 16:35 (67) | 16:59      |            |            |
| 27                  | 08:17   | 16:36 (67) | 07:30      | 17:36      | 16:37      | 05:57      | 05:50 | 06:15  | 06:55     | 07:35   | 08:17    | 08:03    | 16:12 (67) | 08:29      | 16:59      |            |            |            |
|                     | 17:37   | 28         | 17:04 (67) | 18:23      | 20:03      | 20:46      | 21:24 | 21:44  | 21:26     | 20:38   | 19:37    | 18:38    | 16:59      | 22         | 16:34 (67) | 17:00      |            |            |
| 28                  | 08:16   | 16:36 (67) | 07:29      | 17:34      | 16:35      | 05:56      | 05:50 | 06:16  | 06:56     | 07:37   | 08:19    | 08:04    | 16:12 (67) | 08:30      | 16:59      |            |            |            |
|                     | 17:38   | 28         | 17:04 (67) | 18:24      | 20:05      | 20:48      | 21:26 | 21:44  | 21:25     | 20:36   | 19:35    | 18:36    | 16:59      | 21         | 16:33 (67) | 17:00      |            |            |
| 29                  | 08:15   | 16:37 (67) |            | 17:32      | 16:34      | 05:55      | 05:51 | 06:17  | 06:57     | 07:38   | 08:20    | 08:05    | 16:14 (67) | 08:30      | 16:59      |            |            |            |
|                     | 17:40   | 27         | 17:04 (67) |            | 20:06      | 20:49      | 21:27 | 21:44  | 21:24     | 20:34   | 19:32    | 18:35    | 16:58      | 19         | 16:33 (67) | 17:01      |            |            |
| 30                  | 08:13   | 16:38 (67) |            | 17:30      | 16:32      | 05:55      | 07:30 | 06:55  | 06:39     | 06:59   | 07:39    | 08:22    | 08:06      | 16:14 (67) | 08:30      | 16:59      |            |            |
|                     | 17:41   | 26         | 17:04 (67) |            | 20:07      | 20:50      | 21:28 | 21:44  | 21:23     | 20:32   | 19:30    | 18:33    | 16:58      | 18         | 16:32 (67) | 17:02      |            |            |
| 31                  | 08:12   | 16:38 (67) |            | 17:28      |            | 05:54      |       | 06:20  | 07:00     |         | 08:23    |          | 16:58      | 18         | 16:32 (67) | 17:02      |            |            |
|                     | 17:43   | 25         | 17:03 (67) |            | 20:09      |            | 21:29 |        | 21:22     | 20:30   |          | 18:31    |            | 17:03      |            |            |            |            |
| Potential sun hours | 278     | 286        | 367        | 406        | 466        | 475        | 481   | 442    | 380       | 339     | 283      | 266      | 91         |            |            |            |            |            |
| Total, worst case   | 561     | 82         |            |            |            |            |       |        |           |         | 557      |          | 91         |            |            |            |            |            |
| Sun reduction       | 0.54    | 0.52       |            |            |            |            |       |        |           |         | 0.42     |          | 0.45       |            |            |            |            |            |
| Oper. time red.     | 1.00    | 1.00       |            |            |            |            |       |        |           |         | 1.00     |          | 1.00       |            |            |            |            |            |
| Wind dir. red.      | 0.62    | 0.62       |            |            |            |            |       |        |           |         | 0.62     |          | 0.62       |            |            |            |            |            |
| Total reduction     | 0.33    | 0.32       |            |            |            |            |       |        |           |         | 0.26     |          | 0.28       |            |            |            |            |            |
| Total, real         | 188     | 26         |            |            |            |            |       |        |           |         | 145      |          | 25         |            |            |            |            |            |

Table layout: For each day in each month the following matrix apply

|              |                      |                                 |                                  |
|--------------|----------------------|---------------------------------|----------------------------------|
| Day in month | Sun rise (hh:mm)     | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|              | Sun set (hh:mm)      | Last time (hh:mm) with flicker  | (WTG causing flicker last time)  |
|              | Minutes with flicker |                                 |                                  |



Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: R034 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (30)

## Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Reference year for calendar

2023

| Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  |
|------|------|------|------|------|------|------|------|------|------|------|------|
| 0.54 | 0.52 | 0.61 | 0.58 | 0.64 | 0.67 | 0.75 | 0.72 | 0.67 | 0.53 | 0.42 | 0.45 |

Operational time

| N   | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW | NW  | NNW | Sum   |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| 376 | 314 | 339 | 425 | 445 | 474 | 693 | 570 | 488 | 386 | 872 | 609 | 772 | 651 | 677 | 667 | 8,758 |

|                     | January |      | February   |       | March | April | May   | June  | July  | August | September | October | November | December   |                     |
|---------------------|---------|------|------------|-------|-------|-------|-------|-------|-------|--------|-----------|---------|----------|------------|---------------------|
| 1                   | 08:30   |      | 15:49 (70) | 08:11 | 07:27 | 07:26 | 06:30 | 05:53 | 05:52 | 06:21  | 07:01     | 07:41   | 08:25    | 08:08      | 15:37 (70)          |
|                     | 17:04   | 35   | 16:24 (70) | 17:44 | 18:26 | 20:10 | 20:52 | 21:30 | 21:43 | 21:20  | 20:28     | 19:28   | 18:30    | 16:57      | 32 16:09 (70)       |
| 2                   | 08:30   |      | 15:49 (70) | 08:10 | 07:25 | 07:24 | 06:29 | 05:53 | 05:52 | 06:22  | 07:03     | 07:42   | 08:26    | 08:09      | 15:38 (70)          |
|                     | 17:05   | 36   | 16:25 (70) | 17:46 | 18:27 | 20:11 | 20:53 | 21:30 | 21:43 | 21:19  | 20:27     | 19:26   | 18:28    | 16:57      | 32 16:10 (70)       |
| 3                   | 08:30   |      | 15:50 (70) | 08:08 | 07:23 | 07:22 | 06:27 | 05:52 | 05:53 | 06:24  | 07:04     | 07:43   | 08:28    | 08:10      | 15:38 (70)          |
|                     | 17:06   | 35   | 16:25 (70) | 17:47 | 18:29 | 20:13 | 20:54 | 21:31 | 21:43 | 21:17  | 20:25     | 19:24   | 18:27    | 16:56      | 33 16:11 (70)       |
| 4                   | 08:30   |      | 15:51 (70) | 08:07 | 07:21 | 07:20 | 06:26 | 05:51 | 05:53 | 06:25  | 07:05     | 07:45   | 08:29    | 08:11      | 15:38 (70)          |
|                     | 17:07   | 35   | 16:26 (70) | 17:49 | 18:30 | 20:14 | 20:56 | 21:32 | 21:43 | 21:16  | 20:23     | 19:22   | 18:25    | 16:56      | 33 16:11 (70)       |
| 5                   | 08:30   |      | 15:51 (70) | 08:06 | 07:19 | 07:18 | 06:24 | 05:51 | 05:54 | 06:26  | 07:06     | 07:46   | 07:31    | 08:12      | 15:38 (70)          |
|                     | 17:08   | 35   | 16:26 (70) | 17:50 | 18:32 | 20:16 | 20:57 | 21:33 | 21:43 | 21:15  | 20:21     | 19:20   | 17:24    | 16:55      | 33 16:11 (70)       |
| 6                   | 08:30   |      | 15:52 (70) | 08:04 | 07:17 | 07:16 | 06:23 | 05:50 | 05:55 | 06:27  | 07:08     | 07:48   | 07:32    | 08:14      | 15:38 (70)          |
|                     | 17:09   | 35   | 16:27 (70) | 17:52 | 18:33 | 20:17 | 20:58 | 21:34 | 21:42 | 21:13  | 20:19     | 19:18   | 17:22    | 16:55      | 34 16:12 (70)       |
| 7                   | 08:30   |      | 15:52 (70) | 08:03 | 07:15 | 07:14 | 06:21 | 05:50 | 05:55 | 06:29  | 07:09     | 07:49   | 07:34    | 08:15      | 15:39 (70)          |
|                     | 17:10   | 34   | 16:26 (70) | 17:54 | 18:35 | 20:18 | 21:00 | 21:35 | 21:42 | 21:12  | 20:17     | 19:16   | 17:21    | 16:55      | 34 16:13 (70)       |
| 8                   | 08:30   |      | 15:53 (70) | 08:02 | 07:13 | 07:12 | 06:20 | 05:49 | 05:56 | 06:30  | 07:10     | 07:50   | 07:35    | 08:16      | 15:39 (70)          |
|                     | 17:11   | 34   | 16:27 (70) | 17:55 | 18:36 | 20:20 | 21:01 | 21:36 | 21:42 | 21:10  | 20:15     | 19:15   | 17:19    | 16:55      | 34 16:13 (70)       |
| 9                   | 08:29   |      | 15:54 (70) | 08:00 | 07:11 | 07:10 | 06:18 | 05:49 | 05:57 | 06:31  | 07:12     | 07:52   | 07:37    | 08:17      | 15:39 (70)          |
|                     | 17:12   | 33   | 16:27 (70) | 17:57 | 18:37 | 20:21 | 21:02 | 21:36 | 21:41 | 21:09  | 20:13     | 19:13   | 17:18    | 16:54      | 35 16:14 (70)       |
| 10                  | 08:29   |      | 15:54 (70) | 07:59 | 07:10 | 07:08 | 06:17 | 05:49 | 05:58 | 06:32  | 07:13     | 07:53   | 07:38    | 08:18      | 15:39 (70)          |
|                     | 17:13   | 33   | 16:27 (70) | 17:58 | 18:39 | 20:22 | 21:04 | 21:37 | 21:41 | 21:07  | 20:11     | 19:11   | 17:17    | 16:54      | 35 16:14 (70)       |
| 11                  | 08:29   |      | 15:55 (70) | 07:57 | 07:08 | 07:06 | 06:15 | 05:49 | 05:59 | 06:34  | 07:14     | 07:54   | 07:40    | 08:19      | 15:40 (70)          |
|                     | 17:14   | 33   | 16:28 (70) | 18:00 | 18:40 | 20:24 | 21:05 | 21:38 | 21:40 | 21:06  | 20:09     | 19:09   | 17:15    | 16:54      | 35 16:15 (70)       |
| 12                  | 08:28   |      | 15:56 (70) | 07:56 | 08:06 | 07:04 | 06:14 | 05:48 | 05:59 | 06:35  | 07:16     | 07:56   | 07:41    | 08:20      | 15:40 (70)          |
|                     | 17:16   | 31   | 16:27 (70) | 18:00 | 18:42 | 20:25 | 21:06 | 21:38 | 21:39 | 21:04  | 20:07     | 19:07   | 17:14    | 16:54      | 35 16:15 (70)       |
| 13                  | 08:28   |      | 15:57 (70) | 07:54 | 08:04 | 07:02 | 06:13 | 05:48 | 06:00 | 06:36  | 07:17     | 07:57   | 07:43    | 08:21      | 15:41 (70)          |
|                     | 17:17   | 31   | 16:28 (70) | 18:01 | 19:43 | 20:27 | 21:08 | 21:39 | 21:39 | 21:02  | 20:05     | 19:05   | 17:13    | 16:54      | 35 16:16 (70)       |
| 14                  | 08:27   |      | 15:57 (70) | 07:53 | 08:02 | 07:01 | 06:11 | 05:48 | 06:01 | 06:38  | 07:18     | 07:59   | 07:44    | 08:21      | 15:41 (70)          |
|                     | 17:18   | 31   | 16:28 (70) | 18:03 | 19:45 | 20:28 | 21:09 | 21:40 | 21:38 | 21:01  | 20:03     | 19:03   | 17:12    | 16:54      | 36 16:17 (70)       |
| 15                  | 08:27   |      | 15:58 (70) | 07:51 | 08:00 | 06:59 | 06:10 | 05:48 | 06:02 | 06:39  | 07:20     | 08:00   | 07:46    | 08:22      | 15:41 (70)          |
|                     | 17:20   | 29   | 16:27 (70) | 18:04 | 19:46 | 20:29 | 21:10 | 21:40 | 21:38 | 20:59  | 20:01     | 19:01   | 17:11    | 16:54      | 35 16:16 (70)       |
| 16                  | 08:26   |      | 15:59 (70) | 07:49 | 07:58 | 06:57 | 06:09 | 05:48 | 06:03 | 06:40  | 07:21     | 08:01   | 07:47    | 08:23      | 15:41 (70)          |
|                     | 17:21   | 29   | 16:28 (70) | 18:06 | 19:48 | 20:31 | 21:11 | 21:41 | 21:37 | 20:57  | 19:59     | 18:57   | 17:09    | 16:55      | 36 16:17 (70)       |
| 17                  | 08:25   |      | 16:00 (70) | 07:48 | 07:56 | 06:55 | 06:07 | 05:48 | 06:04 | 06:42  | 07:22     | 08:03   | 07:48    | 08:24      | 15:42 (70)          |
|                     | 17:22   | 27   | 16:27 (70) | 18:07 | 19:49 | 20:32 | 21:13 | 21:41 | 21:36 | 20:56  | 19:57     | 18:55   | 17:08    | 16:55      | 36 16:18 (70)       |
| 18                  | 08:25   |      | 16:01 (70) | 07:46 | 07:54 | 06:53 | 06:06 | 05:48 | 06:05 | 06:43  | 07:23     | 08:04   | 07:50    | 08:25      | 15:43 (70)          |
|                     | 17:24   | 25   | 16:26 (70) | 18:09 | 19:50 | 20:34 | 21:14 | 21:42 | 21:35 | 20:54  | 19:55     | 18:54   | 17:07    | 16:55      | 35 16:18 (70)       |
| 19                  | 08:24   |      | 16:02 (70) | 07:44 | 07:52 | 06:51 | 06:05 | 05:48 | 06:06 | 06:44  | 07:25     | 08:06   | 07:51    | 08:25      | 15:43 (70)          |
|                     | 17:25   | 24   | 16:26 (70) | 18:11 | 19:52 | 20:35 | 21:15 | 21:42 | 21:34 | 20:52  | 19:53     | 18:52   | 17:06    | 16:55      | 35 16:18 (70)       |
| 20                  | 08:23   |      | 16:04 (70) | 07:43 | 07:50 | 06:49 | 06:04 | 05:48 | 06:07 | 06:45  | 07:26     | 08:07   | 07:53    | 08:26      | 15:44 (70)          |
|                     | 17:26   | 21   | 16:25 (70) | 18:12 | 19:53 | 20:36 | 21:16 | 21:42 | 21:33 | 20:51  | 19:51     | 18:50   | 17:05    | 16:56      | 35 16:19 (70)       |
| 21                  | 08:22   |      | 16:05 (70) | 07:41 | 07:48 | 06:48 | 06:03 | 05:48 | 06:08 | 06:47  | 07:27     | 08:09   | 07:54    | 08:27      | 15:44 (70)          |
|                     | 17:28   | 19   | 16:24 (70) | 18:14 | 19:55 | 20:38 | 21:17 | 21:43 | 21:33 | 20:49  | 19:49     | 18:48   | 17:04    | 16:56      | 36 16:20 (70)       |
| 22                  | 08:22   |      | 16:07 (70) | 07:39 | 07:46 | 06:46 | 06:02 | 05:48 | 06:09 | 06:48  | 07:29     | 08:10   | 07:56    | 08:27      | 15:44 (70)          |
|                     | 17:29   | 15   | 16:22 (70) | 18:15 | 19:56 | 20:39 | 21:19 | 21:43 | 21:32 | 20:47  | 19:47     | 18:46   | 17:03    | 16:57      | 36 16:20 (70)       |
| 23                  | 08:21   |      | 16:10 (70) | 07:37 | 07:44 | 06:44 | 06:01 | 05:48 | 06:11 | 06:49  | 07:30     | 08:12   | 07:57    | 08:28      | 15:45 (70)          |
|                     | 17:31   | 10   | 16:20 (70) | 18:17 | 19:57 | 20:40 | 21:20 | 21:43 | 21:31 | 20:45  | 19:45     | 18:45   | 17:03    | 16:57      | 36 16:21 (70)       |
| 24                  | 08:20   |      |            | 07:36 | 07:42 | 06:42 | 06:00 | 05:49 | 06:12 | 06:51  | 07:31     | 08:13   | 07:58    | 08:28      | 15:45 (70)          |
|                     | 17:32   |      |            | 18:18 | 19:59 | 20:42 | 21:21 | 21:43 | 21:30 | 20:43  | 19:43     | 18:43   | 17:02    | 16:58      | 36 16:21 (70)       |
| 25                  | 08:19   |      |            | 07:34 | 07:40 | 06:41 | 05:59 | 05:49 | 06:13 | 06:52  | 07:33     | 08:14   | 08:00    | 08:29      | 15:46 (70)          |
|                     | 17:34   |      |            | 18:20 | 20:00 | 20:43 | 21:22 | 21:43 | 21:28 | 20:42  | 19:41     | 18:41   | 17:01    | 16:58      | 35 16:21 (70)       |
| 26                  | 08:18   |      |            | 07:32 | 07:38 | 06:39 | 05:58 | 05:49 | 06:14 | 06:53  | 07:34     | 08:16   | 08:01    | 08:29      | 15:47 (70)          |
|                     | 17:35   |      |            | 18:21 | 20:02 | 20:45 | 21:23 | 21:44 | 21:27 | 20:40  | 19:38     | 18:39   | 17:00    | 16:59      | 35 16:22 (70)       |
| 27                  | 08:17   |      |            | 07:30 | 07:36 | 06:37 | 05:57 | 05:50 | 06:15 | 06:55  | 07:35     | 08:17   | 08:02    | 08:29      | 15:47 (70)          |
|                     | 17:37   |      |            | 18:23 | 20:03 | 20:46 | 21:24 | 21:44 | 21:26 | 20:38  | 19:36     | 18:38   | 16:59    | 16:06 (70) | 17:00 35 16:22 (70) |
| 28                  | 08:16   |      |            | 07:28 | 07:34 | 06:35 | 05:56 | 05:50 | 06:16 | 06:56  | 07:37     | 08:19   | 08:04    | 08:29      | 15:47 (70)          |
|                     | 17:38   |      |            | 18:24 | 20:04 | 20:47 | 21:25 | 21:44 | 21:25 | 20:36  | 19:34     | 18:36   | 16:59    | 16:06 (70) | 17:00 36 16:23 (70) |
| 29                  | 08:15   |      |            |       | 07:32 | 06:34 | 05:55 | 05:51 | 06:17 | 06:57  | 07:38     | 08:20   | 08:05    | 08:30      | 15:48 (70)          |
|                     | 17:40   |      |            |       | 20:06 | 20:49 | 21:26 | 21:44 | 21:24 | 20:34  | 19:32     | 18:35   | 16:58    | 16:08 (70) | 17:01 35 16:23 (70) |
| 30                  | 08:13   |      |            |       | 07:30 | 06:32 | 05:55 | 05:51 | 06:19 | 06:59  | 07:39     | 08:22   | 08:06    | 08:30      | 15:48 (70)          |
|                     | 17:41   |      |            |       | 20:07 | 20:50 | 21:28 | 21:44 | 21:23 | 20:32  | 19:30     | 18:33   | 16:58    | 16:08 (70) | 17:02 35 16:23 (70) |
| 31                  | 08:12   |      |            |       |       |       | 05:54 |       | 06:20 | 07:00  |           | 08:23   |          | 08:30      | 15:48 (70)          |
|                     | 17:43   |      |            |       |       |       | 21:29 |       | 21:21 | 20:30  |           | 18:31   |          | 17:03      | 36 16:24 (70)       |
| Potential sun hours | 278     |      | 286        |       | 367   | 406   | 465   | 475   | 481   | 442    | 380       | 340     | 283      | 266        | 1079                |
| Total, worst case   |         | 670  |            |       |       |       |       |       |       |        |           |         |          |            | 0.45                |
| Sun reduction       |         | 0.54 |            |       |       |       |       |       |       |        |           |         |          |            | 1.00                |
| Oper. time red.     |         | 1.00 |            |       |       |       |       |       |       |        |           |         |          |            | 0.62                |
| Wind dir. red.      |         | 0.62 |            |       |       |       |       |       |       |        |           |         |          |            | 0.28                |
| Total reduction     |         | 0.33 |            |       |       |       |       |       |       |        |           |         |          |            | 0.28                |
| Total, real         |         | 224  |            |       |       |       |       |       |       |        |           |         |          |            | 301                 |

Table layout: For each day in each month the following matrix apply

| Day in month | Sun rise (hh:mm) | Sun set (hh:mm) | Minutes with flicker | First time (hh:mm) with flicker | Last time (hh:mm) with flicker | (WTG causing flicker first time) | (WTG causing flicker last time) |
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|

Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Assumptions for shadow calculations

Reference year for calendar

Shadow receptor: R035 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 90.0° (31)

Sunshine probability S/50 (Sun hours/Possible sun hours) []

2023

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

|                     | January              | February                  | March                        | April                   | May                     | June                    | July                    | August                  | September               | October                 | November                | December                |                                |
|---------------------|----------------------|---------------------------|------------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|--------------------------------|
| 1                   | 08:30<br>17:04<br>32 | 16:04 (70)<br>17:44<br>27 | 16:18 (70)<br>18:26<br>20:10 | 07:27<br>18:26<br>20:10 | 06:30<br>20:52<br>21:29 | 05:53<br>21:29<br>21:43 | 05:52<br>21:20<br>21:43 | 06:21<br>21:20<br>21:43 | 07:01<br>20:28<br>19:28 | 07:41<br>18:30<br>18:30 | 08:25<br>18:30<br>18:30 | 08:08<br>16:57<br>16:57 | 15:48 (70)<br>40<br>16:28 (69) |
| 2                   | 08:30<br>17:05<br>32 | 16:05 (70)<br>17:46<br>24 | 16:20 (70)<br>18:27<br>20:11 | 07:25<br>18:27<br>20:11 | 06:29<br>20:53<br>21:30 | 05:53<br>21:30<br>21:43 | 05:52<br>21:19<br>21:43 | 06:22<br>21:19<br>21:43 | 07:03<br>20:27<br>19:26 | 07:42<br>18:28<br>18:28 | 08:26<br>18:28<br>18:28 | 08:09<br>16:57<br>16:57 | 15:49 (70)<br>40<br>16:29 (69) |
| 3                   | 08:30<br>17:06<br>33 | 16:05 (70)<br>17:47<br>21 | 16:21 (70)<br>18:29<br>20:13 | 07:23<br>18:29<br>20:13 | 06:27<br>20:54<br>21:31 | 05:52<br>21:31<br>21:43 | 05:53<br>21:17<br>21:43 | 06:24<br>21:17<br>21:43 | 07:04<br>20:25<br>19:24 | 07:43<br>18:27<br>18:27 | 08:28<br>18:27<br>18:27 | 08:10<br>16:56<br>16:56 | 15:50 (70)<br>39<br>16:29 (69) |
| 4                   | 08:30<br>17:07<br>34 | 16:05 (70)<br>17:49<br>16 | 16:24 (70)<br>18:30<br>20:14 | 07:21<br>18:30<br>20:14 | 06:26<br>20:56<br>21:32 | 05:51<br>21:32<br>21:43 | 05:53<br>21:16<br>21:43 | 06:25<br>21:16<br>21:43 | 07:05<br>20:23<br>19:22 | 07:45<br>18:25<br>18:25 | 08:29<br>18:25<br>18:25 | 08:11<br>16:56<br>16:56 | 15:50 (70)<br>39<br>16:29 (69) |
| 5                   | 08:30<br>17:08<br>34 | 16:06 (70)<br>17:50<br>9  | 16:24 (70)<br>18:32<br>20:16 | 07:19<br>18:32<br>20:16 | 06:24<br>20:57<br>21:33 | 05:51<br>21:33<br>21:43 | 05:54<br>21:15<br>21:43 | 06:26<br>21:15<br>21:43 | 07:06<br>20:21<br>19:20 | 07:46<br>18:24<br>18:24 | 08:31<br>18:24<br>18:24 | 08:12<br>16:55<br>16:55 | 15:50 (70)<br>39<br>16:29 (69) |
| 6                   | 08:30<br>17:09<br>36 | 16:06 (70)<br>17:52<br>9  | 16:24 (70)<br>18:33<br>20:17 | 07:17<br>18:33<br>20:17 | 06:23<br>20:58<br>21:34 | 05:50<br>21:34<br>21:42 | 05:55<br>21:13<br>21:42 | 06:27<br>21:13<br>21:42 | 07:08<br>20:19<br>19:18 | 07:48<br>18:18<br>18:18 | 08:32<br>18:18<br>18:18 | 08:14<br>16:55<br>16:55 | 15:51 (70)<br>37<br>16:28 (69) |
| 7                   | 08:30<br>17:10<br>37 | 16:05 (70)<br>17:54<br>13 | 16:24 (70)<br>18:35<br>20:18 | 07:15<br>18:35<br>20:18 | 06:21<br>21:00<br>21:35 | 05:50<br>21:35<br>21:42 | 05:55<br>21:12<br>21:42 | 06:29<br>21:12<br>21:42 | 07:09<br>20:17<br>19:16 | 07:49<br>18:16<br>18:16 | 08:34<br>18:16<br>18:16 | 08:15<br>16:55<br>16:55 | 15:52 (70)<br>37<br>16:29 (69) |
| 8                   | 08:30<br>17:11<br>38 | 16:06 (70)<br>17:55<br>13 | 16:24 (70)<br>18:36<br>20:20 | 07:13<br>18:36<br>20:20 | 06:20<br>21:01<br>21:36 | 05:49<br>21:36<br>21:42 | 05:56<br>21:10<br>21:42 | 06:30<br>21:10<br>21:42 | 07:10<br>20:15<br>19:15 | 07:50<br>18:15<br>18:15 | 08:35<br>18:15<br>18:15 | 08:16<br>16:55<br>16:55 | 15:53 (70)<br>35<br>16:28 (69) |
| 9                   | 08:29<br>17:12<br>38 | 16:07 (70)<br>17:57<br>19 | 16:24 (70)<br>18:37<br>20:21 | 07:11<br>18:37<br>20:21 | 06:18<br>21:02<br>21:36 | 05:49<br>21:36<br>21:41 | 05:57<br>21:09<br>21:41 | 06:31<br>21:09<br>21:41 | 07:12<br>20:13<br>19:13 | 07:52<br>18:13<br>18:13 | 08:37<br>18:13<br>18:13 | 08:17<br>16:54<br>16:54 | 15:53 (70)<br>35<br>16:28 (69) |
| 10                  | 08:29<br>17:13<br>39 | 16:07 (70)<br>17:58<br>22 | 16:24 (70)<br>18:39<br>20:22 | 07:10<br>18:39<br>20:22 | 06:17<br>21:04<br>21:37 | 05:49<br>21:37<br>21:41 | 05:58<br>21:07<br>21:41 | 06:32<br>21:07<br>21:41 | 07:13<br>20:11<br>19:11 | 07:53<br>18:11<br>18:11 | 08:38<br>18:11<br>18:11 | 08:18<br>16:54<br>16:54 | 15:54 (70)<br>34<br>16:28 (69) |
| 11                  | 08:29<br>17:14<br>39 | 16:07 (70)<br>17:59<br>25 | 16:24 (70)<br>18:40<br>20:24 | 07:08<br>18:40<br>20:24 | 06:15<br>21:05<br>21:38 | 05:49<br>21:38<br>21:40 | 05:59<br>21:06<br>21:40 | 06:34<br>21:06<br>21:40 | 07:14<br>20:09<br>19:09 | 07:54<br>18:09<br>18:09 | 08:40<br>18:09<br>18:09 | 08:19<br>16:54<br>16:54 | 15:55 (70)<br>33<br>16:28 (69) |
| 12                  | 08:28<br>17:16<br>39 | 16:07 (70)<br>18:00<br>28 | 16:24 (70)<br>18:42<br>20:25 | 07:06<br>18:42<br>20:25 | 06:14<br>21:06<br>21:39 | 05:48<br>21:39<br>21:41 | 05:59<br>21:04<br>21:41 | 06:35<br>21:04<br>21:41 | 07:16<br>20:07<br>19:07 | 07:56<br>18:07<br>18:07 | 08:41<br>18:07<br>18:07 | 08:20<br>16:54<br>16:54 | 15:55 (70)<br>33<br>16:28 (69) |
| 13                  | 08:28<br>17:17<br>40 | 16:07 (70)<br>18:01<br>30 | 16:24 (70)<br>18:43<br>20:27 | 07:05<br>18:43<br>20:27 | 06:13<br>21:08<br>21:39 | 05:48<br>21:39<br>21:41 | 05:59<br>21:02<br>21:41 | 06:36<br>21:02<br>21:41 | 07:17<br>20:05<br>19:05 | 07:57<br>18:05<br>18:05 | 08:42<br>18:05<br>18:05 | 08:21<br>16:54<br>16:54 | 15:56 (70)<br>32<br>16:28 (69) |
| 14                  | 08:27<br>17:18<br>40 | 16:07 (70)<br>18:03<br>31 | 16:24 (70)<br>18:44<br>20:28 | 07:04<br>18:44<br>20:28 | 06:11<br>21:09<br>21:40 | 05:48<br>21:40<br>21:42 | 05:59<br>21:01<br>21:42 | 06:38<br>21:01<br>21:42 | 07:18<br>20:03<br>19:03 | 07:59<br>18:03<br>18:03 | 08:43<br>18:03<br>18:03 | 08:22<br>16:54<br>16:54 | 15:57 (70)<br>31<br>16:28 (69) |
| 15                  | 08:27<br>17:20<br>40 | 16:07 (70)<br>18:04<br>33 | 16:24 (70)<br>18:45<br>20:29 | 07:03<br>18:45<br>20:29 | 06:10<br>21:10<br>21:40 | 05:48<br>21:40<br>21:42 | 05:59<br>21:01<br>21:42 | 06:39<br>21:01<br>21:42 | 07:19<br>20:01<br>19:01 | 07:59<br>18:01<br>18:01 | 08:44<br>18:01<br>18:01 | 08:23<br>16:54<br>16:54 | 15:58 (70)<br>30<br>16:27 (69) |
| 16                  | 08:26<br>17:21<br>39 | 16:08 (70)<br>18:06<br>34 | 16:24 (70)<br>18:46<br>20:30 | 07:02<br>18:46<br>20:30 | 06:09<br>21:11<br>21:41 | 05:48<br>21:41<br>21:43 | 05:59<br>21:01<br>21:43 | 06:40<br>21:01<br>21:43 | 07:21<br>20:57<br>19:59 | 08:01<br>18:57<br>18:57 | 08:45<br>18:57<br>18:57 | 08:24<br>16:55<br>16:55 | 15:59 (70)<br>29<br>16:27 (69) |
| 17                  | 08:25<br>17:22<br>39 | 16:08 (70)<br>18:07<br>35 | 16:24 (70)<br>18:47<br>20:31 | 07:01<br>18:47<br>20:31 | 06:08<br>21:12<br>21:41 | 05:48<br>21:41<br>21:43 | 05:59<br>21:01<br>21:43 | 06:41<br>21:01<br>21:43 | 07:22<br>20:57<br>19:59 | 08:02<br>18:58<br>18:58 | 08:46<br>18:58<br>18:58 | 08:25<br>16:55<br>16:55 | 15:59 (70)<br>29<br>16:27 (69) |
| 18                  | 08:25<br>17:23<br>39 | 16:08 (70)<br>18:08<br>36 | 16:24 (70)<br>18:48<br>20:32 | 07:00<br>18:48<br>20:32 | 06:07<br>21:13<br>21:41 | 05:48<br>21:41<br>21:43 | 05:59<br>21:01<br>21:43 | 06:42<br>21:01<br>21:43 | 07:23<br>20:57<br>19:59 | 08:03<br>18:59<br>18:59 | 08:47<br>18:59<br>18:59 | 08:26<br>16:55<br>16:55 | 15:59 (70)<br>29<br>16:27 (69) |
| 19                  | 08:24<br>17:24<br>39 | 16:08 (70)<br>18:09<br>37 | 16:24 (70)<br>18:49<br>20:33 | 06:59<br>18:49<br>20:33 | 06:06<br>21:14<br>21:41 | 05:48<br>21:41<br>21:43 | 05:59<br>21:01<br>21:43 | 06:43<br>21:01<br>21:43 | 07:24<br>20:57<br>19:59 | 08:04<br>18:59<br>18:59 | 08:48<br>18:59<br>18:59 | 08:27<br>16:55<br>16:55 | 15:59 (70)<br>29<br>16:27 (69) |
| 20                  | 08:23<br>17:25<br>38 | 16:09 (70)<br>18:11<br>38 | 16:24 (70)<br>18:50<br>20:34 | 06:58<br>18:50<br>20:34 | 06:05<br>21:15<br>21:42 | 05:48<br>21:42<br>21:43 | 05:59<br>21:01<br>21:43 | 06:44<br>21:01<br>21:43 | 07:25<br>20:57<br>19:59 | 08:05<br>18:59<br>18:59 | 08:49<br>18:59<br>18:59 | 08:28<br>16:55<br>16:55 | 15:59 (70)<br>28<br>16:27 (69) |
| 21                  | 08:22<br>17:26<br>38 | 16:09 (70)<br>18:12<br>39 | 16:24 (70)<br>18:51<br>20:35 | 06:57<br>18:51<br>20:35 | 06:04<br>21:16<br>21:42 | 05:48<br>21:42<br>21:43 | 05:59<br>21:01<br>21:43 | 06:45<br>21:01<br>21:43 | 07:26<br>20:57<br>19:59 | 08:06<br>18:59<br>18:59 | 08:50<br>18:59<br>18:59 | 08:29<br>16:55<br>16:55 | 15:59 (70)<br>28<br>16:27 (69) |
| 22                  | 08:22<br>17:27<br>38 | 16:09 (70)<br>18:13<br>40 | 16:24 (70)<br>18:52<br>20:36 | 06:56<br>18:52<br>20:36 | 06:03<br>21:17<br>21:43 | 05:48<br>21:43<br>21:43 | 05:59<br>21:01<br>21:43 | 06:46<br>21:01<br>21:43 | 07:27<br>20:57<br>19:59 | 08:07<br>18:59<br>18:59 | 08:51<br>18:59<br>18:59 | 08:30<br>16:55<br>16:55 | 15:59 (70)<br>28<br>16:27 (69) |
| 23                  | 08:21<br>17:28<br>38 | 16:09 (70)<br>18:14<br>41 | 16:24 (70)<br>18:53<br>20:37 | 06:55<br>18:53<br>20:37 | 06:02<br>21:18<br>21:43 | 05:48<br>21:43<br>21:43 | 05:59<br>21:01<br>21:43 | 06:47<br>21:01<br>21:43 | 07:28<br>20:57<br>19:59 | 08:08<br>18:59<br>18:59 | 08:52<br>18:59<br>18:59 | 08:31<br>16:55<br>16:55 | 15:59 (70)<br>28<br>16:27 (69) |
| 24                  | 08:21<br>17:29<br>38 | 16:09 (70)<br>18:15<br>42 | 16:24 (70)<br>18:54<br>20:38 | 06:54<br>18:54<br>20:38 | 06:01<br>21:19<br>21:43 | 05:48<br>21:43<br>21:43 | 05:59<br>21:01<br>21:43 | 06:48<br>21:01<br>21:43 | 07:29<br>20:57<br>19:59 | 08:09<br>18:59<br>18:59 | 08:53<br>18:59<br>18:59 | 08:32<br>16:55<br>16:55 | 15:59 (70)<br>28<br>16:27 (69) |
| 25                  | 08:20<br>17:31<br>38 | 16:10 (70)<br>18:17<br>43 | 16:24 (70)<br>18:55<br>20:39 | 06:53<br>18:55<br>20:39 | 06:00<br>21:20<br>21:43 | 05:48<br>21:43<br>21:43 | 05:59<br>21:01<br>21:43 | 06:49<br>21:01<br>21:43 | 07:30<br>20:57<br>19:59 | 08:10<br>18:59<br>18:59 | 08:54<br>18:59<br>18:59 | 08:33<br>16:55<br>16:55 | 15:59 (70)<br>28<br>16:27 (69) |
| 26                  | 08:18<br>17:32<br>37 | 16:10 (70)<br>18:18<br>44 | 16:24 (70)<br>18:56<br>20:40 | 06:52<br>18:56<br>20:40 | 05:59<br>21:21<br>21:43 | 05:48<br>21:43<br>21:43 | 05:59<br>21:01<br>21:43 | 06:50<br>21:01<br>21:43 | 07:31<br>20:57<br>19:59 | 08:11<br>18:59<br>18:59 | 08:55<br>18:59<br>18:59 | 08:34<br>16:55<br>16:55 | 15:59 (70)<br>28<br>16:27 (69) |
| 27                  | 08:18<br>17:33<br>36 | 16:11 (70)<br>18:19<br>45 | 16:24 (70)<br>18:57<br>20:41 | 06:51<br>18:57<br>20:41 | 05:58<br>21:22<br>21:43 | 05:48<br>21:43<br>21:43 | 05:59<br>21:01<br>21:43 | 06:51<br>21:01<br>21:43 | 07:32<br>20:57<br>19:59 | 08:12<br>18:59<br>18:59 | 08:56<br>18:59<br>18:59 | 08:35<br>16:55<br>16:55 | 15:59 (70)<br>28<br>16:27 (69) |
| 28                  | 08:16<br>17:34<br>33 | 16:12 (70)<br>18:20<br>46 | 16:24 (70)<br>18:58<br>20:42 | 06:50<br>18:58<br>20:42 | 05:57<br>21:23<br>21:43 | 05:48<br>21:43<br>21:43 | 05:59<br>21:01<br>21:43 | 06:52<br>21:01<br>21:43 | 07:33<br>20:57<br>19:59 | 08:13<br>18:59<br>18:59 | 08:57<br>18:59<br>18:59 | 08:36<br>16:55<br>16:55 | 15:59 (70)<br>28<br>16:27 (69) |
| 29                  | 08:15<br>17:35<br>32 | 16:13 (70)<br>18:21<br>47 | 16:24 (70)<br>18:59<br>20:43 | 06:49<br>18:59<br>20:43 | 05:56<br>21:24<br>21:43 | 05:48<br>21:43<br>21:43 | 05:59<br>21:01<br>21:43 | 06:53<br>21:01<br>21:43 | 07:34<br>20:57<br>19:59 | 08:14<br>18:59<br>18:59 | 08:58<br>18:59<br>18:59 | 08:37<br>16:55<br>16:55 | 15:59 (70)<br>28<br>16:27 (69) |
| 30                  | 08:13<br>17:41<br>31 | 16:14 (70)<br>18:24<br>48 | 16:24 (70)<br>19:00<br>20:44 | 06:48<br>19:00<br>20:44 | 05:55<br>21:25<br>21:43 | 05:48<br>21:43<br>21:43 | 05:59<br>21:01<br>21:43 | 06:54<br>21:01<br>21:43 | 07:35<br>20:57<br>19:59 | 08:15<br>18:59<br>18:59 | 08:59<br>18:59<br>18:59 | 08:38<br>16:55<br>16:55 | 15:59 (70)<br>28<br>16:27 (69) |
| 31                  | 08:12<br>17:43<br>28 | 16:15 (70)<br>18:26<br>49 | 16:24 (70)<br>19:01<br>20:45 | 06:47<br>19:01<br>20:45 | 05:54<br>21:26<br>21:43 | 05:48<br>21:43<br>21:43 | 05:59<br>21:01<br>21:43 | 06:55<br>21:01<br>21:43 | 07:36<br>20:57<br>19:59 | 08:16<br>18:59<br>18:59 | 09:00<br>18:59<br>18:59 | 08:39<br>16:55<br>16:55 | 15:59 (70)<br>28<br>16:27 (69) |
| Potential sun hours | 278                  | 286                       | 367                          | 406                     | 465                     | 475                     | 481                     | 442                     | 380                     | 340                     | 283                     | 266                     | 997                            |
| Total, worst case   | 1129                 | 97                        |                              |                         |                         |                         |                         |                         |                         |                         |                         |                         | 997                            |
| Sun reduction       | 0.54                 | 0.52                      |                              |                         |                         |                         |                         |                         |                         |                         |                         |                         | 0.45                           |
| Oper. time red.     | 1.00                 | 1.00                      |                              |                         |                         |                         |                         |                         |                         |                         |                         |                         | 1.00                           |
| Wind dir. red.      | 0.62                 | 0.62                      |                              |                         |                         |                         |                         |                         |                         |                         |                         |                         | 0.62                           |
| Total reduction     | 0.34                 | 0.32                      |                              |                         |                         |                         |                         |                         |                         |                         |                         |                         | 0.28                           |
| Total, real         | 379                  | 31                        |                              |                         |                         |                         |                         |                         |                         |                         |                         |                         | 279                            |

Table layout: For each day in each month the following matrix apply

|              |                      |                                 |                                  |
|--------------|----------------------|---------------------------------|----------------------------------|
| Day in month | Sun rise (hh:mm)     | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|              | Sun set (hh:mm)      | Last time (hh:mm) with flicker  | (WTG causing flicker last time)  |
|              | Minutes with flicker |                                 |                                  |



Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

### Assumptions for shadow calculations

Reference year for calendar

Shadow receptor: R038 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 90.0° (34)

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

|                     | January        | February       | March          | April          | May            | June           | July           | August         | September      | October        | November       | December       |
|---------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 1                   | 08:30<br>17:04 | 08:11<br>17:44 | 07:27<br>18:26 | 07:26<br>20:10 | 06:30<br>20:51 | 05:53<br>21:29 | 05:52<br>21:43 | 06:21<br>21:20 | 07:01<br>20:28 | 07:41<br>19:28 | 08:25<br>18:30 | 08:08<br>16:57 |
| 2                   | 08:30<br>17:05 | 08:10<br>17:46 | 07:25<br>18:27 | 07:24<br>20:11 | 06:29<br>20:53 | 05:53<br>21:30 | 05:52<br>21:43 | 06:22<br>21:19 | 07:03<br>20:26 | 07:42<br>19:26 | 08:26<br>18:28 | 08:09<br>16:57 |
| 3                   | 08:30<br>17:06 | 08:08<br>17:47 | 07:23<br>18:29 | 07:22<br>20:13 | 06:27<br>20:54 | 05:52<br>21:31 | 05:53<br>21:43 | 06:24<br>21:17 | 07:04<br>20:25 | 07:43<br>19:24 | 08:28<br>18:27 | 08:10<br>16:56 |
| 4                   | 08:30<br>17:07 | 08:07<br>17:49 | 07:21<br>18:30 | 07:20<br>20:14 | 06:26<br>20:56 | 05:51<br>21:32 | 05:53<br>21:43 | 06:25<br>21:16 | 07:05<br>20:23 | 07:45<br>19:22 | 08:29<br>18:25 | 08:11<br>16:56 |
| 5                   | 08:30<br>17:08 | 08:06<br>17:50 | 07:19<br>18:32 | 07:18<br>20:16 | 06:24<br>20:57 | 05:51<br>21:33 | 05:54<br>21:43 | 06:26<br>21:15 | 07:06<br>20:21 | 07:46<br>19:20 | 07:31<br>17:24 | 08:12<br>16:55 |
| 6                   | 08:30<br>17:09 | 08:04<br>17:52 | 07:17<br>18:33 | 07:16<br>20:17 | 06:23<br>20:58 | 05:50<br>21:34 | 05:55<br>21:42 | 06:27<br>21:13 | 07:08<br>20:19 | 07:48<br>19:18 | 07:32<br>17:22 | 08:13<br>16:55 |
| 7                   | 08:30<br>17:10 | 08:03<br>17:54 | 07:15<br>18:35 | 07:14<br>20:18 | 06:21<br>21:00 | 05:50<br>21:35 | 05:55<br>21:42 | 06:29<br>21:12 | 07:09<br>20:17 | 07:49<br>19:16 | 07:34<br>17:21 | 08:15<br>16:55 |
| 8                   | 08:29<br>17:11 | 08:02<br>17:55 | 07:13<br>18:36 | 07:12<br>20:20 | 06:20<br>21:01 | 05:50<br>21:36 | 05:56<br>21:41 | 06:30<br>21:10 | 07:10<br>20:15 | 07:50<br>19:15 | 07:35<br>17:19 | 08:16<br>16:55 |
| 9                   | 08:29<br>17:12 | 08:00<br>17:57 | 07:11<br>18:37 | 07:10<br>20:21 | 06:18<br>21:02 | 05:49<br>21:36 | 05:57<br>21:41 | 06:31<br>21:09 | 07:12<br>20:13 | 07:52<br>19:13 | 07:37<br>17:18 | 08:17<br>16:54 |
| 10                  | 08:29<br>17:13 | 07:59<br>17:58 | 07:10<br>18:39 | 07:08<br>20:22 | 06:17<br>21:04 | 05:49<br>21:37 | 05:58<br>21:41 | 06:32<br>21:07 | 07:13<br>20:11 | 07:53<br>19:11 | 07:38<br>17:17 | 08:18<br>16:54 |
| 11                  | 08:28<br>17:15 | 07:57<br>18:00 | 07:08<br>18:40 | 07:06<br>20:24 | 06:15<br>21:05 | 05:49<br>21:38 | 05:59<br>21:40 | 06:34<br>21:06 | 07:14<br>20:09 | 07:54<br>19:09 | 07:40<br>17:15 | 08:19<br>16:54 |
| 12                  | 08:28<br>17:16 | 07:56<br>18:00 | 08:06<br>18:42 | 07:04<br>20:25 | 06:14<br>21:06 | 05:48<br>21:38 | 05:59<br>21:39 | 06:35<br>21:04 | 07:16<br>20:07 | 07:56<br>19:07 | 07:41<br>17:14 | 08:20<br>16:54 |
| 13                  | 08:28<br>17:17 | 07:54<br>18:01 | 08:04<br>19:43 | 07:02<br>20:27 | 06:13<br>21:07 | 05:48<br>21:39 | 06:00<br>21:39 | 06:36<br>21:02 | 07:17<br>20:05 | 07:57<br>19:05 | 07:43<br>17:13 | 08:21<br>16:54 |
| 14                  | 08:27<br>17:18 | 07:53<br>18:03 | 08:02<br>19:45 | 07:01<br>20:28 | 06:11<br>21:09 | 05:48<br>21:40 | 06:01<br>21:38 | 06:38<br>21:01 | 07:18<br>20:03 | 07:59<br>19:03 | 07:44<br>17:12 | 08:21<br>16:54 |
| 15                  | 08:27<br>17:20 | 07:51<br>18:04 | 08:00<br>19:46 | 06:59<br>20:29 | 06:10<br>21:10 | 05:48<br>21:40 | 06:02<br>21:37 | 06:39<br>20:59 | 07:20<br>20:01 | 08:00<br>19:01 | 07:45<br>17:11 | 08:22<br>16:54 |
| 16                  | 08:26<br>17:21 | 07:49<br>18:06 | 07:58<br>19:48 | 06:57<br>20:31 | 06:09<br>21:11 | 05:48<br>21:41 | 06:03<br>21:37 | 06:40<br>20:57 | 07:21<br>19:59 | 08:01<br>18:57 | 07:47<br>17:09 | 08:23<br>16:55 |
| 17                  | 08:25<br>17:22 | 07:48<br>18:07 | 07:56<br>19:49 | 06:55<br>20:32 | 06:08<br>21:13 | 05:48<br>21:41 | 06:04<br>21:36 | 06:42<br>20:56 | 07:22<br>19:57 | 08:03<br>18:55 | 07:48<br>17:08 | 08:24<br>16:55 |
| 18                  | 08:25<br>17:24 | 07:46<br>18:09 | 07:54<br>19:50 | 06:53<br>20:34 | 06:06<br>21:14 | 05:48<br>21:42 | 06:05<br>21:35 | 06:43<br>20:54 | 07:23<br>19:55 | 08:04<br>18:54 | 07:50<br>17:07 | 08:25<br>16:55 |
| 19                  | 08:24<br>17:25 | 07:44<br>18:11 | 07:52<br>19:52 | 06:51<br>20:35 | 06:05<br>21:15 | 05:48<br>21:42 | 06:06<br>21:34 | 06:44<br>20:52 | 07:25<br>19:53 | 08:06<br>18:52 | 07:51<br>17:06 | 08:25<br>16:55 |
| 20                  | 08:23<br>17:26 | 07:43<br>18:12 | 07:50<br>19:53 | 06:49<br>20:36 | 06:04<br>21:16 | 05:48<br>21:42 | 06:07<br>21:33 | 06:45<br>20:51 | 07:26<br>19:51 | 08:07<br>18:50 | 07:53<br>17:05 | 08:26<br>16:56 |
| 21                  | 08:22<br>17:28 | 07:41<br>18:14 | 07:48<br>19:55 | 06:48<br>20:38 | 06:03<br>21:17 | 05:48<br>21:43 | 06:08<br>21:32 | 06:47<br>20:49 | 07:27<br>19:49 | 08:09<br>18:48 | 07:54<br>17:04 | 08:26<br>16:56 |
| 22                  | 08:21<br>17:29 | 07:39<br>18:15 | 07:46<br>19:56 | 06:46<br>20:39 | 06:02<br>21:19 | 05:48<br>21:43 | 06:09<br>21:32 | 06:48<br>20:47 | 07:29<br>19:47 | 08:10<br>18:46 | 07:56<br>17:03 | 08:27<br>16:57 |
| 23                  | 08:21<br>17:31 | 07:37<br>18:17 | 07:44<br>19:57 | 06:44<br>20:40 | 06:01<br>21:20 | 05:48<br>21:43 | 06:11<br>21:31 | 06:49<br>20:45 | 07:30<br>19:45 | 08:11<br>18:45 | 07:57<br>17:03 | 08:28<br>16:57 |
| 24                  | 08:20<br>17:32 | 07:36<br>18:18 | 07:42<br>19:59 | 06:42<br>20:42 | 06:00<br>21:21 | 05:49<br>21:43 | 06:12<br>21:29 | 06:51<br>20:43 | 07:31<br>19:43 | 08:13<br>18:43 | 07:58<br>17:02 | 08:28<br>16:58 |
| 25                  | 08:19<br>17:34 | 07:34<br>18:20 | 07:40<br>20:00 | 06:41<br>20:43 | 05:59<br>21:22 | 05:49<br>21:43 | 06:13<br>21:28 | 06:52<br>20:42 | 07:33<br>19:40 | 08:14<br>18:41 | 08:00<br>17:01 | 08:28<br>16:58 |
| 26                  | 08:18<br>17:35 | 07:32<br>18:21 | 07:38<br>20:02 | 06:39<br>20:45 | 05:58<br>21:23 | 05:49<br>21:44 | 06:14<br>21:27 | 06:53<br>20:40 | 07:34<br>19:38 | 08:16<br>18:39 | 08:01<br>17:00 | 08:29<br>16:59 |
| 27                  | 08:17<br>17:37 | 07:30<br>18:23 | 07:36<br>20:03 | 06:37<br>20:46 | 05:57<br>21:24 | 05:50<br>21:44 | 06:15<br>21:26 | 06:55<br>20:38 | 07:35<br>19:36 | 08:17<br>18:38 | 08:02<br>16:59 | 08:29<br>17:00 |
| 28                  | 08:16<br>17:38 | 07:28<br>18:24 | 07:34<br>20:04 | 06:35<br>20:47 | 05:56<br>21:25 | 05:50<br>21:44 | 06:16<br>21:25 | 06:56<br>20:36 | 07:37<br>19:34 | 08:19<br>18:36 | 08:04<br>16:59 | 08:29<br>17:00 |
| 29                  | 08:14<br>17:40 |                | 07:32<br>20:06 | 06:34<br>20:49 | 05:55<br>21:26 | 05:51<br>21:44 | 06:18<br>21:24 | 06:57<br>20:34 | 07:38<br>19:32 | 08:20<br>18:35 | 08:05<br>16:58 | 08:30<br>17:01 |
| 30                  | 08:13<br>17:41 |                | 07:30<br>20:07 | 06:32<br>20:50 | 05:55<br>21:27 | 05:51<br>21:44 | 06:19<br>21:23 | 06:59<br>20:32 | 07:39<br>19:30 | 08:22<br>18:33 | 08:06<br>16:58 | 08:30<br>17:02 |
| 31                  | 08:12<br>17:43 |                | 07:28<br>20:09 |                | 05:54<br>21:28 |                | 06:20<br>21:21 | 07:00<br>20:30 |                | 08:23<br>18:31 |                | 08:30<br>17:03 |
| Potential sun hours | 278            | 286            | 367            | 406            | 465            | 475            | 481            | 442            | 380            | 340            | 283            | 266            |
| Total, worst case   |                |                |                |                |                |                |                |                |                |                |                |                |
| Sun reduction       |                |                |                |                |                |                |                |                |                |                |                |                |
| Oper. time red.     |                |                |                |                |                |                |                |                |                |                |                |                |
| Wind dir. red.      |                |                |                |                |                |                |                |                |                |                |                |                |
| Total reduction     |                |                |                |                |                |                |                |                |                |                |                |                |
| Total, real         |                |                |                |                |                |                |                |                |                |                |                |                |

Table layout: For each day in each month the following matrix apply

|              |                      |                                 |                                  |
|--------------|----------------------|---------------------------------|----------------------------------|
| Day in month | Sun rise (hh:mm)     | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|              | Sun set (hh:mm)      | Last time (hh:mm) with flicker  | (WTG causing flicker last time)  |
|              | Minutes with flicker |                                 |                                  |

Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: R039 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (35)

## Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Reference year for calendar

2023

| Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  |
|------|------|------|------|------|------|------|------|------|------|------|------|
| 0.54 | 0.52 | 0.61 | 0.58 | 0.64 | 0.67 | 0.75 | 0.72 | 0.67 | 0.53 | 0.42 | 0.45 |

Operational time

| N   | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW | NW  | NNW | Sum   |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| 376 | 314 | 339 | 425 | 445 | 474 | 693 | 570 | 488 | 386 | 872 | 609 | 772 | 651 | 677 | 667 | 8,758 |

|                     | January | February | March | April | May   | June  | July  | August | September | October | November | December |
|---------------------|---------|----------|-------|-------|-------|-------|-------|--------|-----------|---------|----------|----------|
| 1                   | 08:30   | 08:11    | 07:27 | 07:26 | 06:30 | 05:53 | 05:52 | 06:21  | 07:01     | 07:41   | 08:25    | 08:08    |
|                     | 17:04   | 17:44    | 18:26 | 20:10 | 20:51 | 21:29 | 21:43 | 21:20  | 20:28     | 19:28   | 18:30    | 16:57    |
| 2                   | 08:30   | 08:10    | 07:25 | 07:24 | 06:29 | 05:53 | 05:52 | 06:22  | 07:03     | 07:42   | 08:26    | 08:09    |
|                     | 17:05   | 17:46    | 18:27 | 20:11 | 20:53 | 21:30 | 21:43 | 21:19  | 20:26     | 19:26   | 18:28    | 16:57    |
| 3                   | 08:30   | 08:08    | 07:23 | 07:22 | 06:27 | 05:52 | 05:53 | 06:24  | 07:04     | 07:43   | 08:28    | 08:10    |
|                     | 17:06   | 17:47    | 18:29 | 20:13 | 20:54 | 21:31 | 21:43 | 21:17  | 20:25     | 19:24   | 18:27    | 16:56    |
| 4                   | 08:30   | 08:07    | 07:21 | 07:20 | 06:26 | 05:51 | 05:53 | 06:25  | 07:05     | 07:45   | 08:29    | 08:11    |
|                     | 17:07   | 17:49    | 18:30 | 20:14 | 20:56 | 21:32 | 21:43 | 21:16  | 20:23     | 19:22   | 18:25    | 16:56    |
| 5                   | 08:30   | 08:06    | 07:19 | 07:18 | 06:24 | 05:51 | 05:54 | 06:26  | 07:06     | 07:46   | 07:31    | 08:12    |
|                     | 17:08   | 17:50    | 18:32 | 20:16 | 20:57 | 21:33 | 21:43 | 21:15  | 20:21     | 19:20   | 17:24    | 16:55    |
| 6                   | 08:30   | 08:04    | 07:17 | 07:16 | 06:23 | 05:50 | 05:55 | 06:27  | 07:08     | 07:48   | 07:32    | 08:13    |
|                     | 17:09   | 17:52    | 18:33 | 20:17 | 20:58 | 21:34 | 21:42 | 21:13  | 20:19     | 19:18   | 17:22    | 16:55    |
| 7                   | 08:30   | 08:03    | 07:15 | 07:14 | 06:21 | 05:50 | 05:55 | 06:29  | 07:09     | 07:49   | 07:34    | 08:15    |
|                     | 17:10   | 17:54    | 18:35 | 20:18 | 21:00 | 21:35 | 21:42 | 21:12  | 20:17     | 19:16   | 17:21    | 16:55    |
| 8                   | 08:29   | 08:02    | 07:13 | 07:12 | 06:20 | 05:50 | 05:56 | 06:30  | 07:10     | 07:50   | 07:35    | 08:16    |
|                     | 17:11   | 17:55    | 18:36 | 20:20 | 21:01 | 21:36 | 21:41 | 21:10  | 20:15     | 19:15   | 17:19    | 16:55    |
| 9                   | 08:29   | 08:00    | 07:11 | 07:10 | 06:18 | 05:49 | 05:57 | 06:31  | 07:12     | 07:52   | 07:37    | 08:17    |
|                     | 17:12   | 17:57    | 18:37 | 20:21 | 21:02 | 21:36 | 21:41 | 21:09  | 20:13     | 19:13   | 17:18    | 16:54    |
| 10                  | 08:29   | 07:59    | 07:10 | 07:08 | 06:17 | 05:49 | 05:58 | 06:32  | 07:13     | 07:53   | 07:38    | 08:18    |
|                     | 17:13   | 17:58    | 18:39 | 20:22 | 21:04 | 21:37 | 21:41 | 21:07  | 20:11     | 19:11   | 17:17    | 16:54    |
| 11                  | 08:28   | 07:57    | 07:08 | 07:06 | 06:15 | 05:49 | 05:59 | 06:34  | 07:14     | 07:54   | 07:40    | 08:19    |
|                     | 17:15   | 18:00    | 18:40 | 20:24 | 21:05 | 21:38 | 21:40 | 21:06  | 20:09     | 19:09   | 17:15    | 16:54    |
| 12                  | 08:28   | 07:56    | 08:06 | 07:04 | 06:14 | 05:48 | 05:59 | 06:35  | 07:16     | 07:56   | 07:41    | 08:20    |
|                     | 17:16   | 18:00    | 18:42 | 20:25 | 21:06 | 21:38 | 21:39 | 21:04  | 20:07     | 19:07   | 17:14    | 16:54    |
| 13                  | 08:28   | 07:54    | 08:04 | 07:02 | 06:13 | 05:48 | 06:00 | 06:36  | 07:17     | 07:57   | 07:43    | 08:21    |
|                     | 17:17   | 18:01    | 19:43 | 20:27 | 21:07 | 21:39 | 21:39 | 21:02  | 20:05     | 19:05   | 17:13    | 16:54    |
| 14                  | 08:27   | 07:53    | 08:02 | 07:01 | 06:11 | 05:48 | 06:01 | 06:38  | 07:18     | 07:59   | 07:44    | 08:21    |
|                     | 17:18   | 18:03    | 19:45 | 20:28 | 21:09 | 21:40 | 21:38 | 21:01  | 20:03     | 19:03   | 17:12    | 16:54    |
| 15                  | 08:27   | 07:51    | 08:00 | 06:59 | 06:10 | 05:48 | 06:02 | 06:39  | 07:20     | 08:00   | 07:45    | 08:22    |
|                     | 17:20   | 18:04    | 19:46 | 20:29 | 21:10 | 21:40 | 21:37 | 20:59  | 20:01     | 19:01   | 17:11    | 16:54    |
| 16                  | 08:26   | 07:49    | 07:58 | 06:57 | 06:09 | 05:48 | 06:03 | 06:40  | 07:21     | 08:01   | 07:47    | 08:23    |
|                     | 17:21   | 18:06    | 19:48 | 20:31 | 21:11 | 21:41 | 21:37 | 20:57  | 19:59     | 18:57   | 17:09    | 16:55    |
| 17                  | 08:25   | 07:48    | 07:56 | 06:55 | 06:08 | 05:48 | 06:04 | 06:42  | 07:22     | 08:03   | 07:48    | 08:24    |
|                     | 17:22   | 18:07    | 19:49 | 20:32 | 21:13 | 21:41 | 21:36 | 20:56  | 19:57     | 18:55   | 17:08    | 16:55    |
| 18                  | 08:25   | 07:46    | 07:54 | 06:53 | 06:06 | 05:48 | 06:05 | 06:43  | 07:23     | 08:04   | 07:50    | 08:25    |
|                     | 17:24   | 18:09    | 19:50 | 20:34 | 21:14 | 21:41 | 21:35 | 20:54  | 19:55     | 18:54   | 17:07    | 16:55    |
| 19                  | 08:24   | 07:44    | 07:52 | 06:51 | 06:05 | 05:48 | 06:06 | 06:44  | 07:25     | 08:06   | 07:51    | 08:25    |
|                     | 17:25   | 18:11    | 19:52 | 20:35 | 21:15 | 21:42 | 21:34 | 20:52  | 19:53     | 18:52   | 17:06    | 16:55    |
| 20                  | 08:23   | 07:43    | 07:50 | 06:49 | 06:04 | 05:48 | 06:07 | 06:45  | 07:26     | 08:07   | 07:53    | 08:26    |
|                     | 17:26   | 18:12    | 19:53 | 20:36 | 21:16 | 21:42 | 21:33 | 20:51  | 19:51     | 18:50   | 17:05    | 16:56    |
| 21                  | 08:22   | 07:41    | 07:48 | 06:48 | 06:03 | 05:48 | 06:08 | 06:47  | 07:27     | 08:09   | 07:54    | 08:26    |
|                     | 17:28   | 18:14    | 19:55 | 20:38 | 21:17 | 21:43 | 21:32 | 20:49  | 19:49     | 18:48   | 17:04    | 16:56    |
| 22                  | 08:21   | 07:39    | 07:46 | 06:46 | 06:02 | 05:48 | 06:09 | 06:48  | 07:29     | 08:10   | 07:56    | 08:27    |
|                     | 17:29   | 18:15    | 19:56 | 20:39 | 21:19 | 21:43 | 21:32 | 20:47  | 19:47     | 18:46   | 17:03    | 16:57    |
| 23                  | 08:21   | 07:37    | 07:44 | 06:44 | 06:01 | 05:48 | 06:11 | 06:49  | 07:30     | 08:11   | 07:57    | 08:28    |
|                     | 17:31   | 18:17    | 19:57 | 20:40 | 21:20 | 21:43 | 21:31 | 20:45  | 19:45     | 18:45   | 17:03    | 16:57    |
| 24                  | 08:20   | 07:36    | 07:42 | 06:42 | 06:00 | 05:49 | 06:12 | 06:51  | 07:31     | 08:13   | 07:58    | 08:28    |
|                     | 17:32   | 18:18    | 19:59 | 20:42 | 21:21 | 21:43 | 21:29 | 20:43  | 19:43     | 18:43   | 17:02    | 16:58    |
| 25                  | 08:19   | 07:34    | 07:40 | 06:41 | 05:59 | 05:49 | 06:13 | 06:52  | 07:33     | 08:14   | 08:00    | 08:28    |
|                     | 17:34   | 18:20    | 20:00 | 20:43 | 21:22 | 21:43 | 21:28 | 20:42  | 19:40     | 18:41   | 17:01    | 16:58    |
| 26                  | 08:18   | 07:32    | 07:38 | 06:39 | 05:58 | 05:49 | 06:14 | 06:53  | 07:34     | 08:16   | 08:01    | 08:29    |
|                     | 17:35   | 18:21    | 20:02 | 20:45 | 21:23 | 21:44 | 21:27 | 20:40  | 19:38     | 18:39   | 17:00    | 16:59    |
| 27                  | 08:17   | 07:30    | 07:36 | 06:37 | 05:57 | 05:50 | 06:15 | 06:55  | 07:35     | 08:17   | 08:02    | 08:29    |
|                     | 17:37   | 18:23    | 20:03 | 20:46 | 21:24 | 21:44 | 21:26 | 20:38  | 19:36     | 18:38   | 16:59    | 17:00    |
| 28                  | 08:16   | 07:28    | 07:34 | 06:35 | 05:56 | 05:50 | 06:16 | 06:56  | 07:37     | 08:19   | 08:04    | 08:29    |
|                     | 17:38   | 18:24    | 20:04 | 20:47 | 21:25 | 21:44 | 21:25 | 20:36  | 19:34     | 18:36   | 16:59    | 17:00    |
| 29                  | 08:14   |          | 07:32 | 06:34 | 05:55 | 05:51 | 06:18 | 06:57  | 07:38     | 08:20   | 08:05    | 08:30    |
|                     | 17:40   |          | 20:06 | 20:49 | 21:26 | 21:44 | 21:24 | 20:34  | 19:32     | 18:35   | 16:58    | 17:01    |
| 30                  | 08:13   |          | 07:30 | 06:32 | 05:55 | 05:51 | 06:19 | 06:59  | 07:39     | 08:22   | 08:06    | 08:30    |
|                     | 17:41   |          | 20:07 | 20:50 | 21:27 | 21:44 | 21:23 | 20:32  | 19:30     | 18:33   | 16:58    | 17:02    |
| 31                  | 08:12   |          | 07:28 |       | 05:54 |       | 06:20 | 07:00  |           | 08:23   |          | 08:30    |
|                     | 17:43   |          | 20:09 |       | 21:28 |       | 21:21 | 20:30  |           | 18:31   |          | 17:03    |
| Potential sun hours | 278     | 286      | 367   | 406   | 465   | 475   | 481   | 442    | 380       | 340     | 283      | 266      |
| Total, worst case   |         |          |       |       |       |       |       |        |           |         |          |          |
| Sun reduction       |         |          |       |       |       |       |       |        |           |         |          |          |
| Oper. time red.     |         |          |       |       |       |       |       |        |           |         |          |          |
| Wind dir. red.      |         |          |       |       |       |       |       |        |           |         |          |          |
| Total reduction     |         |          |       |       |       |       |       |        |           |         |          |          |
| Total, real         |         |          |       |       |       |       |       |        |           |         |          |          |

Table layout: For each day in each month the following matrix apply

| Day in month | Sun rise (hh:mm) | Sun set (hh:mm) | Minutes with flicker | First time (hh:mm) with flicker | Last time (hh:mm) with flicker | (WTG causing flicker first time) | (WTG causing flicker last time) |
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|



Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

### Assumptions for shadow calculations

Reference year for calendar

Shadow receptor: R040 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 90.0° (36)

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

|                     | January        | February       | March          | April          | May            | June           | July           | August         | September      | October        | November       | December       |
|---------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 1                   | 08:30<br>17:04 | 08:11<br>17:44 | 07:27<br>18:26 | 07:26<br>20:10 | 06:30<br>20:51 | 05:53<br>21:29 | 05:52<br>21:43 | 06:21<br>21:20 | 07:01<br>20:28 | 07:41<br>19:28 | 08:25<br>18:30 | 08:08<br>16:57 |
| 2                   | 08:30<br>17:05 | 08:10<br>17:46 | 07:25<br>18:27 | 07:24<br>20:11 | 06:29<br>20:53 | 05:53<br>21:30 | 05:52<br>21:43 | 06:22<br>21:19 | 07:03<br>20:26 | 07:42<br>19:26 | 08:26<br>18:28 | 08:09<br>16:57 |
| 3                   | 08:30<br>17:06 | 08:08<br>17:47 | 07:23<br>18:29 | 07:22<br>20:13 | 06:27<br>20:54 | 05:52<br>21:31 | 05:53<br>21:43 | 06:24<br>21:17 | 07:04<br>20:25 | 07:43<br>19:24 | 08:28<br>18:27 | 08:10<br>16:56 |
| 4                   | 08:30<br>17:07 | 08:07<br>17:49 | 07:21<br>18:30 | 07:20<br>20:14 | 06:26<br>20:56 | 05:51<br>21:32 | 05:53<br>21:43 | 06:25<br>21:16 | 07:05<br>20:23 | 07:45<br>19:22 | 08:29<br>18:25 | 08:11<br>16:56 |
| 5                   | 08:30<br>17:08 | 08:06<br>17:50 | 07:19<br>18:32 | 07:18<br>20:16 | 06:24<br>20:57 | 05:51<br>21:33 | 05:54<br>21:43 | 06:26<br>21:15 | 07:06<br>20:21 | 07:46<br>19:20 | 08:31<br>17:24 | 08:12<br>16:55 |
| 6                   | 08:30<br>17:09 | 08:04<br>17:52 | 07:17<br>18:33 | 07:16<br>20:17 | 06:23<br>20:58 | 05:50<br>21:34 | 05:55<br>21:42 | 06:27<br>21:13 | 07:08<br>20:19 | 07:48<br>19:18 | 08:32<br>17:22 | 08:13<br>16:55 |
| 7                   | 08:30<br>17:10 | 08:03<br>17:54 | 07:15<br>18:35 | 07:14<br>20:18 | 06:21<br>21:00 | 05:50<br>21:35 | 05:55<br>21:42 | 06:29<br>21:12 | 07:09<br>20:17 | 07:49<br>19:16 | 08:34<br>17:21 | 08:15<br>16:55 |
| 8                   | 08:29<br>17:11 | 08:02<br>17:55 | 07:13<br>18:36 | 07:12<br>20:20 | 06:20<br>21:01 | 05:50<br>21:36 | 05:56<br>21:41 | 06:30<br>21:10 | 07:10<br>20:15 | 07:50<br>19:15 | 08:35<br>17:19 | 08:16<br>16:55 |
| 9                   | 08:29<br>17:12 | 08:00<br>17:57 | 07:11<br>18:37 | 07:10<br>20:21 | 06:18<br>21:02 | 05:49<br>21:36 | 05:57<br>21:41 | 06:31<br>21:09 | 07:12<br>20:13 | 07:52<br>19:13 | 08:37<br>17:18 | 08:17<br>16:54 |
| 10                  | 08:29<br>17:13 | 07:59<br>17:58 | 07:10<br>18:39 | 07:08<br>20:22 | 06:17<br>21:04 | 05:49<br>21:37 | 05:58<br>21:41 | 06:32<br>21:07 | 07:13<br>20:11 | 07:53<br>19:11 | 08:38<br>17:17 | 08:18<br>16:54 |
| 11                  | 08:28<br>17:15 | 07:57<br>18:00 | 07:08<br>18:40 | 07:06<br>20:24 | 06:15<br>21:05 | 05:49<br>21:38 | 05:59<br>21:40 | 06:34<br>21:06 | 07:14<br>20:09 | 07:54<br>19:09 | 08:40<br>17:15 | 08:19<br>16:54 |
| 12                  | 08:28<br>17:16 | 07:56<br>18:00 | 08:06<br>18:42 | 07:04<br>20:25 | 06:14<br>21:06 | 05:48<br>21:38 | 05:59<br>21:39 | 06:35<br>21:04 | 07:16<br>20:07 | 07:56<br>19:07 | 08:41<br>17:14 | 08:20<br>16:54 |
| 13                  | 08:28<br>17:17 | 07:54<br>18:01 | 08:04<br>19:43 | 07:02<br>20:27 | 06:13<br>21:07 | 05:48<br>21:39 | 06:00<br>21:39 | 06:36<br>21:02 | 07:17<br>20:05 | 07:57<br>19:05 | 08:42<br>17:13 | 08:21<br>16:54 |
| 14                  | 08:27<br>17:18 | 07:53<br>18:03 | 08:02<br>19:45 | 07:01<br>20:28 | 06:11<br>21:09 | 05:48<br>21:40 | 06:01<br>21:38 | 06:38<br>21:01 | 07:18<br>20:03 | 07:59<br>19:03 | 08:44<br>17:12 | 08:22<br>16:54 |
| 15                  | 08:27<br>17:20 | 07:51<br>18:04 | 08:00<br>19:46 | 06:59<br>20:29 | 06:10<br>21:10 | 05:48<br>21:40 | 06:02<br>21:37 | 06:39<br>20:59 | 07:20<br>20:01 | 08:00<br>19:01 | 08:45<br>17:11 | 08:22<br>16:54 |
| 16                  | 08:26<br>17:21 | 07:49<br>18:06 | 07:58<br>19:47 | 06:57<br>20:31 | 06:09<br>21:11 | 05:48<br>21:41 | 06:03<br>21:37 | 06:40<br>20:57 | 07:21<br>19:59 | 08:01<br>18:57 | 08:47<br>17:09 | 08:23<br>16:55 |
| 17                  | 08:25<br>17:22 | 07:48<br>18:07 | 07:56<br>19:49 | 06:55<br>20:32 | 06:08<br>21:13 | 05:48<br>21:41 | 06:04<br>21:36 | 06:42<br>20:56 | 07:22<br>19:57 | 08:03<br>18:55 | 08:48<br>17:08 | 08:24<br>16:55 |
| 18                  | 08:25<br>17:24 | 07:46<br>18:09 | 07:54<br>19:50 | 06:53<br>20:34 | 06:06<br>21:14 | 05:48<br>21:41 | 06:05<br>21:35 | 06:43<br>20:54 | 07:23<br>19:55 | 08:04<br>18:54 | 08:50<br>17:07 | 08:25<br>16:55 |
| 19                  | 08:24<br>17:25 | 07:44<br>18:11 | 07:52<br>19:52 | 06:51<br>20:35 | 06:05<br>21:15 | 05:48<br>21:42 | 06:06<br>21:34 | 06:44<br>20:52 | 07:25<br>19:53 | 08:06<br>18:52 | 08:51<br>17:06 | 08:25<br>16:55 |
| 20                  | 08:23<br>17:26 | 07:43<br>18:12 | 07:50<br>19:53 | 06:49<br>20:36 | 06:04<br>21:16 | 05:48<br>21:42 | 06:07<br>21:33 | 06:45<br>20:51 | 07:26<br>19:51 | 08:07<br>18:50 | 08:52<br>17:05 | 08:26<br>16:56 |
| 21                  | 08:22<br>17:28 | 07:41<br>18:14 | 07:48<br>19:55 | 06:48<br>20:38 | 06:03<br>21:17 | 05:48<br>21:43 | 06:08<br>21:32 | 06:47<br>20:49 | 07:27<br>19:49 | 08:09<br>18:48 | 08:54<br>17:04 | 08:26<br>16:56 |
| 22                  | 08:21<br>17:29 | 07:39<br>18:15 | 07:46<br>19:56 | 06:46<br>20:39 | 06:02<br>21:19 | 05:48<br>21:43 | 06:09<br>21:32 | 06:48<br>20:47 | 07:29<br>19:47 | 08:10<br>18:46 | 08:56<br>17:03 | 08:27<br>16:57 |
| 23                  | 08:21<br>17:31 | 07:37<br>18:17 | 07:44<br>19:57 | 06:44<br>20:40 | 06:01<br>21:20 | 05:48<br>21:43 | 06:11<br>21:31 | 06:49<br>20:45 | 07:30<br>19:45 | 08:11<br>18:45 | 08:57<br>17:03 | 08:28<br>16:57 |
| 24                  | 08:20<br>17:32 | 07:36<br>18:18 | 07:42<br>19:59 | 06:42<br>20:42 | 06:00<br>21:21 | 05:49<br>21:43 | 06:12<br>21:29 | 06:51<br>20:43 | 07:31<br>19:43 | 08:13<br>18:43 | 08:58<br>17:02 | 08:28<br>16:58 |
| 25                  | 08:19<br>17:34 | 07:34<br>18:20 | 07:40<br>20:00 | 06:41<br>20:43 | 05:59<br>21:22 | 05:49<br>21:43 | 06:13<br>21:28 | 06:52<br>20:42 | 07:33<br>19:40 | 08:14<br>18:41 | 09:00<br>17:01 | 08:28<br>16:58 |
| 26                  | 08:18<br>17:35 | 07:32<br>18:21 | 07:38<br>20:02 | 06:39<br>20:45 | 05:58<br>21:23 | 05:49<br>21:44 | 06:14<br>21:27 | 06:53<br>20:40 | 07:34<br>19:38 | 08:16<br>18:39 | 09:01<br>17:00 | 08:29<br>16:59 |
| 27                  | 08:17<br>17:37 | 07:30<br>18:23 | 07:36<br>20:03 | 06:37<br>20:46 | 05:57<br>21:24 | 05:50<br>21:44 | 06:15<br>21:26 | 06:55<br>20:38 | 07:35<br>19:36 | 08:17<br>18:38 | 09:02<br>16:59 | 08:29<br>17:00 |
| 28                  | 08:16<br>17:38 | 07:28<br>18:24 | 07:34<br>20:04 | 06:35<br>20:47 | 05:56<br>21:25 | 05:50<br>21:44 | 06:16<br>21:25 | 06:56<br>20:36 | 07:37<br>19:34 | 08:19<br>18:36 | 09:04<br>16:59 | 08:29<br>17:00 |
| 29                  | 08:14<br>17:40 | 07:32<br>20:06 | 07:32<br>20:49 | 06:34<br>21:26 | 05:55<br>21:26 | 05:51<br>21:44 | 06:17<br>21:24 | 06:57<br>20:34 | 07:38<br>19:32 | 08:20<br>18:35 | 09:05<br>16:58 | 08:30<br>17:01 |
| 30                  | 08:13<br>17:41 | 07:30<br>20:07 | 07:30<br>20:50 | 06:32<br>21:27 | 05:55<br>21:27 | 05:51<br>21:44 | 06:19<br>21:23 | 06:59<br>20:32 | 07:39<br>19:30 | 08:22<br>18:33 | 09:06<br>16:58 | 08:30<br>17:02 |
| 31                  | 08:12<br>17:43 | 07:28<br>20:09 | 07:28<br>20:50 | 06:30<br>21:28 | 05:54<br>21:28 | 05:54<br>21:21 | 06:20<br>21:21 | 07:00<br>20:30 | 08:23<br>18:31 | 08:23<br>18:31 | 09:07<br>17:03 | 08:30<br>17:03 |
| Potential sun hours | 278            | 286            | 367            | 406            | 465            | 475            | 481            | 442            | 380            | 340            | 283            | 266            |
| Total, worst case   |                |                |                |                |                |                |                |                |                |                |                |                |
| Sun reduction       |                |                |                |                |                |                |                |                |                |                |                |                |
| Oper. time red.     |                |                |                |                |                |                |                |                |                |                |                |                |
| Wind dir. red.      |                |                |                |                |                |                |                |                |                |                |                |                |
| Total reduction     |                |                |                |                |                |                |                |                |                |                |                |                |
| Total, real         |                |                |                |                |                |                |                |                |                |                |                |                |

Table layout: For each day in each month the following matrix apply

|              |                      |                                 |                                  |
|--------------|----------------------|---------------------------------|----------------------------------|
| Day in month | Sun rise (hh:mm)     | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|              | Sun set (hh:mm)      | Last time (hh:mm) with flicker  | (WTG causing flicker last time)  |
|              | Minutes with flicker |                                 |                                  |

Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

### Assumptions for shadow calculations

Reference year for calendar

2023

Shadow receptor: R041 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 90.0° (37)

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

|                     | January | February | March | April | May   | June  | July  | August | September | October | November | December |
|---------------------|---------|----------|-------|-------|-------|-------|-------|--------|-----------|---------|----------|----------|
| 1                   | 08:30   | 08:11    | 07:27 | 07:26 | 06:30 | 05:53 | 05:52 | 06:21  | 07:01     | 07:41   | 08:25    | 08:08    |
|                     | 17:04   | 17:44    | 18:26 | 20:10 | 20:51 | 21:29 | 21:43 | 21:20  | 20:28     | 19:28   | 18:30    | 16:57    |
| 2                   | 08:30   | 08:10    | 07:25 | 07:24 | 06:29 | 05:53 | 05:52 | 06:22  | 07:03     | 07:42   | 08:26    | 08:09    |
|                     | 17:05   | 17:46    | 18:27 | 20:11 | 20:53 | 21:30 | 21:43 | 21:19  | 20:26     | 19:26   | 18:28    | 16:57    |
| 3                   | 08:30   | 08:08    | 07:23 | 07:22 | 06:27 | 05:52 | 05:53 | 06:24  | 07:04     | 07:43   | 08:28    | 08:10    |
|                     | 17:06   | 17:47    | 18:29 | 20:13 | 20:54 | 21:31 | 21:43 | 21:17  | 20:25     | 19:24   | 18:27    | 16:56    |
| 4                   | 08:30   | 08:07    | 07:21 | 07:20 | 06:26 | 05:51 | 05:53 | 06:25  | 07:05     | 07:45   | 08:29    | 08:11    |
|                     | 17:07   | 17:49    | 18:30 | 20:14 | 20:56 | 21:32 | 21:43 | 21:16  | 20:23     | 19:22   | 18:25    | 16:56    |
| 5                   | 08:30   | 08:06    | 07:19 | 07:18 | 06:24 | 05:51 | 05:54 | 06:26  | 07:06     | 07:46   | 07:31    | 08:12    |
|                     | 17:08   | 17:50    | 18:32 | 20:16 | 20:57 | 21:33 | 21:43 | 21:15  | 20:21     | 19:20   | 17:24    | 16:55    |
| 6                   | 08:30   | 08:04    | 07:17 | 07:16 | 06:23 | 05:50 | 05:55 | 06:27  | 07:08     | 07:48   | 07:32    | 08:13    |
|                     | 17:09   | 17:52    | 18:33 | 20:17 | 20:58 | 21:34 | 21:42 | 21:13  | 20:19     | 19:18   | 17:22    | 16:55    |
| 7                   | 08:30   | 08:03    | 07:15 | 07:14 | 06:21 | 05:50 | 05:55 | 06:29  | 07:09     | 07:49   | 07:34    | 08:15    |
|                     | 17:10   | 17:54    | 18:35 | 20:18 | 21:00 | 21:35 | 21:42 | 21:12  | 20:17     | 19:16   | 17:21    | 16:55    |
| 8                   | 08:29   | 08:02    | 07:13 | 07:12 | 06:20 | 05:50 | 05:56 | 06:30  | 07:10     | 07:50   | 07:35    | 08:16    |
|                     | 17:11   | 17:55    | 18:36 | 20:20 | 21:01 | 21:36 | 21:41 | 21:10  | 20:15     | 19:15   | 17:19    | 16:55    |
| 9                   | 08:29   | 08:00    | 07:11 | 07:10 | 06:18 | 05:49 | 05:57 | 06:31  | 07:12     | 07:52   | 07:37    | 08:17    |
|                     | 17:12   | 17:57    | 18:37 | 20:21 | 21:02 | 21:36 | 21:41 | 21:09  | 20:13     | 19:13   | 17:18    | 16:54    |
| 10                  | 08:29   | 07:59    | 07:10 | 07:08 | 06:17 | 05:49 | 05:58 | 06:32  | 07:13     | 07:53   | 07:38    | 08:18    |
|                     | 17:13   | 17:58    | 18:39 | 20:22 | 21:04 | 21:37 | 21:41 | 21:07  | 20:11     | 19:11   | 17:17    | 16:54    |
| 11                  | 08:28   | 07:57    | 07:08 | 07:06 | 06:15 | 05:49 | 05:59 | 06:34  | 07:14     | 07:54   | 07:40    | 08:19    |
|                     | 17:15   | 18:00    | 18:40 | 20:24 | 21:05 | 21:38 | 21:40 | 21:06  | 20:09     | 19:09   | 17:15    | 16:54    |
| 12                  | 08:28   | 07:56    | 08:06 | 07:04 | 06:14 | 05:48 | 05:59 | 06:35  | 07:16     | 07:56   | 07:41    | 08:20    |
|                     | 17:16   | 18:00    | 18:42 | 20:25 | 21:06 | 21:38 | 21:39 | 21:04  | 20:07     | 19:07   | 17:14    | 16:54    |
| 13                  | 08:28   | 07:54    | 08:04 | 07:02 | 06:13 | 05:48 | 06:00 | 06:36  | 07:17     | 07:57   | 07:43    | 08:21    |
|                     | 17:17   | 18:01    | 19:43 | 20:27 | 21:07 | 21:39 | 21:39 | 21:02  | 20:05     | 19:05   | 17:13    | 16:54    |
| 14                  | 08:27   | 07:53    | 08:02 | 07:01 | 06:11 | 05:48 | 06:01 | 06:38  | 07:18     | 07:59   | 07:44    | 08:21    |
|                     | 17:18   | 18:03    | 19:45 | 20:28 | 21:09 | 21:40 | 21:38 | 21:01  | 20:03     | 19:03   | 17:12    | 16:54    |
| 15                  | 08:27   | 07:51    | 08:00 | 06:59 | 06:10 | 05:48 | 06:02 | 06:39  | 07:20     | 08:00   | 07:45    | 08:22    |
|                     | 17:20   | 18:04    | 19:46 | 20:29 | 21:10 | 21:40 | 21:37 | 20:59  | 20:01     | 19:01   | 17:11    | 16:54    |
| 16                  | 08:26   | 07:49    | 07:58 | 06:57 | 06:09 | 05:48 | 06:03 | 06:40  | 07:21     | 08:01   | 07:47    | 08:23    |
|                     | 17:21   | 18:06    | 19:47 | 20:31 | 21:11 | 21:41 | 21:37 | 20:57  | 19:59     | 18:57   | 17:09    | 16:55    |
| 17                  | 08:25   | 07:48    | 07:56 | 06:55 | 06:08 | 05:48 | 06:04 | 06:42  | 07:22     | 08:03   | 07:48    | 08:24    |
|                     | 17:22   | 18:07    | 19:49 | 20:32 | 21:13 | 21:41 | 21:36 | 20:56  | 19:57     | 18:55   | 17:08    | 16:55    |
| 18                  | 08:25   | 07:46    | 07:54 | 06:53 | 06:06 | 05:48 | 06:05 | 06:43  | 07:23     | 08:04   | 07:50    | 08:25    |
|                     | 17:24   | 18:09    | 19:50 | 20:34 | 21:14 | 21:41 | 21:35 | 20:54  | 19:55     | 18:54   | 17:07    | 16:55    |
| 19                  | 08:24   | 07:44    | 07:52 | 06:51 | 06:05 | 05:48 | 06:06 | 06:44  | 07:25     | 08:06   | 07:51    | 08:25    |
|                     | 17:25   | 18:11    | 19:52 | 20:35 | 21:15 | 21:42 | 21:34 | 20:52  | 19:53     | 18:52   | 17:06    | 16:55    |
| 20                  | 08:23   | 07:43    | 07:50 | 06:49 | 06:04 | 05:48 | 06:07 | 06:45  | 07:26     | 08:07   | 07:53    | 08:26    |
|                     | 17:26   | 18:12    | 19:53 | 20:36 | 21:16 | 21:42 | 21:33 | 20:51  | 19:51     | 18:50   | 17:05    | 16:56    |
| 21                  | 08:22   | 07:41    | 07:48 | 06:48 | 06:03 | 05:48 | 06:08 | 06:47  | 07:27     | 08:09   | 07:54    | 08:26    |
|                     | 17:28   | 18:14    | 19:55 | 20:38 | 21:17 | 21:43 | 21:32 | 20:49  | 19:49     | 18:48   | 17:04    | 16:56    |
| 22                  | 08:21   | 07:39    | 07:46 | 06:46 | 06:02 | 05:48 | 06:09 | 06:48  | 07:29     | 08:10   | 07:56    | 08:27    |
|                     | 17:29   | 18:15    | 19:56 | 20:39 | 21:19 | 21:43 | 21:32 | 20:47  | 19:47     | 18:46   | 17:03    | 16:57    |
| 23                  | 08:21   | 07:37    | 07:44 | 06:44 | 06:01 | 05:48 | 06:11 | 06:49  | 07:30     | 08:11   | 07:57    | 08:28    |
|                     | 17:31   | 18:17    | 19:57 | 20:40 | 21:20 | 21:43 | 21:31 | 20:45  | 19:45     | 18:45   | 17:03    | 16:57    |
| 24                  | 08:20   | 07:36    | 07:42 | 06:42 | 06:00 | 05:49 | 06:12 | 06:51  | 07:31     | 08:13   | 07:58    | 08:28    |
|                     | 17:32   | 18:18    | 19:59 | 20:42 | 21:21 | 21:43 | 21:29 | 20:43  | 19:43     | 18:43   | 17:02    | 16:58    |
| 25                  | 08:19   | 07:34    | 07:40 | 06:41 | 05:59 | 05:49 | 06:13 | 06:52  | 07:33     | 08:14   | 08:00    | 08:28    |
|                     | 17:34   | 18:20    | 20:00 | 20:43 | 21:22 | 21:43 | 21:28 | 20:42  | 19:40     | 18:41   | 17:01    | 16:58    |
| 26                  | 08:18   | 07:32    | 07:38 | 06:39 | 05:58 | 05:49 | 06:14 | 06:53  | 07:34     | 08:16   | 08:01    | 08:29    |
|                     | 17:35   | 18:21    | 20:02 | 20:45 | 21:23 | 21:44 | 21:27 | 20:40  | 19:38     | 18:39   | 17:00    | 16:59    |
| 27                  | 08:17   | 07:30    | 07:36 | 06:37 | 05:57 | 05:50 | 06:15 | 06:55  | 07:35     | 08:17   | 08:02    | 08:29    |
|                     | 17:37   | 18:23    | 20:03 | 20:46 | 21:24 | 21:44 | 21:26 | 20:38  | 19:36     | 18:38   | 16:59    | 17:00    |
| 28                  | 08:16   | 07:28    | 07:34 | 06:35 | 05:56 | 05:50 | 06:16 | 06:56  | 07:37     | 08:19   | 08:04    | 08:29    |
|                     | 17:38   | 18:24    | 20:04 | 20:47 | 21:25 | 21:44 | 21:25 | 20:36  | 19:34     | 18:36   | 16:59    | 17:00    |
| 29                  | 08:14   |          | 07:32 | 06:34 | 05:55 | 05:51 | 06:17 | 06:57  | 07:38     | 08:20   | 08:05    | 08:30    |
|                     | 17:40   |          | 20:06 | 20:49 | 21:26 | 21:44 | 21:24 | 20:34  | 19:32     | 18:35   | 16:58    | 17:01    |
| 30                  | 08:13   |          | 07:30 | 06:32 | 05:55 | 05:51 | 06:19 | 06:59  | 07:39     | 08:22   | 08:06    | 08:30    |
|                     | 17:41   |          | 20:07 | 20:50 | 21:27 | 21:44 | 21:23 | 20:32  | 19:30     | 18:33   | 16:58    | 17:02    |
| 31                  | 08:12   |          | 07:28 |       | 05:54 |       | 06:20 | 07:00  |           | 08:23   |          | 08:30    |
|                     | 17:43   |          | 20:09 |       | 21:28 |       | 21:21 | 20:30  |           | 18:31   |          | 17:03    |
| Potential sun hours | 278     | 286      | 367   | 406   | 465   | 475   | 481   | 442    | 380       | 340     | 283      | 266      |
| Total, worst case   |         |          |       |       |       |       |       |        |           |         |          |          |
| Sun reduction       |         |          |       |       |       |       |       |        |           |         |          |          |
| Oper. time red.     |         |          |       |       |       |       |       |        |           |         |          |          |
| Wind dir. red.      |         |          |       |       |       |       |       |        |           |         |          |          |
| Total reduction     |         |          |       |       |       |       |       |        |           |         |          |          |
| Total, real         |         |          |       |       |       |       |       |        |           |         |          |          |

Table layout: For each day in each month the following matrix apply

|              |                      |                                 |                                  |
|--------------|----------------------|---------------------------------|----------------------------------|
| Day in month | Sun rise (hh:mm)     | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|              | Sun set (hh:mm)      | Last time (hh:mm) with flicker  | (WTG causing flicker last time)  |
|              | Minutes with flicker |                                 |                                  |



Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

## Assumptions for shadow calculations

Reference year for calendar

2023

Shadow receptor: R043 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 90.0° (38)

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

| Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  |
|------|------|------|------|------|------|------|------|------|------|------|------|
| 0.54 | 0.52 | 0.61 | 0.58 | 0.64 | 0.67 | 0.75 | 0.72 | 0.67 | 0.53 | 0.42 | 0.45 |

Operational time

| N   | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW | NW  | NNW | Sum   |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| 376 | 314 | 339 | 425 | 445 | 474 | 693 | 570 | 488 | 386 | 872 | 609 | 772 | 651 | 677 | 667 | 8,758 |

|                     | January | February | March | April | May   | June  | July  | August | September | October | November | December |
|---------------------|---------|----------|-------|-------|-------|-------|-------|--------|-----------|---------|----------|----------|
| 1                   | 08:30   | 08:11    | 07:27 | 07:26 | 06:30 | 05:53 | 05:52 | 06:21  | 07:01     | 07:41   | 08:25    | 08:08    |
|                     | 17:04   | 17:44    | 18:26 | 20:10 | 20:51 | 21:29 | 21:43 | 21:20  | 20:28     | 19:28   | 18:30    | 16:57    |
| 2                   | 08:30   | 08:10    | 07:25 | 07:24 | 06:29 | 05:53 | 05:52 | 06:22  | 07:03     | 07:42   | 08:26    | 08:09    |
|                     | 17:05   | 17:46    | 18:27 | 20:11 | 20:53 | 21:30 | 21:43 | 21:19  | 20:26     | 19:26   | 18:28    | 16:57    |
| 3                   | 08:30   | 08:08    | 07:23 | 07:22 | 06:27 | 05:52 | 05:53 | 06:24  | 07:04     | 07:43   | 08:28    | 08:10    |
|                     | 17:06   | 17:47    | 18:29 | 20:13 | 20:54 | 21:31 | 21:43 | 21:17  | 20:25     | 19:24   | 18:27    | 16:56    |
| 4                   | 08:30   | 08:07    | 07:21 | 07:20 | 06:26 | 05:51 | 05:53 | 06:25  | 07:05     | 07:45   | 08:29    | 08:11    |
|                     | 17:07   | 17:49    | 18:30 | 20:14 | 20:56 | 21:32 | 21:43 | 21:16  | 20:23     | 19:22   | 18:25    | 16:56    |
| 5                   | 08:30   | 08:06    | 07:19 | 07:18 | 06:24 | 05:51 | 05:54 | 06:26  | 07:06     | 07:46   | 07:31    | 08:12    |
|                     | 17:08   | 17:50    | 18:32 | 20:16 | 20:57 | 21:33 | 21:43 | 21:15  | 20:21     | 19:20   | 17:24    | 16:55    |
| 6                   | 08:30   | 08:04    | 07:17 | 07:16 | 06:23 | 05:50 | 05:55 | 06:27  | 07:08     | 07:48   | 07:32    | 08:13    |
|                     | 17:09   | 17:52    | 18:33 | 20:17 | 20:58 | 21:34 | 21:42 | 21:13  | 20:19     | 19:18   | 17:22    | 16:55    |
| 7                   | 08:30   | 08:03    | 07:15 | 07:14 | 06:21 | 05:50 | 05:55 | 06:29  | 07:09     | 07:49   | 07:34    | 08:15    |
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| 8                   | 08:29   | 08:02    | 07:13 | 07:12 | 06:20 | 05:50 | 05:56 | 06:30  | 07:10     | 07:50   | 07:35    | 08:16    |
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| 10                  | 08:29   | 07:59    | 07:09 | 07:08 | 06:17 | 05:49 | 05:58 | 06:32  | 07:13     | 07:53   | 07:38    | 08:18    |
|                     | 17:13   | 17:58    | 18:39 | 20:22 | 21:04 | 21:37 | 21:41 | 21:07  | 20:11     | 19:11   | 17:17    | 16:54    |
| 11                  | 08:28   | 07:57    | 07:08 | 07:06 | 06:15 | 05:49 | 05:59 | 06:34  | 07:14     | 07:54   | 07:40    | 08:19    |
|                     | 17:15   | 18:00    | 18:40 | 20:24 | 21:05 | 21:38 | 21:40 | 21:06  | 20:09     | 19:09   | 17:15    | 16:54    |
| 12                  | 08:28   | 07:56    | 08:06 | 07:04 | 06:14 | 05:48 | 05:59 | 06:35  | 07:16     | 07:56   | 07:41    | 08:20    |
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| 13                  | 08:28   | 07:54    | 08:04 | 07:02 | 06:13 | 05:48 | 06:00 | 06:36  | 07:17     | 07:57   | 07:43    | 08:21    |
|                     | 17:17   | 18:01    | 19:43 | 20:27 | 21:07 | 21:39 | 21:39 | 21:02  | 20:05     | 19:05   | 17:13    | 16:54    |
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|                     | 17:18   | 18:03    | 19:45 | 20:28 | 21:09 | 21:40 | 21:38 | 21:01  | 20:03     | 19:03   | 17:12    | 16:54    |
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| 17                  | 08:25   | 07:48    | 07:56 | 06:55 | 06:08 | 05:48 | 06:04 | 06:42  | 07:22     | 08:03   | 07:48    | 08:24    |
|                     | 17:22   | 18:07    | 19:49 | 20:32 | 21:13 | 21:41 | 21:36 | 20:56  | 19:57     | 18:55   | 17:08    | 16:55    |
| 18                  | 08:25   | 07:46    | 07:54 | 06:53 | 06:06 | 05:48 | 06:05 | 06:43  | 07:23     | 08:04   | 07:50    | 08:25    |
|                     | 17:24   | 18:09    | 19:50 | 20:34 | 21:14 | 21:41 | 21:35 | 20:54  | 19:55     | 18:54   | 17:07    | 16:55    |
| 19                  | 08:24   | 07:44    | 07:52 | 06:51 | 06:05 | 05:48 | 06:06 | 06:44  | 07:25     | 08:06   | 07:51    | 08:25    |
|                     | 17:25   | 18:11    | 19:52 | 20:35 | 21:15 | 21:42 | 21:34 | 20:52  | 19:53     | 18:52   | 17:06    | 16:55    |
| 20                  | 08:23   | 07:43    | 07:50 | 06:49 | 06:04 | 05:48 | 06:07 | 06:45  | 07:26     | 08:07   | 07:53    | 08:26    |
|                     | 17:26   | 18:12    | 19:53 | 20:36 | 21:16 | 21:42 | 21:33 | 20:51  | 19:51     | 18:50   | 17:05    | 16:56    |
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| 22                  | 08:21   | 07:39    | 07:46 | 06:46 | 06:02 | 05:48 | 06:09 | 06:48  | 07:29     | 08:10   | 07:56    | 08:27    |
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|                     | 17:31   | 18:17    | 19:57 | 20:40 | 21:20 | 21:43 | 21:31 | 20:45  | 19:45     | 18:45   | 17:03    | 16:57    |
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| 30                  | 08:13   |          | 07:30 | 06:32 | 05:55 | 05:51 | 06:19 | 06:59  | 07:39     | 08:22   | 08:06    | 08:30    |
|                     | 17:41   |          | 20:07 | 20:50 | 21:27 | 21:44 | 21:23 | 20:32  | 19:30     | 18:33   | 16:58    | 17:02    |
| 31                  | 08:12   |          | 07:28 |       | 05:54 |       | 06:20 | 07:00  |           | 08:23   |          | 08:30    |
|                     | 17:43   |          | 20:09 |       | 21:28 |       | 21:21 | 20:30  |           | 18:31   |          | 17:03    |
| Potential sun hours | 278     | 286      | 367   | 406   | 465   | 475   | 481   | 442    | 380       | 340     | 283      | 266      |
| Total, worst case   |         |          |       |       |       |       |       |        |           |         |          |          |
| Sun reduction       |         |          |       |       |       |       |       |        |           |         |          |          |
| Oper. time red.     |         |          |       |       |       |       |       |        |           |         |          |          |
| Wind dir. red.      |         |          |       |       |       |       |       |        |           |         |          |          |
| Total reduction     |         |          |       |       |       |       |       |        |           |         |          |          |
| Total, real         |         |          |       |       |       |       |       |        |           |         |          |          |

Table layout: For each day in each month the following matrix apply

| Day in month | Sun rise (hh:mm) | Sun set (hh:mm) | Minutes with flicker | First time (hh:mm) with flicker | Last time (hh:mm) with flicker | (WTG causing flicker first time) | (WTG causing flicker last time) |
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|

Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

### Assumptions for shadow calculations

Reference year for calendar

2023

Shadow receptor: R045 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 90.0° (39)

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

|                     | January        | February       | March          | April          | May            | June           | July           | August         | September      | October        | November       | December       |
|---------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 1                   | 08:30<br>17:04 | 08:11<br>17:44 | 07:27<br>18:26 | 07:26<br>20:10 | 06:30<br>20:51 | 05:53<br>21:29 | 05:52<br>21:43 | 06:21<br>21:20 | 07:01<br>20:28 | 07:41<br>19:28 | 08:25<br>18:30 | 08:08<br>16:57 |
| 2                   | 08:30<br>17:05 | 08:10<br>17:46 | 07:25<br>18:27 | 07:24<br>20:11 | 06:29<br>20:53 | 05:53<br>21:30 | 05:52<br>21:43 | 06:22<br>21:19 | 07:03<br>20:26 | 07:42<br>19:26 | 08:26<br>18:28 | 08:09<br>16:57 |
| 3                   | 08:30<br>17:06 | 08:08<br>17:47 | 07:23<br>18:29 | 07:22<br>20:13 | 06:27<br>20:54 | 05:52<br>21:31 | 05:53<br>21:43 | 06:24<br>21:17 | 07:04<br>20:25 | 07:43<br>19:24 | 08:28<br>18:27 | 08:10<br>16:56 |
| 4                   | 08:30<br>17:07 | 08:07<br>17:49 | 07:21<br>18:30 | 07:20<br>20:14 | 06:26<br>20:56 | 05:51<br>21:32 | 05:53<br>21:43 | 06:25<br>21:16 | 07:05<br>20:23 | 07:45<br>19:22 | 08:29<br>18:25 | 08:11<br>16:56 |
| 5                   | 08:30<br>17:08 | 08:06<br>17:50 | 07:19<br>18:32 | 07:18<br>20:16 | 06:24<br>20:57 | 05:51<br>21:33 | 05:54<br>21:43 | 06:26<br>21:15 | 07:06<br>20:21 | 07:46<br>19:20 | 08:31<br>17:24 | 08:12<br>16:55 |
| 6                   | 08:30<br>17:09 | 08:04<br>17:52 | 07:17<br>18:33 | 07:16<br>20:17 | 06:23<br>20:58 | 05:50<br>21:34 | 05:55<br>21:42 | 06:27<br>21:13 | 07:08<br>20:19 | 07:48<br>19:18 | 08:32<br>17:22 | 08:13<br>16:55 |
| 7                   | 08:30<br>17:10 | 08:03<br>17:54 | 07:15<br>18:35 | 07:14<br>20:18 | 06:21<br>21:00 | 05:50<br>21:35 | 05:55<br>21:42 | 06:29<br>21:12 | 07:09<br>20:17 | 07:49<br>19:16 | 08:34<br>17:21 | 08:15<br>16:55 |
| 8                   | 08:29<br>17:11 | 08:02<br>17:55 | 07:13<br>18:36 | 07:12<br>20:20 | 06:20<br>21:01 | 05:50<br>21:36 | 05:56<br>21:41 | 06:30<br>21:10 | 07:10<br>20:15 | 07:50<br>19:14 | 08:35<br>17:19 | 08:16<br>16:55 |
| 9                   | 08:29<br>17:12 | 08:00<br>17:57 | 07:11<br>18:37 | 07:10<br>20:21 | 06:18<br>21:02 | 05:49<br>21:36 | 05:57<br>21:41 | 06:31<br>21:09 | 07:12<br>20:13 | 07:52<br>19:13 | 08:37<br>17:18 | 08:17<br>16:54 |
| 10                  | 08:29<br>17:13 | 07:59<br>17:58 | 07:09<br>18:39 | 07:08<br>20:22 | 06:17<br>21:04 | 05:49<br>21:37 | 05:58<br>21:41 | 06:32<br>21:07 | 07:13<br>20:11 | 07:53<br>19:11 | 08:38<br>17:17 | 08:18<br>16:54 |
| 11                  | 08:28<br>17:15 | 07:57<br>18:00 | 07:08<br>18:40 | 07:06<br>20:24 | 06:15<br>21:05 | 05:49<br>21:38 | 05:59<br>21:40 | 06:34<br>21:06 | 07:14<br>20:09 | 07:54<br>19:09 | 08:40<br>17:15 | 08:19<br>16:54 |
| 12                  | 08:28<br>17:16 | 07:56<br>18:00 | 08:06<br>18:42 | 07:04<br>20:25 | 06:14<br>21:06 | 05:48<br>21:38 | 05:59<br>21:39 | 06:35<br>21:04 | 07:16<br>20:07 | 07:56<br>19:07 | 08:41<br>17:14 | 08:20<br>16:54 |
| 13                  | 08:28<br>17:17 | 07:54<br>18:01 | 08:04<br>19:43 | 07:02<br>20:27 | 06:13<br>21:07 | 05:48<br>21:39 | 06:00<br>21:39 | 06:36<br>21:02 | 07:17<br>20:05 | 07:57<br>19:05 | 08:43<br>17:13 | 08:21<br>16:54 |
| 14                  | 08:27<br>17:18 | 07:53<br>18:03 | 08:02<br>19:45 | 07:01<br>20:28 | 06:11<br>21:09 | 05:48<br>21:40 | 06:01<br>21:38 | 06:38<br>21:01 | 07:18<br>20:03 | 07:59<br>19:03 | 08:44<br>17:12 | 08:22<br>16:54 |
| 15                  | 08:27<br>17:20 | 07:51<br>18:04 | 08:00<br>19:46 | 06:59<br>20:29 | 06:10<br>21:10 | 05:48<br>21:40 | 06:02<br>21:37 | 06:39<br>20:59 | 07:20<br>20:01 | 08:00<br>19:01 | 08:45<br>17:11 | 08:22<br>16:54 |
| 16                  | 08:26<br>17:21 | 07:49<br>18:06 | 07:58<br>19:47 | 06:57<br>20:31 | 06:09<br>21:11 | 05:48<br>21:41 | 06:03<br>21:37 | 06:40<br>20:57 | 07:21<br>19:59 | 08:01<br>18:57 | 08:47<br>17:09 | 08:23<br>16:55 |
| 17                  | 08:25<br>17:22 | 07:48<br>18:07 | 07:56<br>19:49 | 06:55<br>20:32 | 06:08<br>21:13 | 05:48<br>21:41 | 06:04<br>21:36 | 06:42<br>20:56 | 07:22<br>19:57 | 08:03<br>18:55 | 08:48<br>17:08 | 08:24<br>16:55 |
| 18                  | 08:25<br>17:24 | 07:46<br>18:09 | 07:54<br>19:50 | 06:53<br>20:34 | 06:06<br>21:14 | 05:48<br>21:41 | 06:05<br>21:35 | 06:43<br>20:54 | 07:23<br>19:55 | 08:04<br>18:54 | 08:50<br>17:07 | 08:25<br>16:55 |
| 19                  | 08:24<br>17:25 | 07:44<br>18:11 | 07:52<br>19:52 | 06:51<br>20:35 | 06:05<br>21:15 | 05:48<br>21:42 | 06:06<br>21:34 | 06:44<br>20:52 | 07:25<br>19:53 | 08:06<br>18:52 | 08:51<br>17:06 | 08:25<br>16:55 |
| 20                  | 08:23<br>17:26 | 07:43<br>18:12 | 07:50<br>19:53 | 06:49<br>20:36 | 06:04<br>21:16 | 05:48<br>21:42 | 06:07<br>21:33 | 06:45<br>20:51 | 07:26<br>19:51 | 08:07<br>18:50 | 08:53<br>17:05 | 08:26<br>16:56 |
| 21                  | 08:22<br>17:28 | 07:41<br>18:14 | 07:48<br>19:55 | 06:48<br>20:38 | 06:03<br>21:17 | 05:48<br>21:43 | 06:08<br>21:32 | 06:47<br>20:49 | 07:27<br>19:49 | 08:09<br>18:48 | 08:54<br>17:04 | 08:26<br>16:56 |
| 22                  | 08:21<br>17:29 | 07:39<br>18:15 | 07:46<br>19:56 | 06:46<br>20:39 | 06:02<br>21:19 | 05:48<br>21:43 | 06:09<br>21:32 | 06:48<br>20:47 | 07:29<br>19:47 | 08:10<br>18:46 | 08:56<br>17:03 | 08:27<br>16:57 |
| 23                  | 08:21<br>17:31 | 07:37<br>18:17 | 07:44<br>19:57 | 06:44<br>20:40 | 06:01<br>21:20 | 05:48<br>21:43 | 06:11<br>21:31 | 06:49<br>20:45 | 07:30<br>19:45 | 08:11<br>18:45 | 08:57<br>17:03 | 08:28<br>16:57 |
| 24                  | 08:20<br>17:32 | 07:36<br>18:18 | 07:42<br>19:59 | 06:42<br>20:42 | 06:00<br>21:21 | 05:49<br>21:43 | 06:12<br>21:29 | 06:51<br>20:43 | 07:31<br>19:43 | 08:13<br>18:43 | 08:58<br>17:02 | 08:28<br>16:58 |
| 25                  | 08:19<br>17:34 | 07:34<br>18:20 | 07:40<br>20:00 | 06:41<br>20:43 | 05:59<br>21:22 | 05:49<br>21:43 | 06:13<br>21:28 | 06:52<br>20:42 | 07:33<br>19:40 | 08:14<br>18:41 | 08:00<br>17:01 | 08:28<br>16:58 |
| 26                  | 08:18<br>17:35 | 07:32<br>18:21 | 07:38<br>20:02 | 06:39<br>20:45 | 05:58<br>21:23 | 05:49<br>21:44 | 06:14<br>21:27 | 06:53<br>20:40 | 07:34<br>19:38 | 08:16<br>18:39 | 08:01<br>17:00 | 08:29<br>16:59 |
| 27                  | 08:17<br>17:37 | 07:30<br>18:23 | 07:36<br>20:03 | 06:37<br>20:46 | 05:57<br>21:24 | 05:50<br>21:44 | 06:15<br>21:26 | 06:55<br>20:38 | 07:35<br>19:36 | 08:17<br>18:38 | 08:02<br>16:59 | 08:29<br>17:00 |
| 28                  | 08:16<br>17:38 | 07:28<br>18:24 | 07:34<br>20:04 | 06:35<br>20:47 | 05:56<br>21:25 | 05:50<br>21:44 | 06:16<br>21:25 | 06:56<br>20:36 | 07:37<br>19:34 | 08:19<br>18:36 | 08:04<br>16:59 | 08:29<br>17:00 |
| 29                  | 08:14<br>17:40 |                | 07:32<br>20:06 | 06:34<br>20:49 | 05:55<br>21:26 | 05:51<br>21:44 | 06:17<br>21:24 | 06:57<br>20:34 | 07:38<br>19:32 | 08:20<br>18:35 | 08:05<br>16:58 | 08:30<br>17:01 |
| 30                  | 08:13<br>17:41 |                | 07:30<br>20:07 | 06:32<br>20:50 | 05:55<br>21:27 | 05:51<br>21:44 | 06:19<br>21:23 | 06:59<br>20:32 | 07:39<br>19:30 | 08:22<br>18:33 | 08:06<br>16:58 | 08:30<br>17:02 |
| 31                  | 08:12<br>17:43 |                | 07:28<br>20:09 |                | 05:54<br>21:28 |                | 06:20<br>21:21 | 07:00<br>20:30 |                | 08:23<br>18:31 |                | 08:30<br>17:03 |
| Potential sun hours | 278            | 286            | 367            | 406            | 465            | 475            | 481            | 442            | 380            | 340            | 283            | 266            |
| Total, worst case   |                |                |                |                |                |                |                |                |                |                |                |                |
| Sun reduction       |                |                |                |                |                |                |                |                |                |                |                |                |
| Oper. time red.     |                |                |                |                |                |                |                |                |                |                |                |                |
| Wind dir. red.      |                |                |                |                |                |                |                |                |                |                |                |                |
| Total reduction     |                |                |                |                |                |                |                |                |                |                |                |                |
| Total, real         |                |                |                |                |                |                |                |                |                |                |                |                |

Table layout: For each day in each month the following matrix apply

|              |                  |                                 |                                  |
|--------------|------------------|---------------------------------|----------------------------------|
| Day in month | Sun rise (hh:mm) | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|              | Sun set (hh:mm)  | Minutes with flicker            | Last time (hh:mm) with flicker   |
|              |                  |                                 | (WTG causing flicker last time)  |



Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Assumptions for shadow calculations

Reference year for calendar

Shadow receptor: R046 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (40)

2023

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

| N   | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW | NW  | NNW | Sum   |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| 376 | 314 | 339 | 425 | 445 | 474 | 693 | 570 | 488 | 386 | 872 | 609 | 772 | 651 | 677 | 667 | 8,758 |

|                     | January | February | March | April | May   | June  | July  | August | September | October | November | December |
|---------------------|---------|----------|-------|-------|-------|-------|-------|--------|-----------|---------|----------|----------|
| 1                   | 08:30   | 08:11    | 07:27 | 07:26 | 06:30 | 05:53 | 05:52 | 06:21  | 07:01     | 07:41   | 08:25    | 08:08    |
|                     | 17:04   | 17:44    | 18:26 | 20:10 | 20:51 | 21:29 | 21:43 | 21:20  | 20:28     | 19:28   | 18:30    | 16:57    |
| 2                   | 08:30   | 08:10    | 07:25 | 07:24 | 06:29 | 05:53 | 05:52 | 06:22  | 07:03     | 07:42   | 08:26    | 08:09    |
|                     | 17:05   | 17:46    | 18:27 | 20:11 | 20:53 | 21:30 | 21:43 | 21:19  | 20:26     | 19:26   | 18:28    | 16:57    |
| 3                   | 08:30   | 08:08    | 07:23 | 07:22 | 06:27 | 05:52 | 05:53 | 06:24  | 07:04     | 07:43   | 08:28    | 08:10    |
|                     | 17:06   | 17:47    | 18:29 | 20:13 | 20:54 | 21:31 | 21:43 | 21:17  | 20:25     | 19:24   | 18:27    | 16:56    |
| 4                   | 08:30   | 08:07    | 07:21 | 07:20 | 06:26 | 05:51 | 05:53 | 06:25  | 07:05     | 07:45   | 08:29    | 08:11    |
|                     | 17:07   | 17:49    | 18:30 | 20:14 | 20:56 | 21:32 | 21:43 | 21:16  | 20:23     | 19:22   | 18:25    | 16:56    |
| 5                   | 08:30   | 08:06    | 07:19 | 07:18 | 06:24 | 05:51 | 05:54 | 06:26  | 07:06     | 07:46   | 07:31    | 08:12    |
|                     | 17:08   | 17:50    | 18:32 | 20:16 | 20:57 | 21:33 | 21:43 | 21:15  | 20:21     | 19:20   | 17:24    | 16:55    |
| 6                   | 08:30   | 08:04    | 07:17 | 07:16 | 06:23 | 05:50 | 05:55 | 06:27  | 07:08     | 07:48   | 07:32    | 08:13    |
|                     | 17:09   | 17:52    | 18:33 | 20:17 | 20:58 | 21:34 | 21:42 | 21:13  | 20:19     | 19:18   | 17:22    | 16:55    |
| 7                   | 08:30   | 08:03    | 07:15 | 07:14 | 06:21 | 05:50 | 05:55 | 06:29  | 07:09     | 07:49   | 07:34    | 08:15    |
|                     | 17:10   | 17:54    | 18:35 | 20:18 | 21:00 | 21:35 | 21:42 | 21:12  | 20:17     | 19:16   | 17:21    | 16:55    |
| 8                   | 08:29   | 08:02    | 07:13 | 07:12 | 06:20 | 05:50 | 05:56 | 06:30  | 07:10     | 07:50   | 07:35    | 08:16    |
|                     | 17:11   | 17:55    | 18:36 | 20:20 | 21:01 | 21:36 | 21:41 | 21:10  | 20:15     | 19:14   | 17:19    | 16:55    |
| 9                   | 08:29   | 08:00    | 07:11 | 07:10 | 06:18 | 05:49 | 05:57 | 06:31  | 07:12     | 07:52   | 07:37    | 08:17    |
|                     | 17:12   | 17:57    | 18:37 | 20:21 | 21:02 | 21:36 | 21:41 | 21:09  | 20:13     | 19:13   | 17:18    | 16:54    |
| 10                  | 08:29   | 07:59    | 07:09 | 07:08 | 06:17 | 05:49 | 05:58 | 06:32  | 07:13     | 07:53   | 07:38    | 08:18    |
|                     | 17:13   | 17:58    | 18:39 | 20:22 | 21:04 | 21:37 | 21:41 | 21:07  | 20:11     | 19:11   | 17:17    | 16:54    |
| 11                  | 08:28   | 07:57    | 07:08 | 07:06 | 06:15 | 05:49 | 05:59 | 06:34  | 07:14     | 07:54   | 07:40    | 08:19    |
|                     | 17:15   | 18:00    | 18:40 | 20:24 | 21:05 | 21:38 | 21:40 | 21:06  | 20:09     | 19:09   | 17:15    | 16:54    |
| 12                  | 08:28   | 07:56    | 08:06 | 07:04 | 06:14 | 05:48 | 05:59 | 06:35  | 07:16     | 07:56   | 07:41    | 08:20    |
|                     | 17:16   | 18:00    | 18:42 | 20:25 | 21:06 | 21:38 | 21:39 | 21:04  | 20:07     | 19:07   | 17:14    | 16:54    |
| 13                  | 08:28   | 07:54    | 08:04 | 07:02 | 06:13 | 05:48 | 06:00 | 06:36  | 07:17     | 07:57   | 07:43    | 08:21    |
|                     | 17:17   | 18:01    | 19:43 | 20:27 | 21:07 | 21:39 | 21:39 | 21:02  | 20:05     | 19:05   | 17:13    | 16:54    |
| 14                  | 08:27   | 07:53    | 08:02 | 07:01 | 06:11 | 05:48 | 06:01 | 06:38  | 07:18     | 07:59   | 07:44    | 08:21    |
|                     | 17:18   | 18:03    | 19:45 | 20:28 | 21:09 | 21:40 | 21:38 | 21:01  | 20:03     | 19:03   | 17:12    | 16:54    |
| 15                  | 08:27   | 07:51    | 08:00 | 06:59 | 06:10 | 05:48 | 06:02 | 06:39  | 07:20     | 08:00   | 07:45    | 08:22    |
|                     | 17:20   | 18:04    | 19:46 | 20:29 | 21:10 | 21:40 | 21:37 | 20:59  | 20:01     | 19:01   | 17:11    | 16:54    |
| 16                  | 08:26   | 07:49    | 07:58 | 06:57 | 06:09 | 05:48 | 06:03 | 06:40  | 07:21     | 08:01   | 07:47    | 08:23    |
|                     | 17:21   | 18:06    | 19:47 | 20:31 | 21:11 | 21:41 | 21:37 | 20:57  | 19:59     | 18:57   | 17:09    | 16:55    |
| 17                  | 08:25   | 07:48    | 07:56 | 06:55 | 06:08 | 05:48 | 06:04 | 06:42  | 07:22     | 08:03   | 07:48    | 08:24    |
|                     | 17:22   | 18:07    | 19:49 | 20:32 | 21:13 | 21:41 | 21:36 | 20:56  | 19:57     | 18:55   | 17:08    | 16:55    |
| 18                  | 08:25   | 07:46    | 07:54 | 06:53 | 06:06 | 05:48 | 06:05 | 06:43  | 07:23     | 08:04   | 07:50    | 08:25    |
|                     | 17:24   | 18:09    | 19:50 | 20:34 | 21:14 | 21:41 | 21:35 | 20:54  | 19:55     | 18:54   | 17:07    | 16:55    |
| 19                  | 08:24   | 07:44    | 07:52 | 06:51 | 06:05 | 05:48 | 06:06 | 06:44  | 07:25     | 08:06   | 07:51    | 08:25    |
|                     | 17:25   | 18:11    | 19:52 | 20:35 | 21:15 | 21:42 | 21:34 | 20:52  | 19:53     | 18:52   | 17:06    | 16:55    |
| 20                  | 08:23   | 07:43    | 07:50 | 06:49 | 06:04 | 05:48 | 06:07 | 06:45  | 07:26     | 08:07   | 07:53    | 08:26    |
|                     | 17:26   | 18:12    | 19:53 | 20:36 | 21:16 | 21:42 | 21:33 | 20:51  | 19:51     | 18:50   | 17:05    | 16:56    |
| 21                  | 08:22   | 07:41    | 07:48 | 06:48 | 06:03 | 05:48 | 06:08 | 06:47  | 07:27     | 08:09   | 07:54    | 08:26    |
|                     | 17:28   | 18:14    | 19:55 | 20:38 | 21:17 | 21:43 | 21:32 | 20:49  | 19:49     | 18:48   | 17:04    | 16:56    |
| 22                  | 08:21   | 07:39    | 07:46 | 06:46 | 06:02 | 05:48 | 06:09 | 06:48  | 07:29     | 08:10   | 07:56    | 08:27    |
|                     | 17:29   | 18:15    | 19:56 | 20:39 | 21:19 | 21:43 | 21:32 | 20:47  | 19:47     | 18:46   | 17:03    | 16:57    |
| 23                  | 08:21   | 07:37    | 07:44 | 06:44 | 06:01 | 05:48 | 06:11 | 06:49  | 07:30     | 08:11   | 07:57    | 08:28    |
|                     | 17:31   | 18:17    | 19:57 | 20:40 | 21:20 | 21:43 | 21:31 | 20:45  | 19:45     | 18:45   | 17:03    | 16:57    |
| 24                  | 08:20   | 07:36    | 07:42 | 06:42 | 06:00 | 05:49 | 06:12 | 06:51  | 07:31     | 08:13   | 07:58    | 08:28    |
|                     | 17:32   | 18:18    | 19:59 | 20:42 | 21:21 | 21:43 | 21:29 | 20:43  | 19:43     | 18:43   | 17:02    | 16:58    |
| 25                  | 08:19   | 07:34    | 07:40 | 06:41 | 05:59 | 05:49 | 06:13 | 06:52  | 07:33     | 08:14   | 08:00    | 08:28    |
|                     | 17:34   | 18:20    | 20:00 | 20:43 | 21:22 | 21:43 | 21:28 | 20:42  | 19:40     | 18:41   | 17:01    | 16:58    |
| 26                  | 08:18   | 07:32    | 07:38 | 06:39 | 05:58 | 05:49 | 06:14 | 06:53  | 07:34     | 08:16   | 08:01    | 08:29    |
|                     | 17:35   | 18:21    | 20:02 | 20:45 | 21:23 | 21:44 | 21:27 | 20:40  | 19:38     | 18:39   | 17:00    | 16:59    |
| 27                  | 08:17   | 07:30    | 07:36 | 06:37 | 05:57 | 05:50 | 06:15 | 06:55  | 07:35     | 08:17   | 08:02    | 08:29    |
|                     | 17:37   | 18:23    | 20:03 | 20:46 | 21:24 | 21:44 | 21:26 | 20:38  | 19:36     | 18:38   | 16:59    | 17:00    |
| 28                  | 08:16   | 07:28    | 07:34 | 06:35 | 05:56 | 05:50 | 06:16 | 06:56  | 07:37     | 08:19   | 08:04    | 08:29    |
|                     | 17:38   | 18:24    | 20:04 | 20:47 | 21:25 | 21:44 | 21:25 | 20:36  | 19:34     | 18:36   | 16:59    | 17:00    |
| 29                  | 08:14   |          | 07:32 | 06:34 | 05:55 | 05:51 | 06:17 | 06:57  | 07:38     | 08:20   | 08:05    | 08:30    |
|                     | 17:40   |          | 20:06 | 20:49 | 21:26 | 21:44 | 21:24 | 20:34  | 19:32     | 18:35   | 16:58    | 17:01    |
| 30                  | 08:13   |          | 07:30 | 06:32 | 05:55 | 05:51 | 06:19 | 06:59  | 07:39     | 08:22   | 08:06    | 08:30    |
|                     | 17:41   |          | 20:07 | 20:50 | 21:27 | 21:44 | 21:23 | 20:32  | 19:30     | 18:33   | 16:58    | 17:02    |
| 31                  | 08:12   |          | 07:28 |       | 05:54 |       | 06:20 | 07:00  |           | 08:23   |          | 08:30    |
|                     | 17:43   |          | 20:09 |       | 21:28 |       | 21:21 | 20:30  |           | 18:31   |          | 17:03    |
| Potential sun hours | 278     | 286      | 367   | 406   | 465   | 475   | 481   | 442    | 380       | 340     | 283      | 266      |
| Total, worst case   |         |          |       |       |       |       |       |        |           |         |          |          |
| Sun reduction       |         |          |       |       |       |       |       |        |           |         |          |          |
| Oper. time red.     |         |          |       |       |       |       |       |        |           |         |          |          |
| Wind dir. red.      |         |          |       |       |       |       |       |        |           |         |          |          |
| Total reduction     |         |          |       |       |       |       |       |        |           |         |          |          |
| Total, real         |         |          |       |       |       |       |       |        |           |         |          |          |

Table layout: For each day in each month the following matrix apply

| Day in month | Sun rise (hh:mm) | Sun set (hh:mm) | Minutes with flicker | First time (hh:mm) with flicker | Last time (hh:mm) with flicker | (WTG causing flicker first time) | (WTG causing flicker last time) |
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|

Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM  
US-01824-3627 Chelmsford  
+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

## Assumptions for shadow calculations

Reference year for calendar

Shadow receptor: R047 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 90.0° (41)

2023

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

|                     | January | February | March | April | May   | June  | July  | August | September | October | November | December |
|---------------------|---------|----------|-------|-------|-------|-------|-------|--------|-----------|---------|----------|----------|
| 1                   | 08:30   | 08:11    | 07:27 | 07:26 | 06:30 | 05:53 | 05:52 | 06:21  | 07:01     | 07:41   | 08:25    | 08:08    |
|                     | 17:04   | 17:44    | 18:26 | 20:10 | 20:51 | 21:29 | 21:43 | 21:20  | 20:28     | 19:28   | 18:30    | 16:57    |
| 2                   | 08:30   | 08:10    | 07:25 | 07:24 | 06:29 | 05:53 | 05:52 | 06:22  | 07:03     | 07:42   | 08:26    | 08:09    |
|                     | 17:05   | 17:46    | 18:27 | 20:11 | 20:53 | 21:30 | 21:43 | 21:19  | 20:26     | 19:26   | 18:28    | 16:57    |
| 3                   | 08:30   | 08:08    | 07:23 | 07:22 | 06:27 | 05:52 | 05:53 | 06:24  | 07:04     | 07:43   | 08:28    | 08:10    |
|                     | 17:06   | 17:47    | 18:29 | 20:13 | 20:54 | 21:31 | 21:43 | 21:17  | 20:25     | 19:24   | 18:27    | 16:56    |
| 4                   | 08:30   | 08:07    | 07:21 | 07:20 | 06:26 | 05:51 | 05:53 | 06:25  | 07:05     | 07:45   | 08:29    | 08:11    |
|                     | 17:07   | 17:49    | 18:30 | 20:14 | 20:56 | 21:32 | 21:43 | 21:16  | 20:23     | 19:22   | 18:25    | 16:56    |
| 5                   | 08:30   | 08:06    | 07:19 | 07:18 | 06:24 | 05:51 | 05:54 | 06:26  | 07:06     | 07:46   | 07:31    | 08:12    |
|                     | 17:08   | 17:50    | 18:32 | 20:16 | 20:57 | 21:33 | 21:43 | 21:15  | 20:21     | 19:20   | 17:24    | 16:55    |
| 6                   | 08:30   | 08:04    | 07:17 | 07:16 | 06:23 | 05:50 | 05:55 | 06:27  | 07:08     | 07:48   | 07:32    | 08:13    |
|                     | 17:09   | 17:52    | 18:33 | 20:17 | 20:58 | 21:34 | 21:42 | 21:13  | 20:19     | 19:18   | 17:22    | 16:55    |
| 7                   | 08:30   | 08:03    | 07:15 | 07:14 | 06:21 | 05:50 | 05:55 | 06:29  | 07:09     | 07:49   | 07:34    | 08:15    |
|                     | 17:10   | 17:54    | 18:35 | 20:18 | 21:00 | 21:35 | 21:42 | 21:12  | 20:17     | 19:16   | 17:21    | 16:55    |
| 8                   | 08:29   | 08:02    | 07:13 | 07:12 | 06:20 | 05:50 | 05:56 | 06:30  | 07:10     | 07:50   | 07:35    | 08:16    |
|                     | 17:11   | 17:55    | 18:36 | 20:20 | 21:01 | 21:36 | 21:41 | 21:10  | 20:15     | 19:14   | 17:19    | 16:55    |
| 9                   | 08:29   | 08:00    | 07:11 | 07:10 | 06:18 | 05:49 | 05:57 | 06:31  | 07:12     | 07:52   | 07:37    | 08:17    |
|                     | 17:12   | 17:57    | 18:37 | 20:21 | 21:02 | 21:36 | 21:41 | 21:09  | 20:13     | 19:13   | 17:18    | 16:54    |
| 10                  | 08:29   | 07:59    | 07:09 | 07:08 | 06:17 | 05:49 | 05:58 | 06:32  | 07:13     | 07:53   | 07:38    | 08:18    |
|                     | 17:13   | 17:58    | 18:39 | 20:22 | 21:04 | 21:37 | 21:40 | 21:07  | 20:11     | 19:11   | 17:17    | 16:54    |
| 11                  | 08:28   | 07:57    | 07:08 | 07:06 | 06:15 | 05:49 | 05:59 | 06:34  | 07:14     | 07:54   | 07:40    | 08:19    |
|                     | 17:15   | 18:00    | 18:40 | 20:24 | 21:05 | 21:38 | 21:40 | 21:06  | 20:09     | 19:09   | 17:15    | 16:54    |
| 12                  | 08:28   | 07:56    | 08:06 | 07:04 | 06:14 | 05:48 | 05:59 | 06:35  | 07:16     | 07:56   | 07:41    | 08:20    |
|                     | 17:16   | 18:00    | 18:42 | 20:25 | 21:06 | 21:39 | 21:39 | 21:04  | 20:07     | 19:07   | 17:14    | 16:54    |
| 13                  | 08:28   | 07:54    | 08:04 | 07:02 | 06:13 | 05:48 | 06:00 | 06:36  | 07:17     | 07:57   | 07:43    | 08:21    |
|                     | 17:17   | 18:01    | 19:43 | 20:27 | 21:07 | 21:39 | 21:39 | 21:02  | 20:05     | 19:05   | 17:13    | 16:54    |
| 14                  | 08:27   | 07:53    | 08:02 | 07:01 | 06:11 | 05:48 | 06:01 | 06:38  | 07:18     | 07:59   | 07:44    | 08:21    |
|                     | 17:18   | 18:03    | 19:45 | 20:28 | 21:09 | 21:40 | 21:38 | 21:01  | 20:03     | 19:03   | 17:12    | 16:54    |
| 15                  | 08:27   | 07:51    | 08:00 | 06:59 | 06:10 | 05:48 | 06:02 | 06:39  | 07:20     | 08:00   | 07:45    | 08:22    |
|                     | 17:20   | 18:04    | 19:46 | 20:29 | 21:10 | 21:40 | 21:37 | 20:59  | 20:01     | 19:01   | 17:11    | 16:54    |
| 16                  | 08:26   | 07:49    | 07:58 | 06:57 | 06:09 | 05:48 | 06:03 | 06:40  | 07:21     | 08:01   | 07:47    | 08:23    |
|                     | 17:21   | 18:06    | 19:47 | 20:31 | 21:11 | 21:41 | 21:37 | 20:57  | 19:59     | 18:57   | 17:09    | 16:55    |
| 17                  | 08:25   | 07:48    | 07:56 | 06:55 | 06:08 | 05:48 | 06:04 | 06:42  | 07:22     | 08:03   | 07:48    | 08:24    |
|                     | 17:22   | 18:07    | 19:49 | 20:32 | 21:13 | 21:41 | 21:36 | 20:56  | 19:57     | 18:55   | 17:08    | 16:55    |
| 18                  | 08:25   | 07:46    | 07:54 | 06:53 | 06:06 | 05:48 | 06:05 | 06:43  | 07:23     | 08:04   | 07:50    | 08:25    |
|                     | 17:24   | 18:09    | 19:50 | 20:34 | 21:14 | 21:41 | 21:35 | 20:54  | 19:55     | 18:54   | 17:07    | 16:55    |
| 19                  | 08:24   | 07:44    | 07:52 | 06:51 | 06:05 | 05:48 | 06:06 | 06:44  | 07:25     | 08:06   | 07:51    | 08:25    |
|                     | 17:25   | 18:11    | 19:52 | 20:35 | 21:15 | 21:42 | 21:34 | 20:52  | 19:53     | 18:52   | 17:06    | 16:55    |
| 20                  | 08:23   | 07:43    | 07:50 | 06:49 | 06:04 | 05:48 | 06:07 | 06:45  | 07:26     | 08:07   | 07:53    | 08:26    |
|                     | 17:26   | 18:12    | 19:53 | 20:36 | 21:16 | 21:42 | 21:33 | 20:51  | 19:51     | 18:50   | 17:05    | 16:56    |
| 21                  | 08:22   | 07:41    | 07:48 | 06:48 | 06:03 | 05:48 | 06:08 | 06:47  | 07:27     | 08:09   | 07:54    | 08:26    |
|                     | 17:28   | 18:14    | 19:55 | 20:38 | 21:17 | 21:43 | 21:32 | 20:49  | 19:49     | 18:48   | 17:04    | 16:56    |
| 22                  | 08:21   | 07:39    | 07:46 | 06:46 | 06:02 | 05:48 | 06:09 | 06:48  | 07:29     | 08:10   | 07:56    | 08:27    |
|                     | 17:29   | 18:15    | 19:56 | 20:39 | 21:19 | 21:43 | 21:31 | 20:47  | 19:47     | 18:46   | 17:03    | 16:57    |
| 23                  | 08:21   | 07:37    | 07:44 | 06:44 | 06:01 | 05:48 | 06:11 | 06:49  | 07:30     | 08:11   | 07:57    | 08:28    |
|                     | 17:31   | 18:17    | 19:57 | 20:40 | 21:20 | 21:43 | 21:31 | 20:45  | 19:45     | 18:45   | 17:03    | 16:57    |
| 24                  | 08:20   | 07:36    | 07:42 | 06:42 | 06:00 | 05:49 | 06:12 | 06:51  | 07:31     | 08:13   | 07:58    | 08:28    |
|                     | 17:32   | 18:18    | 19:59 | 20:42 | 21:21 | 21:43 | 21:29 | 20:43  | 19:43     | 18:43   | 17:02    | 16:58    |
| 25                  | 08:19   | 07:34    | 07:40 | 06:41 | 05:59 | 05:49 | 06:13 | 06:52  | 07:33     | 08:14   | 08:00    | 08:28    |
|                     | 17:34   | 18:20    | 20:00 | 20:43 | 21:22 | 21:43 | 21:28 | 20:42  | 19:40     | 18:41   | 17:01    | 16:58    |
| 26                  | 08:18   | 07:32    | 07:38 | 06:39 | 05:58 | 05:49 | 06:14 | 06:53  | 07:34     | 08:16   | 08:01    | 08:29    |
|                     | 17:35   | 18:21    | 20:02 | 20:45 | 21:23 | 21:43 | 21:27 | 20:40  | 19:38     | 18:39   | 17:00    | 16:59    |
| 27                  | 08:17   | 07:30    | 07:36 | 06:37 | 05:57 | 05:50 | 06:15 | 06:55  | 07:35     | 08:17   | 08:02    | 08:29    |
|                     | 17:37   | 18:23    | 20:03 | 20:46 | 21:24 | 21:44 | 21:26 | 20:38  | 19:36     | 18:38   | 16:59    | 17:00    |
| 28                  | 08:16   | 07:28    | 07:34 | 06:35 | 05:56 | 05:50 | 06:16 | 06:56  | 07:37     | 08:19   | 08:04    | 08:29    |
|                     | 17:38   | 18:24    | 20:04 | 20:47 | 21:25 | 21:44 | 21:25 | 20:36  | 19:34     | 18:36   | 16:59    | 17:00    |
| 29                  | 08:14   |          | 07:32 | 06:34 | 05:55 | 05:51 | 06:17 | 06:57  | 07:38     | 08:20   | 08:05    | 08:30    |
|                     | 17:40   |          | 20:06 | 20:49 | 21:26 | 21:44 | 21:24 | 20:34  | 19:32     | 18:35   | 16:58    | 17:01    |
| 30                  | 08:13   |          | 07:30 | 06:32 | 05:55 | 05:51 | 06:19 | 06:59  | 07:39     | 08:22   | 08:06    | 08:30    |
|                     | 17:41   |          | 20:07 | 20:50 | 21:27 | 21:43 | 21:23 | 20:32  | 19:30     | 18:33   | 16:58    | 17:02    |
| 31                  | 08:12   |          | 07:28 |       | 05:54 |       | 06:20 | 07:00  |           | 08:23   |          | 08:30    |
|                     | 17:43   |          | 20:09 |       | 21:28 |       | 21:21 | 20:30  |           | 18:31   |          | 17:03    |
| Potential sun hours | 278     | 286      | 367   | 406   | 465   | 475   | 481   | 442    | 380       | 340     | 283      | 266      |
| Total, worst case   |         |          |       |       |       |       |       |        |           |         |          |          |
| Sun reduction       |         |          |       |       |       |       |       |        |           |         |          |          |
| Oper. time red.     |         |          |       |       |       |       |       |        |           |         |          |          |
| Wind dir. red.      |         |          |       |       |       |       |       |        |           |         |          |          |
| Total reduction     |         |          |       |       |       |       |       |        |           |         |          |          |
| Total, real         |         |          |       |       |       |       |       |        |           |         |          |          |

Table layout: For each day in each month the following matrix apply

|              |                      |                                 |                                  |
|--------------|----------------------|---------------------------------|----------------------------------|
| Day in month | Sun rise (hh:mm)     | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|              | Sun set (hh:mm)      | Last time (hh:mm) with flicker  | (WTG causing flicker last time)  |
|              | Minutes with flicker |                                 |                                  |



Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: R048 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (42)

## Assumptions for shadow calculations

Reference year for calendar

2023

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

| Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  |
|------|------|------|------|------|------|------|------|------|------|------|------|
| 0.54 | 0.52 | 0.61 | 0.58 | 0.64 | 0.67 | 0.75 | 0.72 | 0.67 | 0.53 | 0.42 | 0.45 |

Operational time

| N   | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW | NW  | NNW | Sum   |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| 376 | 314 | 339 | 425 | 445 | 474 | 693 | 570 | 488 | 386 | 872 | 609 | 772 | 651 | 677 | 667 | 8,758 |

|    | January |    | February     |       | March |       | April |       | May   |       | June  |       | July  |       | August       |  | September |  | October |              | November |       | December     |              |
|----|---------|----|--------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------------|--|-----------|--|---------|--------------|----------|-------|--------------|--------------|
| 1  | 08:30   |    | 15:43 (Alt1) | 08:11 | 07:27 | 07:26 | 06:30 | 05:53 | 05:52 | 06:21 | 07:01 | 07:41 | 08:25 | 08:08 |              |  |           |  |         |              | 08:25    |       | 15:34 (Alt1) |              |
|    | 17:04   | 32 | 16:15 (Alt1) | 17:44 | 18:26 | 20:10 | 20:51 | 21:29 | 21:43 | 21:20 | 20:28 | 19:28 | 18:30 | 16:57 | 23           |  |           |  |         |              |          |       | 15:57 (Alt1) |              |
| 2  | 08:30   |    | 15:43 (Alt1) | 08:10 | 07:25 | 07:24 | 06:29 | 05:53 | 05:52 | 06:22 | 07:03 | 07:42 | 08:26 | 08:09 |              |  |           |  |         |              |          |       | 15:33 (Alt1) |              |
|    | 17:05   | 33 | 16:16 (Alt1) | 17:46 | 18:27 | 20:11 | 20:53 | 21:30 | 21:43 | 21:19 | 20:26 | 19:26 | 18:28 | 16:57 | 25           |  |           |  |         |              |          |       | 15:58 (Alt1) |              |
| 3  | 08:30   |    | 15:44 (Alt1) | 08:08 | 07:23 | 07:22 | 06:27 | 05:52 | 05:53 | 06:24 | 07:04 | 07:43 | 08:28 | 08:10 |              |  |           |  |         |              |          |       | 15:33 (Alt1) |              |
|    | 17:06   | 32 | 16:16 (Alt1) | 17:47 | 18:29 | 20:13 | 20:54 | 21:31 | 21:43 | 21:17 | 20:25 | 19:24 | 18:27 | 16:56 | 27           |  |           |  |         |              |          |       | 16:00 (Alt1) |              |
| 4  | 08:30   |    | 15:45 (Alt1) | 08:07 | 07:21 | 07:20 | 06:26 | 05:51 | 05:53 | 06:25 | 07:05 | 07:45 | 08:29 | 08:11 |              |  |           |  |         |              |          |       | 15:33 (Alt1) |              |
|    | 17:07   | 31 | 16:16 (Alt1) | 17:49 | 18:30 | 20:14 | 20:56 | 21:32 | 21:43 | 21:16 | 20:23 | 19:22 | 18:25 | 16:56 | 28           |  |           |  |         |              |          |       | 16:01 (Alt1) |              |
| 5  | 08:30   |    | 15:46 (Alt1) | 08:06 | 07:19 | 07:18 | 06:24 | 05:51 | 05:54 | 06:26 | 07:06 | 07:46 | 07:31 | 08:12 |              |  |           |  |         |              |          |       | 15:33 (Alt1) |              |
|    | 17:08   | 31 | 16:17 (Alt1) | 17:50 | 18:32 | 20:16 | 20:57 | 21:33 | 21:43 | 21:15 | 20:21 | 19:20 | 17:24 | 16:55 | 28           |  |           |  |         |              |          |       | 16:01 (Alt1) |              |
| 6  | 08:30   |    | 15:47 (Alt1) | 08:04 | 07:17 | 07:16 | 06:23 | 05:50 | 05:55 | 06:27 | 07:08 | 07:48 | 07:32 | 08:13 |              |  |           |  |         |              |          |       | 15:32 (Alt1) |              |
|    | 17:09   | 30 | 16:17 (Alt1) | 17:52 | 18:33 | 20:17 | 20:58 | 21:34 | 21:42 | 21:13 | 20:19 | 19:18 | 17:22 | 16:55 | 30           |  |           |  |         |              |          |       | 16:02 (Alt1) |              |
| 7  | 08:30   |    | 15:47 (Alt1) | 08:03 | 07:15 | 07:14 | 06:21 | 05:50 | 05:55 | 06:29 | 07:09 | 07:49 | 07:34 | 08:15 |              |  |           |  |         |              |          |       | 15:33 (Alt1) |              |
|    | 17:10   | 30 | 16:17 (Alt1) | 17:54 | 18:35 | 20:18 | 21:00 | 21:35 | 21:42 | 21:12 | 20:17 | 19:16 | 17:21 | 16:55 | 30           |  |           |  |         |              |          |       | 16:03 (Alt1) |              |
| 8  | 08:29   |    | 15:48 (Alt1) | 08:02 | 07:13 | 07:12 | 06:20 | 05:50 | 05:56 | 06:30 | 07:10 | 07:50 | 07:35 | 08:16 |              |  |           |  |         |              |          |       | 15:33 (Alt1) |              |
|    | 17:11   | 29 | 16:17 (Alt1) | 17:55 | 18:36 | 20:20 | 21:01 | 21:36 | 21:41 | 21:10 | 20:15 | 19:15 | 17:19 | 16:55 | 31           |  |           |  |         |              |          |       | 16:04 (Alt1) |              |
| 9  | 08:29   |    | 15:49 (Alt1) | 08:00 | 07:11 | 07:10 | 06:18 | 05:49 | 05:57 | 06:31 | 07:12 | 07:52 | 07:37 | 08:17 |              |  |           |  |         |              |          |       | 15:33 (Alt1) |              |
|    | 17:12   | 28 | 16:17 (Alt1) | 17:57 | 18:37 | 20:21 | 21:02 | 21:36 | 21:41 | 21:09 | 20:13 | 19:13 | 17:18 | 16:54 | 32           |  |           |  |         |              |          |       | 16:05 (Alt1) |              |
| 10 | 08:29   |    | 15:50 (Alt1) | 07:59 | 07:10 | 07:08 | 06:17 | 05:49 | 05:58 | 06:32 | 07:13 | 07:53 | 07:38 | 08:18 |              |  |           |  |         |              |          |       | 15:34 (Alt1) |              |
|    | 17:13   | 27 | 16:17 (Alt1) | 17:58 | 18:39 | 20:22 | 21:04 | 21:37 | 21:40 | 21:07 | 20:11 | 19:11 | 17:17 | 16:54 | 31           |  |           |  |         |              |          |       | 16:05 (Alt1) |              |
| 11 | 08:28   |    | 15:51 (Alt1) | 07:57 | 07:08 | 07:06 | 06:15 | 05:49 | 05:59 | 06:34 | 07:14 | 07:54 | 07:40 | 08:19 |              |  |           |  |         |              |          |       | 15:34 (Alt1) |              |
|    | 17:15   | 26 | 16:17 (Alt1) | 18:00 | 18:40 | 20:24 | 21:05 | 21:38 | 21:40 | 21:06 | 20:09 | 19:09 | 17:15 | 16:54 | 32           |  |           |  |         |              |          |       | 16:06 (Alt1) |              |
| 12 | 08:28   |    | 15:52 (Alt1) | 07:56 | 08:06 | 07:04 | 06:14 | 05:48 | 05:59 | 06:35 | 07:16 | 07:56 | 07:41 | 08:20 |              |  |           |  |         |              |          |       | 15:34 (Alt1) |              |
|    | 17:16   | 24 | 16:16 (Alt1) | 18:00 | 18:42 | 20:25 | 21:06 | 21:38 | 21:39 | 21:04 | 20:07 | 19:07 | 17:14 | 16:54 | 33           |  |           |  |         |              |          |       | 16:07 (Alt1) |              |
| 13 | 08:28   |    | 15:53 (Alt1) | 07:54 | 08:04 | 07:02 | 06:13 | 05:48 | 06:00 | 06:36 | 07:17 | 07:57 | 07:43 | 08:21 |              |  |           |  |         |              |          |       | 15:34 (Alt1) |              |
|    | 17:17   | 23 | 16:16 (Alt1) | 18:01 | 19:43 | 20:27 | 21:07 | 21:39 | 21:39 | 21:02 | 20:05 | 19:05 | 17:13 | 16:54 | 33           |  |           |  |         |              |          |       | 16:07 (Alt1) |              |
| 14 | 08:27   |    | 15:54 (Alt1) | 07:53 | 08:02 | 07:01 | 06:11 | 05:48 | 06:01 | 06:38 | 07:18 | 07:59 | 07:44 | 08:21 |              |  |           |  |         |              |          |       | 15:35 (Alt1) |              |
|    | 17:18   | 22 | 16:16 (Alt1) | 18:03 | 19:45 | 20:28 | 21:09 | 21:40 | 21:38 | 21:01 | 20:03 | 19:03 | 17:12 | 16:54 | 33           |  |           |  |         |              |          |       | 16:08 (Alt1) |              |
| 15 | 08:27   |    | 15:56 (Alt1) | 07:51 | 08:00 | 06:59 | 06:10 | 05:48 | 06:02 | 06:39 | 07:20 | 08:00 | 07:45 | 08:22 |              |  |           |  |         |              |          |       | 15:34 (Alt1) |              |
|    | 17:20   | 19 | 16:15 (Alt1) | 18:04 | 19:46 | 20:29 | 21:10 | 21:40 | 21:37 | 20:59 | 20:01 | 19:01 | 17:11 | 16:54 | 34           |  |           |  |         |              |          |       | 16:08 (Alt1) |              |
| 16 | 08:26   |    | 15:58 (Alt1) | 07:49 | 07:58 | 06:57 | 06:09 | 05:48 | 06:03 | 06:40 | 07:21 | 08:01 | 07:47 | 08:23 |              |  |           |  |         |              |          |       | 15:35 (Alt1) |              |
|    | 17:21   | 16 | 16:14 (Alt1) | 18:06 | 19:47 | 20:31 | 21:11 | 21:41 | 21:37 | 20:57 | 19:59 | 18:57 | 17:09 | 16:55 | 33           |  |           |  |         |              |          |       | 16:08 (Alt1) |              |
| 17 | 08:25   |    | 16:00 (Alt1) | 07:48 | 07:56 | 06:55 | 06:08 | 05:48 | 06:04 | 06:42 | 07:22 | 08:03 | 07:48 | 08:24 |              |  |           |  |         |              |          |       | 15:35 (Alt1) |              |
|    | 17:22   | 13 | 16:13 (Alt1) | 18:07 | 19:49 | 20:32 | 21:13 | 21:41 | 21:36 | 20:56 | 19:57 | 18:55 | 17:08 | 16:55 | 34           |  |           |  |         |              |          |       | 16:09 (Alt1) |              |
| 18 | 08:25   |    | 16:03 (Alt1) | 07:46 | 07:54 | 06:53 | 06:06 | 05:48 | 06:05 | 06:43 | 07:23 | 08:04 | 07:50 | 08:25 |              |  |           |  |         |              |          |       | 15:36 (Alt1) |              |
|    | 17:24   | 7  | 16:10 (Alt1) | 18:09 | 19:50 | 20:34 | 21:14 | 21:41 | 21:35 | 20:54 | 19:55 | 18:54 | 17:07 | 16:55 | 34           |  |           |  |         |              |          |       | 16:10 (Alt1) |              |
| 19 | 08:24   |    |              | 07:44 | 07:52 | 06:51 | 06:05 | 05:48 | 06:06 | 06:44 | 07:25 | 08:06 | 07:51 | 08:25 |              |  |           |  |         |              |          |       | 15:36 (Alt1) |              |
|    | 17:25   |    |              | 18:11 | 19:52 | 20:35 | 21:15 | 21:42 | 21:34 | 20:52 | 19:53 | 18:52 | 17:06 | 16:55 | 34           |  |           |  |         |              |          |       | 16:10 (Alt1) |              |
| 20 | 08:23   |    |              | 07:43 | 07:50 | 06:49 | 06:04 | 05:48 | 06:07 | 06:45 | 07:26 | 08:07 | 07:53 | 08:26 |              |  |           |  |         |              |          |       | 15:37 (Alt1) |              |
|    | 17:26   |    |              | 18:12 | 19:53 | 20:36 | 21:16 | 21:42 | 21:33 | 20:51 | 19:51 | 18:50 | 17:05 | 16:56 | 34           |  |           |  |         |              |          |       | 16:11 (Alt1) |              |
| 21 | 08:22   |    |              | 07:41 | 07:48 | 06:48 | 06:03 | 05:48 | 06:08 | 06:47 | 07:27 | 08:09 | 07:54 | 08:26 |              |  |           |  |         |              |          |       | 15:37 (Alt1) |              |
|    | 17:28   |    |              | 18:14 | 19:55 | 20:38 | 21:17 | 21:43 | 21:32 | 20:49 | 19:49 | 18:48 | 17:04 | 16:56 | 34           |  |           |  |         |              |          |       | 16:11 (Alt1) |              |
| 22 | 08:21   |    |              | 07:39 | 07:46 | 06:46 | 06:02 | 05:48 | 06:09 | 06:48 | 07:29 | 08:10 | 07:56 | 08:27 |              |  |           |  |         |              |          |       | 15:38 (Alt1) |              |
|    | 17:29   |    |              | 18:15 | 19:56 | 20:39 | 21:19 | 21:43 | 21:31 | 20:47 | 19:47 | 18:46 | 17:03 | 16:57 | 34           |  |           |  |         |              |          |       | 16:12 (Alt1) |              |
| 23 | 08:21   |    |              | 07:37 | 07:44 | 06:44 | 06:01 | 05:48 | 06:11 | 06:49 | 07:30 | 08:11 | 07:57 | 08:28 |              |  |           |  |         |              |          |       | 15:38 (Alt1) |              |
|    | 17:31   |    |              | 18:17 | 19:57 | 20:40 | 21:20 | 21:43 | 21:31 | 20:45 | 19:45 | 18:45 | 17:03 | 16:57 | 34           |  |           |  |         |              |          |       | 16:12 (Alt1) |              |
| 24 | 08:20   |    |              | 07:36 | 07:42 | 06:42 | 06:00 | 05:49 | 06:12 | 06:51 | 07:31 | 08:13 | 07:58 | 08:28 |              |  |           |  |         |              |          |       | 15:39 (Alt1) |              |
|    | 17:32   |    |              | 18:18 | 19:59 | 20:42 | 21:21 | 21:43 | 21:29 | 20:43 | 19:43 | 18:43 | 17:02 | 16:58 | 34           |  |           |  |         |              |          |       | 16:13 (Alt1) |              |
| 25 | 08:19   |    |              | 07:34 | 07:40 | 06:41 | 05:59 | 05:49 | 06:13 | 06:52 | 07:33 | 08:14 | 08:00 | 08:28 |              |  |           |  |         |              |          |       | 15:39 (Alt1) |              |
|    | 17:34   |    |              | 18:20 | 20:00 | 20:43 | 21:22 | 21:43 | 21:28 | 20:42 | 19:40 | 18:41 | 17:01 | 16:58 | 34           |  |           |  |         |              |          |       | 16:13 (Alt1) |              |
| 26 | 08:18   |    |              | 07:32 | 07:38 | 06:39 | 05:58 | 05:49 | 06:14 | 06:53 | 07:34 | 08:16 | 08:01 |       |              |  |           |  |         | 15:39 (Alt1) |          | 08:29 | 15:40 (Alt1) |              |
|    | 17:35   |    |              | 18:21 | 20:02 | 20:45 | 21:23 | 21:43 | 21:27 | 20:40 | 19:38 | 18:39 | 17:00 | 10    | 15:49 (Alt1) |  |           |  |         | 15:38 (Alt1) |          | 16:59 | 34           | 16:14 (Alt1) |
| 27 | 08:17   |    |              | 07:30 | 07:36 | 06:37 | 05:57 | 05:50 | 06:15 | 06:55 | 07:35 | 08:17 | 08:02 |       |              |  |           |  |         | 15:38 (Alt1) |          | 08:29 | 15:40 (Alt1) |              |
|    | 17:37   |    |              | 18:23 | 20:03 | 20:46 | 21:24 | 21:44 | 21:26 | 20:38 | 19:36 | 18:38 | 16:59 | 14    | 15:52 (Alt1) |  |           |  |         | 15:36 (Alt1) |          | 17:00 | 34           | 16:14 (Alt1) |
| 28 | 08:16   |    |              | 07:28 | 07:34 | 06:35 | 05:56 | 05:50 | 06:16 | 06:56 | 07:37 | 08:19 | 08:04 |       |              |  |           |  |         | 15:36 (Alt1) |          | 08:29 | 15:41 (Alt1) |              |
|    | 17:38   |    |              | 18:24 | 20:04 | 20:47 | 21:25 | 21:44 | 21:25 | 20:36 | 19:34 | 18:36 | 16:59 | 17    | 15:53 (Alt1) |  |           |  |         | 15:35 (Alt1) |          | 08:30 | 15:41 (Alt1) |              |
| 29 | 08:14   |    |              | 07:32 | 07:38 | 06:34 | 05:55 | 05:51 | 06:18 | 06:57 | 07:38 | 08:20 | 08:05 |       |              |  |           |  |         | 15:55 (Alt1) |          | 17:01 | 33           | 16:14 (Alt1) |
|    | 17:40   |    |              | 20:06 | 20:49 | 21:26 | 21:44 | 21:24 | 21:24 | 20:34 | 19:32 | 18:35 | 16:58 | 20    | 15:55 (Alt1) |  |           |  |         | 15:35 (Alt1) |          | 08:30 | 15:41 (Alt1) |              |
| 30 | 08:13   |    |              | 07:30 | 06:32 | 05:55 | 05:51 | 06:19 | 06:59 | 07:39 | 08:22 | 08:06 |       |       |              |  |           |  |         | 15:57 (Alt1) |          | 17:02 | 34           | 16:15 (Alt1) |
|    | 17:41   |    |              | 20:07 | 20:50 |       | 21:27 | 21:43 | 21:23 | 20:32 | 19:30 | 18:33 | 16:58 | 22    | 15:57 (Alt1) |  |           |  |         |              |          | 08:30 | 15:42 (Alt1) |              |
| 31 | 08:12   |    |              | 07:28 |       | 05:54 |       |       | 06:20 | 07:00 |       | 08:23 |       |       |              |  |           |  |         |              |          | 17:03 | 33           | 16:15 (Alt1) |
|    | 17:43   |    |              | 20:09 |       | 21:28 |       |       | 21:21 | 20:30 |       | 18:31 |       |       |              |  |           |  |         |              |          |       |              |              |

Table layout: For each day in each month the following matrix apply

| Day in month | Sun rise (hh:mm) | Sun set (hh:mm) | Minutes with flicker | First time (hh:mm) with flicker | Last time (hh:mm) with flicker | (WTG causing flicker first time) |
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|

Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM  
US-01824-3627 Chelmsford  
+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: R049 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 90.0° (43)

## Assumptions for shadow calculations

Reference year for calendar

2023

Sunshine probability S/50 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

|                     | January | February        | March           | April        | May   | June  | July  | August | September | October | November | December |                 |                 |
|---------------------|---------|-----------------|-----------------|--------------|-------|-------|-------|--------|-----------|---------|----------|----------|-----------------|-----------------|
| 1                   | 08:30   | 07:11           | 16:38 (Alt1)    | 07:27        | 07:26 | 06:30 | 05:53 | 05:52  | 06:21     | 07:01   | 07:41    | 08:25    | 08:07           | 16:20 (Alt1)    |
| 2                   | 17:04   | 17:44           | 31 17:09 (Alt1) | 18:26        | 20:10 | 20:51 | 21:29 | 21:43  | 21:20     | 20:28   | 19:28    | 18:30    | 16:57           | 11 16:31 (Alt1) |
| 3                   | 08:30   | 08:10           | 16:37 (Alt1)    | 07:25        | 07:24 | 06:29 | 05:53 | 05:52  | 06:22     | 07:03   | 07:42    | 08:26    | 08:09           | 16:21 (Alt1)    |
| 4                   | 17:05   | 17:46           | 31 17:08 (Alt1) | 18:27        | 20:11 | 20:53 | 21:30 | 21:43  | 21:19     | 20:26   | 19:26    | 18:28    | 16:57           | 9 16:30 (Alt1)  |
| 5                   | 08:30   | 08:08           | 16:39 (Alt1)    | 07:23        | 07:22 | 06:27 | 05:52 | 05:53  | 06:24     | 07:04   | 07:43    | 08:28    | 08:10           | 16:23 (Alt1)    |
| 6                   | 17:06   | 17:47           | 29 17:08 (Alt1) | 18:29        | 20:13 | 20:54 | 21:31 | 21:43  | 21:17     | 20:25   | 19:24    | 18:27    | 13 17:17 (Alt1) | 16:56           |
| 7                   | 08:30   | 08:07           | 16:40 (Alt1)    | 07:21        | 07:20 | 06:26 | 05:51 | 05:53  | 06:25     | 07:05   | 07:45    | 08:29    | 17:15 (Alt1)    | 16:25 (Alt1)    |
| 8                   | 17:07   | 17:49           | 28 17:08 (Alt1) | 18:30        | 20:14 | 20:56 | 21:32 | 21:43  | 21:16     | 20:23   | 19:22    | 18:25    | 18 17:33 (Alt1) | 16:55           |
| 9                   | 08:30   | 08:06           | 16:40 (Alt1)    | 07:19        | 07:18 | 06:24 | 05:51 | 05:54  | 06:26     | 07:06   | 07:46    | 08:31    | 16:13 (Alt1)    | 16:27 (Alt1)    |
| 10                  | 17:08   | 17:50           | 27 17:07 (Alt1) | 18:32        | 20:16 | 20:57 | 21:33 | 21:43  | 21:15     | 20:21   | 19:20    | 18:24    | 21 16:34 (Alt1) | 16:55           |
| 11                  | 08:30   | 08:04           | 16:42 (Alt1)    | 07:17        | 07:16 | 06:23 | 05:50 | 05:55  | 06:27     | 07:08   | 07:48    | 08:32    | 16:12 (Alt1)    | 16:28           |
| 12                  | 17:09   | 17:52           | 24 17:06 (Alt1) | 18:33        | 20:17 | 20:58 | 21:34 | 21:42  | 21:13     | 20:19   | 19:18    | 18:22    | 24 16:36 (Alt1) | 16:55           |
| 13                  | 08:30   | 08:03           | 16:43 (Alt1)    | 07:15        | 07:14 | 06:21 | 05:50 | 05:55  | 06:29     | 07:09   | 07:49    | 08:34    | 16:11 (Alt1)    | 16:28           |
| 14                  | 17:10   | 17:54           | 22 17:05 (Alt1) | 18:35        | 20:18 | 21:00 | 21:35 | 21:42  | 21:12     | 20:17   | 19:16    | 18:21    | 26 16:37 (Alt1) | 16:55           |
| 15                  | 08:29   | 08:02           | 16:45 (Alt1)    | 07:13        | 07:12 | 06:20 | 05:50 | 05:56  | 06:30     | 07:10   | 07:50    | 08:35    | 16:10 (Alt1)    | 16:28           |
| 16                  | 17:11   | 17:55           | 19 17:04 (Alt1) | 18:36        | 20:20 | 21:01 | 21:35 | 21:41  | 21:10     | 20:15   | 19:14    | 18:19    | 27 16:37 (Alt1) | 16:55           |
| 17                  | 08:29   | 08:00           | 16:47 (Alt1)    | 07:11        | 07:10 | 06:18 | 05:49 | 05:57  | 06:31     | 07:12   | 07:52    | 08:37    | 16:09 (Alt1)    | 16:27           |
| 18                  | 17:12   | 2 16:45 (Alt1)  | 17:57           | 18:37        | 20:21 | 21:02 | 21:36 | 21:41  | 21:09     | 20:13   | 19:13    | 18:18    | 30 16:39 (Alt1) | 16:54           |
| 19                  | 08:29   | 16:41 (Alt1)    | 07:59           | 16:51 (Alt1) | 07:09 | 06:17 | 05:49 | 05:58  | 06:32     | 07:13   | 07:53    | 08:38    | 16:08 (Alt1)    | 16:28           |
| 20                  | 17:13   | 5 16:46 (Alt1)  | 17:58           | 16:58 (Alt1) | 07:08 | 06:16 | 05:49 | 05:59  | 06:34     | 07:14   | 07:54    | 08:39    | 31 16:39 (Alt1) | 16:54           |
| 21                  | 08:28   | 16:40 (Alt1)    | 07:57           | 16:59        | 07:06 | 06:15 | 05:49 | 05:59  | 06:34     | 07:14   | 07:54    | 08:39    | 16:08 (Alt1)    | 16:28           |
| 22                  | 17:15   | 8 16:48 (Alt1)  | 18:00           | 16:59        | 07:04 | 06:14 | 05:48 | 05:59  | 06:35     | 07:16   | 07:56    | 08:41    | 32 16:40 (Alt1) | 16:54           |
| 23                  | 08:28   | 16:39 (Alt1)    | 07:56           | 16:58        | 07:04 | 06:14 | 05:48 | 05:59  | 06:35     | 07:16   | 07:56    | 08:41    | 16:09 (Alt1)    | 16:28           |
| 24                  | 17:16   | 10 16:49 (Alt1) | 18:00           | 16:59        | 07:04 | 06:14 | 05:48 | 05:59  | 06:35     | 07:16   | 07:56    | 08:41    | 32 16:41 (Alt1) | 16:54           |
| 25                  | 08:28   | 16:39 (Alt1)    | 07:54           | 16:59        | 07:04 | 06:14 | 05:48 | 05:59  | 06:35     | 07:16   | 07:56    | 08:41    | 16:08 (Alt1)    | 16:28           |
| 26                  | 17:17   | 12 16:51 (Alt1) | 18:01           | 16:59        | 07:04 | 06:14 | 05:48 | 05:59  | 06:35     | 07:16   | 07:56    | 08:41    | 32 16:40 (Alt1) | 16:54           |
| 27                  | 08:27   | 16:38 (Alt1)    | 07:52           | 16:58        | 07:01 | 06:11 | 05:48 | 05:59  | 06:35     | 07:16   | 07:56    | 08:41    | 16:08 (Alt1)    | 16:28           |
| 28                  | 17:18   | 14 16:52 (Alt1) | 18:03           | 16:59        | 07:04 | 06:14 | 05:48 | 05:59  | 06:35     | 07:16   | 07:56    | 08:41    | 32 16:41 (Alt1) | 16:54           |
| 29                  | 08:27   | 16:37 (Alt1)    | 07:51           | 16:59        | 07:04 | 06:14 | 05:48 | 05:59  | 06:35     | 07:16   | 07:56    | 08:41    | 16:08 (Alt1)    | 16:28           |
| 30                  | 17:20   | 16 16:53 (Alt1) | 18:04           | 16:59        | 07:04 | 06:14 | 05:48 | 05:59  | 06:35     | 07:16   | 07:56    | 08:41    | 32 16:41 (Alt1) | 16:54           |
| 31                  | 08:26   | 16:36 (Alt1)    | 07:49           | 16:58        | 07:04 | 06:14 | 05:48 | 05:59  | 06:35     | 07:16   | 07:56    | 08:41    | 16:08 (Alt1)    | 16:28           |
| 32                  | 17:21   | 18 16:54 (Alt1) | 18:06           | 16:59        | 07:04 | 06:14 | 05:48 | 05:59  | 06:35     | 07:16   | 07:56    | 08:41    | 32 16:41 (Alt1) | 16:55           |
| 33                  | 08:25   | 16:37 (Alt1)    | 07:48           | 16:58        | 07:04 | 06:14 | 05:48 | 05:59  | 06:35     | 07:16   | 07:56    | 08:41    | 16:09 (Alt1)    | 16:28           |
| 34                  | 17:22   | 19 16:56 (Alt1) | 18:07           | 16:59        | 07:04 | 06:14 | 05:48 | 05:59  | 06:35     | 07:16   | 07:56    | 08:41    | 32 16:42 (Alt1) | 16:55           |
| 35                  | 08:25   | 16:36 (Alt1)    | 07:46           | 16:58        | 07:04 | 06:14 | 05:48 | 05:59  | 06:35     | 07:16   | 07:56    | 08:41    | 16:09 (Alt1)    | 16:28           |
| 36                  | 17:24   | 21 16:57 (Alt1) | 18:09           | 16:59        | 07:04 | 06:14 | 05:48 | 05:59  | 06:35     | 07:16   | 07:56    | 08:41    | 32 16:41 (Alt1) | 16:55           |
| 37                  | 08:24   | 16:36 (Alt1)    | 07:44           | 16:58        | 07:04 | 06:14 | 05:48 | 05:59  | 06:35     | 07:16   | 07:56    | 08:41    | 16:10 (Alt1)    | 16:28           |
| 38                  | 17:25   | 23 16:59 (Alt1) | 18:11           | 16:59        | 07:04 | 06:14 | 05:48 | 05:59  | 06:35     | 07:16   | 07:56    | 08:41    | 32 16:42 (Alt1) | 16:55           |
| 39                  | 08:23   | 16:35 (Alt1)    | 07:43           | 16:58        | 07:04 | 06:14 | 05:48 | 05:59  | 06:35     | 07:16   | 07:56    | 08:41    | 16:10 (Alt1)    | 16:28           |
| 40                  | 17:26   | 25 17:00 (Alt1) | 18:12           | 16:59        | 07:04 | 06:14 | 05:48 | 05:59  | 06:35     | 07:16   | 07:56    | 08:41    | 30 16:40 (Alt1) | 16:56           |
| 41                  | 08:22   | 16:35 (Alt1)    | 07:41           | 16:58        | 07:04 | 06:14 | 05:48 | 05:59  | 06:35     | 07:16   | 07:56    | 08:41    | 16:11 (Alt1)    | 16:28           |
| 42                  | 17:28   | 26 17:01 (Alt1) | 18:14           | 16:59        | 07:04 | 06:14 | 05:48 | 05:59  | 06:35     | 07:16   | 07:56    | 08:41    | 28 16:39 (Alt1) | 16:56           |
| 43                  | 08:21   | 16:35 (Alt1)    | 07:39           | 16:58        | 07:04 | 06:14 | 05:48 | 05:59  | 06:35     | 07:16   | 07:56    | 08:41    | 16:11 (Alt1)    | 16:28           |
| 44                  | 17:29   | 28 17:03 (Alt1) | 18:15           | 16:59        | 07:04 | 06:14 | 05:48 | 05:59  | 06:35     | 07:16   | 07:56    | 08:41    | 27 16:38 (Alt1) | 16:57           |
| 45                  | 08:21   | 16:35 (Alt1)    | 07:37           | 16:58        | 07:04 | 06:14 | 05:48 | 05:59  | 06:35     | 07:16   | 07:56    | 08:41    | 16:12 (Alt1)    | 16:28           |
| 46                  | 17:31   | 30 17:05 (Alt1) | 18:17           | 16:59        | 07:04 | 06:14 | 05:48 | 05:59  | 06:35     | 07:16   | 07:56    | 08:41    | 25 16:37 (Alt1) | 16:57           |
| 47                  | 08:20   | 16:35 (Alt1)    | 07:36           | 16:58        | 07:04 | 06:14 | 05:48 | 05:59  | 06:35     | 07:16   | 07:56    | 08:41    | 16:12 (Alt1)    | 16:28           |
| 48                  | 17:32   | 31 17:06 (Alt1) | 18:18           | 16:59        | 07:04 | 06:14 | 05:48 | 05:59  | 06:35     | 07:16   | 07:56    | 08:41    | 24 16:36 (Alt1) | 16:58           |
| 49                  | 08:19   | 16:35 (Alt1)    | 07:34           | 16:58        | 07:04 | 06:14 | 05:48 | 05:59  | 06:35     | 07:16   | 07:56    | 08:41    | 16:13 (Alt1)    | 16:28           |
| 50                  | 17:34   | 33 17:08 (Alt1) | 18:20           | 16:59        | 07:04 | 06:14 | 05:48 | 05:59  | 06:35     | 07:16   | 07:56    | 08:41    | 23 16:36 (Alt1) | 16:58           |
| 51                  | 08:18   | 16:35 (Alt1)    | 07:32           | 16:58        | 07:04 | 06:14 | 05:48 | 05:59  | 06:35     | 07:16   | 07:56    | 08:41    | 16:14 (Alt1)    | 16:29           |
| 52                  | 17:35   | 33 17:09 (Alt1) | 18:21           | 16:59        | 07:04 | 06:14 | 05:48 | 05:59  | 06:35     | 07:16   | 07:56    | 08:41    | 20 16:34 (Alt1) | 16:59           |
| 53                  | 08:17   | 16:36 (Alt1)    | 07:30           | 16:58        | 07:04 | 06:14 | 05:48 | 05:59  | 06:35     | 07:16   | 07:56    | 08:41    | 16:15 (Alt1)    | 16:29           |
| 54                  | 17:37   | 33 17:09 (Alt1) | 18:23           | 16:59        | 07:04 | 06:14 | 05:48 | 05:59  | 06:35     | 07:16   | 07:56    | 08:41    | 19 16:34 (Alt1) | 17:00           |
| 55                  | 08:16   | 16:36 (Alt1)    | 07:28           | 16:58        | 07:04 | 06:14 | 05:48 | 05:59  | 06:35     | 07:16   | 07:56    | 08:41    | 16:16 (Alt1)    | 16:29           |
| 56                  | 17:38   | 33 17:09 (Alt1) | 18:24           | 16:59        | 07:04 | 06:14 | 05:48 | 05:59  | 06:35     | 07:16   | 07:56    | 08:41    | 17 16:33 (Alt1) | 17:00           |
| 57                  | 08:14   | 16:36 (Alt1)    | 07:27           | 16:58        | 07:04 | 06:14 | 05:48 | 05:59  | 06:35     | 07:16   | 07:56    | 08:41    | 16:17 (Alt1)    | 16:30           |
| 58                  | 17:40   | 33 17:09 (Alt1) | 18:26           | 16:59        | 07:04 | 06:14 | 05:48 | 05:59  | 06:35     | 07:16   | 07:56    | 08:41    | 15 16:32 (Alt1) | 17:01           |
| 59                  | 08:13   | 16:36 (Alt1)    | 07:26           | 16:58        | 07:04 | 06:14 | 05:48 | 05:59  | 06:35     | 07:16   | 07:56    | 08:41    | 16:19 (Alt1)    | 16:30           |
| 60                  | 17:41   | 33 17:09 (Alt1) | 18:27           | 16:59        | 07:04 | 06:14 | 05:48 | 05:59  | 06:35     | 07:16   | 07:56    | 08:41    | 13 16:32 (Alt1) | 17:02           |
| 61                  | 08:12   | 16:37 (Alt1)    | 07:25           | 16:58        | 07:04 | 06:14 | 05:48 | 05:59  | 06:35     | 07:16   | 07:56    | 08:41    | 16:18 (Alt1)    | 16:30           |
| 62                  | 17:43   | 32 17:09 (Alt1) | 18:28           | 16:59        | 07:04 | 06:14 | 05:48 | 05:59  | 06:35     | 07:16   | 07:56    | 08:41    | 17:03           |                 |
| Potential sun hours | 278     | 286             | 367             | 406          | 465   | 475   | 481   | 442    | 380       | 340     | 283      | 266      | 34              |                 |
| Total, worst case   | 518     | 232             |                 |              |       |       |       |        |           |         |          |          | 0.42            | 0.45            |
| Sun reduction       | 0.54    | 0.52            |                 |              |       |       |       |        |           |         |          |          | 0.45            |                 |
| Oper. time red.     | 1.00    | 1.00            |                 |              |       |       |       |        |           |         |          |          | 1.00            |                 |
| Wind dir. red.      | 0.62    | 0.62            |                 |              |       |       |       |        |           |         |          |          | 0.62            |                 |
| Total reduction     | 0.33    | 0.32            |                 |              |       |       |       |        |           |         |          |          | 0.26            | 0.28            |
| Total, real         | 173     | 75              |                 |              |       |       |       |        |           |         |          |          | 188             | 9               |

Table layout: For each day in each month the following matrix apply

|              |                  |                                 |                                  |
|--------------|------------------|---------------------------------|----------------------------------|
| Day in month | Sun rise (hh:mm) | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|              | Sun set (hh:mm)  | Last time (hh:mm) with flicker  | (WTG causing flicker last time)  |



Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM  
US-01824-3627 Chelmsford  
+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: R085 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (76)

## Assumptions for shadow calculations

Reference year for calendar

2023

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

|                     | January        | February       | March          | April          | May            | June           | July           | August         | September      | October        | November              | December       |
|---------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------------|----------------|
| 1                   | 08:30<br>17:04 | 08:11<br>17:44 | 07:27<br>18:26 | 07:26<br>20:10 | 06:31<br>20:52 | 05:53<br>21:29 | 05:52<br>21:43 | 06:21<br>21:20 | 07:01<br>20:28 | 07:41<br>19:28 | 08:05 (Alt1)<br>18:30 | 08:08<br>16:57 |
| 2                   | 08:30<br>17:05 | 08:10<br>17:46 | 07:25<br>18:27 | 07:24<br>20:11 | 06:29<br>20:53 | 05:53<br>21:30 | 05:52<br>21:43 | 06:22<br>21:19 | 07:03<br>20:27 | 34<br>19:26    | 08:06 (Alt1)<br>18:28 | 08:09<br>16:57 |
| 3                   | 08:30<br>17:06 | 08:08<br>17:47 | 07:23<br>18:29 | 07:22<br>20:13 | 06:27<br>20:54 | 05:52<br>21:31 | 05:53<br>21:43 | 06:24<br>21:17 | 07:04<br>20:25 | 32<br>19:24    | 08:08 (Alt1)<br>18:27 | 08:10<br>16:56 |
| 4                   | 08:30<br>17:07 | 08:07<br>17:49 | 07:21<br>18:30 | 07:20<br>20:14 | 06:26<br>20:56 | 05:52<br>21:32 | 05:53<br>21:43 | 06:25<br>21:16 | 07:05<br>20:23 | 30<br>19:22    | 08:09 (Alt1)<br>18:25 | 08:11<br>16:56 |
| 5                   | 08:30<br>17:08 | 08:06<br>17:51 | 07:19<br>18:32 | 07:18<br>20:16 | 06:24<br>20:57 | 05:51<br>21:33 | 05:54<br>21:43 | 06:26<br>21:15 | 07:07<br>20:21 | 27<br>19:20    | 08:10 (Alt1)<br>18:24 | 08:12<br>16:55 |
| 6                   | 08:30<br>17:09 | 08:04<br>17:52 | 07:17<br>18:33 | 07:16<br>20:17 | 06:23<br>20:58 | 05:50<br>21:34 | 05:55<br>21:42 | 06:27<br>21:13 | 07:08<br>20:19 | 25<br>19:19    | 08:12 (Alt1)<br>18:23 | 08:13<br>16:55 |
| 7                   | 08:30<br>17:10 | 08:03<br>17:54 | 07:15<br>18:35 | 07:14<br>20:18 | 06:21<br>21:00 | 05:50<br>21:35 | 05:56<br>21:42 | 06:29<br>21:12 | 07:09<br>20:17 | 22<br>19:17    | 08:13 (Alt1)<br>18:22 | 08:15<br>16:55 |
| 8                   | 08:30<br>17:11 | 08:02<br>17:55 | 07:13<br>18:36 | 07:12<br>20:20 | 06:20<br>21:01 | 05:50<br>21:36 | 05:56<br>21:41 | 06:30<br>21:10 | 07:10<br>20:15 | 19<br>19:15    | 08:15 (Alt1)<br>18:20 | 08:16<br>16:55 |
| 9                   | 08:29<br>17:12 | 08:00<br>17:57 | 07:12<br>18:38 | 07:10<br>20:21 | 06:18<br>21:02 | 05:49<br>21:36 | 05:57<br>21:41 | 06:31<br>21:09 | 07:12<br>20:13 | 15<br>19:13    | 08:16 (Alt1)<br>18:18 | 08:17<br>16:55 |
| 10                  | 08:29<br>17:13 | 07:59<br>17:58 | 07:10<br>18:39 | 07:08<br>20:23 | 06:17<br>21:04 | 05:49<br>21:37 | 05:58<br>21:41 | 06:33<br>21:07 | 07:13<br>20:11 | 10<br>19:11    | 08:26 (Alt1)<br>18:17 | 08:18<br>16:54 |
| 11                  | 08:29<br>17:15 | 07:57<br>18:00 | 07:08<br>18:40 | 07:06<br>20:24 | 06:15<br>21:05 | 05:49<br>21:38 | 05:59<br>21:40 | 06:34<br>21:06 | 07:14<br>20:09 | 07:54<br>19:09 | 08:27 (Alt1)<br>18:16 | 08:19<br>16:54 |
| 12                  | 08:28<br>17:16 | 07:56<br>18:06 | 07:06<br>18:42 | 07:04<br>20:25 | 06:14<br>21:06 | 05:48<br>21:38 | 06:00<br>21:39 | 06:35<br>21:04 | 07:16<br>20:07 | 07:56<br>19:07 | 08:28 (Alt1)<br>18:15 | 08:20<br>16:54 |
| 13                  | 08:28<br>17:17 | 07:54<br>18:01 | 07:04<br>18:43 | 07:03<br>20:27 | 06:13<br>21:07 | 05:48<br>21:39 | 06:00<br>21:39 | 06:36<br>21:02 | 07:17<br>20:05 | 07:57<br>19:05 | 08:29 (Alt1)<br>18:14 | 08:21<br>16:54 |
| 14                  | 08:27<br>17:18 | 07:53<br>18:03 | 07:02<br>18:45 | 07:01<br>20:28 | 06:11<br>21:09 | 05:48<br>21:40 | 06:01<br>21:38 | 06:38<br>21:01 | 07:18<br>20:03 | 07:59<br>19:03 | 08:30 (Alt1)<br>18:13 | 08:22<br>16:54 |
| 15                  | 08:27<br>17:20 | 07:51<br>18:04 | 07:00<br>18:46 | 06:59<br>20:29 | 06:10<br>21:10 | 05:48<br>21:40 | 06:02<br>21:37 | 06:39<br>20:59 | 07:20<br>20:01 | 08:00<br>19:01 | 08:31 (Alt1)<br>18:12 | 08:23<br>16:55 |
| 16                  | 08:26<br>17:21 | 07:49<br>18:06 | 06:58<br>18:48 | 06:57<br>20:31 | 06:09<br>21:11 | 05:48<br>21:41 | 06:03<br>21:37 | 06:40<br>20:57 | 07:21<br>19:59 | 08:02<br>18:57 | 08:32 (Alt1)<br>18:11 | 08:24<br>16:55 |
| 17                  | 08:25<br>17:22 | 07:48<br>18:08 | 06:56<br>18:49 | 06:55<br>20:32 | 06:08<br>21:13 | 05:48<br>21:41 | 06:04<br>21:36 | 06:42<br>20:56 | 07:22<br>19:57 | 08:03<br>18:56 | 08:33 (Alt1)<br>18:10 | 08:25<br>16:55 |
| 18                  | 08:25<br>17:24 | 07:46<br>18:09 | 06:54<br>18:50 | 06:53<br>20:34 | 06:06<br>21:14 | 05:48<br>21:42 | 06:05<br>21:35 | 06:43<br>20:54 | 07:24<br>19:55 | 08:04<br>18:54 | 08:34 (Alt1)<br>18:09 | 08:26<br>16:55 |
| 19                  | 08:24<br>17:25 | 07:44<br>18:11 | 06:52<br>18:52 | 06:51<br>20:35 | 06:05<br>21:15 | 05:48<br>21:42 | 06:06<br>21:34 | 06:44<br>20:52 | 07:25<br>19:53 | 13<br>18:53    | 08:35 (Alt1)<br>18:08 | 08:27<br>16:55 |
| 20                  | 08:23<br>17:27 | 07:43<br>18:12 | 06:50<br>18:53 | 06:50<br>20:36 | 06:04<br>21:16 | 05:48<br>21:42 | 06:07<br>21:33 | 06:46<br>20:51 | 07:26<br>19:51 | 20<br>18:52    | 08:36 (Alt1)<br>18:07 | 08:28<br>16:56 |
| 21                  | 08:22<br>17:28 | 07:41<br>18:14 | 06:48<br>18:55 | 06:48<br>20:38 | 06:03<br>21:17 | 05:48<br>21:43 | 06:08<br>21:33 | 06:47<br>20:49 | 07:28<br>19:49 | 23<br>18:51    | 08:37 (Alt1)<br>18:06 | 08:29<br>16:56 |
| 22                  | 08:22<br>17:29 | 07:39<br>18:15 | 06:46<br>18:56 | 06:46<br>20:39 | 06:02<br>21:19 | 05:48<br>21:43 | 06:10<br>21:32 | 06:48<br>20:47 | 07:29<br>19:47 | 26<br>18:50    | 08:38 (Alt1)<br>18:05 | 08:30<br>16:56 |
| 23                  | 08:21<br>17:31 | 07:37<br>18:17 | 06:44<br>18:57 | 06:44<br>20:41 | 06:01<br>21:20 | 05:49<br>21:43 | 06:11<br>21:31 | 06:50<br>20:45 | 07:30<br>19:45 | 28<br>18:49    | 08:39 (Alt1)<br>18:04 | 08:31<br>16:57 |
| 24                  | 08:20<br>17:32 | 07:36<br>18:18 | 06:42<br>18:59 | 06:42<br>20:42 | 06:00<br>21:21 | 05:49<br>21:43 | 06:12<br>21:30 | 06:51<br>20:43 | 07:31<br>19:43 | 31<br>18:48    | 08:40 (Alt1)<br>18:03 | 08:32<br>16:57 |
| 25                  | 08:19<br>17:33 | 07:34<br>18:20 | 06:40<br>19:00 | 06:41<br>20:43 | 05:59<br>21:22 | 05:49<br>21:43 | 06:13<br>21:28 | 06:52<br>20:42 | 07:33<br>19:41 | 32<br>18:47    | 08:41 (Alt1)<br>18:02 | 08:33<br>16:58 |
| 26                  | 08:18<br>17:35 | 07:32<br>18:22 | 06:38<br>19:02 | 06:39<br>20:45 | 05:58<br>21:23 | 05:49<br>21:44 | 06:14<br>21:27 | 06:53<br>20:40 | 07:34<br>19:39 | 34<br>18:46    | 08:42 (Alt1)<br>18:01 | 08:34<br>16:59 |
| 27                  | 08:17<br>17:37 | 07:30<br>18:23 | 06:36<br>19:03 | 06:37<br>20:46 | 05:57<br>21:24 | 05:50<br>21:44 | 06:15<br>21:26 | 06:55<br>20:38 | 07:35<br>19:37 | 35<br>18:45    | 08:43 (Alt1)<br>18:00 | 08:35<br>16:59 |
| 28                  | 08:16<br>17:38 | 07:29<br>18:24 | 06:34<br>19:04 | 06:35<br>20:47 | 05:56<br>21:25 | 05:50<br>21:44 | 06:16<br>21:25 | 06:56<br>20:36 | 07:37<br>19:34 | 36<br>18:44    | 08:44 (Alt1)<br>17:59 | 08:36<br>16:59 |
| 29                  | 08:15<br>17:40 | 07:32<br>18:26 | 06:32<br>19:06 | 06:34<br>20:49 | 05:56<br>21:26 | 05:51<br>21:44 | 06:18<br>21:24 | 06:57<br>20:34 | 07:38<br>19:32 | 37<br>18:43    | 08:45 (Alt1)<br>17:58 | 08:37<br>16:59 |
| 30                  | 08:13<br>17:41 | 07:30<br>18:27 | 06:30<br>19:07 | 06:32<br>20:50 | 05:55<br>21:27 | 05:51<br>21:44 | 06:19<br>21:23 | 06:59<br>20:32 | 07:39<br>19:30 | 38<br>18:42    | 08:46 (Alt1)<br>17:57 | 08:38<br>16:59 |
| 31                  | 08:12<br>17:43 | 07:28<br>18:29 | 06:28<br>19:09 | 06:30<br>20:51 | 05:54<br>21:28 | 05:50<br>21:44 | 06:20<br>21:21 | 07:00<br>20:30 | 07:40<br>19:29 | 39<br>18:41    | 08:47 (Alt1)<br>17:56 | 08:39<br>16:59 |
| Potential sun hours | 278            | 286            | 367            | 406            | 465            | 475            | 481            | 442            | 380            | 340            | 283                   | 266            |
| Total, worst case   |                |                | 592            |                |                |                |                |                | 383            | 214            |                       |                |
| Sun reduction       |                |                | 0.61           |                |                |                |                |                | 0.67           | 0.53           |                       |                |
| Oper. time red.     |                |                | 1.00           |                |                |                |                |                | 1.00           | 1.00           |                       |                |
| Wind dir. red.      |                |                | 0.68           |                |                |                |                |                | 0.68           | 0.68           |                       |                |
| Total reduction     |                |                | 0.41           |                |                |                |                |                | 0.45           | 0.36           |                       |                |
| Total, real         |                |                | 244            |                |                |                |                |                | 173            | 77             |                       |                |

Table layout: For each day in each month the following matrix apply

|              |                      |                                 |                                  |
|--------------|----------------------|---------------------------------|----------------------------------|
| Day in month | Sun rise (hh:mm)     | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|              | Sun set (hh:mm)      | Last time (hh:mm) with flicker  | (WTG causing flicker last time)  |
|              | Minutes with flicker |                                 |                                  |

Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: R086 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 90.0° (77)

## Assumptions for shadow calculations

Reference year for calendar

2023

Sunshine probability S/50 (Sun hours/Possible sun hours) []

| Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  |
|------|------|------|------|------|------|------|------|------|------|------|------|
| 0.54 | 0.52 | 0.61 | 0.58 | 0.64 | 0.67 | 0.75 | 0.72 | 0.67 | 0.53 | 0.42 | 0.45 |

Operational time

| N   | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW | NW  | NNW | Sum   |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| 376 | 314 | 339 | 425 | 445 | 474 | 693 | 570 | 488 | 386 | 872 | 609 | 772 | 651 | 677 | 667 | 8,758 |

|                     | January        | February       | March               | April                    | May            | June           | July           | August         | September      | October        | November | December |
|---------------------|----------------|----------------|---------------------|--------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------|----------|
| 1                   | 08:30<br>17:04 | 08:11<br>17:44 | 07:27<br>18:26      | 17:51 (54)<br>18:06 (54) | 07:26<br>20:10 | 06:31<br>20:52 | 05:53<br>21:30 | 05:52<br>21:44 | 06:21<br>21:20 | 07:01<br>20:29 |          |          |
| 2                   | 08:30<br>17:05 | 08:10<br>17:46 | 07:25<br>18:27      | 17:49 (54)<br>18:07 (54) | 07:24<br>20:12 | 06:29<br>20:53 | 05:53<br>21:31 | 05:52<br>21:43 | 06:23<br>21:19 | 07:03<br>20:27 |          |          |
| 3                   | 08:30<br>17:06 | 08:09<br>17:48 | 07:23<br>18:29      | 17:47 (54)<br>18:09 (54) | 07:22<br>20:13 | 06:27<br>20:54 | 05:52<br>21:31 | 05:53<br>21:43 | 06:24<br>21:18 | 07:04<br>20:25 |          |          |
| 4                   | 08:30<br>17:07 | 08:07<br>17:49 | 07:21<br>18:30      | 17:46 (54)<br>18:10 (54) | 07:20<br>20:14 | 06:26<br>20:56 | 05:52<br>21:32 | 05:54<br>21:43 | 06:25<br>21:16 | 07:05<br>20:23 |          |          |
| 5                   | 08:30<br>17:08 | 08:06<br>17:51 | 07:19<br>18:32      | 17:45 (54)<br>18:11 (54) | 07:18<br>20:16 | 06:24<br>20:57 | 05:51<br>21:33 | 05:54<br>21:43 | 06:26<br>21:15 | 07:07<br>20:21 |          |          |
| 6                   | 08:30<br>17:09 | 08:05<br>17:52 | 07:17<br>18:33      | 17:44 (54)<br>18:13 (54) | 07:16<br>20:17 | 06:23<br>20:58 | 05:51<br>21:34 | 05:55<br>21:42 | 06:28<br>21:13 | 07:08<br>20:19 |          |          |
| 7                   | 08:30<br>17:10 | 08:03<br>17:54 | 07:15<br>18:35      | 17:43 (54)<br>18:14 (54) | 07:14<br>20:18 | 06:21<br>21:00 | 05:50<br>21:35 | 05:56<br>21:42 | 06:29<br>21:12 | 07:09<br>20:17 |          |          |
| 8                   | 08:30<br>17:11 | 08:02<br>17:55 | 07:14<br>18:36      | 17:43 (54)<br>18:15 (54) | 07:12<br>20:20 | 06:20<br>21:01 | 05:50<br>21:36 | 05:56<br>21:42 | 06:30<br>21:10 | 07:11<br>20:15 |          |          |
| 9                   | 08:29<br>17:12 | 08:00<br>17:57 | 07:12<br>18:38      | 17:42 (54)<br>18:15 (54) | 07:10<br>20:21 | 06:18<br>21:02 | 05:49<br>21:36 | 05:57<br>21:41 | 06:31<br>21:09 | 07:12<br>20:13 |          |          |
| 10                  | 08:29<br>17:14 | 07:59<br>17:58 | 07:10<br>18:39      | 17:42 (54)<br>18:15 (54) | 07:08<br>20:23 | 06:17<br>21:04 | 05:49<br>21:37 | 05:58<br>21:41 | 06:33<br>21:07 | 07:13<br>20:11 |          |          |
| 11                  | 08:29<br>17:15 | 07:57<br>18:00 | 07:08<br>18:41      | 17:42 (54)<br>18:14 (54) | 07:06<br>20:24 | 06:16<br>21:05 | 05:49<br>21:38 | 05:59<br>21:40 | 06:34<br>21:06 | 07:14<br>20:09 |          |          |
| 12                  | 08:28<br>17:16 | 07:56<br>18:00 | 07:06<br>18:42      | 18:42 (54)<br>19:14 (54) | 07:05<br>20:25 | 06:14<br>21:06 | 05:49<br>21:39 | 06:00<br>21:40 | 06:35<br>21:04 | 07:16<br>20:07 |          |          |
| 13                  | 08:28<br>17:17 | 07:54<br>18:01 | 07:04<br>19:43      | 18:42 (54)<br>19:13 (54) | 07:03<br>20:27 | 06:13<br>21:08 | 05:48<br>21:39 | 06:01<br>21:39 | 06:37<br>21:03 | 07:17<br>20:05 |          |          |
| 14                  | 08:27<br>17:19 | 07:53<br>18:03 | 07:02<br>19:45      | 18:43 (54)<br>19:12 (54) | 07:01<br>20:28 | 06:11<br>21:09 | 05:48<br>21:40 | 06:01<br>21:38 | 06:38<br>21:01 | 07:18<br>20:03 |          |          |
| 15                  | 08:27<br>17:20 | 07:51<br>18:05 | 07:00<br>19:46      | 18:44 (54)<br>19:11 (54) | 06:59<br>20:30 | 06:10<br>21:10 | 05:48<br>21:40 | 06:02<br>21:38 | 06:39<br>20:59 | 07:20<br>20:01 |          |          |
| 16                  | 08:26<br>17:21 | 07:49<br>18:06 | 06:58<br>19:48      | 18:45 (54)<br>19:09 (54) | 06:57<br>20:31 | 06:09<br>21:11 | 05:48<br>21:41 | 06:03<br>21:37 | 06:40<br>20:58 | 07:21<br>19:59 |          |          |
| 17                  | 08:25<br>17:22 | 07:48<br>18:08 | 06:56<br>19:49      | 18:46 (54)<br>19:08 (54) | 06:55<br>20:32 | 06:08<br>21:13 | 05:48<br>21:41 | 06:04<br>21:36 | 06:42<br>20:56 | 07:22<br>19:57 |          |          |
| 18                  | 08:25<br>17:24 | 07:46<br>18:09 | 06:54<br>19:51      | 18:48 (54)<br>19:05 (54) | 06:53<br>20:34 | 06:07<br>21:14 | 05:48<br>21:42 | 06:05<br>21:35 | 06:43<br>20:54 | 07:24<br>19:55 |          |          |
| 19                  | 08:24<br>17:25 | 07:45<br>18:11 | 06:52<br>19:52      | 18:50 (54)<br>19:02 (54) | 06:51<br>20:35 | 06:05<br>21:15 | 05:48<br>21:42 | 06:06<br>21:34 | 06:44<br>20:52 | 07:25<br>19:53 |          |          |
| 20                  | 08:23<br>17:27 | 07:43<br>18:12 | 06:50<br>19:53      | 06:50<br>20:36           | 21:16          | 21:42          | 21:34          | 20:51          | 19:51          | 18:50          |          |          |
| 21                  | 08:22<br>17:28 | 07:41<br>18:14 | 06:48<br>19:55      | 06:48<br>20:38           | 21:18          | 21:43          | 21:33          | 20:49          | 19:49          | 18:48          |          |          |
| 22                  | 08:22<br>17:30 | 07:39<br>18:15 | 06:46<br>19:56      | 06:46<br>20:39           | 21:19          | 21:43          | 21:32          | 20:47          | 19:47          | 18:47          |          |          |
| 23                  | 08:21<br>17:31 | 07:38<br>18:17 | 06:44<br>19:58      | 06:44<br>20:41           | 21:20          | 21:43          | 21:31          | 20:45          | 19:45          | 18:45          |          |          |
| 24                  | 08:20<br>17:32 | 07:36<br>18:18 | 06:42<br>19:59      | 06:42<br>20:42           | 21:21          | 21:43          | 21:30          | 20:44          | 19:43          | 18:43          |          |          |
| 25                  | 08:19<br>17:34 | 07:34<br>18:20 | 06:41<br>20:00      | 06:41<br>20:43           | 21:22          | 21:44          | 21:29          | 20:42          | 19:41          | 18:41          |          |          |
| 26                  | 08:18<br>17:35 | 07:32<br>18:21 | 06:39<br>20:02      | 06:39<br>20:45           | 21:23          | 21:44          | 21:27          | 20:40          | 19:39          | 18:39          |          |          |
| 27                  | 08:17<br>17:37 | 07:30<br>18:23 | 06:36<br>18:03 (54) | 06:37<br>20:46           | 21:24          | 21:44          | 21:26          | 20:38          | 19:37          | 18:37          |          |          |
| 28                  | 08:16<br>17:38 | 07:29<br>18:24 | 06:34<br>18:04 (54) | 06:36<br>20:48           | 21:26          | 21:44          | 21:25          | 20:36          | 19:35          | 18:35          |          |          |
| 29                  | 08:15<br>17:40 | 07:27<br>18:24 | 06:32<br>20:06      | 06:34<br>20:49           | 21:27          | 21:44          | 21:24          | 20:34          | 19:33          | 18:33          |          |          |
| 30                  | 08:13<br>17:41 | 07:25<br>18:21 | 06:30<br>20:04      | 06:32<br>20:47           | 21:28          | 21:44          | 21:23          | 20:32          | 19:31          | 18:31          |          |          |
| 31                  | 08:12<br>17:43 | 07:23<br>18:19 | 06:28<br>20:02      | 06:30<br>20:45           | 21:29          | 21:44          | 21:22          | 20:31          | 19:30          | 18:30          |          |          |
| Potential sun hours | 278            | 286            | 367                 | 406                      | 465            | 475            | 481            | 442            | 380            | 340            | 283      | 266      |
| Total, worst case   |                | 15             |                     | 489                      |                |                |                |                | 106            |                | 402      |          |
| Sun reduction       |                | 0.52           |                     | 0.61                     |                |                |                |                | 0.67           |                | 0.53     |          |
| Oper. time red.     |                | 1.00           |                     | 1.00                     |                |                |                |                | 1.00           |                | 1.00     |          |
| Wind dir. red.      |                | 0.66           |                     | 0.66                     |                |                |                |                | 0.66           |                | 0.66     |          |
| Total reduction     |                | 0.34           |                     | 0.40                     |                |                |                |                | 0.44           |                | 0.35     |          |
| Total, real         |                | 5              |                     | 197                      |                |                |                |                | 47             |                | 141      |          |

Table layout: For each day in each month the following matrix apply

| Day in month | Sun rise (hh:mm) | Sun set (hh:mm) | Minutes with flicker | First time (hh:mm) with flicker | Last time (hh:mm) with flicker | (WTG causing flicker first time) | (WTG causing flicker last time) |
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|



**Oliver IV Array 012 8/26/2023**

**AFCOM**

250 APOLLO DR, AECOM  
US-01824-3627 Chelmsford  
+1 9789 052 260  
Mary Kaplan / mary.kaplan@aecom.com  
Calculated:  
8/26/2023 2:11 PM/3.4.424

**Calculation:** Oliver IV Array 012 with 3 Alts 8/26/2023 **Shadow receptor:** R092 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 90.0° (83)

## Reference year for calendar

2023

Sunshine probability S/S0 (Sun hours/Possible sun hours) [°]

| Sunshine probability, %/50 (sun hours/possible sun hours) |      |      |      |      |      |      |      |      |      |      |      |
|-----------------------------------------------------------|------|------|------|------|------|------|------|------|------|------|------|
| Jan                                                       | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  |
| 0.54                                                      | 0.52 | 0.61 | 0.58 | 0.64 | 0.67 | 0.75 | 0.72 | 0.67 | 0.53 | 0.42 | 0.45 |

Operational time

| N   | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW | NW  | NNW | Sum   |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| 376 | 314 | 339 | 425 | 445 | 474 | 693 | 570 | 488 | 386 | 872 | 609 | 772 | 651 | 677 | 667 | 8,758 |

|                     |       | January | February | March | April | May  |            | June |            | July  |            | August     |      | September  | October | November | December |
|---------------------|-------|---------|----------|-------|-------|------|------------|------|------------|-------|------------|------------|------|------------|---------|----------|----------|
| 1                   | 08:31 | 08:12   | 07:27    | 07:26 | 06:31 |      | 05:54      |      | 06:35 (17) | 05:52 |            | 06:22      |      | 06:49 (17) | 07:02   | 07:41    | 08:25    |
|                     | 17:04 | 17:45   | 18:26    | 20:11 | 20:52 |      | 21:30      | 22   | 06:57 (17) | 21:44 |            | 21:21      | 19   | 07:08 (17) | 20:29   | 19:29    | 18:30    |
| 2                   | 08:31 | 08:10   | 07:25    | 07:24 | 06:29 |      | 05:53      |      | 06:37 (17) | 05:53 |            | 06:23      |      | 06:50 (17) | 07:03   | 07:43    | 08:27    |
|                     | 17:05 | 17:46   | 18:28    | 20:12 | 20:53 |      | 21:31      | 20   | 06:57 (17) | 21:44 |            | 21:19      | 18   | 07:08 (17) | 20:27   | 19:27    | 18:29    |
| 3                   | 08:31 | 08:09   | 07:23    | 07:22 | 06:28 |      | 05:53      |      | 06:37 (17) | 05:53 | 06:51 (17) | 06:24      |      | 06:51 (17) | 07:04   | 07:44    | 08:28    |
|                     | 17:06 | 17:48   | 18:29    | 20:13 | 20:55 |      | 21:32      | 19   | 06:56 (17) | 21:44 | 3          | 06:54 (17) | 16   | 07:07 (17) | 20:25   | 19:25    | 18:27    |
| 4                   | 08:31 | 08:08   | 07:22    | 07:21 | 06:26 |      | 05:52      |      | 06:37 (17) | 05:54 | 06:49 (17) | 06:25      |      | 06:52 (17) | 07:06   | 07:45    | 08:30    |
|                     | 17:07 | 17:49   | 18:31    | 20:15 | 20:56 |      | 21:33      | 18   | 06:55 (17) | 21:43 | 7          | 06:56 (17) | 13   | 07:05 (17) | 20:23   | 19:23    | 18:26    |
| 5                   | 08:31 | 08:06   | 07:20    | 07:19 | 06:25 |      | 05:51      |      | 06:38 (17) | 05:55 | 06:48 (17) | 06:27      |      | 06:54 (17) | 07:07   | 07:47    | 08:31    |
|                     | 17:08 | 17:51   | 18:32    | 20:16 | 20:57 |      | 21:34      | 17   | 06:55 (17) | 21:43 | 9          | 06:57 (17) | 11   | 07:05 (17) | 20:21   | 19:21    | 17:24    |
| 6                   | 08:30 | 08:05   | 07:18    | 07:17 | 06:23 |      | 05:51      |      | 06:40 (17) | 05:55 | 06:47 (17) | 06:28      |      | 06:55 (17) | 07:08   | 07:48    | 08:33    |
|                     | 17:09 | 17:53   | 18:34    | 20:18 | 20:59 |      | 21:35      | 15   | 06:55 (17) | 21:43 | 12         | 06:59 (17) | 8    | 07:03 (17) | 20:19   | 19:19    | 17:23    |
| 7                   | 08:30 | 08:04   | 07:16    | 07:15 | 06:22 |      | 05:51      |      | 06:40 (17) | 05:56 | 06:46 (17) | 06:29      |      | 06:56 (17) | 07:10   | 07:49    | 08:34    |
|                     | 17:10 | 17:54   | 18:35    | 20:19 | 21:00 | 5    | 06:46 (17) | 13   | 06:53 (17) | 21:42 | 13         | 06:59 (17) | 5    | 07:01 (17) | 20:17   | 19:17    | 17:21    |
| 8                   | 08:30 | 08:02   | 07:14    | 07:13 | 06:20 |      | 05:50      |      | 06:42 (17) | 05:57 | 06:46 (17) | 06:30      |      | 06:57 (17) | 07:11   | 07:51    | 08:36    |
|                     | 17:12 | 17:56   | 18:37    | 20:20 | 21:01 | 8    | 06:53 (17) | 11   | 06:53 (17) | 21:42 | 15         | 07:01 (17) | 1    | 06:58 (17) | 20:15   | 19:15    | 17:20    |
| 9                   | 08:30 | 08:01   | 07:12    | 07:11 | 06:19 |      | 05:50      |      | 06:43 (17) | 05:58 | 06:45 (17) | 06:32      |      |            | 07:12   | 07:52    | 08:37    |
|                     | 17:13 | 17:57   | 18:38    | 20:22 | 21:03 | 11   | 06:55 (17) | 9    | 06:52 (17) | 21:42 | 17         | 07:02 (17) |      |            | 20:13   | 19:13    | 17:19    |
| 10                  | 08:29 | 07:59   | 07:10    | 07:09 | 06:17 |      | 05:49      |      | 06:44 (17) | 05:58 | 06:45 (17) | 06:33      |      |            | 07:14   | 07:54    | 08:39    |
|                     | 17:14 | 17:59   | 18:39    | 20:23 | 21:04 | 13   | 06:55 (17) | 7    | 06:51 (17) | 21:41 | 18         | 07:03 (17) |      |            | 20:11   | 19:11    | 17:17    |
| 11                  | 08:29 | 07:58   | 07:08    | 07:07 | 06:14 |      | 05:49      |      | 06:46 (17) | 05:59 | 06:45 (17) | 06:34      |      |            | 07:15   | 07:55    | 08:40    |
|                     | 17:15 | 18:00   | 18:41    | 20:24 | 21:05 | 15   | 06:56 (17) | 3    | 06:49 (17) | 21:38 | 19         | 07:04 (17) |      |            | 20:09   | 19:09    | 17:16    |
| 12                  | 08:29 | 07:56   | 08:06    | 07:05 | 06:15 |      | 05:49      |      | 06:40 (17) | 05:49 | 06:44 (17) | 06:36      |      |            | 07:16   | 07:56    | 08:20    |
|                     | 17:16 | 18:00   | 18:42    | 20:26 | 21:07 | 17   | 06:57 (17) |      | 21:40      | 20    | 07:04 (17) | 21:05      |      |            | 20:07   | 19:07    | 17:15    |
| 13                  | 08:28 | 07:55   | 08:04    | 07:03 | 06:13 |      | 05:49      |      | 06:01      |       | 06:43 (17) | 06:37      |      |            | 07:17   | 07:58    | 08:21    |
|                     | 17:18 | 18:02   | 19:44    | 20:27 | 21:08 | 19   | 06:58 (17) |      | 21:39      | 22    | 07:05 (17) | 21:03      |      |            | 20:05   | 19:05    | 17:14    |
| 14                  | 08:28 | 07:53   | 08:02    | 07:01 | 06:12 |      | 05:49      |      | 06:02      |       | 06:43 (17) | 06:38      |      |            | 07:19   | 07:59    | 07:45    |
|                     | 17:19 | 18:03   | 19:45    | 20:29 | 21:09 | 21   | 06:58 (17) |      | 21:39      | 22    | 07:05 (17) | 21:01      |      |            | 20:03   | 19:04    | 17:12    |
| 15                  | 08:27 | 07:52   | 08:00    | 06:59 | 06:11 |      | 05:48      |      | 06:03      |       | 06:43 (17) | 06:40      |      |            | 07:20   | 08:01    | 07:46    |
|                     | 17:20 | 18:05   | 19:47    | 20:30 | 21:11 | 22   | 06:58 (17) |      | 21:38      | 23    | 07:06 (17) | 21:00      |      |            | 20:01   | 19:02    | 17:11    |
| 16                  | 08:27 | 07:50   | 07:58    | 06:57 | 06:09 |      | 05:48      |      | 06:04      |       | 06:42 (17) | 06:41      |      |            | 07:21   | 08:02    | 07:48    |
|                     | 17:22 | 18:07   | 19:48    | 20:31 | 21:12 | 24   | 06:59 (17) |      | 21:37      | 25    | 07:07 (17) | 20:58      |      |            | 19:59   | 19:00    | 17:10    |
| 17                  | 08:26 | 07:48   | 07:56    | 06:56 | 06:08 |      | 05:48      |      | 06:05      |       | 06:42 (17) | 06:42      |      |            | 07:23   | 08:03    | 07:49    |
|                     | 17:23 | 18:08   | 19:50    | 20:33 | 21:13 | 25   | 06:59 (17) |      | 21:37      | 25    | 07:07 (17) | 20:56      |      |            | 19:57   | 18:56    | 17:09    |
| 18                  | 08:25 | 07:47   | 07:54    | 06:54 | 06:07 |      | 05:48      |      | 06:06      |       | 06:42 (17) | 06:43      |      |            | 07:24   | 08:05    | 07:50    |
|                     | 17:24 | 18:10   | 19:51    | 20:34 | 21:14 | 26   | 06:59 (17) |      | 21:36      | 26    | 07:08 (17) | 20:55      |      |            | 19:55   | 18:54    | 17:08    |
| 19                  | 08:24 | 07:45   | 07:52    | 06:52 | 06:06 |      | 05:48      |      | 06:07      |       | 06:42 (17) | 06:45      |      |            | 07:25   | 08:06    | 07:52    |
|                     | 17:26 | 18:11   | 19:52    | 20:35 | 21:16 | 27   | 06:59 (17) |      | 21:35      | 26    | 07:08 (17) | 20:53      |      |            | 19:53   | 18:52    | 17:07    |
| 20                  | 08:24 | 07:43   | 07:50    | 06:50 | 06:05 |      | 05:48      |      | 06:08      |       | 06:42 (17) | 06:46      |      |            | 07:27   | 08:08    | 07:53    |
|                     | 17:27 | 18:13   | 19:54    | 20:37 | 21:17 | 29   | 07:00 (17) |      | 21:34      | 27    | 07:09 (17) | 20:51      |      |            | 19:51   | 18:51    | 17:06    |
| 21                  | 08:23 | 07:42   | 07:48    | 06:48 | 06:04 |      | 05:49      |      | 06:09      |       | 06:41 (17) | 06:47      |      |            | 07:28   | 08:09    | 07:55    |
|                     | 17:28 | 18:14   | 19:55    | 20:38 | 21:18 | 29   | 07:00 (17) |      | 21:33      | 28    | 07:09 (17) | 20:49      |      |            | 19:49   | 18:49    | 17:05    |
| 22                  | 08:22 | 07:40   | 07:46    | 06:46 | 06:02 |      | 05:49      |      | 06:10      |       | 06:41 (17) | 06:49      |      |            | 07:29   | 08:11    | 07:56    |
|                     | 17:28 | 18:16   | 19:57    | 20:40 | 21:19 | 28   | 06:59 (17) |      | 21:32      | 28    | 07:09 (17) | 20:48      |      |            | 19:47   | 18:47    | 17:04    |
| 23                  | 08:21 | 07:38   | 07:44    | 06:45 | 06:01 |      | 05:49      |      | 06:11      |       | 06:41 (17) | 06:50      |      |            | 07:31   | 08:12    | 07:58    |
|                     | 17:31 | 18:17   | 19:58    | 20:41 | 21:20 | 28   | 06:59 (17) |      | 21:31      | 28    | 07:09 (17) | 20:46      |      |            | 19:45   | 18:45    | 17:03    |
| 24                  | 08:20 | 07:36   | 07:42    | 06:43 | 06:00 |      | 05:49      |      | 06:12      |       | 06:41 (17) | 06:51      |      |            | 07:32   | 08:14    | 07:59    |
|                     | 17:33 | 18:19   | 19:59    | 20:42 | 21:22 | 28   | 06:59 (17) |      | 21:30      | 29    | 07:10 (17) | 20:44      |      |            | 19:43   | 18:44    | 17:02    |
| 25                  | 08:19 | 07:34   | 07:40    | 06:41 | 05:59 |      | 05:50      |      | 06:13      |       | 06:41 (17) | 06:53      |      |            | 07:33   | 08:15    | 08:00    |
|                     | 17:34 | 18:20   | 20:01    | 20:44 | 21:23 | 27   | 06:59 (17) |      | 21:29      | 29    | 07:10 (17) | 20:42      |      |            | 19:41   | 18:42    | 17:02    |
| 26                  | 08:18 | 07:33   | 07:38    | 06:39 | 05:59 |      | 05:50      |      | 06:15      |       | 06:42 (17) | 06:54      |      |            | 07:35   | 08:16    | 08:02    |
|                     | 17:36 | 18:22   | 20:02    | 20:45 | 21:24 | 26   | 06:58 (17) |      | 21:28      | 28    | 07:10 (17) | 20:40      |      |            | 19:39   | 18:40    | 17:01    |
| 27                  | 08:17 | 07:31   | 07:36    | 06:38 | 05:58 |      | 05:50      |      | 06:16      |       | 06:43 (17) | 06:55      |      |            | 07:36   | 08:18    | 08:03    |
|                     | 17:37 | 18:23   | 20:04    | 20:47 | 21:25 | 26   | 06:58 (17) |      | 21:27      | 26    | 07:09 (17) | 20:38      |      |            | 19:37   | 18:38    | 17:00    |
| 28                  | 08:16 | 07:29   | 07:34    | 06:36 | 05:57 |      | 05:51      |      | 06:17      |       | 06:44 (17) | 06:57      |      |            | 07:37   | 08:19    | 08:04    |
|                     | 17:39 | 18:25   | 20:05    | 20:48 | 21:26 | 25   | 06:58 (17) |      | 21:26      | 25    | 07:09 (17) | 20:37      |      |            | 19:35   | 18:37    | 16:59    |
| 29                  | 08:15 |         | 07:32    | 06:34 | 05:56 |      | 05:51      |      | 06:18      |       | 06:45 (17) | 06:58      |      |            | 07:39   | 08:21    | 08:06    |
|                     | 17:40 |         | 20:06    | 20:49 | 21:27 | 24   | 06:58 (17) |      | 21:24      | 24    | 07:09 (17) | 20:35      |      |            | 19:33   | 18:35    | 16:59    |
| 30                  | 08:14 |         | 07:30    | 06:33 | 05:55 |      | 05:52      |      | 06:19      |       | 06:47 (17) | 06:59      |      |            | 07:40   | 08:22    | 08:07    |
|                     | 17:42 |         | 20:08    | 20:51 | 21:28 | 23   | 06:57 (17) |      | 21:23      | 22    | 07:09 (17) | 20:33      |      |            | 19:31   | 18:33    | 16:58    |
| 31                  | 08:13 |         | 07:28    |       | 05:55 |      | 06:35 (17) |      | 06:20      |       | 06:48 (17) | 07:00      |      |            | 08:24   |          | 08:31    |
|                     | 17:43 |         | 20:09    |       | 21:29 | 22   | 06:57 (17) |      | 21:22      | 21    | 07:09 (17) | 20:31      |      |            | 18:32   |          | 17:03    |
| Potential sun hours |       | 278     |          |       |       |      |            | 475  |            | 481   |            | 442        |      |            | 380     |          | 266      |
| Total, worst case   |       |         | 286      | 367   | 406   | 465  |            |      | 154        |       | 617        |            | 91   |            |         |          |          |
| Sun reduction       |       |         |          |       |       | 548  | 0.64       |      | 0.67       |       | 0.75       |            | 0.72 |            |         |          |          |
| Oper. time red.     |       |         |          |       |       | 1.00 |            |      | 1.00       |       | 1.00       |            | 1.00 |            |         |          |          |
| Wind dir. red.      |       |         |          |       |       | 0.65 |            |      | 0.65       |       | 0.65       |            | 0.65 |            |         |          |          |
| Total reduction     |       |         |          |       |       | 0.42 |            |      | 0.44       |       | 0.49       |            | 0.47 |            |         |          |          |
| Total_real          |       |         |          |       |       | 2.92 |            |      | .67        |       | 302        |            | .43  |            |         |          |          |

| Day in month | Sun rise (hh:mm) | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|--------------|------------------|---------------------------------|----------------------------------|
|              | Sun set (hh:mm)  | Minutes with flicker            | Last time (hh:mm) with flicker   |
|              |                  |                                 | (WTG causing flicker last time)  |

Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM  
US-01824-3627 Chelmsford  
+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

**SHADOW - Calendar****Calculation:** Oliver IV Array 012 with 3 Alts 8/26/2023**Shadow receptor:** R093 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (84)**Assumptions for shadow calculations**

Reference year for calendar

2023

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

| Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  |
|------|------|------|------|------|------|------|------|------|------|------|------|
| 0.54 | 0.52 | 0.61 | 0.58 | 0.64 | 0.67 | 0.75 | 0.72 | 0.67 | 0.53 | 0.42 | 0.45 |

Operational time

| N   | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW | NW  | NNW | Sum   |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| 376 | 314 | 339 | 425 | 445 | 474 | 693 | 570 | 488 | 386 | 872 | 609 | 772 | 651 | 677 | 667 | 8,758 |

|                     | January | February | March | April | May   | June  | July  | August | September | October | November | December |
|---------------------|---------|----------|-------|-------|-------|-------|-------|--------|-----------|---------|----------|----------|
| 1                   | 08:31   | 08:11    | 07:27 | 07:26 | 06:31 | 05:54 | 05:52 | 06:22  | 07:02     | 07:41   | 08:25    | 08:08    |
|                     | 17:04   | 17:45    | 18:26 | 20:11 | 20:52 | 21:30 | 21:44 | 21:21  | 20:29     | 19:29   | 18:30    | 16:58    |
| 2                   | 08:31   | 08:10    | 07:25 | 07:24 | 06:29 | 05:53 | 05:53 | 06:23  | 07:03     | 07:43   | 08:27    | 08:09    |
|                     | 17:05   | 17:46    | 18:28 | 20:12 | 20:53 | 21:31 | 21:44 | 21:19  | 20:27     | 19:27   | 18:29    | 16:57    |
| 3                   | 08:31   | 08:09    | 07:23 | 07:22 | 06:28 | 05:53 | 05:53 | 06:24  | 07:04     | 07:44   | 08:28    | 08:11    |
|                     | 17:06   | 17:48    | 18:29 | 20:13 | 20:55 | 21:32 | 21:44 | 21:18  | 20:25     | 19:25   | 18:27    | 16:57    |
| 4                   | 08:31   | 08:08    | 07:22 | 07:20 | 06:26 | 05:52 | 05:54 | 06:25  | 07:06     | 07:45   | 08:30    | 08:12    |
|                     | 17:07   | 17:49    | 18:31 | 20:15 | 20:56 | 21:33 | 21:43 | 21:17  | 20:23     | 19:23   | 18:26    | 16:56    |
| 5                   | 08:31   | 08:06    | 07:20 | 07:19 | 06:25 | 05:51 | 05:55 | 06:27  | 07:07     | 07:47   | 07:31    | 08:13    |
|                     | 17:08   | 17:51    | 18:32 | 20:16 | 20:57 | 21:34 | 21:43 | 21:15  | 20:21     | 19:21   | 17:24    | 16:56    |
| 6                   | 08:30   | 08:05    | 07:18 | 07:17 | 06:23 | 05:51 | 05:55 | 06:28  | 07:08     | 07:48   | 07:33    | 08:14    |
|                     | 17:09   | 17:53    | 18:34 | 20:17 | 20:59 | 21:34 | 21:43 | 21:14  | 20:19     | 19:19   | 17:23    | 16:56    |
| 7                   | 08:30   | 08:04    | 07:16 | 07:15 | 06:22 | 05:51 | 05:56 | 06:29  | 07:10     | 07:49   | 07:34    | 08:15    |
|                     | 17:10   | 17:54    | 18:35 | 20:19 | 21:00 | 21:35 | 21:42 | 21:12  | 20:17     | 19:17   | 17:21    | 16:55    |
| 8                   | 08:30   | 08:02    | 07:14 | 07:13 | 06:20 | 05:50 | 05:57 | 06:30  | 07:11     | 07:51   | 07:36    | 08:16    |
|                     | 17:12   | 17:56    | 18:37 | 20:20 | 21:01 | 21:36 | 21:42 | 21:11  | 20:15     | 19:15   | 17:20    | 16:55    |
| 9                   | 08:30   | 08:01    | 07:12 | 07:11 | 06:19 | 05:50 | 05:58 | 06:32  | 07:12     | 07:52   | 07:37    | 08:17    |
|                     | 17:13   | 17:57    | 18:38 | 20:22 | 21:03 | 21:37 | 21:42 | 21:09  | 20:13     | 19:13   | 17:19    | 16:55    |
| 10                  | 08:29   | 07:59    | 07:10 | 07:09 | 06:17 | 05:49 | 05:58 | 06:33  | 07:14     | 07:54   | 07:39    | 08:18    |
|                     | 17:14   | 17:59    | 18:39 | 20:23 | 21:04 | 21:38 | 21:41 | 21:08  | 20:11     | 19:11   | 17:17    | 16:55    |
| 11                  | 08:29   | 07:58    | 07:08 | 07:07 | 06:16 | 05:49 | 05:59 | 06:34  | 07:15     | 07:55   | 07:40    | 08:19    |
|                     | 17:15   | 18:00    | 18:41 | 20:24 | 21:05 | 21:38 | 21:41 | 21:06  | 20:09     | 19:09   | 17:16    | 16:55    |
| 12                  | 08:29   | 07:56    | 08:06 | 07:05 | 06:15 | 05:49 | 06:00 | 06:36  | 07:16     | 07:56   | 07:42    | 08:20    |
|                     | 17:16   | 18:00    | 18:42 | 20:26 | 21:07 | 21:39 | 21:40 | 21:05  | 20:07     | 19:07   | 17:15    | 16:55    |
| 13                  | 08:28   | 07:55    | 08:04 | 07:03 | 06:13 | 05:49 | 06:01 | 06:37  | 07:17     | 07:58   | 07:43    | 08:21    |
|                     | 17:18   | 18:02    | 19:44 | 20:27 | 21:08 | 21:40 | 21:39 | 21:03  | 20:05     | 19:05   | 17:14    | 16:55    |
| 14                  | 08:28   | 07:53    | 08:02 | 07:01 | 06:12 | 05:49 | 06:02 | 06:38  | 07:19     | 07:59   | 07:45    | 08:22    |
|                     | 17:19   | 18:03    | 19:45 | 20:29 | 21:09 | 21:40 | 21:39 | 21:01  | 20:03     | 19:03   | 17:12    | 16:55    |
| 15                  | 08:27   | 07:51    | 08:00 | 06:59 | 06:11 | 05:48 | 06:03 | 06:40  | 07:20     | 08:01   | 07:46    | 08:23    |
|                     | 17:20   | 18:05    | 19:47 | 20:30 | 21:11 | 21:41 | 21:38 | 21:00  | 20:01     | 19:02   | 17:11    | 16:55    |
| 16                  | 08:26   | 07:50    | 07:58 | 06:57 | 06:09 | 05:48 | 06:04 | 06:41  | 07:21     | 08:02   | 07:48    | 08:24    |
|                     | 17:22   | 18:06    | 19:48 | 20:31 | 21:12 | 21:41 | 21:37 | 20:58  | 19:59     | 19:00   | 17:10    | 16:55    |
| 17                  | 08:26   | 07:48    | 07:56 | 06:56 | 06:08 | 05:48 | 06:05 | 06:42  | 07:23     | 08:03   | 07:49    | 08:24    |
|                     | 17:23   | 18:08    | 19:49 | 20:33 | 21:13 | 21:42 | 21:37 | 20:56  | 19:57     | 18:56   | 17:09    | 16:55    |
| 18                  | 08:25   | 07:47    | 07:54 | 06:54 | 06:07 | 05:48 | 06:06 | 06:43  | 07:24     | 08:05   | 07:50    | 08:25    |
|                     | 17:24   | 18:10    | 19:51 | 20:34 | 21:14 | 21:42 | 21:36 | 20:55  | 19:55     | 18:54   | 17:08    | 16:56    |
| 19                  | 08:24   | 07:45    | 07:52 | 06:52 | 06:06 | 05:48 | 06:07 | 06:45  | 07:25     | 08:06   | 07:52    | 08:26    |
|                     | 17:26   | 18:11    | 19:52 | 20:35 | 21:16 | 21:42 | 21:35 | 20:53  | 19:53     | 18:52   | 17:07    | 16:56    |
| 20                  | 08:24   | 07:43    | 07:50 | 06:50 | 06:05 | 05:48 | 06:08 | 06:46  | 07:27     | 08:08   | 07:53    | 08:26    |
|                     | 17:27   | 18:13    | 19:54 | 20:37 | 21:17 | 21:43 | 21:34 | 20:51  | 19:51     | 18:51   | 17:06    | 16:56    |
| 21                  | 08:23   | 07:41    | 07:48 | 06:48 | 06:04 | 05:49 | 06:09 | 06:47  | 07:28     | 08:09   | 07:55    | 08:27    |
|                     | 17:28   | 18:14    | 19:55 | 20:38 | 21:18 | 21:43 | 21:33 | 20:49  | 19:49     | 18:49   | 17:05    | 16:57    |
| 22                  | 08:22   | 07:40    | 07:46 | 06:46 | 06:02 | 05:49 | 06:10 | 06:49  | 07:29     | 08:11   | 07:56    | 08:28    |
|                     | 17:30   | 18:16    | 19:57 | 20:40 | 21:19 | 21:43 | 21:32 | 20:48  | 19:47     | 18:47   | 17:04    | 16:57    |
| 23                  | 08:21   | 07:38    | 07:44 | 06:45 | 06:01 | 05:49 | 06:11 | 06:50  | 07:31     | 08:12   | 07:58    | 08:28    |
|                     | 17:31   | 18:17    | 19:58 | 20:41 | 21:20 | 21:44 | 21:31 | 20:46  | 19:45     | 18:45   | 17:03    | 16:58    |
| 24                  | 08:20   | 07:36    | 07:42 | 06:43 | 06:00 | 05:49 | 06:12 | 06:51  | 07:32     | 08:14   | 07:59    | 08:29    |
|                     | 17:33   | 18:19    | 19:59 | 20:42 | 21:22 | 21:44 | 21:30 | 20:44  | 19:43     | 18:43   | 17:02    | 16:58    |
| 25                  | 08:19   | 07:34    | 07:40 | 06:41 | 05:59 | 05:50 | 06:13 | 06:53  | 07:33     | 08:15   | 08:00    | 08:29    |
|                     | 17:34   | 18:20    | 20:01 | 20:44 | 21:23 | 21:44 | 21:29 | 20:42  | 19:41     | 18:42   | 17:01    | 16:59    |
| 26                  | 08:18   | 07:33    | 07:38 | 06:39 | 05:59 | 05:50 | 06:15 | 06:54  | 07:35     | 08:16   | 08:02    | 08:29    |
|                     | 17:36   | 18:22    | 20:02 | 20:45 | 21:24 | 21:44 | 21:28 | 20:40  | 19:39     | 18:40   | 17:01    | 16:59    |
| 27                  | 08:17   | 07:31    | 07:36 | 06:38 | 05:58 | 05:50 | 06:16 | 06:55  | 07:36     | 08:18   | 08:03    | 08:30    |
|                     | 17:37   | 18:23    | 20:04 | 20:47 | 21:25 | 21:44 | 21:27 | 20:38  | 19:37     | 18:38   | 17:00    | 17:00    |
| 28                  | 08:16   | 07:29    | 07:34 | 06:36 | 05:57 | 05:51 | 06:17 | 06:57  | 07:37     | 08:19   | 08:04    | 08:30    |
|                     | 17:39   | 18:25    | 20:05 | 20:48 | 21:26 | 21:44 | 21:26 | 20:37  | 19:35     | 18:37   | 16:59    | 17:01    |
| 29                  | 08:15   |          | 07:32 | 06:34 | 05:56 | 05:51 | 06:18 | 06:58  | 07:39     | 08:21   | 08:06    | 08:30    |
|                     | 17:40   |          | 20:06 | 20:49 | 21:27 | 21:44 | 21:24 | 20:35  | 19:33     | 18:35   | 16:59    | 17:02    |
| 30                  | 08:14   |          | 07:30 | 06:33 | 05:55 | 05:52 | 06:19 | 06:59  | 07:40     | 08:22   | 08:07    | 08:30    |
|                     | 17:42   |          | 20:08 | 20:51 | 21:28 | 21:44 | 21:23 | 20:33  | 19:31     | 18:33   | 16:58    | 17:02    |
| 31                  | 08:13   |          | 07:28 |       | 05:55 |       | 06:20 | 07:00  |           | 08:24   |          | 08:31    |
|                     | 17:43   |          | 20:09 |       | 21:29 |       | 21:22 | 20:31  |           | 18:32   |          | 17:03    |
| Potential sun hours | 278     | 286      | 367   | 406   | 465   | 475   | 481   | 442    | 380       | 340     | 283      | 266      |
| Total, worst case   |         |          |       |       |       |       |       |        |           |         |          |          |
| Sun reduction       |         |          |       |       |       |       |       |        |           |         |          |          |
| Oper. time red.     |         |          |       |       |       |       |       |        |           |         |          |          |
| Wind dir. red.      |         |          |       |       |       |       |       |        |           |         |          |          |
| Total reduction     |         |          |       |       |       |       |       |        |           |         |          |          |
| Total, real         |         |          |       |       |       |       |       |        |           |         |          |          |

**Table layout: For each day in each month the following matrix apply**

| Day in month | Sun rise (hh:mm) | Sun set (hh:mm) | Minutes with flicker | First time (hh:mm) with flicker | Last time (hh:mm) with flicker | (WTG causing flicker first time) | (WTG causing flicker last time) |
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|



Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: R094 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (85)

## Assumptions for shadow calculations

Reference year for calendar

2023

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

|                     | January        | February       | March          | April          | May            | June           | July                     | August         | September           | October        | November       | December       |
|---------------------|----------------|----------------|----------------|----------------|----------------|----------------|--------------------------|----------------|---------------------|----------------|----------------|----------------|
| 1                   | 08:31<br>17:04 | 08:11<br>17:45 | 07:27<br>18:26 | 07:26<br>20:10 | 06:31<br>20:52 | 05:54<br>21:30 | 20:45 (29)<br>21:05 (29) | 05:52<br>21:44 | 20:45 (29)<br>21:20 | 07:02<br>20:29 | 07:41<br>19:29 | 08:25<br>18:30 |
| 2                   | 08:31<br>17:05 | 08:10<br>17:46 | 07:25<br>18:28 | 07:24<br>20:12 | 06:29<br>20:53 | 05:53<br>21:31 | 20:43 (29)<br>21:05 (29) | 05:53<br>21:44 | 20:45 (29)<br>21:19 | 07:03<br>20:27 | 07:43<br>19:27 | 08:27<br>18:29 |
| 3                   | 08:31<br>17:06 | 08:09<br>17:48 | 07:23<br>18:29 | 07:22<br>20:13 | 06:28<br>20:55 | 05:52<br>21:32 | 20:43 (29)<br>21:07 (29) | 05:53<br>21:43 | 20:46 (29)<br>21:18 | 07:04<br>20:25 | 07:44<br>19:25 | 08:28<br>18:27 |
| 4                   | 08:31<br>17:07 | 08:08<br>17:49 | 07:21<br>18:31 | 07:20<br>20:15 | 06:26<br>20:56 | 05:52<br>21:33 | 20:42 (29)<br>21:07 (29) | 05:54<br>21:43 | 20:46 (29)<br>21:16 | 07:06<br>20:23 | 07:45<br>19:23 | 08:30<br>18:26 |
| 5                   | 08:30<br>17:08 | 08:06<br>17:51 | 07:20<br>18:32 | 07:18<br>20:16 | 06:25<br>20:57 | 05:51<br>21:34 | 20:42 (29)<br>21:08 (29) | 05:54<br>21:43 | 20:46 (29)<br>21:15 | 07:07<br>20:21 | 07:47<br>19:21 | 08:31<br>17:24 |
| 6                   | 08:30<br>17:09 | 08:05<br>17:52 | 07:18<br>18:33 | 07:16<br>20:17 | 06:23<br>20:59 | 05:51<br>21:34 | 20:41 (29)<br>21:08 (29) | 05:55<br>21:43 | 20:47 (29)<br>21:14 | 07:08<br>20:19 | 07:48<br>19:19 | 08:34<br>17:23 |
| 7                   | 08:30<br>17:10 | 08:03<br>17:54 | 07:16<br>18:35 | 07:14<br>20:19 | 06:21<br>21:00 | 05:50<br>21:35 | 20:41 (29)<br>21:09 (29) | 05:56<br>21:42 | 20:47 (29)<br>21:12 | 07:09<br>20:17 | 07:49<br>19:17 | 08:35<br>17:21 |
| 8                   | 08:30<br>17:11 | 08:02<br>17:56 | 07:14<br>18:36 | 07:13<br>20:20 | 06:20<br>21:01 | 05:50<br>21:36 | 20:40 (29)<br>21:10 (29) | 05:57<br>21:42 | 20:48 (29)<br>21:11 | 07:11<br>20:15 | 07:51<br>19:15 | 08:36<br>17:20 |
| 9                   | 08:30<br>17:13 | 08:01<br>17:57 | 07:12<br>18:38 | 07:11<br>20:21 | 06:19<br>21:03 | 05:50<br>21:37 | 20:40 (29)<br>21:11 (29) | 05:57<br>21:41 | 20:49 (29)<br>21:09 | 07:12<br>20:13 | 07:52<br>19:13 | 08:37<br>17:18 |
| 10                  | 08:29<br>17:14 | 07:59<br>17:59 | 07:10<br>18:39 | 07:09<br>20:23 | 06:17<br>21:04 | 05:49<br>21:37 | 20:41 (29)<br>21:11 (29) | 05:58<br>21:41 | 20:50 (29)<br>21:08 | 07:13<br>20:11 | 07:53<br>19:11 | 08:38<br>17:17 |
| 11                  | 08:29<br>17:15 | 07:58<br>18:00 | 07:08<br>18:41 | 07:07<br>20:24 | 06:16<br>21:05 | 05:49<br>21:38 | 20:41 (29)<br>21:12 (29) | 05:59<br>21:40 | 20:50 (29)<br>21:06 | 07:15<br>20:09 | 07:55<br>19:09 | 08:39<br>17:16 |
| 12                  | 08:28<br>17:16 | 07:56<br>18:00 | 08:06<br>18:42 | 07:05<br>20:26 | 06:14<br>21:07 | 05:49<br>21:39 | 20:41 (29)<br>21:13 (29) | 06:00<br>21:40 | 20:51 (29)<br>21:04 | 07:16<br>20:07 | 07:56<br>19:07 | 08:40<br>17:15 |
| 13                  | 08:28<br>17:17 | 07:55<br>18:02 | 08:04<br>19:44 | 07:03<br>20:27 | 06:13<br>21:08 | 05:49<br>21:39 | 20:41 (29)<br>21:14 (29) | 06:01<br>21:39 | 20:53 (29)<br>21:03 | 07:17<br>20:05 | 07:58<br>19:05 | 08:41<br>17:13 |
| 14                  | 08:28<br>17:19 | 07:53<br>18:03 | 08:02<br>19:45 | 07:01<br>20:28 | 06:12<br>21:09 | 05:48<br>21:40 | 20:41 (29)<br>21:14 (29) | 06:02<br>21:39 | 20:54 (29)<br>21:01 | 07:19<br>20:03 | 07:59<br>19:03 | 08:42<br>17:12 |
| 15                  | 08:27<br>17:20 | 07:51<br>18:05 | 08:00<br>19:46 | 06:59<br>20:30 | 06:10<br>21:10 | 05:48<br>21:41 | 20:40 (29)<br>21:14 (29) | 06:03<br>21:38 | 20:55 (29)<br>21:00 | 07:20<br>20:01 | 08:00<br>19:01 | 08:43<br>17:11 |
| 16                  | 08:26<br>17:21 | 07:50<br>18:06 | 07:58<br>19:48 | 06:57<br>20:31 | 06:09<br>21:12 | 05:48<br>21:41 | 20:40 (29)<br>21:14 (29) | 06:04<br>21:37 | 20:57 (29)<br>20:58 | 07:21<br>19:59 | 08:02<br>19:00 | 08:44<br>17:10 |
| 17                  | 08:26<br>17:23 | 07:48<br>18:08 | 07:56<br>19:49 | 06:55<br>20:33 | 06:08<br>21:13 | 05:48<br>21:41 | 20:40 (29)<br>21:15 (29) | 06:05<br>21:36 | 21:00 (29)<br>20:56 | 07:23<br>19:57 | 08:03<br>18:56 | 08:45<br>17:09 |
| 18                  | 08:25<br>17:24 | 07:46<br>18:09 | 07:54<br>19:51 | 06:54<br>20:34 | 06:07<br>21:14 | 05:48<br>21:42 | 20:41 (29)<br>21:16 (29) | 06:06<br>21:36 | 21:04 (29)<br>20:54 | 07:24<br>19:55 | 08:05<br>18:54 | 08:46<br>17:08 |
| 19                  | 08:24<br>17:25 | 07:45<br>18:11 | 07:52<br>19:52 | 06:52<br>20:35 | 06:06<br>21:15 | 05:48<br>21:42 | 20:41 (29)<br>21:16 (29) | 06:07<br>21:35 | 21:07 (29)<br>20:53 | 07:25<br>19:53 | 08:06<br>18:52 | 08:47<br>17:07 |
| 20                  | 08:24<br>17:27 | 07:43<br>18:12 | 07:50<br>19:54 | 06:50<br>20:37 | 06:04<br>21:17 | 05:48<br>21:43 | 20:41 (29)<br>21:16 (29) | 06:08<br>21:34 | 20:56 (29)<br>20:51 | 07:27<br>19:51 | 08:07<br>18:50 | 08:48<br>17:06 |
| 21                  | 08:23<br>17:28 | 07:41<br>18:14 | 07:48<br>19:55 | 06:48<br>20:38 | 06:03<br>21:18 | 05:48<br>21:43 | 20:41 (29)<br>21:17 (29) | 06:09<br>21:33 | 20:57 (29)<br>20:49 | 07:28<br>19:49 | 08:08<br>18:49 | 08:49<br>17:05 |
| 22                  | 08:22<br>17:30 | 07:40<br>18:16 | 07:46<br>19:56 | 06:46<br>20:39 | 06:02<br>21:19 | 05:49<br>21:43 | 20:41 (29)<br>21:17 (29) | 06:10<br>21:32 | 20:58 (29)<br>20:47 | 07:29<br>19:47 | 08:09<br>18:47 | 08:50<br>17:04 |
| 23                  | 08:21<br>17:31 | 07:38<br>18:17 | 07:44<br>19:58 | 06:44<br>20:41 | 06:01<br>21:20 | 05:49<br>21:43 | 20:41 (29)<br>21:17 (29) | 06:11<br>21:31 | 20:59 (29)<br>20:46 | 07:30<br>19:45 | 08:12<br>18:45 | 08:51<br>17:03 |
| 24                  | 08:20<br>17:33 | 07:36<br>18:19 | 07:42<br>19:59 | 06:43<br>20:42 | 06:00<br>21:21 | 05:49<br>21:44 | 20:42 (29)<br>21:17 (29) | 06:12<br>21:30 | 20:51 (29)<br>20:44 | 07:32<br>19:43 | 08:13<br>18:43 | 08:52<br>17:02 |
| 25                  | 08:19<br>17:34 | 07:34<br>18:20 | 07:40<br>20:01 | 06:41<br>20:44 | 05:59<br>21:23 | 05:49<br>21:44 | 20:42 (29)<br>21:17 (29) | 06:13<br>21:29 | 20:52 (29)<br>20:42 | 07:33<br>19:41 | 08:15<br>18:42 | 08:53<br>17:01 |
| 26                  | 08:18<br>17:36 | 07:33<br>18:22 | 07:38<br>20:02 | 06:39<br>20:45 | 05:58<br>21:24 | 05:50<br>21:44 | 20:42 (29)<br>21:17 (29) | 06:14<br>21:28 | 20:54 (29)<br>20:40 | 07:34<br>19:39 | 08:16<br>18:40 | 08:54<br>17:01 |
| 27                  | 08:17<br>17:37 | 07:31<br>18:23 | 07:36<br>20:03 | 06:38<br>20:46 | 05:58<br>21:25 | 05:50<br>21:44 | 20:43 (29)<br>21:18 (29) | 06:16<br>21:27 | 20:55 (29)<br>20:38 | 07:36<br>19:37 | 08:18<br>18:38 | 08:55<br>17:00 |
| 28                  | 08:16<br>17:39 | 07:29<br>18:25 | 07:34<br>20:05 | 06:36<br>20:48 | 05:57<br>21:26 | 05:51<br>21:44 | 20:43 (29)<br>21:17 (29) | 06:17<br>21:25 | 20:56 (29)<br>20:36 | 07:37<br>19:35 | 08:19<br>18:37 | 08:56<br>16:59 |
| 29                  | 08:15<br>17:40 | 07:28<br>18:26 | 07:32<br>20:06 | 06:34<br>20:49 | 05:56<br>21:27 | 05:51<br>21:44 | 20:44 (29)<br>21:18 (29) | 06:18<br>21:24 | 20:58 (29)<br>20:35 | 07:38<br>19:33 | 08:21<br>18:35 | 08:57<br>16:59 |
| 30                  | 08:14<br>17:42 | 07:30<br>20:08 | 07:30<br>20:51 | 06:32<br>20:51 | 05:55<br>21:28 | 05:51<br>21:44 | 20:44 (29)<br>21:17 (29) | 06:19<br>21:23 | 20:59 (29)<br>20:33 | 07:40<br>19:31 | 08:22<br>18:33 | 08:58<br>17:02 |
| 31                  | 08:13<br>17:43 | 07:28<br>20:09 | 07:28<br>20:59 | 06:29<br>21:29 | 05:54<br>21:29 | 05:54<br>21:44 | 20:46 (29)<br>21:04 (29) | 06:20<br>21:22 | 20:50 (29)<br>20:31 | 07:00<br>18:32 | 08:24<br>18:32 | 08:59<br>17:03 |
| Potential sun hours | 278            | 286            | 367            | 406            | 465            | 475            | 481                      | 442            | 380                 | 340            | 283            | 266            |
| Total, worst case   |                |                |                |                | 62             | 947            |                          |                |                     |                |                |                |
| Sun reduction       |                |                |                |                | 0.64           | 0.67           |                          |                |                     |                |                |                |
| Oper. time red.     |                |                |                |                | 1.00           | 1.00           |                          |                |                     |                |                |                |
| Wind dir. red.      |                |                |                |                | 0.65           | 0.65           |                          |                |                     |                |                |                |
| Total reduction     |                |                |                |                | 0.42           | 0.44           |                          |                |                     |                |                |                |
| Total, real         |                |                |                |                | 26             | 414            |                          |                |                     |                |                |                |

Table layout: For each day in each month the following matrix apply

|              |                      |                                 |                                  |
|--------------|----------------------|---------------------------------|----------------------------------|
| Day in month | Sun rise (hh:mm)     | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|              | Sun set (hh:mm)      | Last time (hh:mm) with flicker  | (WTG causing flicker last time)  |
|              | Minutes with flicker |                                 |                                  |

Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: R095 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 90.0° (86)

## Assumptions for shadow calculations

Reference year for calendar

2023

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

| Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  |
|------|------|------|------|------|------|------|------|------|------|------|------|
| 0.54 | 0.52 | 0.61 | 0.58 | 0.64 | 0.67 | 0.75 | 0.72 | 0.67 | 0.53 | 0.42 | 0.45 |

Operational time

| N   | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW | NW  | NNW | Sum   |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| 376 | 314 | 339 | 425 | 445 | 474 | 693 | 570 | 488 | 386 | 872 | 609 | 772 | 651 | 677 | 667 | 8,758 |

|                     | January        | February       | March          | April          | May            | June           | July                     | August         | September                | October        | November                 | December       |                |                |                |
|---------------------|----------------|----------------|----------------|----------------|----------------|----------------|--------------------------|----------------|--------------------------|----------------|--------------------------|----------------|----------------|----------------|----------------|
| 1                   | 08:31<br>17:04 | 08:11<br>17:45 | 07:27<br>18:26 | 07:26<br>20:10 | 06:31<br>20:52 | 05:54<br>21:30 | 06:41 (41)<br>07:12 (41) | 05:52<br>21:44 | 06:51 (41)<br>07:13 (41) | 06:21<br>21:20 | 06:50 (41)<br>07:22 (41) | 07:02<br>20:29 | 07:41<br>19:29 | 08:25<br>18:30 | 08:08<br>16:57 |
| 2                   | 08:31<br>17:05 | 08:10<br>17:46 | 07:25<br>18:28 | 07:24<br>20:12 | 06:29<br>20:53 | 05:53<br>21:31 | 06:41 (41)<br>07:11 (41) | 05:52<br>21:44 | 06:51 (41)<br>07:14 (41) | 06:23<br>21:19 | 06:50 (41)<br>07:21 (41) | 07:03<br>20:27 | 07:42<br>19:27 | 08:27<br>18:29 | 08:09<br>16:57 |
| 3                   | 08:31<br>17:06 | 08:09<br>17:48 | 07:23<br>18:29 | 07:22<br>20:13 | 06:28<br>20:55 | 05:52<br>21:32 | 06:42 (41)<br>07:11 (41) | 05:53<br>21:43 | 06:51 (41)<br>07:15 (41) | 06:24<br>21:18 | 06:51 (41)<br>07:20 (41) | 07:04<br>20:25 | 07:44<br>19:25 | 08:28<br>18:27 | 08:10<br>16:56 |
| 4                   | 08:31<br>17:07 | 08:07<br>17:49 | 07:21<br>18:30 | 07:20<br>20:15 | 06:26<br>20:56 | 05:52<br>21:33 | 06:42 (41)<br>07:11 (41) | 05:54<br>21:43 | 06:51 (41)<br>07:15 (41) | 06:25<br>21:16 | 06:52 (41)<br>07:19 (41) | 07:05<br>20:23 | 07:45<br>19:23 | 08:30<br>18:26 | 08:12<br>16:56 |
| 5                   | 08:30<br>17:08 | 08:06<br>17:51 | 07:19<br>18:32 | 07:18<br>20:16 | 06:24<br>20:57 | 05:51<br>21:33 | 06:43 (41)<br>07:11 (41) | 05:54<br>21:43 | 06:51 (41)<br>07:16 (41) | 06:26<br>21:15 | 06:53 (41)<br>07:18 (41) | 07:07<br>20:21 | 07:47<br>19:21 | 08:31<br>17:24 | 08:13<br>16:56 |
| 6                   | 08:30<br>17:09 | 08:05<br>17:52 | 07:18<br>18:33 | 07:16<br>20:17 | 06:23<br>20:59 | 05:51<br>21:34 | 06:43 (41)<br>07:10 (41) | 05:55<br>21:43 | 06:51 (41)<br>07:16 (41) | 06:28<br>21:13 | 06:54 (41)<br>07:18 (41) | 07:08<br>20:19 | 07:48<br>19:19 | 08:32<br>17:23 | 08:14<br>16:55 |
| 7                   | 08:30<br>17:10 | 08:03<br>17:54 | 07:16<br>18:35 | 07:14<br>20:19 | 06:21<br>21:00 | 05:50<br>21:35 | 06:44 (41)<br>07:10 (41) | 05:56<br>21:42 | 06:50 (41)<br>07:16 (41) | 06:29<br>21:12 | 06:55 (41)<br>07:16 (41) | 07:09<br>20:17 | 07:49<br>19:17 | 08:34<br>17:21 | 08:15<br>16:55 |
| 8                   | 08:30<br>17:11 | 08:02<br>17:55 | 07:14<br>18:36 | 07:12<br>20:20 | 06:20<br>21:01 | 05:50<br>21:36 | 06:45 (41)<br>07:07 (41) | 05:57<br>21:42 | 06:50 (41)<br>07:17 (41) | 06:30<br>21:11 | 06:57 (41)<br>07:14 (41) | 07:11<br>20:15 | 07:51<br>19:15 | 08:36<br>17:20 | 08:16<br>16:55 |
| 9                   | 08:30<br>17:13 | 08:00<br>17:57 | 07:12<br>18:38 | 07:11<br>20:21 | 06:19<br>21:03 | 05:50<br>21:37 | 06:44 (41)<br>07:09 (41) | 05:50<br>21:41 | 06:50 (41)<br>07:18 (41) | 06:32<br>21:09 | 06:58 (41)<br>07:11 (41) | 07:12<br>20:13 | 07:52<br>19:13 | 08:17<br>17:18 | 08:17<br>16:55 |
| 10                  | 08:29<br>17:14 | 07:59<br>17:59 | 07:10<br>18:39 | 07:09<br>20:23 | 06:17<br>21:04 | 05:49<br>21:37 | 06:42 (41)<br>07:09 (41) | 05:49<br>21:41 | 06:49 (41)<br>07:18 (41) | 06:33<br>21:07 | 07:03 (41)<br>07:06 (41) | 07:13<br>20:11 | 07:53<br>19:11 | 08:18<br>17:17 | 08:18<br>16:55 |
| 11                  | 08:29<br>17:15 | 07:58<br>18:00 | 07:08<br>18:41 | 07:07<br>20:24 | 06:16<br>21:05 | 05:49<br>21:38 | 06:46 (41)<br>07:10 (41) | 05:59<br>21:40 | 06:49 (41)<br>07:18 (41) | 06:34<br>21:06 | 07:15<br>21:07           | 07:15<br>20:09 | 07:55<br>19:09 | 08:19<br>17:16 | 08:19<br>16:55 |
| 12                  | 08:28<br>17:16 | 07:56<br>18:00 | 07:06<br>18:42 | 07:05<br>20:26 | 06:14<br>21:07 | 05:49<br>21:39 | 06:47 (41)<br>07:11 (41) | 06:00<br>21:39 | 06:49 (41)<br>07:10 (41) | 06:35<br>21:40 | 07:16<br>21:04           | 07:16<br>20:07 | 07:56<br>19:07 | 08:20<br>17:15 | 08:20<br>16:55 |
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| 14                  | 08:27<br>17:17 | 07:53<br>18:03 | 07:02<br>19:45 | 07:01<br>20:28 | 06:12<br>21:09 | 05:48<br>21:39 | 06:47 (41)<br>07:11 (41) | 06:02<br>21:40 | 06:49 (41)<br>07:10 (41) | 06:38<br>21:01 | 07:19<br>21:01           | 07:19<br>20:03 | 07:59<br>19:03 | 08:22<br>17:12 | 08:22<br>16:55 |
| 15                  | 08:27<br>17:19 | 07:51<br>18:03 | 07:00<br>19:45 | 06:59<br>20:28 | 06:10<br>21:09 | 05:48<br>21:39 | 06:48 (41)<br>07:11 (41) | 06:03<br>21:40 | 06:49 (41)<br>07:10 (41) | 06:39<br>21:01 | 07:20 (41)               | 07:20<br>20:03 | 08:00<br>19:03 | 08:23<br>17:12 | 08:23<br>16:55 |
| 16                  | 08:26<br>17:20 | 07:50<br>18:05 | 07:58<br>19:46 | 06:57<br>20:30 | 06:09<br>21:10 | 05:48<br>21:34 | 06:49 (41)<br>07:12 (41) | 06:04<br>21:40 | 06:49 (41)<br>07:09 (41) | 06:41<br>21:38 | 07:21 (41)               | 07:21<br>20:01 | 08:02<br>19:01 | 08:24<br>17:11 | 08:25<br>16:55 |
| 17                  | 08:26<br>17:21 | 07:48<br>18:06 | 07:56<br>19:48 | 06:55<br>20:31 | 06:08<br>21:12 | 05:48<br>21:34 | 06:49 (41)<br>07:12 (41) | 06:05<br>21:41 | 06:49 (41)<br>07:09 (41) | 06:42<br>21:37 | 07:21 (41)               | 07:21<br>20:58 | 08:03<br>19:00 | 08:25<br>17:10 | 08:25<br>16:55 |
| 18                  | 08:25<br>17:23 | 07:46<br>18:08 | 07:54<br>19:49 | 06:53<br>20:33 | 06:07<br>21:13 | 05:48<br>21:35 | 06:49 (41)<br>07:13 (41) | 06:06<br>21:41 | 06:49 (41)<br>07:09 (41) | 06:43<br>21:36 | 07:22 (41)               | 07:22<br>20:56 | 08:05<br>19:57 | 08:26<br>17:09 | 08:26<br>16:55 |
| 19                  | 08:24<br>17:24 | 07:45<br>18:09 | 07:52<br>19:51 | 06:52<br>20:34 | 06:06<br>21:14 | 05:48<br>21:35 | 06:49 (41)<br>07:13 (41) | 06:07<br>21:42 | 06:49 (41)<br>07:08 (41) | 06:43<br>21:35 | 07:23 (41)               | 07:23<br>20:54 | 08:06<br>19:55 | 08:27<br>17:08 | 08:27<br>16:55 |
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| 26                  | 08:18<br>17:34 | 07:32<br>18:20 | 07:38<br>20:01 | 06:39<br>20:44 | 05:58<br>21:22 | 05:50<br>21:35 | 06:51 (41)<br>07:13 (41) | 06:14<br>21:44 | 06:48 (41)<br>07:10 (41) | 06:54<br>21:29 | 07:30 (41)               | 07:30<br>20:42 | 08:13<br>19:41 | 08:34<br>17:01 | 08:34<br>16:59 |
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| 28                  | 08:16<br>17:37 | 07:29<br>18:23 | 07:34<br>20:03 | 06:36<br>20:46 | 05:57<br>21:25 | 05:50<br>21:33 | 06:52 (41)<br>07:12 (41) | 06:17<br>21:44 | 06:48 (41)<br>07:09 (41) | 06:56<br>21:32 | 07:32 (41)               | 07:32<br>20:38 | 08:15<br>19:37 | 08:36<br>17:00 | 08:36<br>17:00 |
| 29                  | 08:15<br>17:39 | 07:32<br>18:25 | 07:37<br>20:05 | 06:34<br>20:48 | 05:56<br>21:26 | 05:51<br>21:33 | 06:51 (41)<br>07:12 (41) | 06:18<br>21:44 | 06:48 (41)<br>07:09 (41) | 06:58<br>21:35 | 07:33 (41)               | 07:33<br>20:36 | 08:16<br>19:38 | 08:37<br>17:01 | 08:37<br>17:01 |
| 30                  | 08:14<br>17:40 | 07:30<br>18:26 | 07:33<br>20:06 | 06:32<br>20:49 | 05:55<br>21:27 | 05:51<br>21:32 | 06:51 (41)<br>07:12 (41) | 06:19<br>21:44 | 06:48 (41)<br>07:09 (41) | 06:59<br>21:34 | 07:34 (41)               | 07:34<br>20:35 | 08:17<br>19:38 | 08:38<br>17:02 | 08:38<br>17:02 |
| 31                  | 08:14<br>17:42 | 07:30<br>18:28 | 07:33<br>20:06 | 06:32<br>20:50 | 05:55<br>21:28 | 05:51<br>21:33 | 06:51 (41)<br>07:13 (41) | 06:19<br>21:44 | 06:48 (41)<br>07:09 (41) | 06:59<br>21:35 | 07:35 (41)               | 07:35<br>20:36 | 08:18<br>19:39 | 08:39<br>17:03 | 08:39<br>17:03 |
| Potential sun hours | 278            | 286            | 367            | 406            | 465            | 475            | 481                      | 442            | 380                      | 340            | 283                      | 266            |                |                |                |
| Total, worst case   |                |                |                |                | 822            | 673            | 954                      | 220            |                          |                |                          |                |                |                |                |
| Sun reduction       |                |                |                |                | 0.64           | 0.67           | 0.75                     | 0.72           |                          |                |                          |                |                |                |                |
| Oper. time red.     |                |                |                |                | 1.00           | 1.00           | 1.00                     | 1.00           |                          |                |                          |                |                |                |                |
| Wind dir. red.      |                |                |                |                | 0.66           | 0.66           | 0.66                     | 0.66           |                          |                |                          |                |                |                |                |
| Total reduction     |                |                |                |                | 0.42           | 0.44           | 0.49                     | 0.47           |                          |                |                          |                |                |                |                |
| Total, real         |                |                |                |                | 345            | 296            | 469                      | 104            |                          |                |                          |                |                |                |                |



Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM  
US-01824-3627 Chelmsford  
+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: R096 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (87)

### Assumptions for shadow calculations

Reference year for calendar

2023

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

| Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  |
|------|------|------|------|------|------|------|------|------|------|------|------|
| 0.54 | 0.52 | 0.61 | 0.58 | 0.64 | 0.67 | 0.75 | 0.72 | 0.67 | 0.53 | 0.42 | 0.45 |

Operational time

| N   | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW | NW  | NNW | Sum   |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| 376 | 314 | 339 | 425 | 445 | 474 | 693 | 570 | 488 | 386 | 872 | 609 | 772 | 651 | 677 | 667 | 8,758 |

| January             |       | February |            | March      |            | April |       | May   |            | June  |       |
|---------------------|-------|----------|------------|------------|------------|-------|-------|-------|------------|-------|-------|
| 1                   | 08:31 |          | 08:11      | 16:35 (29) | 07:27      | 07:26 |       | 06:31 | 05:54      |       |       |
|                     | 17:04 |          | 17:45      | 45         | 17:20 (29) | 18:26 | 20:10 |       | 20:52      | 21:30 |       |
| 2                   | 08:31 |          | 08:10      |            | 16:36 (29) | 07:25 | 07:24 |       | 06:29      | 05:53 |       |
|                     | 17:05 |          | 17:46      | 46         | 17:22 (29) | 18:28 | 20:12 |       | 20:53      | 21:31 |       |
| 3                   | 08:31 |          | 08:09      |            | 16:36 (29) | 07:23 | 07:22 |       | 07:45 (33) | 06:28 | 05:52 |
|                     | 17:06 |          | 17:48      | 46         | 17:22 (29) | 18:29 | 20:13 | 1     | 07:46 (33) | 20:55 | 21:32 |
| 4                   | 08:31 |          | 08:08      |            | 16:36 (29) | 07:21 | 07:20 |       | 07:44 (33) | 06:26 | 05:52 |
|                     | 17:07 |          | 17:49      | 46         | 17:22 (29) | 18:31 | 20:15 | 8     | 07:52 (33) | 20:56 | 21:33 |
| 5                   | 08:31 |          | 08:06      |            | 16:37 (29) | 07:20 | 07:18 |       | 07:42 (33) | 06:24 | 05:51 |
|                     | 17:08 |          | 17:51      | 45         | 17:22 (29) | 18:32 | 20:16 | 12    | 07:54 (33) | 20:57 | 21:34 |
| 6                   | 08:30 |          | 08:05      |            | 16:36 (29) | 07:18 | 07:16 |       | 07:40 (33) | 06:23 | 05:51 |
|                     | 17:09 |          | 17:52      | 46         | 17:22 (29) | 18:33 | 20:17 | 16    | 07:56 (33) | 20:59 | 21:34 |
| 7                   | 08:30 |          | 08:03      |            | 16:37 (29) | 07:16 | 07:14 |       | 07:38 (33) | 06:21 | 05:50 |
|                     | 17:10 |          | 17:54      | 45         | 17:22 (29) | 18:35 | 20:19 | 19    | 07:57 (33) | 21:00 | 21:35 |
| 8                   | 08:30 |          | 08:02      |            | 16:37 (29) | 07:14 | 07:13 |       | 07:36 (33) | 06:20 | 05:50 |
|                     | 17:11 |          | 17:55      | 44         | 17:21 (29) | 18:36 | 20:20 | 22    | 07:58 (33) | 21:01 | 21:36 |
| 9                   | 08:30 |          | 08:01      |            | 16:38 (29) | 07:12 | 07:11 |       | 07:34 (33) | 06:19 | 05:50 |
|                     | 17:13 |          | 17:57      | 43         | 17:21 (29) | 18:38 | 20:22 | 25    | 07:59 (33) | 21:03 | 21:37 |
| 10                  | 08:29 |          | 07:59      |            | 16:38 (29) | 07:10 | 07:09 |       | 07:32 (33) | 06:17 | 05:49 |
|                     | 17:14 |          | 17:59      | 43         | 17:21 (29) | 18:39 | 20:23 | 27    | 07:59 (33) | 21:04 | 21:37 |
| 11                  | 08:29 |          | 16:46 (29) | 07:58      | 16:40 (29) | 07:08 | 07:07 |       | 07:30 (33) | 06:16 | 05:49 |
|                     | 17:15 | 2        | 16:48 (29) | 18:00      | 17:21 (29) | 18:41 | 20:24 | 29    | 07:59 (33) | 21:05 | 21:38 |
| 12                  | 08:29 |          | 16:45 (29) | 07:56      | 16:40 (29) | 08:06 | 07:05 |       | 07:28 (33) | 06:14 | 05:49 |
|                     | 17:16 | 5        | 16:50 (29) | 18:00      | 17:19 (29) | 18:42 | 20:26 | 31    | 07:59 (33) | 21:07 | 21:39 |
| 13                  | 08:28 |          | 16:43 (29) | 07:55      | 16:41 (29) | 08:04 | 07:03 |       | 07:26 (33) | 06:13 | 05:48 |
|                     | 17:17 | 8        | 16:51 (29) | 18:02      | 17:18 (29) | 19:44 | 20:27 | 33    | 07:59 (33) | 21:08 | 21:39 |
| 14                  | 08:28 |          | 16:42 (29) | 07:53      | 16:42 (29) | 08:02 | 07:01 |       | 07:24 (33) | 06:12 | 05:48 |
|                     | 17:19 | 10       | 16:52 (29) | 18:03      | 17:18 (29) | 19:45 | 20:28 | 35    | 07:59 (33) | 21:09 | 21:40 |
| 15                  | 08:27 |          | 16:42 (29) | 07:51      | 16:43 (29) | 08:00 | 06:59 |       | 07:23 (33) | 06:10 | 05:48 |
|                     | 17:20 | 12       | 16:54 (29) | 18:05      | 17:16 (29) | 19:46 | 20:30 | 37    | 08:00 (33) | 21:10 | 21:41 |
| 16                  | 08:26 |          | 16:41 (29) | 07:50      | 16:44 (29) | 07:58 | 06:57 |       | 07:22 (33) | 06:09 | 05:48 |
|                     | 17:21 | 14       | 16:55 (29) | 18:06      | 17:15 (29) | 19:48 | 20:31 | 37    | 07:59 (33) | 21:12 | 21:41 |
| 17                  | 08:26 |          | 16:40 (29) | 07:48      | 16:47 (29) | 07:56 | 06:55 |       | 07:22 (33) | 06:08 | 05:48 |
|                     | 17:23 | 16       | 16:56 (29) | 18:08      | 17:14 (29) | 19:49 | 20:33 | 37    | 07:59 (33) | 21:13 | 21:42 |
| 18                  | 08:25 |          | 16:39 (29) | 07:46      | 16:49 (29) | 07:54 | 06:54 |       | 07:22 (33) | 06:07 | 05:48 |
|                     | 17:24 | 18       | 16:57 (29) | 18:09      | 17:11 (29) | 19:51 | 20:34 | 36    | 07:58 (33) | 21:14 | 21:42 |
| 19                  | 08:24 |          | 16:39 (29) | 07:45      | 16:51 (29) | 07:52 | 06:52 |       | 07:22 (33) | 06:06 | 05:48 |
|                     | 17:25 | 21       | 17:00 (29) | 18:11      | 17:08 (29) | 19:52 | 20:35 | 35    | 07:57 (33) | 21:15 | 21:42 |
| 20                  | 08:24 |          | 16:39 (29) | 07:43      | 16:58 (29) | 07:50 | 06:50 |       | 07:22 (33) | 06:04 | 05:48 |
|                     | 17:27 | 22       | 17:01 (29) | 18:12      | 17:03 (29) | 19:54 | 20:37 | 34    | 07:56 (33) | 21:17 | 21:43 |
| 21                  | 08:23 |          | 16:38 (29) | 07:41      |            | 07:48 | 06:48 |       | 07:23 (33) | 06:03 | 05:48 |
|                     | 17:28 | 24       | 17:02 (29) | 18:14      |            | 19:55 | 20:38 | 33    | 07:56 (33) | 21:18 | 21:43 |
| 22                  | 08:22 |          | 16:38 (29) | 07:40      |            | 07:46 | 06:46 |       | 07:23 (33) | 06:02 | 05:49 |
|                     | 17:30 | 26       | 17:04 (29) | 18:16      |            | 19:56 | 20:40 | 32    | 07:55 (33) | 21:19 | 21:43 |
| 23                  | 08:21 |          | 16:37 (29) | 07:38      |            | 07:44 | 06:44 |       | 07:23 (33) | 06:01 | 05:49 |
|                     | 17:31 | 28       | 17:05 (29) | 18:17      |            | 19:58 | 20:41 | 31    | 07:54 (33) | 21:20 | 21:44 |
| 24                  | 08:20 |          | 16:37 (29) | 07:36      |            | 07:42 | 06:43 |       | 07:25 (33) | 06:00 | 05:49 |
|                     | 17:33 | 30       | 17:07 (29) | 18:19      |            | 19:59 | 20:42 | 28    | 07:53 (33) | 21:21 | 21:44 |
| 25                  | 08:19 |          | 16:37 (29) | 07:34      |            | 07:40 | 06:41 |       | 07:26 (33) | 05:59 | 05:49 |
|                     | 17:34 | 32       | 17:09 (29) | 18:20      |            | 20:01 | 20:44 | 25    | 07:51 (33) | 21:23 | 21:44 |
| 26                  | 08:18 |          | 16:37 (29) | 07:33      |            | 07:38 | 06:39 |       | 07:27 (33) | 05:58 | 05:50 |
|                     | 17:36 | 33       | 17:10 (29) | 18:22      |            | 20:02 | 20:45 | 22    | 07:49 (33) | 21:24 | 21:44 |
| 27                  | 08:17 |          | 16:36 (29) | 07:31      |            | 07:36 | 06:37 |       | 07:29 (33) | 05:57 | 05:50 |
|                     | 17:37 | 35       | 17:11 (29) | 18:23      |            | 20:03 | 20:46 | 19    | 07:48 (33) | 21:25 | 21:44 |
| 28                  | 08:16 |          | 16:36 (29) | 07:29      |            | 07:34 | 06:36 |       | 07:31 (33) | 05:57 | 05:50 |
|                     | 17:39 | 37       | 17:13 (29) | 18:25      |            | 20:05 | 20:48 | 13    | 07:44 (33) | 21:26 | 21:44 |
| 29                  | 08:15 |          | 16:36 (29) |            |            | 07:32 | 06:34 |       |            | 05:56 | 05:51 |
|                     | 17:40 | 39       | 17:15 (29) |            |            | 20:06 | 20:49 |       |            | 21:27 | 21:44 |
| 30                  | 08:14 |          | 16:36 (29) |            |            | 07:30 | 06:32 |       |            | 05:55 | 05:51 |
|                     | 17:42 | 41       | 17:17 (29) |            |            | 20:08 | 20:51 |       |            | 21:28 | 21:44 |
| 31                  | 08:13 |          | 16:36 (29) |            |            | 07:28 |       |       |            | 05:54 |       |
|                     | 17:43 | 43       | 17:19 (29) |            |            | 20:09 |       |       |            | 21:29 |       |
| Potential sun hours | 278   |          | 286        |            |            | 367   | 406   |       | 465        |       | 475   |
| Total, worst case   | 496   |          | 737        |            |            |       | 677   |       |            |       |       |
| Sun reduction       | 0.54  |          | 0.52       |            |            |       | 0.58  |       |            |       |       |
| Oper. time red.     | 1.00  |          | 1.00       |            |            |       | 1.00  |       |            |       |       |
| Wind dir. red.      | 0.63  |          | 0.63       |            |            |       | 0.67  |       |            |       |       |
| Total reduction     | 0.34  |          | 0.32       |            |            |       | 0.39  |       |            |       |       |
| Total, real         | 167   |          | 239        |            |            |       | 263   |       |            |       |       |

Table layout: For each day in each month the following matrix apply

| Day in month | Sun rise (hh:mm) | Minutes with flicker | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|--------------|------------------|----------------------|---------------------------------|----------------------------------|
|              | Sun set (hh:mm)  |                      | Last time (hh:mm) with flicker  | (WTG causing flicker last time)  |

Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM  
US-01824-3627 Chelmsford  
+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: R096 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (87)

### Assumptions for shadow calculations

Reference year for calendar

2023

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

| Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  |
|------|------|------|------|------|------|------|------|------|------|------|------|
| 0.54 | 0.52 | 0.61 | 0.58 | 0.64 | 0.67 | 0.75 | 0.72 | 0.67 | 0.53 | 0.42 | 0.45 |

Operational time

| N   | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW | NW  | NNW | Sum   |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| 376 | 314 | 339 | 425 | 445 | 474 | 693 | 570 | 488 | 386 | 872 | 609 | 772 | 651 | 677 | 667 | 8,758 |

|                     | July           | August         | September      | October             | November       | December            |
|---------------------|----------------|----------------|----------------|---------------------|----------------|---------------------|
| 1                   | 05:52<br>21:44 | 06:22<br>21:20 | 07:02<br>20:29 | 07:27 (33)<br>19:29 | 07:41<br>18:30 | 17:08 (29)<br>16:57 |
| 2                   | 05:53<br>21:44 | 06:23<br>21:19 | 07:03<br>20:27 | 07:28 (33)<br>19:27 | 07:43<br>18:29 | 17:08 (29)<br>16:57 |
| 3                   | 05:53<br>21:44 | 06:24<br>21:18 | 07:04<br>20:25 | 07:29 (33)<br>19:25 | 07:44<br>18:27 | 17:08 (29)<br>16:57 |
| 4                   | 05:54<br>21:43 | 06:25<br>21:16 | 07:06<br>20:23 | 07:30 (33)<br>19:23 | 07:45<br>18:26 | 17:07 (29)<br>16:56 |
| 5                   | 05:54<br>21:43 | 06:26<br>21:15 | 07:07<br>20:21 | 07:32 (33)<br>19:21 | 07:47<br>17:24 | 16:07 (29)<br>16:56 |
| 6                   | 05:55<br>21:43 | 06:28<br>21:14 | 07:08<br>20:19 | 07:33 (33)<br>19:19 | 07:48<br>17:23 | 16:07 (29)<br>16:55 |
| 7                   | 05:56<br>21:42 | 06:29<br>21:12 | 07:09<br>20:17 | 07:34 (33)<br>19:17 | 07:49<br>17:21 | 16:06 (29)<br>16:55 |
| 8                   | 05:57<br>21:42 | 06:30<br>21:11 | 07:11<br>20:15 | 07:35 (33)<br>19:15 | 07:51<br>17:20 | 16:07 (29)<br>16:55 |
| 9                   | 05:57<br>21:41 | 06:32<br>21:09 | 07:12<br>20:13 | 07:37 (33)<br>19:13 | 07:52<br>17:18 | 16:06 (29)<br>16:55 |
| 10                  | 05:58<br>21:41 | 06:33<br>21:08 | 07:13<br>20:11 | 07:38 (33)<br>19:11 | 07:53<br>17:17 | 16:07 (29)<br>16:55 |
| 11                  | 05:59<br>21:40 | 06:34<br>21:06 | 07:15<br>20:09 | 07:44 (33)<br>19:09 | 07:55<br>17:16 | 16:07 (29)<br>16:55 |
| 12                  | 06:00<br>21:40 | 06:35<br>21:04 | 07:16<br>20:07 | 07:56<br>19:07      | 07:42<br>17:15 | 16:07 (29)<br>16:55 |
| 13                  | 06:01<br>21:39 | 06:37<br>21:03 | 07:17<br>20:05 | 07:58<br>19:05      | 07:43<br>17:13 | 16:08 (29)<br>16:55 |
| 14                  | 06:02<br>21:39 | 06:38<br>21:01 | 07:19<br>20:03 | 07:59<br>19:03      | 07:44<br>17:12 | 16:07 (29)<br>16:55 |
| 15                  | 06:03<br>21:38 | 06:39<br>21:00 | 07:20<br>20:01 | 08:00<br>19:01      | 07:46<br>17:11 | 16:08 (29)<br>16:55 |
| 16                  | 06:04<br>21:37 | 06:41<br>20:58 | 07:21<br>19:59 | 08:02<br>19:00      | 07:47<br>17:10 | 16:09 (29)<br>16:55 |
| 17                  | 06:05<br>21:36 | 06:42<br>20:56 | 07:23<br>19:57 | 08:03<br>18:56      | 07:49<br>17:09 | 16:09 (29)<br>16:55 |
| 18                  | 06:06<br>21:36 | 06:43<br>20:54 | 07:24<br>19:55 | 08:05<br>18:54      | 07:50<br>17:08 | 16:10 (29)<br>16:56 |
| 19                  | 06:07<br>21:35 | 06:45<br>20:53 | 07:25<br>19:53 | 08:06<br>18:52      | 07:52<br>17:07 | 16:10 (29)<br>16:56 |
| 20                  | 06:08<br>21:34 | 06:46<br>20:51 | 07:27<br>19:51 | 08:08<br>18:50      | 07:53<br>17:06 | 16:12 (29)<br>16:56 |
| 21                  | 06:09<br>21:33 | 06:47<br>20:49 | 07:28<br>19:49 | 08:09<br>18:49      | 07:55<br>17:05 | 16:12 (29)<br>16:57 |
| 22                  | 06:10<br>21:32 | 06:49<br>20:47 | 07:29<br>19:47 | 08:10<br>18:47      | 07:56<br>17:04 | 16:13 (29)<br>16:57 |
| 23                  | 06:11<br>21:31 | 06:50<br>20:46 | 07:31<br>19:45 | 08:12<br>18:45      | 07:57<br>17:03 | 16:14 (29)<br>16:58 |
| 24                  | 06:12<br>21:30 | 06:51<br>20:44 | 07:32<br>19:43 | 08:13<br>18:43      | 07:59<br>17:02 | 16:16 (29)<br>16:58 |
| 25                  | 06:13<br>21:29 | 06:52<br>20:42 | 07:33<br>19:41 | 08:15<br>18:42      | 08:00<br>17:01 | 16:16 (29)<br>16:59 |
| 26                  | 06:14<br>21:28 | 06:54<br>20:40 | 07:34<br>19:39 | 08:16<br>18:40      | 08:02<br>17:01 | 16:18 (29)<br>16:59 |
| 27                  | 06:16<br>21:27 | 06:55<br>20:38 | 07:36<br>19:37 | 08:18<br>18:38      | 08:03<br>17:00 | 16:19 (29)<br>17:00 |
| 28                  | 06:17<br>21:25 | 06:56<br>20:36 | 07:37<br>19:35 | 08:19<br>18:37      | 08:04<br>17:00 | 16:21 (29)<br>17:01 |
| 29                  | 06:18<br>21:24 | 06:58<br>20:35 | 07:38<br>19:33 | 08:21<br>18:35      | 08:05<br>17:00 | 16:22 (29)<br>17:01 |
| 30                  | 06:19<br>21:23 | 06:59<br>20:33 | 07:40<br>19:31 | 08:22<br>18:33      | 08:07<br>17:00 | 16:23 (29)<br>17:02 |
| 31                  | 06:20<br>21:22 | 07:00<br>20:31 | 07:41<br>19:30 | 08:24<br>18:32      | 08:08<br>17:00 | 16:24 (29)<br>17:03 |
| Potential sun hours | 481            | 442            | 380            | 340                 | 283            | 266                 |
| Total, worst case   |                | 484            | 211            | 236                 | 997            | 10                  |
| Sun reduction       |                | 0.72           | 0.67           | 0.53                | 0.42           | 0.45                |
| Oper. time red.     |                | 1.00           | 1.00           | 1.00                | 1.00           | 1.00                |
| Wind dir. red.      |                | 0.67           | 0.67           | 0.63                | 0.63           | 0.63                |
| Total reduction     |                | 0.48           | 0.45           | 0.33                | 0.26           | 0.28                |
| Total, real         |                | 233            | 95             | 78                  | 261            | 3                   |

Table layout: For each day in each month the following matrix apply

| Day in month | Sun rise (hh:mm) | Minutes with flicker | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|--------------|------------------|----------------------|---------------------------------|----------------------------------|
|              | Sun set (hh:mm)  |                      | Last time (hh:mm) with flicker  | (WTG causing flicker last time)  |



Project:

Oliver IV Array 012 8/26/2023

Licensed user:

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Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: R097 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (88)

## Assumptions for shadow calculations

Reference year for calendar

2023

Sunshine probability S/50 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

|                     | January | February   | March      | April      | May        | June       | July  | August | September | October | November | December |
|---------------------|---------|------------|------------|------------|------------|------------|-------|--------|-----------|---------|----------|----------|
| 1                   | 08:31   | 09:28 (33) | 08:11      | 16:42 (30) | 07:27      | 07:26      | 06:31 | 05:54  | 05:52     | 06:21   | 07:02    | 07:41    |
| 2                   | 17:04   | 16         | 09:44 (33) | 17:45      | 38         | 17:20 (30) | 18:26 | 20:10  | 20:52     | 21:30   | 21:44    | 21:20    |
| 3                   | 08:31   | 09:29 (33) | 08:10      | 16:42 (30) | 07:25      | 07:24      | 06:29 | 05:53  | 05:52     | 06:23   | 07:03    | 07:43    |
| 4                   | 17:05   | 15         | 09:44 (33) | 17:46      | 40         | 17:22 (30) | 18:28 | 20:12  | 20:53     | 21:31   | 21:44    | 21:19    |
| 5                   | 08:31   | 09:30 (33) | 08:09      | 16:43 (30) | 07:23      | 07:22      | 06:28 | 05:52  | 05:53     | 06:24   | 07:04    | 07:44    |
| 6                   | 17:06   | 13         | 09:43 (33) | 17:48      | 41         | 17:24 (30) | 18:29 | 20:13  | 20:55     | 21:32   | 21:44    | 21:20    |
| 7                   | 08:31   | 09:32 (33) | 08:08      | 16:42 (30) | 07:21      | 07:20      | 06:26 | 05:52  | 05:54     | 06:25   | 07:06    | 07:45    |
| 8                   | 17:07   | 11         | 09:43 (33) | 17:49      | 42         | 17:24 (30) | 18:31 | 20:15  | 20:56     | 21:33   | 21:43    | 21:16    |
| 9                   | 08:31   | 09:33 (33) | 08:06      | 16:43 (30) | 07:20      | 07:18      | 06:24 | 05:51  | 05:54     | 06:26   | 07:07    | 07:47    |
| 10                  | 17:08   | 8          | 09:41 (33) | 17:51      | 41         | 17:24 (30) | 18:32 | 20:16  | 20:57     | 21:34   | 21:43    | 21:15    |
| 11                  | 08:30   | 09:37 (33) | 08:05      | 16:42 (30) | 07:18      | 07:16      | 06:23 | 05:51  | 05:55     | 06:28   | 07:08    | 07:48    |
| 12                  | 17:09   | 1          | 09:38 (33) | 17:52      | 42         | 17:24 (30) | 18:33 | 20:17  | 20:59     | 21:34   | 21:43    | 21:14    |
| 13                  | 08:30   | 08:01      |            | 16:44 (30) | 07:12      | 07:11      | 06:19 | 05:50  | 05:57     | 06:32   | 07:12    | 07:52    |
| 14                  | 17:10   |            | 17:54      | 41         | 17:24 (30) | 18:35      | 20:19 | 21:00  | 21:35     | 21:42   | 21:12    | 21:17    |
| 15                  | 08:30   | 08:02      |            | 16:43 (30) | 07:14      | 07:12      | 06:20 | 05:50  | 05:57     | 06:30   | 07:11    | 07:51    |
| 16                  | 17:11   |            | 17:55      | 41         | 17:24 (30) | 18:36      | 20:20 | 21:01  | 21:36     | 21:42   | 21:11    | 21:15    |
| 17                  | 08:30   | 08:01      |            | 16:44 (30) | 07:12      | 07:11      | 06:19 | 05:50  | 05:57     | 06:32   | 07:12    | 07:52    |
| 18                  | 17:12   |            | 17:57      | 40         | 17:24 (30) | 18:38      | 20:22 | 21:03  | 21:37     | 21:41   | 21:09    | 21:13    |
| 19                  | 08:29   | 07:59      |            | 16:44 (30) | 07:10      | 07:09      | 06:17 | 05:49  | 05:58     | 06:33   | 07:13    | 07:53    |
| 20                  | 17:14   |            | 17:59      | 39         | 17:23 (30) | 18:39      | 20:23 | 21:04  | 21:37     | 21:41   | 21:08    | 21:11    |
| 21                  | 08:29   | 07:58      |            | 16:45 (30) | 07:08      | 07:07      | 06:16 | 05:49  | 05:59     | 06:34   | 07:15    | 07:55    |
| 22                  | 17:15   |            | 18:00      | 38         | 17:23 (30) | 18:41      | 20:24 | 21:05  | 21:38     | 21:40   | 21:06    | 21:09    |
| 23                  | 08:29   | 07:56      |            | 16:45 (30) | 08:06      | 07:05      | 06:14 | 05:49  | 06:00     | 06:35   | 07:16    | 07:56    |
| 24                  | 17:16   |            | 18:00      | 37         | 17:22 (30) | 18:42      | 20:26 | 21:07  | 21:39     | 21:40   | 21:07    | 21:07    |
| 25                  | 08:28   | 07:55      |            | 16:46 (30) | 08:04      | 07:03      | 06:13 | 05:48  | 06:01     | 06:37   | 07:17    | 07:58    |
| 26                  | 17:17   |            | 18:02      | 35         | 17:21 (30) | 19:44      | 20:27 | 21:08  | 21:39     | 21:39   | 21:03    | 21:05    |
| 27                  | 08:28   | 07:53      |            | 16:47 (30) | 08:02      | 07:01      | 06:12 | 05:48  | 06:02     | 06:38   | 07:19    | 07:59    |
| 28                  | 17:19   |            | 18:03      | 34         | 17:21 (30) | 19:45      | 20:28 | 21:09  | 21:40     | 21:39   | 21:03    | 21:03    |
| 29                  | 08:27   | 07:51      |            | 16:48 (30) | 08:00      | 06:59      | 06:10 | 05:48  | 06:03     | 06:39   | 07:20    | 08:00    |
| 30                  | 17:20   |            | 18:05      | 32         | 17:20 (30) | 19:46      | 20:30 | 21:10  | 21:41     | 21:38   | 21:00    | 21:01    |
| 31                  | 08:26   | 07:50      |            | 16:49 (30) | 07:58      | 06:57      | 06:09 | 05:48  | 06:04     | 06:41   | 07:21    | 08:02    |
| 32                  | 17:21   |            | 18:06      | 29         | 17:18 (30) | 19:48      | 20:31 | 21:12  | 21:41     | 21:37   | 21:05    | 21:00    |
| 33                  | 08:26   | 16:52 (30) | 07:48      |            | 16:52 (30) | 07:56      | 06:55 | 06:08  | 05:48     | 06:05   | 06:42    | 07:23    |
| 34                  | 17:23   | 4          | 16:56 (30) | 18:08      | 25         | 17:17 (30) | 19:49 | 20:33  | 21:13     | 21:42   | 21:36    | 21:05    |
| 35                  | 08:25   | 16:50 (30) | 07:46      |            | 16:53 (30) | 07:54      | 06:53 | 06:07  | 05:48     | 06:06   | 06:43    | 07:24    |
| 36                  | 17:24   | 7          | 16:57 (30) | 18:09      | 22         | 17:15 (30) | 19:51 | 20:34  | 21:14     | 21:42   | 21:36    | 21:05    |
| 37                  | 08:24   | 16:49 (30) | 07:45      |            | 16:56 (30) | 07:52      | 06:52 | 06:06  | 05:48     | 06:07   | 06:45    | 07:25    |
| 38                  | 17:25   | 10         | 16:59 (30) | 18:11      | 16         | 17:12 (30) | 19:52 | 20:35  | 21:15     | 21:42   | 21:35    | 21:05    |
| 39                  | 08:24   | 16:48 (30) | 07:43      |            | 17:02 (30) | 07:50      | 06:50 | 06:04  | 05:48     | 06:08   | 06:46    | 07:27    |
| 40                  | 17:27   | 13         | 17:01 (30) | 18:12      | 5          | 17:07 (30) | 19:54 | 20:37  | 21:17     | 21:43   | 21:34    | 21:05    |
| 41                  | 08:23   | 16:47 (30) | 07:41      |            | 07:48      | 06:48      | 06:03 | 05:48  | 06:09     | 06:47   | 07:28    | 08:09    |
| 42                  | 17:28   | 15         | 17:02 (30) | 18:14      |            | 19:55      | 20:38 | 21:18  | 21:43     | 21:33   | 21:04    | 21:04    |
| 43                  | 08:22   | 16:46 (30) | 07:40      |            | 07:46      | 06:46      | 06:02 | 05:49  | 06:10     | 06:48   | 07:29    | 08:10    |
| 44                  | 17:30   | 18         | 17:04 (30) | 18:16      |            | 19:56      | 20:40 | 21:19  | 21:43     | 21:32   | 21:04    | 21:04    |
| 45                  | 08:21   | 16:46 (30) | 07:38      |            | 07:44      | 06:44      | 06:01 | 05:49  | 06:11     | 06:50   | 07:30    | 08:12    |
| 46                  | 17:31   | 19         | 17:05 (30) | 18:17      |            | 19:58      | 20:41 | 21:20  | 21:44     | 21:31   | 21:04    | 21:04    |
| 47                  | 08:20   | 16:45 (30) | 07:36      |            | 07:42      | 06:43      | 06:00 | 05:49  | 06:12     | 06:51   | 07:32    | 08:13    |
| 48                  | 17:33   | 22         | 17:07 (30) | 18:19      |            | 19:59      | 20:42 | 21:21  | 21:44     | 21:30   | 21:04    | 21:04    |
| 49                  | 08:19   | 16:45 (30) | 07:34      |            | 07:40      | 06:41      | 05:59 | 05:49  | 06:13     | 06:52   | 07:33    | 08:15    |
| 50                  | 17:34   | 24         | 17:09 (30) | 18:20      |            | 20:01      | 20:44 | 21:23  | 21:44     | 21:29   | 21:04    | 21:04    |
| 51                  | 08:18   | 16:44 (30) | 07:33      |            | 07:38      | 06:39      | 05:58 | 05:50  | 06:14     | 06:54   | 07:34    | 08:16    |
| 52                  | 17:36   | 26         | 17:10 (30) | 18:22      |            | 20:02      | 20:45 | 21:24  | 21:44     | 21:28   | 21:04    | 21:04    |
| 53                  | 08:17   | 16:43 (30) | 07:31      |            | 07:36      | 06:37      | 05:57 | 05:50  | 06:15     | 06:55   | 07:36    | 08:18    |
| 54                  | 17:37   | 28         | 17:11 (30) | 18:23      |            | 20:03      | 20:46 | 21:25  | 21:44     | 21:27   | 21:03    | 21:03    |
| 55                  | 08:16   | 16:43 (30) | 07:29      |            | 07:34      | 06:36      | 05:57 | 05:50  | 06:17     | 06:56   | 07:37    | 08:19    |
| 56                  | 17:39   | 30         | 17:13 (30) | 18:25      |            | 20:05      | 20:48 | 21:26  | 21:44     | 21:25   | 21:03    | 21:03    |
| 57                  | 08:15   | 16:43 (30) |            |            | 07:32      | 06:34      | 05:56 | 05:51  | 06:18     | 06:58   | 07:38    | 08:21    |
| 58                  | 17:40   | 32         | 17:15 (30) |            | 20:06      | 20:49      | 21:27 | 21:44  | 21:24     | 21:24   | 21:03    | 21:03    |
| 59                  | 08:14   | 16:43 (30) |            |            | 07:30      | 06:32      | 05:55 | 05:51  | 06:19     | 06:59   | 07:40    | 08:22    |
| 60                  | 17:42   | 34         | 17:17 (30) |            | 20:08      | 20:51      | 21:28 | 21:44  | 21:23     | 21:23   | 21:03    | 21:03    |
| 61                  | 08:13   | 16:43 (30) |            |            | 07:28      |            | 05:54 |        | 06:20     | 07:00   |          | 08:24    |
| 62                  | 17:43   | 36         | 17:19 (30) |            | 20:09      |            | 21:29 |        | 21:22     | 20:31   |          | 18:32    |
| Potential sun hours | 278     |            | 286        |            | 367        | 406        | 465   | 475    | 481       | 442     | 380      | 340      |
| Total, worst case   | 382     |            | 678        |            |            |            |       |        |           |         | 223      | 785      |
| Sun reduction       | 0.54    |            | 0.52       |            |            |            |       |        |           |         | 0.53     | 0.42     |
| Oper. time red.     | 1.00    |            | 1.00       |            |            |            |       |        |           |         | 1.00     | 1.00     |
| Wind dir. red.      | 0.63    |            | 0.63       |            |            |            |       |        |           |         | 0.63     | 0.65     |
| Total reduction     | 0.34    |            | 0.33       |            |            |            |       |        |           |         | 0.33     | 0.29     |
| Total, real         | 131     |            | 223        |            |            |            |       |        |           |         | 75       | 208      |

Table layout: For each day in each month the following matrix apply

|              |                  |                                 |                                  |
|--------------|------------------|---------------------------------|----------------------------------|
| Day in month | Sun rise (hh:mm) | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|              | Sun set (hh:mm)  | Minutes with flicker            | Last time (hh:mm) with flicker   |
|              |                  |                                 | (WTG causing flicker last time)  |

Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: R098 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (89)

## Assumptions for shadow calculations

Reference year for calendar

2023

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

| Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  |
|------|------|------|------|------|------|------|------|------|------|------|------|
| 0.54 | 0.52 | 0.61 | 0.58 | 0.64 | 0.67 | 0.75 | 0.72 | 0.67 | 0.53 | 0.42 | 0.45 |

Operational time

| N   | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW | NW  | NNW | Sum   |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| 376 | 314 | 339 | 425 | 445 | 474 | 693 | 570 | 488 | 386 | 872 | 609 | 772 | 651 | 677 | 667 | 8,758 |

|                     | January        | February       | March          |    | April               |    | May                 |                | June           |                | July                |                     | August              |                | September      |  | October |  | November |  | December |
|---------------------|----------------|----------------|----------------|----|---------------------|----|---------------------|----------------|----------------|----------------|---------------------|---------------------|---------------------|----------------|----------------|--|---------|--|----------|--|----------|
| 1                   | 08:31<br>17:04 | 08:11<br>17:45 | 07:27<br>18:26 |    | 07:26<br>20:10      | 40 | 07:51 (52)<br>20:52 | 06:31<br>21:30 | 05:54<br>21:44 | 05:52<br>21:20 | 06:21<br>21:20      | 07:01<br>20:29      | 07:51 (52)<br>19:29 | 07:41<br>18:30 | 08:25<br>16:57 |  |         |  |          |  |          |
| 2                   | 08:31<br>17:05 | 08:10<br>17:46 | 07:25<br>18:27 |    | 07:24<br>20:12      | 40 | 07:51 (52)<br>20:53 | 06:29<br>21:31 | 05:53<br>21:44 | 05:52<br>21:19 | 06:23<br>21:19      | 07:03<br>20:27      | 07:50 (52)<br>19:27 | 07:42<br>18:28 | 08:27<br>16:59 |  |         |  |          |  |          |
| 3                   | 08:31<br>17:06 | 08:09<br>17:48 | 07:23<br>18:29 |    | 07:22<br>20:13      | 41 | 07:50 (52)<br>20:54 | 06:27<br>21:32 | 05:52<br>21:43 | 05:53<br>21:18 | 06:24<br>21:18      | 07:04<br>20:25      | 07:48 (52)<br>19:25 | 07:44<br>18:28 | 08:28<br>16:56 |  |         |  |          |  |          |
| 4                   | 08:30<br>17:07 | 08:07<br>17:49 | 07:21<br>18:30 |    | 07:20<br>20:14      | 40 | 07:50 (52)<br>20:56 | 06:26<br>21:33 | 05:52<br>21:43 | 05:54<br>21:16 | 06:25<br>21:16      | 07:05<br>20:23      | 07:47 (52)<br>19:23 | 07:45<br>18:29 | 08:29<br>16:56 |  |         |  |          |  |          |
| 5                   | 08:30<br>17:08 | 08:06<br>17:51 | 07:19<br>18:32 |    | 07:18<br>20:16      | 41 | 07:49 (52)<br>20:57 | 06:24<br>21:33 | 05:51<br>21:43 | 05:54<br>21:15 | 06:26<br>21:15      | 07:07<br>20:21      | 07:47 (52)<br>19:21 | 07:46<br>17:24 | 08:31<br>16:56 |  |         |  |          |  |          |
| 6                   | 08:30<br>17:09 | 08:05<br>17:52 | 07:18<br>18:33 |    | 07:16<br>20:17      | 40 | 07:49 (52)<br>20:59 | 06:23<br>21:34 | 05:51<br>21:43 | 05:55<br>21:13 | 06:28<br>21:13      | 07:08<br>20:19      | 07:46 (52)<br>19:19 | 07:48<br>17:23 | 08:32<br>16:55 |  |         |  |          |  |          |
| 7                   | 08:30<br>17:10 | 08:03<br>17:54 | 07:16<br>18:35 |    | 07:14<br>20:19      | 40 | 07:50 (52)<br>21:00 | 06:21<br>21:35 | 05:50<br>21:42 | 05:56<br>21:12 | 06:29<br>21:12      | 07:09<br>20:17      | 07:45 (52)<br>19:17 | 07:49<br>17:21 | 08:34<br>16:55 |  |         |  |          |  |          |
| 8                   | 08:30<br>17:11 | 08:02<br>17:55 | 07:14<br>18:36 |    | 07:12<br>20:20      | 39 | 07:50 (52)<br>21:01 | 06:20<br>21:36 | 05:50<br>21:42 | 05:56<br>21:10 | 06:30<br>21:10      | 07:11<br>20:15      | 07:44 (52)<br>19:15 | 07:51<br>17:20 | 08:35<br>16:55 |  |         |  |          |  |          |
| 9                   | 08:30<br>17:12 | 08:00<br>17:57 | 07:12<br>18:38 |    | 07:10<br>20:21      | 38 | 07:50 (52)<br>21:03 | 06:18<br>21:37 | 05:49<br>21:41 | 05:57<br>21:09 | 06:31<br>21:09      | 07:12<br>20:13      | 07:45 (52)<br>19:13 | 07:52<br>17:18 | 08:36<br>16:55 |  |         |  |          |  |          |
| 10                  | 08:29<br>17:14 | 07:59<br>17:58 | 07:10<br>18:39 |    | 07:09<br>20:23      | 37 | 07:50 (52)<br>21:04 | 06:17<br>21:37 | 05:49<br>21:41 | 05:58<br>21:07 | 06:33<br>21:07      | 07:13<br>20:11      | 07:44 (52)<br>19:11 | 07:53<br>17:17 | 08:37<br>16:55 |  |         |  |          |  |          |
| 11                  | 08:29<br>17:15 | 07:57<br>18:00 | 07:08<br>18:41 |    | 07:07<br>20:24      | 35 | 07:51 (52)<br>21:05 | 06:16<br>21:38 | 05:49<br>21:40 | 05:59<br>21:06 | 06:34<br>21:06      | 07:15<br>20:09      | 07:44 (52)<br>19:09 | 07:55<br>17:16 | 08:40<br>16:55 |  |         |  |          |  |          |
| 12                  | 08:28<br>17:16 | 07:56<br>18:00 | 07:06<br>18:42 |    | 07:05<br>20:26      | 33 | 07:51 (52)<br>21:06 | 06:14<br>21:39 | 05:49<br>21:40 | 06:00<br>21:04 | 06:35<br>21:04      | 07:16<br>20:07      | 07:43 (52)<br>19:07 | 07:56<br>17:14 | 08:41<br>16:55 |  |         |  |          |  |          |
| 13                  | 08:28<br>17:17 | 07:54<br>18:02 | 07:04<br>19:44 |    | 07:03<br>20:27      | 31 | 07:52 (52)<br>21:08 | 06:13<br>21:39 | 05:48<br>21:39 | 06:01<br>21:03 | 06:37<br>21:03      | 07:17<br>20:05      | 07:44 (52)<br>19:05 | 07:58<br>17:13 | 08:43<br>16:55 |  |         |  |          |  |          |
| 14                  | 08:27<br>17:19 | 07:53<br>18:03 | 07:02<br>19:45 |    | 07:01<br>20:28      | 28 | 07:53 (52)<br>21:09 | 06:12<br>21:40 | 05:48<br>21:38 | 06:02<br>21:01 | 06:38<br>21:01      | 07:19<br>20:03      | 07:44 (52)<br>19:03 | 07:59<br>17:12 | 08:44<br>16:55 |  |         |  |          |  |          |
| 15                  | 08:27<br>17:20 | 07:51<br>18:05 | 07:00<br>19:46 |    | 06:59<br>20:30      | 25 | 07:54 (52)<br>21:10 | 06:10<br>21:40 | 05:48<br>21:38 | 06:02<br>20:59 | 06:39<br>20:59      | 07:20<br>20:01      | 07:44 (52)<br>19:01 | 07:03<br>17:11 | 08:45<br>16:55 |  |         |  |          |  |          |
| 16                  | 08:26<br>17:21 | 07:50<br>18:06 | 07:58<br>19:48 |    | 06:57<br>20:31      | 22 | 07:56 (52)<br>21:12 | 06:09<br>21:41 | 05:48<br>21:37 | 06:03<br>20:58 | 06:41<br>20:58      | 07:21<br>19:59      | 07:45 (52)<br>18:58 | 07:02<br>17:10 | 08:46<br>16:55 |  |         |  |          |  |          |
| 17                  | 08:26<br>17:23 | 07:48<br>18:08 | 07:56<br>19:49 |    | 06:55<br>20:32      | 15 | 07:59 (52)<br>21:13 | 06:08<br>21:41 | 05:48<br>21:36 | 06:04<br>20:56 | 06:42<br>20:56      | 07:22<br>19:57      | 07:47 (52)<br>18:56 | 07:03<br>17:09 | 08:47<br>16:55 |  |         |  |          |  |          |
| 18                  | 08:25<br>17:24 | 07:46<br>18:09 | 07:54<br>19:51 |    | 06:53<br>20:34      | 5  | 08:04 (52)<br>21:14 | 06:07<br>21:42 | 05:48<br>21:35 | 06:05<br>20:54 | 06:43<br>20:54      | 07:24<br>19:55      | 07:48 (52)<br>18:54 | 07:05<br>17:08 | 08:48<br>16:55 |  |         |  |          |  |          |
| 19                  | 08:24<br>17:25 | 07:45<br>18:11 | 07:52<br>19:52 |    | 06:52<br>20:35      |    | 08:09 (52)<br>21:15 | 06:05<br>21:42 | 05:48<br>21:35 | 06:07<br>20:53 | 06:44<br>20:53      | 07:25<br>19:53      | 07:49 (52)<br>18:52 | 07:06<br>17:07 | 08:49<br>16:56 |  |         |  |          |  |          |
| 20                  | 08:23<br>17:27 | 07:43<br>18:12 | 07:50<br>19:53 |    | 06:50<br>20:37      |    | 08:04 (52)<br>21:17 | 06:04<br>21:43 | 05:48<br>21:34 | 06:08<br>20:51 | 06:46<br>20:51      | 07:26<br>19:51      | 07:51 (52)<br>18:50 | 07:07<br>17:06 | 08:50<br>16:56 |  |         |  |          |  |          |
| 21                  | 08:23<br>17:28 | 07:41<br>18:14 | 07:48<br>19:55 |    | 06:48<br>20:38      |    | 06:03 (52)<br>21:18 | 05:48<br>21:43 | 06:09<br>21:33 | 06:09<br>20:49 | 06:47<br>20:49      | 07:28<br>19:49      | 07:52 (52)<br>18:48 | 07:08<br>17:05 | 08:51<br>16:56 |  |         |  |          |  |          |
| 22                  | 08:22<br>17:30 | 07:40<br>18:15 | 07:46<br>19:56 |    | 06:46<br>20:39      |    | 06:02 (52)<br>21:19 | 05:48<br>21:43 | 06:10<br>21:32 | 06:10<br>20:47 | 06:48<br>20:47      | 07:29<br>19:47      | 07:54 (52)<br>18:47 | 07:09<br>17:04 | 08:52<br>16:57 |  |         |  |          |  |          |
| 23                  | 08:21<br>17:31 | 07:38<br>18:17 | 07:44<br>19:58 | 13 | 08:07 (52)<br>20:41 |    | 06:01 (52)<br>21:20 | 05:49<br>21:43 | 06:11<br>21:31 | 06:10<br>20:46 | 06:50<br>20:46      | 07:30<br>19:45      | 08:12 (52)<br>18:45 | 07:10<br>17:03 | 08:53<br>16:57 |  |         |  |          |  |          |
| 24                  | 08:20<br>17:33 | 07:36<br>18:18 | 07:42<br>19:59 | 19 | 08:05 (52)<br>20:42 |    | 06:00 (52)<br>21:21 | 05:49<br>21:44 | 06:12<br>21:30 | 06:12<br>20:44 | 06:51<br>20:44      | 07:32<br>19:43      | 08:13 (52)<br>18:43 | 07:11<br>17:02 | 08:54<br>16:58 |  |         |  |          |  |          |
| 25                  | 08:19<br>17:34 | 07:34<br>18:20 | 07:40<br>20:01 | 23 | 08:03 (52)<br>20:44 |    | 06:03 (52)<br>21:22 | 05:49<br>21:44 | 06:13<br>21:29 | 06:13<br>20:42 | 06:52<br>20:42      | 07:33<br>19:41      | 08:14 (52)<br>18:41 | 07:12<br>17:01 | 08:55<br>16:59 |  |         |  |          |  |          |
| 26                  | 08:18<br>17:35 | 07:32<br>18:21 | 07:38<br>20:02 | 26 | 08:01 (52)<br>20:45 |    | 06:04 (52)<br>21:24 | 05:50<br>21:44 | 06:14<br>21:28 | 06:14<br>20:40 | 06:54<br>20:40      | 07:34<br>19:39      | 08:15 (52)<br>18:40 | 07:13<br>17:00 | 08:56<br>16:59 |  |         |  |          |  |          |
| 27                  | 08:17<br>17:37 | 07:31<br>18:23 | 07:36<br>20:03 | 29 | 07:59 (52)<br>20:46 |    | 06:05 (52)<br>21:25 | 05:50<br>21:44 | 06:15<br>21:27 | 06:15<br>20:38 | 06:55<br>20:38      | 07:36<br>19:37      | 08:16 (52)<br>18:38 | 07:14<br>17:00 | 08:57<br>17:00 |  |         |  |          |  |          |
| 28                  | 08:16<br>17:38 | 07:29<br>18:24 | 07:34<br>20:05 | 32 | 07:57 (52)<br>20:48 |    | 06:06 (52)<br>21:26 | 05:50<br>21:44 | 06:16<br>21:25 | 06:16<br>20:36 | 06:56<br>20:36      | 07:37<br>19:35      | 08:17 (52)<br>18:36 | 07:15<br>16:59 | 08:58<br>17:01 |  |         |  |          |  |          |
| 29                  | 08:15<br>17:40 | 07:32<br>18:26 | 07:32<br>20:06 | 35 | 07:55 (52)<br>20:49 |    | 06:07 (52)<br>21:27 | 05:51<br>21:44 | 06:18<br>21:24 | 06:18<br>20:34 | 06:58<br>20:34      | 07:38<br>19:33      | 08:18 (52)<br>18:35 | 07:16<br>16:58 | 08:59<br>17:01 |  |         |  |          |  |          |
| 30                  | 08:14<br>17:42 | 07:30<br>18:28 | 07:30<br>20:07 | 37 | 07:53 (52)<br>20:50 |    | 06:08 (52)<br>21:28 | 05:52<br>21:44 | 06:19<br>21:23 | 06:19<br>20:33 | 06:59<br>20:33      | 07:40<br>19:31      | 08:19 (52)<br>18:33 | 07:17<br>16:58 | 09:00<br>17:02 |  |         |  |          |  |          |
| 31                  | 08:12<br>17:43 | 07:28<br>18:29 | 07:28<br>20:09 | 39 | 07:52 (52)<br>20:51 |    | 06:09 (52)<br>21:29 | 05:54<br>21:44 | 06:20<br>21:22 | 07:00<br>20:31 | 07:52 (52)<br>18:30 | 07:52 (52)<br>18:30 | 08:21 (52)<br>18:32 | 07:18<br>16:59 | 09:01<br>17:03 |  |         |  |          |  |          |
| Potential sun hours | 278            | 286            | 367            |    | 406                 |    | 465                 | 475            | 481            | 442            |                     | 380                 | 340                 | 283            | 266            |  |         |  |          |  |          |
| Total, worst case   |                |                | 253            |    | 590                 |    | 0.58                |                |                |                | 112                 | 745                 |                     |                |                |  |         |  |          |  |          |
| Sun reduction       |                |                | 0.61           |    | 0.58                |    |                     |                |                |                | 0.72                | 0.67                |                     |                |                |  |         |  |          |  |          |
| Oper. time red.     |                |                | 1.00           |    | 1.00                |    |                     |                |                |                | 1.00                | 1.00                |                     |                |                |  |         |  |          |  |          |
| Wind dir. red.      |                |                | 0.68           |    | 0.68                |    |                     |                |                |                | 0.68                | 0.68                |                     |                |                |  |         |  |          |  |          |
| Total reduction     |                |                | 0.42           |    | 0.40                |    |                     |                |                |                | 0.49                | 0.46                |                     |                |                |  |         |  |          |  |          |
| Total, real         |                |                | 105            |    | 233                 |    |                     |                |                |                | 55                  | 340                 |                     |                |                |  |         |  |          |  |          |

Table layout: For each day in each month the following matrix apply

| Day in month | Sun rise (hh:mm) | First time (hh:mm) with flicker | (WTG causing flicker first time) |                                 |
|--------------|------------------|---------------------------------|----------------------------------|---------------------------------|
|              | Sun set (hh:mm)  | Minutes with flicker            | Last time (hh:mm) with flicker   | (WTG causing flicker last time) |



Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: R100 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (90)

Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Reference year for calendar

2023

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

|                     | [January       | [February           | [March         | [April         | [May           | [June               | [July          | [August        | [September     | [October       | [November      | [December      |                |                     |
|---------------------|----------------|---------------------|----------------|----------------|----------------|---------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
| 1                   | 08:30<br>17:04 | 09:11 (56)<br>17:45 | 08:11<br>18:26 | 07:27<br>20:10 | 06:31<br>20:52 | 19:55 (42)<br>20:52 | 05:53<br>21:30 | 05:52<br>21:44 | 06:21<br>21:20 | 07:01<br>19:29 | 07:41<br>18:30 | 08:25<br>16:57 | 08:08<br>16:57 | 09:07 (56)<br>16:57 |
| 2                   | 08:31<br>17:05 | 09:12 (56)<br>17:46 | 08:10<br>18:27 | 07:25<br>20:12 | 06:29<br>20:53 | 19:55 (42)<br>20:53 | 05:53<br>21:31 | 05:52<br>21:44 | 06:23<br>21:19 | 07:03<br>19:27 | 07:42<br>18:28 | 08:26<br>16:57 | 08:09<br>16:57 | 09:04 (56)<br>16:57 |
| 3                   | 08:31<br>17:06 | 09:13 (56)<br>17:48 | 08:09<br>18:29 | 07:23<br>20:13 | 06:27<br>20:54 | 19:57 (42)<br>20:54 | 05:53<br>21:32 | 05:52<br>21:43 | 06:24<br>21:18 | 07:04<br>19:25 | 07:44<br>18:27 | 08:28<br>16:56 | 08:10<br>16:56 | 09:03 (56)<br>16:56 |
| 4                   | 08:30<br>17:07 | 09:13 (56)<br>17:49 | 08:07<br>18:30 | 07:21<br>20:14 | 06:26<br>20:56 | 19:59 (42)<br>20:56 | 05:52<br>21:33 | 05:54<br>21:43 | 06:25<br>21:16 | 07:05<br>19:23 | 07:45<br>18:25 | 08:29<br>16:56 | 08:11<br>16:56 | 09:02 (56)<br>16:56 |
| 5                   | 08:30<br>17:08 | 09:14 (56)<br>17:51 | 08:06<br>18:32 | 07:19<br>20:16 | 06:24<br>20:57 | 20:03 (42)<br>20:57 | 05:51<br>21:33 | 05:54<br>21:43 | 06:26<br>21:15 | 07:07<br>19:21 | 07:46<br>17:24 | 08:31<br>16:56 | 08:13<br>16:56 | 09:02 (56)<br>16:56 |
| 6                   | 08:30<br>17:09 | 09:15 (56)<br>17:52 | 08:05<br>18:33 | 07:17<br>20:17 | 06:23<br>20:59 | 20:08 (42)<br>20:59 | 05:51<br>21:34 | 05:55<br>21:43 | 06:28<br>21:13 | 07:08<br>19:19 | 07:48<br>17:22 | 08:32<br>16:55 | 08:14<br>16:55 | 09:02 (56)<br>16:55 |
| 7                   | 08:30<br>17:10 | 09:16 (56)<br>17:54 | 08:03<br>18:35 | 07:16<br>20:19 | 06:21<br>21:00 | 20:09 (42)<br>21:00 | 05:50<br>21:35 | 05:56<br>21:42 | 06:29<br>21:12 | 07:09<br>19:17 | 07:49<br>17:21 | 08:34<br>16:55 | 08:15<br>16:55 | 09:02 (56)<br>16:55 |
| 8                   | 08:30<br>17:11 | 09:16 (56)<br>17:55 | 08:02<br>18:36 | 07:14<br>20:20 | 06:20<br>21:01 | 20:10 (42)<br>21:01 | 05:50<br>21:36 | 05:56<br>21:42 | 06:30<br>21:10 | 07:11<br>19:15 | 07:51<br>17:20 | 08:35<br>16:55 | 08:16<br>16:55 | 09:01 (56)<br>16:55 |
| 9                   | 08:30<br>17:12 | 09:18 (56)<br>17:57 | 08:00<br>18:38 | 07:12<br>20:21 | 06:18<br>21:03 | 20:11 (42)<br>21:03 | 05:49<br>21:37 | 05:57<br>21:41 | 06:31<br>21:09 | 07:12<br>19:13 | 07:52<br>17:18 | 08:37<br>16:55 | 08:17<br>16:55 | 09:01 (56)<br>16:55 |
| 10                  | 08:29<br>17:14 | 09:19 (56)<br>17:58 | 07:59<br>18:39 | 07:10<br>20:23 | 06:17<br>21:04 | 20:12 (42)<br>21:04 | 05:49<br>21:38 | 05:58<br>21:41 | 06:33<br>21:07 | 07:13<br>19:11 | 07:53<br>17:17 | 08:38<br>16:55 | 08:18<br>16:55 | 09:01 (56)<br>16:55 |
| 11                  | 08:29<br>17:15 | 09:21 (56)<br>18:00 | 07:57<br>18:41 | 07:07<br>20:24 | 06:16<br>21:05 | 20:13 (42)<br>21:05 | 05:49<br>21:38 | 05:59<br>21:40 | 06:34<br>21:06 | 07:14<br>19:09 | 07:54<br>17:16 | 08:39<br>16:54 | 08:19<br>16:54 | 09:01 (56)<br>16:54 |
| 12                  | 08:28<br>17:16 | 09:23 (56)<br>18:00 | 07:56<br>18:42 | 07:05<br>20:26 | 06:14<br>21:06 | 20:14 (42)<br>21:06 | 05:48<br>21:39 | 06:00<br>21:40 | 06:35<br>21:04 | 07:15<br>19:07 | 07:55<br>17:14 | 08:40<br>16:54 | 08:20<br>16:54 | 09:02 (56)<br>16:54 |
| 13                  | 08:28<br>17:17 | 09:24 (56)<br>18:01 | 07:54<br>18:43 | 07:03<br>20:27 | 06:13<br>21:08 | 20:15 (42)<br>21:08 | 05:48<br>21:39 | 06:00<br>21:03 | 06:37<br>21:09 | 07:17<br>19:05 | 07:57<br>17:13 | 08:41<br>16:54 | 08:21<br>16:54 | 09:02 (56)<br>16:54 |
| 14                  | 08:27<br>17:19 | 09:25 (56)<br>18:02 | 07:53<br>18:44 | 07:01<br>20:28 | 06:11<br>21:09 | 20:16 (42)<br>21:09 | 05:48<br>21:38 | 06:01<br>21:01 | 06:38<br>21:04 | 07:18<br>19:03 | 07:59<br>17:12 | 08:42<br>16:55 | 08:22<br>16:55 | 09:02 (56)<br>16:55 |
| 15                  | 08:27<br>17:20 | 09:26 (56)<br>18:03 | 07:51<br>18:45 | 06:59<br>20:30 | 06:10<br>21:10 | 20:17 (42)<br>21:10 | 05:48<br>21:38 | 06:02<br>21:09 | 06:39<br>21:05 | 07:20<br>19:01 | 08:00<br>17:11 | 08:43<br>16:55 | 08:23<br>16:55 | 09:03 (56)<br>16:55 |
| 16                  | 08:26<br>17:21 | 09:27 (56)<br>18:04 | 07:50<br>18:46 | 06:57<br>20:31 | 06:09<br>21:12 | 20:18 (42)<br>21:12 | 05:48<br>21:41 | 06:03<br>21:37 | 06:40<br>21:08 | 07:21<br>19:00 | 08:02<br>17:09 | 08:44<br>16:55 | 08:24<br>16:55 | 09:03 (56)<br>16:55 |
| 17                  | 08:26<br>17:22 | 09:28 (56)<br>18:05 | 07:49<br>18:47 | 06:55<br>20:32 | 06:08<br>21:13 | 20:19 (42)<br>21:13 | 05:48<br>21:41 | 06:04<br>21:36 | 06:42<br>21:06 | 07:22<br>19:00 | 08:03<br>17:07 | 08:45<br>16:55 | 08:25<br>16:55 | 09:03 (56)<br>16:55 |
| 18                  | 08:25<br>17:23 | 09:29 (56)<br>18:06 | 07:47<br>18:48 | 06:53<br>20:33 | 06:07<br>21:14 | 20:20 (42)<br>21:14 | 05:48<br>21:41 | 06:05<br>21:36 | 06:43<br>21:05 | 07:23<br>19:00 | 08:04<br>17:06 | 08:46<br>16:55 | 08:26<br>16:55 | 09:04 (56)<br>16:55 |
| 19                  | 08:24<br>17:24 | 09:30 (56)<br>18:07 | 07:45<br>18:49 | 06:51<br>20:34 | 06:05<br>21:15 | 20:21 (42)<br>21:15 | 05:48<br>21:42 | 06:06<br>21:35 | 06:44<br>21:03 | 07:24<br>19:00 | 08:05<br>17:05 | 08:47<br>16:55 | 08:27<br>16:55 | 09:04 (56)<br>16:55 |
| 20                  | 08:23<br>17:25 | 09:31 (56)<br>18:08 | 07:43<br>18:50 | 06:50<br>20:35 | 06:04<br>21:16 | 20:22 (42)<br>21:16 | 05:48<br>21:42 | 06:07<br>21:35 | 06:46<br>21:02 | 07:25<br>19:00 | 08:06<br>17:04 | 08:48<br>16:55 | 08:28<br>16:55 | 09:05 (56)<br>16:55 |
| 21                  | 08:23<br>17:26 | 09:32 (56)<br>18:09 | 07:42<br>18:51 | 06:48<br>20:36 | 06:03<br>21:17 | 20:23 (42)<br>21:17 | 05:48<br>21:43 | 06:08<br>21:34 | 06:47<br>21:01 | 07:26<br>19:00 | 08:07<br>17:03 | 08:49<br>16:55 | 08:29<br>16:55 | 09:05 (56)<br>16:55 |
| 22                  | 08:22<br>17:27 | 09:33 (56)<br>18:10 | 07:41<br>18:52 | 06:46<br>20:37 | 06:02<br>21:18 | 20:24 (42)<br>21:18 | 05:48<br>21:43 | 06:10<br>21:33 | 06:48<br>21:00 | 07:27<br>19:00 | 08:08<br>17:02 | 08:50<br>16:55 | 08:30<br>16:55 | 09:06 (56)<br>16:55 |
| 23                  | 08:21<br>17:28 | 09:34 (56)<br>18:11 | 07:40<br>18:53 | 06:44<br>20:38 | 06:01<br>21:19 | 20:25 (42)<br>21:19 | 05:49<br>21:44 | 06:11<br>21:32 | 06:50<br>21:00 | 07:28<br>19:00 | 08:09<br>17:01 | 08:51<br>16:55 | 08:31<br>16:55 | 09:06 (56)<br>16:55 |
| 24                  | 08:20<br>17:29 | 09:35 (56)<br>18:12 | 07:39<br>18:54 | 06:43<br>20:39 | 06:00<br>21:20 | 20:26 (42)<br>21:20 | 05:49<br>21:44 | 06:12<br>21:30 | 06:51<br>21:00 | 07:29<br>19:00 | 08:10<br>17:00 | 08:52<br>16:55 | 08:32<br>16:55 | 09:07 (56)<br>16:55 |
| 25                  | 08:19<br>17:30 | 09:36 (56)<br>18:13 | 07:38<br>18:55 | 06:42<br>20:40 | 05:59<br>21:21 | 20:27 (42)<br>21:21 | 05:49<br>21:44 | 06:13<br>21:30 | 06:52<br>21:00 | 07:30<br>19:00 | 08:11<br>17:00 | 08:53<br>16:55 | 08:33<br>16:55 | 09:07 (56)<br>16:55 |
| 26                  | 08:18<br>17:31 | 09:37 (56)<br>18:14 | 07:37<br>18:56 | 06:41<br>20:41 | 05:58<br>21:22 | 20:28 (42)<br>21:22 | 05:50<br>21:44 | 06:14<br>21:29 | 06:54<br>21:00 | 07:31<br>19:00 | 08:12<br>17:00 | 08:54<br>16:55 | 08:34<br>16:55 | 09:08 (56)<br>16:55 |
| 27                  | 08:17<br>17:32 | 09:38 (56)<br>18:15 | 07:36<br>18:57 | 06:40<br>20:42 | 05:57<br>21:23 | 20:29 (42)<br>21:23 | 05:50<br>21:44 | 06:15<br>21:28 | 06:55<br>21:00 | 07:32<br>19:00 | 08:13<br>17:00 | 08:55<br>16:55 | 08:35<br>16:55 | 09:08 (56)<br>16:55 |
| 28                  | 08:16<br>17:33 | 09:39 (56)<br>18:16 | 07:35<br>18:58 | 06:39<br>20:43 | 05:56<br>21:24 | 20:30 (42)<br>21:24 | 05:50<br>21:44 | 06:16<br>21:25 | 06:56<br>21:00 | 07:33<br>19:00 | 08:14<br>17:00 | 08:56<br>16:55 | 08:36<br>16:55 | 09:09 (56)<br>16:55 |
| 29                  | 08:15<br>17:40 | 09:40 (56)<br>18:17 | 07:34<br>19:00 | 06:38<br>20:44 | 05:55<br>21:25 | 20:31 (42)<br>21:25 | 05:51<br>21:44 | 06:18<br>21:24 | 06:58<br>21:00 | 07:34<br>19:00 | 08:15<br>17:00 | 08:57<br>16:55 | 08:37<br>16:55 | 09:10 (56)<br>16:55 |
| 30                  | 08:14<br>17:41 | 09:41 (56)<br>18:18 | 07:33<br>19:01 | 06:37<br>20:45 | 05:54<br>21:26 | 20:32 (42)<br>21:26 | 05:51<br>21:44 | 06:19<br>21:23 | 06:59<br>21:00 | 07:35<br>19:00 | 08:16<br>17:00 | 08:58<br>16:55 | 08:38<br>16:55 | 09:11 (56)<br>16:55 |
| 31                  | 08:12<br>17:43 | 09:42 (56)<br>18:19 | 07:32<br>19:02 | 06:36<br>20:46 | 05:53<br>21:27 | 20:33 (42)<br>21:27 | 05:51<br>21:44 | 06:20<br>21:23 | 07:00<br>21:00 | 07:36<br>19:00 | 08:17<br>17:00 | 08:59<br>16:55 | 08:39<br>16:55 | 09:12 (56)<br>16:55 |
| Potential sun hours | 278            | 231                 | 286            | 367            | 406            | 465                 | 475            | 481            | 442            | 380            | 340            | 283            | 266            | 712                 |
| Total, worst case   |                | 0.54                |                |                | 0.58           |                     |                |                | 0.72           |                |                |                |                | 0.45                |
| Sun reduction       |                | 1.00                |                |                | 1.00           |                     |                |                | 1.00           |                |                |                |                | 1.00                |
| Oper. time red.     |                | 0.65                |                |                | 0.68           |                     |                |                | 0.68           |                |                |                |                | 0.65                |
| Wind dir. red.      |                | 0.35                |                |                | 0.39           |                     |                |                | 0.43           |                |                |                |                | 0.29                |
| Total reduction     |                | 81                  |                |                | 145            |                     |                |                | 219            |                |                |                |                | 208                 |

Table layout: For each day in each month the following matrix apply

|              |                  |                                 |                                  |
|--------------|------------------|---------------------------------|----------------------------------|
| Day in month | Sun rise (hh:mm) | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|              | Sun set (hh:mm)  | Minutes with flicker            | Last time (hh:mm) with flicker   |
|              |                  |                                 | (WTG causing flicker last time)  |

Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023 Shadow receptor: R101 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (91)

## Assumptions for shadow calculations

Reference year for calendar

2023

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

|                     | January | February | March | April      | May        | June  |
|---------------------|---------|----------|-------|------------|------------|-------|
| 1                   | 08:30   | 08:11    | 07:27 | 07:26      | 19:25 (42) | 06:31 |
|                     | 17:04   | 17:44    | 18:26 | 20:10      | 19:48 (42) | 20:52 |
| 2                   | 08:31   | 08:10    | 07:25 | 07:24      | 19:25 (42) | 06:29 |
|                     | 17:05   | 17:46    | 18:27 | 20:12      | 19:47 (42) | 20:53 |
| 3                   | 08:31   | 08:09    | 07:23 | 07:22      | 19:26 (42) | 06:27 |
|                     | 17:06   | 17:48    | 18:29 | 20:13      | 19:45 (42) | 20:54 |
| 4                   | 08:30   | 08:07    | 07:21 | 07:20      | 19:27 (42) | 06:26 |
|                     | 17:07   | 17:49    | 18:30 | 20:14      | 19:44 (42) | 20:56 |
| 5                   | 08:30   | 08:06    | 07:19 | 07:18      | 19:29 (42) | 06:24 |
|                     | 17:08   | 17:51    | 18:32 | 20:16      | 19:41 (42) | 20:57 |
| 6                   | 08:30   | 08:05    | 07:17 | 07:16      | 19:34 (42) | 06:23 |
|                     | 17:09   | 17:52    | 18:33 | 20:17      | 19:36 (42) | 20:59 |
| 7                   | 08:30   | 08:03    | 07:16 | 07:14      |            | 06:21 |
|                     | 17:10   | 17:54    | 18:35 | 20:19      |            | 21:00 |
| 8                   | 08:30   | 08:02    | 07:14 | 07:12      |            | 06:20 |
|                     | 17:11   | 17:55    | 18:36 | 20:20      |            | 21:01 |
| 9                   | 08:30   | 08:00    | 07:12 | 07:10      |            | 06:18 |
|                     | 17:12   | 17:57    | 18:38 | 20:21      |            | 21:03 |
| 10                  | 08:29   | 07:59    | 07:10 | 07:08      |            | 06:17 |
|                     | 17:13   | 17:58    | 18:39 | 20:23      |            | 21:04 |
| 11                  | 08:29   | 07:57    | 07:08 | 07:07      |            | 06:16 |
|                     | 17:15   | 18:00    | 18:41 | 20:24      |            | 21:05 |
| 12                  | 08:28   | 07:56    | 08:06 | 07:05      |            | 06:14 |
|                     | 17:16   | 18:00    | 18:42 | 20:25      |            | 21:06 |
| 13                  | 08:28   | 07:54    | 08:04 | 07:03      |            | 06:13 |
|                     | 17:17   | 18:01    | 19:43 | 20:27      |            | 21:08 |
| 14                  | 08:27   | 07:53    | 08:02 | 07:01      |            | 06:11 |
|                     | 17:18   | 18:03    | 19:45 | 20:28      |            | 21:09 |
| 15                  | 08:27   | 07:51    | 08:00 | 06:59      |            | 06:10 |
|                     | 17:20   | 18:05    | 19:46 | 20:30      |            | 21:10 |
| 16                  | 08:26   | 07:50    | 07:58 | 06:57      |            | 06:09 |
|                     | 17:21   | 18:06    | 19:48 | 20:31      |            | 21:12 |
| 17                  | 08:26   | 07:48    | 07:56 | 06:55      |            | 06:08 |
|                     | 17:22   | 18:08    | 19:49 | 20:32      |            | 21:13 |
| 18                  | 08:25   | 07:46    | 07:54 | 06:53      |            | 06:07 |
|                     | 17:24   | 18:09    | 19:51 | 20:34      |            | 21:14 |
| 19                  | 08:24   | 07:45    | 07:52 | 06:51      |            | 06:05 |
|                     | 17:25   | 18:11    | 19:52 | 20:35      |            | 21:15 |
| 20                  | 08:23   | 07:43    | 07:50 | 06:50      |            | 06:04 |
|                     | 17:27   | 18:12    | 19:53 | 20:37      |            | 21:17 |
| 21                  | 08:23   | 07:41    | 07:48 | 06:48      |            | 06:03 |
|                     | 17:28   | 18:14    | 19:55 | 20:38      |            | 21:18 |
| 22                  | 08:22   | 07:39    | 07:46 | 19:32 (42) | 06:46      | 06:02 |
|                     | 17:30   | 18:15    | 19:56 | 19:36 (42) | 20:39      | 21:19 |
| 23                  | 08:21   | 07:38    | 07:44 | 19:30 (42) | 06:44      | 06:01 |
|                     | 17:31   | 18:17    | 19:58 | 19:37 (42) | 20:41      | 21:20 |
| 24                  | 08:20   | 07:36    | 07:42 | 19:28 (42) | 06:42      | 06:00 |
|                     | 17:32   | 18:18    | 19:59 | 19:39 (42) | 20:42      | 21:21 |
| 25                  | 08:19   | 07:34    | 07:40 | 19:27 (42) | 06:41      | 05:59 |
|                     | 17:34   | 18:20    | 20:00 | 19:40 (42) | 20:43      | 21:22 |
| 26                  | 08:18   | 07:32    | 07:38 | 19:26 (42) | 06:39      | 05:58 |
|                     | 17:35   | 18:21    | 20:02 | 19:41 (42) | 20:45      | 21:24 |
| 27                  | 08:17   | 07:31    | 07:36 | 19:25 (42) | 06:37      | 05:57 |
|                     | 17:37   | 18:23    | 20:03 | 19:43 (42) | 20:46      | 21:25 |
| 28                  | 08:16   | 07:29    | 07:34 | 19:25 (42) | 06:36      | 05:56 |
|                     | 17:38   | 18:24    | 20:05 | 19:44 (42) | 20:48      | 21:26 |
| 29                  | 08:15   |          | 07:32 | 19:24 (42) | 06:34      | 05:56 |
|                     | 17:40   |          | 20:06 | 19:46 (42) | 20:49      | 21:27 |
| 30                  | 08:14   |          | 07:30 | 19:24 (42) | 06:32      | 05:55 |
|                     | 17:41   |          | 20:07 | 19:47 (42) | 20:50      | 21:28 |
| 31                  | 08:12   |          | 07:28 | 19:24 (42) |            | 05:54 |
|                     | 17:43   |          | 20:09 | 19:48 (42) |            | 21:29 |
| Potential sun hours | 278     | 286      | 367   | 406        | 465        | 475   |
| Total, worst case   |         |          | 156   | 95         | 738        | 1311  |
| Sun reduction       |         |          | 0.61  | 0.58       | 0.64       | 0.67  |
| Oper. time red.     |         |          | 1.00  | 1.00       | 1.00       | 1.00  |
| Wind dir. red.      |         |          | 0.68  | 0.68       | 0.67       | 0.67  |
| Total reduction     |         |          | 0.42  | 0.40       | 0.43       | 0.45  |
| Total, real         |         |          | 65    | 38         | 316        | 587   |

Table layout: For each day in each month the following matrix apply

|              |                      |                                 |                                  |
|--------------|----------------------|---------------------------------|----------------------------------|
| Day in month | Sun rise (hh:mm)     | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|              | Sun set (hh:mm)      | Last time (hh:mm) with flicker  | (WTG causing flicker last time)  |
|              | Minutes with flicker |                                 |                                  |



Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

## Assumptions for shadow calculations

Reference year for calendar

2023

Shadow receptor: R101 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (91)

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

| Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  |
|------|------|------|------|------|------|------|------|------|------|------|------|
| 0.54 | 0.52 | 0.61 | 0.58 | 0.64 | 0.67 | 0.75 | 0.72 | 0.67 | 0.53 | 0.42 | 0.45 |

Operational time

| N   | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW | NW  | NNW | Sum   |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| 376 | 314 | 339 | 425 | 445 | 474 | 693 | 570 | 488 | 386 | 872 | 609 | 772 | 651 | 677 | 667 | 8,758 |

| July                |       | August        |       | September     |       | October       |       | November |       | December |  |
|---------------------|-------|---------------|-------|---------------|-------|---------------|-------|----------|-------|----------|--|
| 1                   | 05:52 | 20:21 (43)    | 06:21 | 20:32 (43)    | 07:01 | 07:41         | 08:25 | 08:08    |       |          |  |
|                     | 21:44 | 43 21:04 (43) | 21:20 | 22 20:54 (43) | 20:29 | 19:29         | 18:30 | 16:57    |       |          |  |
| 2                   | 05:52 | 20:21 (43)    | 06:23 | 20:35 (43)    | 07:03 | 07:42         | 08:26 | 08:09    |       |          |  |
|                     | 21:44 | 44 21:05 (43) | 21:19 | 19 20:54 (43) | 20:27 | 19:27         | 18:28 | 16:57    |       |          |  |
| 3                   | 05:53 | 20:21 (43)    | 06:24 | 20:37 (43)    | 07:04 | 07:44         | 08:28 | 08:10    |       |          |  |
|                     | 21:43 | 44 21:05 (43) | 21:18 | 16 20:53 (43) | 20:25 | 19:25         | 18:27 | 16:56    |       |          |  |
| 4                   | 05:54 | 20:21 (43)    | 06:25 | 20:39 (43)    | 07:05 | 07:45         | 08:29 | 08:11    |       |          |  |
|                     | 21:43 | 44 21:05 (43) | 21:16 | 12 20:51 (43) | 20:23 | 19:23         | 18:25 | 16:56    |       |          |  |
| 5                   | 05:54 | 20:22 (43)    | 06:26 |               | 07:07 | 07:46         | 07:31 | 08:13    |       |          |  |
|                     | 21:43 | 44 21:06 (43) | 21:15 |               | 20:21 | 19:21         | 17:24 | 16:56    |       |          |  |
| 6                   | 05:55 | 20:21 (43)    | 06:28 |               | 07:08 | 07:48         | 07:32 | 08:14    |       |          |  |
|                     | 21:43 | 44 21:05 (43) | 21:13 |               | 20:19 | 19:19         | 17:22 | 16:55    |       |          |  |
| 7                   | 05:56 | 20:22 (43)    | 06:29 |               | 07:09 | 07:49         | 07:34 | 08:15    |       |          |  |
|                     | 21:42 | 44 21:06 (43) | 21:12 |               | 20:17 | 19:17         | 17:21 | 16:55    |       |          |  |
| 8                   | 05:56 | 20:22 (43)    | 06:30 |               | 07:11 | 19:26 (42)    | 07:51 | 07:35    | 08:16 |          |  |
|                     | 21:42 | 44 21:06 (43) | 21:10 |               | 20:15 | 8 19:34 (42)  | 19:15 | 17:20    | 16:55 |          |  |
| 9                   | 05:57 | 20:23 (43)    | 06:31 |               | 07:12 | 19:23 (42)    | 07:52 | 07:37    | 08:17 |          |  |
|                     | 21:41 | 44 21:07 (43) | 21:09 |               | 20:13 | 14 19:37 (42) | 19:13 | 17:18    | 16:55 |          |  |
| 10                  | 05:58 | 20:22 (43)    | 06:33 |               | 07:13 | 19:21 (42)    | 07:53 | 07:38    | 08:18 |          |  |
|                     | 21:41 | 44 21:06 (43) | 21:07 |               | 20:11 | 18 19:39 (42) | 19:11 | 17:17    | 16:55 |          |  |
| 11                  | 05:59 | 20:22 (43)    | 06:34 |               | 07:15 | 19:19 (42)    | 07:55 | 07:40    | 08:19 |          |  |
|                     | 21:40 | 44 21:06 (43) | 21:06 |               | 20:09 | 20 19:39 (42) | 19:09 | 17:16    | 16:54 |          |  |
| 12                  | 06:00 | 20:23 (43)    | 06:35 |               | 07:16 | 19:17 (42)    | 07:56 | 07:41    | 08:20 |          |  |
|                     | 21:40 | 44 21:07 (43) | 21:04 |               | 20:07 | 23 19:40 (42) | 19:07 | 17:14    | 16:54 |          |  |
| 13                  | 06:01 | 20:23 (43)    | 06:37 |               | 07:17 | 19:17 (42)    | 07:57 | 07:43    | 08:21 |          |  |
|                     | 21:39 | 44 21:07 (43) | 21:03 |               | 20:05 | 24 19:41 (42) | 19:05 | 17:13    | 16:54 |          |  |
| 14                  | 06:01 | 20:23 (43)    | 06:38 |               | 07:18 | 19:16 (42)    | 07:59 | 07:44    | 08:22 |          |  |
|                     | 21:38 | 44 21:07 (43) | 21:01 |               | 20:03 | 23 19:39 (42) | 19:03 | 17:12    | 16:55 |          |  |
| 15                  | 06:02 | 20:24 (43)    | 06:39 |               | 07:20 | 19:15 (42)    | 08:00 | 07:46    | 08:23 |          |  |
|                     | 21:38 | 43 21:07 (43) | 20:59 |               | 20:01 | 22 19:37 (42) | 19:01 | 17:11    | 16:55 |          |  |
| 16                  | 06:03 | 20:23 (43)    | 06:40 |               | 07:21 | 19:14 (42)    | 08:02 | 07:47    | 08:23 |          |  |
|                     | 21:37 | 43 21:06 (43) | 20:58 |               | 19:59 | 21 19:35 (42) | 18:58 | 17:10    | 16:55 |          |  |
| 17                  | 06:04 | 20:23 (43)    | 06:42 |               | 07:22 | 19:14 (42)    | 08:03 | 07:49    | 08:24 |          |  |
|                     | 21:36 | 43 21:06 (43) | 20:56 |               | 19:57 | 19 19:33 (42) | 18:56 | 17:09    | 16:55 |          |  |
| 18                  | 06:05 | 20:24 (43)    | 06:43 |               | 07:24 | 19:14 (42)    | 08:05 | 07:50    | 08:25 |          |  |
|                     | 21:35 | 42 21:06 (43) | 20:54 |               | 19:55 | 17 19:31 (42) | 18:54 | 17:07    | 16:55 |          |  |
| 19                  | 06:06 | 20:24 (43)    | 06:44 |               | 07:25 | 19:14 (42)    | 08:06 | 07:52    | 08:26 |          |  |
|                     | 21:35 | 42 21:06 (43) | 20:53 |               | 19:53 | 15 19:29 (42) | 18:52 | 17:06    | 16:56 |          |  |
| 20                  | 06:07 | 20:24 (43)    | 06:46 |               | 07:26 | 19:15 (42)    | 08:07 | 07:53    | 08:26 |          |  |
|                     | 21:34 | 42 21:06 (43) | 20:51 |               | 19:51 | 12 19:27 (42) | 18:50 | 17:05    | 16:56 |          |  |
| 21                  | 06:09 | 20:24 (43)    | 06:47 |               | 07:28 | 19:15 (42)    | 08:09 | 07:54    | 08:27 |          |  |
|                     | 21:33 | 42 21:06 (43) | 20:49 |               | 19:49 | 10 19:25 (42) | 18:48 | 17:05    | 16:56 |          |  |
| 22                  | 06:10 | 20:25 (43)    | 06:48 |               | 07:29 | 19:16 (42)    | 08:10 | 07:56    | 08:27 |          |  |
|                     | 21:32 | 40 21:05 (43) | 20:47 |               | 19:47 | 7 19:23 (42)  | 18:47 | 17:04    | 16:57 |          |  |
| 23                  | 06:11 | 20:25 (43)    | 06:50 |               | 07:30 | 19:18 (42)    | 08:12 | 07:57    | 08:28 |          |  |
|                     | 21:31 | 39 21:04 (43) | 20:45 |               | 19:45 | 2 19:20 (42)  | 18:45 | 17:03    | 16:57 |          |  |
| 24                  | 06:12 | 20:27 (43)    | 06:51 |               | 07:32 |               | 08:13 | 07:59    | 08:28 |          |  |
|                     | 21:30 | 37 21:04 (43) | 20:44 |               | 19:43 |               | 18:43 | 17:02    | 16:58 |          |  |
| 25                  | 06:13 | 20:27 (43)    | 06:52 |               | 07:33 |               | 08:15 | 08:00    | 08:29 |          |  |
|                     | 21:29 | 36 21:03 (43) | 20:42 |               | 19:41 |               | 18:41 | 17:01    | 16:58 |          |  |
| 26                  | 06:14 | 20:28 (43)    | 06:54 |               | 07:34 |               | 08:16 | 08:01    | 08:29 |          |  |
|                     | 21:28 | 34 21:02 (43) | 20:40 |               | 19:39 |               | 18:40 | 17:00    | 16:59 |          |  |
| 27                  | 06:15 | 20:28 (43)    | 06:55 |               | 07:36 |               | 08:18 | 08:03    | 08:29 |          |  |
|                     | 21:26 | 33 21:01 (43) | 20:38 |               | 19:37 |               | 18:38 | 17:00    | 17:00 |          |  |
| 28                  | 06:16 | 20:29 (43)    | 06:56 |               | 07:37 |               | 08:19 | 08:04    | 08:30 |          |  |
|                     | 21:25 | 31 21:00 (43) | 20:36 |               | 19:35 |               | 18:36 | 16:59    | 17:00 |          |  |
| 29                  | 06:18 | 20:30 (43)    | 06:58 |               | 07:38 |               | 08:21 | 08:05    | 08:30 |          |  |
|                     | 21:24 | 28 20:58 (43) | 20:34 |               | 19:33 |               | 18:35 | 16:58    | 17:01 |          |  |
| 30                  | 06:19 | 20:30 (43)    | 06:59 |               | 07:40 |               | 08:22 | 08:07    | 08:30 |          |  |
|                     | 21:23 | 27 20:57 (43) | 20:33 |               | 19:31 |               | 18:33 | 16:58    | 17:02 |          |  |
| 31                  | 06:20 | 20:31 (43)    | 07:00 |               |       |               | 08:24 |          | 08:30 |          |  |
|                     | 21:22 | 25 20:56 (43) | 20:31 |               |       |               | 18:32 |          | 17:03 |          |  |
| Potential sun hours | 481   |               | 442   |               | 380   |               | 340   | 283      | 266   |          |  |
| Total, worst case   | 1242  |               | 69    |               | 255   |               |       |          |       |          |  |
| Sun reduction       | 0.75  |               | 0.72  |               | 0.67  |               |       |          |       |          |  |
| Oper. time red.     | 1.00  |               | 1.00  |               | 1.00  |               |       |          |       |          |  |
| Wind dir. red.      | 0.67  |               | 0.67  |               | 0.68  |               |       |          |       |          |  |
| Total reduction     | 0.50  |               | 0.48  |               | 0.46  |               |       |          |       |          |  |
| Total, real         | 623   |               | 33    |               | 116   |               |       |          |       |          |  |

Table layout: For each day in each month the following matrix apply

| Day in month | Sun rise (hh:mm) | Sun set (hh:mm) | Minutes with flicker | First time (hh:mm) with flicker | Last time (hh:mm) with flicker | (WTG causing flicker first time) | (WTG causing flicker last time) |
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|

Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: R102 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 90.0° (92)

### Assumptions for shadow calculations

Reference year for calendar

2023

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

|                     | January        | February       | March          | April          | May            | June           | July           | August         | September      | October                  | November       | December       |
|---------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|--------------------------|----------------|----------------|
| 1                   | 08:30<br>17:04 | 08:11<br>17:44 | 07:27<br>18:26 | 07:26<br>20:10 | 06:31<br>20:52 | 05:53<br>21:30 | 05:52<br>21:44 | 06:21<br>21:20 | 07:01<br>20:29 | 07:26 (66)<br>07:35 (66) | 07:41<br>19:29 | 08:25<br>18:30 |
| 2                   | 08:30<br>17:05 | 08:10<br>17:46 | 07:25<br>18:27 | 07:24<br>20:12 | 06:29<br>20:53 | 05:53<br>21:31 | 05:52<br>21:44 | 06:22<br>21:19 | 07:03<br>20:27 | 07:28 (66)<br>07:34 (66) | 07:42<br>19:27 | 08:26<br>18:28 |
| 3                   | 08:30<br>17:06 | 08:09<br>17:47 | 07:23<br>18:29 | 07:22<br>20:13 | 06:27<br>20:54 | 05:52<br>21:32 | 05:53<br>21:43 | 06:24<br>21:18 | 07:04<br>20:25 | 07:29 (66)<br>07:32 (66) | 07:44<br>19:25 | 08:28<br>18:27 |
| 4                   | 08:30<br>17:07 | 08:07<br>17:49 | 07:21<br>18:30 | 07:20<br>20:14 | 06:26<br>20:56 | 05:52<br>21:32 | 05:53<br>21:43 | 06:25<br>21:16 | 07:05<br>20:23 |                          | 07:45<br>19:23 | 08:29<br>18:25 |
| 5                   | 08:30<br>17:08 | 08:06<br>17:51 | 07:19<br>18:32 | 07:18<br>20:16 | 06:24<br>20:57 | 05:51<br>21:33 | 05:54<br>21:43 | 06:26<br>21:15 | 07:07<br>20:21 |                          | 07:46<br>19:21 | 07:31<br>18:24 |
| 6                   | 08:30<br>17:09 | 08:05<br>17:52 | 07:17<br>18:33 | 07:16<br>20:17 | 06:23<br>20:58 | 05:50<br>21:34 | 05:55<br>21:42 | 06:27<br>21:13 | 07:08<br>20:19 |                          | 07:48<br>19:19 | 07:32<br>18:22 |
| 7                   | 08:30<br>17:10 | 08:03<br>17:54 | 07:15<br>18:35 | 07:14<br>20:18 | 06:21<br>21:00 | 05:50<br>21:35 | 05:56<br>21:42 | 06:29<br>21:12 | 07:09<br>20:17 |                          | 07:49<br>19:17 | 07:34<br>18:21 |
| 8                   | 08:30<br>17:11 | 08:02<br>17:55 | 07:14<br>18:36 | 07:12<br>20:20 | 06:20<br>21:01 | 05:50<br>21:36 | 05:56<br>21:42 | 06:30<br>21:10 | 07:11<br>20:15 |                          | 07:50<br>19:15 | 07:35<br>18:20 |
| 9                   | 08:29<br>17:12 | 08:00<br>17:57 | 07:12<br>18:38 | 07:10<br>20:21 | 06:18<br>21:02 | 05:49<br>21:37 | 05:57<br>21:41 | 06:31<br>21:09 | 07:12<br>20:13 |                          | 07:52<br>19:13 | 07:37<br>18:18 |
| 10                  | 08:29<br>17:13 | 07:59<br>17:58 | 07:10<br>18:39 | 07:08<br>20:23 | 06:17<br>21:04 | 05:49<br>21:37 | 05:58<br>21:41 | 06:33<br>21:07 | 07:13<br>20:11 |                          | 07:53<br>19:11 | 07:38<br>18:17 |
| 11                  | 08:29<br>17:15 | 07:57<br>18:00 | 07:08<br>18:40 | 07:06<br>20:24 | 06:15<br>21:05 | 05:49<br>21:38 | 05:59<br>21:40 | 06:34<br>21:06 | 07:14<br>20:09 |                          | 07:55<br>19:09 | 07:40<br>18:16 |
| 12                  | 08:28<br>17:16 | 07:56<br>18:00 | 08:06<br>18:42 | 07:05<br>20:25 | 06:14<br>21:06 | 05:48<br>21:39 | 06:00<br>21:40 | 06:35<br>21:04 | 07:16<br>20:07 |                          | 07:56<br>19:07 | 07:41<br>18:14 |
| 13                  | 08:28<br>17:17 | 07:54<br>18:01 | 08:04<br>19:43 | 07:03<br>20:27 | 06:13<br>21:08 | 05:48<br>21:39 | 06:00<br>21:39 | 06:36<br>21:03 | 07:17<br>20:05 |                          | 07:57<br>19:05 | 07:43<br>18:13 |
| 14                  | 08:27<br>17:18 | 07:53<br>18:03 | 08:02<br>19:45 | 07:01<br>20:28 | 06:11<br>21:09 | 05:48<br>21:40 | 06:01<br>21:38 | 06:38<br>21:01 | 07:18<br>20:03 |                          | 07:59<br>19:03 | 07:44<br>18:12 |
| 15                  | 08:27<br>17:20 | 07:51<br>18:05 | 08:00<br>19:46 | 06:59<br>20:30 | 06:10<br>21:10 | 05:48<br>21:40 | 06:02<br>21:38 | 06:39<br>20:59 | 07:20<br>20:01 |                          | 08:00<br>19:01 | 07:46<br>18:11 |
| 16                  | 08:26<br>17:21 | 07:50<br>18:06 | 07:58<br>19:48 | 06:57<br>20:31 | 06:09<br>21:12 | 05:48<br>21:41 | 06:03<br>21:37 | 06:40<br>20:58 | 07:21<br>19:59 |                          | 08:02<br>18:57 | 07:47<br>18:10 |
| 17                  | 08:26<br>17:22 | 07:48<br>18:08 | 07:56<br>19:49 | 06:55<br>20:32 | 06:08<br>21:13 | 05:48<br>21:41 | 06:04<br>21:36 | 06:42<br>20:56 | 07:22<br>19:57 |                          | 08:03<br>18:56 | 07:49<br>18:08 |
| 18                  | 08:25<br>17:24 | 07:46<br>18:09 | 07:54<br>19:51 | 06:53<br>20:34 | 06:06<br>21:14 | 05:48<br>21:42 | 06:05<br>21:35 | 06:43<br>20:54 | 07:24<br>19:55 |                          | 08:04<br>18:54 | 07:50<br>18:07 |
| 19                  | 08:24<br>17:25 | 07:45<br>18:11 | 07:52<br>19:52 | 06:51<br>20:35 | 06:05<br>21:15 | 05:48<br>21:42 | 06:06<br>21:35 | 06:44<br>20:53 | 07:25<br>19:53 |                          | 08:06<br>18:52 | 07:52<br>18:06 |
| 20                  | 08:23<br>17:27 | 07:43<br>18:12 | 07:50<br>19:53 | 06:50<br>20:37 | 06:04<br>21:16 | 05:48<br>21:42 | 06:07<br>21:34 | 06:46<br>20:51 | 07:26<br>19:51 |                          | 08:07<br>18:50 | 07:53<br>18:05 |
| 21                  | 08:23<br>17:28 | 07:41<br>18:14 | 07:48<br>19:55 | 06:48<br>20:38 | 06:03<br>21:18 | 05:48<br>21:43 | 06:08<br>21:33 | 06:47<br>20:49 | 07:28<br>19:49 |                          | 08:09<br>18:48 | 07:54<br>18:04 |
| 22                  | 08:22<br>17:29 | 07:39<br>18:15 | 07:46<br>19:56 | 06:46<br>20:39 | 06:02<br>21:19 | 05:48<br>21:43 | 06:10<br>21:32 | 06:48<br>20:47 | 07:29<br>19:47 |                          | 08:10<br>18:47 | 07:56<br>18:04 |
| 23                  | 08:21<br>17:31 | 07:38<br>18:17 | 07:44<br>19:58 | 06:44<br>20:41 | 06:01<br>21:20 | 05:49<br>21:43 | 06:11<br>21:31 | 06:50<br>20:45 | 07:30<br>19:45 |                          | 08:12<br>18:45 | 07:57<br>18:03 |
| 24                  | 08:20<br>17:32 | 07:36<br>18:18 | 07:42<br>19:59 | 06:42<br>20:42 | 06:00<br>21:21 | 05:49<br>21:44 | 06:12<br>21:30 | 06:51<br>20:44 | 07:32<br>19:43 |                          | 08:13<br>18:43 | 07:59<br>18:02 |
| 25                  | 08:19<br>17:34 | 07:34<br>18:20 | 07:40<br>20:00 | 06:41<br>20:43 | 05:59<br>21:22 | 05:49<br>21:44 | 06:13<br>21:29 | 06:52<br>20:42 | 07:33<br>19:41 |                          | 08:15<br>18:41 | 08:00<br>18:01 |
| 26                  | 08:18<br>17:35 | 07:32<br>18:21 | 07:38<br>20:02 | 06:39<br>20:45 | 05:58<br>21:23 | 05:49<br>21:44 | 06:14<br>21:28 | 06:53<br>20:40 | 07:34<br>19:39 |                          | 08:16<br>18:40 | 08:01<br>18:00 |
| 27                  | 08:17<br>17:37 | 07:30<br>18:23 | 07:36<br>20:03 | 06:37<br>20:46 | 05:57<br>21:25 | 05:50<br>21:44 | 06:15<br>21:26 | 06:55<br>20:38 | 07:36<br>19:37 |                          | 08:18<br>18:38 | 08:03<br>18:00 |
| 28                  | 08:16<br>17:38 | 07:29<br>18:24 | 07:34<br>20:05 | 06:36<br>20:48 | 05:56<br>21:26 | 05:50<br>21:44 | 06:16<br>21:25 | 06:56<br>20:36 | 07:37<br>19:35 |                          | 08:19<br>18:36 | 08:04<br>18:00 |
| 29                  | 08:15<br>17:40 | 07:27<br>20:06 | 07:32<br>20:06 | 06:34<br>20:49 | 05:56<br>21:27 | 05:51<br>21:44 | 06:18<br>21:24 | 06:57<br>20:34 | 07:38<br>19:33 |                          | 08:20<br>18:35 | 08:05<br>18:00 |
| 30                  | 08:14<br>17:41 | 07:25<br>20:07 | 07:30<br>20:07 | 06:32<br>20:50 | 05:55<br>21:28 | 05:51<br>21:44 | 06:19<br>21:23 | 06:59<br>20:32 | 07:40<br>19:31 |                          | 08:22<br>18:33 | 08:07<br>18:00 |
| 31                  | 08:12<br>17:43 | 07:23<br>20:09 | 07:28<br>20:09 |                | 05:54<br>21:29 |                | 06:20<br>21:22 | 07:00<br>20:31 |                |                          | 08:23<br>18:31 | 08:30<br>18:00 |
| Potential sun hours | 278            | 286            | 367            | 406            | 465            | 475            | 481            | 442            | 380            | 340                      | 283            | 266            |
| Total, worst case   |                |                |                | 274            |                |                |                |                | 260            |                          |                |                |
| Sun reduction       |                |                |                | 0.58           |                |                |                |                | 0.67           |                          |                |                |
| Oper. time red.     |                |                |                | 1.00           |                |                |                |                | 1.00           |                          |                |                |
| Wind dir. red.      |                |                |                | 0.67           |                |                |                |                | 0.67           |                          |                |                |
| Total reduction     |                |                |                | 0.39           |                |                |                |                | 0.45           |                          |                |                |
| Total, real         |                |                |                | 106            |                |                |                |                | 125            |                          |                |                |

Table layout: For each day in each month the following matrix apply

|              |                      |                                 |                                  |
|--------------|----------------------|---------------------------------|----------------------------------|
| Day in month | Sun rise (hh:mm)     | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|              | Sun set (hh:mm)      | Last time (hh:mm) with flicker  | (WTG causing flicker last time)  |
|              | Minutes with flicker |                                 |                                  |



Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: R103 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 90.0° (93)

## Assumptions for shadow calculations

Reference year for calendar

2023

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

|                     | January | February | March | April | May        | June       | July       | August | September | October    | November   | December   |            |       |       |       |
|---------------------|---------|----------|-------|-------|------------|------------|------------|--------|-----------|------------|------------|------------|------------|-------|-------|-------|
| 1                   | 08:30   | 08:11    | 07:27 | 07:26 | 06:31      | 19:37 (57) | 05:53      | 05:52  | 06:21     | 06:48 (67) | 07:01      | 19:50 (57) | 07:41      | 08:25 | 08:08 |       |
| 2                   | 17:04   | 17:44    | 18:26 | 20:10 | 20:52      | 35         | 20:12 (57) | 21:30  | 21:44     | 21:20      | 21:09 (67) | 20:29      | 19:29      | 18:30 | 16:57 |       |
| 3                   | 08:30   | 08:10    | 07:25 | 07:24 | 06:29      | 19:37 (57) | 05:53      | 05:52  | 06:22     | 06:50 (67) | 07:03      | 20:04 (57) | 07:42      | 08:26 | 08:09 |       |
| 4                   | 17:05   | 17:46    | 18:27 | 20:12 | 20:53      | 33         | 20:10 (57) | 21:31  | 21:44     | 21:19      | 20:10 (67) | 20:27      | 19:27      | 18:28 | 16:57 |       |
| 5                   | 08:30   | 08:09    | 07:23 | 07:22 | 06:27      | 19:38 (57) | 05:52      | 05:53  | 06:24     | 06:51 (67) | 07:04      |            | 07:44      | 08:28 | 08:10 |       |
| 6                   | 17:06   | 17:47    | 18:29 | 20:13 | 20:54      | 32         | 20:10 (57) | 21:32  | 21:43     | 21:18      | 20:09 (67) | 20:25      | 19:25      | 18:27 | 16:56 |       |
| 7                   | 08:30   | 08:07    | 07:21 | 07:20 | 06:26      | 19:39 (57) | 05:52      | 05:53  | 06:25     | 06:52 (67) | 07:05      |            | 07:45      | 08:29 | 08:11 |       |
| 8                   | 17:07   | 17:49    | 18:30 | 20:14 | 20:56      | 34         | 20:09 (57) | 21:32  | 21:43     | 21:16      | 20:08 (57) | 20:23      | 19:23      | 18:25 | 16:56 |       |
| 9                   | 08:30   | 08:06    | 07:19 | 07:18 | 06:24      | 19:40 (57) | 05:51      | 05:54  | 06:26     | 06:53 (67) | 07:07      |            | 07:46      | 07:31 | 08:13 |       |
| 10                  | 17:08   | 17:51    | 18:32 | 20:16 | 20:57      | 34         | 20:08 (57) | 21:33  | 21:43     | 21:15      | 20:11 (57) | 20:21      | 19:21      | 17:24 | 16:55 |       |
| 11                  | 08:30   | 08:05    | 07:17 | 07:16 | 06:23      | 19:41 (57) | 05:50      | 05:55  | 06:27     | 06:54 (67) | 07:08      |            | 07:48      | 07:32 | 08:14 |       |
| 12                  | 17:09   | 17:52    | 18:33 | 20:17 | 20:58      | 34         | 20:06 (57) | 21:34  | 21:43     | 21:13      | 20:13 (57) | 20:19      | 19:19      | 17:22 | 16:55 |       |
| 13                  | 08:30   | 08:03    | 07:15 | 07:14 | 06:21      | 19:42 (57) | 05:50      | 05:56  | 06:29     | 06:56 (67) | 07:09      |            | 07:49      | 07:34 | 08:15 |       |
| 14                  | 17:10   | 17:54    | 18:35 | 20:19 | 21:00      | 34         | 20:05 (57) | 21:35  | 21:42     | 21:12      | 20:15 (57) | 20:17      | 19:17      | 17:21 | 16:55 |       |
| 15                  | 08:30   | 08:02    | 07:14 | 07:12 | 06:20      | 19:43 (57) | 05:50      | 05:56  | 06:30     | 06:57 (67) | 07:11      |            | 07:50      | 07:35 | 08:16 |       |
| 16                  | 17:11   | 17:55    | 18:36 | 20:20 | 21:01      | 33         | 20:04 (57) | 21:36  | 21:42     | 21:10      | 20:16 (57) | 20:15      | 19:15      | 17:20 | 16:55 |       |
| 17                  | 08:29   | 08:00    | 07:12 | 07:10 | 06:18      | 19:44 (57) | 05:49      | 05:57  | 06:31     | 06:58 (67) | 07:12      |            | 07:52      | 07:37 | 08:17 |       |
| 18                  | 17:12   | 17:57    | 18:38 | 20:21 | 21:02      | 31         | 20:01 (57) | 21:37  | 21:41     | 21:09      | 20:17 (57) | 20:13      | 19:13      | 17:18 | 16:55 |       |
| 19                  | 08:29   | 07:59    | 07:10 | 07:08 | 06:17      | 19:45 (57) | 05:49      | 05:58  | 06:33     | 06:59 (67) | 07:13      |            | 07:53      | 07:38 | 08:18 |       |
| 20                  | 17:13   | 17:58    | 18:39 | 20:23 | 21:04      | 25         | 19:58 (57) | 21:37  | 21:41     | 21:07      | 20:18 (57) | 20:11      | 19:11      | 17:17 | 16:54 |       |
| 21                  | 08:29   | 07:57    | 07:08 | 07:06 | 06:15      | 19:46 (57) | 05:49      | 05:59  | 06:34     | 06:56 (67) | 07:14      |            | 07:55      | 07:40 | 08:19 |       |
| 22                  | 17:15   | 18:00    | 18:41 | 20:24 | 21:05      | 18         | 06:59 (67) | 21:38  | 21:40     | 21:06      | 20:18 (57) | 20:09      | 19:09      | 17:16 | 16:54 |       |
| 23                  | 08:28   | 07:56    | 07:06 | 07:05 | 19:53 (57) | 06:14      | 06:39 (67) | 05:48  | 06:00     | 06:35      | 19:46 (57) | 20:16      | 19:06      | 17:14 | 16:54 |       |
| 24                  | 17:16   | 18:00    | 18:42 | 20:25 | 21:06      | 20         | 06:59 (67) | 21:39  | 21:40     | 21:04      | 20:20 (57) | 20:07      | 19:07      | 17:14 | 16:54 |       |
| 25                  | 08:28   | 07:54    | 07:04 | 07:03 | 19:49 (57) | 06:13      | 06:38 (67) | 05:48  | 06:00     | 06:36      | 19:45 (57) | 20:17      | 19:05      | 17:13 | 16:54 |       |
| 26                  | 17:17   | 18:01    | 18:43 | 20:27 | 21:08      | 21         | 06:59 (67) | 21:39  | 21:39     | 21:03      | 20:20 (57) | 20:05      | 19:05      | 17:13 | 16:54 |       |
| 27                  | 08:27   | 07:53    | 07:02 | 07:01 | 19:46 (57) | 06:11      | 06:37 (67) | 05:48  | 06:01     | 06:38      | 19:44 (57) | 20:18      | 19:04      | 17:12 | 16:54 |       |
| 28                  | 17:18   | 18:03    | 18:45 | 20:28 | 21:09      | 22         | 06:59 (67) | 21:40  | 21:38     | 5          | 06:52 (67) | 06:38      | 19:43 (57) | 19:03 | 17:12 | 16:54 |
| 29                  | 08:27   | 07:51    | 07:00 | 06:59 | 19:44 (57) | 06:10      | 06:36 (67) | 05:48  | 06:02     | 06:49 (67) | 06:39      | 19:43 (57) | 19:00      | 17:11 | 16:55 |       |
| 30                  | 17:20   | 18:05    | 18:46 | 20:30 | 21:10      | 23         | 06:59 (67) | 21:40  | 21:38     | 10         | 06:59 (67) | 20:59      | 19:01      | 17:11 | 16:55 |       |
| 31                  | 08:26   | 07:50    | 07:58 | 06:57 | 19:42 (57) | 06:09      | 06:35 (67) | 05:48  | 06:03     | 06:48 (67) | 06:40      | 19:44 (57) | 19:02      | 17:11 | 16:55 |       |
| 32                  | 17:21   | 18:06    | 18:48 | 20:31 | 21:12      | 24         | 06:59 (67) | 21:41  | 21:37     | 13         | 07:01 (67) | 20:58      | 18:57      | 17:10 | 16:55 |       |
| 33                  | 08:26   | 07:48    | 07:56 | 06:55 | 19:42 (57) | 06:08      | 06:33 (67) | 05:48  | 06:04     | 06:47 (67) | 06:42      | 19:43 (57) | 19:59      | 19:03 | 17:11 | 16:55 |
| 34                  | 17:22   | 18:08    | 18:49 | 20:32 | 21:13      | 25         | 06:58 (67) | 21:41  | 21:36     | 15         | 07:02 (67) | 20:56      | 18:56      | 17:08 | 16:55 |       |
| 35                  | 08:25   | 07:46    | 07:54 | 06:53 | 19:40 (57) | 06:06      | 06:32 (67) | 05:48  | 06:05     | 06:46 (67) | 06:43      | 19:42 (57) | 19:05      | 17:07 | 16:55 |       |
| 36                  | 17:24   | 18:09    | 18:51 | 20:34 | 21:14      | 26         | 06:58 (67) | 21:42  | 21:35     | 17         | 07:03 (67) | 20:54      | 18:54      | 17:07 | 16:55 |       |
| 37                  | 08:24   | 07:45    | 07:52 | 06:51 | 19:39 (57) | 06:05      | 06:31 (67) | 05:48  | 06:06     | 06:45 (67) | 06:44      | 19:42 (57) | 19:06      | 17:07 | 16:55 |       |
| 38                  | 17:25   | 18:11    | 18:52 | 20:35 | 21:15      | 27         | 06:58 (67) | 21:42  | 21:35     | 19         | 07:04 (67) | 20:53      | 18:52      | 17:06 | 16:56 |       |
| 39                  | 08:23   | 07:43    | 07:50 | 06:50 | 19:38 (57) | 06:04      | 06:32 (67) | 05:48  | 06:07     | 06:45 (67) | 06:46      | 19:41 (57) | 19:07      | 17:05 | 16:56 |       |
| 40                  | 17:27   | 18:12    | 18:53 | 20:37 | 21:16      | 26         | 06:58 (67) | 21:43  | 21:34     | 20         | 07:05 (67) | 20:51      | 18:50      | 17:05 | 16:56 |       |
| 41                  | 08:23   | 07:41    | 07:48 | 06:48 | 19:37 (57) | 06:03      | 06:32 (67) | 05:48  | 06:08     | 06:44 (67) | 06:47      | 19:42 (57) | 19:08      | 17:04 | 16:56 |       |
| 42                  | 17:28   | 18:14    | 18:55 | 20:38 | 21:18      | 25         | 06:57 (67) | 21:43  | 21:33     | 22         | 07:06 (67) | 20:49      | 18:48      | 17:04 | 16:56 |       |
| 43                  | 08:22   | 07:39    | 07:46 | 06:46 | 19:37 (57) | 06:02      | 06:33 (67) | 05:48  | 06:10     | 06:43 (67) | 06:48      | 19:42 (57) | 19:07      | 17:04 | 16:56 |       |
| 44                  | 17:29   | 18:15    | 18:56 | 20:39 | 21:19      | 24         | 06:57 (67) | 21:43  | 21:32     | 23         | 07:06 (67) | 20:47      | 18:47      | 17:04 | 16:57 |       |
| 45                  | 08:21   | 07:38    | 07:44 | 06:44 | 19:36 (57) | 06:01      | 06:33 (67) | 05:49  | 06:11     | 06:43 (67) | 06:50      | 19:41 (57) | 19:07      | 17:03 | 16:57 |       |
| 46                  | 17:31   | 18:17    | 18:58 | 20:41 | 21:20      | 23         | 06:56 (67) | 21:43  | 21:31     | 24         | 07:07 (67) | 20:45      | 18:45      | 17:03 | 16:57 |       |
| 47                  | 08:20   | 07:36    | 07:42 | 06:42 | 19:36 (57) | 06:00      | 06:34 (67) | 05:49  | 06:12     | 06:42 (67) | 06:51      | 19:41 (57) | 19:07      | 17:03 | 16:57 |       |
| 48                  | 17:32   | 18:18    | 18:59 | 20:42 | 21:21      | 22         | 06:56 (67) | 21:44  | 21:30     | 25         | 07:07 (67) | 20:44      | 18:43      | 17:02 | 16:58 |       |
| 49                  | 08:19   | 07:34    | 07:40 | 06:41 | 19:36 (57) | 05:59      | 06:36 (67) | 05:49  | 06:13     | 06:43 (67) | 06:52      | 19:42 (57) | 19:08      | 17:00 | 16:59 |       |
| 50                  | 17:34   | 18:20    | 19:00 | 20:43 | 21:22      | 20         | 06:56 (67) | 21:44  | 21:29     | 26         | 07:09 (67) | 20:42      | 18:41      | 17:01 | 16:58 |       |
| 51                  | 08:18   | 07:32    | 07:38 | 06:39 | 19:36 (57) | 05:58      | 06:36 (67) | 05:49  | 06:14     | 06:42 (67) | 06:54      | 19:42 (57) | 19:08      | 17:00 | 16:59 |       |
| 52                  | 17:35   | 18:21    | 19:02 | 20:45 | 21:23      | 19         | 06:55 (67) | 21:44  | 21:28     | 27         | 07:09 (67) | 20:40      | 18:40      | 17:00 | 16:59 |       |
| 53                  | 08:17   | 07:30    | 07:36 | 06:37 | 19:35 (57) | 05:57      | 06:37 (67) | 05:50  | 06:15     | 06:43 (67) | 06:55      | 19:43 (57) | 19:08      | 17:00 | 16:59 |       |
| 54                  | 17:37   | 18:23    | 19:03 | 20:46 | 21:25      | 17         | 06:54 (67) | 21:44  | 21:26     | 26         | 07:09 (67) | 20:38      | 18:38      | 17:00 | 16:59 |       |
| 55                  | 08:16   | 07:29    | 07:34 | 06:36 | 19:36 (57) | 05:56      | 06:38 (67) | 05:50  | 06:16     | 06:44 (67) | 06:56      | 19:43 (57) | 19:09      | 17:00 | 16:59 |       |
| 56                  | 17:38   | 18:24    | 19:05 | 20:48 | 21:26      | 15         | 06:53 (67) | 21:44  | 21:25     | 25         | 07:09 (67) | 20:36      | 18:36      | 16:59 | 17:00 |       |
| 57                  | 08:15   | 07:32    | 07:38 | 06:34 | 19:36 (57) | 05:56      | 06:40 (67) | 05:51  | 06:18     | 06:45 (67) | 06:57      | 19:45 (57) | 19:10      | 17:00 | 16:59 |       |
| 58                  | 17:40   | 18:26    | 19:06 | 20:49 | 21:27      | 13         | 06:53 (67) | 21:44  | 21:24     | 25         | 07:10 (67) | 20:34      | 18:35      | 16:58 | 17:01 |       |
| 59                  | 08:14   | 07:30    | 07:36 | 06:32 | 19:36 (57) | 05:55      | 06:41 (67) | 05:51  | 06:19     | 06:46 (67) | 06:59      | 19:46 (57) | 19:11      | 17:00 | 16:59 |       |
| 60                  | 17:41   | 18:27    | 19:07 | 20:50 | 21:28      | 10         | 06:51 (67) | 21:44  | 21:23     | 23         | 07:09 (67) | 20:32      | 18:33      | 16:58 | 17:02 |       |
| 61                  | 08:12   | 07:28    | 07:34 | 06:30 | 19:34 (57) | 05:54      | 06:43 (67) | 05:51  | 06:20     | 06:47 (67) | 07:00      | 19:48 (57) | 19:13      | 17:00 | 16:59 |       |
| 62                  | 17:43   | 18:29    | 19:09 | 20:52 | 21:29      | 5          | 06:48 (67) | 21:44  | 21:22     | 22         | 07:09 (67) | 20:31      | 18:31      | 16:58 | 17:03 |       |
| Potential sun hours | 278     | 286      | 367   | 406   | 466        | 475        | 481        | 442    | 380       | 339        | 283        | 266        |            |       |       |       |
| Total, worst case   |         |          |       |       |            |            |            |        |           |            |            |            |            |       |       |       |
| Sun reduction       |         |          |       |       | 609        | 750        |            | 367    | 987       |            | 14         |            |            |       |       |       |
| Oper. time red.     |         |          |       |       | 0.58       | 0.64       |            | 0.75   | 0.72      |            | 0.67       |            |            |       |       |       |
| Wind dir. red.      |         |          |       |       | 1.00       | 1.00       |            | 1.00   | 1.00      |            | 1.00       |            |            |       |       |       |
| Total reduction     |         |          |       |       | 0.68       | 0.66       |            | 0.65   | 0.67      |            | 0.68       |            |            |       |       |       |
| Total, real         |         |          |       |       | 0.39       | 0.42       |            | 0.49   | 0.49      |            | 0.45       |            |            |       |       |       |
|                     |         |          |       |       | 239        | 318        |            | 180    | 479       |            | 6          |            |            |       |       |       |

Table layout: For each day in each month the following matrix apply

|              |                      |                                 |                                  |
|--------------|----------------------|---------------------------------|----------------------------------|
| Day in month | Sun rise (hh:mm)     | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|              | Sun set (hh:mm)      | Last time (hh:mm) with flicker  | (WTG causing flicker last time)  |
|              | Minutes with flicker |                                 |                                  |

Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM  
US-01824-3627 Chelmsford  
+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

## Assumptions for shadow calculations

Reference year for calendar

Shadow receptor: R104 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (94)

Sunshine probability S/50 (Sun hours/Possible sun hours) []

2023

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

|    | [January | [February | [March | [April | [May       | [June      | [July      | [August    | [September | [October   | [November  | [December  |            |       |            |            |       |       |       |       |
|----|----------|-----------|--------|--------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------|------------|------------|-------|-------|-------|-------|
| 1  | 08:30    | 08:11     | 07:27  | 07:26  | 06:31      | 19:44 (57) | 05:53      | 06:24 (67) | 05:52      | 06:33 (67) | 06:21      | 06:48 (67) | 07:01      | 07:41 | 08:25      | 08:08      |       |       |       |       |
|    | 17:04    | 17:44     | 18:26  | 20:10  | 20:52      | 36         | 20:20 (57) | 21:30      | 27         | 06:53 (67) | 21:44      | 20         | 06:53 (67) | 21:20 | 23         | 20:19 (57) | 20:29 | 19:29 | 18:30 | 16:57 |
| 2  | 08:30    | 08:10     | 07:25  | 07:24  | 06:29      | 19:44 (57) | 05:53      | 06:24 (67) | 05:52      | 06:33 (67) | 06:22      | 06:50 (67) | 07:03      | 07:42 | 08:26      | 08:09      |       |       |       |       |
|    | 17:05    | 17:46     | 18:27  | 20:12  | 20:53      | 35         | 20:19 (57) | 21:31      | 26         | 06:50 (67) | 21:44      | 20         | 06:53 (67) | 21:19 | 25         | 20:22 (57) | 20:27 | 19:27 | 18:28 | 16:57 |
| 3  | 08:30    | 08:09     | 07:23  | 07:22  | 06:27      | 19:45 (57) | 05:52      | 06:24 (67) | 05:53      | 06:33 (67) | 06:24      | 06:51 (67) | 07:04      | 07:44 | 08:28      | 08:10      |       |       |       |       |
|    | 17:06    | 17:47     | 18:29  | 20:13  | 20:54      | 34         | 20:19 (57) | 21:32      | 26         | 06:50 (67) | 21:43      | 20         | 06:53 (67) | 21:18 | 25         | 20:23 (57) | 20:25 | 19:25 | 18:27 | 16:56 |
| 4  | 08:30    | 08:07     | 07:21  | 07:20  | 06:26      | 19:45 (57) | 05:52      | 06:25 (67) | 05:53      | 06:33 (67) | 06:25      | 06:52 (67) | 07:05      | 07:45 | 08:29      | 08:11      |       |       |       |       |
|    | 17:07    | 17:49     | 18:30  | 20:14  | 20:56      | 33         | 20:18 (57) | 21:32      | 25         | 06:50 (67) | 21:43      | 21         | 06:54 (67) | 21:16 | 24         | 20:24 (57) | 20:23 | 19:23 | 18:25 | 16:56 |
| 5  | 08:30    | 08:06     | 07:19  | 07:18  | 06:24      | 19:45 (57) | 05:51      | 06:26 (67) | 05:54      | 06:33 (67) | 06:26      | 06:55 (67) | 07:07      | 07:46 | 08:31      | 08:13      |       |       |       |       |
|    | 17:08    | 17:51     | 18:32  | 20:16  | 20:57      | 33         | 20:18 (57) | 21:33      | 24         | 06:50 (67) | 21:43      | 22         | 06:55 (67) | 21:15 | 27         | 20:25 (57) | 20:21 | 19:21 | 17:24 | 16:55 |
| 6  | 08:30    | 08:05     | 07:17  | 07:16  | 06:23      | 19:45 (57) | 05:50      | 06:26 (67) | 05:55      | 06:32 (67) | 06:27      | 06:57 (67) | 07:08      | 07:48 | 08:32      | 08:14      |       |       |       |       |
|    | 17:09    | 17:52     | 18:33  | 20:17  | 20:58      | 32         | 20:17 (57) | 21:34      | 24         | 06:50 (67) | 21:42      | 23         | 06:55 (67) | 21:13 | 28         | 20:25 (57) | 20:19 | 19:19 | 17:22 | 16:55 |
| 7  | 08:30    | 08:03     | 07:15  | 07:14  | 06:21      | 19:46 (57) | 05:50      | 06:26 (67) | 05:55      | 06:32 (67) | 06:29      | 06:57 (67) | 07:09      | 07:49 | 08:34      | 08:15      |       |       |       |       |
|    | 17:10    | 17:54     | 18:35  | 20:19  | 21:00      | 31         | 20:17 (57) | 21:35      | 24         | 06:50 (67) | 21:42      | 24         | 06:56 (67) | 21:12 | 30         | 20:27 (57) | 20:17 | 19:17 | 17:21 | 16:55 |
| 8  | 08:30    | 08:02     | 07:14  | 07:12  | 06:20      | 19:48 (57) | 05:50      | 06:26 (67) | 05:56      | 06:32 (67) | 06:30      | 06:56 (67) | 07:11      | 07:50 | 08:35      | 08:16      |       |       |       |       |
|    | 17:11    | 17:55     | 18:36  | 20:20  | 21:01      | 28         | 20:16 (57) | 21:36      | 23         | 06:49 (67) | 21:42      | 25         | 06:57 (67) | 21:10 | 31         | 20:27 (57) | 20:15 | 19:15 | 17:20 | 16:55 |
| 9  | 08:29    | 08:00     | 07:12  | 07:10  | 06:18      | 19:48 (57) | 05:49      | 06:27 (67) | 05:57      | 06:32 (67) | 06:31      | 06:57 (67) | 07:12      | 07:52 | 08:37      | 08:17      |       |       |       |       |
|    | 17:12    | 17:57     | 18:38  | 20:21  | 21:02      | 27         | 20:15 (57) | 21:37      | 22         | 06:49 (67) | 21:41      | 24         | 06:56 (67) | 21:09 | 32         | 20:27 (57) | 20:13 | 19:13 | 17:18 | 16:55 |
| 10 | 08:29    | 07:59     | 07:10  | 07:08  | 06:17      | 19:49 (57) | 05:49      | 06:28 (67) | 05:58      | 06:32 (67) | 06:33      | 06:57 (67) | 07:13      | 07:53 | 08:38      | 08:18      |       |       |       |       |
|    | 17:13    | 17:58     | 18:39  | 20:23  | 21:04      | 25         | 20:14 (57) | 21:37      | 21         | 06:49 (67) | 21:41      | 25         | 06:57 (67) | 21:07 | 34         | 20:28 (57) | 20:11 | 19:11 | 17:17 | 16:54 |
| 11 | 08:29    | 07:57     | 07:08  | 07:06  | 06:15      | 06:41 (67) | 05:49      | 06:29 (67) | 05:59      | 06:32 (67) | 06:34      | 06:57 (67) | 07:14      | 07:55 | 08:40      | 08:19      |       |       |       |       |
|    | 17:15    | 18:00     | 18:40  | 20:24  | 21:05      | 24         | 20:13 (57) | 21:38      | 20         | 06:49 (67) | 21:40      | 26         | 06:58 (67) | 21:06 | 35         | 20:28 (57) | 20:09 | 19:09 | 17:16 | 16:54 |
| 12 | 08:28    | 07:56     | 07:06  | 07:05  | 06:14      | 06:39 (67) | 05:48      | 06:28 (67) | 06:00      | 06:32 (67) | 06:35      | 06:57 (67) | 07:16      | 07:56 | 08:41      | 08:20      |       |       |       |       |
|    | 17:16    | 18:00     | 18:42  | 20:25  | 21:06      | 24         | 20:11 (57) | 21:39      | 20         | 06:48 (67) | 21:40      | 26         | 06:58 (67) | 21:04 | 36         | 20:29 (57) | 20:07 | 19:07 | 17:14 | 16:54 |
| 13 | 08:28    | 07:54     | 07:04  | 07:03  | 06:13      | 06:38 (67) | 05:48      | 06:29 (67) | 06:00      | 06:32 (67) | 06:36      | 06:57 (67) | 07:17      | 07:57 | 08:43      | 08:21      |       |       |       |       |
|    | 17:17    | 18:01     | 18:43  | 20:27  | 21:08      | 23         | 20:09 (57) | 21:39      | 20         | 06:49 (67) | 21:39      | 27         | 06:59 (67) | 21:03 | 35         | 20:28 (57) | 20:05 | 19:05 | 17:13 | 16:54 |
| 14 | 08:27    | 07:53     | 07:02  | 07:01  | 06:11      | 06:37 (67) | 05:48      | 06:30 (67) | 06:01      | 06:32 (67) | 06:38      | 06:57 (67) | 07:18      | 07:59 | 08:44      | 08:22      |       |       |       |       |
|    | 17:18    | 18:03     | 18:45  | 20:28  | 21:09      | 19         | 20:06 (57) | 21:40      | 19         | 06:49 (67) | 21:38      | 27         | 06:59 (67) | 21:01 | 36         | 20:28 (57) | 20:03 | 19:03 | 17:12 | 16:54 |
| 15 | 08:27    | 07:51     | 07:00  | 06:59  | 06:10      | 06:36 (67) | 05:48      | 06:30 (67) | 06:02      | 06:31 (67) | 06:39      | 06:57 (67) | 07:20      | 08:00 | 08:46      | 08:23      |       |       |       |       |
|    | 17:20    | 18:05     | 18:46  | 20:30  | 21:10      | 12         | 06:48 (67) | 21:40      | 19         | 06:49 (67) | 21:38      | 28         | 06:59 (67) | 20:59 | 36         | 20:28 (57) | 20:01 | 19:01 | 17:11 | 16:55 |
| 16 | 08:26    | 07:50     | 07:58  | 06:57  | 06:09      | 06:35 (67) | 05:48      | 06:31 (67) | 06:03      | 06:31 (67) | 06:40      | 06:57 (67) | 07:21      | 08:02 | 08:47      | 08:23      |       |       |       |       |
|    | 17:21    | 18:06     | 18:48  | 20:31  | 21:12      | 14         | 06:49 (67) | 21:41      | 18         | 06:49 (67) | 21:37      | 28         | 06:59 (67) | 20:58 | 36         | 20:28 (57) | 19:59 | 18:57 | 17:10 | 16:55 |
| 17 | 08:26    | 07:48     | 07:56  | 06:55  | 19:58 (57) | 06:08      | 06:33 (67) | 05:48      | 06:31 (67) | 06:04      | 06:32 (67) | 06:42      | 06:57 (67) | 07:22 | 08:03      | 08:48      | 08:24 |       |       |       |
|    | 17:22    | 18:08     | 18:49  | 20:32  | 14         | 20:12 (57) | 21:13      | 15         | 06:48 (67) | 21:41      | 18         | 06:49 (67) | 21:36      | 28    | 07:00 (67) | 20:56      | 19:56 | 17:08 | 16:55 |       |
| 18 | 08:25    | 07:46     | 07:54  | 06:53  | 19:55 (57) | 06:06      | 06:32 (67) | 05:48      | 06:31 (67) | 06:05      | 06:33 (67) | 06:43      | 06:57 (67) | 07:24 | 08:05      | 08:50      | 08:25 |       |       |       |
|    | 17:24    | 18:09     | 18:51  | 20:34  | 18         | 20:13 (57) | 21:14      | 17         | 06:49 (67) | 21:42      | 18         | 06:49 (67) | 21:35      | 27    | 07:00 (67) | 20:54      | 19:54 | 17:07 | 16:55 |       |
| 19 | 08:24    | 07:45     | 07:52  | 06:51  | 19:53 (57) | 06:05      | 06:31 (67) | 06:06      | 06:32 (67) | 06:06      | 06:34 (67) | 06:44      | 06:54 (67) | 07:25 | 08:06      | 08:51      | 08:26 |       |       |       |
|    | 17:25    | 18:11     | 18:52  | 20:35  | 21         | 20:14 (57) | 21:15      | 18         | 06:49 (67) | 21:42      | 17         | 06:49 (67) | 21:35      | 26    | 07:00 (67) | 20:53      | 19:53 | 17:06 | 16:56 |       |
| 20 | 08:23    | 07:43     | 07:50  | 06:50  | 19:51 (57) | 06:04      | 06:30 (67) | 06:07      | 06:32 (67) | 06:07      | 06:35 (67) | 06:46      | 06:57 (67) | 07:26 | 08:07      | 08:52      | 08:26 |       |       |       |
|    | 17:27    | 18:12     | 18:53  | 20:37  | 24         | 20:15 (57) | 21:16      | 20         | 06:50 (67) | 21:43      | 16         | 06:48 (67) | 21:34      | 25    | 07:00 (67) | 20:51      | 19:51 | 18:50 | 17:05 | 16:56 |
| 21 | 08:23    | 07:41     | 07:48  | 06:48  | 19:49 (57) | 06:03      | 06:29 (67) | 06:08      | 06:33 (67) | 06:08      | 06:36 (67) | 06:47      | 06:57 (67) | 07:28 | 08:09      | 08:54      | 08:27 |       |       |       |
|    | 17:28    | 18:14     | 18:55  | 20:38  | 27         | 20:16 (57) | 21:18      | 21         | 06:50 (67) | 21:43      | 16         | 06:49 (67) | 21:33      | 24    | 07:00 (67) | 20:49      | 19:49 | 18:48 | 17:04 | 16:56 |
| 22 | 08:22    | 07:39     | 07:46  | 06:46  | 19:49 (57) | 06:02      | 06:28 (67) | 06:08      | 06:33 (67) | 06:10      | 06:37 (67) | 06:48      | 06:57 (67) | 07:29 | 08:10      | 08:56      | 08:27 |       |       |       |
|    | 17:29    | 18:15     | 18:56  | 20:39  | 29         | 20:18 (57) | 21:19      | 22         | 06:50 (67) | 21:43      | 16         | 06:49 (67) | 21:32      | 23    | 07:00 (67) | 20:47      | 19:47 | 18:47 | 17:04 | 16:57 |
| 23 | 08:21    | 07:38     | 07:44  | 06:44  | 19:47 (57) | 06:01      | 06:27 (67) | 06:09      | 06:33 (67) | 06:11      | 06:38 (67) | 06:50      | 06:59 (67) | 07:30 | 08:12      | 08:57      | 08:28 |       |       |       |
|    | 17:31    | 18:17     | 18:58  | 20:41  | 32         | 20:19 (57) | 21:20      | 23         | 06:50 (67) | 21:43      | 16         | 06:49 (67) | 21:31      | 22    | 07:00 (67) | 20:45      | 19:45 | 18:45 | 17:03 | 16:57 |
| 24 | 08:20    | 07:36     | 07:42  | 06:42  | 19:46 (57) | 06:00      | 06:26 (67) | 06:09      | 06:33 (67) | 06:12      | 06:39 (67) | 06:51      | 06:59 (67) | 07:32 | 08:13      | 08:58      | 08:28 |       |       |       |
|    | 17:32    | 18:18     | 18:59  | 20:42  | 34         | 20:20 (57) | 21:21      | 24         | 06:50 (67) | 21:44      | 16         | 06:49 (67) | 21:30      | 21    | 07:00 (67) | 20:44      | 19:44 | 18:43 | 17:02 | 16:58 |
| 25 | 08:19    | 07:34     | 07:40  | 06:41  | 19:46 (57) | 05:59      | 06:26 (67) | 06:09      | 06:34 (67) | 06:13      | 06:41 (67) | 06:52      | 06:59 (67) | 07:33 | 08:15      | 09:00      | 08:29 |       |       |       |
|    | 17:34    | 18:20     | 19:00  | 20:43  | 35         | 20:21 (57) | 21:22      | 25         | 06:51 (67) | 21:44      | 17         | 06:51 (67) | 21:29      | 20    | 07:01 (67) | 20:42      | 19:42 | 18:41 | 17:01 | 16:58 |
| 26 | 08:18    | 07:32     | 07:38  | 06:39  | 19:45 (57) | 05:58      | 06:25 (67) | 06:09      | 06:33 (67) | 06:14      | 06:42 (67) | 06:53      | 06:57 (67) | 07:34 | 08:16      | 09:01      | 08:29 |       |       |       |
|    | 17:35    | 18:21     | 19:02  | 20:45  | 36         | 20:21 (57) | 21:23      | 26         | 06:51 (67) | 21:44      | 18         | 06:51 (67) | 21:28      | 18    | 07:00 (67) | 20:40      | 19:40 | 18:40 | 17:00 | 16:59 |
| 27 | 08:17    | 07:30     | 07:36  | 06:37  | 19:45 (57) | 05:57      | 06:24 (67) | 06:09      | 06:34 (67) | 06:15      | 06:43 (67) | 06:55      | 06:59 (67) | 07:36 | 08:18      | 09:03      | 08:29 |       |       |       |
|    | 17:37    | 18:23     | 19:03  | 20:46  | 35         | 20:20 (57) | 21:25      | 27         | 06:51 (67) | 21:44      | 18         | 06:51 (67) | 21:26      | 17    | 07:00 (67) | 20:38      | 19:38 | 18:38 | 17:00 | 17:00 |
| 28 | 08:16    | 07:29     | 07:34  | 06:36  | 19:45 (57) | 05:56      | 06:23 (67) | 06:09      | 06:33 (67) | 06:16      | 06:44 (67) | 06:56      | 06:59 (67) | 07:37 | 08:19      | 09:04      | 08:30 |       |       |       |
|    | 17:38    | 18:24     | 19:05  | 20:48  | 36         | 20:21 (57) | 21:26      | 28         | 06:51 (67) | 21:44      | 19         | 06:52 (67) | 21:25      | 15    | 06:59 (67) | 20:36      | 19:36 | 18:36 | 17:05 | 17:05 |
| 29 | 08:15    | 07:28     | 07:32  | 06:34  | 19:44 (57) | 05:56      | 06:23 (67) | 06:09      | 06:33 (67) | 06:18      | 06:45 (67) | 06:57      | 06:59 (67) | 07:38 | 08:20      | 09:05      | 08:30 |       |       |       |
|    | 17:40    | 18:25     | 19:06  | 20:49  | 36         | 20:20 (57) | 21:27      | 28         | 06:51 (67) | 21:44      | 19         | 06:52 (67) | 21:24      | 14    | 06:59 (67) | 20:34      | 19:34 | 18:33 | 17:05 | 17:01 |
| 30 | 08:14    | 07:30     | 07:36  | 06:32  | 19:44 (57) | 05:55      | 06:23 (67) | 06:09      | 06:33 (67) | 06:19      | 06:46 (67) | 06:59      | 06:59 (    |       |            |            |       |       |       |       |



Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: R105 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (95)

## Assumptions for shadow calculations

Reference year for calendar

2023

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

| Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  |
|------|------|------|------|------|------|------|------|------|------|------|------|
| 0.54 | 0.52 | 0.61 | 0.58 | 0.64 | 0.67 | 0.75 | 0.72 | 0.67 | 0.53 | 0.42 | 0.45 |

Operational time

| N   | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW | NW  | NNW | Sum   |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| 376 | 314 | 339 | 425 | 445 | 474 | 693 | 570 | 488 | 386 | 872 | 609 | 772 | 651 | 677 | 667 | 8,758 |

|                     | January |      | February   |       | March | April | May   | June  | July  | August | September | October | November | December      |               |
|---------------------|---------|------|------------|-------|-------|-------|-------|-------|-------|--------|-----------|---------|----------|---------------|---------------|
| 1                   | 08:31   |      | 09:25 (34) | 08:11 | 07:27 | 07:26 | 06:31 | 05:54 | 05:52 | 06:21  | 07:02     | 07:41   | 08:25    | 08:08         | 09:13 (34)    |
|                     | 17:04   | 44   | 10:09 (34) | 17:45 | 18:26 | 20:10 | 20:52 | 21:30 | 21:44 | 21:21  | 20:29     | 19:29   | 18:30    | 16:57         | 40 09:53 (34) |
| 2                   | 08:31   |      | 09:26 (34) | 08:10 | 07:25 | 07:24 | 06:29 | 05:53 | 05:52 | 06:23  | 07:03     | 07:43   | 08:27    | 08:09         | 09:13 (34)    |
|                     | 17:05   | 43   | 10:09 (34) | 17:46 | 18:28 | 20:12 | 20:53 | 21:31 | 21:44 | 21:19  | 20:27     | 19:27   | 18:29    | 16:57         | 40 09:53 (34) |
| 3                   | 08:31   |      | 09:26 (34) | 08:09 | 07:23 | 07:22 | 06:28 | 05:52 | 05:53 | 06:24  | 07:04     | 07:44   | 08:28    | 08:10         | 09:13 (34)    |
|                     | 17:06   | 43   | 10:09 (34) | 17:48 | 18:29 | 20:13 | 20:55 | 21:32 | 21:44 | 21:18  | 20:25     | 19:25   | 18:27    | 16:56         | 41 09:54 (34) |
| 4                   | 08:31   |      | 09:27 (34) | 08:08 | 07:21 | 07:20 | 06:26 | 05:52 | 05:54 | 06:25  | 07:06     | 07:45   | 08:30    | 08:12         | 09:14 (34)    |
|                     | 17:07   | 43   | 10:10 (34) | 17:49 | 18:31 | 20:15 | 20:56 | 21:33 | 21:43 | 21:16  | 20:23     | 19:23   | 18:25    | 16:56         | 41 09:55 (34) |
| 5                   | 08:31   |      | 09:27 (34) | 08:06 | 07:20 | 07:18 | 06:24 | 05:51 | 05:54 | 06:26  | 07:07     | 07:47   | 08:31    | 08:13         | 09:14 (34)    |
|                     | 17:08   | 43   | 10:10 (34) | 17:51 | 18:32 | 20:16 | 20:57 | 21:34 | 21:43 | 21:15  | 20:21     | 19:21   | 17:24    | 16:56         | 42 09:56 (34) |
| 6                   | 08:30   |      | 09:27 (34) | 08:05 | 07:18 | 07:16 | 06:23 | 05:51 | 05:55 | 06:28  | 07:08     | 07:48   | 07:33    | 08:14         | 09:14 (34)    |
|                     | 17:09   | 43   | 10:10 (34) | 17:52 | 18:33 | 20:17 | 20:59 | 21:34 | 21:43 | 21:14  | 20:19     | 19:19   | 17:23    | 16:55         | 42 09:56 (34) |
| 7                   | 08:30   |      | 09:28 (34) | 08:03 | 07:16 | 07:14 | 06:21 | 05:50 | 05:56 | 06:29  | 07:09     | 07:49   | 07:34    | 08:15         | 09:14 (34)    |
|                     | 17:10   | 43   | 10:11 (34) | 17:54 | 18:35 | 20:19 | 21:00 | 21:35 | 21:42 | 21:12  | 20:17     | 19:17   | 17:21    | 16:55         | 42 09:56 (34) |
| 8                   | 08:30   |      | 09:29 (34) | 08:02 | 07:14 | 07:12 | 06:20 | 05:50 | 05:56 | 06:30  | 07:11     | 07:51   | 07:36    | 08:16         | 09:14 (34)    |
|                     | 17:11   | 42   | 10:11 (34) | 17:55 | 18:36 | 20:20 | 21:01 | 21:36 | 21:42 | 21:11  | 20:15     | 19:15   | 17:20    | 16:55         | 43 09:57 (34) |
| 9                   | 08:30   |      | 09:29 (34) | 08:01 | 07:12 | 07:11 | 06:18 | 05:49 | 05:57 | 06:32  | 07:12     | 07:52   | 07:37    | 08:17         | 09:14 (34)    |
|                     | 17:12   | 42   | 10:11 (34) | 17:57 | 18:38 | 20:22 | 21:03 | 21:37 | 21:42 | 21:09  | 20:13     | 19:13   | 17:18    | 16:55         | 43 09:57 (34) |
| 10                  | 08:29   |      | 09:30 (34) | 07:59 | 07:10 | 07:09 | 06:17 | 05:49 | 05:58 | 06:33  | 07:13     | 07:53   | 07:39    | 08:18         | 09:15 (34)    |
|                     | 17:14   | 41   | 10:11 (34) | 17:59 | 18:39 | 20:23 | 21:04 | 21:38 | 21:41 | 21:08  | 20:11     | 19:11   | 17:17    | 16:55         | 43 09:58 (34) |
| 11                  | 08:29   |      | 09:30 (34) | 07:58 | 07:08 | 07:07 | 06:16 | 05:49 | 05:59 | 06:34  | 07:15     | 07:55   | 07:40    | 08:19         | 09:15 (34)    |
|                     | 17:15   | 41   | 10:11 (34) | 18:00 | 18:41 | 20:24 | 21:05 | 21:38 | 21:41 | 21:06  | 20:09     | 19:09   | 17:16    | 16:55         | 43 09:58 (34) |
| 12                  | 08:29   |      | 09:32 (34) | 07:56 | 08:06 | 07:05 | 06:14 | 05:49 | 06:00 | 06:35  | 07:16     | 07:56   | 07:42    | 08:20         | 09:15 (34)    |
|                     | 17:16   | 40   | 10:12 (34) | 18:00 | 18:42 | 20:26 | 21:07 | 21:39 | 21:40 | 21:04  | 20:07     | 19:07   | 17:15    | 16:55         | 44 09:59 (34) |
| 13                  | 08:28   |      | 09:32 (34) | 07:55 | 08:04 | 07:03 | 06:13 | 05:48 | 06:01 | 06:37  | 07:17     | 07:58   | 07:43    | 08:21         | 09:16 (34)    |
|                     | 17:17   | 39   | 10:11 (34) | 18:02 | 19:44 | 20:27 | 21:08 | 21:39 | 21:39 | 21:03  | 20:05     | 19:05   | 17:13    | 16:55         | 43 09:59 (34) |
| 14                  | 08:28   |      | 09:32 (34) | 07:53 | 08:02 | 07:01 | 06:12 | 05:48 | 06:02 | 06:38  | 07:19     | 07:59   | 07:45    | 08:22         | 09:16 (34)    |
|                     | 17:19   | 39   | 10:11 (34) | 18:03 | 19:45 | 20:28 | 21:09 | 21:40 | 21:39 | 21:01  | 20:03     | 19:03   | 17:12    | 16:55         | 44 10:00 (34) |
| 15                  | 08:27   |      | 09:34 (34) | 07:51 | 08:00 | 06:59 | 06:10 | 05:48 | 06:03 | 06:39  | 07:20     | 08:00   | 07:46    | 08:23         | 09:17 (34)    |
|                     | 17:20   | 37   | 10:11 (34) | 18:05 | 19:46 | 20:30 | 21:11 | 21:41 | 21:38 | 21:00  | 20:01     | 19:01   | 17:11    | 16:55         | 44 10:01 (34) |
| 16                  | 08:26   |      | 09:34 (34) | 07:50 | 07:58 | 06:57 | 06:09 | 05:48 | 06:03 | 06:41  | 07:21     | 08:02   | 07:47    | 08:24         | 09:18 (34)    |
|                     | 17:21   | 37   | 10:11 (34) | 18:06 | 19:48 | 20:31 | 21:12 | 21:41 | 21:37 | 20:58  | 19:59     | 19:00   | 17:10    | 16:55         | 43 10:01 (34) |
| 17                  | 08:26   |      | 09:35 (34) | 07:48 | 07:56 | 06:55 | 06:08 | 05:48 | 06:04 | 06:42  | 07:23     | 08:03   | 07:49    | 08:24         | 09:17 (34)    |
|                     | 17:23   | 36   | 10:11 (34) | 18:08 | 19:49 | 20:33 | 21:13 | 21:42 | 21:36 | 20:56  | 19:57     | 18:56   | 17:09    | 5 09:26 (34)  | 08:24         |
| 18                  | 08:25   |      | 09:36 (34) | 07:46 | 07:54 | 06:53 | 06:07 | 05:48 | 06:05 | 06:43  | 07:24     | 08:05   | 07:50    | 09:31 (34)    | 16:55         |
|                     | 17:24   | 34   | 10:10 (34) | 18:09 | 19:51 | 20:34 | 21:14 | 21:42 | 21:36 | 20:54  | 19:55     | 18:54   | 17:08    | 14 09:36 (34) | 08:25         |
| 19                  | 08:24   |      | 09:37 (34) | 07:45 | 07:52 | 06:52 | 06:05 | 05:48 | 06:07 | 06:45  | 07:25     | 08:06   | 07:52    | 09:19 (34)    | 16:55         |
|                     | 17:25   | 33   | 10:10 (34) | 18:11 | 19:52 | 20:35 | 21:16 | 21:42 | 21:35 | 20:53  | 19:53     | 18:52   | 17:07    | 19 09:38 (34) | 08:26         |
| 20                  | 08:24   |      | 09:38 (34) | 07:43 | 07:50 | 06:50 | 06:04 | 05:48 | 06:08 | 06:46  | 07:27     | 08:08   | 07:53    | 09:18 (34)    | 16:56         |
|                     | 17:27   | 32   | 10:10 (34) | 18:12 | 19:54 | 20:37 | 21:17 | 21:43 | 21:34 | 20:51  | 19:51     | 18:50   | 17:06    | 23 09:41 (34) | 08:26         |
| 21                  | 08:23   |      | 09:40 (34) | 07:41 | 07:48 | 06:48 | 06:03 | 05:48 | 06:09 | 06:47  | 07:28     | 08:09   | 07:55    | 09:16 (34)    | 16:56         |
|                     | 17:28   | 29   | 10:09 (34) | 18:14 | 19:55 | 20:38 | 21:18 | 21:43 | 21:33 | 20:49  | 19:49     | 18:49   | 17:05    | 26 09:42 (34) | 08:27         |
| 22                  | 08:22   |      | 09:41 (34) | 07:40 | 07:46 | 06:46 | 06:02 | 05:48 | 06:10 | 06:48  | 07:29     | 08:10   | 07:56    | 09:16 (34)    | 16:57         |
|                     | 17:30   | 27   | 10:08 (34) | 18:15 | 19:56 | 20:40 | 21:19 | 21:43 | 21:32 | 20:47  | 19:47     | 18:47   | 17:04    | 28 09:44 (34) | 08:28         |
| 23                  | 08:21   |      | 09:42 (34) | 07:38 | 07:44 | 06:44 | 06:01 | 05:49 | 06:11 | 06:50  | 07:30     | 08:12   | 07:57    | 09:15 (34)    | 16:57         |
|                     | 17:31   | 25   | 10:07 (34) | 18:17 | 19:58 | 20:41 | 21:20 | 21:44 | 21:31 | 20:46  | 19:45     | 18:45   | 17:03    | 30 09:45 (34) | 08:29         |
| 24                  | 08:20   |      | 09:44 (34) | 07:36 | 07:42 | 06:43 | 06:00 | 05:49 | 06:12 | 06:51  | 07:32     | 08:13   | 07:59    | 09:15 (34)    | 16:58         |
|                     | 17:33   | 22   | 10:06 (34) | 18:19 | 19:59 | 20:42 | 21:21 | 21:44 | 21:30 | 20:44  | 19:43     | 18:43   | 17:02    | 32 09:47 (34) | 08:29         |
| 25                  | 08:19   |      | 09:47 (34) | 07:34 | 07:40 | 06:41 | 05:59 | 05:49 | 06:13 | 06:52  | 07:33     | 08:15   | 08:00    | 09:14 (34)    | 16:59         |
|                     | 17:34   | 17   | 10:04 (34) | 18:20 | 20:01 | 20:44 | 21:23 | 21:44 | 21:29 | 20:42  | 19:41     | 18:42   | 17:01    | 33 09:47 (34) | 08:29         |
| 26                  | 08:18   |      | 09:50 (34) | 07:33 | 07:38 | 06:39 | 05:58 | 05:50 | 06:14 | 06:54  | 07:34     | 08:16   | 08:02    | 09:14 (34)    | 16:59         |
|                     | 17:36   | 11   | 10:01 (34) | 18:22 | 20:02 | 20:45 | 21:24 | 21:44 | 21:28 | 20:40  | 19:39     | 18:40   | 17:00    | 35 09:49 (34) | 08:30         |
| 27                  | 08:17   |      |            | 07:31 | 07:36 | 06:37 | 05:57 | 05:50 | 06:15 | 06:55  | 07:36     | 08:18   | 08:03    | 09:13 (34)    | 16:59         |
|                     | 17:37   |      |            | 18:23 | 20:03 | 20:46 | 21:25 | 21:44 | 21:27 | 20:38  | 19:37     | 18:38   | 17:00    | 36 09:49 (34) | 08:30         |
| 28                  | 08:16   |      |            | 07:29 | 07:34 | 06:36 | 05:57 | 05:50 | 06:17 | 06:56  | 07:37     | 08:19   | 08:04    | 09:14 (34)    | 16:59         |
|                     | 17:39   |      |            | 18:25 | 20:05 | 20:48 | 21:26 | 21:44 | 21:26 | 20:36  | 19:35     | 18:37   | 16:59    | 37 09:51 (34) | 08:30         |
| 29                  | 08:15   |      |            |       | 07:32 | 06:34 | 05:56 | 05:51 | 06:18 | 06:58  | 07:38     | 08:21   | 08:06    | 09:13 (34)    | 16:59         |
|                     | 17:40   |      |            |       | 20:06 | 20:49 | 21:27 | 21:44 | 21:24 | 20:35  | 19:33     | 18:35   | 16:58    | 38 09:51 (34) | 08:30         |
| 30                  | 08:14   |      |            |       | 07:30 | 06:32 | 05:55 | 05:51 | 06:19 | 06:59  | 07:40     | 08:22   | 08:07    | 09:13 (34)    | 16:59         |
|                     | 17:42   |      |            |       | 20:08 | 20:51 | 21:28 | 21:44 | 21:23 | 20:33  | 19:31     | 18:33   | 16:58    | 39 09:52 (34) | 08:30         |
| 31                  | 08:13   |      |            |       | 07:28 |       | 05:54 |       | 06:20 | 07:00  |           | 08:24   |          | 08:31         | 17:02         |
|                     | 17:43   |      |            |       | 20:09 |       | 21:29 |       | 21:22 | 20:31  |           | 18:32   |          | 17:03         | 44 10:08 (34) |
| Potential sun hours | 278     |      | 286        | 367   | 406   | 466   | 475   | 481   | 442   | 380    | 340       | 283     |          | 266           | 1334          |
| Total, worst case   |         | 926  |            |       |       |       |       |       |       |        |           |         |          |               |               |
| Sun reduction       |         | 0.54 |            |       |       |       |       |       |       |        |           |         |          |               | 0.45          |
| Oper. time red.     |         | 1.00 |            |       |       |       |       |       |       |        |           |         |          |               | 1.00          |
| Wind dir. red.      |         | 0.64 |            |       |       |       |       |       |       |        |           |         |          |               | 0.64          |
| Total reduction     |         | 0.35 |            |       |       |       |       |       |       |        |           |         |          |               | 0.29          |
| Total, real         |         | 322  |            |       |       |       |       |       |       |        |           |         |          |               | 367           |

Table layout: For each day in each month the following matrix apply

| Day in month | Sun rise (hh:mm) | Sun set (hh:mm) | Minutes with flicker | First time (hh:mm) with flicker | Last time (hh:mm) with flicker | (WTG causing flicker first time) | (WTG causing flicker last time) |
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|

Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: R106 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (96)

## Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Reference year for calendar

2023

| Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  |
|------|------|------|------|------|------|------|------|------|------|------|------|
| 0.54 | 0.52 | 0.61 | 0.58 | 0.64 | 0.67 | 0.75 | 0.72 | 0.67 | 0.53 | 0.42 | 0.45 |

Operational time

| N   | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW | NW  | NNW | Sum   |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| 376 | 314 | 339 | 425 | 445 | 474 | 693 | 570 | 488 | 386 | 872 | 609 | 772 | 651 | 677 | 667 | 8,758 |

|                     | January | February | March | April | May   | June  | July  | August | September | October | November | December |               |
|---------------------|---------|----------|-------|-------|-------|-------|-------|--------|-----------|---------|----------|----------|---------------|
| 1                   | 08:31   | 08:11    | 07:27 | 07:26 | 06:31 | 05:54 | 05:52 | 06:22  | 07:02     | 07:41   | 08:25    | 08:08    |               |
|                     | 17:04   | 17:45    | 18:26 | 20:10 | 20:52 | 21:30 | 21:44 | 21:21  | 20:29     | 19:29   | 18:30    | 16:57    |               |
| 2                   | 08:31   | 08:10    | 07:25 | 07:24 | 06:29 | 05:53 | 05:52 | 06:23  | 07:03     | 07:43   | 08:27    | 08:09    |               |
|                     | 17:05   | 17:46    | 18:28 | 20:12 | 20:53 | 21:31 | 21:44 | 21:19  | 20:27     | 19:27   | 18:29    | 16:57    |               |
| 3                   | 08:31   | 08:09    | 07:23 | 07:22 | 06:28 | 05:52 | 05:53 | 06:24  | 07:04     | 07:44   | 08:28    | 08:11    |               |
|                     | 17:06   | 17:48    | 18:29 | 20:13 | 20:55 | 21:32 | 21:44 | 21:18  | 20:25     | 19:25   | 18:27    | 16:56    |               |
| 4                   | 08:31   | 08:08    | 07:21 | 07:20 | 06:26 | 05:52 | 05:54 | 06:25  | 07:06     | 07:45   | 08:30    | 08:12    |               |
|                     | 17:07   | 17:49    | 18:31 | 20:15 | 20:56 | 21:33 | 21:43 | 21:16  | 20:23     | 19:23   | 18:26    | 16:56    |               |
| 5                   | 08:31   | 08:06    | 07:20 | 07:18 | 06:24 | 05:51 | 05:54 | 06:26  | 07:07     | 07:47   | 07:31    | 08:13    |               |
|                     | 17:08   | 17:51    | 18:32 | 20:16 | 20:57 | 21:34 | 21:43 | 21:15  | 20:21     | 19:21   | 17:24    | 16:56    |               |
| 6                   | 08:30   | 08:05    | 07:18 | 07:16 | 06:23 | 05:51 | 05:55 | 06:28  | 07:08     | 07:48   | 07:33    | 08:14    |               |
|                     | 17:09   | 17:52    | 18:33 | 20:17 | 20:59 | 21:34 | 21:43 | 21:14  | 20:19     | 19:19   | 17:23    | 16:55    |               |
| 7                   | 08:30   | 08:04    | 07:16 | 07:14 | 06:21 | 05:50 | 05:56 | 06:29  | 07:09     | 07:49   | 07:34    | 08:15    |               |
|                     | 17:10   | 17:54    | 18:35 | 20:19 | 21:00 | 21:35 | 21:42 | 21:12  | 20:17     | 19:17   | 17:21    | 16:55    |               |
| 8                   | 08:30   | 08:02    | 07:14 | 07:13 | 06:20 | 05:50 | 05:57 | 06:30  | 07:11     | 07:51   | 07:36    | 08:16    |               |
|                     | 17:11   | 17:55    | 18:36 | 20:20 | 21:01 | 21:36 | 21:42 | 21:11  | 20:15     | 19:15   | 17:20    | 16:55    |               |
| 9                   | 08:30   | 08:01    | 07:12 | 07:11 | 06:19 | 05:49 | 05:57 | 06:32  | 07:12     | 07:52   | 07:37    | 08:17    |               |
|                     | 17:12   | 17:57    | 18:38 | 20:22 | 21:03 | 21:37 | 21:42 | 21:09  | 20:13     | 19:13   | 17:18    | 16:55    |               |
| 10                  | 08:29   | 07:59    | 07:10 | 07:09 | 06:17 | 05:49 | 05:58 | 06:33  | 07:13     | 07:54   | 07:39    | 08:18    |               |
|                     | 17:14   | 17:59    | 18:39 | 20:23 | 21:04 | 21:38 | 21:41 | 21:08  | 20:11     | 19:11   | 17:17    | 16:55    |               |
| 11                  | 08:29   | 07:58    | 07:08 | 07:07 | 06:16 | 05:49 | 05:59 | 06:34  | 07:15     | 07:55   | 07:40    | 08:19    |               |
|                     | 17:15   | 18:00    | 18:41 | 20:24 | 21:05 | 21:38 | 21:41 | 21:06  | 20:09     | 19:09   | 17:16    | 16:55    |               |
| 12                  | 08:29   | 07:56    | 08:06 | 07:05 | 06:14 | 05:49 | 06:00 | 06:35  | 07:16     | 07:56   | 07:42    | 08:20    |               |
|                     | 17:16   | 18:00    | 18:42 | 20:26 | 21:07 | 21:39 | 21:40 | 21:04  | 20:07     | 19:07   | 17:15    | 16:55    |               |
| 13                  | 08:28   | 07:55    | 08:04 | 07:03 | 06:13 | 05:48 | 06:01 | 06:37  | 07:17     | 07:58   | 07:43    | 08:21    |               |
|                     | 17:17   | 18:02    | 19:44 | 20:27 | 21:08 | 21:40 | 21:39 | 21:03  | 20:05     | 19:05   | 17:13    | 16:55    |               |
| 14                  | 08:28   | 07:53    | 08:02 | 07:01 | 06:12 | 05:48 | 06:02 | 06:38  | 07:19     | 07:59   | 07:45    | 08:22    |               |
|                     | 17:19   | 18:03    | 19:45 | 20:28 | 21:09 | 21:40 | 21:39 | 21:01  | 20:03     | 19:03   | 17:12    | 16:55    |               |
| 15                  | 08:27   | 07:51    | 08:00 | 06:59 | 06:10 | 05:48 | 06:03 | 06:39  | 07:20     | 08:01   | 07:46    | 08:23    | 15:44 (23)    |
|                     | 17:20   | 18:05    | 19:47 | 20:30 | 21:11 | 21:41 | 21:38 | 21:00  | 20:01     | 19:01   | 17:11    | 16:55    | 5 15:49 (23)  |
| 16                  | 08:26   | 07:50    | 07:58 | 06:57 | 06:09 | 05:48 | 06:04 | 06:41  | 07:21     | 08:02   | 07:47    | 08:24    | 15:43 (23)    |
|                     | 17:21   | 18:06    | 19:48 | 20:31 | 21:12 | 21:41 | 21:37 | 20:58  | 19:59     | 19:00   | 17:10    | 16:55    | 7 15:50 (23)  |
| 17                  | 08:26   | 07:48    | 07:56 | 06:55 | 06:08 | 05:48 | 06:05 | 06:42  | 07:23     | 08:03   | 07:49    | 08:24    | 15:43 (23)    |
|                     | 17:23   | 18:08    | 19:49 | 20:33 | 21:13 | 21:42 | 21:36 | 20:56  | 19:57     | 18:56   | 17:09    | 16:55    | 9 15:52 (23)  |
| 18                  | 08:25   | 07:47    | 07:54 | 06:54 | 06:07 | 05:48 | 06:06 | 06:43  | 07:24     | 08:05   | 07:50    | 08:25    | 15:42 (23)    |
|                     | 17:24   | 18:09    | 19:51 | 20:34 | 21:14 | 21:42 | 21:36 | 20:55  | 19:55     | 18:54   | 17:08    | 16:55    | 10 15:52 (23) |
| 19                  | 08:24   | 07:45    | 07:52 | 06:52 | 06:06 | 05:48 | 06:07 | 06:45  | 07:25     | 08:06   | 07:52    | 08:26    | 15:43 (23)    |
|                     | 17:25   | 18:11    | 19:52 | 20:35 | 21:16 | 21:42 | 21:35 | 20:53  | 19:53     | 18:52   | 17:07    | 16:56    | 10 15:53 (23) |
| 20                  | 08:24   | 07:43    | 07:50 | 06:50 | 06:04 | 05:48 | 06:08 | 06:46  | 07:27     | 08:08   | 07:53    | 08:26    | 15:42 (23)    |
|                     | 17:27   | 18:12    | 19:54 | 20:37 | 21:17 | 21:43 | 21:34 | 20:51  | 19:51     | 18:50   | 17:06    | 16:56    | 12 15:54 (23) |
| 21                  | 08:23   | 07:41    | 07:48 | 06:48 | 06:03 | 05:48 | 06:09 | 06:47  | 07:28     | 08:09   | 07:55    | 08:27    | 15:43 (23)    |
|                     | 17:28   | 18:14    | 19:55 | 20:38 | 21:18 | 21:43 | 21:33 | 20:49  | 19:49     | 18:49   | 17:05    | 16:57    | 12 15:55 (23) |
| 22                  | 08:22   | 07:40    | 07:46 | 06:46 | 06:02 | 05:49 | 06:10 | 06:49  | 07:29     | 08:11   | 07:56    | 08:28    | 15:44 (23)    |
|                     | 17:30   | 18:16    | 19:56 | 20:40 | 21:19 | 21:43 | 21:32 | 20:48  | 19:47     | 18:47   | 17:04    | 16:57    | 12 15:56 (23) |
| 23                  | 08:21   | 07:38    | 07:44 | 06:44 | 06:01 | 05:49 | 06:11 | 06:50  | 07:31     | 08:12   | 07:57    | 08:28    | 15:44 (23)    |
|                     | 17:31   | 18:17    | 19:58 | 20:41 | 21:20 | 21:44 | 21:31 | 20:46  | 19:45     | 18:45   | 17:03    | 16:58    | 12 15:56 (23) |
| 24                  | 08:20   | 07:36    | 07:42 | 06:43 | 06:00 | 05:49 | 06:12 | 06:51  | 07:32     | 08:13   | 07:59    | 08:29    | 15:44 (23)    |
|                     | 17:33   | 18:19    | 19:59 | 20:42 | 21:21 | 21:44 | 21:30 | 20:44  | 19:43     | 18:43   | 17:02    | 16:58    | 12 15:56 (23) |
| 25                  | 08:19   | 07:34    | 07:40 | 06:41 | 05:59 | 05:49 | 06:13 | 06:52  | 07:33     | 08:15   | 08:00    | 08:29    | 15:45 (23)    |
|                     | 17:34   | 18:20    | 20:01 | 20:44 | 21:23 | 21:44 | 21:29 | 20:42  | 19:41     | 18:42   | 17:01    | 16:59    | 12 15:57 (23) |
| 26                  | 08:18   | 07:33    | 07:38 | 06:39 | 05:58 | 05:50 | 06:14 | 06:54  | 07:35     | 08:16   | 08:02    | 08:29    | 15:46 (23)    |
|                     | 17:36   | 18:22    | 20:02 | 20:45 | 21:24 | 21:44 | 21:28 | 20:40  | 19:39     | 18:40   | 17:01    | 16:59    | 10 15:56 (23) |
| 27                  | 08:17   | 07:31    | 07:36 | 06:37 | 05:57 | 05:50 | 06:15 | 06:55  | 07:36     | 08:18   | 08:03    | 08:30    | 15:46 (23)    |
|                     | 17:37   | 18:23    | 20:03 | 20:46 | 21:25 | 21:44 | 21:27 | 20:38  | 19:37     | 18:38   | 17:00    | 17:00    | 10 15:57 (23) |
| 28                  | 08:16   | 07:29    | 07:34 | 06:36 | 05:57 | 05:50 | 06:17 | 06:56  | 07:37     | 08:19   | 08:04    | 08:30    | 15:48 (23)    |
|                     | 17:39   | 18:25    | 20:05 | 20:48 | 21:26 | 21:44 | 21:26 | 20:37  | 19:35     | 18:37   | 16:59    | 17:01    | 9 15:57 (23)  |
| 29                  | 08:15   |          | 07:32 | 06:34 | 05:56 | 05:51 | 06:18 | 06:58  | 07:39     | 08:21   | 08:06    | 08:30    | 15:49 (23)    |
|                     | 17:40   |          | 20:06 | 20:49 | 21:27 | 21:44 | 21:24 | 20:35  | 19:33     | 18:35   | 16:59    | 17:01    | 7 15:56 (23)  |
| 30                  | 08:14   |          | 07:30 | 06:32 | 05:55 | 05:51 | 06:19 | 06:59  | 07:40     | 08:22   | 08:07    | 08:30    | 15:51 (23)    |
|                     | 17:42   |          | 20:08 | 20:51 | 21:28 | 21:44 | 21:23 | 20:33  | 19:31     | 18:33   | 16:58    | 17:02    | 4 15:55 (23)  |
| 31                  | 08:13   |          | 07:28 |       | 05:54 |       | 06:20 | 07:00  |           | 08:24   |          | 08:31    |               |
|                     | 17:43   |          | 20:09 |       | 21:29 |       | 21:22 | 20:31  |           | 18:32   |          | 17:03    |               |
| Potential sun hours | 278     | 286      | 367   | 406   | 466   | 475   | 481   | 442    | 380       | 340     | 283      | 266      |               |
| Total, worst case   |         |          |       |       |       |       |       |        |           |         |          |          | 153           |
| Sun reduction       |         |          |       |       |       |       |       |        |           |         |          |          | 0.45          |
| Oper. time red.     |         |          |       |       |       |       |       |        |           |         |          |          | 1.00          |
| Wind dir. red.      |         |          |       |       |       |       |       |        |           |         |          |          | 0.61          |
| Total reduction     |         |          |       |       |       |       |       |        |           |         |          |          | 0.28          |
| Total, real         |         |          |       |       |       |       |       |        |           |         |          |          | 42            |

Table layout: For each day in each month the following matrix apply

| Day in month | Sun rise (hh:mm) | Sun set (hh:mm) | Minutes with flicker | First time (hh:mm) with flicker | Last time (hh:mm) with flicker | (WTG causing flicker first time) | (WTG causing flicker last time) |
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|



Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

### Assumptions for shadow calculations

Reference year for calendar

Shadow receptor: R107 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 90.0° (97)

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

2023

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

|                     | January |      | February   |       | March | April | May   | June  | July  | August | September | October | November   | December   |            |            |
|---------------------|---------|------|------------|-------|-------|-------|-------|-------|-------|--------|-----------|---------|------------|------------|------------|------------|
| 1                   | 08:31   | 32   | 15:44 (23) | 08:11 | 07:27 | 07:26 | 06:31 | 05:54 | 05:52 | 06:22  | 07:02     | 07:41   | 08:25      | 08:08      | 15:36 (23) |            |
|                     | 17:04   |      | 16:16 (23) | 17:45 | 18:26 | 20:10 | 20:52 | 21:30 | 21:44 | 21:21  | 20:29     | 19:29   | 18:30      | 16:57      | 21         | 15:57 (23) |
| 2                   | 08:31   | 31   | 15:45 (23) | 08:10 | 07:25 | 07:24 | 06:29 | 05:53 | 05:52 | 06:23  | 07:03     | 07:43   | 08:27      | 08:09      | 15:35 (23) |            |
|                     | 17:05   |      | 16:16 (23) | 17:46 | 18:28 | 20:12 | 20:53 | 21:31 | 21:44 | 21:19  | 20:27     | 19:27   | 18:29      | 16:57      | 23         | 15:58 (23) |
| 3                   | 08:31   | 31   | 15:46 (23) | 08:09 | 07:23 | 07:22 | 06:28 | 05:52 | 05:53 | 06:24  | 07:04     | 07:44   | 08:28      | 08:11      | 15:35 (23) |            |
|                     | 17:06   |      | 16:17 (23) | 17:48 | 18:29 | 20:13 | 20:55 | 21:32 | 21:44 | 21:18  | 20:25     | 19:25   | 18:27      | 16:56      | 24         | 15:59 (23) |
| 4                   | 08:31   | 31   | 15:46 (23) | 08:08 | 07:21 | 07:20 | 06:26 | 05:52 | 05:54 | 06:25  | 07:06     | 07:45   | 08:30      | 08:12      | 15:35 (23) |            |
|                     | 17:07   |      | 16:17 (23) | 17:49 | 18:31 | 20:15 | 20:56 | 21:33 | 21:43 | 21:16  | 20:23     | 19:23   | 18:26      | 16:56      | 26         | 16:01 (23) |
| 5                   | 08:31   | 30   | 15:46 (23) | 08:06 | 07:20 | 07:18 | 06:24 | 05:51 | 05:54 | 06:26  | 07:07     | 07:47   | 07:31      | 08:13      | 15:35 (23) |            |
|                     | 17:08   |      | 16:16 (23) | 17:51 | 18:32 | 20:16 | 20:57 | 21:34 | 21:43 | 21:15  | 20:21     | 19:21   | 17:24      | 16:56      | 27         | 16:02 (23) |
| 6                   | 08:30   | 30   | 15:47 (23) | 08:05 | 07:18 | 07:16 | 06:23 | 05:51 | 05:55 | 06:28  | 07:08     | 07:48   | 07:33      | 08:14      | 15:34 (23) |            |
|                     | 17:09   |      | 16:17 (23) | 17:52 | 18:33 | 20:17 | 20:59 | 21:34 | 21:43 | 21:14  | 20:19     | 19:19   | 17:23      | 16:55      | 28         | 16:02 (23) |
| 7                   | 08:30   | 28   | 15:49 (23) | 08:04 | 07:16 | 07:14 | 06:21 | 05:50 | 05:56 | 06:29  | 07:09     | 07:49   | 07:34      | 08:15      | 15:34 (23) |            |
|                     | 17:10   |      | 16:17 (23) | 17:54 | 18:35 | 20:19 | 21:00 | 21:35 | 21:42 | 21:12  | 20:17     | 19:17   | 17:21      | 16:55      | 29         | 16:03 (23) |
| 8                   | 08:30   | 27   | 15:50 (23) | 08:02 | 07:14 | 07:13 | 06:20 | 05:50 | 05:57 | 06:30  | 07:11     | 07:51   | 07:36      | 08:16      | 15:34 (23) |            |
|                     | 17:11   |      | 16:17 (23) | 17:55 | 18:36 | 20:20 | 21:01 | 21:36 | 21:42 | 21:11  | 20:15     | 19:15   | 17:20      | 16:55      | 29         | 16:03 (23) |
| 9                   | 08:30   | 27   | 15:50 (23) | 08:01 | 07:12 | 07:11 | 06:19 | 05:50 | 05:57 | 06:32  | 07:12     | 07:52   | 07:37      | 08:17      | 15:34 (23) |            |
|                     | 17:12   |      | 16:17 (23) | 17:57 | 18:38 | 20:22 | 21:03 | 21:37 | 21:42 | 21:09  | 20:13     | 19:13   | 17:18      | 16:55      | 30         | 16:04 (23) |
| 10                  | 08:29   | 25   | 15:52 (23) | 07:59 | 07:10 | 07:09 | 06:17 | 05:49 | 05:58 | 06:33  | 07:13     | 07:54   | 07:39      | 08:18      | 15:34 (23) |            |
|                     | 17:14   |      | 16:17 (23) | 17:59 | 18:39 | 20:23 | 21:04 | 21:38 | 21:41 | 21:08  | 20:11     | 19:11   | 17:17      | 16:55      | 31         | 16:05 (23) |
| 11                  | 08:29   | 24   | 15:52 (23) | 07:58 | 07:08 | 07:07 | 06:16 | 05:49 | 05:59 | 06:34  | 07:15     | 07:55   | 07:40      | 08:19      | 15:34 (23) |            |
|                     | 17:15   |      | 16:16 (23) | 18:00 | 18:41 | 20:24 | 21:05 | 21:38 | 21:41 | 21:06  | 20:09     | 19:09   | 17:16      | 16:55      | 31         | 16:05 (23) |
| 12                  | 08:29   | 22   | 15:54 (23) | 07:56 | 08:06 | 07:05 | 06:14 | 05:49 | 06:00 | 06:35  | 07:16     | 07:56   | 07:42      | 08:20      | 15:35 (23) |            |
|                     | 17:16   |      | 16:16 (23) | 18:00 | 18:42 | 20:26 | 21:07 | 21:39 | 21:40 | 21:04  | 20:07     | 19:07   | 17:15      | 16:55      | 31         | 16:06 (23) |
| 13                  | 08:28   | 20   | 15:55 (23) | 07:55 | 08:04 | 07:03 | 06:13 | 05:48 | 06:01 | 06:37  | 07:17     | 07:58   | 07:43      | 08:21      | 15:35 (23) |            |
|                     | 17:17   |      | 16:15 (23) | 18:02 | 19:44 | 20:27 | 21:08 | 21:40 | 21:39 | 21:03  | 20:05     | 19:05   | 17:13      | 16:55      | 32         | 16:07 (23) |
| 14                  | 08:28   | 18   | 15:56 (23) | 07:53 | 08:02 | 07:01 | 06:12 | 05:48 | 06:02 | 06:38  | 07:19     | 07:59   | 07:45      | 08:22      | 15:35 (23) |            |
|                     | 17:19   |      | 16:14 (23) | 18:03 | 19:45 | 20:28 | 21:09 | 21:40 | 21:39 | 21:01  | 20:03     | 19:03   | 17:12      | 16:55      | 33         | 16:08 (23) |
| 15                  | 08:27   | 16   | 15:58 (23) | 07:51 | 08:00 | 06:59 | 06:10 | 05:48 | 06:03 | 06:39  | 07:20     | 08:01   | 07:46      | 08:23      | 15:36 (23) |            |
|                     | 17:20   |      | 16:14 (23) | 18:05 | 19:47 | 20:30 | 21:11 | 21:41 | 21:38 | 21:00  | 20:01     | 19:01   | 17:11      | 16:55      | 32         | 16:08 (23) |
| 16                  | 08:26   | 12   | 16:00 (23) | 07:50 | 07:58 | 06:57 | 06:09 | 05:48 | 06:04 | 06:41  | 07:21     | 08:02   | 07:47      | 08:24      | 15:36 (23) |            |
|                     | 17:21   |      | 16:12 (23) | 18:06 | 19:48 | 20:31 | 21:12 | 21:41 | 21:37 | 20:58  | 19:59     | 19:00   | 17:10      | 16:55      | 33         | 16:09 (23) |
| 17                  | 08:26   | 5    | 16:04 (23) | 07:48 | 07:56 | 06:55 | 06:08 | 05:48 | 06:05 | 06:42  | 07:23     | 08:03   | 07:49      | 08:24      | 15:37 (23) |            |
|                     | 17:23   |      | 16:09 (23) | 18:08 | 19:49 | 20:33 | 21:13 | 21:42 | 21:36 | 20:56  | 19:57     | 18:56   | 17:09      | 16:55      | 33         | 16:10 (23) |
| 18                  | 08:25   |      |            | 07:47 | 07:54 | 06:54 | 06:07 | 05:48 | 06:06 | 06:43  | 07:24     | 08:05   | 07:50      | 08:25      | 15:37 (23) |            |
|                     | 17:24   |      | 18:09      | 19:51 | 20:34 | 21:14 | 21:42 | 21:36 | 20:55 | 19:55  | 18:54     | 17:08   | 16:55      | 33         | 16:10 (23) |            |
| 19                  | 08:24   |      | 07:45      | 07:52 | 06:52 | 06:06 | 05:48 | 06:07 | 06:45 | 07:25  | 08:06     | 07:52   | 08:26      | 15:37 (23) |            |            |
|                     | 17:25   |      | 18:11      | 19:52 | 20:35 | 21:16 | 21:42 | 21:35 | 20:53 | 19:53  | 18:52     | 17:07   | 16:56      | 34         | 16:11 (23) |            |
| 20                  | 08:24   |      | 07:43      | 07:50 | 06:50 | 06:04 | 05:48 | 06:08 | 06:46 | 07:27  | 08:08     | 07:53   | 08:26      | 15:37 (23) |            |            |
|                     | 17:27   |      | 18:12      | 19:54 | 20:37 | 21:17 | 21:43 | 21:34 | 20:51 | 19:51  | 18:50     | 17:06   | 16:56      | 33         | 16:10 (23) |            |
| 21                  | 08:23   |      | 07:41      | 07:48 | 06:48 | 06:03 | 05:48 | 06:09 | 06:47 | 07:28  | 08:09     | 07:55   | 08:27      | 15:38 (23) |            |            |
|                     | 17:28   |      | 18:14      | 19:55 | 20:38 | 21:18 | 21:43 | 21:33 | 20:49 | 19:49  | 18:49     | 17:05   | 16:57      | 33         | 16:11 (23) |            |
| 22                  | 08:22   |      | 07:40      | 07:46 | 06:46 | 06:02 | 05:49 | 06:10 | 06:49 | 07:29  | 08:11     | 07:56   | 08:28      | 15:39 (23) |            |            |
|                     | 17:30   |      | 18:16      | 19:56 | 20:40 | 21:19 | 21:43 | 21:32 | 20:48 | 19:47  | 18:47     | 17:04   | 16:57      | 33         | 16:12 (23) |            |
| 23                  | 08:21   |      | 07:38      | 07:44 | 06:44 | 06:01 | 05:49 | 06:11 | 06:50 | 07:31  | 08:12     | 07:57   | 08:28      | 15:39 (23) |            |            |
|                     | 17:31   |      | 18:17      | 19:58 | 20:41 | 21:20 | 21:44 | 21:31 | 20:46 | 19:45  | 18:45     | 17:03   | 16:58      | 33         | 16:12 (23) |            |
| 24                  | 08:20   |      | 07:36      | 07:42 | 06:43 | 06:00 | 05:49 | 06:12 | 06:51 | 07:32  | 08:13     | 07:59   | 08:29      | 15:39 (23) |            |            |
|                     | 17:33   |      | 18:19      | 19:59 | 20:42 | 21:21 | 21:44 | 21:30 | 20:44 | 19:43  | 18:43     | 17:02   | 16:58      | 33         | 16:12 (23) |            |
| 25                  | 08:19   |      | 07:34      | 07:40 | 06:41 | 05:59 | 05:49 | 06:13 | 06:52 | 07:33  | 08:15     | 08:00   | 08:29      | 15:40 (23) |            |            |
|                     | 17:34   |      | 18:20      | 20:01 | 20:44 | 21:23 | 21:44 | 21:29 | 20:42 | 19:41  | 18:42     | 17:01   | 16:59      | 33         | 16:13 (23) |            |
| 26                  | 08:18   |      | 07:33      | 07:38 | 06:39 | 05:58 | 05:50 | 06:14 | 06:54 | 07:35  | 08:16     | 08:02   | 08:29      | 15:40 (23) |            |            |
|                     | 17:36   |      | 18:22      | 20:02 | 20:45 | 21:24 | 21:44 | 21:28 | 20:40 | 19:39  | 18:40     | 17:01   | 16:59      | 34         | 16:14 (23) |            |
| 27                  | 08:17   |      | 07:31      | 07:36 | 06:37 | 05:57 | 05:50 | 06:15 | 06:55 | 07:36  | 08:18     | 08:03   | 08:30      | 15:41 (23) |            |            |
|                     | 17:37   |      | 18:23      | 20:03 | 20:46 | 21:25 | 21:44 | 21:27 | 20:38 | 19:37  | 18:38     | 17:00   | 8          | 15:41 (23) | 08:30      | 15:41 (23) |
| 28                  | 08:16   |      | 07:29      | 07:34 | 06:36 | 05:57 | 05:50 | 06:17 | 06:56 | 07:37  | 08:19     | 08:04   | 15:39 (23) | 08:30      | 15:42 (23) |            |
|                     | 17:39   |      | 18:25      | 20:05 | 20:48 | 21:26 | 21:44 | 21:26 | 20:37 | 19:35  | 18:37     | 16:59   | 14         | 15:53 (23) | 08:30      | 15:42 (23) |
| 29                  | 08:15   |      |            | 07:32 | 06:34 | 05:56 | 05:51 | 06:18 | 06:58 | 07:39  | 08:21     | 08:06   | 15:37 (23) | 08:30      | 15:42 (23) |            |
|                     | 17:40   |      |            | 20:06 | 20:49 | 21:27 | 21:44 | 21:24 | 20:35 | 19:33  | 18:35     | 16:59   | 17         | 15:54 (23) | 08:30      | 15:42 (23) |
| 30                  | 08:14   |      |            | 07:30 | 06:32 | 05:55 | 05:51 | 06:19 | 06:59 | 07:40  | 08:22     | 08:07   | 15:36 (23) | 08:30      | 15:43 (23) |            |
|                     | 17:42   |      |            | 20:08 | 20:51 | 21:28 | 21:44 | 21:23 | 20:33 | 19:31  | 18:33     | 16:58   | 19         | 15:55 (23) | 08:30      | 15:43 (23) |
| 31                  | 08:13   |      |            | 07:28 |       | 05:54 |       | 06:20 | 07:00 |        | 08:24     |         | 08:31      | 17:02      | 32         | 16:15 (23) |
|                     | 17:43   |      |            | 20:09 |       | 21:29 |       | 21:22 | 20:31 |        | 18:32     |         | 17:03      | 33         | 16:16 (23) |            |
| Potential sun hours | 278     |      | 286        | 367   | 406   | 466   | 475   | 481   | 442   | 380    | 340       | 283     |            | 266        |            |            |
| Total, worst case   |         | 409  |            |       |       |       |       |       |       |        |           |         | 58         |            | 956        |            |
| Sun reduction       |         | 0.54 |            |       |       |       |       |       |       |        |           |         | 0.42       |            | 0.45       |            |
| Oper. time red.     |         | 1.00 |            |       |       |       |       |       |       |        |           |         | 1.00       |            | 1.00       |            |
| Wind dir. red.      |         | 0.62 |            |       |       |       |       |       |       |        |           |         | 0.62       |            | 0.62       |            |
| Total reduction     |         | 0.33 |            |       |       |       |       |       |       |        |           |         | 0.26       |            | 0.28       |            |
| Total, real         |         | 136  |            |       |       |       |       |       |       |        |           |         | 15         |            | 265        |            |

Table layout: For each day in each month the following matrix apply

|              |                  |                                 |                                  |                                 |
|--------------|------------------|---------------------------------|----------------------------------|---------------------------------|
| Day in month | Sun rise (hh:mm) | First time (hh:mm) with flicker | (WTG causing flicker first time) |                                 |
|              | Sun set (hh:mm)  | Minutes with flicker            | Last time (hh:mm) with flicker   | (WTG causing flicker last time) |

Project:

Oliver IV Array 012 8/26/2023

Licensed user:

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US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: R108 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 90.0° (98)

## Assumptions for shadow calculations

Reference year for calendar

2023

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

|                     | January        | February       | March          | April                  | May            | June           | July           | August         | September      | October        | November       | December       |
|---------------------|----------------|----------------|----------------|------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 1                   | 08:31<br>17:05 | 08:12<br>17:45 | 07:27<br>18:26 | 08:20 (1)<br>09:05 (1) | 07:27<br>20:11 | 06:31<br>20:52 | 05:54<br>21:30 | 05:52<br>21:44 | 06:22<br>21:21 | 07:02<br>20:29 | 07:42<br>19:29 | 08:25<br>18:30 |
| 2                   | 08:31<br>17:05 | 08:10<br>17:47 | 07:26<br>18:28 | 08:21 (1)<br>09:04 (1) | 07:25<br>20:12 | 06:30<br>20:54 | 05:53<br>21:31 | 05:53<br>21:44 | 06:23<br>21:19 | 07:03<br>20:27 | 07:43<br>19:27 | 08:10<br>18:29 |
| 3                   | 08:31<br>17:06 | 08:09<br>17:48 | 07:24<br>18:29 | 08:23 (1)<br>09:03 (1) | 07:23<br>20:14 | 06:28<br>20:55 | 05:53<br>21:32 | 05:53<br>21:44 | 06:24<br>21:18 | 07:05<br>20:25 | 07:44<br>19:25 | 08:11<br>18:27 |
| 4                   | 08:31<br>17:07 | 08:08<br>17:50 | 07:22<br>18:31 | 08:23 (1)<br>09:02 (1) | 07:21<br>20:15 | 06:26<br>20:56 | 05:52<br>21:33 | 05:54<br>21:44 | 06:26<br>21:17 | 07:06<br>20:23 | 07:46<br>19:23 | 08:12<br>18:26 |
| 5                   | 08:31<br>17:08 | 08:07<br>17:51 | 07:20<br>18:32 | 08:25 (1)<br>09:00 (1) | 07:20<br>20:16 | 06:25<br>20:58 | 05:52<br>21:34 | 05:55<br>21:43 | 06:27<br>21:15 | 07:07<br>20:21 | 07:47<br>19:21 | 08:13<br>18:29 |
| 6                   | 08:31<br>17:09 | 08:05<br>17:53 | 07:18<br>18:34 | 08:26 (1)<br>09:01 (1) | 07:17<br>20:17 | 06:23<br>20:59 | 05:51<br>21:35 | 05:55<br>21:43 | 06:28<br>21:14 | 07:08<br>20:19 | 07:48<br>19:19 | 08:14<br>18:26 |
| 7                   | 08:31<br>17:11 | 08:04<br>17:54 | 07:16<br>18:35 | 08:27 (1)<br>09:02 (1) | 07:15<br>20:18 | 06:22<br>21:00 | 05:51<br>21:36 | 05:56<br>21:43 | 06:29<br>21:12 | 07:10<br>20:17 | 07:50<br>19:17 | 08:15<br>18:29 |
| 8                   | 08:31<br>17:12 | 08:02<br>17:56 | 07:14<br>18:37 | 08:30 (1)<br>09:05 (1) | 07:13<br>20:19 | 06:20<br>21:02 | 05:50<br>21:36 | 05:57<br>21:42 | 06:31<br>21:11 | 07:11<br>20:16 | 07:51<br>19:15 | 08:16<br>18:31 |
| 9                   | 08:31<br>17:13 | 08:01<br>17:57 | 07:12<br>18:38 | 08:33 (1)<br>09:08 (1) | 07:11<br>20:22 | 06:19<br>21:03 | 05:50<br>21:37 | 05:58<br>21:42 | 06:32<br>21:09 | 07:12<br>20:14 | 07:52<br>19:13 | 08:17<br>18:32 |
| 10                  | 08:31<br>17:14 | 08:00<br>17:59 | 07:10<br>18:40 | 08:36 (1)<br>09:11 (1) | 07:10<br>20:23 | 06:17<br>21:04 | 05:50<br>21:38 | 05:58<br>21:41 | 06:33<br>21:08 | 07:14<br>20:12 | 07:54<br>19:11 | 08:18<br>18:35 |
| 11                  | 08:29<br>17:15 | 07:58<br>18:00 | 07:08<br>18:41 | 08:25 (1)<br>09:04 (1) | 07:08<br>20:25 | 06:16<br>21:06 | 05:49<br>21:38 | 05:59<br>21:41 | 06:34<br>21:06 | 07:15<br>20:10 | 07:55<br>19:09 | 08:19<br>18:36 |
| 12                  | 08:29<br>17:16 | 07:56<br>18:00 | 07:06<br>18:43 | 08:23 (1)<br>09:05 (1) | 07:06<br>20:26 | 06:15<br>21:07 | 05:49<br>21:39 | 06:00<br>21:40 | 06:36<br>21:05 | 07:16<br>20:08 | 07:57<br>19:07 | 08:20<br>18:36 |
| 13                  | 08:28<br>17:18 | 07:55<br>18:02 | 07:04<br>18:44 | 08:23 (1)<br>09:06 (1) | 07:03<br>20:27 | 06:13<br>21:08 | 05:49<br>21:40 | 06:01<br>21:40 | 06:37<br>21:03 | 07:18<br>20:06 | 07:58<br>19:06 | 08:21<br>18:37 |
| 14                  | 08:28<br>17:19 | 07:53<br>18:04 | 07:02<br>18:45 | 08:22 (1)<br>09:07 (1) | 07:01<br>20:29 | 06:12<br>21:10 | 05:49<br>21:40 | 06:02<br>21:39 | 06:38<br>21:02 | 07:19<br>20:04 | 07:59<br>19:04 | 08:22<br>18:38 |
| 15                  | 08:27<br>17:20 | 07:52<br>18:05 | 07:00<br>18:46 | 08:21 (1)<br>09:07 (1) | 06:59<br>20:30 | 06:11<br>21:11 | 05:49<br>21:41 | 06:03<br>21:38 | 06:40<br>21:00 | 07:20<br>20:01 | 08:01<br>19:02 | 08:23<br>18:39 |
| 16                  | 08:27<br>17:22 | 07:50<br>18:07 | 06:58<br>18:47 | 08:21 (1)<br>09:08 (1) | 06:58<br>20:32 | 06:09<br>21:12 | 05:48<br>21:41 | 06:04<br>21:38 | 06:41<br>20:58 | 07:22<br>19:59 | 08:02<br>19:00 | 08:24<br>18:40 |
| 17                  | 08:26<br>17:23 | 07:48<br>18:08 | 06:56<br>18:48 | 08:21 (1)<br>09:08 (1) | 06:56<br>20:33 | 06:08<br>21:13 | 05:48<br>21:42 | 06:05<br>21:37 | 06:42<br>20:57 | 07:23<br>19:57 | 08:04<br>18:56 | 08:25<br>18:41 |
| 18                  | 08:25<br>17:24 | 07:47<br>18:10 | 06:54<br>18:48 | 08:20 (1)<br>09:08 (1) | 06:54<br>20:34 | 06:07<br>21:15 | 05:48<br>21:42 | 06:06<br>21:36 | 06:44<br>20:55 | 07:24<br>19:55 | 08:05<br>18:54 | 08:26<br>18:42 |
| 19                  | 08:25<br>17:26 | 07:45<br>18:11 | 06:52<br>18:49 | 08:20 (1)<br>09:09 (1) | 06:52<br>20:36 | 06:06<br>21:16 | 05:48<br>21:43 | 06:07<br>21:35 | 06:45<br>20:53 | 07:26<br>19:53 | 08:07<br>18:53 | 08:27<br>18:48 |
| 20                  | 08:24<br>17:27 | 07:43<br>18:13 | 06:50<br>18:51 | 08:20 (1)<br>09:09 (1) | 06:50<br>20:37 | 06:05<br>21:17 | 05:49<br>21:43 | 06:08<br>21:34 | 06:46<br>20:51 | 07:27<br>19:51 | 08:08<br>18:51 | 08:27<br>18:49 |
| 21                  | 08:23<br>17:29 | 07:42<br>18:14 | 06:48<br>18:53 | 08:19 (1)<br>09:09 (1) | 06:48<br>20:38 | 06:04<br>21:18 | 05:49<br>21:43 | 06:09<br>21:33 | 06:48<br>20:50 | 07:28<br>19:49 | 08:09<br>18:49 | 08:27<br>18:50 |
| 22                  | 08:22<br>17:30 | 07:40<br>18:16 | 06:46<br>18:57 | 08:19 (1)<br>09:09 (1) | 06:47<br>20:40 | 06:03<br>21:19 | 05:49<br>21:44 | 06:10<br>21:32 | 06:49<br>20:48 | 07:30<br>19:47 | 08:11<br>18:47 | 08:28<br>18:51 |
| 23                  | 08:21<br>17:31 | 07:38<br>18:17 | 06:45<br>18:58 | 08:19 (1)<br>09:08 (1) | 06:45<br>20:41 | 06:02<br>21:21 | 05:49<br>21:44 | 06:11<br>21:31 | 06:50<br>20:46 | 07:31<br>19:45 | 08:12<br>18:45 | 08:28<br>18:50 |
| 24                  | 08:20<br>17:33 | 07:36<br>18:19 | 06:43<br>18:59 | 08:18 (1)<br>09:09 (1) | 06:43<br>20:43 | 06:01<br>21:22 | 05:49<br>21:44 | 06:12<br>21:30 | 06:51<br>20:44 | 07:32<br>19:43 | 08:14<br>18:44 | 08:29<br>18:51 |
| 25                  | 08:19<br>17:34 | 07:35<br>18:20 | 06:41<br>19:01 | 08:18 (1)<br>09:08 (1) | 06:41<br>20:44 | 06:00<br>21:23 | 05:50<br>21:44 | 06:14<br>21:29 | 06:53<br>20:42 | 07:33<br>19:41 | 08:15<br>18:42 | 08:30<br>18:51 |
| 26                  | 08:18<br>17:36 | 07:33<br>18:22 | 06:40<br>19:02 | 08:17 (1)<br>09:07 (1) | 06:40<br>20:45 | 05:59<br>21:24 | 05:50<br>21:44 | 06:15<br>21:28 | 06:54<br>20:41 | 07:35<br>19:39 | 08:17<br>18:40 | 08:31<br>18:51 |
| 27                  | 08:17<br>17:37 | 07:31<br>18:23 | 06:38<br>19:04 | 08:16 (1)<br>09:07 (1) | 06:38<br>20:47 | 05:58<br>21:25 | 05:50<br>21:44 | 06:16<br>21:27 | 06:55<br>20:39 | 07:36<br>19:37 | 08:18<br>18:39 | 08:32<br>18:51 |
| 28                  | 08:16<br>17:39 | 07:29<br>18:25 | 06:36<br>19:06 | 08:15 (1)<br>09:06 (1) | 06:36<br>20:48 | 05:57<br>21:26 | 05:51<br>21:44 | 06:17<br>21:26 | 06:57<br>20:37 | 07:37<br>19:35 | 08:20<br>18:37 | 08:33<br>18:51 |
| 29                  | 08:15<br>17:40 | 07:27<br>18:20 | 06:34<br>19:07 | 08:14 (1)<br>09:05 (1) | 06:34<br>20:50 | 05:56<br>21:27 | 05:51<br>21:44 | 06:18<br>21:25 | 06:58<br>20:35 | 07:39<br>19:33 | 08:21<br>18:35 | 08:34<br>18:53 |
| 30                  | 08:14<br>17:42 | 07:25<br>18:17 | 06:33<br>19:08 | 08:13 (1)<br>09:04 (1) | 06:33<br>20:51 | 05:55<br>21:28 | 05:52<br>21:44 | 06:19<br>21:23 | 06:59<br>20:33 | 07:40<br>19:31 | 08:23<br>18:34 | 08:35<br>18:53 |
| 31                  | 08:13<br>17:43 | 07:24<br>18:18 | 06:32<br>19:09 | 08:12 (1)<br>09:03 (1) | 06:32<br>20:50 | 05:54<br>21:29 | 05:53<br>21:44 | 06:20<br>21:22 | 07:01<br>20:31 | 07:41<br>18:32 | 08:24<br>18:35 | 08:36<br>18:54 |
| Potential sun hours | 278            | 286            | 367            | 406                    | 465            | 475            | 481            | 442            | 380            | 340            | 283            | 266            |
| Total, worst case   |                |                | 1030           |                        | 302            |                |                |                |                |                | 1106           | 240            |
| Sun reduction       |                |                | 0.52           |                        | 0.61           |                |                |                |                |                | 0.53           | 0.42           |
| Oper. time red.     |                |                | 1.00           |                        | 1.00           |                |                |                |                |                | 1.00           | 1.00           |
| Wind dir. red.      |                |                | 0.66           |                        | 0.66           |                |                |                |                |                | 0.66           | 0.66           |
| Total reduction     |                |                | 0.35           |                        | 0.41           |                |                |                |                |                | 0.35           | 0.28           |
| Total, real         |                |                | 356            |                        | 122            |                |                |                |                |                | 390            | 67             |

Table layout: For each day in each month the following matrix apply

|              |                      |                                 |                                  |
|--------------|----------------------|---------------------------------|----------------------------------|
| Day in month | Sun rise (hh:mm)     | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|              | Sun set (hh:mm)      | Last time (hh:mm) with flicker  | (WTG causing flicker last time)  |
|              | Minutes with flicker |                                 |                                  |



Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM  
US-01824-3627 Chelmsford  
+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

### Assumptions for shadow calculations

Reference year for calendar

Shadow receptor: R109 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (99)

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

|                     | January        | February       | March          | April          | May            | June           | July           | August         | September      | October        | November       | December       |
|---------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 1                   | 08:31<br>17:04 | 08:12<br>17:45 | 07:27<br>18:26 | 07:27<br>20:11 | 06:31<br>20:52 | 05:54<br>21:30 | 05:52<br>21:44 | 06:22<br>21:21 | 07:02<br>20:29 | 07:41<br>19:29 | 08:25<br>18:30 | 08:08<br>16:58 |
| 2                   | 08:31<br>17:05 | 08:10<br>17:46 | 07:25<br>18:28 | 07:25<br>20:12 | 06:29<br>20:53 | 05:53<br>21:31 | 05:53<br>21:44 | 06:23<br>21:19 | 07:03<br>20:27 | 07:43<br>19:27 | 08:27<br>18:29 | 08:09<br>16:57 |
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| 6                   | 08:31<br>17:09 | 08:05<br>17:53 | 07:18<br>18:34 | 07:17<br>20:18 | 06:23<br>20:59 | 05:51<br>21:35 | 05:55<br>21:43 | 06:28<br>21:14 | 07:08<br>20:19 | 07:48<br>19:19 | 08:33<br>17:23 | 08:14<br>16:56 |
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| 8                   | 08:30<br>17:12 | 08:02<br>17:56 | 07:14<br>18:37 | 07:13<br>20:20 | 06:20<br>21:02 | 05:50<br>21:36 | 05:57<br>21:42 | 06:31<br>21:11 | 07:11<br>20:15 | 07:51<br>19:15 | 08:36<br>17:20 | 08:16<br>16:55 |
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| 10                  | 08:30<br>17:14 | 08:01<br>17:59 | 07:10<br>18:40 | 07:09<br>20:23 | 06:17<br>21:04 | 05:49<br>21:38 | 05:58<br>21:41 | 06:33<br>21:08 | 07:14<br>20:11 | 07:54<br>19:11 | 08:39<br>17:17 | 08:18<br>16:55 |
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| 14                  | 08:28<br>17:19 | 08:03<br>18:03 | 08:02<br>19:45 | 07:01<br>20:29 | 06:12<br>21:09 | 05:49<br>21:40 | 06:02<br>21:39 | 06:38<br>21:01 | 07:19<br>20:03 | 07:59<br>19:04 | 08:45<br>17:12 | 08:22<br>16:55 |
| 15                  | 08:27<br>17:20 | 08:02<br>18:05 | 08:00<br>19:47 | 06:59<br>20:30 | 06:11<br>21:11 | 05:48<br>21:41 | 06:03<br>21:38 | 06:40<br>21:00 | 07:20<br>20:01 | 08:01<br>19:02 | 08:46<br>17:11 | 08:23<br>16:55 |
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| 22                  | 08:22<br>17:30 | 08:07<br>18:16 | 08:04<br>19:57 | 06:46<br>20:40 | 06:03<br>21:19 | 05:49<br>21:43 | 06:10<br>21:32 | 06:49<br>20:48 | 07:29<br>19:47 | 08:11<br>18:47 | 08:56<br>17:04 | 08:28<br>16:57 |
| 23                  | 08:21<br>17:31 | 08:08<br>18:17 | 08:04<br>19:58 | 06:45<br>20:41 | 06:02<br>21:20 | 05:49<br>21:44 | 06:11<br>21:31 | 06:50<br>20:46 | 07:31<br>19:45 | 08:12<br>18:45 | 08:58<br>17:03 | 08:28<br>16:58 |
| 24                  | 08:20<br>17:33 | 08:09<br>18:19 | 08:04<br>19:59 | 06:43<br>20:42 | 06:01<br>21:22 | 05:49<br>21:44 | 06:12<br>21:30 | 06:51<br>20:44 | 07:32<br>19:43 | 08:14<br>18:44 | 08:59<br>17:02 | 08:29<br>16:58 |
| 25                  | 08:19<br>17:34 | 08:10<br>18:20 | 08:05<br>20:01 | 06:41<br>20:44 | 06:00<br>21:23 | 05:50<br>21:44 | 06:13<br>21:29 | 06:53<br>20:42 | 07:33<br>19:41 | 08:15<br>18:42 | 09:00<br>17:02 | 08:29<br>16:59 |
| 26                  | 08:18<br>17:36 | 08:11<br>18:22 | 08:06<br>20:02 | 06:39<br>20:45 | 05:59<br>21:24 | 05:50<br>21:44 | 06:15<br>21:28 | 06:54<br>20:40 | 07:35<br>19:39 | 08:17<br>18:40 | 09:02<br>17:01 | 08:29<br>17:00 |
| 27                  | 08:17<br>17:37 | 08:12<br>18:23 | 08:06<br>20:04 | 06:38<br>20:47 | 05:58<br>21:25 | 05:50<br>21:44 | 06:16<br>21:27 | 06:55<br>20:39 | 07:36<br>19:37 | 08:18<br>18:38 | 09:03<br>17:00 | 08:30<br>17:00 |
| 28                  | 08:16<br>17:39 | 08:13<br>18:25 | 08:06<br>20:05 | 06:36<br>20:48 | 05:57<br>21:26 | 05:51<br>21:44 | 06:17<br>21:26 | 06:57<br>20:37 | 07:37<br>19:35 | 08:19<br>18:37 | 09:04<br>16:59 | 08:30<br>17:01 |
| 29                  | 08:15<br>17:40 |                | 08:06<br>20:06 | 06:34<br>20:49 | 05:56<br>21:27 | 05:51<br>21:44 | 06:18<br>21:24 | 06:58<br>20:35 | 07:39<br>19:33 | 08:21<br>18:35 | 09:06<br>16:59 | 08:30<br>17:02 |
| 30                  | 08:14<br>17:42 |                | 08:06<br>20:08 | 06:33<br>20:51 | 05:55<br>21:28 | 05:52<br>21:44 | 06:19<br>21:23 | 06:59<br>20:33 | 07:40<br>19:31 | 08:22<br>18:34 | 09:07<br>16:58 | 08:31<br>17:02 |
| 31                  | 08:13<br>17:43 |                | 08:07<br>20:09 | 06:32<br>21:29 | 05:55<br>21:29 | 05:55<br>21:22 | 06:21<br>20:31 | 07:01<br>18:32 |                | 08:24<br>17:03 |                | 08:31<br>17:03 |
| Potential sun hours | 278            | 286            | 367            | 406            | 465            | 475            | 481            | 442            | 380            | 340            | 283            | 266            |
| Total, worst case   |                |                |                |                |                |                |                |                |                |                |                |                |
| Sun reduction       |                |                |                |                |                |                |                |                |                |                |                |                |
| Oper. time red.     |                |                |                |                |                |                |                |                |                |                |                |                |
| Wind dir. red.      |                |                |                |                |                |                |                |                |                |                |                |                |
| Total reduction     |                |                |                |                |                |                |                |                |                |                |                |                |
| Total, real         |                |                |                |                |                |                |                |                |                |                |                |                |

Table layout: For each day in each month the following matrix apply

|              |                  |                                 |                                  |
|--------------|------------------|---------------------------------|----------------------------------|
| Day in month | Sun rise (hh:mm) | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|              | Sun set (hh:mm)  | Minutes with flicker            | Last time (hh:mm) with flicker   |
|              |                  |                                 | (WTG causing flicker last time)  |

Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM  
US-01824-3627 Chelmsford  
+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

**SHADOW - Calendar**

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: R110 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (100)

**Assumptions for shadow calculations**

Reference year for calendar

2023

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

| Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  |
|------|------|------|------|------|------|------|------|------|------|------|------|
| 0.54 | 0.52 | 0.61 | 0.58 | 0.64 | 0.67 | 0.75 | 0.72 | 0.67 | 0.53 | 0.42 | 0.45 |

Operational time

| N   | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW | NW  | NNW | Sum   |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| 376 | 314 | 339 | 425 | 445 | 474 | 693 | 570 | 488 | 386 | 872 | 609 | 772 | 651 | 677 | 667 | 8,758 |

|                     | January        | February       | March          | April          | May            | June           | July           | August         | September      | October        | November       | December       |
|---------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 1                   | 08:31<br>17:04 | 08:11<br>17:45 | 07:27<br>18:26 | 07:26<br>20:11 | 06:31<br>20:52 | 05:54<br>21:30 | 05:52<br>21:44 | 06:22<br>21:21 | 07:02<br>20:29 | 07:41<br>19:29 | 08:25<br>18:30 | 08:08<br>16:58 |
| 2                   | 08:31<br>17:05 | 08:10<br>17:46 | 07:25<br>18:28 | 07:24<br>20:12 | 06:29<br>20:53 | 05:53<br>21:31 | 05:53<br>21:44 | 06:23<br>21:19 | 07:03<br>20:27 | 07:43<br>19:27 | 08:27<br>18:29 | 08:09<br>16:57 |
| 3                   | 08:31<br>17:06 | 08:09<br>17:48 | 07:23<br>18:29 | 07:23<br>20:13 | 06:28<br>20:55 | 05:53<br>21:32 | 05:53<br>21:44 | 06:24<br>21:18 | 07:04<br>20:25 | 07:44<br>19:25 | 08:28<br>18:27 | 08:11<br>16:57 |
| 4                   | 08:31<br>17:07 | 08:08<br>17:50 | 07:22<br>18:31 | 07:21<br>20:15 | 06:26<br>20:56 | 05:52<br>21:33 | 05:54<br>21:43 | 06:25<br>21:17 | 07:06<br>20:23 | 07:45<br>19:23 | 08:30<br>18:26 | 08:12<br>16:56 |
| 5                   | 08:31<br>17:08 | 08:06<br>17:51 | 07:20<br>18:32 | 07:19<br>20:16 | 06:25<br>20:57 | 05:52<br>21:34 | 05:55<br>21:43 | 06:27<br>21:15 | 07:07<br>20:21 | 07:47<br>19:21 | 07:31<br>18:24 | 08:13<br>16:56 |
| 6                   | 08:30<br>17:09 | 08:05<br>17:53 | 07:18<br>18:34 | 07:17<br>20:18 | 06:23<br>20:59 | 05:51<br>21:34 | 05:55<br>21:43 | 06:28<br>21:14 | 07:08<br>20:19 | 07:48<br>19:19 | 07:33<br>18:23 | 08:14<br>16:56 |
| 7                   | 08:30<br>17:11 | 08:04<br>17:54 | 07:16<br>18:35 | 07:15<br>20:19 | 06:22<br>21:00 | 05:51<br>21:35 | 05:56<br>21:42 | 06:29<br>21:12 | 07:10<br>20:17 | 07:49<br>19:17 | 07:34<br>18:21 | 08:15<br>16:55 |
| 8                   | 08:30<br>17:12 | 08:02<br>17:56 | 07:14<br>18:37 | 07:13<br>20:20 | 06:20<br>21:01 | 05:50<br>21:36 | 05:57<br>21:42 | 06:31<br>21:11 | 07:11<br>20:15 | 07:51<br>19:15 | 07:36<br>18:20 | 08:16<br>16:55 |
| 9                   | 08:30<br>17:13 | 08:01<br>17:57 | 07:12<br>18:38 | 07:11<br>20:22 | 06:19<br>21:03 | 05:50<br>21:37 | 05:58<br>21:42 | 06:32<br>21:09 | 07:12<br>20:13 | 07:52<br>19:13 | 07:37<br>18:19 | 08:17<br>16:55 |
| 10                  | 08:29<br>17:14 | 07:59<br>17:59 | 07:10<br>18:39 | 07:09<br>20:23 | 06:17<br>21:04 | 05:49<br>21:38 | 05:58<br>21:41 | 06:33<br>21:08 | 07:14<br>20:11 | 07:54<br>19:11 | 07:39<br>18:17 | 08:18<br>16:55 |
| 11                  | 08:29<br>17:15 | 07:58<br>18:00 | 07:08<br>18:41 | 07:07<br>20:24 | 06:16<br>21:05 | 05:49<br>21:38 | 05:59<br>21:41 | 06:34<br>21:06 | 07:15<br>20:09 | 07:55<br>19:09 | 07:40<br>18:16 | 08:19<br>16:55 |
| 12                  | 08:29<br>17:16 | 07:56<br>18:00 | 08:06<br>18:42 | 07:05<br>20:26 | 06:15<br>21:07 | 05:49<br>21:39 | 06:00<br>21:40 | 06:36<br>21:05 | 07:16<br>20:07 | 07:56<br>19:07 | 07:42<br>18:15 | 08:20<br>16:55 |
| 13                  | 08:28<br>17:18 | 07:55<br>18:02 | 08:04<br>19:44 | 07:03<br>20:27 | 06:13<br>21:08 | 05:49<br>21:40 | 06:01<br>21:39 | 06:37<br>21:03 | 07:18<br>20:05 | 07:58<br>19:05 | 07:43<br>18:14 | 08:21<br>16:55 |
| 14                  | 08:28<br>17:19 | 07:53<br>18:03 | 08:02<br>19:45 | 07:01<br>20:29 | 06:12<br>21:09 | 05:49<br>21:40 | 06:02<br>21:39 | 06:38<br>21:01 | 07:19<br>20:03 | 07:59<br>19:04 | 07:45<br>18:12 | 08:22<br>16:55 |
| 15                  | 08:27<br>17:20 | 07:52<br>18:05 | 08:00<br>19:47 | 06:59<br>20:30 | 06:11<br>21:11 | 05:48<br>21:41 | 06:03<br>21:38 | 06:40<br>21:00 | 07:20<br>20:01 | 08:01<br>19:02 | 07:46<br>18:11 | 08:23<br>16:55 |
| 16                  | 08:26<br>17:22 | 07:50<br>18:07 | 07:58<br>19:48 | 06:57<br>20:31 | 06:09<br>21:12 | 05:48<br>21:41 | 06:04<br>21:37 | 06:41<br>20:58 | 07:21<br>19:59 | 08:02<br>19:00 | 07:48<br>18:10 | 08:24<br>16:55 |
| 17                  | 08:26<br>17:23 | 07:48<br>18:08 | 07:56<br>19:50 | 06:56<br>20:33 | 06:08<br>21:13 | 05:48<br>21:42 | 06:05<br>21:37 | 06:42<br>20:56 | 07:23<br>19:57 | 08:03<br>18:56 | 07:49<br>18:09 | 08:24<br>16:56 |
| 18                  | 08:25<br>17:24 | 07:47<br>18:10 | 07:54<br>19:51 | 06:54<br>20:34 | 06:07<br>21:14 | 05:48<br>21:42 | 06:06<br>21:36 | 06:43<br>20:55 | 07:24<br>19:55 | 08:05<br>18:54 | 07:50<br>18:08 | 08:25<br>16:56 |
| 19                  | 08:24<br>17:26 | 07:45<br>18:11 | 07:52<br>19:52 | 06:52<br>20:36 | 06:06<br>21:16 | 05:48<br>21:42 | 06:07<br>21:35 | 06:45<br>20:53 | 07:25<br>19:53 | 08:06<br>18:52 | 07:52<br>18:07 | 08:26<br>16:56 |
| 20                  | 08:24<br>17:27 | 07:43<br>18:13 | 07:50<br>19:54 | 06:50<br>20:37 | 06:05<br>21:17 | 05:49<br>21:43 | 06:08<br>21:34 | 06:46<br>20:51 | 07:27<br>19:51 | 08:08<br>18:51 | 07:53<br>18:06 | 08:26<br>16:56 |
| 21                  | 08:23<br>17:29 | 07:42<br>18:14 | 07:48<br>19:55 | 06:48<br>20:38 | 06:04<br>21:18 | 05:49<br>21:43 | 06:09<br>21:33 | 06:47<br>20:49 | 07:28<br>19:49 | 08:09<br>18:49 | 07:55<br>18:05 | 08:27<br>16:57 |
| 22                  | 08:22<br>17:30 | 07:40<br>18:16 | 07:46<br>19:57 | 06:46<br>20:40 | 06:03<br>21:19 | 05:49<br>21:43 | 06:10<br>21:32 | 06:49<br>20:48 | 07:29<br>19:47 | 08:11<br>18:47 | 07:56<br>18:04 | 08:28<br>16:57 |
| 23                  | 08:21<br>17:31 | 07:38<br>18:17 | 07:44<br>19:58 | 06:45<br>20:41 | 06:01<br>21:20 | 05:49<br>21:44 | 06:11<br>21:31 | 06:50<br>20:46 | 07:31<br>19:45 | 08:12<br>18:45 | 07:58<br>18:03 | 08:28<br>16:58 |
| 24                  | 08:20<br>17:33 | 07:36<br>18:19 | 07:42<br>19:59 | 06:43<br>20:42 | 06:01<br>21:22 | 05:49<br>21:44 | 06:12<br>21:30 | 06:51<br>20:44 | 07:32<br>19:43 | 08:14<br>18:44 | 07:59<br>18:02 | 08:29<br>16:58 |
| 25                  | 08:19<br>17:34 | 07:34<br>18:20 | 07:40<br>20:01 | 06:41<br>20:44 | 06:00<br>21:23 | 05:50<br>21:44 | 06:13<br>21:29 | 06:53<br>20:42 | 07:33<br>19:41 | 08:15<br>18:42 | 08:00<br>18:02 | 08:29<br>16:59 |
| 26                  | 08:18<br>17:36 | 07:33<br>18:22 | 07:38<br>20:02 | 06:39<br>20:45 | 05:59<br>21:24 | 05:50<br>21:44 | 06:15<br>21:28 | 06:54<br>20:40 | 07:35<br>19:39 | 08:16<br>18:40 | 08:02<br>18:01 | 08:29<br>17:00 |
| 27                  | 08:17<br>17:37 | 07:31<br>18:23 | 07:36<br>20:04 | 06:38<br>20:47 | 05:58<br>21:25 | 05:50<br>21:44 | 06:16<br>21:27 | 06:55<br>20:38 | 07:36<br>19:37 | 08:18<br>18:38 | 08:03<br>18:00 | 08:30<br>17:00 |
| 28                  | 08:16<br>17:39 | 07:29<br>18:25 | 07:34<br>20:05 | 06:36<br>20:48 | 05:57<br>21:26 | 05:51<br>21:44 | 06:17<br>21:26 | 06:57<br>20:37 | 07:37<br>19:35 | 08:19<br>18:37 | 08:04<br>18:06 | 08:30<br>17:01 |
| 29                  | 08:15<br>17:40 |                | 07:32<br>20:06 | 06:34<br>20:49 | 05:56<br>21:27 | 05:51<br>21:44 | 06:18<br>21:24 | 06:58<br>20:35 | 07:39<br>19:33 | 08:21<br>18:35 | 08:06<br>18:05 | 08:30<br>17:02 |
| 30                  | 08:14<br>17:42 |                | 07:30<br>20:08 | 06:33<br>20:51 | 05:55<br>21:28 | 05:52<br>21:44 | 06:19<br>21:23 | 06:59<br>20:33 | 07:40<br>19:31 | 08:22<br>18:34 | 08:07<br>18:04 | 08:30<br>17:02 |
| 31                  | 08:13<br>17:43 |                | 07:28<br>20:09 |                | 05:55<br>21:29 |                | 06:21<br>21:22 | 07:01<br>20:31 |                | 08:24<br>18:32 |                | 08:31<br>17:03 |
| Potential sun hours | 278            | 286            | 367            | 406            | 465            | 475            | 481            | 442            | 380            | 340            | 283            | 266            |
| Total, worst case   |                |                |                |                |                |                |                |                |                |                |                |                |
| Sun reduction       |                |                |                |                |                |                |                |                |                |                |                |                |
| Oper. time red.     |                |                |                |                |                |                |                |                |                |                |                |                |
| Wind dir. red.      |                |                |                |                |                |                |                |                |                |                |                |                |
| Total reduction     |                |                |                |                |                |                |                |                |                |                |                |                |
| Total, real         |                |                |                |                |                |                |                |                |                |                |                |                |

Table layout: For each day in each month the following matrix apply

| Day in month | Sun rise (hh:mm) | Sun set (hh:mm) | Minutes with flicker | First time (hh:mm) with flicker | Last time (hh:mm) with flicker | (WTG causing flicker first time) | (WTG causing flicker last time) |
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|



Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

### Assumptions for shadow calculations

Reference year for calendar

Shadow receptor: R111 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 90.0° (101)

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

2023

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

|                     | January        | February       | March          | April          | May                | June           | July           | August         | September      | October            | November       | December       |
|---------------------|----------------|----------------|----------------|----------------|--------------------|----------------|----------------|----------------|----------------|--------------------|----------------|----------------|
| 1                   | 08:31<br>17:04 | 08:12<br>17:45 | 07:27<br>18:26 | 07:27<br>20:11 | 07:50 (6)<br>20:52 | 05:54<br>21:30 | 05:52<br>21:44 | 06:22<br>21:21 | 07:02<br>20:29 | 07:47 (6)<br>19:29 | 08:26<br>18:30 | 08:08<br>16:58 |
| 2                   | 08:31<br>17:05 | 08:11<br>17:46 | 07:26<br>18:28 | 07:25<br>20:12 | 07:48 (6)<br>20:54 | 05:53<br>21:31 | 05:53<br>21:44 | 06:23<br>21:20 | 07:03<br>20:27 | 07:44 (6)<br>19:27 | 08:27<br>18:29 | 08:10<br>16:57 |
| 3                   | 08:31<br>17:06 | 08:09<br>17:48 | 07:24<br>18:29 | 07:23<br>20:14 | 07:46 (6)<br>20:55 | 05:53<br>21:32 | 05:53<br>21:44 | 06:24<br>21:18 | 07:05<br>20:25 | 07:41 (6)<br>19:25 | 08:29<br>18:27 | 08:11<br>16:57 |
| 4                   | 08:31<br>17:07 | 08:08<br>17:50 | 07:22<br>18:31 | 07:21<br>20:15 | 07:44 (6)<br>20:56 | 05:52<br>21:33 | 05:54<br>21:44 | 06:25<br>21:17 | 07:06<br>20:23 | 07:40 (6)<br>19:23 | 08:30<br>18:26 | 08:12<br>16:56 |
| 5                   | 08:31<br>17:08 | 08:07<br>17:51 | 07:20<br>18:32 | 07:19<br>20:16 | 07:42 (6)<br>20:58 | 05:51<br>21:34 | 05:55<br>21:44 | 06:27<br>21:15 | 07:07<br>20:21 | 07:39 (6)<br>19:21 | 08:31<br>17:24 | 08:13<br>16:56 |
| 6                   | 08:31<br>17:09 | 08:05<br>17:53 | 07:18<br>18:34 | 07:17<br>20:18 | 07:42 (6)<br>20:59 | 05:51<br>21:35 | 05:55<br>21:43 | 06:28<br>21:14 | 07:08<br>20:20 | 07:38 (6)<br>19:19 | 08:32<br>17:23 | 08:14<br>16:56 |
| 7                   | 08:31<br>17:10 | 08:04<br>17:54 | 07:16<br>18:35 | 07:15<br>20:19 | 07:42 (6)<br>21:00 | 05:50<br>21:36 | 05:56<br>21:43 | 06:29<br>21:13 | 07:10<br>20:18 | 07:38 (6)<br>19:17 | 08:33<br>17:21 | 08:16<br>16:55 |
| 8                   | 08:30<br>17:12 | 08:02<br>17:56 | 07:14<br>18:37 | 07:13<br>20:21 | 07:42 (6)<br>21:02 | 05:50<br>21:37 | 05:57<br>21:42 | 06:31<br>21:11 | 07:11<br>20:16 | 07:37 (6)<br>19:15 | 08:34<br>17:20 | 08:17<br>16:55 |
| 9                   | 08:30<br>17:13 | 08:01<br>17:57 | 07:12<br>18:38 | 07:11<br>20:22 | 07:42 (6)<br>21:03 | 05:50<br>21:37 | 05:57<br>21:42 | 06:32<br>21:10 | 07:12<br>20:14 | 07:37 (6)<br>19:13 | 08:35<br>17:19 | 08:18<br>16:55 |
| 10                  | 08:30<br>17:14 | 08:00<br>17:59 | 07:10<br>18:40 | 07:09<br>20:23 | 07:43 (6)<br>21:04 | 05:49<br>21:38 | 05:58<br>21:41 | 06:33<br>21:08 | 07:14<br>20:12 | 07:38 (6)<br>19:11 | 08:36<br>17:17 | 08:19<br>16:55 |
| 11                  | 08:29<br>17:15 | 07:58<br>18:00 | 07:08<br>18:41 | 07:07<br>20:25 | 07:44 (6)<br>21:06 | 05:49<br>21:39 | 05:59<br>21:41 | 06:34<br>21:06 | 07:15<br>20:10 | 07:40 (6)<br>19:09 | 08:37<br>17:16 | 08:20<br>16:55 |
| 12                  | 08:29<br>17:16 | 07:57<br>18:00 | 07:06<br>18:43 | 07:05<br>20:26 | 07:46 (6)<br>21:07 | 05:49<br>21:39 | 06:00<br>21:40 | 06:36<br>21:05 | 07:16<br>20:08 | 07:41 (6)<br>19:07 | 08:38<br>17:15 | 08:21<br>16:55 |
| 13                  | 08:29<br>17:18 | 07:55<br>18:02 | 07:04<br>19:44 | 07:03<br>20:27 | 07:56 (6)<br>21:08 | 05:49<br>21:40 | 06:01<br>21:40 | 06:37<br>21:03 | 07:18<br>20:06 | 07:42 (6)<br>19:06 | 08:39<br>17:14 | 08:22<br>16:55 |
| 14                  | 08:28<br>17:19 | 07:53<br>18:03 | 07:02<br>19:45 | 07:01<br>20:29 | 07:56 (6)<br>21:10 | 05:48<br>21:41 | 06:02<br>21:39 | 06:38<br>21:02 | 07:19<br>20:04 | 07:43 (6)<br>19:04 | 08:40<br>17:12 | 08:23<br>16:55 |
| 15                  | 08:27<br>17:20 | 07:52<br>18:05 | 07:00<br>19:47 | 06:59<br>20:30 | 07:56 (6)<br>21:11 | 05:48<br>21:41 | 06:03<br>21:38 | 06:40<br>21:00 | 07:20<br>20:02 | 07:45 (6)<br>19:02 | 08:41<br>17:11 | 08:24<br>16:55 |
| 16                  | 08:27<br>17:22 | 07:50<br>18:07 | 06:59<br>19:48 | 06:57<br>20:32 | 07:56 (6)<br>21:12 | 05:48<br>21:42 | 06:04<br>21:38 | 06:41<br>20:58 | 07:22<br>20:00 | 07:46 (6)<br>19:00 | 08:42<br>17:10 | 08:25<br>16:55 |
| 17                  | 08:26<br>17:23 | 07:49<br>18:08 | 06:57<br>19:50 | 06:56<br>20:33 | 07:56 (6)<br>21:13 | 05:48<br>21:42 | 06:05<br>21:37 | 06:42<br>20:57 | 07:23<br>19:57 | 07:49 (6)<br>18:56 | 08:43<br>17:09 | 08:26<br>16:55 |
| 18                  | 08:26<br>17:24 | 07:47<br>18:10 | 06:55<br>19:51 | 06:54<br>20:34 | 07:56 (6)<br>21:15 | 05:48<br>21:42 | 06:06<br>21:36 | 06:44<br>20:55 | 07:24<br>19:55 | 07:50 (6)<br>18:54 | 08:44<br>17:08 | 08:27<br>16:56 |
| 19                  | 08:25<br>17:26 | 07:45<br>18:11 | 06:53<br>19:53 | 06:52<br>20:36 | 07:56 (6)<br>21:16 | 05:48<br>21:43 | 06:07<br>21:35 | 06:45<br>20:53 | 07:26<br>19:53 | 07:51 (6)<br>18:52 | 08:45<br>17:07 | 08:28<br>16:56 |
| 20                  | 08:24<br>17:27 | 07:43<br>18:13 | 06:51<br>19:54 | 06:50<br>20:37 | 07:56 (6)<br>21:17 | 05:48<br>21:43 | 06:08<br>21:34 | 06:46<br>20:51 | 07:27<br>19:51 | 07:52 (6)<br>18:51 | 08:46<br>17:06 | 08:29<br>16:56 |
| 21                  | 08:23<br>17:28 | 07:42<br>18:14 | 06:49<br>19:55 | 06:48<br>20:39 | 07:56 (6)<br>21:18 | 05:49<br>21:44 | 06:09<br>21:33 | 06:47<br>20:50 | 07:28<br>19:49 | 07:53 (6)<br>18:49 | 08:47<br>17:05 | 08:30<br>16:57 |
| 22                  | 08:22<br>17:30 | 07:40<br>18:16 | 06:47<br>19:57 | 06:46<br>20:40 | 07:56 (6)<br>21:20 | 05:49<br>21:44 | 06:10<br>21:32 | 06:49<br>20:48 | 07:30<br>19:47 | 07:54 (6)<br>18:47 | 08:48<br>17:04 | 08:31<br>16:57 |
| 23                  | 08:22<br>17:31 | 07:38<br>18:17 | 06:45<br>19:58 | 06:45<br>20:41 | 07:56 (6)<br>21:21 | 05:49<br>21:44 | 06:11<br>21:31 | 06:50<br>20:46 | 07:31<br>19:45 | 07:55 (6)<br>18:45 | 08:49<br>17:03 | 08:32<br>16:58 |
| 24                  | 08:21<br>17:33 | 07:37<br>18:19 | 06:43<br>20:00 | 06:43<br>20:43 | 07:56 (6)<br>21:22 | 05:49<br>21:44 | 06:12<br>21:30 | 06:51<br>20:44 | 07:32<br>19:43 | 07:56 (6)<br>18:44 | 08:50<br>17:02 | 08:33<br>16:58 |
| 25                  | 08:20<br>17:34 | 07:35<br>18:20 | 06:41<br>20:01 | 06:41<br>20:44 | 07:56 (6)<br>21:23 | 05:50<br>21:44 | 06:13<br>21:29 | 06:53<br>20:42 | 07:33<br>19:41 | 07:57 (6)<br>18:42 | 08:51<br>17:02 | 08:34<br>16:59 |
| 26                  | 08:19<br>17:36 | 07:33<br>18:22 | 06:39<br>20:02 | 06:39<br>20:45 | 07:56 (6)<br>21:24 | 05:50<br>21:45 | 06:15<br>21:28 | 06:54<br>20:41 | 07:35<br>19:39 | 07:58 (6)<br>18:40 | 08:52<br>17:01 | 08:35<br>16:59 |
| 27                  | 08:18<br>17:37 | 07:31<br>18:23 | 06:37<br>20:04 | 06:38<br>20:47 | 07:56 (6)<br>21:25 | 05:50<br>21:45 | 06:16<br>21:27 | 06:55<br>20:39 | 07:36<br>19:37 | 07:59 (6)<br>18:38 | 08:53<br>17:00 | 08:36<br>17:00 |
| 28                  | 08:16<br>17:39 | 07:29<br>18:25 | 06:35<br>20:05 | 06:36<br>20:48 | 07:56 (6)<br>21:26 | 05:51<br>21:45 | 06:17<br>21:26 | 06:57<br>20:37 | 07:37<br>19:35 | 08:00 (6)<br>18:37 | 08:54<br>16:59 | 08:37<br>17:01 |
| 29                  | 08:15<br>17:40 | 07:27<br>18:27 | 06:33<br>20:07 | 06:34<br>20:50 | 07:56 (6)<br>21:27 | 05:51<br>21:45 | 06:18<br>21:25 | 06:58<br>20:35 | 07:39<br>19:33 | 08:01 (6)<br>18:35 | 08:55<br>16:59 | 08:38<br>17:02 |
| 30                  | 08:14<br>17:42 | 07:28<br>18:28 | 06:31<br>20:08 | 06:33<br>20:51 | 07:56 (6)<br>21:28 | 05:52<br>21:45 | 06:19<br>21:24 | 06:59<br>20:33 | 07:40<br>19:31 | 08:02 (6)<br>18:34 | 08:56<br>16:58 | 08:39<br>17:02 |
| 31                  | 08:13<br>17:43 | 07:29<br>18:29 | 06:29<br>20:09 | 06:31<br>20:51 | 07:56 (6)<br>21:29 | 05:53<br>21:45 | 06:21<br>21:22 | 07:01<br>20:31 | 07:41<br>19:31 | 08:03 (6)<br>18:32 | 08:57<br>16:59 | 08:40<br>17:03 |
| Potential sun hours | 278            | 286            | 367            | 406            | 466                | 475            | 481            | 443            | 380            | 339                | 283            | 266            |
| Total, worst case   |                |                | 26             | 227            |                    |                |                |                | 262            |                    |                |                |
| Sun reduction       |                |                | 0.61           | 0.58           |                    |                |                |                | 0.67           |                    |                |                |
| Oper. time red.     |                |                | 1.00           | 1.00           |                    |                |                |                | 1.00           |                    |                |                |
| Wind dir. red.      |                |                | 0.68           | 0.68           |                    |                |                |                | 0.68           |                    |                |                |
| Total reduction     |                |                | 0.41           | 0.39           |                    |                |                |                | 0.46           |                    |                |                |
| Total, real         |                |                | 11             | 89             |                    |                |                |                | 119            |                    |                |                |

Table layout: For each day in each month the following matrix apply

|              |                  |                                 |                                  |
|--------------|------------------|---------------------------------|----------------------------------|
| Day in month | Sun rise (hh:mm) | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|              | Sun set (hh:mm)  | Minutes with flicker            | Last time (hh:mm) with flicker   |
|              |                  |                                 | (WTG causing flicker last time)  |

Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM  
US-01824-3627 Chelmsford  
+1 9789 052 260Mary Kaplan / mary.kaplan@aecom.com  
Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

## Assumptions for shadow calculations

Reference year for calendar

2023

Shadow receptor: R112 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (102)

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

| Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  |
|------|------|------|------|------|------|------|------|------|------|------|------|
| 0.54 | 0.52 | 0.61 | 0.58 | 0.64 | 0.67 | 0.75 | 0.72 | 0.67 | 0.53 | 0.42 | 0.45 |

Operational time

| N   | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW | NW  | NNW | Sum   |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| 376 | 314 | 339 | 425 | 445 | 474 | 693 | 570 | 488 | 386 | 872 | 609 | 772 | 651 | 677 | 667 | 8,758 |

|                     | January | February      | March         | April         | May              | June  |
|---------------------|---------|---------------|---------------|---------------|------------------|-------|
| 1                   | 08:31   | 08:12         | 08:37 (14)    | 07:27         | 07:55 (15)       | 06:31 |
|                     | 17:04   | 17:45         | 29 09:06 (14) | 18:26         | 24 08:19 (15)    | 20:52 |
| 2                   | 08:31   | 08:10         | 08:36 (14)    | 07:25         | 07:24 07:55 (15) | 06:29 |
|                     | 17:05   | 17:46         | 31 09:07 (14) | 18:28         | 23 08:18 (15)    | 20:53 |
| 3                   | 08:31   | 08:09         | 08:36 (14)    | 07:24         | 07:23 07:56 (15) | 06:28 |
|                     | 17:06   | 17:48         | 31 09:07 (14) | 18:29         | 21 08:17 (15)    | 20:55 |
| 4                   | 08:31   | 08:08         | 08:35 (14)    | 07:22         | 07:21 07:57 (15) | 06:26 |
|                     | 17:07   | 17:49         | 32 09:07 (14) | 18:31         | 18 08:15 (15)    | 20:56 |
| 5                   | 08:31   | 08:06         | 08:35 (14)    | 07:20         | 07:19 07:58 (15) | 06:25 |
|                     | 17:08   | 17:51         | 33 09:08 (14) | 18:32         | 16 08:14 (15)    | 20:58 |
| 6                   | 08:31   | 08:05         | 08:36 (14)    | 07:18         | 07:17 08:00 (15) | 06:23 |
|                     | 17:09   | 17:53         | 33 09:09 (14) | 18:34         | 11 08:11 (15)    | 20:59 |
| 7                   | 08:30   | 08:04         | 08:35 (14)    | 07:16         | 07:15 06:22      | 05:50 |
|                     | 17:10   | 17:54         | 33 09:08 (14) | 18:35         | 20:19            | 21:35 |
| 8                   | 08:30   | 08:02         | 08:36 (14)    | 07:14         | 07:13 06:20      | 05:50 |
|                     | 17:12   | 17:56         | 33 09:09 (14) | 18:37         | 20:20            | 21:36 |
| 9                   | 08:30   | 08:01         | 08:36 (14)    | 07:12         | 07:11 06:19      | 05:50 |
|                     | 17:13   | 17:57         | 32 09:08 (14) | 18:38         | 20:22            | 21:37 |
| 10                  | 08:30   | 07:59         | 08:36 (14)    | 07:10         | 07:09 06:17      | 05:49 |
|                     | 17:14   | 17:59         | 32 09:08 (14) | 18:39         | 20:23            | 21:38 |
| 11                  | 08:29   | 07:58         | 08:37 (14)    | 07:08         | 07:07 06:16      | 05:49 |
|                     | 17:15   | 18:00         | 31 09:08 (14) | 18:41         | 20:24            | 21:38 |
| 12                  | 08:29   | 07:56         | 08:37 (14)    | 08:06         | 07:05 06:14      | 05:49 |
|                     | 17:16   | 18:00         | 30 09:07 (14) | 18:42         | 20:26            | 21:39 |
| 13                  | 08:28   | 07:55         | 08:38 (14)    | 08:04         | 07:03 06:13      | 05:49 |
|                     | 17:18   | 18:02         | 29 09:07 (14) | 19:44         | 20:27            | 21:08 |
| 14                  | 08:28   | 07:53         | 08:39 (14)    | 08:02         | 07:01 06:12      | 05:48 |
|                     | 17:19   | 18:03         | 26 09:05 (14) | 19:45         | 20:29            | 21:09 |
| 15                  | 08:27   | 07:52         | 08:40 (14)    | 08:00         | 06:59 06:11      | 05:48 |
|                     | 17:20   | 18:05         | 24 09:04 (14) | 19:47         | 20:30            | 21:11 |
| 16                  | 08:27   | 07:50         | 08:42 (14)    | 07:58         | 06:57 06:09      | 05:48 |
|                     | 17:21   | 18:07         | 21 09:03 (14) | 19:48         | 20:31            | 21:12 |
| 17                  | 08:26   | 07:48         | 08:43 (14)    | 07:56         | 06:56 06:08      | 05:48 |
|                     | 17:23   | 18:08         | 18 09:01 (14) | 19:50         | 20:33            | 21:13 |
| 18                  | 08:25   | 07:47         | 08:46 (14)    | 07:54         | 06:54 06:07      | 05:48 |
|                     | 17:24   | 18:10         | 12 08:58 (14) | 19:51         | 20:34            | 21:14 |
| 19                  | 08:25   | 07:45         | 07:52         | 07:52         | 06:52 06:06      | 05:48 |
|                     | 17:26   | 18:11         | 19:52         | 20:36         | 21:16            | 21:43 |
| 20                  | 08:24   | 07:43         | 07:50         | 07:50         | 06:50 06:05      | 05:48 |
|                     | 17:27   | 18:13         | 19:54         | 20:37         | 21:17            | 21:43 |
| 21                  | 08:23   | 07:42         | 07:48         | 06:48         | 06:03 05:49      |       |
|                     | 17:28   | 18:14         | 19:55         | 20:38         | 21:18            | 21:43 |
| 22                  | 08:22   | 07:40         | 07:46         | 06:46         | 06:02 05:49      |       |
|                     | 17:30   | 18:16         | 19:57         | 3 08:13 (15)  | 20:40            | 21:19 |
| 23                  | 08:21   | 07:38         | 07:44         | 06:45         | 06:01 05:49      |       |
|                     | 17:31   | 18:17         | 19:58         | 9 08:17 (15)  | 20:41            | 21:20 |
| 24                  | 08:20   | 07:36         | 07:42         | 06:43         | 06:00 05:49      |       |
|                     | 17:33   | 7 08:54 (14)  | 18:19         | 12 08:18 (15) | 20:42            | 21:22 |
| 25                  | 08:19   | 07:35         | 07:40         | 06:41         | 05:59 05:50      |       |
|                     | 17:34   | 11 08:57 (14) | 18:20         | 15 08:19 (15) | 20:44            | 21:23 |
| 26                  | 08:18   | 07:33         | 07:38         | 06:39         | 05:59 05:50      |       |
|                     | 17:36   | 14 08:59 (14) | 18:22         | 18 08:20 (15) | 20:45            | 21:24 |
| 27                  | 08:17   | 07:31         | 07:36         | 06:38         | 05:58 05:50      |       |
|                     | 17:37   | 17 09:01 (14) | 18:23         | 21 08:21 (15) | 20:47            | 21:25 |
| 28                  | 08:16   | 07:29         | 07:34         | 06:36         | 05:57 05:51      |       |
|                     | 17:39   | 20 09:03 (14) | 18:25         | 23 08:21 (15) | 20:48            | 21:26 |
| 29                  | 08:15   | 07:27         | 07:32         | 06:34         | 05:56 05:51      |       |
|                     | 17:40   | 22 09:03 (14) | 20:06         | 25 08:21 (15) | 20:49            | 21:27 |
| 30                  | 08:14   | 07:25         | 07:30         | 06:33         | 05:55 05:52      |       |
|                     | 17:42   | 24 09:04 (14) | 20:08         | 25 08:20 (15) | 20:51            | 21:28 |
| 31                  | 08:13   | 07:23         | 07:28         | 06:31         | 05:54 05:54      |       |
|                     | 17:43   | 26 09:05 (14) | 20:09         | 25 08:20 (15) | 21:29            | 475   |
| Potential sun hours | 278     | 286           | 367           | 406           | 466              |       |
| Total, worst case   | 141     | 510           | 176           | 113           |                  |       |
| Sun reduction       | 0.54    | 0.52          | 0.61          | 0.58          |                  |       |
| Oper. time red.     | 1.00    | 1.00          | 1.00          | 1.00          |                  |       |
| Wind dir. red.      | 0.65    | 0.65          | 0.68          | 0.68          |                  |       |
| Total reduction     | 0.35    | 0.34          | 0.41          | 0.39          |                  |       |
| Total, real         | 49      | 172           | 73            | 45            |                  |       |

Table layout: For each day in each month the following matrix apply

| Day in month | Sun rise (hh:mm) | Sun set (hh:mm) | Minutes with flicker | First time (hh:mm) with flicker | Last time (hh:mm) with flicker | (WTG causing flicker first time) | (WTG causing flicker last time) |
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|



Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM  
US-01824-3627 Chelmsford  
+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: R112 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (102)

### Assumptions for shadow calculations

Reference year for calendar

2023

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

|                     | July           | August         | September      | October        | November                 | December            |
|---------------------|----------------|----------------|----------------|----------------|--------------------------|---------------------|
| 1                   | 05:52<br>21:44 | 06:22<br>21:21 | 07:02<br>20:29 | 07:41<br>19:29 | 08:25<br>18:30           | 09:07 (14)<br>16:58 |
| 2                   | 05:53<br>21:44 | 06:23<br>21:19 | 07:03<br>20:27 | 07:43<br>19:27 | 08:27<br>18:29           | 09:06 (14)<br>16:57 |
| 3                   | 05:53<br>21:44 | 06:24<br>21:18 | 07:04<br>20:25 | 07:44<br>19:25 | 08:28<br>18:27           | 09:06 (14)<br>16:57 |
| 4                   | 05:54<br>21:44 | 06:25<br>21:17 | 07:06<br>20:23 | 07:45<br>19:23 | 08:30<br>18:26           | 09:06 (14)<br>16:56 |
| 5                   | 05:55<br>21:43 | 06:27<br>21:15 | 07:07<br>20:21 | 07:47<br>19:21 | 07:31<br>17:24           | 08:05 (14)<br>16:56 |
| 6                   | 05:55<br>21:43 | 06:28<br>21:14 | 07:08<br>20:19 | 07:48<br>19:19 | 07:33<br>17:23           | 08:06 (14)<br>16:56 |
| 7                   | 05:56<br>21:43 | 06:29<br>21:12 | 07:10<br>20:17 | 07:50<br>19:17 | 07:34<br>17:21           | 08:05 (14)<br>16:55 |
| 8                   | 05:57<br>21:42 | 06:30<br>21:11 | 07:11<br>20:15 | 07:51<br>19:15 | 07:36<br>17:20           | 08:06 (14)<br>16:55 |
| 9                   | 05:57<br>21:42 | 06:32<br>21:09 | 07:12<br>20:13 | 07:52<br>19:13 | 07:37<br>17:19           | 08:06 (14)<br>16:55 |
| 10                  | 05:58<br>21:41 | 06:33<br>21:08 | 07:14<br>20:11 | 07:54<br>19:11 | 07:39<br>17:17           | 08:06 (14)<br>16:55 |
| 11                  | 05:59<br>21:41 | 06:34<br>21:06 | 07:15<br>20:09 | 07:55<br>19:09 | 07:40<br>17:16           | 08:08 (14)<br>16:55 |
| 12                  | 06:00<br>21:40 | 06:36<br>21:05 | 07:16<br>20:07 | 07:56<br>19:07 | 07:42<br>17:15           | 08:09 (14)<br>16:55 |
| 13                  | 06:01<br>21:39 | 06:37<br>21:03 | 07:18<br>20:05 | 07:58<br>19:05 | 07:43<br>17:14           | 08:11 (14)<br>16:55 |
| 14                  | 06:02<br>21:39 | 06:38<br>21:01 | 07:19<br>20:03 | 07:59<br>19:04 | 07:45<br>17:12           | 08:13 (14)<br>16:55 |
| 15                  | 06:03<br>21:38 | 06:40<br>21:00 | 07:20<br>20:01 | 08:01<br>19:02 | 07:46<br>17:11           | 08:14 (14)<br>16:55 |
| 16                  | 06:04<br>21:37 | 06:41<br>20:58 | 07:21<br>19:59 | 08:02<br>19:00 | 07:48<br>17:10           | 08:16 (14)<br>16:55 |
| 17                  | 06:05<br>21:37 | 06:42<br>20:56 | 07:23<br>19:57 | 08:04<br>18:56 | 07:49<br>17:09           | 08:17 (14)<br>16:55 |
| 18                  | 06:06<br>21:36 | 06:43<br>20:55 | 07:24<br>19:55 | 08:05<br>18:54 | 07:51<br>17:08           | 08:19 (14)<br>16:55 |
| 19                  | 06:07<br>21:35 | 06:45<br>20:53 | 07:25<br>19:53 | 08:06<br>18:52 | 07:52<br>17:07           | 08:20 (14)<br>16:56 |
| 20                  | 06:08<br>21:34 | 06:46<br>20:51 | 07:27<br>19:51 | 08:08<br>18:51 | 07:53<br>17:06           | 08:22 (14)<br>16:56 |
| 21                  | 06:09<br>21:33 | 06:47<br>20:49 | 07:28<br>19:49 | 08:09<br>18:49 | 07:55<br>17:05           | 08:26 (14)<br>16:57 |
| 22                  | 06:10<br>21:32 | 06:49<br>20:48 | 07:29<br>19:47 | 08:11<br>18:47 | 07:56<br>17:04           | 08:28<br>16:57      |
| 23                  | 06:11<br>21:31 | 06:50<br>20:46 | 07:31<br>19:45 | 08:12<br>18:45 | 07:58<br>17:03           | 08:28<br>16:58      |
| 24                  | 06:12<br>21:30 | 06:51<br>20:44 | 07:32<br>19:43 | 08:14<br>18:43 | 07:59<br>17:02           | 08:29<br>16:58      |
| 25                  | 06:13<br>21:29 | 06:53<br>20:42 | 07:33<br>19:41 | 08:15<br>18:42 | 09:17 (14)<br>09:27 (14) | 08:29<br>17:01      |
| 26                  | 06:15<br>21:28 | 06:54<br>20:40 | 07:35<br>19:39 | 08:17<br>18:40 | 09:13 (14)<br>09:29 (14) | 08:30<br>17:01      |
| 27                  | 06:16<br>21:27 | 06:55<br>20:39 | 07:36<br>19:37 | 08:18<br>18:38 | 09:12 (14)<br>09:32 (14) | 08:30<br>17:00      |
| 28                  | 06:17<br>21:26 | 06:57<br>20:37 | 07:37<br>19:35 | 08:19<br>18:37 | 09:10 (14)<br>09:33 (14) | 08:30<br>17:01      |
| 29                  | 06:18<br>21:24 | 06:58<br>20:35 | 07:39<br>19:33 | 08:21<br>18:35 | 09:09 (14)<br>09:35 (14) | 08:30<br>17:02      |
| 30                  | 06:19<br>21:23 | 06:59<br>20:33 | 07:40<br>19:31 | 08:22<br>18:33 | 09:07 (14)<br>09:35 (14) | 08:31<br>17:02      |
| 31                  | 06:20<br>21:22 | 07:00<br>20:31 |                | 08:24<br>18:32 | 09:07 (14)<br>09:36 (14) | 08:31<br>17:03      |
| Potential sun hours | 481            | 442            | 380            | 340            | 283                      | 266                 |
| Total, worst case   |                |                | 293            | 152            | 503                      |                     |
| Sun reduction       |                |                | 0.67           | 0.53           | 0.42                     |                     |
| Oper. time red.     |                |                | 1.00           | 1.00           | 1.00                     |                     |
| Wind dir. red.      |                |                | 0.68           | 0.65           | 0.65                     |                     |
| Total reduction     |                |                | 0.46           | 0.34           | 0.27                     |                     |
| Total, real         |                |                | 133            | 52             | 137                      |                     |

Table layout: For each day in each month the following matrix apply

|              |                      |                                 |                                  |
|--------------|----------------------|---------------------------------|----------------------------------|
| Day in month | Sun rise (hh:mm)     | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|              | Sun set (hh:mm)      | Last time (hh:mm) with flicker  | (WTG causing flicker last time)  |
|              | Minutes with flicker |                                 |                                  |

Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM  
US-01824-3627 Chelmsford  
+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: R113 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (103)

## Assumptions for shadow calculations

Reference year for calendar

2023

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

|                     | January        | February       | March          | April               | May                 | June                |
|---------------------|----------------|----------------|----------------|---------------------|---------------------|---------------------|
| 1                   | 08:31<br>17:04 | 08:12<br>17:45 | 07:27<br>18:26 | 17:39 (11)<br>20:11 | 06:31<br>20:52      | 20:12 (12)<br>21:30 |
| 2                   | 08:31<br>17:05 | 08:10<br>17:46 | 07:25<br>18:28 | 17:50 (11)<br>20:12 | 18<br>20:53         | 20:12 (12)<br>21:31 |
| 3                   | 08:31<br>17:06 | 08:09<br>17:48 | 07:23<br>18:29 | 07:22<br>20:13      | 19<br>20:55         | 20:11 (12)<br>21:32 |
| 4                   | 08:31<br>17:07 | 08:08<br>17:49 | 07:22<br>18:31 | 07:20<br>20:15      | 21<br>20:56         | 20:11 (12)<br>21:33 |
| 5                   | 08:31<br>17:08 | 08:06<br>17:51 | 07:20<br>18:32 | 07:18<br>20:16      | 23<br>20:58         | 20:10 (12)<br>21:34 |
| 6                   | 08:31<br>17:09 | 08:05<br>17:52 | 07:18<br>18:34 | 07:17<br>20:18      | 25<br>20:59         | 20:10 (12)<br>21:35 |
| 7                   | 08:30<br>17:10 | 08:04<br>17:54 | 07:16<br>18:35 | 07:15<br>20:19      | 26<br>20:59         | 20:09 (12)<br>21:35 |
| 8                   | 08:30<br>17:11 | 08:02<br>17:56 | 07:14<br>18:37 | 07:13<br>20:20      | 28<br>21:02         | 20:10 (12)<br>21:36 |
| 9                   | 08:30<br>17:13 | 08:01<br>17:57 | 07:12<br>18:38 | 07:11<br>20:22      | 29<br>21:03         | 20:10 (12)<br>21:37 |
| 10                  | 08:30<br>17:14 | 07:59<br>17:59 | 07:10<br>18:39 | 07:09<br>20:23      | 29<br>21:04         | 20:10 (12)<br>21:38 |
| 11                  | 08:29<br>17:15 | 07:58<br>18:00 | 07:08<br>18:41 | 07:07<br>20:24      | 28<br>21:06         | 20:11 (12)<br>21:38 |
| 12                  | 08:29<br>17:16 | 07:56<br>18:00 | 07:06<br>18:42 | 07:05<br>20:26      | 27<br>21:05         | 20:12 (12)<br>21:38 |
| 13                  | 08:28<br>17:17 | 07:55<br>18:02 | 07:04<br>18:44 | 07:03<br>20:27      | 27<br>21:07         | 20:12 (12)<br>21:39 |
| 14                  | 08:28<br>17:19 | 07:53<br>18:03 | 07:02<br>18:45 | 07:01<br>20:29      | 25<br>21:08         | 20:12 (12)<br>21:40 |
| 15                  | 08:27<br>17:20 | 07:52<br>18:05 | 07:00<br>18:47 | 06:59<br>20:30      | 24<br>21:09         | 20:13 (12)<br>21:40 |
| 16                  | 08:27<br>17:21 | 07:50<br>18:06 | 06:58<br>18:48 | 06:57<br>20:31      | 22<br>21:11         | 20:13 (12)<br>21:41 |
| 17                  | 08:26<br>17:23 | 07:48<br>18:08 | 06:56<br>18:49 | 06:55<br>20:33      | 20<br>21:12         | 20:14 (12)<br>21:41 |
| 18                  | 08:25<br>17:24 | 07:47<br>18:10 | 06:54<br>18:51 | 06:54<br>20:34      | 20<br>21:13         | 20:16 (12)<br>21:42 |
| 19                  | 08:25<br>17:26 | 07:45<br>18:11 | 06:52<br>18:52 | 06:52<br>20:36      | 17<br>21:14         | 20:17 (12)<br>21:42 |
| 20                  | 08:24<br>17:27 | 07:43<br>18:13 | 06:50<br>18:54 | 06:50<br>20:37      | 15<br>21:16         | 20:19 (12)<br>21:43 |
| 21                  | 08:23<br>17:28 | 07:42<br>18:14 | 06:48<br>18:55 | 06:48<br>20:38      | 11<br>21:17         | 20:20 (12)<br>21:43 |
| 22                  | 08:22<br>17:30 | 07:40<br>18:16 | 06:46<br>18:57 | 06:46<br>20:40      | 4<br>21:17          | 20:21 (12)<br>21:43 |
| 23                  | 08:21<br>17:31 | 07:38<br>18:17 | 06:44<br>18:58 | 06:45<br>20:41      | 20:22 (12)<br>21:22 | 20:22 (12)<br>21:44 |
| 24                  | 08:20<br>17:33 | 07:36<br>18:19 | 06:42<br>18:59 | 06:43<br>20:42      | 20:23 (12)<br>21:23 | 20:23 (12)<br>21:44 |
| 25                  | 08:19<br>17:34 | 07:34<br>18:20 | 06:40<br>19:01 | 06:41<br>20:44      | 20:24 (12)<br>21:24 | 20:24 (12)<br>21:44 |
| 26                  | 08:18<br>17:36 | 07:33<br>18:22 | 06:38<br>19:02 | 06:39<br>20:45      | 20:25 (12)<br>21:25 | 20:25 (12)<br>21:44 |
| 27                  | 08:17<br>17:37 | 07:31<br>18:23 | 06:36<br>19:04 | 06:38<br>20:47      | 20:26 (12)<br>21:26 | 20:26 (12)<br>21:44 |
| 28                  | 08:16<br>17:39 | 07:29<br>18:25 | 06:34<br>19:05 | 06:36<br>20:48      | 20:27 (12)<br>21:27 | 20:27 (12)<br>21:44 |
| 29                  | 08:15<br>17:40 |                | 06:32<br>19:06 | 06:34<br>20:49      | 20:28 (12)<br>21:28 | 20:28 (12)<br>21:44 |
| 30                  | 08:14<br>17:42 |                | 06:30<br>19:08 | 06:33<br>20:51      | 20:29 (12)<br>21:29 | 20:29 (12)<br>21:44 |
| 31                  | 08:13<br>17:43 |                | 06:28<br>19:09 | 06:31<br>20:54      |                     |                     |
| Potential sun hours | 278            | 286            | 367            | 406                 | 466                 | 475                 |
| Total, worst case   |                | 270            | 11             | 53                  | 437                 | 331                 |
| Sun reduction       |                | 0.52           | 0.61           | 0.58                | 0.64                | 0.67                |
| Oper. time red.     |                | 1.00           | 1.00           | 1.00                | 1.00                | 1.00                |
| Wind dir. red.      |                | 0.66           | 0.66           | 0.68                | 0.68                | 0.63                |
| Total reduction     |                | 0.34           | 0.40           | 0.39                | 0.43                | 0.42                |
| Total, real         |                | 92             | 4              | 21                  | 189                 | 139                 |

Table layout: For each day in each month the following matrix apply

|              |                      |                                 |                                  |
|--------------|----------------------|---------------------------------|----------------------------------|
| Day in month | Sun rise (hh:mm)     | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|              | Sun set (hh:mm)      | Last time (hh:mm) with flicker  | (WTG causing flicker last time)  |
|              | Minutes with flicker |                                 |                                  |



Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

**SHADOW - Calendar****Calculation:** Oliver IV Array 012 with 3 Alts 8/26/2023**Shadow receptor:** R113 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (103)**Assumptions for shadow calculations**

Reference year for calendar

2023

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

| Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  |
|------|------|------|------|------|------|------|------|------|------|------|------|
| 0.54 | 0.52 | 0.61 | 0.58 | 0.64 | 0.67 | 0.75 | 0.72 | 0.67 | 0.53 | 0.42 | 0.45 |

Operational time

| N   | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW | NW  | NNW | Sum   |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| 376 | 314 | 339 | 425 | 445 | 474 | 693 | 570 | 488 | 386 | 872 | 609 | 772 | 651 | 677 | 667 | 8,758 |

| July                |       | August     |            | September  |       | October    |       | November |            | December |       |
|---------------------|-------|------------|------------|------------|-------|------------|-------|----------|------------|----------|-------|
| 1                   | 05:52 | 06:21 (19) | 06:22      | 20:23 (12) | 07:02 | 07:41      |       | 08:25    | 08:08      |          |       |
|                     | 21:44 | 14         | 06:35 (19) | 21:21      | 24    | 20:47 (12) | 20:29 | 19:29    | 18:30      | 16:58    |       |
| 2                   | 05:53 |            | 06:21 (19) | 06:23      |       | 20:22 (12) | 07:03 | 07:43    | 08:27      | 08:09    |       |
|                     | 21:44 | 13         | 06:34 (19) | 21:19      | 26    | 20:48 (12) | 20:27 | 19:27    | 18:29      | 16:57    |       |
| 3                   | 05:53 |            | 06:23 (19) | 06:24      |       | 20:21 (12) | 07:04 | 07:44    | 08:28      | 08:11    |       |
|                     | 21:44 | 10         | 06:33 (19) | 21:18      | 27    | 20:48 (12) | 20:25 | 19:25    | 18:27      | 16:57    |       |
| 4                   | 05:54 |            | 06:24 (19) | 06:25      |       | 20:20 (12) | 07:06 | 07:45    | 08:30      | 08:12    |       |
|                     | 21:44 | 7          | 06:31 (19) | 21:17      | 28    | 20:48 (12) | 20:23 | 19:23    | 18:26      | 16:56    |       |
| 5                   | 05:54 |            |            | 06:27      |       | 20:20 (12) | 07:07 | 07:47    | 07:31      | 08:13    |       |
|                     | 21:43 |            |            | 21:15      | 28    | 20:48 (12) | 20:21 | 19:21    | 17:24      | 16:56    |       |
| 6                   | 05:55 |            |            | 06:28      |       | 20:20 (12) | 07:08 | 07:48    | 07:33      | 08:14    |       |
|                     | 21:43 |            |            | 21:14      | 29    | 20:49 (12) | 20:19 | 19:19    | 17:23      | 16:56    |       |
| 7                   | 05:56 |            |            | 06:29      |       | 20:20 (12) | 07:10 | 07:49    | 07:34      | 08:15    |       |
|                     | 21:43 |            |            | 21:12      | 27    | 20:47 (12) | 20:17 | 19:17    | 17:21      | 16:55    |       |
| 8                   | 05:57 |            |            | 06:30      |       | 20:19 (12) | 07:11 | 07:51    | 07:36      | 08:16    |       |
|                     | 21:42 |            |            | 21:11      | 27    | 20:46 (12) | 20:15 | 19:15    | 17:20      | 16:55    |       |
| 9                   | 05:57 |            |            | 06:32      |       | 20:19 (12) | 07:12 | 07:52    | 07:37      | 08:17    |       |
|                     | 21:42 |            |            | 21:09      | 25    | 20:44 (12) | 20:13 | 19:13    | 17:19      | 16:55    |       |
| 10                  | 05:58 |            |            | 06:33      |       | 20:20 (12) | 07:14 | 07:54    | 07:39      | 08:18    |       |
|                     | 21:41 |            |            | 21:08      | 23    | 20:43 (12) | 20:11 | 19:11    | 17:17      | 16:55    |       |
| 11                  | 05:59 |            |            | 06:34      |       | 20:20 (12) | 07:15 | 07:55    | 07:40      | 08:19    |       |
|                     | 21:41 |            |            | 21:06      | 22    | 20:42 (12) | 20:09 | 19:09    | 17:16      | 16:55    |       |
| 12                  | 06:00 |            |            | 06:36      |       | 20:20 (12) | 07:16 | 07:56    | 07:42      | 08:20    |       |
|                     | 21:40 |            |            | 21:05      | 20    | 20:40 (12) | 20:07 | 19:07    | 17:15      | 16:55    |       |
| 13                  | 06:01 |            |            | 06:37      |       | 20:20 (12) | 07:17 | 07:58    | 07:43      | 08:21    |       |
|                     | 21:39 |            |            | 21:03      | 18    | 20:38 (12) | 20:05 | 19:05    | 17:13      | 16:55    |       |
| 14                  | 06:02 |            |            | 06:38      |       | 20:20 (12) | 07:19 | 07:59    | 18:13 (11) | 07:45    | 08:22 |
|                     | 21:39 |            |            | 21:01      | 16    | 20:36 (12) | 20:03 | 19:03    | 18:22 (11) | 17:12    | 16:55 |
| 15                  | 06:03 |            |            | 06:39      |       | 20:22 (12) | 07:20 | 08:01    | 18:09 (11) | 07:46    | 08:23 |
|                     | 21:38 |            |            | 21:00      | 14    | 20:36 (12) | 20:01 | 19:02    | 18:25 (11) | 17:11    | 16:55 |
| 16                  | 06:04 |            |            | 06:41      |       | 20:22 (12) | 07:21 | 08:02    | 18:08 (11) | 07:48    | 08:24 |
|                     | 21:37 |            |            | 20:58      | 12    | 20:34 (12) | 19:59 | 19:00    | 18:27 (11) | 17:10    | 16:55 |
| 17                  | 06:05 |            |            | 06:42      |       | 20:23 (12) | 07:23 | 08:03    | 18:06 (11) | 07:49    | 08:24 |
|                     | 21:37 |            |            | 20:56      | 9     | 20:32 (12) | 19:57 | 18:56    | 18:27 (11) | 17:09    | 16:55 |
| 18                  | 06:06 |            |            | 06:43      |       | 20:24 (12) | 07:24 | 08:05    | 18:05 (11) | 07:51    | 08:25 |
|                     | 21:36 |            |            | 20:55      | 6     | 20:30 (12) | 19:55 | 18:54    | 18:29 (11) | 17:08    | 16:56 |
| 19                  | 06:07 |            |            | 06:45      |       | 20:28 (12) | 07:25 | 08:06    | 18:04 (11) | 07:52    | 08:26 |
|                     | 21:35 |            |            | 20:53      | 1     | 20:29 (12) | 19:53 | 18:52    | 18:29 (11) | 17:07    | 16:56 |
| 20                  | 06:08 |            |            | 06:46      |       |            | 07:27 | 08:08    | 18:03 (11) | 07:53    | 08:27 |
|                     | 21:34 |            |            | 20:51      |       |            | 19:51 | 18:50    | 18:28 (11) | 17:06    | 16:56 |
| 21                  | 06:09 |            |            | 06:47      |       |            | 07:28 | 08:09    | 18:02 (11) | 07:55    | 08:27 |
|                     | 21:33 |            |            | 20:49      |       |            | 19:49 | 18:49    | 18:25 (11) | 17:05    | 16:57 |
| 22                  | 06:10 |            |            | 06:49      |       |            | 07:29 | 08:11    | 18:02 (11) | 07:56    | 08:28 |
|                     | 21:32 |            |            | 20:48      |       |            | 19:47 | 18:47    | 18:24 (11) | 17:04    | 16:57 |
| 23                  | 06:11 |            |            | 06:50      |       |            | 07:31 | 08:12    | 18:02 (11) | 07:58    | 08:28 |
|                     | 21:31 |            |            | 20:46      |       |            | 19:45 | 18:45    | 18:22 (11) | 17:03    | 16:58 |
| 24                  | 06:12 |            |            | 06:51      |       |            | 07:32 | 08:14    | 18:02 (11) | 07:59    | 08:29 |
|                     | 21:30 |            |            | 20:44      |       |            | 19:43 | 18:43    | 18:20 (11) | 17:02    | 16:58 |
| 25                  | 06:13 |            |            | 06:53      |       |            | 07:33 | 08:15    | 18:03 (11) | 08:00    | 08:29 |
|                     | 21:29 | 3          | 20:33 (12) | 20:42      |       |            | 19:41 | 18:42    | 18:19 (11) | 17:01    | 16:59 |
| 26                  | 06:14 |            |            | 06:54      |       |            | 07:35 | 08:16    | 18:02 (11) | 08:02    | 08:29 |
|                     | 21:28 | 10         | 20:30 (12) | 20:40      |       |            | 19:39 | 18:40    | 18:17 (11) | 17:01    | 16:59 |
| 27                  | 06:16 |            |            | 06:55      |       |            | 07:36 | 08:18    | 18:03 (11) | 08:03    | 08:30 |
|                     | 21:27 | 14         | 20:28 (12) | 20:38      |       |            | 19:37 | 18:38    | 18:15 (11) | 17:00    | 17:00 |
| 28                  | 06:17 |            |            | 06:56      |       |            | 07:37 | 08:19    | 18:04 (11) | 08:04    | 08:30 |
|                     | 21:26 | 17         | 20:43 (12) | 20:37      |       |            | 19:35 | 18:37    | 18:13 (11) | 16:59    | 17:01 |
| 29                  | 06:18 |            |            | 06:58      |       |            | 07:39 | 08:21    | 18:05 (11) | 08:06    | 08:30 |
|                     | 21:24 | 19         | 20:44 (12) | 20:35      |       |            | 19:33 | 18:35    | 18:12 (11) | 16:59    | 17:01 |
| 30                  | 06:19 |            |            | 06:59      |       |            | 07:40 | 08:22    | 18:06 (11) | 08:07    | 08:31 |
|                     | 21:23 | 21         | 20:45 (12) | 20:33      |       |            | 19:31 | 18:33    | 18:09 (11) | 16:58    | 17:02 |
| 31                  | 06:20 |            |            | 07:00      |       |            |       | 08:24    |            |          | 08:31 |
|                     | 21:22 | 23         | 20:47 (12) | 20:31      |       |            |       | 18:32    |            |          | 17:03 |
| Potential sun hours | 481   |            | 442        |            | 380   |            | 340   |          | 283        |          | 266   |
| Total, worst case   | 151   |            | 382        |            |       |            | 284   |          |            |          |       |
| Sun reduction       | 0.75  |            | 0.72       |            |       |            | 0.53  |          |            |          |       |
| Oper. time red.     | 1.00  |            | 1.00       |            |       |            | 1.00  |          |            |          |       |
| Wind dir. red.      | 0.66  |            | 0.68       |            |       |            | 0.66  |          |            |          |       |
| Total reduction     | 0.50  |            | 0.49       |            |       |            | 0.35  |          |            |          |       |
| Total, real         | 75    |            | 186        |            |       |            | 99    |          |            |          |       |

**Table layout: For each day in each month the following matrix apply**

| Day in month | Sun rise (hh:mm) | Sun set (hh:mm) | Minutes with flicker | First time (hh:mm) with flicker | Last time (hh:mm) with flicker | (WTG causing flicker first time) | (WTG causing flicker last time) |
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|

Project:

Oliver IV Array 012 8/26/2023

Licensed user:

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+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: R114 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (104)

## Assumptions for shadow calculations

Reference year for calendar

2023

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

|                     | January        | February       | March          |    | April          |    | May                      |                | June           |                | July           |    | August                   |                | September                |                | October        |  | November       |  | December |
|---------------------|----------------|----------------|----------------|----|----------------|----|--------------------------|----------------|----------------|----------------|----------------|----|--------------------------|----------------|--------------------------|----------------|----------------|--|----------------|--|----------|
| 1                   | 08:31<br>17:04 | 08:11<br>17:44 | 07:27<br>18:26 |    | 07:26<br>20:10 | 49 | 08:03 (47)<br>08:52 (47) | 06:31<br>20:52 | 05:53<br>21:30 | 05:52<br>21:44 | 06:21<br>21:21 |    | 07:01<br>20:29           | 43             | 07:27 (48)<br>08:39 (47) | 07:41<br>19:29 | 08:25<br>18:30 |  | 08:08<br>16:57 |  |          |
| 2                   | 08:31<br>17:05 | 08:10<br>17:46 | 07:25<br>18:27 |    | 07:24<br>20:12 | 48 | 08:03 (47)<br>08:51 (47) | 06:29<br>20:53 | 05:53<br>21:31 | 05:52<br>21:44 | 06:22<br>21:19 |    | 07:03<br>20:27           | 42             | 07:28 (48)<br>08:40 (47) | 07:42<br>19:27 | 08:27<br>18:28 |  | 08:09<br>16:57 |  |          |
| 3                   | 08:31<br>17:06 | 08:09<br>17:48 | 07:23<br>18:29 |    | 07:22<br>20:13 | 48 | 08:03 (47)<br>08:51 (47) | 06:27<br>20:55 | 05:52<br>21:32 | 05:53<br>21:44 | 06:24<br>21:18 |    | 07:04<br>20:25           | 39             | 07:29 (48)<br>08:41 (47) | 07:44<br>19:25 | 08:28<br>18:27 |  | 08:11<br>16:56 |  |          |
| 4                   | 08:31<br>17:07 | 08:08<br>17:49 | 07:21<br>18:30 |    | 07:20<br>20:15 | 47 | 08:03 (47)<br>08:50 (47) | 06:26<br>20:56 | 05:51<br>21:33 | 05:53<br>21:43 | 06:25<br>21:16 |    | 07:05<br>20:23           | 40             | 08:02 (47)<br>08:42 (47) | 07:45<br>19:23 | 08:30<br>18:25 |  | 08:12<br>16:56 |  |          |
| 5                   | 08:31<br>17:08 | 08:06<br>17:51 | 07:20<br>18:32 |    | 07:18<br>20:16 | 46 | 08:03 (47)<br>08:49 (47) | 06:24<br>20:57 | 05:51<br>21:34 | 05:54<br>21:43 | 06:26<br>21:15 |    | 07:07<br>20:21           | 41             | 08:02 (47)<br>08:43 (47) | 07:47<br>19:21 | 07:31<br>17:24 |  | 08:13<br>16:55 |  |          |
| 6                   | 08:31<br>17:09 | 08:05<br>17:52 | 07:18<br>18:33 |    | 07:16<br>20:17 | 45 | 08:04 (47)<br>08:49 (47) | 06:23<br>20:59 | 05:50<br>21:35 | 05:55<br>21:43 | 06:28<br>21:14 |    | 07:08<br>20:19           | 43             | 08:00 (47)<br>08:43 (47) | 07:48<br>19:19 | 07:33<br>17:22 |  | 08:14<br>16:55 |  |          |
| 7                   | 08:30<br>17:10 | 08:03<br>17:54 | 07:16<br>18:35 |    | 07:14<br>20:19 | 44 | 08:04 (47)<br>08:48 (47) | 06:21<br>21:00 | 05:50<br>21:35 | 05:55<br>21:42 | 06:29<br>21:12 |    | 07:09<br>20:17           | 45             | 07:59 (47)<br>08:44 (47) | 07:49<br>19:17 | 07:34<br>17:21 |  | 08:15<br>16:55 |  |          |
| 8                   | 08:30<br>17:11 | 08:02<br>17:55 | 07:14<br>18:36 |    | 07:12<br>20:20 | 43 | 08:04 (47)<br>08:47 (47) | 06:20<br>21:01 | 05:50<br>21:36 | 05:56<br>21:42 | 06:30<br>21:11 |    | 07:11<br>20:15           | 46             | 07:58 (47)<br>08:44 (47) | 07:51<br>19:15 | 07:36<br>17:20 |  | 08:16<br>16:55 |  |          |
| 9                   | 08:30<br>17:12 | 08:01<br>17:57 | 07:12<br>18:38 |    | 07:10<br>20:21 | 40 | 08:05 (47)<br>08:45 (47) | 06:18<br>21:03 | 05:49<br>21:37 | 05:57<br>21:42 | 06:31<br>21:09 |    | 07:12<br>20:13           | 47             | 07:58 (47)<br>08:45 (47) | 07:52<br>19:13 | 07:37<br>17:18 |  | 08:17<br>16:55 |  |          |
| 10                  | 08:29<br>17:13 | 07:59<br>17:58 | 07:10<br>18:39 |    | 07:08<br>20:23 | 38 | 08:06 (47)<br>08:44 (47) | 06:17<br>21:04 | 05:49<br>21:38 | 05:58<br>21:41 | 06:33<br>21:08 |    | 07:13<br>20:11           | 47             | 07:57 (47)<br>08:44 (47) | 07:53<br>19:11 | 07:39<br>17:17 |  | 08:18<br>16:54 |  |          |
| 11                  | 08:29<br>17:15 | 07:58<br>18:00 | 07:08<br>18:41 |    | 07:07<br>20:24 | 41 | 07:30 (48)<br>08:42 (47) | 06:15<br>21:05 | 05:49<br>21:38 | 05:59<br>21:41 | 06:34<br>21:06 |    | 07:15<br>20:09           | 48             | 07:56 (47)<br>08:44 (47) | 07:55<br>19:09 | 07:40<br>17:16 |  | 08:19<br>16:54 |  |          |
| 12                  | 08:29<br>17:16 | 07:56<br>18:00 | 07:06<br>18:42 |    | 07:05<br>20:26 | 42 | 07:28 (48)<br>08:40 (47) | 06:14<br>21:07 | 05:48<br>21:39 | 06:00<br>21:40 | 06:35<br>21:04 |    | 07:16<br>20:07           | 49             | 07:55 (47)<br>08:44 (47) | 07:56<br>19:07 | 07:42<br>17:14 |  | 08:20<br>16:54 |  |          |
| 13                  | 08:28<br>17:17 | 07:55<br>18:01 | 07:04<br>18:44 |    | 07:03<br>20:27 | 43 | 07:26 (48)<br>08:38 (47) | 06:13<br>21:08 | 05:48<br>21:40 | 06:00<br>21:39 | 06:37<br>21:03 |    | 07:17<br>20:05           | 49             | 07:55 (47)<br>08:44 (47) | 07:58<br>19:05 | 07:43<br>17:13 |  | 08:21<br>16:54 |  |          |
| 14                  | 08:28<br>17:18 | 07:53<br>18:03 | 07:02<br>18:45 |    | 07:01<br>20:28 | 41 | 07:24 (48)<br>08:35 (47) | 06:11<br>21:09 | 05:48<br>21:40 | 06:01<br>21:39 | 06:38<br>21:01 |    | 07:19<br>20:03           | 10             | 07:55 (47)<br>08:44 (47) | 07:59<br>19:03 | 07:45<br>17:12 |  | 08:22<br>16:54 |  |          |
| 15                  | 08:27<br>17:20 | 07:51<br>18:05 | 07:00<br>18:46 |    | 06:59<br>20:30 | 38 | 07:22 (48)<br>08:32 (47) | 06:10<br>21:11 | 05:48<br>21:41 | 06:02<br>21:38 | 06:39<br>21:00 | 15 | 07:26 (48)<br>07:41 (48) | 07:20<br>20:01 | 07:54 (47)<br>08:43 (47) | 08:00<br>19:01 | 07:46<br>17:11 |  | 08:23<br>16:55 |  |          |
| 16                  | 08:26<br>17:21 | 07:50<br>18:06 | 06:58<br>18:48 | 11 | 06:57<br>20:31 | 32 | 07:21 (48)<br>08:28 (47) | 06:09<br>21:12 | 05:48<br>21:41 | 06:03<br>21:37 | 06:40<br>20:58 | 19 | 07:25 (48)<br>07:44 (48) | 07:21<br>20:00 | 07:55 (47)<br>08:43 (47) | 08:02<br>18:58 | 07:47<br>17:10 |  | 08:24<br>16:55 |  |          |
| 17                  | 08:26<br>17:22 | 07:48<br>18:08 | 06:56<br>18:49 | 20 | 06:55<br>20:33 | 24 | 07:19 (48)<br>08:43 (47) | 06:08<br>21:13 | 05:48<br>21:42 | 06:04<br>21:37 | 06:42<br>20:56 | 22 | 07:23 (48)<br>07:45 (48) | 07:22<br>20:01 | 07:54 (47)<br>08:42 (47) | 08:03<br>18:56 | 07:49<br>17:08 |  | 08:25<br>16:55 |  |          |
| 18                  | 08:25<br>17:24 | 07:46<br>18:09 | 06:54<br>18:51 | 26 | 06:53<br>20:34 | 26 | 07:17 (48)<br>08:46 (47) | 06:06<br>21:14 | 05:48<br>21:43 | 06:05<br>21:36 | 06:43<br>20:55 | 23 | 07:22 (48)<br>07:45 (48) | 07:22<br>20:02 | 07:54 (47)<br>08:41 (47) | 08:05<br>18:54 | 07:50<br>17:07 |  | 08:25<br>16:55 |  |          |
| 19                  | 08:24<br>17:25 | 07:45<br>18:11 | 06:52<br>18:52 | 31 | 06:51<br>20:35 | 28 | 07:15 (48)<br>08:47 (47) | 06:05<br>21:16 | 05:48<br>21:43 | 06:06<br>21:35 | 06:44<br>20:53 | 25 | 07:21 (48)<br>07:46 (48) | 07:21<br>20:03 | 07:54 (47)<br>08:40 (47) | 08:06<br>18:52 | 07:52<br>17:06 |  | 08:26<br>16:56 |  |          |
| 20                  | 08:24<br>17:27 | 07:43<br>18:12 | 06:50<br>18:54 | 34 | 06:50<br>20:37 | 28 | 08:14 (47)<br>08:48 (47) | 06:04<br>21:17 | 05:48<br>21:43 | 06:07<br>21:34 | 06:46<br>20:51 | 26 | 07:21 (48)<br>07:47 (48) | 07:26<br>20:04 | 07:55 (47)<br>08:40 (47) | 08:07<br>18:50 | 07:53<br>17:05 |  | 08:26<br>16:56 |  |          |
| 21                  | 08:23<br>17:28 | 07:41<br>18:14 | 06:48<br>18:55 | 37 | 06:48<br>20:38 | 29 | 08:12 (47)<br>08:49 (47) | 06:03<br>21:18 | 05:48<br>21:43 | 06:08<br>21:33 | 06:47<br>20:49 | 27 | 07:20 (48)<br>07:47 (48) | 07:28<br>20:05 | 07:55 (47)<br>08:38 (47) | 08:09<br>18:48 | 07:55<br>17:04 |  | 08:27<br>16:56 |  |          |
| 22                  | 08:22<br>17:29 | 07:40<br>18:15 | 06:46<br>18:56 | 39 | 06:46<br>20:40 | 28 | 08:11 (47)<br>08:50 (47) | 06:02<br>21:19 | 05:48<br>21:43 | 06:10<br>21:32 | 06:48<br>20:47 | 28 | 07:19 (48)<br>07:47 (48) | 07:29<br>20:06 | 07:55 (47)<br>08:37 (47) | 08:10<br>18:47 | 07:56<br>17:04 |  | 08:28<br>16:57 |  |          |
| 23                  | 08:21<br>17:31 | 07:38<br>18:17 | 06:44<br>18:58 | 42 | 06:44<br>20:41 | 28 | 08:09 (47)<br>08:51 (47) | 06:01<br>21:20 | 05:48<br>21:44 | 06:11<br>21:31 | 06:50<br>20:46 | 28 | 07:18 (48)<br>07:46 (48) | 07:30<br>20:07 | 07:57 (47)<br>08:36 (47) | 08:12<br>18:45 | 07:58<br>17:03 |  | 08:28<br>16:57 |  |          |
| 24                  | 08:20<br>17:32 | 07:36<br>18:18 | 06:42<br>18:59 | 44 | 06:42<br>20:42 | 27 | 08:08 (47)<br>08:52 (47) | 06:00<br>21:22 | 05:49<br>21:44 | 06:12<br>21:30 | 06:51<br>20:44 | 29 | 07:18 (48)<br>07:47 (48) | 07:32<br>20:08 | 07:57 (47)<br>08:34 (47) | 08:13<br>18:43 | 07:59<br>17:02 |  | 08:29<br>16:58 |  |          |
| 25                  | 08:19<br>17:34 | 07:34<br>18:20 | 06:40<br>19:01 | 45 | 06:41<br>20:44 | 25 | 08:07 (47)<br>08:52 (47) | 05:59<br>21:23 | 05:49<br>21:44 | 06:13<br>21:29 | 06:52<br>20:42 | 28 | 07:18 (48)<br>07:46 (48) | 07:33<br>20:09 | 07:58 (47)<br>08:32 (47) | 08:15<br>18:41 | 08:00<br>17:01 |  | 08:29<br>16:58 |  |          |
| 26                  | 08:18<br>17:35 | 07:33<br>18:21 | 06:38<br>19:02 | 46 | 06:39<br>20:45 | 24 | 08:06 (47)<br>08:52 (47) | 05:58<br>21:24 | 05:49<br>21:44 | 06:14<br>21:28 | 06:54<br>20:40 | 27 | 07:19 (48)<br>07:46 (48) | 07:34<br>20:10 | 07:59 (47)<br>08:33 (47) | 08:16<br>18:40 | 08:02<br>17:00 |  | 08:30<br>16:59 |  |          |
| 27                  | 08:17<br>17:37 | 07:31<br>18:23 | 06:36<br>19:03 | 48 | 06:37<br>20:46 | 22 | 08:05 (47)<br>08:53 (47) | 05:57<br>21:25 | 05:50<br>21:44 | 06:15<br>21:27 | 06:55<br>20:38 | 25 | 07:20 (48)<br>07:45 (48) | 07:36<br>20:11 | 07:59 (47)<br>08:34 (47) | 08:17<br>18:39 | 08:03<br>17:00 |  | 08:30<br>17:00 |  |          |
| 28                  | 08:16<br>17:38 | 07:29<br>18:24 | 06:34<br>19:05 | 48 | 06:36<br>20:48 | 20 | 08:04 (47)<br>08:53 (47) | 05:56<br>21:26 | 05:50<br>21:44 | 06:16<br>21:26 | 06:56<br>20:36 | 23 | 07:22 (48)<br>07:46 (48) | 07:37<br>20:12 | 08:04 (47)<br>08:35 (47) | 08:19<br>18:36 | 08:04<br>16:59 |  | 08:30<br>17:00 |  |          |
| 29                  | 08:15<br>17:40 | 07:28<br>18:25 | 06:32<br>19:06 | 49 | 06:34<br>20:49 | 17 | 08:04 (47)<br>08:53 (47) | 05:56<br>21:27 | 05:51<br>21:44 | 06:18<br>21:24 | 06:58<br>20:35 | 37 | 07:23 (48)<br>07:48 (48) | 07:38<br>20:13 | 08:01 (47)<br>08:32 (47) | 08:21<br>18:35 | 08:06<br>16:58 |  | 08:30<br>17:01 |  |          |
| 30                  | 08:14<br>17:41 | 07:27<br>18:26 | 06:30<br>19:07 | 48 | 06:32<br>20:51 | 12 | 08:04 (47)<br>08:52 (47) | 05:55<br>21:28 | 05:51<br>21:44 | 06:19<br>21:23 | 06:59<br>20:33 | 41 | 07:24 (48)<br>07:49 (48) | 07:39<br>20:14 | 08:02 (47)<br>08:35 (47) | 08:22<br>18:33 | 08:07<br>16:58 |  | 08:30<br>17:02 |  |          |
| 31                  | 08:13<br>17:43 | 07:28<br>18:29 | 06:28<br>19:09 | 49 | 06:29<br>20:54 |    | 08:03 (47)<br>08:52 (47) | 05:54<br>21:29 | 05:54<br>21:44 | 06:20<br>21:22 | 07:00<br>20:31 | 41 | 07:25 (48)<br>07:47 (48) | 07:39<br>20:15 | 08:03 (47)<br>08:37 (47) | 08:24<br>18:32 | 08:08<br>16:58 |  | 08:31<br>17:03 |  |          |
| Potential sun hours | 278            | 286            | 367            |    | 406            |    |                          | 466            | 475            | 481            | 443            |    | 380                      |                | 339                      |                | 282            |  | 266            |  |          |
| Total, worst case   |                |                | 617            |    | 1023           |    |                          |                |                |                | 475            |    | 1189                     |                |                          |                |                |  |                |  |          |
| Sun reduction       |                |                | 0.61           |    | 0.58           |    |                          |                |                |                | 0.72           |    | 0.67                     |                |                          |                |                |  |                |  |          |
| Oper. time red.     |                |                | 1.00           |    | 1.00           |    |                          |                |                |                | 1.00           |    | 1.00                     |                |                          |                |                |  |                |  |          |
| Wind dir. red.      |                |                | 0.68           |    | 0.67           |    |                          |                |                |                | 0.67           |    | 0.68                     |                |                          |                |                |  |                |  |          |
| Total reduction     |                |                | 0.42           |    | 0.39           |    |                          |                |                |                | 0.48           |    | 0.46                     |                |                          |                |                |  |                |  |          |
| Total, real         |                |                | 256            |    | 400            |    |                          |                |                |                | 229            |    | 542                      |                |                          |                |                |  |                |  |          |

Table layout: For each day in each month the following matrix apply

|              |                      |                                 |                                  |
|--------------|----------------------|---------------------------------|----------------------------------|
| Day in month | Sun rise (hh:mm)     | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|              | Sun set (hh:mm)      | Last time (hh:mm) with flicker  | (WTG causing flicker last time)  |
|              | Minutes with flicker |                                 |                                  |



Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM  
US-01824-3627 Chelmsford  
+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

### Assumptions for shadow calculations

Reference year for calendar

Shadow receptor: R115 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (105)

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

|                     | January        | February       | March          | April          | May            | June           | July           | August         | September      | October        | November       | December       |
|---------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 1                   | 08:31<br>17:04 | 08:11<br>17:44 | 07:27<br>18:26 | 07:26<br>20:10 | 06:31<br>20:52 | 05:53<br>21:30 | 05:52<br>21:44 | 06:21<br>21:21 | 07:01<br>20:29 | 07:41<br>19:29 | 08:25<br>18:30 | 08:08<br>16:57 |
| 2                   | 08:31<br>17:05 | 08:10<br>17:46 | 07:25<br>18:27 | 07:24<br>20:12 | 06:29<br>20:53 | 05:53<br>21:31 | 05:52<br>21:44 | 06:22<br>21:19 | 07:03<br>20:27 | 07:42<br>19:27 | 08:27<br>18:28 | 08:09<br>16:57 |
| 3                   | 08:31<br>17:06 | 08:09<br>17:48 | 07:23<br>18:29 | 07:22<br>20:13 | 06:27<br>20:55 | 05:52<br>21:32 | 05:53<br>21:44 | 06:24<br>21:18 | 07:04<br>20:25 | 07:44<br>19:25 | 08:28<br>18:27 | 08:10<br>16:56 |
| 4                   | 08:31<br>17:07 | 08:08<br>17:49 | 07:21<br>18:30 | 07:20<br>20:15 | 06:26<br>20:56 | 05:51<br>21:33 | 05:53<br>21:43 | 06:25<br>21:16 | 07:05<br>20:23 | 07:45<br>19:23 | 08:30<br>18:25 | 08:12<br>16:56 |
| 5                   | 08:31<br>17:08 | 08:06<br>17:51 | 07:19<br>18:32 | 07:18<br>20:16 | 06:24<br>20:57 | 05:51<br>21:34 | 05:54<br>21:43 | 06:26<br>21:15 | 07:07<br>20:21 | 07:46<br>19:21 | 07:31<br>17:24 | 08:13<br>16:55 |
| 6                   | 08:30<br>17:09 | 08:05<br>17:52 | 07:18<br>18:33 | 07:16<br>20:17 | 06:23<br>20:59 | 05:50<br>21:34 | 05:55<br>21:43 | 06:27<br>21:14 | 07:08<br>20:19 | 07:48<br>19:19 | 07:33<br>17:22 | 08:14<br>16:55 |
| 7                   | 08:30<br>17:10 | 08:03<br>17:54 | 07:16<br>18:35 | 07:14<br>20:19 | 06:21<br>21:00 | 05:50<br>21:35 | 05:55<br>21:42 | 06:29<br>21:12 | 07:09<br>20:17 | 07:49<br>19:17 | 07:34<br>17:21 | 08:15<br>16:55 |
| 8                   | 08:30<br>17:11 | 08:02<br>17:55 | 07:14<br>18:36 | 07:12<br>20:20 | 06:20<br>21:01 | 05:50<br>21:36 | 05:56<br>21:42 | 06:30<br>21:11 | 07:11<br>20:15 | 07:51<br>19:15 | 07:36<br>17:20 | 08:16<br>16:55 |
| 9                   | 08:30<br>17:12 | 08:01<br>17:57 | 07:12<br>18:38 | 07:10<br>20:21 | 06:18<br>21:03 | 05:49<br>21:37 | 05:57<br>21:42 | 06:31<br>21:09 | 07:12<br>20:13 | 07:52<br>19:13 | 07:37<br>17:18 | 08:17<br>16:55 |
| 10                  | 08:29<br>17:13 | 07:59<br>17:58 | 07:10<br>18:39 | 07:08<br>20:23 | 06:17<br>21:04 | 05:49<br>21:38 | 05:58<br>21:41 | 06:33<br>21:08 | 07:13<br>20:11 | 07:53<br>19:11 | 07:39<br>17:17 | 08:18<br>16:54 |
| 11                  | 08:29<br>17:15 | 07:58<br>18:00 | 07:08<br>18:41 | 07:07<br>20:24 | 06:15<br>21:05 | 05:49<br>21:38 | 05:59<br>21:41 | 06:34<br>21:06 | 07:15<br>20:09 | 07:55<br>19:09 | 07:40<br>17:16 | 08:19<br>16:54 |
| 12                  | 08:29<br>17:16 | 07:56<br>18:00 | 08:06<br>18:42 | 07:05<br>20:26 | 06:14<br>21:07 | 05:48<br>21:39 | 06:00<br>21:40 | 06:35<br>21:04 | 07:16<br>20:07 | 07:56<br>19:07 | 07:42<br>17:14 | 08:20<br>16:54 |
| 13                  | 08:28<br>17:17 | 07:55<br>18:01 | 08:04<br>19:43 | 07:03<br>20:27 | 06:13<br>21:08 | 05:48<br>21:40 | 06:00<br>21:39 | 06:37<br>21:03 | 07:17<br>20:05 | 07:58<br>19:05 | 07:43<br>17:13 | 08:21<br>16:54 |
| 14                  | 08:28<br>17:18 | 07:53<br>18:03 | 08:02<br>19:45 | 07:01<br>20:28 | 06:11<br>21:09 | 05:48<br>21:40 | 06:01<br>21:39 | 06:38<br>21:01 | 07:18<br>20:03 | 07:59<br>19:03 | 07:44<br>17:12 | 08:22<br>16:54 |
| 15                  | 08:27<br>17:20 | 07:51<br>18:05 | 08:00<br>19:46 | 06:59<br>20:30 | 06:10<br>21:11 | 05:48<br>21:41 | 06:02<br>21:38 | 06:39<br>21:00 | 07:20<br>20:01 | 08:00<br>19:01 | 07:46<br>17:11 | 08:23<br>16:55 |
| 16                  | 08:26<br>17:21 | 07:50<br>18:06 | 07:58<br>19:48 | 06:57<br>20:31 | 06:09<br>21:12 | 05:48<br>21:41 | 06:03<br>21:37 | 06:40<br>20:58 | 07:21<br>19:59 | 08:02<br>18:58 | 07:47<br>17:10 | 08:24<br>16:55 |
| 17                  | 08:26<br>17:22 | 07:48<br>18:08 | 07:56<br>19:49 | 06:55<br>20:33 | 06:08<br>21:13 | 05:48<br>21:42 | 06:04<br>21:36 | 06:42<br>20:56 | 07:22<br>19:57 | 08:03<br>18:56 | 07:49<br>17:08 | 08:24<br>16:55 |
| 18                  | 08:25<br>17:24 | 07:46<br>18:09 | 07:54<br>19:51 | 06:53<br>20:34 | 06:06<br>21:14 | 05:48<br>21:42 | 06:05<br>21:36 | 06:43<br>20:54 | 07:24<br>19:55 | 08:05<br>18:54 | 07:50<br>17:07 | 08:25<br>16:55 |
| 19                  | 08:24<br>17:25 | 07:45<br>18:11 | 07:52<br>19:52 | 06:51<br>20:35 | 06:05<br>21:16 | 05:48<br>21:42 | 06:06<br>21:35 | 06:44<br>20:53 | 07:25<br>19:53 | 08:06<br>18:52 | 07:52<br>17:06 | 08:26<br>16:56 |
| 20                  | 08:24<br>17:27 | 07:43<br>18:12 | 07:50<br>19:53 | 06:50<br>20:37 | 06:04<br>21:17 | 05:48<br>21:43 | 06:07<br>21:34 | 06:46<br>20:51 | 07:26<br>19:51 | 08:08<br>18:50 | 07:53<br>17:05 | 08:26<br>16:56 |
| 21                  | 08:23<br>17:28 | 07:41<br>18:14 | 07:48<br>19:55 | 06:48<br>20:38 | 06:03<br>21:18 | 05:48<br>21:43 | 06:08<br>21:33 | 06:47<br>20:49 | 07:28<br>19:49 | 08:09<br>18:48 | 07:55<br>17:04 | 08:27<br>16:56 |
| 22                  | 08:22<br>17:29 | 07:40<br>18:15 | 07:46<br>19:56 | 06:46<br>20:39 | 06:02<br>21:19 | 05:48<br>21:43 | 06:10<br>21:32 | 06:48<br>20:47 | 07:29<br>19:47 | 08:10<br>18:47 | 07:56<br>17:04 | 08:28<br>16:57 |
| 23                  | 08:21<br>17:31 | 07:38<br>18:17 | 07:44<br>19:58 | 06:44<br>20:41 | 06:01<br>21:20 | 05:48<br>21:44 | 06:11<br>21:31 | 06:50<br>20:46 | 07:30<br>19:45 | 08:12<br>18:45 | 07:57<br>17:03 | 08:28<br>16:57 |
| 24                  | 08:20<br>17:32 | 07:36<br>18:18 | 07:42<br>19:59 | 06:42<br>20:42 | 06:00<br>21:21 | 05:49<br>21:44 | 06:12<br>21:30 | 06:51<br>20:44 | 07:32<br>19:43 | 08:13<br>18:43 | 07:59<br>17:02 | 08:29<br>16:58 |
| 25                  | 08:19<br>17:34 | 07:34<br>18:20 | 07:40<br>20:01 | 06:41<br>20:44 | 05:59<br>21:23 | 05:49<br>21:44 | 06:13<br>21:29 | 06:52<br>20:42 | 07:33<br>19:41 | 08:15<br>18:41 | 08:00<br>17:01 | 08:29<br>16:58 |
| 26                  | 08:18<br>17:35 | 07:32<br>18:21 | 07:38<br>20:02 | 06:39<br>20:45 | 05:58<br>21:24 | 05:49<br>21:44 | 06:14<br>21:28 | 06:54<br>20:40 | 07:34<br>19:39 | 08:16<br>18:40 | 08:02<br>17:00 | 08:29<br>16:59 |
| 27                  | 08:17<br>17:37 | 07:31<br>18:23 | 07:36<br>20:03 | 06:37<br>20:46 | 05:57<br>21:25 | 05:50<br>21:44 | 06:15<br>21:27 | 06:55<br>20:38 | 07:36<br>19:37 | 08:18<br>18:38 | 08:03<br>17:00 | 08:30<br>17:00 |
| 28                  | 08:16<br>17:38 | 07:29<br>18:24 | 07:34<br>20:05 | 06:36<br>20:48 | 05:56<br>21:26 | 05:50<br>21:44 | 06:16<br>21:26 | 06:56<br>20:36 | 07:37<br>19:35 | 08:19<br>18:36 | 08:04<br>16:59 | 08:30<br>17:00 |
| 29                  | 08:15<br>17:40 |                | 07:32<br>20:06 | 06:34<br>20:49 | 05:56<br>21:27 | 05:51<br>21:44 | 06:18<br>21:24 | 06:57<br>20:35 | 07:38<br>19:33 | 08:21<br>18:35 | 08:06<br>16:58 | 08:30<br>17:01 |
| 30                  | 08:14<br>17:41 |                | 07:30<br>20:08 | 06:32<br>20:51 | 05:55<br>21:28 | 05:51<br>21:44 | 06:19<br>21:23 | 06:59<br>20:33 | 07:40<br>19:31 | 08:22<br>18:33 | 08:07<br>16:58 | 08:30<br>17:02 |
| 31                  | 08:13<br>17:43 |                | 07:28<br>20:09 |                | 05:54<br>21:29 |                | 06:20<br>21:22 | 07:00<br>20:31 |                | 08:24<br>18:31 |                | 08:31<br>17:03 |
| Potential sun hours | 278            | 286            | 367            | 406            | 466            | 475            | 481            | 443            | 380            | 339            | 283            | 266            |
| Total, worst case   |                |                |                |                |                |                |                |                |                |                |                |                |
| Sun reduction       |                |                |                |                |                |                |                |                |                |                |                |                |
| Oper. time red.     |                |                |                |                |                |                |                |                |                |                |                |                |
| Wind dir. red.      |                |                |                |                |                |                |                |                |                |                |                |                |
| Total reduction     |                |                |                |                |                |                |                |                |                |                |                |                |
| Total, real         |                |                |                |                |                |                |                |                |                |                |                |                |

Table layout: For each day in each month the following matrix apply

|              |                      |                                 |                                  |
|--------------|----------------------|---------------------------------|----------------------------------|
| Day in month | Sun rise (hh:mm)     | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|              | Sun set (hh:mm)      | Last time (hh:mm) with flicker  | (WTG causing flicker last time)  |
|              | Minutes with flicker |                                 |                                  |

Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM  
US-01824-3627 Chelmsford  
+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com  
Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: R116 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 90.0° (106)

### Assumptions for shadow calculations

Reference year for calendar

2023

Sunshine probability S/50 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

|                     | January        | February            | March               | April          | May            | June           | July           | August         | September           | October        | November       | December       |
|---------------------|----------------|---------------------|---------------------|----------------|----------------|----------------|----------------|----------------|---------------------|----------------|----------------|----------------|
| 1                   | 08:31<br>17:04 | 08:11<br>17:44      | 08:37 (59)<br>18:04 | 07:27<br>18:05 | 07:26<br>18:06 | 06:31<br>17:00 | 05:53<br>16:20 | 05:52<br>16:21 | 06:24 (60)<br>16:21 | 07:01<br>16:29 | 07:41<br>16:30 | 08:25<br>16:59 |
| 2                   | 08:31<br>17:05 | 08:10<br>17:46      | 08:36 (59)<br>18:05 | 07:24<br>18:07 | 06:29<br>18:08 | 05:53<br>16:21 | 05:52<br>16:20 | 05:52<br>16:21 | 06:25 (60)<br>16:22 | 07:03<br>16:27 | 07:42<br>16:28 | 08:27<br>16:59 |
| 3                   | 08:31<br>17:06 | 08:09<br>17:47      | 08:35 (59)<br>18:29 | 07:23<br>18:29 | 06:27<br>18:29 | 05:52<br>16:21 | 05:52<br>16:20 | 05:53<br>16:21 | 06:25 (60)<br>16:24 | 07:04<br>16:27 | 07:44<br>16:28 | 08:28<br>16:59 |
| 4                   | 08:31<br>17:07 | 08:08<br>17:49      | 08:34 (59)<br>18:59 | 07:21<br>19:04 | 06:56<br>19:04 | 05:51<br>16:21 | 05:51<br>16:21 | 05:53<br>16:21 | 06:25 (60)<br>16:25 | 07:05<br>16:28 | 07:45<br>16:28 | 08:30<br>16:59 |
| 5                   | 08:31<br>17:08 | 08:06<br>17:51      | 08:36 (59)<br>19:00 | 07:19<br>18:32 | 06:54<br>18:32 | 05:51<br>16:21 | 05:51<br>16:21 | 05:54<br>16:21 | 06:26 (60)<br>16:26 | 07:07<br>16:28 | 07:46<br>16:28 | 08:31<br>16:59 |
| 6                   | 08:30<br>17:09 | 08:05<br>17:52      | 08:36 (59)<br>19:01 | 07:18<br>18:33 | 06:56<br>18:33 | 05:50<br>16:21 | 05:50<br>16:20 | 05:55<br>16:20 | 06:26 (60)<br>16:27 | 07:08<br>16:28 | 07:48<br>16:28 | 08:32<br>16:59 |
| 7                   | 08:30<br>17:10 | 08:03<br>17:54      | 08:37 (59)<br>19:02 | 07:16<br>18:35 | 06:57<br>18:35 | 05:51<br>16:21 | 05:51<br>16:20 | 05:58<br>16:20 | 06:27 (60)<br>16:28 | 07:09<br>16:29 | 07:49<br>16:29 | 08:33<br>16:59 |
| 8                   | 08:30<br>17:11 | 08:02<br>17:55      | 08:38 (59)<br>19:03 | 07:14<br>18:36 | 06:58<br>18:36 | 05:50<br>16:21 | 05:50<br>16:20 | 05:56<br>16:20 | 06:27 (60)<br>16:28 | 07:11<br>16:29 | 07:51<br>16:29 | 08:34<br>16:59 |
| 9                   | 08:30<br>17:12 | 08:01<br>17:57      | 08:40 (59)<br>19:04 | 07:12<br>18:38 | 06:59<br>18:38 | 05:49<br>16:21 | 05:49<br>16:20 | 05:57<br>16:20 | 06:27 (60)<br>16:29 | 07:12<br>16:30 | 07:52<br>16:30 | 08:35<br>16:59 |
| 10                  | 08:29<br>17:13 | 07:59<br>17:58      | 08:42 (59)<br>19:05 | 07:08<br>18:39 | 06:59<br>18:39 | 05:49<br>16:21 | 05:49<br>16:20 | 05:58<br>16:20 | 06:28 (60)<br>16:30 | 07:13<br>16:30 | 07:53<br>16:30 | 08:36<br>16:59 |
| 11                  | 08:29<br>17:15 | 07:58<br>18:00      | 08:43 (59)<br>19:06 | 07:06<br>18:41 | 06:59<br>18:41 | 05:49<br>16:21 | 05:49<br>16:20 | 05:59<br>16:20 | 06:29 (60)<br>16:31 | 07:15<br>16:31 | 07:55<br>16:31 | 08:37<br>16:59 |
| 12                  | 08:29<br>17:16 | 07:56<br>18:01      | 08:44 (59)<br>19:07 | 07:05<br>18:42 | 06:59<br>18:42 | 05:48<br>16:21 | 05:48<br>16:20 | 05:59<br>16:20 | 06:30 (60)<br>16:32 | 07:16<br>16:32 | 07:56<br>16:32 | 08:38<br>16:59 |
| 13                  | 08:28<br>17:17 | 07:54<br>18:01      | 08:45 (59)<br>19:08 | 07:03<br>18:43 | 06:59<br>18:43 | 05:48<br>16:21 | 05:48<br>16:20 | 05:59<br>16:20 | 06:31 (60)<br>16:33 | 07:17<br>16:33 | 07:58<br>16:33 | 08:39<br>16:59 |
| 14                  | 08:28<br>17:18 | 07:53<br>18:03      | 08:46 (59)<br>19:09 | 07:01<br>18:44 | 06:59<br>18:44 | 05:48<br>16:21 | 05:48<br>16:20 | 05:59<br>16:20 | 06:32 (60)<br>16:34 | 07:18<br>16:34 | 07:59<br>16:34 | 08:40<br>16:59 |
| 15                  | 08:27<br>17:20 | 07:51<br>18:05      | 08:47 (59)<br>19:10 | 06:59<br>18:45 | 06:59<br>18:45 | 05:48<br>16:21 | 05:48<br>16:20 | 06:02<br>16:20 | 06:33 (60)<br>16:35 | 07:20<br>16:35 | 07:59<br>16:35 | 08:41<br>16:59 |
| 16                  | 08:26<br>17:21 | 07:50<br>18:06      | 08:48 (59)<br>19:11 | 06:57<br>18:46 | 06:59<br>18:46 | 05:48<br>16:21 | 05:48<br>16:20 | 06:03<br>16:20 | 06:34 (60)<br>16:36 | 07:21<br>16:36 | 08:02<br>16:36 | 08:42<br>16:59 |
| 17                  | 08:26<br>17:22 | 07:48<br>18:07      | 08:49 (59)<br>19:12 | 06:55<br>18:47 | 06:59<br>18:47 | 05:48<br>16:21 | 05:48<br>16:20 | 06:04<br>16:20 | 06:35 (60)<br>16:37 | 07:22<br>16:37 | 08:03<br>16:37 | 08:43<br>16:59 |
| 18                  | 08:25<br>17:24 | 07:46<br>18:09      | 08:50 (59)<br>19:13 | 06:54<br>18:48 | 06:59<br>18:48 | 05:48<br>16:21 | 05:48<br>16:20 | 06:05<br>16:20 | 06:36 (60)<br>16:38 | 07:24<br>16:38 | 08:05<br>16:38 | 08:44<br>16:59 |
| 19                  | 08:24<br>17:25 | 07:45<br>18:11      | 08:51 (59)<br>19:14 | 06:52<br>18:49 | 06:59<br>18:49 | 05:48<br>16:21 | 05:48<br>16:20 | 06:06<br>16:20 | 06:37 (60)<br>16:39 | 07:25<br>16:39 | 08:06<br>16:39 | 08:45<br>16:59 |
| 20                  | 08:24<br>17:27 | 08:51 (59)<br>19:15 | 07:43<br>19:15      | 07:43<br>19:15 | 06:59<br>18:50 | 05:48<br>16:21 | 05:48<br>16:20 | 06:07<br>16:20 | 06:38 (60)<br>16:40 | 07:26<br>16:40 | 08:08<br>16:40 | 08:46<br>16:59 |
| 21                  | 08:23<br>17:28 | 08:50 (59)<br>19:16 | 07:42<br>19:16      | 07:42<br>19:16 | 06:59<br>18:51 | 05:48<br>16:21 | 05:48<br>16:20 | 06:08<br>16:20 | 06:39 (60)<br>16:41 | 07:28<br>16:41 | 08:09<br>16:41 | 08:47<br>16:59 |
| 22                  | 08:22<br>17:29 | 08:53 (59)<br>19:17 | 07:41<br>19:17      | 07:41<br>19:17 | 06:59<br>18:52 | 05:48<br>16:21 | 05:48<br>16:20 | 06:09<br>16:20 | 06:40 (60)<br>16:42 | 07:29<br>16:42 | 08:10<br>16:42 | 08:48<br>16:59 |
| 23                  | 08:21<br>17:31 | 08:48 (59)<br>19:18 | 07:38<br>19:18      | 07:38<br>19:18 | 06:59<br>18:53 | 05:48<br>16:21 | 05:48<br>16:20 | 06:10<br>16:20 | 06:41 (60)<br>16:43 | 07:30<br>16:43 | 08:12<br>16:43 | 08:49<br>16:59 |
| 24                  | 08:20<br>17:32 | 08:47 (59)<br>19:19 | 07:36<br>19:19      | 07:36<br>19:19 | 06:59<br>18:54 | 05:48<br>16:21 | 05:48<br>16:20 | 06:11<br>16:20 | 06:42 (60)<br>16:44 | 07:32<br>16:44 | 08:13<br>16:44 | 08:50<br>16:59 |
| 25                  | 08:19<br>17:34 | 08:46 (59)<br>19:20 | 07:34<br>19:20      | 07:34<br>19:20 | 06:59<br>18:55 | 05:48<br>16:21 | 05:48<br>16:20 | 06:13<br>16:20 | 06:43 (60)<br>16:45 | 07:33<br>16:45 | 08:15<br>16:45 | 08:51<br>16:59 |
| 26                  | 08:18<br>17:35 | 08:58 (59)<br>19:21 | 07:33<br>19:21      | 07:33<br>19:21 | 06:59<br>18:56 | 05:48<br>16:21 | 05:48<br>16:20 | 06:14<br>16:20 | 06:44 (60)<br>16:46 | 07:34<br>16:46 | 08:16<br>16:46 | 08:52<br>16:59 |
| 27                  | 08:17<br>17:37 | 08:43 (59)<br>19:22 | 07:31<br>19:22      | 07:31<br>19:22 | 06:59<br>18:57 | 05:48<br>16:21 | 05:48<br>16:20 | 06:15<br>16:20 | 06:45 (60)<br>16:47 | 07:36<br>16:47 | 08:18<br>16:47 | 08:53<br>16:59 |
| 28                  | 08:16<br>17:38 | 08:42 (59)<br>19:23 | 07:30<br>19:23      | 07:30<br>19:23 | 06:59<br>18:58 | 05:48<br>16:21 | 05:48<br>16:20 | 06:16<br>16:20 | 06:46 (60)<br>16:48 | 07:37<br>16:48 | 08:19<br>16:48 | 08:54<br>16:59 |
| 29                  | 08:15<br>17:40 | 08:41 (59)<br>19:24 | 07:29<br>19:24      | 07:29<br>19:24 | 06:59<br>18:59 | 05:48<br>16:21 | 05:48<br>16:20 | 06:17<br>16:20 | 06:47 (60)<br>16:49 | 07:38<br>16:49 | 08:20<br>16:49 | 08:55<br>16:59 |
| 30                  | 08:14<br>17:41 | 08:40 (59)<br>19:25 | 07:28<br>19:25      | 07:28<br>19:25 | 06:59<br>19:00 | 05:48<br>16:21 | 05:48<br>16:20 | 06:18<br>16:20 | 06:48 (60)<br>16:50 | 07:39<br>16:50 | 08:21<br>16:50 | 08:56<br>16:59 |
| 31                  | 08:13<br>17:43 | 08:39 (59)<br>19:26 | 07:28<br>19:26      | 07:28<br>19:26 | 06:59<br>19:01 | 05:48<br>16:21 | 05:48<br>16:20 | 06:19<br>16:20 | 06:49 (60)<br>16:51 | 07:40<br>16:51 | 08:22<br>16:51 | 08:57<br>16:59 |
| Potential sun hours | 278            | 286                 | 367                 | 406            | 429            | 475            | 481            | 443            | 386                 | 339            | 283            | 256            |
| Total, worst case   | 145            | 215                 |                     |                | 230            | 1061           | 673            |                |                     |                | 365            |                |
| Sun reduction       | 0.54           | 0.52                |                     |                | 0.64           | 0.67           | 0.75           |                |                     |                | 0.42           |                |
| Oper. time red.     | 1.00           | 1.00                |                     |                | 1.00           | 1.00           | 1.00           |                |                     |                | 1.00           |                |
| Wind dir. red.      | 0.65           | 0.65                |                     |                | 0.64           | 0.64           | 0.64           |                |                     |                | 0.65           |                |
| Total reduction     | 0.35           | 0.34                |                     |                | 0.35           | 0.43           | 0.48           |                |                     |                | 0.27           |                |
| Total, real         | 51             | 73                  |                     |                | 95             | 454            | 325            |                |                     |                | 100            |                |



Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

### Assumptions for shadow calculations

Reference year for calendar

2023

Shadow receptor: R117 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 90.0° (215)

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

| January             |       | February      |            | March         |       | April |       | May   |       | June       |            |
|---------------------|-------|---------------|------------|---------------|-------|-------|-------|-------|-------|------------|------------|
| 1                   | 08:31 | 15:54 (46)    | 08:11      | 08:37 (59)    | 07:27 | 07:26 | 06:31 | 05:53 |       |            |            |
|                     | 17:04 | 12 16:06 (46) | 17:44      | 21 08:58 (59) | 18:26 | 20:10 | 20:52 | 21:30 |       |            |            |
| 2                   | 08:31 | 15:56 (46)    | 08:10      | 08:36 (59)    | 07:25 | 07:24 | 06:29 | 05:53 |       | 06:24 (60) |            |
|                     | 17:05 | 9 16:05 (46)  | 17:46      | 23 08:59 (59) | 18:27 | 20:12 | 20:53 | 21:31 | 2     | 06:26 (60) |            |
| 3                   | 08:31 | 15:58 (46)    | 08:09      | 08:35 (59)    | 07:23 | 07:22 | 06:27 | 05:52 |       | 06:20 (60) |            |
|                     | 17:06 | 6 16:04 (46)  | 17:47      | 24 08:59 (59) | 18:29 | 20:13 | 20:55 | 21:32 | 9     | 06:29 (60) |            |
| 4                   | 08:31 |               | 08:08      | 08:33 (59)    | 07:21 | 07:20 | 06:26 | 05:51 |       | 06:19 (60) |            |
|                     | 17:07 |               | 17:49      | 26 08:59 (59) | 18:30 | 20:14 | 20:56 | 21:33 | 13    | 06:32 (60) |            |
| 5                   | 08:31 |               | 08:06      | 08:32 (59)    | 07:19 | 07:18 | 06:24 | 05:51 |       | 06:19 (60) |            |
|                     | 17:08 |               | 17:51      | 27 08:59 (59) | 18:32 | 20:16 | 20:57 | 21:34 | 15    | 06:34 (60) |            |
| 6                   | 08:30 |               | 08:05      | 08:31 (59)    | 07:18 | 07:16 | 06:23 | 05:50 |       | 06:18 (60) |            |
|                     | 17:09 |               | 17:52      | 27 08:58 (59) | 18:33 | 20:17 | 20:59 | 21:34 | 16    | 06:34 (60) |            |
| 7                   | 08:30 |               | 08:03      | 08:32 (59)    | 07:16 | 07:14 | 06:21 | 05:50 |       | 06:18 (60) |            |
|                     | 17:10 |               | 17:54      | 26 08:58 (59) | 18:35 | 20:19 | 21:00 | 21:35 | 18    | 06:36 (60) |            |
| 8                   | 08:30 |               | 08:02      | 08:33 (59)    | 07:14 | 07:12 | 06:20 | 05:50 |       | 06:17 (60) |            |
|                     | 17:11 |               | 17:55      | 24 08:57 (59) | 18:36 | 20:20 | 21:01 | 21:36 | 19    | 06:36 (60) |            |
| 9                   | 08:30 |               | 08:01      | 08:34 (59)    | 07:12 | 07:10 | 06:18 | 05:49 |       | 06:17 (60) |            |
|                     | 17:12 |               | 17:57      | 23 08:57 (59) | 18:38 | 20:21 | 21:03 | 21:37 | 20    | 06:37 (60) |            |
| 10                  | 08:29 |               | 07:59      | 08:35 (59)    | 07:10 | 07:08 | 06:17 | 05:49 |       | 06:17 (60) |            |
|                     | 17:13 |               | 17:58      | 20 08:55 (59) | 18:39 | 20:23 | 21:04 | 21:38 | 21    | 06:38 (60) |            |
| 11                  | 08:29 |               | 07:58      | 08:37 (59)    | 07:08 | 07:06 | 06:15 | 05:49 |       | 06:17 (60) |            |
|                     | 17:15 |               | 18:00      | 17 08:54 (59) | 18:41 | 20:24 | 21:05 | 21:38 | 22    | 06:39 (60) |            |
| 12                  | 08:29 |               | 07:56      | 08:39 (59)    | 08:06 | 07:05 | 06:14 | 05:48 |       | 06:16 (60) |            |
|                     | 17:16 |               | 18:00      | 13 08:52 (59) | 18:42 | 20:26 | 21:07 | 21:39 | 23    | 06:39 (60) |            |
| 13                  | 08:28 |               | 07:54      | 08:42 (59)    | 08:04 | 07:03 | 06:13 | 05:48 |       | 06:16 (60) |            |
|                     | 17:17 |               | 18:01      | 5 08:47 (59)  | 19:43 | 20:27 | 21:08 | 21:39 | 23    | 06:39 (60) |            |
| 14                  | 08:28 |               | 07:53      |               | 08:02 | 07:01 | 06:11 | 05:48 |       | 06:16 (60) |            |
|                     | 17:18 |               | 18:03      |               | 19:45 | 20:28 | 21:09 | 21:40 | 24    | 06:40 (60) |            |
| 15                  | 08:27 |               | 07:51      |               | 08:00 | 06:59 | 06:10 | 05:48 |       | 06:16 (60) |            |
|                     | 17:20 |               | 18:05      |               | 19:46 | 20:30 | 21:10 | 21:41 | 24    | 06:40 (60) |            |
| 16                  | 08:26 |               | 07:50      |               | 07:58 | 06:57 | 06:09 | 05:48 |       | 06:16 (60) |            |
|                     | 17:21 |               | 18:06      |               | 19:48 | 20:31 | 21:12 | 21:41 | 25    | 06:41 (60) |            |
| 17                  | 08:26 |               | 07:48      |               | 07:56 | 06:55 | 06:08 | 05:48 |       | 06:16 (60) |            |
|                     | 17:22 |               | 18:08      |               | 19:49 | 20:33 | 21:13 | 21:42 | 25    | 06:41 (60) |            |
| 18                  | 08:25 |               | 07:46      |               | 07:54 | 06:53 | 06:06 | 05:48 |       | 06:16 (60) |            |
|                     | 17:24 |               | 18:09      |               | 19:51 | 20:34 | 21:14 | 21:42 | 26    | 06:42 (60) |            |
| 19                  | 08:24 |               | 07:45      |               | 07:52 | 06:51 | 06:05 | 05:48 |       | 06:16 (60) |            |
|                     | 17:25 |               | 18:11      |               | 19:52 | 20:35 | 21:15 | 21:42 | 26    | 06:42 (60) |            |
| 20                  | 08:24 |               | 07:43      |               | 07:50 | 06:50 | 06:04 | 05:48 |       | 06:16 (60) |            |
|                     | 17:27 |               | 18:12      |               | 19:53 | 20:37 | 21:17 | 21:43 | 26    | 06:42 (60) |            |
| 21                  | 08:23 |               | 07:41      |               | 07:48 | 06:48 | 06:03 | 05:48 |       | 06:17 (60) |            |
|                     | 17:28 |               | 18:14      |               | 19:55 | 20:38 | 21:18 | 21:43 | 26    | 06:43 (60) |            |
| 22                  | 08:22 |               | 07:40      |               | 07:46 | 06:46 | 06:02 | 05:48 |       | 06:17 (60) |            |
|                     | 17:29 |               | 18:15      |               | 19:56 | 20:39 | 21:19 | 21:43 | 26    | 06:43 (60) |            |
| 23                  | 08:21 |               | 08:48 (59) |               | 07:38 | 07:44 | 06:44 | 06:01 | 05:48 |            | 06:17 (60) |
|                     | 17:31 | 3             | 08:51 (59) |               | 18:17 | 19:58 | 20:41 | 21:20 | 21:44 | 26         | 06:43 (60) |
| 24                  | 08:20 |               | 08:47 (59) |               | 07:36 | 07:42 | 06:42 | 06:00 | 05:49 |            | 06:17 (60) |
|                     | 17:32 | 6             | 08:53 (59) |               | 18:18 | 19:59 | 20:42 | 21:21 | 21:44 | 26         | 06:43 (60) |
| 25                  | 08:19 |               | 08:46 (59) |               | 07:34 | 07:40 | 06:41 | 05:59 | 05:49 |            | 06:18 (60) |
|                     | 17:34 | 8             | 08:54 (59) |               | 18:20 | 20:01 | 20:44 | 21:23 | 21:44 | 26         | 06:44 (60) |
| 26                  | 08:18 |               | 08:45 (59) |               | 07:32 | 07:38 | 06:39 | 05:58 | 05:49 |            | 06:18 (60) |
|                     | 17:35 | 10            | 08:55 (59) |               | 18:21 | 20:02 | 20:45 | 21:24 | 21:44 | 25         | 06:43 (60) |
| 27                  | 08:17 |               | 08:43 (59) |               | 07:31 | 07:36 | 06:37 | 05:57 | 05:50 |            | 06:18 (60) |
|                     | 17:37 | 12            | 08:55 (59) |               | 18:23 | 20:03 | 20:46 | 21:25 | 21:44 | 25         | 06:43 (60) |
| 28                  | 08:16 |               | 08:42 (59) |               | 07:29 | 07:34 | 06:36 | 05:56 | 05:50 |            | 06:19 (60) |
|                     | 17:38 | 14            | 08:56 (59) |               | 18:24 | 20:05 | 20:48 | 21:26 | 21:44 | 25         | 06:44 (60) |
| 29                  | 08:15 |               | 08:41 (59) |               | 07:27 | 07:32 | 06:34 | 05:55 | 05:51 |            | 06:19 (60) |
|                     | 17:40 | 16            | 08:57 (59) |               | 07:25 | 20:06 | 20:49 | 21:27 | 21:44 | 24         | 06:43 (60) |
| 30                  | 08:14 |               | 08:40 (59) |               | 07:23 | 07:30 | 06:32 | 05:55 | 05:51 |            | 06:20 (60) |
|                     | 17:41 | 18            | 08:58 (59) |               | 07:21 | 20:08 | 20:50 | 21:28 | 21:44 | 24         | 06:44 (60) |
| 31                  | 08:13 |               | 08:39 (59) |               | 07:19 | 07:28 | 05:54 |       |       |            |            |
|                     | 17:43 | 19            | 08:58 (59) |               | 07:17 | 20:09 | 21:29 |       |       |            |            |
| Potential sun hours | 278   |               | 286        |               | 367   | 406   | 466   | 475   |       |            |            |
| Total, worst case   | 133   |               | 276        |               |       |       |       | 630   |       |            |            |
| Sun reduction       | 0.54  |               | 0.52       |               |       |       |       | 0.67  |       |            |            |
| Oper. time red.     | 1.00  |               | 1.00       |               |       |       |       | 1.00  |       |            |            |
| Wind dir. red.      | 0.65  |               | 0.65       |               |       |       |       | 0.63  |       |            |            |
| Total reduction     | 0.35  |               | 0.34       |               |       |       |       | 0.42  |       |            |            |
| Total, real         | 46    |               | 94         |               |       |       |       | 268   |       |            |            |

Table layout: For each day in each month the following matrix apply

|              |                  |                                 |                                  |
|--------------|------------------|---------------------------------|----------------------------------|
| Day in month | Sun rise (hh:mm) | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|              | Sun set (hh:mm)  | Minutes with flicker            | Last time (hh:mm) with flicker   |
|              |                  |                                 | (WTG causing flicker last time)  |

Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM  
US-01824-3627 Chelmsford  
+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023 Shadow receptor: R117 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 90.0° (215)

## Assumptions for shadow calculations

Reference year for calendar

2023

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

|                     | July  | August     | September  | October | November | December |
|---------------------|-------|------------|------------|---------|----------|----------|
| 1                   | 05:52 | 06:20 (60) | 06:21      | 07:01   | 07:41    | 08:25    |
| 2                   | 21:44 | 23         | 06:43 (60) | 21:20   | 20:29    | 19:29    |
| 3                   | 05:52 | 06:21 (60) | 06:22      | 07:03   | 07:42    | 08:27    |
| 4                   | 21:44 | 23         | 06:44 (60) | 21:19   | 20:27    | 19:27    |
| 5                   | 05:53 | 06:21 (60) | 06:24      | 07:04   | 07:44    | 08:28    |
| 6                   | 21:44 | 22         | 06:43 (60) | 21:18   | 20:25    | 19:25    |
| 7                   | 05:53 | 06:22 (60) | 06:25      | 07:05   | 07:45    | 08:30    |
| 8                   | 21:43 | 21         | 06:43 (60) | 21:16   | 20:23    | 19:23    |
| 9                   | 05:54 | 06:23 (60) | 06:26      | 07:07   | 07:46    | 07:31    |
| 10                  | 21:43 | 20         | 06:43 (60) | 21:15   | 20:21    | 19:21    |
| 11                  | 05:55 | 06:23 (60) | 06:27      | 07:08   | 07:48    | 07:33    |
| 12                  | 21:43 | 19         | 06:42 (60) | 21:14   | 20:19    | 19:19    |
| 13                  | 05:55 | 06:24 (60) | 06:29      | 07:09   | 07:49    | 07:34    |
| 14                  | 21:42 | 18         | 06:42 (60) | 21:12   | 20:17    | 19:17    |
| 15                  | 05:56 | 06:25 (60) | 06:30      | 07:11   | 07:51    | 07:36    |
| 16                  | 21:42 | 16         | 06:41 (60) | 21:11   | 20:15    | 19:15    |
| 17                  | 05:57 | 06:25 (60) | 06:31      | 07:12   | 07:52    | 07:37    |
| 18                  | 21:42 | 15         | 06:40 (60) | 21:09   | 20:13    | 19:13    |
| 19                  | 05:58 | 06:26 (60) | 06:33      | 07:13   | 07:53    | 07:39    |
| 20                  | 21:41 | 13         | 06:39 (60) | 21:08   | 20:11    | 19:11    |
| 21                  | 05:59 | 06:28 (60) | 06:34      | 07:15   | 07:55    | 07:40    |
| 22                  | 21:40 | 9          | 06:37 (60) | 21:06   | 20:09    | 19:09    |
| 23                  | 05:59 | 06:32 (60) | 06:35      | 07:16   | 07:56    | 07:41    |
| 24                  | 21:40 | 2          | 06:34 (60) | 21:04   | 20:07    | 19:07    |
| 25                  | 06:00 |            | 06:36      | 07:17   | 07:58    | 07:43    |
| 26                  | 21:39 |            | 21:03      | 20:05   | 19:05    | 17:13    |
| 27                  | 06:01 |            | 06:38      | 07:18   | 07:59    | 07:44    |
| 28                  | 21:39 |            | 21:01      | 20:03   | 19:03    | 17:12    |
| 29                  | 06:02 |            | 06:39      | 07:20   | 08:00    | 07:46    |
| 30                  | 21:38 |            | 20:59      | 20:01   | 19:01    | 17:11    |
| 31                  | 06:03 |            | 06:40      | 07:21   | 08:02    | 07:47    |
| 32                  | 21:37 |            | 20:58      | 19:59   | 18:57    | 17:10    |
| 33                  | 06:04 |            | 06:42      | 07:22   | 08:03    | 07:49    |
| 34                  | 21:36 |            | 20:56      | 19:57   | 18:56    | 17:08    |
| 35                  | 06:05 |            | 06:43      | 07:24   | 08:05    | 07:50    |
| 36                  | 21:36 |            | 20:54      | 19:55   | 18:54    | 17:07    |
| 37                  | 06:06 |            | 06:44      | 07:25   | 08:06    | 07:52    |
| 38                  | 21:35 |            | 20:53      | 19:53   | 18:52    | 17:06    |
| 39                  | 06:07 |            | 06:46      | 07:26   | 08:08    | 07:53    |
| 40                  | 21:34 |            | 20:51      | 19:51   | 18:50    | 17:05    |
| 41                  | 06:08 |            | 06:47      | 07:28   | 08:09    | 07:55    |
| 42                  | 21:33 |            | 20:49      | 19:49   | 18:48    | 17:04    |
| 43                  | 06:09 |            | 06:48      | 07:29   | 08:10    | 07:56    |
| 44                  | 21:32 |            | 20:47      | 19:47   | 18:47    | 17:03    |
| 45                  | 06:11 |            | 06:50      | 07:30   | 08:12    | 07:57    |
| 46                  | 21:31 |            | 20:46      | 19:45   | 18:45    | 17:03    |
| 47                  | 06:12 |            | 06:51      | 07:32   | 08:13    | 07:59    |
| 48                  | 21:30 |            | 20:44      | 19:43   | 18:43    | 17:02    |
| 49                  | 06:13 |            | 06:52      | 07:33   | 08:15    | 08:00    |
| 50                  | 21:29 |            | 20:42      | 19:41   | 18:41    | 17:01    |
| 51                  | 06:14 |            | 06:54      | 07:34   | 08:16    | 08:02    |
| 52                  | 21:28 |            | 20:40      | 19:39   | 18:40    | 17:00    |
| 53                  | 06:15 |            | 06:55      | 07:36   | 08:18    | 08:03    |
| 54                  | 21:27 |            | 20:38      | 19:37   | 18:38    | 17:00    |
| 55                  | 06:16 |            | 06:56      | 07:37   | 08:19    | 08:04    |
| 56                  | 21:25 |            | 20:36      | 19:35   | 18:36    | 16:59    |
| 57                  | 06:18 |            | 06:57      | 07:38   | 08:21    | 08:05    |
| 58                  | 21:24 |            | 20:34      | 19:33   | 18:35    | 16:58    |
| 59                  | 06:19 |            | 06:59      | 07:40   | 08:22    | 08:07    |
| 60                  | 21:23 |            | 20:33      | 19:31   | 18:33    | 16:58    |
| 61                  | 06:20 |            | 07:00      |         | 08:24    | 08:31    |
| 62                  | 21:22 |            | 20:31      | 18:31   | 11       | 17:03    |
| Potential sun hours | 481   | 443        | 380        | 339     | 283      | 266      |
| Total, worst case   | 201   |            |            | 11      | 371      | 313      |
| Sun reduction       | 0.75  |            |            | 0.53    | 0.42     | 0.45     |
| Oper. time red.     | 1.00  |            |            | 1.00    | 1.00     | 1.00     |
| Wind dir. red.      | 0.63  |            |            | 0.65    | 0.65     | 0.62     |
| Total reduction     | 0.48  |            |            | 0.35    | 0.27     | 0.28     |
| Total, real         | 96    |            |            | 4       | 102      | 87       |

Table layout: For each day in each month the following matrix apply

|              |                      |                                 |                                  |
|--------------|----------------------|---------------------------------|----------------------------------|
| Day in month | Sun rise (hh:mm)     | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|              | Sun set (hh:mm)      | Last time (hh:mm) with flicker  | (WTG causing flicker last time)  |
|              | Minutes with flicker |                                 |                                  |



Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: R118 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 90.0° (107)

### Assumptions for shadow calculations

Reference year for calendar

2023

Sunshine probability S/50 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

|                     | January              | February                          | March                             | April                   | May                     | June                    | July                    | August                  | September               | October                      | November                     | December                     |
|---------------------|----------------------|-----------------------------------|-----------------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|------------------------------|------------------------------|------------------------------|
| 1                   | 08:31<br>17:04<br>23 | 15:54 (46)<br>16:17 (46)<br>17:44 | 08:37 (59)<br>08:55 (59)<br>18:26 | 07:27<br>18:26<br>20:10 | 06:31<br>20:52<br>21:30 | 05:53<br>21:30<br>21:44 | 05:52<br>21:44<br>21:20 | 06:21<br>21:20<br>20:29 | 07:01<br>19:29<br>18:30 | 07:41<br>19:29<br>09:23 (59) | 08:25<br>16:57<br>09:00 (59) | 08:08<br>16:57<br>09:00 (59) |
| 2                   | 08:31<br>17:05       | 15:55 (46)<br>16:18 (46)<br>17:46 | 08:36 (59)<br>08:56 (59)<br>18:27 | 07:25<br>20:12<br>20:53 | 06:29<br>21:31<br>21:31 | 05:53<br>21:44<br>21:19 | 05:52<br>21:44<br>21:19 | 06:22<br>20:27<br>19:27 | 07:42<br>19:27<br>18:28 | 07:42<br>19:27<br>09:25 (59) | 08:25<br>16:57<br>09:00 (59) | 08:08<br>16:57<br>09:00 (59) |
| 3                   | 08:31<br>17:06       | 15:55 (46)<br>16:18 (46)<br>17:47 | 08:35 (59)<br>08:57 (59)<br>18:29 | 07:23<br>20:13<br>20:55 | 06:27<br>21:32<br>21:32 | 05:53<br>21:44<br>21:18 | 05:53<br>21:44<br>21:18 | 06:24<br>20:25<br>19:25 | 07:44<br>19:25<br>18:27 | 07:44<br>19:25<br>09:26 (59) | 08:25<br>16:56<br>09:00 (59) | 08:08<br>16:56<br>09:00 (59) |
| 4                   | 08:31<br>17:07       | 15:56 (46)<br>16:18 (46)<br>17:49 | 08:33 (59)<br>08:57 (59)<br>18:30 | 07:21<br>20:14<br>20:56 | 06:26<br>21:33<br>21:33 | 05:53<br>21:43<br>21:16 | 05:53<br>21:43<br>21:16 | 06:25<br>20:23<br>19:23 | 07:45<br>19:23<br>18:25 | 07:45<br>19:23<br>09:26 (59) | 08:25<br>16:56<br>09:00 (59) | 08:08<br>16:56<br>09:00 (59) |
| 5                   | 08:31<br>17:08       | 15:57 (46)<br>16:17 (46)<br>17:51 | 08:32 (59)<br>08:57 (59)<br>18:32 | 07:19<br>20:16<br>20:57 | 06:24<br>21:34<br>21:34 | 05:54<br>21:43<br>21:15 | 05:54<br>21:43<br>21:15 | 06:26<br>20:21<br>19:21 | 07:46<br>19:21<br>18:26 | 07:46<br>19:21<br>09:27 (59) | 08:25<br>16:55<br>09:00 (59) | 08:08<br>16:55<br>09:00 (59) |
| 6                   | 08:30<br>17:09       | 15:58 (46)<br>16:17 (46)<br>17:52 | 08:30 (59)<br>08:57 (59)<br>18:33 | 07:18<br>20:17<br>20:59 | 06:23<br>21:34<br>21:34 | 05:55<br>21:43<br>21:14 | 05:55<br>21:43<br>21:14 | 06:27<br>20:19<br>19:19 | 07:48<br>19:19<br>18:27 | 07:48<br>19:19<br>09:28 (59) | 08:25<br>16:55<br>09:00 (59) | 08:08<br>16:55<br>09:00 (59) |
| 7                   | 08:30<br>17:10       | 15:59 (46)<br>16:17 (46)<br>17:54 | 08:29 (59)<br>08:57 (59)<br>18:35 | 07:16<br>20:19<br>21:00 | 06:21<br>21:35<br>21:42 | 05:50<br>21:42<br>21:12 | 05:50<br>21:42<br>21:12 | 06:29<br>20:17<br>19:17 | 07:49<br>19:17<br>18:27 | 07:49<br>19:17<br>09:29 (59) | 08:25<br>16:55<br>09:00 (59) | 08:08<br>16:55<br>09:00 (59) |
| 8                   | 08:30<br>17:11       | 16:01 (46)<br>16:17 (46)<br>17:55 | 08:29 (59)<br>08:56 (59)<br>18:36 | 07:14<br>20:20<br>21:01 | 06:20<br>21:36<br>21:42 | 05:50<br>21:42<br>21:11 | 05:50<br>21:42<br>21:11 | 06:30<br>20:15<br>19:15 | 07:51<br>19:15<br>18:27 | 07:51<br>19:15<br>09:30 (59) | 08:25<br>16:55<br>09:00 (59) | 08:08<br>16:55<br>09:00 (59) |
| 9                   | 08:30<br>17:12       | 16:02 (46)<br>16:16 (46)<br>17:57 | 08:30 (59)<br>08:56 (59)<br>18:38 | 07:12<br>20:21<br>21:03 | 06:18<br>21:37<br>21:42 | 05:49<br>21:42<br>21:09 | 05:49<br>21:42<br>21:09 | 06:31<br>20:13<br>19:13 | 07:52<br>19:13<br>18:27 | 07:52<br>19:13<br>09:31 (59) | 08:25<br>16:54<br>09:00 (59) | 08:08<br>16:54<br>09:00 (59) |
| 10                  | 08:29<br>17:13       | 16:04 (46)<br>16:15 (46)<br>17:58 | 08:30 (59)<br>08:55 (59)<br>18:39 | 07:10<br>20:23<br>21:04 | 06:17<br>21:38<br>21:44 | 05:49<br>21:44<br>21:08 | 05:49<br>21:44<br>21:08 | 06:33<br>20:11<br>19:11 | 07:53<br>19:11<br>18:27 | 07:53<br>19:11<br>09:32 (59) | 08:25<br>16:54<br>09:00 (59) | 08:08<br>16:54<br>09:00 (59) |
| 11                  | 08:29<br>17:15       | 16:06 (46)<br>16:13 (46)<br>18:00 | 08:31 (59)<br>08:55 (59)<br>18:41 | 07:08<br>20:24<br>21:05 | 06:15<br>21:38<br>21:40 | 05:49<br>21:40<br>21:06 | 05:49<br>21:40<br>21:06 | 06:34<br>20:09<br>19:09 | 07:55<br>19:09<br>18:27 | 07:55<br>19:09<br>09:33 (59) | 08:25<br>16:54<br>09:00 (59) | 08:08<br>16:54<br>09:00 (59) |
| 12                  | 08:29<br>17:16       | 16:06 (46)<br>16:14 (46)<br>18:01 | 08:32 (59)<br>08:54 (59)<br>18:42 | 07:05<br>20:26<br>21:07 | 06:14<br>21:39<br>21:41 | 05:49<br>21:41<br>21:04 | 05:49<br>21:41<br>21:04 | 06:35<br>20:07<br>19:07 | 07:56<br>19:07<br>18:27 | 07:56<br>19:07<br>09:34 (59) | 08:25<br>16:54<br>09:00 (59) | 08:08<br>16:54<br>09:00 (59) |
| 13                  | 08:28<br>17:17       | 16:07 (46)<br>16:15 (46)<br>18:02 | 08:33 (59)<br>08:52 (59)<br>19:43 | 07:03<br>20:27<br>21:08 | 06:13<br>21:39<br>21:41 | 05:48<br>21:41<br>21:03 | 05:48<br>21:41<br>21:03 | 06:36<br>20:05<br>19:05 | 07:57<br>19:05<br>18:27 | 07:57<br>19:05<br>09:35 (59) | 08:25<br>16:54<br>09:00 (59) | 08:08<br>16:54<br>09:00 (59) |
| 14                  | 08:28<br>17:18       | 16:08 (46)<br>16:16 (46)<br>18:03 | 08:34 (59)<br>08:51 (59)<br>19:45 | 07:01<br>20:28<br>21:09 | 06:11<br>21:40<br>21:41 | 05:48<br>21:41<br>21:03 | 05:48<br>21:41<br>21:03 | 06:37<br>20:04<br>19:04 | 07:58<br>19:04<br>18:27 | 07:58<br>19:04<br>09:36 (59) | 08:25<br>16:54<br>09:00 (59) | 08:08<br>16:54<br>09:00 (59) |
| 15                  | 08:27<br>17:20       | 16:09 (46)<br>16:17 (46)<br>18:04 | 08:35 (59)<br>08:50 (59)<br>19:46 | 07:00<br>20:29<br>21:10 | 06:10<br>21:41<br>21:42 | 05:48<br>21:42<br>21:04 | 05:48<br>21:42<br>21:04 | 06:38<br>20:01<br>19:01 | 07:59<br>19:01<br>18:27 | 07:59<br>19:01<br>09:37 (59) | 08:25<br>16:54<br>09:00 (59) | 08:08<br>16:54<br>09:00 (59) |
| 16                  | 08:26<br>17:21       | 16:10 (46)<br>16:18 (46)<br>18:05 | 08:36 (59)<br>08:49 (59)<br>19:47 | 06:59<br>20:30<br>21:11 | 06:09<br>21:42<br>21:43 | 05:48<br>21:43<br>21:05 | 05:48<br>21:43<br>21:05 | 06:39<br>20:00<br>19:00 | 08:00<br>19:00<br>18:27 | 08:00<br>19:00<br>09:38 (59) | 08:25<br>16:54<br>09:00 (59) | 08:08<br>16:54<br>09:00 (59) |
| 17                  | 08:26<br>17:22       | 16:11 (46)<br>16:19 (46)<br>18:06 | 08:37 (59)<br>08:48 (59)<br>19:48 | 06:58<br>20:31<br>21:12 | 06:08<br>21:43<br>21:44 | 05:48<br>21:44<br>21:06 | 05:48<br>21:44<br>21:06 | 06:40<br>20:00<br>19:00 | 08:01<br>19:00<br>18:27 | 08:01<br>19:00<br>09:39 (59) | 08:25<br>16:54<br>09:00 (59) | 08:08<br>16:54<br>09:00 (59) |
| 18                  | 08:25<br>17:23       | 16:12 (46)<br>16:20 (46)<br>18:07 | 08:38 (59)<br>08:47 (59)<br>19:49 | 06:57<br>20:32<br>21:13 | 06:07<br>21:44<br>21:45 | 05:48<br>21:45<br>21:07 | 05:48<br>21:45<br>21:07 | 06:41<br>20:00<br>19:00 | 08:02<br>19:00<br>18:27 | 08:02<br>19:00<br>09:40 (59) | 08:25<br>16:54<br>09:00 (59) | 08:08<br>16:54<br>09:00 (59) |
| 19                  | 08:24<br>17:24       | 16:13 (46)<br>16:21 (46)<br>18:08 | 08:39 (59)<br>08:46 (59)<br>19:50 | 06:56<br>20:33<br>21:14 | 06:06<br>21:45<br>21:46 | 05:48<br>21:46<br>21:08 | 05:48<br>21:46<br>21:08 | 06:42<br>20:00<br>19:00 | 08:03<br>19:00<br>18:27 | 08:03<br>19:00<br>09:41 (59) | 08:25<br>16:54<br>09:00 (59) | 08:08<br>16:54<br>09:00 (59) |
| 20                  | 08:24<br>17:25       | 16:14 (46)<br>16:22 (46)<br>18:09 | 08:40 (59)<br>08:45 (59)<br>19:51 | 06:55<br>20:34<br>21:15 | 06:05<br>21:46<br>21:47 | 05:48<br>21:47<br>21:09 | 05:48<br>21:47<br>21:09 | 06:43<br>20:00<br>19:00 | 08:04<br>19:00<br>18:27 | 08:04<br>19:00<br>09:42 (59) | 08:25<br>16:54<br>09:00 (59) | 08:08<br>16:54<br>09:00 (59) |
| 21                  | 08:23<br>17:26       | 16:15 (46)<br>16:23 (46)<br>18:10 | 08:41 (59)<br>08:44 (59)<br>19:52 | 06:54<br>20:35<br>21:16 | 06:04<br>21:47<br>21:48 | 05:48<br>21:48<br>21:10 | 05:48<br>21:48<br>21:10 | 06:44<br>20:00<br>19:00 | 08:05<br>19:00<br>18:27 | 08:05<br>19:00<br>09:43 (59) | 08:25<br>16:54<br>09:00 (59) | 08:08<br>16:54<br>09:00 (59) |
| 22                  | 08:23<br>17:27       | 16:16 (46)<br>16:24 (46)<br>18:11 | 08:42 (59)<br>08:43 (59)<br>19:53 | 06:53<br>20:36<br>21:17 | 06:03<br>21:48<br>21:49 | 05:48<br>21:49<br>21:11 | 05:48<br>21:49<br>21:11 | 06:45<br>20:00<br>19:00 | 08:06<br>19:00<br>18:27 | 08:06<br>19:00<br>09:44 (59) | 08:25<br>16:54<br>09:00 (59) | 08:08<br>16:54<br>09:00 (59) |
| 23                  | 08:23<br>17:28       | 16:17 (46)<br>16:25 (46)<br>18:12 | 08:43 (59)<br>08:44 (59)<br>19:54 | 06:52<br>20:37<br>21:18 | 06:02<br>21:49<br>21:50 | 05:48<br>21:50<br>21:12 | 05:48<br>21:50<br>21:12 | 06:46<br>20:00<br>19:00 | 08:07<br>19:00<br>18:27 | 08:07<br>19:00<br>09:45 (59) | 08:25<br>16:54<br>09:00 (59) | 08:08<br>16:54<br>09:00 (59) |
| 24                  | 08:22<br>17:29       | 16:18 (46)<br>16:26 (46)<br>18:13 | 08:44 (59)<br>08:45 (59)<br>19:55 | 06:51<br>20:38<br>21:19 | 06:01<br>21:50<br>21:51 | 05:48<br>21:51<br>21:13 | 05:48<br>21:51<br>21:13 | 06:47<br>20:00<br>19:00 | 08:08<br>19:00<br>18:27 | 08:08<br>19:00<br>09:46 (59) | 08:25<br>16:54<br>09:00 (59) | 08:08<br>16:54<br>09:00 (59) |
| 25                  | 08:22<br>17:30       | 16:19 (46)<br>16:27 (46)<br>18:14 | 08:45 (59)<br>08:46 (59)<br>19:56 | 06:50<br>20:39<br>21:20 | 06:00<br>21:51<br>21:52 | 05:48<br>21:52<br>21:14 | 05:48<br>21:52<br>21:14 | 06:48<br>20:00<br>19:00 | 08:09<br>19:00<br>18:27 | 08:09<br>19:00<br>09:47 (59) | 08:25<br>16:54<br>09:00 (59) | 08:08<br>16:54<br>09:00 (59) |
| 26                  | 08:21<br>17:31       | 16:20 (46)<br>16:28 (46)<br>18:15 | 08:46 (59)<br>08:47 (59)<br>19:57 | 06:49<br>20:40<br>21:21 | 05:59<br>21:52<br>21:53 | 05:48<br>21:53<br>21:15 | 05:48<br>21:53<br>21:15 | 06:49<br>20:00<br>19:00 | 08:10<br>19:00<br>18:27 | 08:10<br>19:00<br>09:48 (59) | 08:25<br>16:54<br>09:00 (59) | 08:08<br>16:54<br>09:00 (59) |
| 27                  | 08:21<br>17:32       | 16:21 (46)<br>16:29 (46)<br>18:16 | 08:47 (59)<br>08:48 (59)<br>19:58 | 06:48<br>20:41<br>21:22 | 05:58<br>21:53<br>21:54 | 05:48<br>21:54<br>21:16 | 05:48<br>21:54<br>21:16 | 06:50<br>20:00<br>19:00 | 08:11<br>19:00<br>18:27 | 08:11<br>19:00<br>09:49 (59) | 08:25<br>16:54<br>09:00 (59) | 08:08<br>16:54<br>09:00 (59) |
| 28                  | 08:20<br>17:33       | 16:22 (46)<br>16:30 (46)<br>18:17 | 08:48 (59)<br>08:49 (59)<br>19:59 | 06:47<br>20:42<br>21:23 | 05:57<br>21:54<br>21:55 | 05:48<br>21:55<br>21:17 | 05:48<br>21:55<br>21:17 | 06:51<br>20:00<br>19:00 | 08:12<br>19:00<br>18:27 | 08:12<br>19:00<br>09:50 (59) | 08:25<br>16:54<br>09:00 (59) | 08:08<br>16:54<br>09:00 (59) |
| 29                  | 08:20<br>17:34       | 16:23 (46)<br>16:31 (46)<br>18:18 | 08:49 (59)<br>08:50 (59)<br>20:00 | 06:46<br>20:43<br>21:24 | 05:56<br>21:55<br>21:56 | 05:48<br>21:56<br>21:18 | 05:48<br>21:56<br>21:18 | 06:52<br>20:00<br>19:00 | 08:13<br>19:00<br>18:27 | 08:13<br>19:00<br>09:51 (59) | 08:25<br>16:54<br>09:00 (59) | 08:08<br>16:54<br>09:00 (59) |
| 30                  | 08:19<br>17:35       | 16:24 (46)<br>16:32 (46)<br>18:19 | 08:50 (59)<br>08:51 (59)<br>20:01 | 06:45<br>20:44<br>21:25 | 05:55<br>21:56<br>21:57 | 05:48<br>21:57<br>21:19 | 05:48<br>21:57<br>21:19 | 06:53<br>20:00<br>19:00 | 08:14<br>19:00<br>18:27 | 08:14<br>19:00<br>09:52 (59) | 08:25<br>16:54<br>09:00 (59) | 08:08<br>16:54<br>09:00 (59) |
| 31                  | 08:19<br>17:36       | 16:25 (46)<br>16:33 (46)<br>18:20 | 08:51 (59)<br>08:52 (59)<br>20:02 | 06:44<br>20:45<br>21:26 | 05:54<br>21:57<br>21:58 | 05:48<br>21:58<br>21:20 | 05:48<br>21:58<br>21:20 | 06:54<br>20:00<br>19:00 | 08:15<br>19:00<br>18:27 | 08:15<br>19:00<br>09:53 (59) | 08:25<br>16:54<br>09:00 (59) | 08:08<br>16:54<br>09:00 (59) |
| Potential sun hours | 278                  | 286                               | 367                               | 406                     | 466                     | 475                     | 481                     | 443                     | 380                     | 339                          | 283                          | 266                          |
| Total, worst case   | 262                  | 333                               |                                   |                         |                         |                         |                         |                         |                         |                              | 347                          | 663                          |
| Sun reduction       | 0.54                 | 0.52                              |                                   |                         |                         |                         |                         |                         |                         |                              | 0.53                         | 0.45                         |
| Oper. time red.     | 1.00                 | 1.00                              |                                   |                         |                         |                         |                         |                         |                         |                              | 1.00                         | 1.00                         |
| Wind dir. red.      | 0.63                 | 0.66                              |                                   |                         |                         |                         |                         |                         |                         |                              | 0.66                         | 0.62                         |
| Total reduction     | 0.34                 | 0.34                              |                                   |                         |                         |                         |                         |                         |                         |                              | 0.35                         | 0.28                         |
| Total, real         | 89                   | 114                               |                                   |                         |                         |                         |                         |                         |                         |                              | 96                           | 184                          |

Table layout: For each day in each month the following matrix apply

|              |                  |                                 |                                  |
|--------------|------------------|---------------------------------|----------------------------------|
| Day in month | Sun rise (hh:mm) | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|              | Sun set (hh:mm)  | Minutes with flicker            | Last time (hh:mm) with flicker   |
|              |                  |                                 | (WTG causing flicker last time)  |

Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: R119 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (108)

## Assumptions for shadow calculations

Reference year for calendar

2023

Sunshine probability S/50 (Sun hours/Possible sun hours) []

| Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  |
|------|------|------|------|------|------|------|------|------|------|------|------|
| 0.54 | 0.52 | 0.61 | 0.58 | 0.64 | 0.67 | 0.75 | 0.72 | 0.67 | 0.53 | 0.42 | 0.45 |

Operational time

| N   | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW | NW  | NNW | Sum   |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| 376 | 314 | 339 | 425 | 445 | 474 | 693 | 570 | 488 | 386 | 872 | 609 | 772 | 651 | 677 | 667 | 8,758 |

|                     |       | January    | February | March | April | May   | June  | July       | August     | September  | October    | November | December |            |            |            |
|---------------------|-------|------------|----------|-------|-------|-------|-------|------------|------------|------------|------------|----------|----------|------------|------------|------------|
| 1                   | 08:31 | 09:00 (59) | 08:11    | 07:27 | 07:26 | 06:31 | 05:53 | 20:48 (47) | 05:52      | 20:53 (47) | 06:21      | 07:01    | 08:25    | 08:08      | 08:38 (59) |            |
| 17:04               | 45    | 16:36 (46) | 17:44    | 18:26 | 20:10 | 20:52 | 21:30 | 17         | 21:05 (47) | 21:44      | 21:20      | 20:29    | 18:30    | 16:57      | 56         | 16:26 (46) |
| 2                   | 08:31 | 09:00 (59) | 08:10    | 07:25 | 07:24 | 06:29 | 05:53 | 20:48 (47) | 05:52      | 20:54 (47) | 06:22      | 07:03    | 08:27    | 08:09      | 08:39 (59) |            |
| 17:05               | 45    | 16:37 (46) | 17:46    | 18:27 | 20:12 | 20:53 | 21:31 | 18         | 21:06 (47) | 21:44      | 21:19      | 20:27    | 18:28    | 16:57      | 55         | 16:26 (46) |
| 3                   | 08:31 | 09:00 (59) | 08:09    | 07:23 | 07:22 | 06:27 | 05:52 | 20:47 (47) | 05:53      | 20:53 (47) | 06:24      | 07:04    | 08:28    | 08:10      | 08:40 (59) |            |
| 17:06               | 48    | 16:39 (46) | 17:47    | 18:29 | 20:13 | 20:55 | 21:32 | 19         | 21:06 (47) | 21:44      | 21:18      | 20:25    | 18:27    | 16:56      | 55         | 16:27 (46) |
| 4                   | 08:31 | 09:00 (59) | 08:08    | 07:21 | 07:20 | 06:26 | 05:51 | 20:48 (47) | 05:53      | 20:54 (47) | 06:25      | 07:05    | 08:30    | 08:12      | 08:42 (59) |            |
| 17:07               | 49    | 16:40 (46) | 17:49    | 18:30 | 20:14 | 20:56 | 21:33 | 19         | 21:07 (47) | 21:43      | 21:17      | 20:23    | 18:25    | 16:56      | 54         | 16:28 (46) |
| 5                   | 08:31 | 08:59 (59) | 08:06    | 07:19 | 07:18 | 06:24 | 05:51 | 20:47 (47) | 05:54      | 20:54 (47) | 06:26      | 07:07    | 08:31    | 08:13      | 08:43 (59) |            |
| 17:08               | 49    | 16:40 (46) | 17:51    | 18:32 | 20:16 | 20:57 | 21:34 | 21         | 21:08 (47) | 21:43      | 21:17      | 20:21    | 18:27    | 16:55      | 53         | 16:28 (46) |
| 6                   | 08:30 | 08:59 (59) | 08:05    | 07:18 | 07:16 | 06:23 | 05:50 | 20:48 (47) | 05:55      | 20:54 (47) | 06:27      | 07:08    | 08:32    | 08:14      | 08:44 (59) |            |
| 17:09               | 51    | 16:41 (46) | 17:52    | 18:33 | 20:17 | 20:59 | 21:34 | 21         | 21:09 (47) | 21:43      | 21:15      | 20:21    | 18:27    | 16:55      | 54         | 16:29 (46) |
| 7                   | 08:30 | 08:59 (59) | 08:03    | 07:16 | 07:14 | 06:21 | 05:50 | 20:48 (47) | 05:55      | 20:54 (47) | 06:29      | 07:09    | 08:34    | 08:15      | 08:45 (59) |            |
| 17:10               | 53    | 16:43 (46) | 17:54    | 18:35 | 20:19 | 21:00 | 21:35 | 22         | 21:10 (47) | 21:42      | 21:12      | 20:17    | 18:21    | 16:55      | 52         | 16:28 (46) |
| 8                   | 08:30 | 08:58 (59) | 08:02    | 07:14 | 07:12 | 06:20 | 05:50 | 20:48 (47) | 05:56      | 20:55 (47) | 06:30      | 07:11    | 08:36    | 08:16      | 08:46 (59) |            |
| 17:11               | 54    | 16:43 (46) | 17:55    | 18:36 | 20:20 | 21:01 | 21:36 | 22         | 21:10 (47) | 21:42      | 21:11      | 20:15    | 18:21    | 16:55      | 51         | 16:28 (46) |
| 9                   | 08:30 | 08:58 (59) | 08:01    | 07:12 | 07:10 | 06:18 | 05:49 | 20:48 (47) | 05:57      | 20:54 (47) | 06:31      | 07:12    | 08:37    | 08:17      | 08:47 (59) |            |
| 17:12               | 55    | 16:44 (46) | 17:57    | 18:38 | 20:21 | 21:03 | 21:37 | 23         | 21:11 (47) | 21:42      | 21:14      | 20:19    | 18:23    | 16:54      | 50         | 16:28 (46) |
| 10                  | 08:29 | 08:58 (59) | 07:59    | 07:10 | 07:08 | 06:17 | 05:49 | 20:49 (47) | 05:58      | 20:55 (47) | 06:33      | 07:13    | 08:38    | 08:18      | 08:48 (59) |            |
| 17:13               | 55    | 16:44 (46) | 17:58    | 18:39 | 20:23 | 21:04 | 21:37 | 23         | 21:12 (47) | 21:41      | 21:14      | 20:18    | 18:21    | 16:54      | 47         | 16:27 (46) |
| 11                  | 08:29 | 08:57 (59) | 07:58    | 07:08 | 07:06 | 06:15 | 05:49 | 20:49 (47) | 05:59      | 20:55 (47) | 06:34      | 07:14    | 08:39    | 08:19      | 08:49 (59) |            |
| 17:15               | 56    | 16:44 (46) | 18:00    | 18:41 | 20:24 | 21:05 | 21:38 | 24         | 21:13 (47) | 21:39      | 21:16      | 20:09    | 18:26    | 16:54      | 47         | 16:27 (46) |
| 12                  | 08:29 | 08:57 (59) | 07:56    | 08:06 | 07:05 | 06:14 | 05:48 | 20:49 (47) | 05:59      | 20:55 (47) | 06:35      | 07:16    | 08:41    | 08:20      | 08:50 (59) |            |
| 17:16               | 55    | 16:44 (46) | 18:00    | 18:42 | 20:26 | 21:07 | 21:39 | 23         | 21:12 (47) | 21:40      | 21:14      | 20:07    | 18:21    | 16:54      | 46         | 16:27 (46) |
| 13                  | 08:28 | 08:56 (59) | 07:54    | 08:04 | 07:03 | 06:13 | 05:48 | 20:49 (47) | 06:00      | 20:56 (47) | 06:36      | 07:17    | 08:42    | 08:21      | 08:51 (59) |            |
| 17:17               | 55    | 16:44 (46) | 18:01    | 19:43 | 20:27 | 21:08 | 21:39 | 24         | 21:13 (47) | 21:39      | 21:13      | 21:03    | 20:05    | 17:13      | 8          | 08:45 (59) |
| 14                  | 08:28 | 08:55 (59) | 07:53    | 08:02 | 07:01 | 06:11 | 05:48 | 20:50 (47) | 06:01      | 20:56 (47) | 06:38      | 07:18    | 08:43    | 08:22      | 08:52 (59) |            |
| 17:18               | 55    | 16:43 (46) | 18:03    | 19:45 | 20:28 | 21:09 | 21:40 | 24         | 21:14 (47) | 21:39      | 21:13      | 21:03    | 20:03    | 17:12      | 14         | 08:55 (59) |
| 15                  | 08:27 | 08:56 (59) | 07:51    | 08:00 | 06:59 | 06:10 | 05:48 | 20:50 (47) | 06:02      | 20:56 (47) | 06:39      | 07:20    | 08:46    | 08:23      | 08:53 (59) |            |
| 17:20               | 54    | 16:44 (46) | 18:05    | 19:46 | 20:30 | 21:10 | 21:41 | 24         | 21:14 (47) | 21:38      | 21:11      | 20:04    | 20:07    | 17:11      | 18         | 08:58 (59) |
| 16                  | 08:26 | 08:56 (59) | 07:50    | 07:58 | 06:57 | 06:09 | 05:48 | 20:50 (47) | 06:03      | 20:56 (47) | 06:40      | 07:21    | 08:47    | 08:24      | 08:54 (59) |            |
| 17:21               | 52    | 16:43 (46) | 18:06    | 19:48 | 20:31 | 21:12 | 21:41 | 25         | 21:15 (47) | 21:37      | 21:10      | 20:08    | 18:57    | 17:10      | 21         | 09:00 (59) |
| 17                  | 08:26 | 08:56 (59) | 07:48    | 07:56 | 06:55 | 06:08 | 05:48 | 20:50 (47) | 06:04      | 20:57 (47) | 06:42      | 07:22    | 08:03    | 07:49      | 08:37 (59) |            |
| 17:22               | 51    | 16:43 (46) | 18:08    | 19:49 | 20:32 | 21:13 | 21:42 | 25         | 21:15 (47) | 21:36      | 21:10      | 20:07    | 18:56    | 17:08      | 24         | 09:01 (59) |
| 18                  | 08:25 | 08:57 (59) | 07:46    | 07:54 | 06:53 | 06:06 | 05:48 | 20:51 (47) | 06:05      | 20:57 (47) | 06:43      | 07:24    | 08:05    | 07:50      | 08:37 (59) |            |
| 17:24               | 48    | 16:42 (46) | 18:09    | 19:51 | 20:34 | 21:14 | 21:42 | 24         | 21:15 (47) | 21:36      | 21:09      | 20:04    | 19:55    | 17:54      | 26         | 09:03 (59) |
| 19                  | 08:24 | 08:58 (59) | 07:45    | 07:52 | 06:51 | 06:05 | 05:48 | 20:51 (47) | 06:06      | 20:58 (47) | 06:44      | 07:25    | 08:06    | 07:52      | 08:36 (59) |            |
| 17:25               | 44    | 16:41 (46) | 18:11    | 19:52 | 20:35 | 21:15 | 21:42 | 25         | 21:16 (47) | 21:35      | 21:08      | 20:04    | 19:53    | 18:52      | 27         | 09:03 (59) |
| 20                  | 08:24 | 08:59 (59) | 07:43    | 07:50 | 06:50 | 06:04 | 05:48 | 20:51 (47) | 06:07      | 20:58 (47) | 06:46      | 07:26    | 08:08    | 07:53      | 08:36 (59) |            |
| 17:27               | 39    | 16:39 (46) | 18:12    | 19:53 | 20:37 | 21:17 | 21:43 | 25         | 21:16 (47) | 21:34      | 21:07      | 20:01    | 19:51    | 18:50      | 29         | 09:05 (59) |
| 21                  | 08:23 | 08:59 (59) | 07:41    | 07:48 | 06:48 | 06:03 | 05:48 | 20:52 (47) | 06:08      | 20:59 (47) | 06:47      | 07:28    | 08:09    | 07:55      | 08:35 (59) |            |
| 17:28               | 32    | 09:31 (59) | 18:14    | 19:55 | 20:38 | 21:18 | 2     | 20:54 (47) | 21:43      | 25         | 21:17 (47) | 21:33    | 8        | 21:07 (47) | 20:49      | 19:49      |
| 22                  | 08:22 | 09:00 (59) | 07:40    | 07:46 | 06:46 | 06:02 | 05:48 | 20:52 (47) | 06:09      | 20:52 (47) | 06:48      | 07:29    | 08:10    | 07:56      | 08:35 (59) |            |
| 17:29               | 31    | 09:31 (59) | 18:15    | 19:56 | 20:39 | 21:19 | 4     | 20:55 (47) | 21:43      | 25         | 21:17 (47) | 21:32    | 6        | 21:06 (47) | 20:47      | 19:47      |
| 23                  | 08:21 | 09:01 (59) | 07:38    | 07:44 | 06:44 | 06:01 | 05:48 | 20:50 (47) | 06:11      | 21:01 (47) | 06:50      | 07:30    | 08:12    | 07:57      | 08:35 (59) |            |
| 17:31               | 29    | 09:30 (59) | 18:17    | 19:58 | 20:41 | 21:20 | 6     | 20:56 (47) | 21:44      | 25         | 21:17 (47) | 21:31    | 4        | 21:05 (47) | 20:46      | 19:45      |
| 24                  | 08:20 | 09:02 (59) | 07:36    | 07:42 | 06:42 | 06:00 | 05:48 | 20:49 (47) | 06:12      | 20:52 (47) | 06:51      | 07:32    | 08:13    | 07:59      | 08:35 (59) |            |
| 17:32               | 28    | 09:30 (59) | 18:18    | 19:59 | 20:42 | 21:21 | 8     | 20:57 (47) | 21:44      | 25         | 21:17 (47) | 21:30    | 2        | 21:04 (47) | 20:44      | 19:43      |
| 25                  | 08:19 | 09:03 (59) | 07:34    | 07:40 | 06:41 | 05:59 | 05:48 | 20:49 (47) | 06:13      | 20:53 (47) | 06:13      | 06:52    | 07:33    | 08:15      | 08:00      | 08:35 (59) |
| 17:34               | 27    | 09:30 (59) | 18:20    | 20:00 | 20:44 | 21:23 | 9     | 20:58 (47) | 21:44      | 25         | 21:18 (47) | 21:29    | 20:42    | 19:41      | 18:41      | 17:01      |
| 26                  | 08:18 | 09:04 (59) | 07:32    | 07:38 | 06:39 | 05:58 | 05:48 | 20:49 (47) | 06:14      | 20:53 (47) | 06:14      | 06:54    | 07:34    | 08:16      | 08:02      | 08:35 (59) |
| 17:35               | 25    | 09:29 (59) | 18:21    | 20:02 | 20:45 | 21:24 | 10    | 20:59 (47) | 21:44      | 24         | 21:17 (47) | 21:28    | 20:40    | 19:39      | 18:40      | 17:00      |
| 27                  | 08:17 | 09:05 (59) | 07:31    | 07:36 | 06:37 | 05:57 | 05:48 | 20:48 (47) | 06:15      | 20:52 (47) | 06:15      | 06:55    | 07:36    | 08:18      | 08:03      | 08:35 (59) |
| 17:37               | 22    | 09:27 (59) | 18:23    | 20:03 | 20:46 | 21:25 | 12    | 21:00 (47) | 21:44      | 25         | 21:17 (47) | 21:27    | 20:38    | 19:37      | 18:38      | 17:00      |
| 28                  | 08:16 | 09:06 (59) | 07:29    | 07:34 | 06:36 | 05:56 | 05:48 | 20:48 (47) | 06:16      | 20:53 (47) | 06:16      | 06:56    | 07:37    | 08:19      | 08:04      | 08:36 (59) |
| 17:38               | 20    | 09:26 (59) | 18:24    | 20:05 | 20:48 | 21:26 | 13    | 21:01 (47) | 21:44      | 25         | 21:18 (47) | 21:25    | 20:36    | 19:35      | 18:36      | 16:59      |
| 29                  | 08:15 | 09:08 (59) | 07:28    | 07:32 | 06:34 | 05:55 | 05:48 | 20:47 (47) | 06:18      | 20:53 (47) | 06:18      | 06:57    | 07:38    | 08:21      | 08:05      | 08:36 (59) |
| 17:40               | 17    | 09:25 (59) | 18:22    | 20:06 | 20:49 | 21:27 | 14    | 21:01 (47) | 21:44      | 24         | 21:17 (47) | 21:24    | 20:34    | 19:33      | 18:35      | 16:58      |
| 30                  | 08:14 | 09:11 (59) | 07:27    | 07:30 | 06:32 | 05:55 | 05:48 | 20:48 (47) | 06:19      | 20:54 (47) | 06:19      | 06:59    | 07:40    | 08:22      | 08:07      | 08:36 (59) |
| 17:41               | 12    | 09:23 (59) | 18:23    | 20:07 | 20:50 | 21:28 | 15    | 21:03 (47) | 21:44      | 24         | 21:18 (47) | 21:23    | 20:33    | 19:31      | 18:33      | 16:58      |
| 31                  | 08:13 | 09:13 (59) | 07:28    | 07:32 | 06:34 | 05:55 | 05:48 | 20:47 (47) | 06:20      | 20:54 (47) | 06:20      | 07:00    | 07:40    | 08:24      | 08:09      | 08:39 (59) |
| 17:43               | 17    | 09:24 (59) | 18:24    | 20:08 | 20:51 | 21:29 | 17    | 21:04 (47) | 21:44      | 24         | 21:18 (47) | 21:23    | 20:33    | 19:31      | 18:33      | 16:58      |
| Potential sun hours | 278   |            | 286      | 367   | 406   | 466   | 475   | 481        | 443        | 380        | 339        | 283      | 266      | 1402       | 402        |            |
| Total, worst case   | 1256  |            |          |       |       | 110   | 695   | 386        |            |            |            | 611      | 642      | 1000       | 0.45       |            |
| Sun reduction       | 0.54  |            |          |       |       | 0.64  | 0.67  | 0.75       |            |            |            | 0.62     | 0.65     | 1.00       | 0.45       |            |
| Oper. time red.     | 1.00  |            |          |       |       | 1.00  | 1.00  | 1.00       |            |            |            | 1.00     | 1.00     | 1.00       | 1.00       |            |
| Wind dir. red.      | 0.6   |            |          |       |       | 0.66  | 0.66  | 0.66       |            |            |            | 0.66     | 0.66     | 0.66       | 0.64       |            |
| Total reduction     | 0.35  |            |          |       |       | 0.42  | 0.44  | 0.49       |            |            |            | 0.67     | 0.67     | 0.29       | 0.29       |            |
| Total, real         | 435   |            |          |       |       | 46    | 306   | 190        |            |            |            | 126      | 126      | 402        | 402        |            |



Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Assumptions for shadow calculations

Reference year for calendar

Shadow receptor: R120 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 90.0° (109)

Sunshine probability S/50 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

| N   | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW | NW  | NNW | Sum   |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| 376 | 314 | 339 | 425 | 445 | 474 | 693 | 570 | 488 | 386 | 872 | 609 | 772 | 651 | 677 | 667 | 8,758 |

|                     | January | February |     | March      | April | May   |            | June       |            | July       |            | August     | September  | October    |            | November | December   |            |            |       |  |     |  |
|---------------------|---------|----------|-----|------------|-------|-------|------------|------------|------------|------------|------------|------------|------------|------------|------------|----------|------------|------------|------------|-------|--|-----|--|
| 1                   | 08:31   | 08:11    |     | 07:27      | 07:26 | 06:30 |            | 05:53      |            | 20:43 (60) | 05:51      | 20:50 (60) | 06:21      | 07:01      | 07:41      | 08:25    | 17:43 (59) | 08:08      |            |       |  |     |  |
| 2                   | 17:04   | 17:44    |     | 18:26      | 20:10 | 20:52 |            | 21:30      | 21         | 21:04 (60) | 21:43      | 21:15 (60) | 21:20      | 20:29      | 19:29      | 18:30    | 23         | 18:06 (59) | 16:57      |       |  |     |  |
| 3                   | 08:31   | 08:10    |     | 07:25      | 07:24 | 06:29 |            | 05:53      | 22         | 21:06 (60) | 05:52      | 20:50 (60) | 06:22      | 07:03      | 07:42      | 08:26    |            | 17:43 (59) | 08:09      |       |  |     |  |
| 4                   | 17:05   | 17:46    |     | 18:27      | 20:12 | 20:53 |            | 21:31      | 22         | 21:06 (60) | 21:44      | 21:16 (60) | 21:19      | 20:27      | 19:27      | 18:28    | 22         | 18:05 (59) | 16:57      |       |  |     |  |
| 5                   | 08:31   | 08:09    |     | 07:23      | 07:22 | 06:27 |            | 05:52      | 23         | 21:06 (60) | 05:53      | 20:50 (60) | 06:24      | 07:04      | 07:44      | 08:28    |            | 17:44 (59) | 08:10      |       |  |     |  |
| 6                   | 17:06   | 17:47    | 2   | 17:22 (59) | 18:29 | 20:13 | 20:54      | 21:32      | 23         | 21:06 (60) | 21:43      | 21:15 (60) | 21:25      | 20:25      | 19:25      | 18:27    | 19         | 18:03 (59) | 16:56      |       |  |     |  |
| 7                   | 08:31   | 08:07    |     | 17:19 (59) | 07:21 | 07:20 | 06:26      | 05:51      | 24         | 21:06 (60) | 05:53      | 20:50 (60) | 06:25      | 07:05      | 07:45      | 08:29    |            | 17:44 (59) | 08:12      |       |  |     |  |
| 8                   | 17:07   | 17:49    | 5   | 17:24 (59) | 18:30 | 20:16 | 20:56      | 21:33      | 23         | 21:07 (60) | 21:43      | 21:16 (60) | 21:16      | 20:23      | 19:23      | 18:25    | 17         | 18:01 (59) | 16:56      |       |  |     |  |
| 9                   | 08:30   | 08:06    |     | 17:18 (59) | 07:19 | 07:18 | 06:24      | 05:51      | 24         | 21:04 (60) | 05:54      | 20:50 (60) | 06:26      | 07:07      | 07:46      | 07:31    |            | 16:45 (59) | 08:13      |       |  |     |  |
| 10                  | 17:08   | 17:50    | 8   | 17:26 (59) | 18:32 | 20:16 | 20:57      | 21:33      | 24         | 21:08 (60) | 21:43      | 21:16 (60) | 21:15      | 20:21      | 19:21      | 17:24    | 15         | 17:00 (59) | 16:55      |       |  |     |  |
| 11                  | 08:30   | 08:05    |     | 17:16 (59) | 07:17 | 07:16 | 06:23      | 05:50      | 24         | 21:04 (60) | 05:55      | 20:50 (60) | 06:27      | 07:08      | 07:48      | 07:32    |            | 16:46 (59) | 08:14      |       |  |     |  |
| 12                  | 17:09   | 17:52    | 12  | 17:28 (59) | 18:33 | 20:17 | 20:59      | 21:34      | 25         | 21:09 (60) | 21:43      | 21:16 (60) | 21:13      | 20:19      | 19:19      | 17:22    | 12         | 16:58 (59) | 16:55      |       |  |     |  |
| 13                  | 08:30   | 08:03    |     | 17:16 (59) | 07:21 | 07:20 | 06:21      | 05:50      | 25         | 21:04 (60) | 05:54      | 20:51 (60) | 06:29      | 07:09      | 07:49      | 07:33    |            | 16:47 (59) | 08:15      |       |  |     |  |
| 14                  | 17:10   | 17:54    | 14  | 17:30 (59) | 18:35 | 20:19 | 21:00      | 21:35      | 25         | 21:10 (60) | 21:42      | 21:16 (60) | 21:12      | 20:17      | 19:17      | 17:21    | 10         | 16:57 (59) | 16:55      |       |  |     |  |
| 15                  | 08:30   | 08:02    |     | 17:15 (59) | 07:14 | 07:12 | 06:20      | 05:49      | 26         | 21:04 (60) | 05:56      | 20:51 (60) | 06:30      | 07:10      | 07:50      | 07:35    |            | 16:49 (59) | 08:16      |       |  |     |  |
| 16                  | 17:11   | 17:55    | 16  | 17:31 (59) | 18:36 | 20:20 | 21:01      | 21:36      | 26         | 21:10 (60) | 21:42      | 21:15 (60) | 21:21      | 20:15      | 19:15      | 17:19    | 7          | 16:56 (59) | 16:55      |       |  |     |  |
| 17                  | 08:30   | 08:00    |     | 17:15 (59) | 07:12 | 07:10 | 06:18      | 05:49      | 26         | 21:05 (60) | 05:57      | 20:51 (60) | 06:31      | 07:12      | 07:52      | 07:37    |            | 16:50 (59) | 08:17      |       |  |     |  |
| 18                  | 17:12   | 17:57    | 18  | 17:33 (59) | 18:38 | 20:21 | 21:03      | 21:37      | 26         | 21:11 (60) | 21:43      | 21:14 (60) | 21:09      | 20:13      | 19:13      | 17:18    | 4          | 16:54 (59) | 16:54      |       |  |     |  |
| 19                  | 08:29   | 07:59    | 10  | 17:14 (59) | 07:17 | 07:16 | 06:17      | 05:49      | 27         | 21:05 (60) | 05:58      | 20:51 (60) | 06:32      | 07:17      | 07:53      | 07:38    |            | 16:52 (59) | 08:18      |       |  |     |  |
| 20                  | 17:13   | 17:58    | 20  | 17:34 (59) | 18:39 | 20:23 | 21:04      | 21:37      | 26         | 21:11 (60) | 21:41      | 21:14 (60) | 21:07      | 20:11      | 19:11      | 17:17    | 1          | 16:53 (59) | 16:54      |       |  |     |  |
| 21                  | 08:29   | 07:57    |     | 17:14 (59) | 07:08 | 07:06 | 06:15      | 05:48      | 28         | 21:06 (60) | 05:59      | 20:51 (60) | 06:34      | 07:14      | 07:55      | 07:40    |            |            | 08:19      |       |  |     |  |
| 22                  | 17:14   | 18:00    | 23  | 17:37 (59) | 18:40 | 20:24 | 21:05      | 21:38      | 25         | 21:11 (60) | 21:40      | 21:14 (60) | 21:06      | 20:09      | 19:09      | 17:15    |            |            | 16:54      |       |  |     |  |
| 23                  | 08:28   | 07:56    |     | 17:14 (59) | 08:06 | 07:04 | 06:14      | 05:48      | 28         | 21:06 (60) | 05:59      | 20:52 (60) | 06:35      | 07:16      | 07:56      | 07:41    |            |            | 08:20      |       |  |     |  |
| 24                  | 17:16   | 18:00    | 24  | 17:38 (59) | 18:42 | 20:26 | 21:06      | 21:39      | 26         | 21:11 (60) | 21:40      | 21:14 (60) | 21:04      | 20:07      | 19:07      | 17:14    |            |            | 16:54      |       |  |     |  |
| 25                  | 08:28   | 07:54    |     | 17:13 (59) | 08:04 | 07:03 | 06:13      | 05:48      | 28         | 21:06 (60) | 06:00      | 20:52 (60) | 06:36      | 07:17      | 07:57      | 07:43    |            |            | 08:21      |       |  |     |  |
| 26                  | 17:17   | 18:01    | 26  | 17:39 (59) | 19:43 | 20:27 | 21:08      | 21:39      | 25         | 21:11 (60) | 21:39      | 21:13 (60) | 21:03      | 20:05      | 19:05      | 17:13    |            |            | 16:54      |       |  |     |  |
| 27                  | 08:27   | 07:53    |     | 17:14 (59) | 08:02 | 07:01 | 06:11      | 05:48      | 28         | 21:06 (60) | 06:01      | 20:52 (60) | 06:38      | 07:18      | 07:59      | 07:44    |            |            | 08:22      |       |  |     |  |
| 28                  | 17:18   | 18:03    | 27  | 17:41 (59) | 19:45 | 20:28 | 21:09      | 21:40      | 25         | 21:11 (60) | 21:39      | 20:11 (60) | 21:01      | 20:03      | 19:03      | 17:12    |            |            | 16:54      |       |  |     |  |
| 29                  | 08:27   | 07:51    |     | 17:14 (59) | 08:00 | 06:59 | 06:10      | 05:48      | 28         | 21:06 (60) | 06:02      | 20:52 (60) | 06:39      | 07:20      | 08:00      | 07:46    |            |            | 08:23      |       |  |     |  |
| 30                  | 17:20   | 18:04    | 29  | 17:43 (59) | 19:46 | 20:30 | 21:10      | 21:40      | 26         | 21:12 (60) | 21:38      | 21:11 (60) | 20:59      | 20:01      | 19:01      | 17:11    |            |            | 16:54      |       |  |     |  |
| 31                  | 08:26   | 07:50    |     | 17:14 (59) | 07:58 | 06:57 | 06:09      | 05:48      | 28         | 21:07 (60) | 06:03      | 20:53 (60) | 06:40      | 07:21      | 08:02      | 07:47    |            |            | 08:23      |       |  |     |  |
| 32                  | 17:21   | 18:06    | 30  | 17:44 (59) | 19:48 | 20:31 | 21:12      | 21:41      | 25         | 21:12 (60) | 21:37      | 21:10 (60) | 20:58      | 19:59      | 18:57      | 17:09    |            |            | 16:55      |       |  |     |  |
| 33                  | 08:26   | 07:48    |     | 17:15 (59) | 07:56 | 06:55 | 06:08      | 05:48      | 28         | 21:07 (60) | 06:04      | 20:53 (60) | 06:42      | 07:22      | 08:03      | 07:49    |            |            | 08:24      |       |  |     |  |
| 34                  | 17:22   | 18:08    | 29  | 17:44 (59) | 19:49 | 20:32 | 21:13      | 21:41      | 25         | 21:12 (60) | 21:36      | 21:10 (60) | 20:56      | 19:57      | 18:56      | 17:08    |            |            | 16:55      |       |  |     |  |
| 35                  | 08:25   | 07:50    |     | 17:15 (59) | 07:54 | 06:53 | 06:06      | 05:48      | 28         | 21:07 (60) | 06:05      | 20:54 (60) | 06:43      | 07:24      | 08:05      | 07:45    |            |            | 08:25      |       |  |     |  |
| 36                  | 17:24   | 18:09    | 28  | 17:43 (59) | 19:51 | 20:34 | 21:14      | 21:42      | 25         | 21:12 (60) | 21:36      | 21:09 (60) | 20:54      | 19:55      | 18:54      | 17:07    |            |            | 16:55      |       |  |     |  |
| 37                  | 08:24   | 07:45    |     | 17:16 (59) | 07:52 | 06:51 | 06:05      | 05:48      | 28         | 21:07 (60) | 06:06      | 20:54 (60) | 06:44      | 07:25      | 08:06      | 07:52    |            |            | 08:26      |       |  |     |  |
| 38                  | 17:25   | 18:11    | 26  | 17:42 (59) | 19:52 | 20:35 | 21:15      | 21:42      | 25         | 21:12 (60) | 21:35      | 21:08 (60) | 20:53      | 19:53      | 18:52      | 17:06    |            |            | 16:55      |       |  |     |  |
| 39                  | 08:23   | 07:43    |     | 17:16 (59) | 07:50 | 06:50 | 06:04      | 05:48      | 28         | 21:07 (60) | 06:07      | 20:55 (60) | 06:48      | 07:26      | 08:07      | 07:53    |            |            | 08:26      |       |  |     |  |
| 40                  | 17:26   | 18:12    | 25  | 17:41 (59) | 19:53 | 20:33 | 21:13      | 21:43      | 25         | 21:12 (60) | 21:34      | 21:05 (60) | 20:51      | 19:51      | 18:50      | 17:01    |            |            | 16:56      |       |  |     |  |
| 41                  | 08:23   | 07:41    |     | 17:18 (59) | 07:48 | 06:48 | 06:03      | 05:48      | 28         | 21:07 (60) | 06:08      | 20:55 (60) | 06:47      | 07:28      | 08:09      | 07:50    |            |            | 08:27      |       |  |     |  |
| 42                  | 17:28   | 18:14    | 23  | 17:41 (59) | 19:55 | 20:38 | 21:18      | 4          | 20:49 (60) | 21:43      | 25         | 21:12 (60) | 21:33      | 12         | 17:07 (60) | 20:49    | 19:48      | 19         | 18:09 (59) | 17:04 |  |     |  |
| 43                  | 08:22   | 07:39    |     | 17:20 (59) | 07:46 | 06:46 | 06:02      | 05:48      | 28         | 21:07 (60) | 06:09      | 20:56 (60) | 06:48      | 07:29      | 08:10      | 10       | 17:49 (59) | 17:03      | 08:27      |       |  |     |  |
| 44                  | 17:29   | 18:15    | 19  | 17:39 (59) | 19:56 | 20:39 | 21:19      | 8          | 20:55 (60) | 21:43      | 25         | 21:13 (60) | 21:32      | 10         | 21:06 (60) | 20:47    | 19:47      | 22         | 18:11 (59) | 17:06 |  |     |  |
| 45                  | 08:21   | 07:38    |     | 17:22 (59) | 07:44 | 06:44 | 06:01      | 05:48      | 28         | 21:08 (60) | 06:11      | 20:57 (60) | 06:49      | 07:30      | 08:12      | 12       | 17:47 (59) | 17:07      | 08:28      |       |  |     |  |
| 46                  | 17:31   | 18:17    | 14  | 17:36 (59) | 19:58 | 20:40 | 21:20      | 21:43      | 25         | 21:13 (60) | 21:31      | 8          | 21:05 (60) | 20:45      | 18:45      | 24       | 18:11 (59) | 17:03      | 08:29      |       |  |     |  |
| 47                  | 08:20   | 07:36    |     | 17:26 (59) | 07:42 | 06:42 | 06:00      | 05:48      | 28         | 21:08 (60) | 06:12      | 20:59 (60) | 06:51      | 07:32      | 08:13      | 17       | 17:46 (59) | 17:05      | 08:28      |       |  |     |  |
| 48                  | 17:32   | 18:18    | 6   | 17:32 (59) | 19:59 | 20:42 | 21:21      | 12         | 20:57 (60) | 21:44      | 25         | 21:13 (60) | 21:30      | 5          | 21:04 (60) | 20:44    | 19:43      | 27         | 18:13 (59) | 17:02 |  |     |  |
| 49                  | 08:19   | 07:34    |     | 17:40      | 06:41 | 06:41 | 05:59      | 20:45 (60) | 05:49      | 28         | 21:08 (60) | 06:13      | 21:00 (60) | 06:52      | 07:33      | 18:15    | 17         | 17:45 (59) | 08:00      |       |  |     |  |
| 50                  | 17:34   | 18:20    |     | 18:20      | 20:44 | 21:22 | 12         | 20:57 (60) | 21:44      | 25         | 21:13 (60) | 21:29      | 3          | 21:03 (60) | 20:42      | 19:41    | 28         | 18:13 (59) | 17:01      |       |  |     |  |
| 51                  | 08:18   | 07:32    |     | 17:38      | 06:58 | 06:58 | 06:08      | 20:49 (60) | 06:14      | 28         | 21:09 (60) | 06:14      | 20:42      | 06:53      | 07:34      | 18:16    |            |            | 08:01      |       |  |     |  |
| 52                  | 17:35   | 18:21    |     | 20:02      | 20:45 | 21:24 | 14         | 20:59 (60) | 21:44      | 25         | 21:14 (60) | 21:28      | 20:40      | 19:39      | 18:40      | 30       | 18:14 (59) | 17:00      | 16:59      |       |  |     |  |
| 53                  | 08:17   | 07:31    |     | 17:36      | 06:37 | 05:57 | 20:44 (60) | 05:50      | 20:49 (60) | 06:15      | 28         | 21:09 (60) | 06:15      | 06:55      | 07:36      | 18:18    |            |            | 08:03      |       |  |     |  |
| 54                  | 17:37   | 18:23    |     | 20:03      | 20:46 | 21:25 | 16         | 21:00 (60) | 21:44      | 25         | 21:14 (60) | 21:27      | 20:38      | 19:37      | 18:38      | 30       | 18:13 (59) | 16:59      | 17:00      |       |  |     |  |
| 55                  | 08:16   | 07:29    |     | 17:35      | 06:35 | 05:56 | 20:44 (60) | 05:50      | 20:50 (60) | 06:16      | 28         | 21:06 (60) | 06:16      | 06:56      | 07:37      | 18:19    |            |            | 08:04      |       |  |     |  |
| 56                  | 17:38   | 18:24    |     | 20:04      | 20:48 | 21:26 | 17         | 21:01 (60) | 21:44      | 25         | 21:15 (60) | 21:25      | 20:46      | 19:35      | 18:36      | 30       | 18:13 (59) | 16:59      | 17:00      |       |  |     |  |
| 57                  | 08:15   |          |     | 17:32      | 06:35 | 05:55 | 20:44 (60) | 05:50      | 20:49 (60) | 06:17      | 28         | 21:07 (60) | 06:17      | 06:57      | 07:38      | 18:21    |            |            | 08:05      |       |  |     |  |
| 58                  | 17:40   |          |     | 20:06      | 20:49 | 21:27 | 17         | 21:01 (60) | 21:44      | 26         | 21:15 (60) | 21:24      | 20:34      | 19:33      | 18:35      | 28       | 18:12 (59) | 16:58      | 17:01      |       |  |     |  |
| 59                  | 08:14   |          |     | 17:30      | 06:32 | 05:55 | 20:44 (60) | 05:51      | 20:50 (60) | 06:19      | 28         | 21:06 (60) | 06:19      | 06:59      | 07:40      | 08:22    |            |            | 08:07      |       |  |     |  |
| 60                  | 17:41   |          |     | 20:07      | 20:50 | 21:28 | 19         | 21:03 (60) | 21:44      | 25         | 21:15 (60) | 21:23      | 20:32      | 19:31      | 18:33      | 26       | 18:09 (59) | 16:58      | 17:02      |       |  |     |  |
| 61                  | 08:12   |          |     | 17:28      | 06:28 | 05:54 | 20:44 (60) | 05:49      | 20:44 (60) | 06:20      | 28         | 21:06 (60) | 06:20      | 07:00      | 08:24      | 24       | 17:43 (59) | 16:57      | 17:00      |       |  |     |  |
| 62                  | 17:43   |          |     | 20:29      | 21:12 | 21:22 | 20         | 21:04 (60) | 21:40      | 25         | 21:12 (60) | 21:22      | 20:32      | 19:31      | 18:33      | 25       | 18:08 (59) | 16:57      | 17:03      |       |  |     |  |
| Potential sun hours | 278     | 286      |     | 367        | 406   | 466   |            | 475        |            | 481        |            | 468        |            | 443        | 380        | 339      |            | 302        |            | 283   |  | 130 |  |
| Total, worst case   |         |          | 424 |            |       | 151   |            | 744        |            | 468        | </         |            |            |            |            |          |            |            |            |       |  |     |  |

Table layout: For each day in each month the following matrix apply

| Day in month    | Sun rise (hh:mm)     | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|-----------------|----------------------|---------------------------------|----------------------------------|
| Sun set (hh:mm) | Minutes with flicker | Last time (hh:mm) with flicker  | (WTG causing flicker last time)  |

Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

### Assumptions for shadow calculations

Reference year for calendar

Shadow receptor: R121 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 90.0° (110)

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

|                     | January        | February       | March          | April          | May            | June           | July                | August              | September           | October        | November       | December       |
|---------------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|---------------------|---------------------|----------------|----------------|----------------|
| 1                   | 08:31<br>17:04 | 08:11<br>17:44 | 07:27<br>18:26 | 07:26<br>20:10 | 06:30<br>20:52 | 05:53<br>21:30 | 20:52 (65)<br>21:44 | 05:51<br>21:17 (65) | 20:56 (65)<br>21:20 | 06:21<br>20:29 | 07:41<br>19:29 | 08:25<br>18:30 |
| 2                   | 08:31<br>17:05 | 08:10<br>17:46 | 07:25<br>18:27 | 07:24<br>20:12 | 06:29<br>20:53 | 05:52<br>21:31 | 20:52 (65)<br>21:44 | 05:52<br>21:17 (65) | 20:56 (65)<br>21:19 | 06:22<br>20:27 | 19:29<br>19:27 | 18:30<br>18:28 |
| 3                   | 08:31<br>17:06 | 08:09<br>17:47 | 07:23<br>18:29 | 07:22<br>20:13 | 06:27<br>20:54 | 05:52<br>21:32 | 20:51 (65)<br>21:43 | 05:53<br>21:17 (65) | 20:56 (65)<br>21:18 | 06:24<br>20:25 | 07:44<br>19:25 | 08:28<br>18:27 |
| 4                   | 08:31<br>17:07 | 08:07<br>17:49 | 07:21<br>18:30 | 07:20<br>20:14 | 06:26<br>20:56 | 05:51<br>21:33 | 20:52 (65)<br>21:43 | 05:53<br>21:17 (65) | 20:57 (65)<br>21:16 | 06:25<br>20:23 | 07:45<br>19:23 | 08:29<br>18:25 |
| 5                   | 08:30<br>17:08 | 08:06<br>17:50 | 07:19<br>18:32 | 07:18<br>20:16 | 06:24<br>20:57 | 05:51<br>21:33 | 20:51 (65)<br>21:43 | 05:54<br>21:16 (65) | 20:56 (65)<br>21:15 | 06:26<br>20:21 | 07:46<br>19:21 | 07:31<br>17:24 |
| 6                   | 08:30<br>17:09 | 08:05<br>17:52 | 07:17<br>18:33 | 07:16<br>20:17 | 06:23<br>20:59 | 05:50<br>21:34 | 20:51 (65)<br>21:43 | 05:55<br>21:16 (65) | 20:57 (65)<br>21:13 | 06:27<br>20:19 | 07:48<br>19:19 | 07:32<br>17:22 |
| 7                   | 08:30<br>17:10 | 08:03<br>17:54 | 07:15<br>18:35 | 07:14<br>20:18 | 06:21<br>21:00 | 05:50<br>21:35 | 20:52 (65)<br>21:42 | 05:55<br>21:16 (65) | 20:58 (65)<br>21:12 | 06:29<br>20:17 | 07:49<br>19:17 | 07:34<br>17:21 |
| 8                   | 08:30<br>17:11 | 08:02<br>17:55 | 07:14<br>18:36 | 07:12<br>20:20 | 06:20<br>21:01 | 05:49<br>21:36 | 20:51 (65)<br>21:42 | 05:56<br>21:16 (65) | 20:58 (65)<br>21:10 | 06:30<br>20:15 | 07:50<br>19:15 | 07:35<br>17:19 |
| 9                   | 08:30<br>17:12 | 08:00<br>17:57 | 07:12<br>18:38 | 07:10<br>20:21 | 06:18<br>21:03 | 05:49<br>21:37 | 20:51 (65)<br>21:41 | 05:57<br>21:14 (65) | 20:58 (65)<br>21:09 | 06:31<br>20:13 | 07:52<br>19:13 | 07:37<br>17:18 |
| 10                  | 08:29<br>17:13 | 07:59<br>17:58 | 07:10<br>18:39 | 07:08<br>20:23 | 06:17<br>21:04 | 05:49<br>21:37 | 20:51 (65)<br>21:41 | 05:58<br>21:14 (65) | 20:59 (65)<br>21:07 | 06:32<br>20:11 | 07:53<br>19:11 | 07:38<br>17:17 |
| 11                  | 08:29<br>17:14 | 07:57<br>18:00 | 07:08<br>18:40 | 07:06<br>20:24 | 06:15<br>21:05 | 05:48<br>21:38 | 20:51 (65)<br>21:40 | 05:58<br>21:14 (65) | 20:59 (65)<br>21:06 | 06:34<br>20:09 | 07:55<br>19:09 | 07:40<br>17:15 |
| 12                  | 08:28<br>17:16 | 07:56<br>18:00 | 08:06<br>18:42 | 07:04<br>20:25 | 06:14<br>21:06 | 05:48<br>21:39 | 20:51 (65)<br>21:40 | 05:59<br>21:14 (65) | 20:59 (65)<br>21:04 | 06:35<br>20:07 | 07:56<br>19:07 | 07:41<br>17:14 |
| 13                  | 08:28<br>17:17 | 07:54<br>18:01 | 08:04<br>19:43 | 07:03<br>20:27 | 06:13<br>21:08 | 05:48<br>21:39 | 20:52 (65)<br>21:39 | 06:00<br>21:13 (65) | 20:59 (65)<br>21:03 | 06:36<br>20:05 | 07:57<br>19:05 | 07:43<br>17:13 |
| 14                  | 08:27<br>17:18 | 07:53<br>18:03 | 08:02<br>19:45 | 07:01<br>20:28 | 06:11<br>21:09 | 05:48<br>21:40 | 20:52 (65)<br>21:39 | 06:01<br>21:12 (65) | 20:59 (65)<br>21:01 | 06:38<br>20:03 | 07:59<br>19:03 | 07:44<br>17:12 |
| 15                  | 08:27<br>17:20 | 07:51<br>18:04 | 08:00<br>19:46 | 06:59<br>20:30 | 06:10<br>21:10 | 05:48<br>21:40 | 20:52 (65)<br>21:38 | 06:02<br>21:11 (65) | 20:59 (65)<br>20:59 | 06:39<br>20:01 | 08:00<br>19:01 | 07:46<br>17:11 |
| 16                  | 08:26<br>17:21 | 07:50<br>18:06 | 07:58<br>19:48 | 06:57<br>20:31 | 06:09<br>21:12 | 05:48<br>21:41 | 20:52 (65)<br>21:37 | 06:03<br>21:10 (65) | 20:58 (65)<br>21:03 | 06:40<br>20:58 | 08:02<br>18:57 | 07:47<br>17:09 |
| 17                  | 08:26<br>17:22 | 07:48<br>18:07 | 07:56<br>19:49 | 06:55<br>20:32 | 06:07<br>21:13 | 05:48<br>21:41 | 20:52 (65)<br>21:36 | 06:04<br>21:10 (65) | 20:56 (65)<br>21:04 | 06:42<br>20:56 | 08:03<br>19:57 | 07:49<br>17:08 |
| 18                  | 08:25<br>17:24 | 07:46<br>18:09 | 07:54<br>19:50 | 06:53<br>20:34 | 06:06<br>21:14 | 05:48<br>21:42 | 20:53 (65)<br>21:35 | 06:05<br>21:15 (65) | 20:54 (65)<br>21:09 | 06:43<br>20:54 | 08:05<br>18:54 | 07:50<br>17:07 |
| 19                  | 08:24<br>17:25 | 07:45<br>18:11 | 07:52<br>19:52 | 06:51<br>20:35 | 06:05<br>21:15 | 05:48<br>21:42 | 20:53 (65)<br>21:35 | 06:06<br>21:16 (65) | 20:54 (65)<br>21:06 | 06:44<br>20:53 | 08:06<br>18:52 | 07:52<br>17:06 |
| 20                  | 08:23<br>17:26 | 07:43<br>18:12 | 07:50<br>19:53 | 06:49<br>20:37 | 06:04<br>21:17 | 05:48<br>21:43 | 20:53 (65)<br>21:34 | 06:07<br>21:16 (65) | 20:53 (65)<br>20:51 | 06:45<br>19:51 | 08:07<br>18:50 | 07:53<br>17:05 |
| 21                  | 08:23<br>17:28 | 07:41<br>18:14 | 07:48<br>19:55 | 06:48<br>20:38 | 06:03<br>21:18 | 05:48<br>21:43 | 20:53 (65)<br>21:33 | 06:08<br>21:16 (65) | 20:51 (65)<br>20:49 | 06:47<br>19:49 | 08:09<br>18:48 | 07:54<br>17:04 |
| 22                  | 08:22<br>17:29 | 07:39<br>18:15 | 07:46<br>19:56 | 06:46<br>20:39 | 06:02<br>21:19 | 05:48<br>21:43 | 20:54 (65)<br>21:32 | 06:09<br>21:17 (65) | 20:48 (65)<br>20:47 | 06:48<br>19:47 | 08:10<br>18:46 | 07:56<br>17:03 |
| 23                  | 08:21<br>17:31 | 07:38<br>18:17 | 07:44<br>19:58 | 06:44<br>20:41 | 06:01<br>21:20 | 05:48<br>21:43 | 20:54 (65)<br>21:31 | 06:10<br>21:14 (65) | 20:49 (65)<br>20:45 | 06:49<br>19:45 | 08:12<br>18:45 | 07:57<br>17:02 |
| 24                  | 08:20<br>17:32 | 07:36<br>18:18 | 07:42<br>19:59 | 06:42<br>20:42 | 06:00<br>21:21 | 05:49<br>21:44 | 20:54 (65)<br>21:30 | 06:12<br>21:17 (65) | 20:48 (65)<br>20:44 | 06:51<br>19:43 | 08:13<br>18:43 | 07:59<br>17:02 |
| 25                  | 08:19<br>17:34 | 07:34<br>18:20 | 07:40<br>20:00 | 06:41<br>20:43 | 05:59<br>21:22 | 05:49<br>21:44 | 20:54 (65)<br>21:29 | 06:13<br>21:17 (65) | 20:47 (65)<br>20:42 | 06:52<br>19:41 | 08:15<br>18:41 | 08:00<br>17:01 |
| 26                  | 08:18<br>17:35 | 07:32<br>18:21 | 07:38<br>20:02 | 06:39<br>20:45 | 05:58<br>21:24 | 05:49<br>21:44 | 20:55 (65)<br>21:28 | 06:14<br>21:17 (65) | 20:46 (65)<br>20:40 | 06:53<br>19:39 | 08:16<br>18:40 | 08:01<br>17:00 |
| 27                  | 08:17<br>17:37 | 07:30<br>18:23 | 07:36<br>20:03 | 06:37<br>20:46 | 05:57<br>21:25 | 05:49<br>21:44 | 20:55 (65)<br>21:27 | 06:15<br>21:17 (65) | 20:45 (65)<br>20:38 | 06:55<br>19:37 | 08:18<br>18:38 | 08:03<br>16:59 |
| 28                  | 08:16<br>17:38 | 07:29<br>18:24 | 07:34<br>20:05 | 06:35<br>20:48 | 05:56<br>21:26 | 05:49<br>21:44 | 20:54 (65)<br>21:25 | 06:16<br>21:18 (65) | 20:36 (65)<br>20:36 | 06:56<br>19:35 | 08:19<br>18:36 | 08:04<br>16:59 |
| 29                  | 08:15<br>17:40 |                | 07:32<br>20:06 | 06:34<br>20:49 | 05:55<br>21:27 | 05:49<br>21:44 | 20:55 (65)<br>21:24 | 06:17<br>21:17 (65) | 20:36 (65)<br>20:34 | 06:57<br>19:33 | 08:21<br>18:35 | 08:05<br>16:58 |
| 30                  | 08:14<br>17:41 |                | 07:30<br>20:07 | 06:32<br>20:50 | 05:55<br>21:28 | 05:49<br>21:44 | 20:56 (65)<br>21:23 | 06:19<br>21:18 (65) | 20:35 (65)<br>20:32 | 06:59<br>19:31 | 08:22<br>18:33 | 08:07<br>16:58 |
| 31                  | 08:12<br>17:43 |                | 07:28<br>20:09 |                | 05:54<br>21:29 | 05:49<br>21:44 | 20:56 (65)<br>21:22 | 06:20<br>21:22      | 20:32<br>20:31      | 07:00<br>20:31 | 08:23<br>18:31 | 08:30<br>17:03 |
| Potential sun hours | 278            | 286            | 367            | 406            | 466            | 475            | 481                 | 443                 | 380                 | 339            | 283            | 266            |
| Total, worst case   |                |                |                |                | 44             | 616            | 274                 |                     |                     |                |                |                |
| Sun reduction       |                |                |                |                | 0.64           | 0.67           | 0.75                |                     |                     |                |                |                |
| Oper. time red.     |                |                |                |                | 1.00           | 1.00           | 1.00                |                     |                     |                |                |                |
| Wind dir. red.      |                |                |                |                | 0.65           | 0.65           | 0.65                |                     |                     |                |                |                |
| Total reduction     |                |                |                |                | 0.42           | 0.44           | 0.49                |                     |                     |                |                |                |
| Total, real         |                |                |                |                | 18             | 270            | 135                 |                     |                     |                |                |                |

Table layout: For each day in each month the following matrix apply

|              |                      |                                 |                                  |
|--------------|----------------------|---------------------------------|----------------------------------|
| Day in month | Sun rise (hh:mm)     | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|              | Sun set (hh:mm)      | Last time (hh:mm) with flicker  | (WTG causing flicker last time)  |
|              | Minutes with flicker |                                 |                                  |



Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: R122 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 90.0° (111)

## Assumptions for shadow calculations

Reference year for calendar

2023

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

| Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  |
|------|------|------|------|------|------|------|------|------|------|------|------|
| 0.54 | 0.52 | 0.61 | 0.58 | 0.64 | 0.67 | 0.75 | 0.72 | 0.67 | 0.53 | 0.42 | 0.45 |

Operational time

| N   | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW | NW  | NNW | Sum   |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| 376 | 314 | 339 | 425 | 445 | 474 | 693 | 570 | 488 | 386 | 872 | 609 | 772 | 651 | 677 | 667 | 8,758 |

|                     | January | February | March | April | May   | June  | July       | August     | September  | October | November   | December |       |
|---------------------|---------|----------|-------|-------|-------|-------|------------|------------|------------|---------|------------|----------|-------|
| 1                   | 08:31   | 08:11    | 07:27 | 07:26 | 06:30 | 05:53 | 05:51      | 21:03 (65) | 06:21      | 07:01   | 07:41      | 08:25    | 08:08 |
| 2                   | 17:04   | 17:44    | 18:26 | 20:10 | 20:52 | 21:30 | 21:44      | 14         | 21:17 (65) | 21:20   | 20:29      | 19:29    | 18:30 |
|                     | 08:31   | 08:10    | 07:25 | 07:24 | 06:29 | 05:52 | 21:03 (65) | 05:52      | 21:04 (65) | 06:22   | 07:03      | 07:42    | 08:26 |
| 3                   | 17:05   | 17:46    | 18:27 | 20:12 | 20:53 | 21:31 | 3          | 21:06 (65) | 21:44      | 13      | 21:17 (65) | 21:19    | 20:27 |
|                     | 08:31   | 08:09    | 07:23 | 07:22 | 06:27 | 05:52 | 21:02 (65) | 05:53      | 21:04 (65) | 06:24   | 07:04      | 07:44    | 08:28 |
| 4                   | 17:06   | 17:47    | 18:29 | 20:13 | 20:54 | 21:32 | 4          | 21:06 (65) | 21:43      | 13      | 21:17 (65) | 21:18    | 20:25 |
|                     | 08:31   | 08:07    | 07:21 | 07:20 | 06:26 | 05:51 | 21:02 (65) | 05:53      | 21:05 (65) | 06:25   | 07:05      | 07:45    | 08:29 |
| 5                   | 17:07   | 17:49    | 18:30 | 20:14 | 20:56 | 21:33 | 5          | 21:07 (65) | 21:43      | 12      | 21:17 (65) | 21:16    | 20:23 |
|                     | 08:30   | 08:06    | 07:19 | 07:18 | 06:24 | 05:51 | 21:01 (65) | 05:54      | 21:05 (65) | 06:26   | 07:06      | 07:46    | 08:31 |
| 6                   | 17:08   | 17:50    | 18:32 | 20:16 | 20:57 | 21:33 | 7          | 21:08 (65) | 21:43      | 11      | 21:16 (65) | 21:15    | 20:21 |
|                     | 08:30   | 08:05    | 07:17 | 07:16 | 06:23 | 05:50 | 21:01 (65) | 05:55      | 21:06 (65) | 06:27   | 07:08      | 07:48    | 08:32 |
| 7                   | 17:09   | 17:52    | 18:33 | 20:17 | 20:59 | 21:34 | 8          | 21:09 (65) | 21:43      | 10      | 21:16 (65) | 21:13    | 20:19 |
|                     | 08:30   | 08:03    | 07:15 | 07:14 | 06:21 | 05:50 | 21:01 (65) | 05:55      | 21:07 (65) | 06:29   | 07:09      | 07:49    | 08:34 |
| 8                   | 17:10   | 17:54    | 18:35 | 20:18 | 21:00 | 21:35 | 9          | 21:10 (65) | 21:42      | 9       | 21:16 (65) | 21:12    | 20:17 |
|                     | 08:30   | 08:02    | 07:14 | 07:12 | 06:20 | 05:49 | 21:00 (65) | 05:56      | 21:08 (65) | 06:30   | 07:10      | 07:50    | 08:35 |
| 9                   | 17:11   | 17:55    | 18:36 | 20:20 | 21:01 | 21:36 | 10         | 21:10 (65) | 21:42      | 8       | 21:16 (65) | 21:10    | 20:15 |
|                     | 08:30   | 08:00    | 07:12 | 07:10 | 06:18 | 05:49 | 21:00 (65) | 05:57      | 21:08 (65) | 06:31   | 07:12      | 07:52    | 08:37 |
| 10                  | 17:12   | 17:57    | 18:38 | 20:21 | 21:03 | 21:37 | 11         | 21:11 (65) | 21:41      | 6       | 21:14 (65) | 21:09    | 20:13 |
|                     | 08:29   | 07:59    | 07:10 | 07:08 | 06:17 | 05:49 | 21:00 (65) | 05:58      | 21:09 (65) | 06:32   | 07:13      | 07:53    | 08:38 |
| 11                  | 17:13   | 17:58    | 18:39 | 20:23 | 21:04 | 21:37 | 12         | 21:12 (65) | 21:41      | 5       | 21:14 (65) | 21:07    | 20:11 |
|                     | 08:29   | 07:57    | 07:08 | 07:06 | 06:15 | 05:48 | 20:59 (65) | 05:58      | 21:10 (65) | 06:34   | 07:14      | 07:55    | 08:40 |
| 12                  | 17:14   | 18:00    | 18:40 | 20:24 | 21:05 | 21:38 | 13         | 21:12 (65) | 21:40      | 4       | 21:14 (65) | 21:06    | 20:09 |
|                     | 08:28   | 07:56    | 08:06 | 07:04 | 06:14 | 05:48 | 20:59 (65) | 05:59      | 21:11 (65) | 06:35   | 07:16      | 07:56    | 08:41 |
| 13                  | 17:16   | 18:00    | 18:42 | 20:25 | 21:06 | 21:39 | 13         | 21:12 (65) | 21:40      | 3       | 21:14 (65) | 21:04    | 20:07 |
|                     | 08:28   | 07:54    | 08:04 | 07:03 | 06:13 | 05:48 | 20:59 (65) | 06:00      | 21:11 (65) | 06:36   | 07:17      | 07:57    | 08:43 |
| 14                  | 17:17   | 18:01    | 19:43 | 20:27 | 21:08 | 21:39 | 14         | 21:13 (65) | 21:39      | 21:03   | 20:05      | 19:05    | 17:13 |
|                     | 08:27   | 07:53    | 08:02 | 07:01 | 06:11 | 05:48 | 21:00 (65) | 06:01      | 21:03      | 20:18   | 19:08      | 17:14    | 16:54 |
| 15                  | 17:18   | 18:03    | 19:45 | 20:28 | 21:09 | 21:40 | 14         | 21:14 (65) | 21:39      | 21:01   | 20:03      | 19:03    | 17:12 |
|                     | 08:27   | 07:51    | 08:00 | 06:59 | 06:10 | 05:48 | 21:00 (65) | 06:02      | 21:03      | 20:19   | 19:09      | 17:16    | 16:54 |
| 16                  | 17:20   | 18:04    | 19:46 | 20:30 | 21:10 | 21:40 | 14         | 21:14 (65) | 21:38      | 20:59   | 20:01      | 19:01    | 17:11 |
|                     | 08:26   | 07:50    | 07:58 | 06:57 | 06:09 | 05:48 | 21:00 (65) | 06:03      | 20:58      | 20:02   | 19:02      | 17:11    | 16:54 |
| 17                  | 17:21   | 18:06    | 19:48 | 20:31 | 21:12 | 21:41 | 15         | 21:15 (65) | 21:37      | 20:58   | 19:59      | 18:57    | 17:09 |
|                     | 08:26   | 07:48    | 07:56 | 06:55 | 06:07 | 05:48 | 21:00 (65) | 06:04      | 20:57      | 20:05   | 19:05      | 17:11    | 16:54 |
| 18                  | 17:22   | 18:07    | 19:49 | 20:32 | 21:13 | 21:41 | 15         | 21:15 (65) | 21:36      | 20:56   | 19:57      | 18:56    | 17:08 |
|                     | 08:25   | 07:46    | 07:54 | 06:53 | 06:06 | 05:48 | 21:00 (65) | 06:05      | 20:55      | 20:07   | 19:07      | 17:11    | 16:54 |
| 19                  | 17:24   | 18:09    | 19:50 | 20:34 | 21:14 | 21:42 | 15         | 21:15 (65) | 21:35      | 20:54   | 19:55      | 18:54    | 17:07 |
|                     | 08:24   | 07:45    | 07:52 | 06:51 | 06:05 | 05:48 | 21:00 (65) | 06:06      | 20:53      | 20:09   | 19:09      | 17:16    | 16:54 |
| 20                  | 17:25   | 18:11    | 19:52 | 20:35 | 21:15 | 21:42 | 16         | 21:16 (65) | 21:35      | 20:53   | 19:53      | 18:52    | 17:06 |
|                     | 08:23   | 07:43    | 07:50 | 06:49 | 06:04 | 05:48 | 21:00 (65) | 06:07      | 20:52      | 20:15   | 19:15      | 17:11    | 16:54 |
| 21                  | 17:26   | 18:12    | 19:53 | 20:37 | 21:17 | 21:43 | 16         | 21:16 (65) | 21:34      | 20:51   | 19:51      | 18:50    | 17:05 |
|                     | 08:23   | 07:41    | 07:48 | 06:48 | 06:03 | 05:48 | 21:00 (65) | 06:08      | 20:50      | 20:19   | 19:19      | 17:11    | 16:54 |
| 22                  | 17:28   | 18:14    | 19:55 | 20:38 | 21:18 | 21:43 | 16         | 21:16 (65) | 21:33      | 20:49   | 19:49      | 18:48    | 17:04 |
|                     | 08:22   | 07:39    | 07:46 | 06:46 | 06:02 | 05:48 | 21:01 (65) | 06:09      | 20:48      | 20:22   | 19:22      | 17:11    | 16:54 |
| 23                  | 17:29   | 18:15    | 19:56 | 20:39 | 21:19 | 21:43 | 16         | 21:17 (65) | 21:32      | 20:47   | 19:47      | 18:46    | 17:03 |
|                     | 08:21   | 07:38    | 07:44 | 06:44 | 06:01 | 05:48 | 21:01 (65) | 06:10      | 20:46      | 20:24   | 19:24      | 17:11    | 16:54 |
| 24                  | 17:31   | 18:17    | 19:58 | 20:41 | 21:20 | 21:43 | 16         | 21:17 (65) | 21:31      | 20:45   | 19:45      | 18:45    | 17:02 |
|                     | 08:20   | 07:36    | 07:42 | 06:42 | 06:00 | 05:49 | 21:01 (65) | 06:12      | 20:44      | 20:26   | 19:26      | 17:11    | 16:54 |
| 25                  | 17:32   | 18:18    | 19:59 | 20:42 | 21:21 | 21:44 | 16         | 21:17 (65) | 21:30      | 20:44   | 19:43      | 18:43    | 17:02 |
|                     | 08:19   | 07:34    | 07:40 | 06:41 | 05:59 | 05:49 | 21:01 (65) | 06:13      | 20:43      | 20:29   | 19:29      | 17:11    | 16:54 |
| 26                  | 17:34   | 18:20    | 20:00 | 20:43 | 21:22 | 21:44 | 16         | 21:17 (65) | 21:29      | 20:42   | 19:41      | 18:41    | 17:01 |
|                     | 08:18   | 07:32    | 07:38 | 06:39 | 05:58 | 05:49 | 21:02 (65) | 06:14      | 20:41      | 20:31   | 19:31      | 18:31    | 17:01 |
| 27                  | 17:35   | 18:21    | 20:02 | 20:45 | 21:24 | 21:44 | 15         | 21:17 (65) | 21:28      | 20:40   | 19:39      | 18:40    | 17:00 |
|                     | 08:17   | 07:30    | 07:36 | 06:37 | 05:57 | 05:50 | 21:02 (65) | 06:15      | 20:39      | 20:33   | 19:33      | 18:33    | 17:01 |
| 28                  | 17:37   | 18:23    | 20:03 | 20:46 | 21:25 | 21:44 | 15         | 21:17 (65) | 21:27      | 20:38   | 19:37      | 18:38    | 16:59 |
|                     | 08:16   | 07:29    | 07:34 | 06:35 | 05:56 | 05:50 | 21:03 (65) | 06:16      | 20:37      | 20:34   | 19:34      | 18:34    | 17:01 |
| 29                  | 17:38   | 18:24    | 20:05 | 20:48 | 21:26 | 21:44 | 15         | 21:18 (65) | 21:25      | 20:36   | 19:35      | 18:36    | 16:59 |
|                     | 08:15   | 07:32    | 07:34 | 06:34 | 05:55 | 05:50 | 21:03 (65) | 06:17      | 20:35      | 20:36   | 19:36      | 18:36    | 17:01 |
| 30                  | 17:40   | 07:30    | 07:30 | 06:32 | 05:55 | 05:51 | 14         | 21:17 (65) | 21:24      | 20:34   | 19:33      | 18:35    | 16:58 |
|                     | 08:14   | 07:27    | 07:30 | 06:30 | 05:54 | 05:51 | 14         | 21:04 (65) | 06:19      | 20:33   | 19:34      | 18:35    | 17:01 |
| 31                  | 17:41   | 07:28    | 07:28 | 06:30 | 05:54 | 05:51 | 14         | 21:18 (65) | 21:23      | 20:32   | 19:31      | 18:33    | 16:58 |
|                     | 08:12   | 07:25    | 07:28 | 06:28 | 05:54 | 05:50 | 14         | 21:04 (65) | 06:20      | 20:31   | 19:32      | 18:33    | 17:01 |
| Potential sun hours | 17:43   | 20:09    |       |       | 21:29 |       |            | 21:22      |            | 20:31   |            | 18:31    |       |
|                     | 278     | 286      | 367   | 406   | 466   | 475   | 481        | 443        | 380        | 339     | 283        | 266      |       |
| Total, worst case   |         |          |       |       |       |       | 367        |            |            |         |            |          |       |
| Sun reduction       |         |          |       |       |       |       | 0.67       |            |            |         |            |          |       |
| Oper. time red.     |         |          |       |       |       |       | 1.00       |            |            |         |            |          |       |
| Wind dir. red.      |         |          |       |       |       |       | 0.65       |            |            |         |            |          |       |
| Total reduction     |         |          |       |       |       |       | 0.43       |            |            |         |            |          |       |
| Total, real         |         |          |       |       |       |       | 160        |            |            |         |            |          |       |

Table layout: For each day in each month the following matrix apply

| Day in month | Sun rise (hh:mm) | Sun set (hh:mm) | Minutes with flicker | First time (hh:mm) with flicker | Last time (hh:mm) with flicker | (WTG causing flicker first time) | (WTG causing flicker last time) |
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|
|              |                  |                 |                      |                                 |                                |                                  |                                 |

Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: R123 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 90.0° (112)

## Assumptions for shadow calculations

Reference year for calendar

2023

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

|                     | January | February | March | April | May   | June       | July       | August     | September  | October    | November   | December |            |       |       |       |       |       |       |
|---------------------|---------|----------|-------|-------|-------|------------|------------|------------|------------|------------|------------|----------|------------|-------|-------|-------|-------|-------|-------|
| 1                   | 08:30   | 08:11    | 07:27 | 07:26 | 06:30 | 05:53      | 06:21 (71) | 05:51      | 06:31 (71) | 06:21      | 07:01      | 07:41    | 08:25      | 08:08 |       |       |       |       |       |
|                     | 17:04   | 17:44    | 18:26 | 20:10 | 20:52 | 21:30      | 25         | 06:46 (71) | 21:44      | 18         | 06:49 (71) | 21:20    | 20:29      | 19:28 | 18:30 | 16:57 |       |       |       |
| 2                   | 08:31   | 08:10    | 07:25 | 07:24 | 06:29 | 05:52      | 06:22 (71) | 05:52      | 06:31 (71) | 06:22      | 07:03      | 07:42    | 08:26      | 08:09 |       |       |       |       |       |
|                     | 17:05   | 17:46    | 18:27 | 20:11 | 20:53 | 21:31      | 24         | 06:46 (71) | 21:44      | 19         | 06:50 (71) | 21:19    | 20:27      | 19:26 | 18:28 | 16:56 |       |       |       |
| 3                   | 08:31   | 08:09    | 07:23 | 07:22 | 06:27 | 05:52      | 06:22 (71) | 05:53      | 06:30 (71) | 06:23      | 07:04      | 07:44    | 08:28      | 08:10 |       |       |       |       |       |
|                     | 17:06   | 17:47    | 18:29 | 20:13 | 20:54 | 21:32      | 24         | 06:46 (71) | 21:43      | 20         | 06:50 (71) | 21:18    | 20:25      | 19:24 | 18:27 | 16:56 |       |       |       |
| 4                   | 08:30   | 08:07    | 07:21 | 07:20 | 06:26 | 05:51      | 06:23 (71) | 05:53      | 06:31 (71) | 06:25      | 07:05      | 07:45    | 08:29      | 08:11 |       |       |       |       |       |
|                     | 17:07   | 17:49    | 18:30 | 20:14 | 20:56 | 21:33      | 23         | 06:46 (71) | 21:43      | 19         | 06:50 (71) | 21:16    | 20:23      | 19:22 | 18:25 | 16:56 |       |       |       |
| 5                   | 08:30   | 08:06    | 07:19 | 07:18 | 06:24 | 05:51      | 06:23 (71) | 05:54      | 06:30 (71) | 06:26      | 07:06      | 07:46    | 07:31      | 08:13 |       |       |       |       |       |
|                     | 17:08   | 17:50    | 18:32 | 20:16 | 20:57 | 21:33      | 22         | 06:45 (71) | 21:43      | 20         | 06:50 (71) | 21:15    | 20:21      | 19:20 | 17:24 | 16:55 |       |       |       |
| 6                   | 08:30   | 08:05    | 07:17 | 07:16 | 06:22 | 05:50      | 06:24 (71) | 05:55      | 06:30 (71) | 06:27      | 07:08      | 07:48    | 07:32      | 08:14 |       |       |       |       |       |
|                     | 17:09   | 17:52    | 18:33 | 20:17 | 20:58 | 21:34      | 22         | 06:46 (71) | 21:43      | 21         | 06:51 (71) | 21:13    | 20:19      | 19:18 | 17:22 | 16:55 |       |       |       |
| 7                   | 08:30   | 08:03    | 07:15 | 07:14 | 06:21 | 05:50      | 06:24 (71) | 05:55      | 06:30 (71) | 06:29      | 07:09      | 07:49    | 07:34      | 08:15 |       |       |       |       |       |
|                     | 17:10   | 17:53    | 18:35 | 20:18 | 21:00 | 21:35      | 22         | 06:46 (71) | 21:42      | 22         | 06:52 (71) | 21:12    | 20:17      | 19:17 | 17:21 | 16:55 |       |       |       |
| 8                   | 08:30   | 08:02    | 07:13 | 07:12 | 06:20 | 05:49      | 06:24 (71) | 05:56      | 06:29 (71) | 06:30      | 07:10      | 07:50    | 07:35      | 08:16 |       |       |       |       |       |
|                     | 17:11   | 17:55    | 18:36 | 20:20 | 21:01 | 21:36      | 21         | 06:45 (71) | 21:42      | 23         | 06:52 (71) | 21:10    | 20:15      | 19:15 | 17:19 | 16:54 |       |       |       |
| 9                   | 08:29   | 08:00    | 07:12 | 07:10 | 06:18 | 05:49      | 06:25 (71) | 05:57      | 06:30 (71) | 06:31      | 07:12      | 07:52    | 07:37      | 08:17 |       |       |       |       |       |
|                     | 17:12   | 17:57    | 18:37 | 20:21 | 21:02 | 21:37      | 20         | 06:45 (71) | 21:41      | 22         | 06:52 (71) | 21:09    | 20:13      | 19:13 | 17:18 | 16:54 |       |       |       |
| 10                  | 08:29   | 07:59    | 07:10 | 07:08 | 06:17 | 05:49      | 06:26 (71) | 05:58      | 06:30 (71) | 06:32      | 07:13      | 07:53    | 07:38      | 08:18 |       |       |       |       |       |
|                     | 17:13   | 17:58    | 18:39 | 20:23 | 21:04 | 21:37      | 19         | 06:45 (71) | 21:41      | 23         | 06:53 (71) | 21:07    | 20:11      | 19:11 | 17:17 | 16:54 |       |       |       |
| 11                  | 08:29   | 07:57    | 07:08 | 07:06 | 06:15 | 05:48      | 06:25 (71) | 05:58      | 06:30 (71) | 06:34      | 07:14      | 07:55    | 07:40      | 08:19 |       |       |       |       |       |
|                     | 17:14   | 18:00    | 18:40 | 20:24 | 21:05 | 21:38      | 20         | 06:45 (71) | 21:40      | 24         | 06:54 (71) | 21:06    | 20:09      | 19:09 | 17:15 | 16:54 |       |       |       |
| 12                  | 08:28   | 07:56    | 08:06 | 07:04 | 06:14 | 05:48      | 06:26 (71) | 05:59      | 06:30 (71) | 06:35      | 07:16      | 07:56    | 07:41      | 08:20 |       |       |       |       |       |
|                     | 17:16   | 18:00    | 18:42 | 20:25 | 21:06 | 21:39      | 19         | 06:45 (71) | 21:40      | 24         | 06:54 (71) | 21:04    | 20:07      | 19:07 | 17:14 | 16:54 |       |       |       |
| 13                  | 08:28   | 07:54    | 08:04 | 07:02 | 06:12 | 05:48      | 06:27 (71) | 06:00      | 06:29 (71) | 06:36      | 07:17      | 07:57    | 07:43      | 08:21 |       |       |       |       |       |
|                     | 17:17   | 18:01    | 19:43 | 20:27 | 21:08 | 21:39      | 18         | 06:45 (71) | 21:39      | 25         | 06:54 (71) | 21:03    | 20:05      | 19:05 | 17:13 | 16:54 |       |       |       |
| 14                  | 08:27   | 07:53    | 08:02 | 07:01 | 06:11 | 05:48      | 06:27 (71) | 06:01      | 06:29 (71) | 06:38      | 07:18      | 07:59    | 07:44      | 08:22 |       |       |       |       |       |
|                     | 17:18   | 18:03    | 19:45 | 20:28 | 21:09 | 3          | 06:40 (71) | 21:40      | 18         | 06:45 (71) | 21:38      | 25       | 06:54 (71) | 21:01 | 20:03 | 19:03 | 17:12 | 16:54 |       |
| 15                  | 08:27   | 07:51    | 08:00 | 06:59 | 06:10 | 05:48      | 06:28 (71) | 06:02      | 06:30 (71) | 06:39      | 07:20      | 08:00    | 07:46      | 08:23 |       |       |       |       |       |
|                     | 17:19   | 18:04    | 19:46 | 20:30 | 21:10 | 5          | 06:41 (71) | 21:40      | 17         | 06:45 (71) | 21:38      | 24       | 06:54 (71) | 21:30 | 20:59 | 20:01 | 19:01 | 17:10 | 16:54 |
| 16                  | 08:26   | 07:49    | 07:58 | 06:57 | 06:09 | 05:48      | 06:34 (71) | 06:03      | 06:31 (71) | 06:40      | 07:21      | 08:02    | 07:47      | 08:23 |       |       |       |       |       |
|                     | 17:21   | 18:06    | 19:48 | 20:31 | 21:12 | 7          | 06:41 (71) | 21:41      | 17         | 06:45 (71) | 21:37      | 24       | 06:55 (71) | 21:30 | 19:59 | 18:57 | 17:09 | 16:54 |       |
| 17                  | 08:26   | 07:48    | 07:56 | 06:55 | 06:07 | 05:48      | 06:33 (71) | 06:04      | 06:29 (71) | 06:04      | 06:32 (71) | 06:42    | 07:22      | 08:03 | 07:49 | 08:24 |       |       |       |
|                     | 17:22   | 18:07    | 19:49 | 20:32 | 21:13 | 9          | 06:42 (71) | 21:41      | 16         | 06:45 (71) | 21:36      | 23       | 06:55 (71) | 21:26 | 19:57 | 18:55 | 17:08 | 16:55 |       |
| 18                  | 08:25   | 07:46    | 07:54 | 06:53 | 06:06 | 05:48      | 06:32 (71) | 06:05      | 06:29 (71) | 06:05      | 06:33 (71) | 06:43    | 07:24      | 08:04 | 07:50 | 08:25 |       |       |       |
|                     | 17:24   | 18:09    | 19:50 | 20:34 | 21:14 | 11         | 06:43 (71) | 21:42      | 16         | 06:45 (71) | 21:35      | 22       | 06:55 (71) | 21:30 | 19:55 | 18:54 | 17:07 | 16:55 |       |
| 19                  | 08:24   | 07:45    | 07:52 | 06:51 | 06:05 | 05:48      | 06:31 (71) | 06:06      | 06:29 (71) | 06:06      | 06:34 (71) | 06:44    | 07:25      | 08:06 | 07:52 | 08:26 |       |       |       |
|                     | 17:25   | 18:11    | 19:52 | 20:35 | 21:15 | 13         | 06:44 (71) | 21:42      | 16         | 06:45 (71) | 21:35      | 21       | 06:55 (71) | 21:30 | 19:53 | 18:52 | 17:06 | 16:55 |       |
| 20                  | 08:23   | 07:43    | 07:50 | 06:49 | 06:04 | 05:48      | 06:30 (71) | 06:07      | 06:30 (71) | 06:07      | 06:35 (71) | 06:45    | 07:26      | 08:07 | 07:53 | 08:26 |       |       |       |
|                     | 17:26   | 18:12    | 19:53 | 20:36 | 21:17 | 14         | 06:44 (71) | 21:43      | 15         | 06:45 (71) | 21:34      | 20       | 06:55 (71) | 21:30 | 19:51 | 18:50 | 17:05 | 16:56 |       |
| 21                  | 08:23   | 07:41    | 07:48 | 06:48 | 06:03 | 05:48      | 06:29 (71) | 06:08      | 06:30 (71) | 06:08      | 06:36 (71) | 06:47    | 07:27      | 08:09 | 07:54 | 08:27 |       |       |       |
|                     | 17:28   | 18:14    | 19:55 | 20:38 | 21:18 | 16         | 06:45 (71) | 21:43      | 15         | 06:45 (71) | 21:33      | 19       | 06:55 (71) | 21:49 | 19:49 | 18:48 | 17:04 | 16:56 |       |
| 22                  | 08:22   | 07:39    | 07:46 | 06:46 | 06:02 | 05:48      | 06:28 (71) | 06:09      | 06:31 (71) | 06:09      | 06:37 (71) | 06:48    | 07:29      | 08:10 | 07:56 | 08:27 |       |       |       |
|                     | 17:29   | 18:15    | 19:56 | 20:39 | 21:19 | 17         | 06:45 (71) | 21:43      | 15         | 06:46 (71) | 21:32      | 18       | 06:55 (71) | 21:47 | 19:47 | 18:46 | 17:03 | 16:56 |       |
| 23                  | 08:21   | 07:38    | 07:44 | 06:44 | 06:01 | 05:48      | 06:27 (71) | 06:10      | 06:31 (71) | 06:10      | 06:38 (71) | 06:49    | 07:30      | 08:12 | 07:57 | 08:28 |       |       |       |
|                     | 17:31   | 18:17    | 19:57 | 20:41 | 21:20 | 18         | 06:45 (71) | 21:43      | 15         | 06:46 (71) | 21:31      | 17       | 06:55 (71) | 21:45 | 19:45 | 18:45 | 17:02 | 16:57 |       |
| 24                  | 08:20   | 07:36    | 07:42 | 06:42 | 06:00 | 05:49      | 06:26 (71) | 06:12      | 06:30 (71) | 06:12      | 06:39 (71) | 06:51    | 07:31      | 08:13 | 07:59 | 08:28 |       |       |       |
|                     | 17:32   | 18:18    | 19:59 | 20:42 | 21:21 | 19         | 06:45 (71) | 21:44      | 16         | 06:46 (71) | 21:30      | 16       | 06:55 (71) | 21:44 | 19:43 | 18:43 | 17:02 | 16:58 |       |
| 25                  | 08:19   | 07:34    | 07:40 | 06:40 | 05:59 | 05:49      | 06:25 (71) | 06:13      | 06:30 (71) | 06:13      | 06:40 (71) | 06:52    | 07:33      | 08:15 | 08:00 | 08:29 |       |       |       |
|                     | 17:34   | 18:20    | 20:00 | 20:43 | 21:22 | 20         | 06:45 (71) | 21:44      | 16         | 06:46 (71) | 21:29      | 14       | 06:54 (71) | 21:42 | 19:41 | 18:41 | 17:01 | 16:58 |       |
| 26                  | 08:18   | 07:32    | 07:38 | 06:39 | 05:58 | 05:49      | 06:25 (71) | 06:14      | 06:31 (71) | 06:14      | 06:41 (71) | 06:53    | 07:34      | 08:16 | 08:01 | 08:29 |       |       |       |
|                     | 17:35   | 18:21    | 20:02 | 20:45 | 21:23 | 21         | 06:46 (71) | 21:44      | 16         | 06:47 (71) | 21:28      | 13       | 06:54 (71) | 21:40 | 19:39 | 18:39 | 17:00 | 16:59 |       |
| 27                  | 08:17   | 07:30    | 07:36 | 06:37 | 05:57 | 05:50      | 06:24 (71) | 06:10      | 06:31 (71) | 06:15      | 06:43 (71) | 06:55    | 07:35      | 08:18 | 08:03 | 08:29 |       |       |       |
|                     | 17:37   | 18:23    | 20:03 | 20:46 | 21:25 | 22         | 06:46 (71) | 21:44      | 16         | 06:47 (71) | 21:26      | 11       | 06:54 (71) | 21:38 | 19:37 | 18:38 | 16:59 | 16:59 |       |
| 28                  | 08:16   | 07:29    | 07:34 | 06:35 | 05:56 | 05:50      | 06:23 (71) | 06:10      | 06:31 (71) | 06:16      | 06:44 (71) | 06:56    | 07:37      | 08:19 | 08:04 | 08:30 |       |       |       |
|                     | 17:38   | 18:24    | 20:05 | 20:48 | 21:26 | 23         | 06:46 (71) | 21:44      | 17         | 06:48 (71) | 21:25      | 10       | 06:54 (71) | 21:36 | 19:34 | 18:36 | 16:59 | 17:00 |       |
| 29                  | 08:15   | 07:32    | 06:34 |       | 05:55 | 05:50      | 06:22 (71) | 06:10      | 06:31 (71) | 06:17      | 06:45 (71) | 06:57    | 07:38      | 08:20 | 08:05 | 08:30 |       |       |       |
|                     | 17:40   | 20:06    | 20:49 |       | 21:27 | 24         | 06:46 (71) | 21:44      | 17         | 06:48 (71) | 21:24      | 8        | 06:53 (71) | 21:34 | 19:32 | 18:34 | 16:58 | 17:01 |       |
| 30                  | 08:14   | 07:30    | 06:32 |       | 05:55 | 05:51      | 06:22 (71) | 06:10      | 06:30 (71) | 06:19      | 06:46 (71) | 06:59    | 07:39      | 08:22 | 08:07 | 08:30 |       |       |       |
|                     | 17:41   | 20:07    | 20:50 |       | 21:28 | 24         | 06:46 (71) | 21:44      | 18         | 06:48 (71) | 21:23      | 5        | 06:51 (71) | 21:32 | 19:30 | 18:33 | 16:57 | 17:02 |       |
| 31                  | 08:12   | 07:28    |       |       | 05:54 | 06:21 (71) |            |            | 06:20      |            | 06:47 (71) | 07:00    |            | 08:23 |       | 08:30 |       |       |       |
|                     | 17:43   | 20:09    |       |       | 21:29 | 25         | 06:46 (71) |            | 21:22      | 3          | 06:50 (71) | 20:30    |            | 18:31 |       | 17:03 |       |       |       |
| Potential sun hours | 278     | 286      | 367   | 406   | 466   |            | 475        | 555        | 481        |            | 443        | 380      | 339        | 283   | 266   |       |       |       |       |
| Total, worst case   |         |          |       |       | 291   |            |            | 573        |            |            |            |          |            |       |       |       |       |       |       |
| Sun reduction       |         |          |       |       | 0.64  |            |            | 0.67       |            |            |            |          |            |       |       |       |       |       |       |
| Oper. time red.     |         |          |       |       | 1.00  |            |            | 1.00       |            |            |            |          |            |       |       |       |       |       |       |
|                     |         |          |       |       |       |            |            |            |            |            |            |          |            |       |       |       |       |       |       |



Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

## Assumptions for shadow calculations

Reference year for calendar

Shadow receptor: R125 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (113)

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

| N   | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW | NW  | NNW | Sum   |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| 376 | 314 | 339 | 425 | 445 | 474 | 693 | 570 | 488 | 386 | 872 | 609 | 772 | 651 | 677 | 667 | 8,758 |

|                     | January | February | March | April | May   | June  | July  | August | September | October | November | December |
|---------------------|---------|----------|-------|-------|-------|-------|-------|--------|-----------|---------|----------|----------|
| 1                   | 08:31   | 08:11    | 07:27 | 07:26 | 06:30 | 05:53 | 05:51 | 06:21  | 07:01     | 07:41   | 08:25    | 08:08    |
|                     | 17:04   | 17:44    | 18:26 | 20:10 | 20:52 | 21:30 | 21:44 | 21:20  | 20:29     | 19:29   | 18:30    | 16:57    |
| 2                   | 08:31   | 08:10    | 07:25 | 07:24 | 06:29 | 05:52 | 05:52 | 06:22  | 07:03     | 07:42   | 08:27    | 08:09    |
|                     | 17:05   | 17:46    | 18:27 | 20:12 | 20:53 | 21:31 | 21:44 | 21:19  | 20:27     | 19:27   | 18:28    | 16:56    |
| 3                   | 08:31   | 08:09    | 07:23 | 07:22 | 06:27 | 05:52 | 05:53 | 06:24  | 07:04     | 07:44   | 08:28    | 08:10    |
|                     | 17:06   | 17:47    | 18:29 | 20:13 | 20:55 | 21:32 | 21:44 | 21:18  | 20:25     | 19:25   | 18:27    | 16:56    |
| 4                   | 08:31   | 08:08    | 07:21 | 07:20 | 06:26 | 05:51 | 05:53 | 06:25  | 07:05     | 07:45   | 08:30    | 08:12    |
|                     | 17:07   | 17:49    | 18:30 | 20:14 | 20:56 | 21:33 | 21:43 | 21:16  | 20:23     | 19:23   | 18:25    | 16:56    |
| 5                   | 08:31   | 08:06    | 07:19 | 07:18 | 06:24 | 05:51 | 05:54 | 06:26  | 07:07     | 07:46   | 07:31    | 08:13    |
|                     | 17:08   | 17:50    | 18:32 | 20:16 | 20:57 | 21:34 | 21:43 | 21:15  | 20:21     | 19:21   | 17:24    | 16:55    |
| 6                   | 08:30   | 08:05    | 07:17 | 07:16 | 06:23 | 05:50 | 05:55 | 06:27  | 07:08     | 07:48   | 07:33    | 08:14    |
|                     | 17:09   | 17:52    | 18:33 | 20:17 | 20:59 | 21:34 | 21:43 | 21:14  | 20:19     | 19:19   | 17:22    | 16:55    |
| 7                   | 08:30   | 08:03    | 07:16 | 07:14 | 06:21 | 05:50 | 05:55 | 06:29  | 07:09     | 07:49   | 07:34    | 08:15    |
|                     | 17:10   | 17:54    | 18:35 | 20:19 | 21:00 | 21:35 | 21:42 | 21:12  | 20:17     | 19:17   | 17:21    | 16:55    |
| 8                   | 08:30   | 08:02    | 07:14 | 07:12 | 06:20 | 05:49 | 05:56 | 06:30  | 07:10     | 07:51   | 07:36    | 08:16    |
|                     | 17:11   | 17:55    | 18:36 | 20:20 | 21:01 | 21:36 | 21:42 | 21:11  | 20:15     | 19:15   | 17:19    | 16:54    |
| 9                   | 08:30   | 08:01    | 07:12 | 07:10 | 06:18 | 05:49 | 05:57 | 06:31  | 07:12     | 07:52   | 07:37    | 08:17    |
|                     | 17:12   | 17:57    | 18:38 | 20:21 | 21:03 | 21:37 | 21:42 | 21:09  | 20:13     | 19:13   | 17:18    | 16:54    |
| 10                  | 08:29   | 07:59    | 07:10 | 07:08 | 06:17 | 05:49 | 05:58 | 06:32  | 07:13     | 07:53   | 07:39    | 08:18    |
|                     | 17:13   | 17:58    | 18:39 | 20:23 | 21:04 | 21:38 | 21:41 | 21:08  | 20:11     | 19:11   | 17:17    | 16:54    |
| 11                  | 08:29   | 07:58    | 07:08 | 07:06 | 06:15 | 05:48 | 05:58 | 06:34  | 07:14     | 07:55   | 07:40    | 08:19    |
|                     | 17:14   | 18:00    | 18:40 | 20:24 | 21:05 | 21:38 | 21:41 | 21:06  | 20:09     | 19:09   | 17:15    | 16:54    |
| 12                  | 08:29   | 07:56    | 08:06 | 07:04 | 06:14 | 05:48 | 05:59 | 06:35  | 07:16     | 07:56   | 07:41    | 08:20    |
|                     | 17:16   | 18:00    | 18:42 | 20:26 | 21:07 | 21:39 | 21:40 | 21:04  | 20:07     | 19:07   | 17:14    | 16:54    |
| 13                  | 08:28   | 07:54    | 08:04 | 07:03 | 06:13 | 05:48 | 06:00 | 06:36  | 07:17     | 07:57   | 07:43    | 08:21    |
|                     | 17:17   | 18:01    | 19:43 | 20:27 | 21:08 | 21:40 | 21:39 | 21:03  | 20:05     | 19:05   | 17:13    | 16:54    |
| 14                  | 08:28   | 07:53    | 08:02 | 07:01 | 06:11 | 05:48 | 06:01 | 06:38  | 07:18     | 07:59   | 07:44    | 08:22    |
|                     | 17:18   | 18:03    | 19:45 | 20:28 | 21:09 | 21:40 | 21:39 | 21:01  | 20:03     | 19:03   | 17:12    | 16:54    |
| 15                  | 08:27   | 07:51    | 08:00 | 06:59 | 06:10 | 05:48 | 06:02 | 06:39  | 07:20     | 08:00   | 07:46    | 08:23    |
|                     | 17:19   | 18:04    | 19:46 | 20:30 | 21:10 | 21:41 | 21:38 | 20:59  | 20:01     | 19:01   | 17:11    | 16:54    |
| 16                  | 08:26   | 07:50    | 07:58 | 06:57 | 06:09 | 05:48 | 06:03 | 06:40  | 07:21     | 08:02   | 07:47    | 08:24    |
|                     | 17:21   | 18:06    | 19:48 | 20:31 | 21:12 | 21:41 | 21:37 | 20:58  | 19:59     | 18:57   | 17:09    | 16:54    |
| 17                  | 08:26   | 07:48    | 07:56 | 06:55 | 06:07 | 05:48 | 06:04 | 06:42  | 07:22     | 08:03   | 07:49    | 08:24    |
|                     | 17:22   | 18:07    | 19:49 | 20:32 | 21:13 | 21:42 | 21:36 | 20:56  | 19:57     | 18:56   | 17:08    | 16:55    |
| 18                  | 08:25   | 07:46    | 07:54 | 06:53 | 06:06 | 05:48 | 06:05 | 06:43  | 07:24     | 08:05   | 07:50    | 08:25    |
|                     | 17:24   | 18:09    | 19:51 | 20:34 | 21:14 | 21:42 | 21:36 | 20:54  | 19:55     | 18:54   | 17:07    | 16:55    |
| 19                  | 08:24   | 07:45    | 07:52 | 06:51 | 06:05 | 05:48 | 06:06 | 06:44  | 07:25     | 08:06   | 07:52    | 08:26    |
|                     | 17:25   | 18:11    | 19:52 | 20:35 | 21:15 | 21:42 | 21:35 | 20:53  | 19:53     | 18:52   | 17:06    | 16:55    |
| 20                  | 08:24   | 07:43    | 07:50 | 06:49 | 06:04 | 05:48 | 06:07 | 06:45  | 07:26     | 08:07   | 07:53    | 08:26    |
|                     | 17:26   | 18:12    | 19:53 | 20:37 | 21:17 | 21:43 | 21:34 | 20:51  | 19:51     | 18:50   | 17:05    | 16:56    |
| 21                  | 08:23   | 07:41    | 07:48 | 06:48 | 06:03 | 05:48 | 06:08 | 06:47  | 07:28     | 08:09   | 07:55    | 08:27    |
|                     | 17:28   | 18:14    | 19:55 | 20:38 | 21:18 | 21:43 | 21:33 | 20:49  | 19:49     | 18:48   | 17:04    | 16:56    |
| 22                  | 08:22   | 07:40    | 07:46 | 06:46 | 06:02 | 05:48 | 06:09 | 06:48  | 07:29     | 08:10   | 07:56    | 08:28    |
|                     | 17:29   | 18:15    | 19:56 | 20:39 | 21:19 | 21:43 | 21:32 | 20:47  | 19:47     | 18:46   | 17:03    | 16:57    |
| 23                  | 08:21   | 07:38    | 07:44 | 06:44 | 06:01 | 05:48 | 06:10 | 06:49  | 07:30     | 08:12   | 07:57    | 08:28    |
|                     | 17:31   | 18:17    | 19:58 | 20:41 | 21:20 | 21:44 | 21:31 | 20:46  | 19:45     | 18:45   | 17:02    | 16:57    |
| 24                  | 08:20   | 07:36    | 07:42 | 06:42 | 06:00 | 05:49 | 06:12 | 06:51  | 07:32     | 08:13   | 07:59    | 08:29    |
|                     | 17:32   | 18:18    | 19:59 | 20:42 | 21:21 | 21:44 | 21:30 | 20:44  | 19:43     | 18:43   | 17:02    | 16:58    |
| 25                  | 08:19   | 07:34    | 07:40 | 06:41 | 05:59 | 05:49 | 06:13 | 06:52  | 07:33     | 08:15   | 08:00    | 08:29    |
|                     | 17:34   | 18:20    | 20:00 | 20:44 | 21:23 | 21:44 | 21:29 | 20:42  | 19:41     | 18:41   | 17:01    | 16:58    |
| 26                  | 08:18   | 07:32    | 07:38 | 06:39 | 05:58 | 05:49 | 06:14 | 06:53  | 07:34     | 08:16   | 08:02    | 08:29    |
|                     | 17:35   | 18:21    | 20:02 | 20:45 | 21:24 | 21:44 | 21:28 | 20:40  | 19:39     | 18:40   | 17:00    | 16:59    |
| 27                  | 08:17   | 07:31    | 07:36 | 06:37 | 05:57 | 05:50 | 06:15 | 06:55  | 07:36     | 08:18   | 08:03    | 08:30    |
|                     | 17:37   | 18:23    | 20:03 | 20:46 | 21:25 | 21:44 | 21:27 | 20:38  | 19:37     | 18:38   | 16:59    | 16:59    |
| 28                  | 08:16   | 07:29    | 07:34 | 06:35 | 05:56 | 05:50 | 06:16 | 06:56  | 07:37     | 08:19   | 08:04    | 08:30    |
|                     | 17:38   | 18:24    | 20:05 | 20:48 | 21:26 | 21:44 | 21:25 | 20:36  | 19:35     | 18:36   | 16:59    | 17:00    |
| 29                  | 08:15   |          | 07:32 | 06:34 | 05:55 | 05:50 | 06:17 | 06:57  | 07:38     | 08:21   | 08:05    | 08:30    |
|                     | 17:40   |          | 20:06 | 20:49 | 21:27 | 21:44 | 21:24 | 20:34  | 19:33     | 18:35   | 16:58    | 17:01    |
| 30                  | 08:14   |          | 07:30 | 06:32 | 05:55 | 05:51 | 06:19 | 06:59  | 07:40     | 08:22   | 08:07    | 08:30    |
|                     | 17:41   |          | 20:07 | 20:50 | 21:28 | 21:44 | 21:23 | 20:33  | 19:31     | 18:33   | 16:57    | 17:02    |
| 31                  | 08:13   |          | 07:28 |       | 05:54 |       | 06:20 | 07:00  |           | 08:24   |          | 08:31    |
|                     | 17:43   |          | 20:09 |       | 21:29 |       | 21:22 | 20:31  |           | 18:31   |          | 17:03    |
| Potential sun hours | 277     | 286      | 367   | 406   | 466   | 475   | 481   | 443    | 380       | 339     | 282      | 266      |
| Total, worst case   |         |          |       |       |       |       |       |        |           |         |          |          |
| Sun reduction       |         |          |       |       |       |       |       |        |           |         |          |          |
| Oper. time red.     |         |          |       |       |       |       |       |        |           |         |          |          |
| Wind dir. red.      |         |          |       |       |       |       |       |        |           |         |          |          |
| Total reduction     |         |          |       |       |       |       |       |        |           |         |          |          |
| Total, real         |         |          |       |       |       |       |       |        |           |         |          |          |

Table layout: For each day in each month the following matrix apply

| Day in month | Sun rise (hh:mm) | Sun set (hh:mm) | Minutes with flicker | First time (hh:mm) with flicker | Last time (hh:mm) with flicker | (WTG causing flicker first time) | (WTG causing flicker last time) |
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|

Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM  
US-01824-3627 Chelmsford  
+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

**SHADOW - Calendar**

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Assumptions for shadow calculations

Reference year for calendar

Shadow receptor: R126 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (114)

2023

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

| Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  |
|------|------|------|------|------|------|------|------|------|------|------|------|
| 0.54 | 0.52 | 0.61 | 0.58 | 0.64 | 0.67 | 0.75 | 0.72 | 0.67 | 0.53 | 0.42 | 0.45 |

Operational time

| N   | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW | NW  | NNW | Sum   |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| 376 | 314 | 339 | 425 | 445 | 474 | 693 | 570 | 488 | 386 | 872 | 609 | 772 | 651 | 677 | 667 | 8,758 |

|                     | January | February | March | April | May   | June  | July  | August | September | October | November | December |
|---------------------|---------|----------|-------|-------|-------|-------|-------|--------|-----------|---------|----------|----------|
| 1                   | 08:31   | 08:11    | 07:27 | 07:26 | 06:30 | 05:53 | 05:51 | 06:21  | 07:01     | 07:41   | 08:25    | 08:08    |
|                     | 17:04   | 17:44    | 18:26 | 20:10 | 20:52 | 21:30 | 21:44 | 21:20  | 20:29     | 19:29   | 18:30    | 16:57    |
| 2                   | 08:31   | 08:10    | 07:25 | 07:24 | 06:29 | 05:52 | 05:52 | 06:22  | 07:03     | 07:42   | 08:27    | 08:09    |
|                     | 17:05   | 17:46    | 18:27 | 20:12 | 20:53 | 21:31 | 21:44 | 21:19  | 20:27     | 19:27   | 18:28    | 16:56    |
| 3                   | 08:31   | 08:09    | 07:23 | 07:22 | 06:27 | 05:52 | 05:53 | 06:24  | 07:04     | 07:44   | 08:28    | 08:10    |
|                     | 17:06   | 17:47    | 18:29 | 20:13 | 20:55 | 21:32 | 21:44 | 21:18  | 20:25     | 19:25   | 18:27    | 16:56    |
| 4                   | 08:31   | 08:08    | 07:21 | 07:20 | 06:26 | 05:51 | 05:53 | 06:25  | 07:05     | 07:45   | 08:30    | 08:12    |
|                     | 17:07   | 17:49    | 18:30 | 20:14 | 20:56 | 21:33 | 21:43 | 21:16  | 20:23     | 19:23   | 18:25    | 16:56    |
| 5                   | 08:31   | 08:06    | 07:19 | 07:18 | 06:24 | 05:51 | 05:54 | 06:26  | 07:07     | 07:46   | 07:31    | 08:13    |
|                     | 17:08   | 17:50    | 18:32 | 20:16 | 20:57 | 21:34 | 21:43 | 21:15  | 20:21     | 19:21   | 17:24    | 16:55    |
| 6                   | 08:30   | 08:05    | 07:17 | 07:16 | 06:23 | 05:50 | 05:55 | 06:27  | 07:08     | 07:48   | 07:33    | 08:14    |
|                     | 17:09   | 17:52    | 18:33 | 20:17 | 20:59 | 21:34 | 21:43 | 21:14  | 20:19     | 19:19   | 17:22    | 16:55    |
| 7                   | 08:30   | 08:03    | 07:16 | 07:14 | 06:21 | 05:50 | 05:55 | 06:29  | 07:09     | 07:49   | 07:34    | 08:15    |
|                     | 17:10   | 17:54    | 18:35 | 20:19 | 21:00 | 21:35 | 21:42 | 21:12  | 20:17     | 19:17   | 17:21    | 16:55    |
| 8                   | 08:30   | 08:02    | 07:14 | 07:12 | 06:20 | 05:49 | 05:56 | 06:30  | 07:10     | 07:51   | 07:36    | 08:16    |
|                     | 17:11   | 17:55    | 18:36 | 20:20 | 21:01 | 21:36 | 21:42 | 21:11  | 20:15     | 19:15   | 17:19    | 16:54    |
| 9                   | 08:30   | 08:01    | 07:12 | 07:10 | 06:18 | 05:49 | 05:57 | 06:31  | 07:12     | 07:52   | 07:37    | 08:17    |
|                     | 17:12   | 17:57    | 18:38 | 20:21 | 21:03 | 21:37 | 21:42 | 21:09  | 20:13     | 19:13   | 17:18    | 16:54    |
| 10                  | 08:29   | 07:59    | 07:10 | 07:08 | 06:17 | 05:49 | 05:58 | 06:32  | 07:13     | 07:53   | 07:39    | 08:18    |
|                     | 17:13   | 17:58    | 18:39 | 20:23 | 21:04 | 21:38 | 21:41 | 21:08  | 20:11     | 19:11   | 17:17    | 16:54    |
| 11                  | 08:29   | 07:58    | 07:08 | 07:06 | 06:15 | 05:48 | 05:58 | 06:34  | 07:14     | 07:55   | 07:40    | 08:19    |
|                     | 17:14   | 18:00    | 18:40 | 20:24 | 21:05 | 21:38 | 21:41 | 21:06  | 20:09     | 19:09   | 17:15    | 16:54    |
| 12                  | 08:29   | 07:56    | 08:06 | 07:04 | 06:14 | 05:48 | 05:59 | 06:35  | 07:16     | 07:56   | 07:41    | 08:20    |
|                     | 17:16   | 18:00    | 18:42 | 20:26 | 21:07 | 21:39 | 21:40 | 21:04  | 20:07     | 19:07   | 17:14    | 16:54    |
| 13                  | 08:28   | 07:54    | 08:04 | 07:03 | 06:13 | 05:48 | 06:00 | 06:36  | 07:17     | 07:57   | 07:43    | 08:21    |
|                     | 17:17   | 18:01    | 19:43 | 20:27 | 21:08 | 21:40 | 21:39 | 21:03  | 20:05     | 19:05   | 17:13    | 16:54    |
| 14                  | 08:28   | 07:53    | 08:02 | 07:01 | 06:11 | 05:48 | 06:01 | 06:38  | 07:18     | 07:59   | 07:44    | 08:22    |
|                     | 17:18   | 18:03    | 19:45 | 20:28 | 21:09 | 21:40 | 21:39 | 21:01  | 20:03     | 19:03   | 17:12    | 16:54    |
| 15                  | 08:27   | 07:51    | 08:00 | 06:59 | 06:10 | 05:48 | 06:02 | 06:39  | 07:20     | 08:00   | 07:46    | 08:23    |
|                     | 17:19   | 18:04    | 19:46 | 20:30 | 21:10 | 21:41 | 21:38 | 20:59  | 20:01     | 19:01   | 17:11    | 16:54    |
| 16                  | 08:26   | 07:50    | 07:58 | 06:57 | 06:09 | 05:48 | 06:03 | 06:40  | 07:21     | 08:02   | 07:47    | 08:24    |
|                     | 17:21   | 18:06    | 19:48 | 20:31 | 21:12 | 21:41 | 21:37 | 20:58  | 19:59     | 18:57   | 17:09    | 16:54    |
| 17                  | 08:26   | 07:48    | 07:56 | 06:55 | 06:07 | 05:48 | 06:04 | 06:42  | 07:22     | 08:03   | 07:49    | 08:24    |
|                     | 17:22   | 18:07    | 19:49 | 20:32 | 21:13 | 21:42 | 21:36 | 20:56  | 19:57     | 18:56   | 17:08    | 16:55    |
| 18                  | 08:25   | 07:46    | 07:54 | 06:53 | 06:06 | 05:48 | 06:05 | 06:43  | 07:24     | 08:05   | 07:50    | 08:25    |
|                     | 17:24   | 18:09    | 19:51 | 20:34 | 21:14 | 21:42 | 21:36 | 20:54  | 19:55     | 18:54   | 17:07    | 16:55    |
| 19                  | 08:24   | 07:45    | 07:52 | 06:51 | 06:05 | 05:48 | 06:06 | 06:44  | 07:25     | 08:06   | 07:52    | 08:26    |
|                     | 17:25   | 18:11    | 19:52 | 20:35 | 21:15 | 21:42 | 21:35 | 20:53  | 19:53     | 18:52   | 17:06    | 16:55    |
| 20                  | 08:24   | 07:43    | 07:50 | 06:49 | 06:04 | 05:48 | 06:07 | 06:45  | 07:26     | 08:07   | 07:53    | 08:26    |
|                     | 17:26   | 18:12    | 19:53 | 20:37 | 21:17 | 21:43 | 21:34 | 20:51  | 19:51     | 18:50   | 17:05    | 16:56    |
| 21                  | 08:23   | 07:41    | 07:48 | 06:48 | 06:03 | 05:48 | 06:08 | 06:47  | 07:28     | 08:09   | 07:55    | 08:27    |
|                     | 17:28   | 18:14    | 19:55 | 20:38 | 21:18 | 21:43 | 21:33 | 20:49  | 19:49     | 18:48   | 17:04    | 16:56    |
| 22                  | 08:22   | 07:40    | 07:46 | 06:46 | 06:02 | 05:48 | 06:09 | 06:48  | 07:29     | 08:10   | 07:56    | 08:28    |
|                     | 17:29   | 18:15    | 19:56 | 20:39 | 21:19 | 21:43 | 21:32 | 20:47  | 19:47     | 18:46   | 17:03    | 16:56    |
| 23                  | 08:21   | 07:38    | 07:44 | 06:44 | 06:01 | 05:48 | 06:10 | 06:49  | 07:30     | 08:12   | 07:57    | 08:28    |
|                     | 17:31   | 18:17    | 19:58 | 20:41 | 21:20 | 21:44 | 21:31 | 20:46  | 19:45     | 18:45   | 17:02    | 16:57    |
| 24                  | 08:20   | 07:36    | 07:42 | 06:42 | 06:00 | 05:49 | 06:12 | 06:51  | 07:32     | 08:13   | 07:59    | 08:29    |
|                     | 17:32   | 18:18    | 19:59 | 20:42 | 21:21 | 21:44 | 21:30 | 20:44  | 19:43     | 18:43   | 17:02    | 16:58    |
| 25                  | 08:19   | 07:34    | 07:40 | 06:41 | 05:59 | 05:49 | 06:13 | 06:52  | 07:33     | 08:15   | 08:00    | 08:29    |
|                     | 17:34   | 18:20    | 20:00 | 20:44 | 21:23 | 21:44 | 21:29 | 20:42  | 19:41     | 18:41   | 17:01    | 16:58    |
| 26                  | 08:18   | 07:32    | 07:38 | 06:39 | 05:58 | 05:49 | 06:14 | 06:53  | 07:34     | 08:16   | 08:02    | 08:29    |
|                     | 17:35   | 18:21    | 20:02 | 20:45 | 21:24 | 21:44 | 21:28 | 20:40  | 19:39     | 18:40   | 17:00    | 16:59    |
| 27                  | 08:17   | 07:31    | 07:36 | 06:37 | 05:57 | 05:50 | 06:15 | 06:55  | 07:36     | 08:18   | 08:03    | 08:30    |
|                     | 17:37   | 18:23    | 20:03 | 20:46 | 21:25 | 21:44 | 21:27 | 20:38  | 19:37     | 18:38   | 16:59    | 16:59    |
| 28                  | 08:16   | 07:29    | 07:34 | 06:35 | 05:56 | 05:50 | 06:16 | 06:56  | 07:37     | 08:19   | 08:04    | 08:30    |
|                     | 17:38   | 18:24    | 20:05 | 20:48 | 21:26 | 21:44 | 21:25 | 20:36  | 19:35     | 18:36   | 16:59    | 17:00    |
| 29                  | 08:15   |          | 07:32 | 06:34 | 05:55 | 05:50 | 06:17 | 06:57  | 07:38     | 08:21   | 08:05    | 08:30    |
|                     | 17:40   |          | 20:06 | 20:49 | 21:27 | 21:44 | 21:24 | 20:34  | 19:33     | 18:35   | 16:58    | 17:01    |
| 30                  | 08:14   |          | 07:30 | 06:32 | 05:55 | 05:51 | 06:19 | 06:59  | 07:40     | 08:22   | 08:07    | 08:30    |
|                     | 17:41   |          | 20:07 | 20:50 | 21:28 | 21:44 | 21:23 | 20:33  | 19:31     | 18:33   | 16:57    | 17:02    |
| 31                  | 08:13   |          | 07:28 |       | 05:54 |       | 06:20 | 07:00  |           | 08:24   |          | 08:31    |
|                     | 17:43   |          | 20:09 |       | 21:29 |       | 21:22 | 20:31  |           | 18:31   |          | 17:03    |
| Potential sun hours | 277     | 286      | 367   | 406   | 466   | 475   | 481   | 443    | 380       | 339     | 282      | 266      |
| Total, worst case   |         |          |       |       |       |       |       |        |           |         |          |          |
| Sun reduction       |         |          |       |       |       |       |       |        |           |         |          |          |
| Oper. time red.     |         |          |       |       |       |       |       |        |           |         |          |          |
| Wind dir. red.      |         |          |       |       |       |       |       |        |           |         |          |          |
| Total reduction     |         |          |       |       |       |       |       |        |           |         |          |          |
| Total, real         |         |          |       |       |       |       |       |        |           |         |          |          |

Table layout: For each day in each month the following matrix apply

| Day in month | Sun rise (hh:mm) | Sun set (hh:mm) | Minutes with flicker | First time (hh:mm) with flicker | Last time (hh:mm) with flicker | (WTG causing flicker first time) | (WTG causing flicker last time) |
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|



Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: R129 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (116)

## Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Reference year for calendar

2023

| Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  |
|------|------|------|------|------|------|------|------|------|------|------|------|
| 0.54 | 0.52 | 0.61 | 0.58 | 0.64 | 0.67 | 0.75 | 0.72 | 0.67 | 0.53 | 0.42 | 0.45 |

Operational time

| N   | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW | NW  | NNW | Sum   |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| 376 | 314 | 339 | 425 | 445 | 474 | 693 | 570 | 488 | 386 | 872 | 609 | 772 | 651 | 677 | 667 | 8,758 |

|                     | January | February | March | April | May   | June  | July  | August | September | October | November | December |
|---------------------|---------|----------|-------|-------|-------|-------|-------|--------|-----------|---------|----------|----------|
| 1                   | 08:31   | 08:11    | 07:27 | 07:26 | 06:30 | 05:53 | 05:51 | 06:21  | 07:01     | 07:41   | 08:25    | 08:08    |
|                     | 17:04   | 17:44    | 18:26 | 20:10 | 20:52 | 21:30 | 21:44 | 21:21  | 20:29     | 19:29   | 18:30    | 16:57    |
| 2                   | 08:31   | 08:10    | 07:25 | 07:24 | 06:29 | 05:52 | 05:52 | 06:22  | 07:03     | 07:42   | 08:27    | 08:09    |
|                     | 17:05   | 17:46    | 18:27 | 20:12 | 20:53 | 21:31 | 21:44 | 21:19  | 20:27     | 19:27   | 18:28    | 16:56    |
| 3                   | 08:31   | 08:09    | 07:23 | 07:22 | 06:27 | 05:52 | 05:52 | 06:23  | 07:04     | 07:44   | 08:28    | 08:10    |
|                     | 17:05   | 17:47    | 18:29 | 20:13 | 20:55 | 21:32 | 21:44 | 21:18  | 20:25     | 19:25   | 18:27    | 16:56    |
| 4                   | 08:31   | 08:08    | 07:21 | 07:20 | 06:26 | 05:51 | 05:53 | 06:25  | 07:05     | 07:45   | 08:30    | 08:12    |
|                     | 17:06   | 17:49    | 18:30 | 20:14 | 20:56 | 21:33 | 21:43 | 21:16  | 20:23     | 19:23   | 18:25    | 16:56    |
| 5                   | 08:31   | 08:06    | 07:19 | 07:18 | 06:24 | 05:51 | 05:54 | 06:26  | 07:06     | 07:46   | 07:31    | 08:13    |
|                     | 17:07   | 17:50    | 18:32 | 20:16 | 20:57 | 21:34 | 21:43 | 21:15  | 20:21     | 19:21   | 17:24    | 16:55    |
| 6                   | 08:30   | 08:05    | 07:17 | 07:16 | 06:22 | 05:50 | 05:54 | 06:27  | 07:08     | 07:48   | 07:33    | 08:14    |
|                     | 17:09   | 17:52    | 18:33 | 20:17 | 20:59 | 21:35 | 21:43 | 21:14  | 20:19     | 19:19   | 17:22    | 16:55    |
| 7                   | 08:30   | 08:03    | 07:16 | 07:14 | 06:21 | 05:50 | 05:55 | 06:28  | 07:09     | 07:49   | 07:34    | 08:15    |
|                     | 17:10   | 17:53    | 18:35 | 20:19 | 21:00 | 21:35 | 21:42 | 21:12  | 20:17     | 19:17   | 17:21    | 16:55    |
| 8                   | 08:30   | 08:02    | 07:14 | 07:12 | 06:19 | 05:49 | 05:56 | 06:30  | 07:10     | 07:51   | 07:36    | 08:16    |
|                     | 17:11   | 17:55    | 18:36 | 20:20 | 21:01 | 21:36 | 21:42 | 21:11  | 20:15     | 19:15   | 17:19    | 16:54    |
| 9                   | 08:30   | 08:01    | 07:12 | 07:10 | 06:18 | 05:49 | 05:57 | 06:31  | 07:12     | 07:52   | 07:37    | 08:17    |
|                     | 17:12   | 17:57    | 18:38 | 20:21 | 21:03 | 21:37 | 21:42 | 21:09  | 20:13     | 19:13   | 17:18    | 16:54    |
| 10                  | 08:29   | 07:59    | 07:10 | 07:08 | 06:17 | 05:49 | 05:58 | 06:32  | 07:13     | 07:53   | 07:39    | 08:18    |
|                     | 17:13   | 17:58    | 18:39 | 20:23 | 21:04 | 21:38 | 21:41 | 21:08  | 20:11     | 19:11   | 17:17    | 16:54    |
| 11                  | 08:29   | 07:58    | 07:08 | 07:06 | 06:15 | 05:48 | 05:58 | 06:34  | 07:14     | 07:55   | 07:40    | 08:19    |
|                     | 17:14   | 18:00    | 18:40 | 20:24 | 21:05 | 21:38 | 21:41 | 21:06  | 20:09     | 19:09   | 17:15    | 16:54    |
| 12                  | 08:29   | 07:56    | 08:06 | 07:04 | 06:14 | 05:48 | 05:59 | 06:35  | 07:16     | 07:56   | 07:41    | 08:20    |
|                     | 17:16   | 18:00    | 18:42 | 20:26 | 21:07 | 21:39 | 21:40 | 21:04  | 20:07     | 19:07   | 17:14    | 16:54    |
| 13                  | 08:28   | 07:54    | 08:04 | 07:02 | 06:12 | 05:48 | 06:00 | 06:36  | 07:17     | 07:57   | 07:43    | 08:21    |
|                     | 17:17   | 18:01    | 19:43 | 20:27 | 21:08 | 21:40 | 21:39 | 21:03  | 20:05     | 19:05   | 17:13    | 16:54    |
| 14                  | 08:28   | 07:53    | 08:02 | 07:01 | 06:11 | 05:48 | 06:01 | 06:38  | 07:18     | 07:59   | 07:44    | 08:22    |
|                     | 17:18   | 18:03    | 19:45 | 20:28 | 21:09 | 21:40 | 21:39 | 21:01  | 20:03     | 19:03   | 17:12    | 16:54    |
| 15                  | 08:27   | 07:51    | 08:00 | 06:59 | 06:10 | 05:48 | 06:02 | 06:39  | 07:20     | 08:00   | 07:46    | 08:23    |
|                     | 17:19   | 18:04    | 19:46 | 20:30 | 21:10 | 21:41 | 21:38 | 20:59  | 20:01     | 19:01   | 17:10    | 16:54    |
| 16                  | 08:26   | 07:50    | 07:58 | 06:57 | 06:09 | 05:47 | 06:03 | 06:40  | 07:21     | 08:02   | 07:47    | 08:24    |
|                     | 17:21   | 18:06    | 19:48 | 20:31 | 21:12 | 21:41 | 21:37 | 20:58  | 19:59     | 18:57   | 17:09    | 16:54    |
| 17                  | 08:26   | 07:48    | 07:56 | 06:55 | 06:07 | 05:47 | 06:04 | 06:41  | 07:22     | 08:03   | 07:49    | 08:24    |
|                     | 17:22   | 18:07    | 19:49 | 20:32 | 21:13 | 21:42 | 21:36 | 20:56  | 19:57     | 18:55   | 17:08    | 16:55    |
| 18                  | 08:25   | 07:46    | 07:54 | 06:53 | 06:06 | 05:47 | 06:05 | 06:43  | 07:24     | 08:05   | 07:50    | 08:25    |
|                     | 17:23   | 18:09    | 19:50 | 20:34 | 21:14 | 21:42 | 21:36 | 20:54  | 19:55     | 18:54   | 17:07    | 16:55    |
| 19                  | 08:24   | 07:45    | 07:52 | 06:51 | 06:05 | 05:48 | 06:06 | 06:44  | 07:25     | 08:06   | 07:52    | 08:26    |
|                     | 17:25   | 18:11    | 19:52 | 20:35 | 21:16 | 21:42 | 21:35 | 20:53  | 19:53     | 18:52   | 17:06    | 16:55    |
| 20                  | 08:24   | 07:43    | 07:50 | 06:49 | 06:04 | 05:48 | 06:07 | 06:45  | 07:26     | 08:07   | 07:53    | 08:26    |
|                     | 17:26   | 18:12    | 19:53 | 20:37 | 21:17 | 21:43 | 21:34 | 20:51  | 19:51     | 18:50   | 17:05    | 16:56    |
| 21                  | 08:23   | 07:41    | 07:48 | 06:48 | 06:03 | 05:48 | 06:08 | 06:47  | 07:28     | 08:09   | 07:55    | 08:27    |
|                     | 17:28   | 18:14    | 19:55 | 20:38 | 21:18 | 21:43 | 21:33 | 20:49  | 19:49     | 18:48   | 17:04    | 16:56    |
| 22                  | 08:22   | 07:40    | 07:46 | 06:46 | 06:02 | 05:48 | 06:09 | 06:48  | 07:29     | 08:10   | 07:56    | 08:28    |
|                     | 17:29   | 18:15    | 19:56 | 20:39 | 21:19 | 21:43 | 21:32 | 20:47  | 19:47     | 18:46   | 17:03    | 16:56    |
| 23                  | 08:21   | 07:38    | 07:44 | 06:44 | 06:01 | 05:48 | 06:10 | 06:49  | 07:30     | 08:12   | 07:57    | 08:28    |
|                     | 17:31   | 18:17    | 19:58 | 20:41 | 21:20 | 21:44 | 21:31 | 20:46  | 19:45     | 18:45   | 17:02    | 16:57    |
| 24                  | 08:20   | 07:36    | 07:42 | 06:42 | 06:00 | 05:48 | 06:11 | 06:51  | 07:32     | 08:13   | 07:59    | 08:29    |
|                     | 17:32   | 18:18    | 19:59 | 20:42 | 21:21 | 21:44 | 21:30 | 20:44  | 19:43     | 18:43   | 17:02    | 16:57    |
| 25                  | 08:19   | 07:34    | 07:40 | 06:40 | 05:59 | 05:49 | 06:13 | 06:52  | 07:33     | 08:15   | 08:00    | 08:29    |
|                     | 17:34   | 18:20    | 20:00 | 20:44 | 21:23 | 21:44 | 21:29 | 20:42  | 19:41     | 18:41   | 17:01    | 16:58    |
| 26                  | 08:18   | 07:32    | 07:38 | 06:39 | 05:58 | 05:49 | 06:14 | 06:53  | 07:34     | 08:16   | 08:02    | 08:29    |
|                     | 17:35   | 18:21    | 20:02 | 20:45 | 21:24 | 21:44 | 21:28 | 20:40  | 19:39     | 18:39   | 17:00    | 16:59    |
| 27                  | 08:17   | 07:31    | 07:36 | 06:37 | 05:57 | 05:49 | 06:15 | 06:55  | 07:36     | 08:18   | 08:03    | 08:30    |
|                     | 17:37   | 18:23    | 20:03 | 20:46 | 21:25 | 21:44 | 21:27 | 20:38  | 19:37     | 18:38   | 16:59    | 16:59    |
| 28                  | 08:16   | 07:29    | 07:34 | 06:35 | 05:56 | 05:50 | 06:16 | 06:56  | 07:37     | 08:19   | 08:04    | 08:30    |
|                     | 17:38   | 18:24    | 20:05 | 20:48 | 21:26 | 21:44 | 21:26 | 20:36  | 19:35     | 18:36   | 16:59    | 17:00    |
| 29                  | 08:15   |          | 07:32 | 06:34 | 05:55 | 05:50 | 06:17 | 06:57  | 07:38     | 08:21   | 08:06    | 08:30    |
|                     | 17:40   |          | 20:06 | 20:49 | 21:27 | 21:44 | 21:24 | 20:34  | 19:33     | 18:34   | 16:58    | 17:01    |
| 30                  | 08:14   |          | 07:30 | 06:32 | 05:54 | 05:51 | 06:19 | 06:59  | 07:40     | 08:22   | 08:07    | 08:30    |
|                     | 17:41   |          | 20:07 | 20:50 | 21:28 | 21:44 | 21:23 | 20:33  | 19:31     | 18:33   | 16:57    | 17:02    |
| 31                  | 08:13   |          | 07:28 |       | 05:54 |       | 06:20 | 07:00  |           | 08:24   |          | 08:31    |
|                     | 17:43   |          | 20:09 |       | 21:29 |       | 21:22 | 20:31  |           | 18:31   |          | 17:02    |
| Potential sun hours | 277     | 286      | 367   | 406   | 466   | 475   | 481   | 443    | 380       | 339     | 282      | 266      |
| Total, worst case   |         |          |       |       |       |       |       |        |           |         |          |          |
| Sun reduction       |         |          |       |       |       |       |       |        |           |         |          |          |
| Oper. time red.     |         |          |       |       |       |       |       |        |           |         |          |          |
| Wind dir. red.      |         |          |       |       |       |       |       |        |           |         |          |          |
| Total reduction     |         |          |       |       |       |       |       |        |           |         |          |          |
| Total, real         |         |          |       |       |       |       |       |        |           |         |          |          |

Table layout: For each day in each month the following matrix apply

| Day in month | Sun rise (hh:mm) | Sun set (hh:mm) | Minutes with flicker | First time (hh:mm) with flicker | Last time (hh:mm) with flicker | (WTG causing flicker first time) | (WTG causing flicker last time) |
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|

Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: R130 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (117)

## Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Reference year for calendar

2023

| Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  |
|------|------|------|------|------|------|------|------|------|------|------|------|
| 0.54 | 0.52 | 0.61 | 0.58 | 0.64 | 0.67 | 0.75 | 0.72 | 0.67 | 0.53 | 0.42 | 0.45 |

Operational time

| N   | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW | NW  | NNW | Sum   |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| 376 | 314 | 339 | 425 | 445 | 474 | 693 | 570 | 488 | 386 | 872 | 609 | 772 | 651 | 677 | 667 | 8,758 |

|                     | January | February | March | April | May   | June  | July  | August | September | October | November | December |
|---------------------|---------|----------|-------|-------|-------|-------|-------|--------|-----------|---------|----------|----------|
| 1                   | 08:31   | 08:11    | 07:27 | 07:26 | 06:30 | 05:53 | 05:51 | 06:21  | 07:01     | 07:41   | 08:25    | 08:08    |
|                     | 17:04   | 17:44    | 18:26 | 20:10 | 20:52 | 21:30 | 21:44 | 21:21  | 20:29     | 19:29   | 18:30    | 16:57    |
| 2                   | 08:31   | 08:10    | 07:25 | 07:24 | 06:29 | 05:52 | 05:52 | 06:22  | 07:03     | 07:42   | 08:27    | 08:09    |
|                     | 17:05   | 17:46    | 18:27 | 20:12 | 20:53 | 21:31 | 21:44 | 21:19  | 20:27     | 19:27   | 18:28    | 16:56    |
| 3                   | 08:31   | 08:09    | 07:23 | 07:22 | 06:27 | 05:52 | 05:52 | 06:23  | 07:04     | 07:44   | 08:28    | 08:11    |
|                     | 17:05   | 17:47    | 18:29 | 20:13 | 20:55 | 21:32 | 21:44 | 21:18  | 20:25     | 19:25   | 18:27    | 16:56    |
| 4                   | 08:31   | 08:08    | 07:21 | 07:20 | 06:26 | 05:51 | 05:53 | 06:25  | 07:05     | 07:45   | 08:30    | 08:12    |
|                     | 17:06   | 17:49    | 18:30 | 20:14 | 20:56 | 21:33 | 21:43 | 21:16  | 20:23     | 19:23   | 18:25    | 16:56    |
| 5                   | 08:31   | 08:06    | 07:19 | 07:18 | 06:24 | 05:51 | 05:54 | 06:26  | 07:06     | 07:46   | 07:31    | 08:13    |
|                     | 17:07   | 17:50    | 18:32 | 20:16 | 20:57 | 21:34 | 21:43 | 21:15  | 20:21     | 19:21   | 17:24    | 16:55    |
| 6                   | 08:30   | 08:05    | 07:17 | 07:16 | 06:22 | 05:50 | 05:54 | 06:27  | 07:08     | 07:48   | 07:33    | 08:14    |
|                     | 17:09   | 17:52    | 18:33 | 20:17 | 20:59 | 21:35 | 21:43 | 21:14  | 20:19     | 19:19   | 17:22    | 16:55    |
| 7                   | 08:30   | 08:03    | 07:16 | 07:14 | 06:21 | 05:50 | 05:55 | 06:29  | 07:09     | 07:49   | 07:34    | 08:15    |
|                     | 17:10   | 17:53    | 18:35 | 20:19 | 21:00 | 21:35 | 21:42 | 21:12  | 20:17     | 19:17   | 17:21    | 16:55    |
| 8                   | 08:30   | 08:02    | 07:14 | 07:12 | 06:19 | 05:49 | 05:56 | 06:30  | 07:10     | 07:51   | 07:36    | 08:16    |
|                     | 17:11   | 17:55    | 18:36 | 20:20 | 21:01 | 21:36 | 21:42 | 21:11  | 20:15     | 19:15   | 17:19    | 16:54    |
| 9                   | 08:30   | 08:01    | 07:12 | 07:10 | 06:18 | 05:49 | 05:57 | 06:31  | 07:12     | 07:52   | 07:37    | 08:17    |
|                     | 17:12   | 17:57    | 18:38 | 20:21 | 21:03 | 21:37 | 21:42 | 21:09  | 20:13     | 19:13   | 17:18    | 16:54    |
| 10                  | 08:29   | 07:59    | 07:10 | 07:08 | 06:17 | 05:49 | 05:57 | 06:32  | 07:13     | 07:53   | 07:39    | 08:18    |
|                     | 17:13   | 17:58    | 18:39 | 20:23 | 21:04 | 21:38 | 21:41 | 21:08  | 20:11     | 19:11   | 17:17    | 16:54    |
| 11                  | 08:29   | 07:58    | 07:08 | 07:06 | 06:15 | 05:48 | 05:58 | 06:34  | 07:14     | 07:55   | 07:40    | 08:19    |
|                     | 17:14   | 18:00    | 18:40 | 20:24 | 21:05 | 21:38 | 21:41 | 21:06  | 20:09     | 19:09   | 17:15    | 16:54    |
| 12                  | 08:29   | 07:56    | 08:06 | 07:04 | 06:14 | 05:48 | 05:59 | 06:35  | 07:16     | 07:56   | 07:42    | 08:20    |
|                     | 17:16   | 18:00    | 18:42 | 20:26 | 21:07 | 21:39 | 21:40 | 21:04  | 20:07     | 19:07   | 17:14    | 16:54    |
| 13                  | 08:28   | 07:54    | 08:04 | 07:02 | 06:12 | 05:48 | 06:00 | 06:36  | 07:17     | 07:57   | 07:43    | 08:21    |
|                     | 17:17   | 18:01    | 19:43 | 20:27 | 21:08 | 21:40 | 21:39 | 21:03  | 20:05     | 19:05   | 17:13    | 16:54    |
| 14                  | 08:28   | 07:53    | 08:02 | 07:01 | 06:11 | 05:48 | 06:01 | 06:38  | 07:18     | 07:59   | 07:44    | 08:22    |
|                     | 17:18   | 18:03    | 19:45 | 20:28 | 21:09 | 21:40 | 21:39 | 21:01  | 20:03     | 19:03   | 17:12    | 16:54    |
| 15                  | 08:27   | 07:51    | 08:00 | 06:59 | 06:10 | 05:48 | 06:02 | 06:39  | 07:20     | 08:00   | 07:46    | 08:23    |
|                     | 17:19   | 18:04    | 19:46 | 20:30 | 21:11 | 21:38 | 21:00 | 21:00  | 20:01     | 19:01   | 17:10    | 16:54    |
| 16                  | 08:26   | 07:50    | 07:58 | 06:57 | 06:09 | 05:47 | 06:03 | 06:40  | 07:21     | 08:02   | 07:47    | 08:24    |
|                     | 17:21   | 18:06    | 19:48 | 20:31 | 21:12 | 21:41 | 21:37 | 20:58  | 19:59     | 18:57   | 17:09    | 16:54    |
| 17                  | 08:26   | 07:48    | 07:56 | 06:55 | 06:07 | 05:47 | 06:04 | 06:41  | 07:22     | 08:03   | 07:49    | 08:24    |
|                     | 17:22   | 18:07    | 19:49 | 20:32 | 21:13 | 21:42 | 21:37 | 20:56  | 19:57     | 18:55   | 17:08    | 16:55    |
| 18                  | 08:25   | 07:46    | 07:54 | 06:53 | 06:06 | 05:47 | 06:05 | 06:43  | 07:24     | 08:05   | 07:50    | 08:25    |
|                     | 17:23   | 18:09    | 19:51 | 20:34 | 21:14 | 21:42 | 21:36 | 20:54  | 19:55     | 18:54   | 17:07    | 16:55    |
| 19                  | 08:24   | 07:45    | 07:52 | 06:51 | 06:05 | 05:48 | 06:06 | 06:44  | 07:25     | 08:06   | 07:52    | 08:26    |
|                     | 17:25   | 18:11    | 19:52 | 20:35 | 21:16 | 21:43 | 21:35 | 20:53  | 19:53     | 18:52   | 17:06    | 16:55    |
| 20                  | 08:24   | 07:43    | 07:50 | 06:49 | 06:04 | 05:48 | 06:07 | 06:45  | 07:26     | 08:07   | 07:53    | 08:26    |
|                     | 17:26   | 18:12    | 19:53 | 20:37 | 21:17 | 21:43 | 21:34 | 20:51  | 19:51     | 18:50   | 17:05    | 16:56    |
| 21                  | 08:23   | 07:41    | 07:48 | 06:48 | 06:03 | 05:48 | 06:08 | 06:47  | 07:28     | 08:09   | 07:55    | 08:27    |
|                     | 17:28   | 18:14    | 19:55 | 20:38 | 21:18 | 21:43 | 21:33 | 20:49  | 19:49     | 18:48   | 17:04    | 16:56    |
| 22                  | 08:22   | 07:40    | 07:46 | 06:46 | 06:02 | 05:48 | 06:09 | 06:48  | 07:29     | 08:10   | 07:56    | 08:28    |
|                     | 17:29   | 18:15    | 19:56 | 20:39 | 21:19 | 21:43 | 21:32 | 20:47  | 19:47     | 18:46   | 17:03    | 16:56    |
| 23                  | 08:21   | 07:38    | 07:44 | 06:44 | 06:01 | 05:48 | 06:10 | 06:49  | 07:30     | 08:12   | 07:57    | 08:28    |
|                     | 17:31   | 18:17    | 19:58 | 20:41 | 21:20 | 21:44 | 21:31 | 20:46  | 19:45     | 18:45   | 17:02    | 16:57    |
| 24                  | 08:20   | 07:36    | 07:42 | 06:42 | 06:00 | 05:48 | 06:11 | 06:51  | 07:32     | 08:13   | 07:59    | 08:29    |
|                     | 17:32   | 18:18    | 19:59 | 20:42 | 21:22 | 21:44 | 21:30 | 20:44  | 19:43     | 18:43   | 17:02    | 16:57    |
| 25                  | 08:19   | 07:34    | 07:40 | 06:40 | 05:59 | 05:49 | 06:13 | 06:52  | 07:33     | 08:15   | 08:00    | 08:29    |
|                     | 17:34   | 18:20    | 20:00 | 20:44 | 21:23 | 21:44 | 21:29 | 20:42  | 19:41     | 18:41   | 17:01    | 16:58    |
| 26                  | 08:18   | 07:32    | 07:38 | 06:39 | 05:58 | 05:49 | 06:14 | 06:53  | 07:34     | 08:16   | 08:02    | 08:29    |
|                     | 17:35   | 18:21    | 20:02 | 20:45 | 21:24 | 21:44 | 21:28 | 20:40  | 19:39     | 18:39   | 17:00    | 16:59    |
| 27                  | 08:17   | 07:31    | 07:36 | 06:37 | 05:57 | 05:49 | 06:15 | 06:55  | 07:36     | 08:18   | 08:03    | 08:30    |
|                     | 17:37   | 18:23    | 20:03 | 20:46 | 21:25 | 21:44 | 21:27 | 20:38  | 19:37     | 18:38   | 16:59    | 16:59    |
| 28                  | 08:16   | 07:29    | 07:34 | 06:35 | 05:56 | 05:50 | 06:16 | 06:56  | 07:37     | 08:19   | 08:04    | 08:30    |
|                     | 17:38   | 18:24    | 20:05 | 20:48 | 21:26 | 21:44 | 21:26 | 20:36  | 19:35     | 18:36   | 16:59    | 17:00    |
| 29                  | 08:15   |          | 07:32 | 06:34 | 05:55 | 05:50 | 06:17 | 06:57  | 07:38     | 08:21   | 08:06    | 08:30    |
|                     | 17:40   |          | 20:06 | 20:49 | 21:27 | 21:44 | 21:24 | 20:34  | 19:33     | 18:34   | 16:58    | 17:01    |
| 30                  | 08:14   |          | 07:30 | 06:32 | 05:54 | 05:51 | 06:19 | 06:59  | 07:40     | 08:22   | 08:07    | 08:30    |
|                     | 17:41   |          | 20:07 | 20:51 | 21:28 | 21:44 | 21:23 | 20:33  | 19:31     | 18:33   | 16:57    | 17:02    |
| 31                  | 08:13   |          | 07:28 |       | 05:54 |       | 06:20 | 07:00  |           | 08:24   |          | 08:31    |
|                     | 17:43   |          | 20:09 |       | 21:29 |       | 21:22 | 20:31  |           | 18:31   |          | 17:02    |
| Potential sun hours | 277     | 286      | 367   | 406   | 466   | 475   | 481   | 443    | 380       | 339     | 282      | 266      |
| Total, worst case   |         |          |       |       |       |       |       |        |           |         |          |          |
| Sun reduction       |         |          |       |       |       |       |       |        |           |         |          |          |
| Oper. time red.     |         |          |       |       |       |       |       |        |           |         |          |          |
| Wind dir. red.      |         |          |       |       |       |       |       |        |           |         |          |          |
| Total reduction     |         |          |       |       |       |       |       |        |           |         |          |          |
| Total, real         |         |          |       |       |       |       |       |        |           |         |          |          |

Table layout: For each day in each month the following matrix apply

| Day in month | Sun rise (hh:mm) | Sun set (hh:mm) | Minutes with flicker | First time (hh:mm) with flicker | Last time (hh:mm) with flicker | (WTG causing flicker first time) | (WTG causing flicker last time) |
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|



Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

### Assumptions for shadow calculations

Reference year for calendar

2023

Shadow receptor: R131 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 90.0° (118)

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

|                     | January        | February       | March          | April          | May            | June           | July           | August         | September      | October        | November       | December       |
|---------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 1                   | 08:31<br>17:04 | 08:11<br>17:44 | 07:27<br>18:26 | 07:26<br>20:10 | 06:30<br>20:52 | 05:53<br>21:30 | 05:51<br>21:44 | 06:21<br>21:21 | 07:01<br>20:29 | 07:41<br>19:29 | 08:25<br>18:30 | 08:08<br>16:57 |
| 2                   | 08:31<br>17:05 | 08:10<br>17:46 | 07:25<br>18:27 | 07:24<br>20:12 | 06:29<br>20:53 | 05:52<br>21:31 | 05:52<br>21:44 | 06:22<br>21:19 | 07:03<br>20:27 | 07:42<br>19:27 | 08:27<br>18:28 | 08:09<br>16:56 |
| 3                   | 08:31<br>17:05 | 08:09<br>17:47 | 07:23<br>18:29 | 07:22<br>20:13 | 06:27<br>20:55 | 05:52<br>21:32 | 05:52<br>21:44 | 06:23<br>21:18 | 07:04<br>20:25 | 07:44<br>19:25 | 08:28<br>18:27 | 08:11<br>16:56 |
| 4                   | 08:31<br>17:06 | 08:08<br>17:49 | 07:21<br>18:30 | 07:20<br>20:14 | 06:26<br>20:56 | 05:51<br>21:33 | 05:53<br>21:43 | 06:25<br>21:16 | 07:05<br>20:23 | 07:45<br>19:23 | 08:30<br>18:25 | 08:12<br>16:56 |
| 5                   | 08:31<br>17:07 | 08:06<br>17:50 | 07:19<br>18:32 | 07:18<br>20:16 | 06:24<br>20:57 | 05:51<br>21:34 | 05:54<br>21:43 | 06:26<br>21:15 | 07:06<br>20:21 | 07:46<br>19:21 | 07:31<br>17:24 | 08:13<br>16:55 |
| 6                   | 08:30<br>17:09 | 08:05<br>17:52 | 07:17<br>18:33 | 07:16<br>20:17 | 06:22<br>20:59 | 05:50<br>21:35 | 05:54<br>21:43 | 06:27<br>21:14 | 07:08<br>20:19 | 07:48<br>19:19 | 07:33<br>17:22 | 08:14<br>16:55 |
| 7                   | 08:30<br>17:10 | 08:03<br>17:53 | 07:16<br>18:35 | 07:14<br>20:19 | 06:21<br>21:00 | 05:50<br>21:35 | 05:55<br>21:42 | 06:29<br>21:12 | 07:09<br>20:17 | 07:49<br>19:17 | 07:34<br>17:21 | 08:15<br>16:55 |
| 8                   | 08:30<br>17:11 | 08:02<br>17:55 | 07:14<br>18:36 | 07:12<br>20:20 | 06:19<br>21:01 | 05:49<br>21:36 | 05:56<br>21:42 | 06:30<br>21:11 | 07:10<br>20:15 | 07:51<br>19:15 | 07:36<br>17:19 | 08:16<br>16:54 |
| 9                   | 08:30<br>17:12 | 08:01<br>17:57 | 07:12<br>18:38 | 07:10<br>20:21 | 06:18<br>21:03 | 05:49<br>21:37 | 05:57<br>21:42 | 06:31<br>21:09 | 07:12<br>20:13 | 07:52<br>19:13 | 07:37<br>17:18 | 08:17<br>16:54 |
| 10                  | 08:29<br>17:13 | 07:59<br>17:58 | 07:10<br>18:39 | 07:08<br>20:23 | 06:17<br>21:04 | 05:49<br>21:38 | 05:57<br>21:41 | 06:32<br>21:08 | 07:13<br>20:11 | 07:53<br>19:11 | 07:39<br>17:17 | 08:18<br>16:54 |
| 11                  | 08:29<br>17:14 | 07:58<br>18:00 | 07:08<br>18:40 | 07:06<br>20:24 | 06:15<br>21:05 | 05:48<br>21:38 | 05:58<br>21:41 | 06:34<br>21:06 | 07:14<br>20:09 | 07:55<br>19:09 | 07:40<br>17:15 | 08:19<br>16:54 |
| 12                  | 08:29<br>17:16 | 07:56<br>18:00 | 08:06<br>18:42 | 07:04<br>20:26 | 06:14<br>21:07 | 05:48<br>21:39 | 05:59<br>21:40 | 06:35<br>21:04 | 07:16<br>20:07 | 07:56<br>19:07 | 07:42<br>17:14 | 08:20<br>16:54 |
| 13                  | 08:28<br>17:17 | 07:54<br>18:01 | 08:04<br>19:43 | 07:02<br>20:27 | 06:12<br>21:08 | 05:48<br>21:40 | 06:00<br>21:39 | 06:36<br>21:03 | 07:17<br>20:05 | 07:57<br>19:05 | 07:43<br>17:13 | 08:21<br>16:54 |
| 14                  | 08:28<br>17:18 | 07:53<br>18:03 | 08:02<br>19:45 | 07:01<br>20:28 | 06:11<br>21:09 | 05:48<br>21:40 | 06:01<br>21:39 | 06:38<br>21:01 | 07:18<br>20:03 | 07:59<br>19:03 | 07:44<br>17:12 | 08:22<br>16:54 |
| 15                  | 08:27<br>17:19 | 07:51<br>18:04 | 08:00<br>19:46 | 06:59<br>20:30 | 06:10<br>21:11 | 05:48<br>21:41 | 06:02<br>21:38 | 06:39<br>21:00 | 07:20<br>20:01 | 08:00<br>19:01 | 07:46<br>17:10 | 08:23<br>16:54 |
| 16                  | 08:26<br>17:21 | 07:50<br>18:06 | 07:58<br>19:48 | 06:57<br>20:31 | 06:09<br>21:12 | 05:47<br>21:41 | 06:03<br>21:37 | 06:40<br>20:58 | 07:21<br>19:59 | 08:02<br>18:57 | 07:47<br>17:09 | 08:24<br>16:54 |
| 17                  | 08:26<br>17:22 | 07:48<br>18:07 | 07:56<br>19:49 | 06:55<br>20:32 | 06:07<br>21:13 | 05:47<br>21:42 | 06:04<br>21:37 | 06:41<br>20:56 | 07:22<br>19:57 | 08:03<br>18:55 | 07:49<br>17:08 | 08:24<br>16:55 |
| 18                  | 08:25<br>17:23 | 07:46<br>18:09 | 07:54<br>19:50 | 06:53<br>20:34 | 06:06<br>21:14 | 05:47<br>21:42 | 06:05<br>21:36 | 06:43<br>20:54 | 07:24<br>19:55 | 08:05<br>18:54 | 07:50<br>17:07 | 08:25<br>16:55 |
| 19                  | 08:24<br>17:25 | 07:45<br>18:11 | 07:52<br>19:52 | 06:51<br>20:35 | 06:05<br>21:16 | 05:48<br>21:43 | 06:06<br>21:35 | 06:44<br>20:53 | 07:25<br>19:53 | 08:06<br>18:52 | 07:52<br>17:06 | 08:26<br>16:55 |
| 20                  | 08:24<br>17:26 | 07:43<br>18:12 | 07:50<br>19:53 | 06:49<br>20:37 | 06:04<br>21:17 | 05:48<br>21:43 | 06:07<br>21:34 | 06:45<br>20:51 | 07:26<br>19:51 | 08:07<br>18:50 | 07:53<br>17:05 | 08:26<br>16:56 |
| 21                  | 08:23<br>17:28 | 07:41<br>18:14 | 07:48<br>19:55 | 06:48<br>20:38 | 06:03<br>21:18 | 05:48<br>21:43 | 06:08<br>21:33 | 06:47<br>20:49 | 07:28<br>19:49 | 08:09<br>18:48 | 07:55<br>17:04 | 08:27<br>16:56 |
| 22                  | 08:22<br>17:29 | 07:40<br>18:15 | 07:46<br>19:56 | 06:46<br>20:39 | 06:02<br>21:19 | 05:48<br>21:43 | 06:09<br>21:32 | 06:48<br>20:47 | 07:29<br>19:47 | 08:10<br>18:46 | 07:56<br>17:03 | 08:28<br>16:56 |
| 23                  | 08:21<br>17:31 | 07:38<br>18:17 | 07:44<br>19:58 | 06:44<br>20:41 | 06:01<br>21:20 | 05:48<br>21:44 | 06:10<br>21:31 | 06:49<br>20:46 | 07:30<br>19:45 | 08:12<br>18:45 | 07:57<br>17:02 | 08:28<br>16:57 |
| 24                  | 08:20<br>17:32 | 07:36<br>18:18 | 07:42<br>19:59 | 06:42<br>20:42 | 06:00<br>21:21 | 05:48<br>21:44 | 06:11<br>21:30 | 06:51<br>20:44 | 07:32<br>19:43 | 08:13<br>18:43 | 07:59<br>17:02 | 08:29<br>16:57 |
| 25                  | 08:19<br>17:34 | 07:34<br>18:20 | 07:40<br>20:00 | 06:40<br>20:44 | 05:59<br>21:23 | 05:49<br>21:44 | 06:13<br>21:29 | 06:52<br>20:42 | 07:33<br>19:41 | 08:15<br>18:41 | 08:00<br>17:01 | 08:29<br>16:58 |
| 26                  | 08:18<br>17:35 | 07:32<br>18:21 | 07:38<br>20:02 | 06:39<br>20:45 | 05:58<br>21:24 | 05:49<br>21:44 | 06:14<br>21:28 | 06:53<br>20:40 | 07:34<br>19:39 | 08:16<br>18:39 | 08:02<br>17:00 | 08:29<br>16:59 |
| 27                  | 08:17<br>17:37 | 07:31<br>18:23 | 07:36<br>20:03 | 06:37<br>20:46 | 05:57<br>21:25 | 05:49<br>21:44 | 06:15<br>21:27 | 06:55<br>20:38 | 07:36<br>19:37 | 08:18<br>18:38 | 08:03<br>16:59 | 08:30<br>16:59 |
| 28                  | 08:16<br>17:38 | 07:29<br>18:24 | 07:34<br>20:05 | 06:35<br>20:48 | 05:56<br>21:26 | 05:50<br>21:44 | 06:16<br>21:26 | 06:56<br>20:36 | 07:37<br>19:35 | 08:19<br>18:36 | 08:04<br>16:59 | 08:30<br>17:00 |
| 29                  | 08:15<br>17:40 | 07:32<br>20:06 | 07:32<br>20:49 | 06:34<br>20:49 | 05:55<br>21:27 | 05:50<br>21:44 | 06:17<br>21:24 | 06:57<br>20:34 | 07:38<br>19:33 | 08:21<br>18:34 | 08:06<br>16:58 | 08:30<br>17:01 |
| 30                  | 08:14<br>17:41 | 07:30<br>20:07 | 07:30<br>20:51 | 06:32<br>20:51 | 05:54<br>21:28 | 05:51<br>21:44 | 06:19<br>21:23 | 06:59<br>20:33 | 07:40<br>19:31 | 08:22<br>18:33 | 08:07<br>16:57 | 08:30<br>17:02 |
| 31                  | 08:13<br>17:43 | 07:28<br>20:09 | 07:28<br>20:09 | 05:54<br>21:29 | 05:54<br>21:29 | 06:20<br>21:22 | 07:00<br>20:31 | 07:00<br>18:31 | 08:24<br>17:02 | 08:24<br>16:57 | 08:31<br>17:02 | 08:31<br>16:57 |
| Potential sun hours | 277            | 286            | 367            | 406            | 466            | 475            | 481            | 443            | 380            | 339            | 282            | 266            |
| Total, worst case   |                |                |                |                |                |                |                |                |                |                |                |                |
| Sun reduction       |                |                |                |                |                |                |                |                |                |                |                |                |
| Oper. time red.     |                |                |                |                |                |                |                |                |                |                |                |                |
| Wind dir. red.      |                |                |                |                |                |                |                |                |                |                |                |                |
| Total reduction     |                |                |                |                |                |                |                |                |                |                |                |                |
| Total, real         |                |                |                |                |                |                |                |                |                |                |                |                |

Table layout: For each day in each month the following matrix apply

|              |                      |                                 |                                  |
|--------------|----------------------|---------------------------------|----------------------------------|
| Day in month | Sun rise (hh:mm)     | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|              | Sun set (hh:mm)      | Last time (hh:mm) with flicker  | (WTG causing flicker last time)  |
|              | Minutes with flicker |                                 |                                  |

Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM  
US-01824-3627 Chelmsford  
+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: R138 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (125)

### Assumptions for shadow calculations

Reference year for calendar

2023

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

|    | January |    | February   |       | March |       | April |       | May   |       | June  |       | July  |       | August     |            | September |  | October |  | November |  | December |            |            |
|----|---------|----|------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------------|------------|-----------|--|---------|--|----------|--|----------|------------|------------|
| 1  | 08:31   |    | 09:27 (61) | 08:11 | 07:27 | 07:26 | 06:30 | 05:53 | 05:51 | 06:21 | 07:01 | 07:41 | 08:25 | 08:08 | 09:16 (61) |            |           |  |         |  |          |  | 08:08    | 09:16 (61) |            |
|    | 17:04   | 42 | 10:09 (61) | 17:44 | 18:26 | 20:10 | 20:52 | 21:30 | 21:44 | 21:21 | 20:29 | 19:29 | 18:30 | 16:57 | 36         | 09:52 (61) |           |  |         |  |          |  | 16:57    | 36         | 09:52 (61) |
| 2  | 08:31   |    | 09:27 (61) | 08:10 | 07:25 | 07:24 | 06:29 | 05:52 | 05:52 | 06:22 | 07:03 | 07:42 | 08:27 | 08:09 | 09:16 (61) |            |           |  |         |  |          |  | 08:09    | 09:16 (61) |            |
|    | 17:05   | 42 | 10:09 (61) | 17:46 | 18:27 | 20:12 | 20:53 | 21:31 | 21:44 | 21:19 | 20:27 | 19:27 | 18:28 | 16:56 | 37         | 09:53 (61) |           |  |         |  |          |  | 16:56    | 37         | 09:53 (61) |
| 3  | 08:31   |    | 09:28 (61) | 08:09 | 07:23 | 07:22 | 06:27 | 05:52 | 05:53 | 06:24 | 07:04 | 07:44 | 08:28 | 08:11 | 09:15 (61) |            |           |  |         |  |          |  | 08:11    | 09:15 (61) |            |
|    | 17:06   | 42 | 10:10 (61) | 17:47 | 18:29 | 20:13 | 20:55 | 21:32 | 21:44 | 21:18 | 20:25 | 19:25 | 18:27 | 16:56 | 38         | 09:53 (61) |           |  |         |  |          |  | 16:56    | 38         | 09:53 (61) |
| 4  | 08:31   |    | 09:29 (61) | 08:08 | 07:21 | 07:20 | 06:26 | 05:51 | 05:53 | 06:25 | 07:05 | 07:45 | 08:30 | 08:12 | 09:16 (61) |            |           |  |         |  |          |  | 08:12    | 09:16 (61) |            |
|    | 17:07   | 41 | 10:10 (61) | 17:49 | 18:30 | 20:15 | 20:56 | 21:33 | 21:44 | 21:17 | 20:23 | 19:23 | 18:25 | 16:56 | 39         | 09:55 (61) |           |  |         |  |          |  | 16:56    | 39         | 09:55 (61) |
| 5  | 08:31   |    | 09:29 (61) | 08:06 | 07:19 | 07:18 | 06:24 | 05:51 | 05:54 | 06:26 | 07:07 | 07:46 | 07:31 | 08:13 | 09:16 (61) |            |           |  |         |  |          |  | 08:13    | 09:16 (61) |            |
|    | 17:08   | 42 | 10:11 (61) | 17:50 | 18:32 | 20:16 | 20:57 | 21:34 | 21:43 | 21:15 | 20:21 | 19:21 | 17:24 | 16:55 | 39         | 09:55 (61) |           |  |         |  |          |  | 16:55    | 39         | 09:55 (61) |
| 6  | 08:31   |    | 09:29 (61) | 08:05 | 07:18 | 07:16 | 06:23 | 05:50 | 05:55 | 06:27 | 07:08 | 07:48 | 07:33 | 08:14 | 09:16 (61) |            |           |  |         |  |          |  | 08:14    | 09:16 (61) |            |
|    | 17:09   | 41 | 10:10 (61) | 17:52 | 18:33 | 20:17 | 20:59 | 21:35 | 21:43 | 21:14 | 20:19 | 19:19 | 17:22 | 16:55 | 40         | 09:56 (61) |           |  |         |  |          |  | 16:55    | 40         | 09:56 (61) |
| 7  | 08:30   |    | 09:30 (61) | 08:04 | 07:16 | 07:14 | 06:21 | 05:50 | 05:55 | 06:29 | 07:09 | 07:49 | 07:34 | 08:15 | 09:16 (61) |            |           |  |         |  |          |  | 08:15    | 09:16 (61) |            |
|    | 17:10   | 41 | 10:11 (61) | 17:54 | 18:35 | 20:19 | 21:00 | 21:35 | 21:43 | 21:12 | 20:17 | 19:17 | 17:21 | 16:55 | 40         | 09:56 (61) |           |  |         |  |          |  | 16:55    | 40         | 09:56 (61) |
| 8  | 08:30   |    | 09:31 (61) | 08:02 | 07:14 | 07:12 | 06:20 | 05:49 | 05:56 | 06:30 | 07:11 | 07:51 | 07:36 | 08:16 | 09:16 (61) |            |           |  |         |  |          |  | 08:16    | 09:16 (61) |            |
|    | 17:11   | 40 | 10:11 (61) | 17:55 | 18:36 | 20:20 | 21:01 | 21:36 | 21:42 | 21:11 | 20:15 | 19:15 | 17:19 | 16:54 | 41         | 09:57 (61) |           |  |         |  |          |  | 16:54    | 41         | 09:57 (61) |
| 9  | 08:30   |    | 09:31 (61) | 08:01 | 07:12 | 07:10 | 06:18 | 05:49 | 05:57 | 06:31 | 07:12 | 07:52 | 07:37 | 08:17 | 09:17 (61) |            |           |  |         |  |          |  | 08:17    | 09:17 (61) |            |
|    | 17:12   | 40 | 10:11 (61) | 17:57 | 18:38 | 20:21 | 21:03 | 21:37 | 21:42 | 21:09 | 20:13 | 19:13 | 17:18 | 16:54 | 41         | 09:58 (61) |           |  |         |  |          |  | 16:54    | 41         | 09:58 (61) |
| 10 | 08:30   |    | 09:33 (61) | 07:59 | 07:10 | 07:08 | 06:17 | 05:49 | 05:58 | 06:32 | 07:13 | 07:53 | 07:39 | 08:18 | 09:17 (61) |            |           |  |         |  |          |  | 08:18    | 09:17 (61) |            |
|    | 17:13   | 38 | 10:11 (61) | 17:58 | 18:39 | 20:23 | 21:04 | 21:38 | 21:41 | 21:08 | 20:11 | 19:11 | 17:17 | 16:54 | 42         | 09:59 (61) |           |  |         |  |          |  | 16:54    | 42         | 09:59 (61) |
| 11 | 08:29   |    | 09:33 (61) | 07:58 | 07:08 | 07:06 | 06:15 | 05:48 | 05:58 | 06:34 | 07:14 | 07:55 | 07:40 | 08:19 | 09:18 (61) |            |           |  |         |  |          |  | 08:19    | 09:18 (61) |            |
|    | 17:14   | 37 | 10:10 (61) | 18:00 | 18:41 | 20:24 | 21:05 | 21:38 | 21:41 | 21:06 | 20:09 | 19:09 | 17:15 | 16:54 | 42         | 10:00 (61) |           |  |         |  |          |  | 16:54    | 42         | 10:00 (61) |
| 12 | 08:29   |    | 09:34 (61) | 07:56 | 08:06 | 07:04 | 06:14 | 05:48 | 05:59 | 06:35 | 07:16 | 07:56 | 07:42 | 08:20 | 09:18 (61) |            |           |  |         |  |          |  | 08:20    | 09:18 (61) |            |
|    | 17:16   | 37 | 10:11 (61) | 18:00 | 18:42 | 20:26 | 21:07 | 21:39 | 21:40 | 21:05 | 20:07 | 19:07 | 17:14 | 16:54 | 42         | 10:00 (61) |           |  |         |  |          |  | 16:54    | 42         | 10:00 (61) |
| 13 | 08:28   |    | 09:35 (61) | 07:55 | 08:04 | 07:03 | 06:13 | 05:48 | 06:00 | 06:36 | 07:17 | 07:58 | 07:43 | 08:21 | 09:17 (61) |            |           |  |         |  |          |  | 08:21    | 09:17 (61) |            |
|    | 17:17   | 35 | 10:10 (61) | 18:01 | 19:43 | 20:27 | 21:08 | 21:40 | 21:39 | 21:03 | 20:05 | 19:05 | 17:13 | 16:54 | 43         | 10:00 (61) |           |  |         |  |          |  | 16:54    | 43         | 10:00 (61) |
| 14 | 08:28   |    | 09:36 (61) | 07:53 | 08:02 | 07:01 | 06:11 | 05:48 | 06:01 | 06:38 | 07:18 | 07:59 | 07:45 | 08:22 | 09:18 (61) |            |           |  |         |  |          |  | 08:22    | 09:18 (61) |            |
|    | 17:18   | 35 | 10:11 (61) | 18:03 | 19:45 | 20:28 | 21:09 | 21:40 | 21:39 | 21:01 | 20:03 | 19:03 | 17:12 | 16:54 | 43         | 10:01 (61) |           |  |         |  |          |  | 16:54    | 43         | 10:01 (61) |
| 15 | 08:27   |    | 09:37 (61) | 07:51 | 08:00 | 06:59 | 06:10 | 05:48 | 06:02 | 06:39 | 07:20 | 08:00 | 07:46 | 08:23 | 09:18 (61) |            |           |  |         |  |          |  | 08:23    | 09:18 (61) |            |
|    | 17:20   | 33 | 10:10 (61) | 18:04 | 19:46 | 20:30 | 21:11 | 21:41 | 21:38 | 21:00 | 20:01 | 19:01 | 17:11 | 16:54 | 43         | 10:01 (61) |           |  |         |  |          |  | 16:54    | 43         | 10:01 (61) |
| 16 | 08:27   |    | 09:38 (61) | 07:50 | 07:58 | 06:57 | 06:09 | 05:48 | 06:03 | 06:40 | 07:21 | 08:02 | 07:48 | 08:24 | 09:19 (61) |            |           |  |         |  |          |  | 08:24    | 09:19 (61) |            |
|    | 17:21   | 31 | 10:09 (61) | 18:06 | 19:48 | 20:31 | 21:12 | 21:41 | 21:37 | 20:58 | 19:59 | 18:57 | 17:09 | 16:54 | 43         | 10:02 (61) |           |  |         |  |          |  | 16:54    | 43         | 10:02 (61) |
| 17 | 08:26   |    | 09:39 (61) | 07:48 | 07:56 | 06:55 | 06:07 | 05:48 | 06:04 | 06:42 | 07:22 | 08:03 | 07:49 | 08:24 | 09:20 (61) |            |           |  |         |  |          |  | 08:24    | 09:20 (61) |            |
|    | 17:22   | 30 | 10:09 (61) | 18:08 | 19:49 | 20:33 | 21:13 | 21:42 | 21:37 | 20:56 | 19:57 | 18:56 | 17:08 | 16:55 | 43         | 10:03 (61) |           |  |         |  |          |  | 16:55    | 43         | 10:03 (61) |
| 18 | 08:25   |    | 09:41 (61) | 07:46 | 07:54 | 06:53 | 06:06 | 05:48 | 06:05 | 06:43 | 07:24 | 08:05 | 07:50 | 08:25 | 09:19 (61) |            |           |  |         |  |          |  | 08:25    | 09:19 (61) |            |
|    | 17:24   | 28 | 10:09 (61) | 18:09 | 19:51 | 20:34 | 21:14 | 21:42 | 21:36 | 20:55 | 19:55 | 18:54 | 17:07 | 16:55 | 44         | 10:03 (61) |           |  |         |  |          |  | 16:55    | 44         | 10:03 (61) |
| 19 | 08:24   |    | 09:42 (61) | 07:45 | 07:52 | 06:51 | 06:05 | 05:48 | 06:06 | 06:44 | 07:25 | 08:06 | 07:52 | 08:26 | 09:20 (61) |            |           |  |         |  |          |  | 08:26    | 09:20 (61) |            |
|    | 17:25   | 26 | 10:08 (61) | 18:11 | 19:52 | 20:35 | 21:16 | 21:43 | 21:35 | 20:53 | 19:53 | 18:52 | 17:06 | 16:55 | 43         | 10:03 (61) |           |  |         |  |          |  | 16:55    | 43         | 10:03 (61) |
| 20 | 08:24   |    | 09:43 (61) | 07:43 | 07:50 | 06:50 | 06:04 | 05:48 | 06:07 | 06:46 | 07:26 | 08:08 | 07:53 | 08:27 | 09:21 (61) |            |           |  |         |  |          |  | 08:27    | 09:21 (61) |            |
|    | 17:26   | 23 | 10:06 (61) | 18:12 | 19:53 | 20:37 | 21:17 | 21:43 | 21:34 | 20:51 | 19:51 | 18:50 | 17:05 | 16:56 | 43         | 10:04 (61) |           |  |         |  |          |  | 16:56    | 43         | 10:04 (61) |
| 21 | 08:23   |    | 09:45 (61) | 07:41 | 07:48 | 06:48 | 06:03 | 05:48 | 06:08 | 06:47 | 07:28 | 08:09 | 07:55 | 08:27 | 09:21 (61) |            |           |  |         |  |          |  | 08:27    | 09:21 (61) |            |
|    | 17:28   | 20 | 10:05 (61) | 18:14 | 19:55 | 20:38 | 21:18 | 21:43 | 21:33 | 20:49 | 19:49 | 18:48 | 17:04 | 12    | 09:25 (61) | 08:27      |           |  |         |  |          |  | 16:56    | 43         | 10:04 (61) |
| 22 | 08:22   |    | 09:48 (61) | 07:40 | 07:46 | 06:46 | 06:02 | 05:48 | 06:09 | 06:48 | 07:29 | 08:10 | 07:56 | 08:28 | 09:22 (61) |            |           |  |         |  |          |  | 08:28    | 09:22 (61) |            |
|    | 17:29   | 15 | 10:03 (61) | 18:15 | 19:56 | 20:40 | 21:19 | 21:44 | 21:32 | 20:47 | 19:47 | 18:47 | 17:03 | 17    | 09:39 (61) | 16:57      | 43        |  |         |  |          |  | 16:57    | 43         | 10:05 (61) |
| 23 | 08:21   |    | 09:52 (61) | 07:38 | 07:44 | 06:44 | 06:01 | 05:48 | 06:10 | 06:49 | 07:30 | 08:12 | 07:58 | 08:28 | 09:22 (61) |            |           |  |         |  |          |  | 08:28    | 09:22 (61) |            |
|    | 17:31   | 8  | 10:00 (61) | 18:17 | 19:58 | 20:41 | 21:20 | 21:44 | 21:31 | 20:46 | 19:45 | 18:45 | 17:02 | 21    | 09:42 (61) | 16:57      | 43        |  |         |  |          |  | 16:57    | 43         | 10:05 (61) |
| 24 | 08:20   |    |            | 07:36 | 07:42 | 06:42 | 06:00 | 05:49 | 06:12 | 06:51 | 07:32 | 08:13 | 07:59 | 08:29 | 09:23 (61) |            |           |  |         |  |          |  | 08:29    | 09:23 (61) |            |
|    | 17:32   |    |            | 18:18 | 19:59 | 20:42 | 21:22 | 21:44 | 21:30 | 20:44 | 19:43 | 18:43 | 17:02 | 25    | 09:44 (61) | 16:58      | 43        |  |         |  |          |  | 16:58    | 43         | 10:06 (61) |
| 25 | 08:19   |    |            | 07:34 | 07:40 | 06:41 | 05:59 | 05:49 | 06:13 | 06:52 | 07:33 | 08:15 | 08:00 | 08:29 | 09:23 (61) |            |           |  |         |  |          |  | 08:29    | 09:23 (61) |            |
|    | 17:34   |    |            | 18:20 | 20:01 | 20:44 | 21:23 | 21:44 | 21:29 | 20:42 | 19:41 | 18:41 | 17:01 | 27    | 09:46 (61) | 16:58      | 43        |  |         |  |          |  | 16:58    | 43         | 10:06 (61) |
| 26 | 08:18   |    |            | 07:32 | 07:38 | 06:39 | 05:58 | 05:49 | 06:14 | 06:53 | 07:34 | 08:16 | 08:02 | 08:29 | 09:23 (61) |            |           |  |         |  |          |  | 08:29    | 09:23 (61) |            |
|    | 17:35   |    |            | 18:21 | 20:02 | 20:45 | 21:24 | 21:44 | 21:28 | 20:40 | 19:39 | 18:40 | 17:00 | 29    | 09:47 (61) | 16:59      | 43        |  |         |  |          |  | 16:59    | 43         | 10:06 (61) |
| 27 | 08:17   |    |            | 07:31 | 07:36 | 06:37 | 05:57 | 05:50 | 06:15 | 06:55 | 07:36 | 08:18 | 08:03 | 08:30 | 09:24 (61) |            |           |  |         |  |          |  | 08:30    | 09:24 (61) |            |
|    | 17:37   |    |            | 18:23 | 20:03 | 20:46 | 21:25 | 21:44 | 21:27 | 20:38 | 19:37 | 18:38 | 16:59 | 31    | 09:48 (61) | 16:59      | 44        |  |         |  |          |  | 16:59    | 44         | 10:08 (61) |
| 28 | 08:16   |    |            | 07:29 | 07:34 | 06:35 | 05:56 | 05:50 | 06:16 | 06:56 | 07:37 | 08:19 | 08:04 | 08:30 | 09:25 (61) |            |           |  |         |  |          |  | 08:30    | 09:25 (61) |            |
|    | 17:38   |    |            | 18:24 | 20:05 | 20:48 | 21:26 | 21:44 | 21:26 | 20:36 | 19:35 | 18:36 | 16:59 | 32    | 09:49 (61) | 17:00      | 43        |  |         |  |          |  | 17:00    | 43         | 10:08 (61) |
| 29 | 08:15   |    |            |       | 07:32 | 06:34 | 05:55 | 05:50 | 06:17 | 06:57 | 07:38 | 08:21 | 08:06 | 08:30 | 09:25 (61) |            |           |  |         |  |          |  | 08:30    | 09:25 (61) |            |
|    | 17:     |    |            |       |       |       |       |       |       |       |       |       |       |       |            |            |           |  |         |  |          |  |          |            |            |

Table layout: For each day in each month the following matrix apply

|              |                      |                                 |                                  |
|--------------|----------------------|---------------------------------|----------------------------------|
| Day in month | Sun rise (hh:mm)     | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|              | Sun set (hh:mm)      | Last time (hh:mm) with flicker  | (WTG causing flicker last time)  |
|              | Minutes with flicker |                                 |                                  |



Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: R142 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (129)

## Assumptions for shadow calculations

Reference year for calendar

2023

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

|                     | January        | February       | March          | April                    | May            | June           | July           | August         | September      | October        | November                    | December       |
|---------------------|----------------|----------------|----------------|--------------------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------------------|----------------|
| 1                   | 08:31<br>17:04 | 08:12<br>17:45 | 07:27<br>18:26 | 17:43 (20)<br>18:05 (20) | 07:26<br>20:10 | 06:31<br>20:52 | 05:54<br>21:30 | 05:52<br>21:44 | 06:21<br>21:21 | 07:02<br>20:29 | 07:41<br>19:29              | 08:25<br>18:30 |
| 2                   | 08:31<br>17:05 | 08:10<br>17:46 | 07:25<br>18:28 | 17:43 (20)<br>18:07 (20) | 07:24<br>20:12 | 06:29<br>20:53 | 05:53<br>21:31 | 05:52<br>21:44 | 06:23<br>21:19 | 07:03<br>20:27 | 07:43<br>19:27              | 08:27<br>18:29 |
| 3                   | 08:31<br>17:06 | 08:09<br>17:48 | 07:23<br>18:29 | 17:42 (20)<br>18:08 (20) | 07:22<br>20:13 | 06:28<br>20:55 | 05:52<br>21:32 | 05:53<br>21:44 | 06:24<br>21:18 | 07:04<br>20:25 | 07:44<br>19:25              | 08:28<br>18:27 |
| 4                   | 08:31<br>17:07 | 08:08<br>17:49 | 07:22<br>18:31 | 17:42 (20)<br>18:07 (20) | 07:20<br>20:15 | 06:26<br>20:56 | 05:52<br>21:33 | 05:54<br>21:43 | 06:25<br>21:17 | 07:06<br>20:23 | 07:45<br>19:23              | 08:30<br>18:26 |
| 5                   | 08:31<br>17:08 | 08:06<br>17:51 | 07:20<br>18:32 | 17:42 (20)<br>18:06 (20) | 07:18<br>20:16 | 06:24<br>20:57 | 05:51<br>21:34 | 05:54<br>21:43 | 06:26<br>21:15 | 07:07<br>20:21 | 07:47<br>19:21              | 08:31<br>18:36 |
| 6                   | 08:31<br>17:09 | 08:05<br>17:52 | 07:18<br>18:33 | 17:43 (20)<br>18:06 (20) | 07:16<br>20:17 | 06:23<br>20:59 | 05:51<br>21:35 | 05:55<br>21:43 | 06:28<br>21:14 | 07:08<br>20:19 | 10 18:26 (20)<br>18:36 (20) | 07:31<br>18:30 |
| 7                   | 08:30<br>17:10 | 08:04<br>17:54 | 07:16<br>18:35 | 17:44 (20)<br>18:05 (20) | 07:14<br>20:19 | 06:21<br>21:00 | 05:50<br>21:35 | 05:56<br>21:43 | 06:29<br>21:12 | 07:09<br>20:17 | 15 18:38 (20)<br>18:40 (20) | 07:34<br>18:30 |
| 8                   | 08:30<br>17:11 | 08:02<br>17:55 | 07:14<br>18:36 | 17:45 (20)<br>18:04 (20) | 07:13<br>20:20 | 06:20<br>21:01 | 05:50<br>21:36 | 05:56<br>21:42 | 06:30<br>21:11 | 07:11<br>20:15 | 18 18:40 (20)<br>18:42 (20) | 07:36<br>18:30 |
| 9                   | 08:30<br>17:12 | 08:01<br>17:57 | 07:12<br>18:37 | 17:47 (20)<br>18:02 (20) | 07:11<br>20:22 | 06:18<br>21:03 | 05:49<br>21:37 | 05:57<br>21:42 | 06:32<br>21:09 | 07:12<br>20:13 | 20 18:40 (20)<br>18:42 (20) | 07:37<br>18:30 |
| 10                  | 08:30<br>17:14 | 07:59<br>17:59 | 07:10<br>18:39 | 17:49 (20)<br>17:59 (20) | 07:09<br>20:23 | 06:17<br>21:04 | 05:49<br>21:38 | 05:58<br>21:41 | 06:33<br>21:08 | 07:13<br>20:11 | 23 18:42 (20)<br>18:44 (20) | 07:39<br>18:30 |
| 11                  | 08:29<br>17:15 | 07:58<br>18:00 | 07:08<br>18:41 | 17:59 (20)<br>18:00      | 20:23          | 06:16<br>21:05 | 05:49<br>21:38 | 05:59<br>21:41 | 06:34<br>21:06 | 07:15<br>20:09 | 24 18:42 (20)<br>18:44 (20) | 07:40<br>18:30 |
| 12                  | 08:29<br>17:16 | 07:56<br>18:00 | 07:06<br>18:42 | 18:00                    | 20:26          | 06:14<br>21:07 | 05:49<br>21:39 | 06:00<br>21:40 | 06:35<br>21:05 | 07:16<br>20:07 | 25 18:42 (20)<br>18:44 (20) | 07:42<br>18:30 |
| 13                  | 08:28<br>17:17 | 07:55<br>18:02 | 07:04<br>19:44 | 18:00                    | 20:27          | 06:13<br>21:08 | 05:48<br>21:40 | 06:01<br>21:39 | 06:37<br>21:03 | 07:17<br>20:05 | 24 18:40 (20)<br>18:42 (20) | 07:43<br>18:30 |
| 14                  | 08:28<br>17:19 | 07:53<br>18:03 | 07:02<br>19:45 | 18:00                    | 20:29          | 06:12<br>21:09 | 05:48<br>21:40 | 06:02<br>21:39 | 06:38<br>21:01 | 07:19<br>20:03 | 23 18:39 (20)<br>18:41 (20) | 07:45<br>18:30 |
| 15                  | 08:27<br>17:20 | 07:51<br>18:05 | 07:00<br>19:47 | 18:00                    | 20:30          | 06:10<br>21:11 | 05:48<br>21:41 | 06:03<br>21:38 | 06:39<br>21:00 | 07:20<br>20:01 | 21 18:37 (20)<br>18:39 (20) | 07:46<br>18:30 |
| 16                  | 08:27<br>17:21 | 07:50<br>18:06 | 07:58<br>19:48 | 18:05                    | 20:31          | 06:09<br>21:12 | 05:48<br>21:41 | 06:03<br>21:37 | 06:41<br>20:58 | 07:21<br>19:59 | 18 18:35 (20)<br>18:37 (20) | 07:48<br>18:30 |
| 17                  | 08:26<br>17:23 | 07:48<br>18:08 | 07:56<br>19:49 | 18:06                    | 20:33          | 06:08<br>21:13 | 05:48<br>21:42 | 06:04<br>21:37 | 06:42<br>20:56 | 07:23<br>19:57 | 16 18:33 (20)<br>18:35 (20) | 07:49<br>18:30 |
| 18                  | 08:25<br>17:24 | 07:47<br>18:09 | 07:54<br>19:51 | 18:07                    | 20:34          | 06:07<br>21:14 | 05:48<br>21:42 | 06:06<br>21:36 | 06:43<br>20:55 | 07:24<br>19:55 | 13 18:31 (20)<br>18:33 (20) | 07:50<br>18:30 |
| 19                  | 08:25<br>17:25 | 07:45<br>18:11 | 07:52<br>19:52 | 18:09                    | 20:35          | 06:05<br>21:16 | 05:48<br>21:43 | 06:07<br>21:35 | 06:45<br>20:53 | 07:25<br>19:53 | 10 18:29 (20)<br>18:31 (20) | 07:52<br>18:30 |
| 20                  | 08:24<br>17:27 | 07:43<br>18:12 | 07:50<br>19:54 | 18:11                    | 20:37          | 06:04<br>21:17 | 05:48<br>21:43 | 06:08<br>21:34 | 06:46<br>20:51 | 07:27<br>19:51 | 7 18:28 (20)<br>18:30 (20)  | 07:53<br>18:30 |
| 21                  | 08:23<br>17:28 | 07:41<br>18:14 | 07:48<br>19:55 | 18:12                    | 20:38          | 06:03<br>21:18 | 05:48<br>21:43 | 06:09<br>21:33 | 06:47<br>20:49 | 07:28<br>19:49 | 18:30                       | 07:55<br>18:30 |
| 22                  | 08:22<br>17:30 | 07:40<br>18:16 | 07:46<br>19:56 | 18:14                    | 20:40          | 06:02<br>21:19 | 05:48<br>21:44 | 06:10<br>21:32 | 06:48<br>20:48 | 07:29<br>19:47 | 18:30                       | 07:56<br>18:30 |
| 23                  | 08:21<br>17:31 | 07:38<br>18:17 | 07:44<br>19:58 | 18:16                    | 20:41          | 06:01<br>21:20 | 05:49<br>21:44 | 06:11<br>21:31 | 06:50<br>20:46 | 07:31<br>19:45 | 18:30                       | 07:58<br>18:30 |
| 24                  | 08:20<br>17:33 | 07:36<br>18:19 | 07:42<br>19:59 | 18:17                    | 20:42          | 06:00<br>21:22 | 05:49<br>21:44 | 06:12<br>21:30 | 06:51<br>20:44 | 07:32<br>19:43 | 18:30                       | 07:59<br>18:30 |
| 25                  | 08:19<br>17:34 | 07:34<br>18:20 | 07:40<br>19:59 | 18:19                    | 20:43          | 05:59<br>21:23 | 05:49<br>21:44 | 06:13<br>21:29 | 06:52<br>20:42 | 07:33<br>19:41 | 18:30                       | 08:00<br>18:30 |
| 26                  | 08:18<br>17:36 | 07:33<br>18:22 | 07:38<br>19:59 | 18:20                    | 20:44          | 05:58<br>21:24 | 05:50<br>21:44 | 06:14<br>21:28 | 06:54<br>20:40 | 07:35<br>19:39 | 18:30                       | 08:02<br>18:30 |
| 27                  | 08:17<br>17:37 | 07:31<br>18:23 | 07:36<br>20:04 | 18:22                    | 20:45          | 05:57<br>21:25 | 05:50<br>21:44 | 06:15<br>21:27 | 06:55<br>20:38 | 07:36<br>19:37 | 18:30                       | 08:03<br>18:30 |
| 28                  | 08:16<br>17:39 | 07:29<br>18:25 | 07:34<br>20:05 | 18:23                    | 20:46          | 05:56<br>21:26 | 05:50<br>21:44 | 06:16<br>21:26 | 06:56<br>20:37 | 07:37<br>19:35 | 18:30                       | 08:04<br>18:30 |
| 29                  | 08:15<br>17:40 | 07:27<br>18:26 | 07:32<br>20:06 | 18:25                    | 20:47          | 05:55<br>21:27 | 05:51<br>21:44 | 06:17<br>21:24 | 06:57<br>20:35 | 07:38<br>19:33 | 18:30                       | 08:05<br>18:30 |
| 30                  | 08:14<br>17:42 | 07:25<br>18:28 | 07:30<br>20:08 | 18:26                    | 20:48          | 05:54<br>21:28 | 05:51<br>21:44 | 06:18<br>21:23 | 06:58<br>20:33 | 07:39<br>19:31 | 18:30                       | 08:06<br>18:30 |
| 31                  | 08:13<br>17:43 | 07:23<br>18:30 | 07:28<br>20:09 | 18:27                    | 20:49          | 05:53<br>21:29 | 05:50<br>21:44 | 06:19<br>21:22 | 06:59<br>20:31 | 07:40<br>18:32 | 18:30                       | 08:07<br>18:30 |
| Potential sun hours | 278            | 286            | 367            | 406                      | 466            | 475            | 481            | 443            | 380            | 340            | 283                         | 266            |
| Total, worst case   |                | 80             | 209            |                          |                |                |                |                |                |                |                             |                |
| Sun reduction       |                | 0.52           | 0.61           |                          |                |                |                |                |                |                |                             |                |
| Oper. time red.     |                | 1.00           | 1.00           |                          |                |                |                |                |                |                |                             |                |
| Wind dir. red.      |                | 0.66           | 0.66           |                          |                |                |                |                |                |                |                             |                |
| Total reduction     |                | 0.34           | 0.40           |                          |                |                |                |                |                |                |                             |                |
| Total, real         |                | 27             | 84             |                          |                |                |                |                |                |                |                             |                |

Table layout: For each day in each month the following matrix apply

|              |                      |                                 |                                  |
|--------------|----------------------|---------------------------------|----------------------------------|
| Day in month | Sun rise (hh:mm)     | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|              | Sun set (hh:mm)      | Last time (hh:mm) with flicker  | (WTG causing flicker last time)  |
|              | Minutes with flicker |                                 |                                  |

Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023 Shadow receptor: R143 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (130)

### Assumptions for shadow calculations

Reference year for calendar

2023

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

|                     | January        | February       | March          | April          | May                 | June                     | July           | August         | September      | October             | November       | December       |                |
|---------------------|----------------|----------------|----------------|----------------|---------------------|--------------------------|----------------|----------------|----------------|---------------------|----------------|----------------|----------------|
| 1                   | 08:31<br>17:04 | 08:12<br>17:45 | 07:27<br>18:26 | 07:26<br>20:10 | 06:31<br>20:52      | 19:49 (26)<br>20:20 (26) | 05:53<br>21:30 | 05:52<br>21:44 | 06:21<br>21:21 | 07:02<br>20:29      | 07:41<br>19:29 | 08:25<br>18:30 | 08:08<br>16:57 |
| 2                   | 08:31<br>17:05 | 08:10<br>17:46 | 07:25<br>18:28 | 07:24<br>20:12 | 06:29<br>20:53      | 19:49 (26)<br>20:20 (26) | 05:53<br>21:31 | 05:52<br>21:44 | 06:23<br>21:19 | 07:03<br>20:27      | 07:43<br>19:27 | 08:27<br>18:28 | 08:09<br>16:57 |
| 3                   | 08:31<br>17:06 | 08:09<br>17:48 | 07:23<br>18:29 | 07:22<br>20:13 | 06:28<br>20:55      | 19:49 (26)<br>20:19 (26) | 05:52<br>21:32 | 05:53<br>21:44 | 06:24<br>21:18 | 07:04<br>20:19 (26) | 07:44<br>19:25 | 08:28<br>18:27 | 08:11<br>16:56 |
| 4                   | 08:31<br>17:07 | 08:08<br>17:49 | 07:21<br>18:30 | 07:20<br>20:15 | 06:26<br>20:56      | 19:50 (26)<br>20:19 (26) | 05:52<br>21:33 | 05:54<br>21:44 | 06:25<br>21:17 | 07:05<br>20:21 (26) | 07:45<br>19:23 | 08:30<br>18:25 | 08:12<br>16:56 |
| 5                   | 08:31<br>17:08 | 08:06<br>17:51 | 07:20<br>18:32 | 07:18<br>20:16 | 06:24<br>20:57      | 19:50 (26)<br>20:17 (26) | 05:51<br>21:34 | 05:54<br>21:43 | 06:26<br>21:15 | 07:07<br>20:23 (26) | 07:47<br>19:21 | 08:31<br>17:24 | 08:13<br>16:56 |
| 6                   | 08:31<br>17:09 | 08:05<br>17:52 | 07:18<br>18:33 | 07:16<br>20:17 | 06:23<br>20:59      | 19:51 (26)<br>20:17 (26) | 05:51<br>21:35 | 05:55<br>21:43 | 06:28<br>21:14 | 07:08<br>20:24 (26) | 07:48<br>19:19 | 08:33<br>17:23 | 08:14<br>16:55 |
| 7                   | 08:30<br>17:10 | 08:04<br>17:54 | 07:16<br>18:35 | 07:14<br>20:19 | 06:21<br>21:00      | 19:51 (26)<br>20:15 (26) | 05:50<br>21:35 | 05:56<br>21:43 | 06:29<br>21:12 | 07:09<br>20:26 (26) | 07:49<br>19:17 | 08:34<br>17:21 | 08:15<br>16:55 |
| 8                   | 08:30<br>17:11 | 08:02<br>17:55 | 07:14<br>18:36 | 07:12<br>20:20 | 06:20<br>21:01      | 19:53 (26)<br>20:15 (26) | 05:50<br>21:36 | 05:56<br>21:42 | 06:30<br>21:11 | 07:11<br>20:26 (26) | 07:51<br>19:15 | 08:36<br>17:20 | 08:16<br>16:55 |
| 9                   | 08:30<br>17:12 | 08:01<br>17:57 | 07:12<br>18:38 | 07:11<br>20:22 | 06:18<br>21:03      | 19:54 (26)<br>20:13 (26) | 05:49<br>21:37 | 05:57<br>21:42 | 06:31<br>21:09 | 07:12<br>20:27 (26) | 07:52<br>19:13 | 08:37<br>17:18 | 08:17<br>16:55 |
| 10                  | 08:30<br>17:14 | 07:59<br>17:58 | 07:10<br>18:39 | 07:09<br>20:23 | 06:17<br>21:04      | 19:55 (26)<br>20:11 (26) | 05:49<br>21:38 | 05:58<br>21:41 | 06:33<br>21:08 | 07:13<br>20:27 (26) | 07:54<br>19:11 | 08:39<br>17:17 | 08:18<br>16:55 |
| 11                  | 08:29<br>17:15 | 07:58<br>18:00 | 07:08<br>18:41 | 07:07<br>20:24 | 06:16<br>21:05      | 19:58 (26)<br>20:10 (26) | 05:49<br>21:38 | 05:59<br>21:41 | 06:34<br>21:06 | 07:15<br>20:28 (26) | 07:55<br>19:09 | 08:40<br>17:16 | 08:19<br>16:54 |
| 12                  | 08:29<br>17:16 | 07:56<br>18:00 | 07:06<br>18:42 | 07:05<br>20:26 | 06:14<br>21:07      | 20:03 (26)<br>20:05 (26) | 05:48<br>21:39 | 06:00<br>21:40 | 06:35<br>21:05 | 07:16<br>20:28 (26) | 07:56<br>19:07 | 08:42<br>17:14 | 08:20<br>16:54 |
| 13                  | 08:28<br>17:17 | 07:55<br>18:02 | 07:04<br>19:44 | 07:03<br>20:27 | 06:13<br>21:08      | 05:48<br>21:40           | 06:01<br>21:39 | 06:37<br>21:03 | 06:30<br>21:01 | 07:17<br>20:28 (26) | 07:58<br>19:05 | 08:43<br>17:13 | 08:21<br>16:54 |
| 14                  | 08:28<br>17:19 | 07:53<br>18:03 | 07:02<br>19:45 | 07:01<br>20:29 | 06:12<br>21:09      | 05:48<br>21:40           | 06:01<br>21:39 | 06:38<br>21:01 | 06:38<br>21:01 | 07:19<br>20:28 (26) | 07:59<br>19:03 | 08:44<br>17:12 | 08:22<br>16:55 |
| 15                  | 08:27<br>17:20 | 07:51<br>18:05 | 07:00<br>19:46 | 06:59<br>20:30 | 06:10<br>21:11      | 05:48<br>21:41           | 06:02<br>21:38 | 06:39<br>21:00 | 06:39<br>21:00 | 07:20<br>20:27 (26) | 08:01<br>19:01 | 08:45<br>17:11 | 08:23<br>16:55 |
| 16                  | 08:27<br>17:21 | 07:50<br>18:06 | 06:58<br>19:48 | 06:57<br>20:31 | 06:09<br>21:12      | 05:48<br>21:41           | 06:03<br>21:37 | 06:41<br>20:58 | 06:41<br>20:58 | 07:21<br>19:59      | 08:02<br>19:00 | 08:46<br>17:10 | 08:24<br>16:55 |
| 17                  | 08:26<br>17:22 | 07:48<br>18:08 | 06:56<br>19:49 | 06:55<br>20:33 | 06:08<br>21:13      | 05:48<br>21:42           | 06:04<br>21:37 | 06:42<br>20:56 | 06:42<br>20:56 | 07:23<br>19:57      | 08:03<br>18:56 | 08:49<br>17:09 | 08:24<br>16:55 |
| 18                  | 08:25<br>17:24 | 07:47<br>18:09 | 06:54<br>19:51 | 06:53<br>20:34 | 06:07<br>20:12 (26) | 05:48<br>21:42           | 06:05<br>21:36 | 06:43<br>20:55 | 06:43<br>20:55 | 07:24<br>19:56 (26) | 08:05<br>18:54 | 08:50<br>17:08 | 08:25<br>16:55 |
| 19                  | 08:25<br>17:25 | 07:45<br>18:11 | 06:52<br>19:52 | 06:52<br>20:35 | 06:05<br>20:14 (26) | 05:48<br>21:43           | 06:06<br>21:35 | 06:44<br>20:53 | 06:44<br>20:53 | 07:25<br>19:57 (26) | 08:06<br>18:52 | 08:52<br>17:07 | 08:26<br>16:56 |
| 20                  | 08:24<br>17:27 | 07:43<br>18:12 | 06:50<br>19:54 | 06:50<br>20:37 | 06:04<br>20:15 (26) | 05:48<br>21:43           | 06:07<br>21:34 | 06:46<br>20:51 | 06:46<br>20:51 | 07:27<br>19:57 (26) | 08:08<br>18:50 | 08:53<br>17:06 | 08:27<br>16:56 |
| 21                  | 08:23<br>17:28 | 07:41<br>18:14 | 06:48<br>19:55 | 06:48<br>20:38 | 06:03<br>20:17 (26) | 05:48<br>21:43           | 06:09<br>21:33 | 06:47<br>20:49 | 06:47<br>20:49 | 07:28<br>19:57 (26) | 08:09<br>18:49 | 08:55<br>17:05 | 08:27<br>16:56 |
| 22                  | 08:22<br>17:30 | 07:40<br>18:15 | 06:46<br>19:56 | 06:46<br>20:40 | 06:02<br>20:18 (26) | 05:48<br>21:44           | 06:10<br>21:32 | 06:48<br>20:48 | 06:48<br>20:48 | 07:29<br>19:58 (26) | 08:11<br>18:47 | 08:56<br>17:04 | 08:28<br>16:57 |
| 23                  | 08:21<br>17:31 | 07:38<br>18:17 | 06:44<br>19:58 | 06:44<br>20:41 | 06:01<br>20:19 (26) | 05:49<br>21:44           | 06:11<br>21:31 | 06:50<br>20:46 | 06:50<br>20:46 | 07:31<br>19:58 (26) | 08:12<br>18:45 | 08:58<br>17:03 | 08:28<br>16:57 |
| 24                  | 08:20<br>17:32 | 07:36<br>18:19 | 06:43<br>19:59 | 06:43<br>20:42 | 06:00<br>20:19 (26) | 05:49<br>21:44           | 06:12<br>21:30 | 06:51<br>20:44 | 06:51<br>20:44 | 07:32<br>19:59 (26) | 08:13<br>18:43 | 08:59<br>17:02 | 08:29<br>16:58 |
| 25                  | 08:19<br>17:34 | 07:34<br>18:20 | 06:41<br>20:01 | 06:41<br>20:44 | 05:59<br>20:20 (26) | 05:49<br>21:44           | 06:13<br>21:29 | 06:52<br>20:42 | 06:52<br>20:42 | 07:33<br>20:18 (26) | 08:15<br>18:42 | 09:00<br>17:01 | 08:29<br>16:58 |
| 26                  | 08:18<br>17:35 | 07:33<br>18:22 | 06:39<br>20:02 | 06:39<br>20:45 | 05:58<br>20:20 (26) | 05:50<br>21:44           | 06:14<br>21:28 | 06:54<br>20:40 | 06:54<br>20:40 | 07:34<br>20:16 (26) | 08:16<br>18:39 | 09:02<br>17:00 | 08:29<br>16:59 |
| 27                  | 08:17<br>17:37 | 07:31<br>18:23 | 06:37<br>20:03 | 06:37<br>20:47 | 05:57<br>20:20 (26) | 05:50<br>21:44           | 06:15<br>21:27 | 06:55<br>20:38 | 06:55<br>20:38 | 07:36<br>20:12 (26) | 08:18<br>18:38 | 09:03<br>17:00 | 08:30<br>16:59 |
| 28                  | 08:16<br>17:38 | 07:29<br>18:25 | 06:36<br>20:05 | 06:36<br>20:48 | 05:56<br>20:21 (26) | 05:50<br>21:44           | 06:17<br>21:26 | 06:56<br>20:37 | 06:56<br>20:37 | 07:37<br>19:35      | 08:19<br>18:36 | 09:04<br>17:00 | 08:31<br>16:59 |
| 29                  | 08:15<br>17:40 | 07:32<br>18:26 | 06:34<br>20:06 | 06:34<br>20:49 | 05:56<br>20:20 (26) | 05:51<br>21:44           | 06:18<br>21:24 | 06:58<br>20:35 | 06:58<br>20:35 | 07:39<br>19:33      | 08:21<br>18:35 | 09:06<br>16:58 | 08:30<br>17:01 |
| 30                  | 08:14<br>17:42 | 07:30<br>18:28 | 06:32<br>20:08 | 06:32<br>20:51 | 05:55<br>20:20 (26) | 05:51<br>21:44           | 06:19<br>21:23 | 06:59<br>20:33 | 06:59<br>20:33 | 07:40<br>19:31      | 08:22<br>18:33 | 09:07<br>16:58 | 08:31<br>17:02 |
| 31                  | 08:13<br>17:43 | 07:28<br>18:29 | 06:28<br>20:09 | 06:28<br>20:54 | 05:54<br>21:29      | 06:20<br>21:22           | 07:00<br>20:31 | 07:00<br>20:31 | 07:00<br>20:31 | 08:24<br>18:32      | 09:08<br>16:58 | 09:31<br>17:03 | 08:32<br>17:03 |
| Potential sun hours | 278            | 286            | 367            | 406            | 466                 | 475                      | 481            | 443            | 380            | 339                 | 283            | 266            | 144            |
| Total, worst case   |                |                |                | 337            | 269                 |                          |                | 611            |                |                     |                |                | 0.45           |
| Sun reduction       |                |                |                | 0.58           | 0.64                |                          |                | 0.72           |                |                     |                |                | 1.00           |
| Oper. time red.     |                |                |                | 1.00           | 1.00                |                          |                | 1.00           |                |                     |                |                | 0.64           |
| Wind dir. red.      |                |                |                | 0.68           | 0.68                |                          |                | 0.68           |                |                     |                |                | 0.29           |
| Total reduction     |                |                |                | 0.39           | 0.43                |                          |                | 0.49           |                |                     |                |                | 0.42           |
| Total, real         |                |                |                | 132            | 117                 |                          |                | 298            |                |                     |                |                |                |

Table layout: For each day in each month the following matrix apply

|              |                      |                                 |                                  |
|--------------|----------------------|---------------------------------|----------------------------------|
| Day in month | Sun rise (hh:mm)     | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|              | Sun set (hh:mm)      | Last time (hh:mm) with flicker  | (WTG causing flicker last time)  |
|              | Minutes with flicker |                                 |                                  |



**Oliver IV Array 012 8/26/2023**

Licensed user:

**AECOM**

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

**Calculation:** Oliver IV Array 012 with 3 Alts 8/26/2023

**Shadow receptor:** R144 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (131)

### Assumptions for shadow calculations

Sunshine probability  $S/S_0$  (Sun hours/Possible sun hours) []

Reference year for calendar

2023

| Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  |
|------|------|------|------|------|------|------|------|------|------|------|------|
| 0.54 | 0.52 | 0.61 | 0.58 | 0.64 | 0.67 | 0.75 | 0.72 | 0.67 | 0.53 | 0.42 | 0.45 |

### Operational time

| N   | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW | NW  | NNW | Sum   |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| 376 | 314 | 339 | 425 | 445 | 474 | 693 | 570 | 488 | 386 | 872 | 609 | 772 | 651 | 677 | 667 | 8,758 |

|                     |       | January | February | March | April         |       | May           |       | June  | July  | August        |            | September | October | November | December |
|---------------------|-------|---------|----------|-------|---------------|-------|---------------|-------|-------|-------|---------------|------------|-----------|---------|----------|----------|
| 1                   | 08:31 | 08:12   | 07:27    | 07:26 |               | 06:31 | 07:07 (27)    | 05:53 | 05:52 | 06:21 |               | 07:02      | 07:41     | 08:25   | 08:08    |          |
|                     | 17:04 | 17:45   | 18:26    | 20:11 |               | 20:52 | 28 07:35 (27) | 21:30 | 21:44 | 21:21 |               | 20:29      | 19:29     | 18:30   | 16:57    |          |
| 2                   | 08:31 | 08:10   | 07:25    | 07:24 |               | 06:29 | 07:09 (27)    | 05:53 | 05:52 | 06:23 |               | 07:03      | 07:43     | 08:27   | 08:10    |          |
|                     | 17:05 | 17:46   | 18:28    | 20:12 |               | 20:54 | 25 07:34 (27) | 21:31 | 21:44 | 21:19 |               | 20:27      | 19:27     | 18:29   | 16:57    |          |
| 3                   | 08:31 | 08:09   | 07:23    | 07:22 |               | 06:28 | 07:09 (27)    | 05:52 | 05:53 | 06:24 |               | 07:04      | 07:44     | 08:28   | 08:11    |          |
|                     | 17:06 | 17:48   | 18:29    | 20:13 |               | 20:55 | 24 07:33 (27) | 21:32 | 21:44 | 21:18 |               | 20:25      | 19:25     | 18:27   | 16:56    |          |
| 4                   | 08:31 | 08:08   | 07:22    | 07:20 |               | 06:26 | 07:10 (27)    | 05:52 | 05:54 | 06:25 |               | 07:06      | 07:45     | 08:30   | 08:12    |          |
|                     | 17:07 | 17:49   | 18:31    | 20:15 |               | 20:56 | 22 07:32 (27) | 21:33 | 21:44 | 21:17 |               | 20:23      | 19:23     | 18:26   | 16:56    |          |
| 5                   | 08:31 | 08:06   | 07:20    | 07:18 |               | 06:24 | 07:11 (27)    | 05:51 | 05:54 | 06:26 |               | 07:07      | 07:47     | 07:31   | 08:13    |          |
|                     | 17:08 | 17:51   | 18:32    | 20:16 |               | 20:58 | 19 07:30 (27) | 21:34 | 21:43 | 21:15 |               | 20:21      | 19:21     | 17:24   | 16:56    |          |
| 6                   | 08:31 | 08:05   | 07:18    | 07:16 |               | 06:23 | 07:13 (27)    | 05:51 | 05:55 | 06:28 |               | 07:08      | 07:48     | 07:33   | 08:14    |          |
|                     | 17:09 | 17:52   | 18:34    | 20:18 |               | 20:59 | 16 07:29 (27) | 21:35 | 21:43 | 21:14 |               | 20:19      | 19:19     | 17:23   | 16:55    |          |
| 7                   | 08:31 | 08:04   | 07:16    | 07:15 |               | 06:21 | 07:14 (27)    | 05:50 | 05:56 | 06:29 | 07:25 (27)    | 07:10      | 07:49     | 07:34   | 08:15    |          |
|                     | 17:10 | 17:54   | 18:35    | 20:19 |               | 21:00 | 12 07:26 (27) | 21:36 | 21:43 | 21:12 | 11 07:36 (27) | 20:17      | 19:17     | 17:21   | 16:55    |          |
| 8                   | 08:30 | 08:02   | 07:14    | 07:13 |               | 06:20 | 07:19 (27)    | 05:50 | 05:56 | 06:30 |               | 07:22 (27) | 07:11     | 07:51   | 07:36    |          |
|                     | 17:11 | 17:55   | 18:36    | 20:20 |               | 21:02 | 3 07:22 (27)  | 21:36 | 21:42 | 21:11 | 16 07:38 (27) | 20:15      | 19:15     | 17:20   | 16:55    |          |
| 9                   | 08:30 | 08:01   | 07:12    | 07:11 |               | 06:18 |               | 05:49 | 05:57 | 06:32 | 16 07:20 (27) | 07:12      | 07:52     | 07:37   | 08:17    |          |
|                     | 17:12 | 17:57   | 18:38    | 20:22 |               | 21:03 |               | 21:37 | 21:42 | 21:09 | 19 07:39 (27) | 20:13      | 19:13     | 17:18   | 16:55    |          |
| 10                  | 08:30 | 07:59   | 07:10    | 07:09 |               | 06:17 |               | 05:49 | 05:58 | 06:33 | 19 07:19 (27) | 07:13      | 07:54     | 07:39   | 08:19    |          |
|                     | 17:14 | 17:59   | 18:39    | 20:23 |               | 21:04 |               | 21:38 | 21:41 | 21:08 | 21 07:40 (27) | 20:11      | 19:11     | 17:17   | 16:55    |          |
| 11                  | 08:29 | 07:58   | 07:08    | 07:07 |               | 06:16 |               | 05:49 | 05:59 | 06:34 | 21 07:18 (27) | 07:15      | 07:55     | 07:40   | 08:19    |          |
|                     | 17:15 | 18:00   | 18:41    | 20:24 |               | 21:06 |               | 21:39 | 21:41 | 21:06 | 24 07:42 (27) | 20:09      | 19:09     | 17:16   | 16:55    |          |
| 12                  | 08:29 | 07:56   | 08:06    | 07:05 |               | 06:14 |               | 05:49 | 06:00 | 06:35 | 24 07:17 (27) | 07:16      | 07:56     | 07:42   | 08:20    |          |
|                     | 17:16 | 18:00   | 18:42    | 20:26 |               | 21:07 |               | 21:39 | 21:40 | 21:05 | 25 07:42 (27) | 20:07      | 19:07     | 17:15   | 16:54    |          |
| 13                  | 08:28 | 07:55   | 08:04    | 07:03 |               | 06:13 |               | 05:48 | 06:01 | 06:37 | 25 07:16 (27) | 07:17      | 07:58     | 07:43   | 08:21    |          |
|                     | 17:17 | 18:02   | 19:44    | 20:27 |               | 21:08 |               | 21:40 | 21:40 | 21:03 | 27 07:43 (27) | 20:05      | 19:05     | 17:13   | 16:55    |          |
| 14                  | 08:28 | 07:53   | 08:02    | 07:01 |               | 06:12 |               | 05:48 | 06:02 | 06:38 | 27 07:15 (27) | 07:19      | 07:59     | 07:45   | 08:22    |          |
|                     | 17:19 | 18:03   | 19:45    | 20:29 |               | 21:10 |               | 21:40 | 21:39 | 21:01 | 28 07:43 (27) | 20:03      | 19:03     | 17:12   | 16:55    |          |
| 15                  | 08:27 | 07:52   | 08:00    | 06:59 |               | 06:10 |               | 05:48 | 06:02 | 06:39 | 28 07:15 (27) | 07:20      | 08:01     | 07:46   | 08:23    |          |
|                     | 17:20 | 18:05   | 19:47    | 20:30 |               | 21:11 |               | 21:41 | 21:38 | 21:00 | 29 07:44 (27) | 20:01      | 19:02     | 17:11   | 16:55    |          |
| 16                  | 08:27 | 07:50   | 07:58    | 06:57 |               | 06:09 |               | 05:48 | 06:03 | 06:41 | 29 07:14 (27) | 07:21      | 08:02     | 07:48   | 08:24    |          |
|                     | 17:21 | 18:06   | 19:48    | 20:31 | 9 07:21 (27)  | 21:12 |               | 21:41 | 21:38 | 20:58 | 30 07:44 (27) | 19:59      | 19:00     | 17:10   | 16:55    |          |
| 17                  | 08:26 | 07:48   | 07:56    | 06:55 |               | 06:08 |               | 05:48 | 06:04 | 06:42 | 30 07:14 (27) | 07:23      | 08:04     | 07:49   | 08:25    |          |
|                     | 17:23 | 18:08   | 19:49    | 20:33 | 13 07:32 (27) | 21:13 |               | 21:42 | 21:37 | 20:56 | 30 07:44 (27) | 19:57      | 18:56     | 17:09   | 16:55    |          |
| 18                  | 08:25 | 07:47   | 07:54    | 06:54 |               | 06:07 |               | 05:48 | 06:05 | 06:43 | 30 07:13 (27) | 07:24      | 08:05     | 07:51   | 08:25    |          |
|                     | 17:24 | 18:09   | 19:51    | 20:34 | 17 07:34 (27) | 21:15 |               | 21:42 | 21:36 | 20:55 | 30 07:43 (27) | 19:55      | 18:54     | 17:08   | 16:55    |          |
| 19                  | 08:25 | 07:45   | 07:52    | 06:52 |               | 06:05 |               | 05:48 | 06:06 | 06:45 | 30 07:13 (27) | 07:25      | 08:06     | 07:52   | 08:26    |          |
|                     | 17:25 | 18:11   | 19:52    | 20:36 | 20 07:35 (27) | 21:16 |               | 21:43 | 21:35 | 20:53 | 30 07:43 (27) | 19:53      | 18:52     | 17:07   | 16:56    |          |
| 20                  | 08:24 | 07:43   | 07:50    | 06:50 |               | 06:04 |               | 05:48 | 06:08 | 06:46 | 30 07:13 (27) | 07:27      | 08:08     | 07:54   | 08:27    |          |
|                     | 17:27 | 18:12   | 19:54    | 20:37 | 22 07:36 (27) | 21:17 |               | 21:43 | 21:34 | 20:51 | 30 07:43 (27) | 19:51      | 18:50     | 17:06   | 16:56    |          |
| 21                  | 08:23 | 07:42   | 07:48    | 06:48 |               | 06:03 |               | 05:48 | 06:09 | 06:47 | 30 07:13 (27) | 07:28      | 08:09     | 07:55   | 08:27    |          |
|                     | 17:28 | 18:14   | 19:55    | 20:38 | 25 07:37 (27) | 21:18 |               | 21:43 | 21:33 | 20:49 | 30 07:43 (27) | 19:49      | 18:49     | 17:05   | 16:56    |          |
| 22                  | 08:22 | 07:40   | 07:46    | 06:46 |               | 06:02 |               | 05:48 | 06:10 | 06:49 | 30 07:14 (27) | 07:29      | 08:11     | 07:56   | 08:28    |          |
|                     | 17:30 | 18:16   | 19:57    | 20:40 | 27 07:37 (27) | 21:19 |               | 21:44 | 21:32 | 20:48 | 28 07:42 (27) | 19:47      | 18:47     | 17:04   | 16:57    |          |
| 23                  | 08:21 | 07:38   | 07:44    | 06:44 |               | 06:01 |               | 05:49 | 06:11 | 06:50 | 28 07:15 (27) | 07:31      | 08:12     | 07:58   | 08:28    |          |
|                     | 17:31 | 18:17   | 19:58    | 20:41 | 29 07:37 (27) | 21:21 |               | 21:44 | 21:31 | 20:46 | 26 07:41 (27) | 19:45      | 18:45     | 17:03   | 16:57    |          |
| 24                  | 08:20 | 07:36   | 07:42    | 06:43 |               | 06:00 |               | 05:49 | 06:12 | 06:51 | 26 07:17 (27) | 07:32      | 08:14     | 07:59   | 08:29    |          |
|                     | 17:33 | 18:19   | 19:59    | 20:43 | 30 07:38 (27) | 21:22 |               | 21:44 | 21:30 | 20:44 | 23 07:40 (27) | 19:43      | 18:43     | 17:02   | 16:58    |          |
| 25                  | 08:19 | 07:35   | 07:40    | 06:41 |               | 05:59 |               | 05:49 | 06:13 | 06:52 | 23 07:18 (27) | 07:33      | 08:15     | 08:00   | 08:29    |          |
|                     | 17:34 | 18:20   | 20:01    | 20:44 | 30 07:37 (27) | 21:23 |               | 21:44 | 21:29 | 20:42 | 21 07:39 (27) | 19:41      | 18:42     | 17:01   | 16:59    |          |
| 26                  | 08:18 | 07:33   | 07:38    | 06:39 |               | 05:58 |               | 05:50 | 06:14 | 06:54 | 21 07:19 (27) | 07:35      | 08:17     | 08:02   | 08:30    |          |
|                     | 17:36 | 18:22   | 20:02    | 20:45 | 30 07:37 (27) | 21:24 |               | 21:44 | 21:28 | 20:40 | 18 07:37 (27) | 19:39      | 18:40     | 17:00   | 16:59    |          |
| 27                  | 08:17 | 07:31   | 07:36    | 06:37 |               | 05:57 |               | 05:50 | 06:15 | 06:55 | 18 07:20 (27) | 07:36      | 08:18     | 08:03   | 08:30    |          |
|                     | 17:37 | 18:23   | 20:04    | 20:47 | 30 07:37 (27) | 21:25 |               | 21:44 | 21:27 | 20:39 | 15 07:35 (27) | 19:37      | 18:38     | 17:00   | 17:00    |          |
| 28                  | 08:16 | 07:29   | 07:34    | 06:36 |               | 05:57 |               | 05:50 | 06:17 | 06:56 | 15 07:22 (27) | 07:37      | 08:19     | 08:04   | 08:30    |          |
|                     | 17:39 | 18:25   | 20:05    | 20:48 | 30 07:37 (27) | 21:26 |               | 21:44 | 21:26 | 20:37 | 11 07:33 (27) | 19:35      | 18:37     | 16:59   | 17:01    |          |
| 29                  | 08:15 |         | 07:32    | 06:34 |               | 05:56 |               | 05:51 | 06:18 | 06:58 | 6 07:23 (27)  | 07:39      | 08:21     | 08:06   | 08:30    |          |
|                     | 17:40 |         | 20:06    | 20:49 | 29 07:36 (27) | 21:27 |               | 21:44 | 21:25 | 20:35 | 07:29 (27)    | 19:33      | 18:35     | 16:58   | 17:01    |          |
| 30                  | 08:14 |         | 07:30    | 06:32 |               | 05:55 |               | 05:51 | 06:19 | 06:59 |               | 07:40      | 08:22     | 08:07   | 08:31    |          |
|                     | 17:42 |         | 20:08    | 20:51 | 29 07:36 (27) | 21:28 |               | 21:44 | 21:23 | 20:33 |               | 19:31      | 18:33     | 16:58   | 17:02    |          |
| 31                  | 08:13 |         | 07:28    |       |               | 05:54 |               |       | 06:20 | 07:00 |               |            | 08:24     |         | 17:01    |          |
|                     | 17:43 |         | 20:09    |       |               | 21:29 |               |       | 21:22 | 20:31 |               |            | 18:32     |         | 17:03    |          |
| Potential sun hours | 277   | 286     | 367      | 406   |               | 466   |               |       | 475   | 481   | 443           |            | 380       | 339     | 282      | 266      |
| Total, worst case   |       |         |          |       |               | 370   |               | 149   |       |       | 528           |            |           |         |          |          |
| Sun reduction       |       |         |          |       |               | 0.58  |               | 0.64  |       |       | 0.72          |            |           |         |          |          |
| Oper. time red.     |       |         |          |       |               | 1.00  |               | 1.00  |       |       | 1.00          |            |           |         |          |          |
| Wind dir. red.      |       |         |          |       |               | 0.66  |               | 0.66  |       |       | 0.66          |            |           |         |          |          |
| Total reduction     |       |         |          |       |               | 0.38  |               | 0.42  |       |       | 0.48          |            |           |         |          |          |
| Total, real         |       |         |          |       |               | 142   |               | 63    |       |       | 251           |            |           |         |          |          |

**Table layout: For each day in each month the following matrix apply**

| Day in month | Sun rise (hh:mm) | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|--------------|------------------|---------------------------------|----------------------------------|
|              | Sun set (hh:mm)  | Minutes with flicker            | Last time (hh:mm) with flicker   |
|              |                  |                                 | (WTG causing flicker last time)  |

Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Assumptions for shadow calculations

Reference year for calendar

Shadow receptor: R147 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (132)

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

|                     | January        | February                    | March                       | April          | May            | June           | July           | August         | September      | October        | November       | December                    |                             |                |
|---------------------|----------------|-----------------------------|-----------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------------------|-----------------------------|----------------|
| 1                   | 08:31<br>17:04 | 08:12<br>17:45              | 34 08:38 (16)<br>09:12 (16) | 07:27<br>18:26 | 07:26<br>20:11 | 06:31<br>20:52 | 05:54<br>21:30 | 05:52<br>21:44 | 06:22<br>21:21 | 07:02<br>20:29 | 07:41<br>19:29 | 08:25<br>18:30              | 50 08:55 (16)<br>09:45 (16) | 08:08<br>16:57 |
| 2                   | 08:31<br>17:05 | 08:10<br>17:46              | 36 08:36 (16)<br>09:12 (16) | 07:25<br>18:28 | 07:24<br>20:12 | 06:29<br>20:54 | 05:53<br>21:31 | 05:52<br>21:44 | 06:23<br>21:20 | 07:03<br>20:27 | 07:43<br>19:27 | 08:27<br>18:29              | 50 08:55 (16)<br>09:45 (16) | 08:10<br>16:57 |
| 3                   | 08:31<br>17:06 | 08:09<br>17:48              | 38 08:35 (16)<br>09:13 (16) | 07:24<br>18:29 | 07:22<br>20:13 | 06:28<br>20:55 | 05:52<br>21:32 | 05:53<br>21:44 | 06:24<br>21:18 | 07:04<br>20:25 | 07:44<br>19:25 | 08:28<br>18:27              | 50 08:55 (16)<br>09:45 (16) | 08:11<br>16:56 |
| 4                   | 08:31<br>17:07 | 08:08<br>17:49              | 40 08:34 (16)<br>09:14 (16) | 07:22<br>18:31 | 07:20<br>20:15 | 06:26<br>20:56 | 05:52<br>21:33 | 05:54<br>21:44 | 06:25<br>21:17 | 07:06<br>20:23 | 07:45<br>19:23 | 08:30<br>18:26              | 48 08:57 (16)<br>09:45 (16) | 08:12<br>16:56 |
| 5                   | 08:31<br>17:08 | 08:07<br>17:51              | 42 08:32 (16)<br>09:14 (16) | 07:20<br>18:32 | 07:18<br>20:16 | 06:25<br>20:58 | 05:51<br>21:34 | 05:54<br>21:43 | 06:26<br>21:15 | 07:07<br>20:21 | 07:47<br>19:21 | 07:31<br>17:24              | 47 08:58 (16)<br>09:45 (16) | 08:13<br>16:56 |
| 6                   | 08:31<br>17:09 | 08:05<br>17:52              | 44 08:31 (16)<br>09:15 (16) | 07:18<br>18:34 | 07:17<br>20:18 | 06:23<br>20:59 | 05:51<br>21:35 | 05:55<br>21:43 | 06:28<br>21:14 | 07:08<br>20:19 | 07:48<br>19:19 | 07:33<br>17:23              | 45 08:59 (16)<br>09:45 (16) | 08:14<br>16:55 |
| 7                   | 08:31<br>17:10 | 08:04<br>17:54              | 46 08:29 (16)<br>09:15 (16) | 07:16<br>18:35 | 07:15<br>20:19 | 06:21<br>21:00 | 05:50<br>21:36 | 05:56<br>21:43 | 06:29<br>21:12 | 07:10<br>20:17 | 07:50<br>19:17 | 07:34<br>17:21              | 43 08:01 (16)<br>08:44 (16) | 08:15<br>16:55 |
| 8                   | 08:30<br>17:11 | 08:02<br>17:56              | 48 08:28 (16)<br>09:16 (16) | 07:14<br>18:37 | 07:13<br>20:20 | 06:20<br>21:02 | 05:50<br>21:36 | 05:56<br>21:42 | 06:30<br>21:11 | 07:11<br>20:15 | 07:51<br>19:15 | 07:36<br>17:20              | 41 08:03 (16)<br>08:44 (16) | 08:16<br>16:55 |
| 9                   | 08:30<br>17:12 | 08:01<br>17:57              | 49 08:26 (16)<br>09:15 (16) | 07:12<br>18:38 | 07:11<br>20:22 | 06:19<br>21:03 | 05:49<br>21:37 | 05:57<br>21:42 | 06:32<br>21:09 | 07:12<br>20:13 | 07:52<br>19:13 | 07:37<br>17:18              | 39 08:05 (16)<br>08:44 (16) | 08:18<br>16:55 |
| 10                  | 08:30<br>17:14 | 07:59<br>17:59              | 50 08:26 (16)<br>09:16 (16) | 07:10<br>18:39 | 07:09<br>20:23 | 06:17<br>21:04 | 05:49<br>21:38 | 05:58<br>21:41 | 06:33<br>21:08 | 07:14<br>20:11 | 07:54<br>19:11 | 07:39<br>17:17              | 37 08:06 (16)<br>08:43 (16) | 08:19<br>16:55 |
| 11                  | 08:29<br>17:15 | 07:58<br>18:00              | 50 08:26 (16)<br>09:16 (16) | 07:08<br>18:41 | 07:07<br>20:25 | 06:16<br>21:06 | 05:49<br>21:39 | 05:59<br>21:41 | 06:34<br>21:06 | 07:15<br>20:09 | 07:55<br>19:09 | 07:40<br>17:16              | 35 08:08 (16)<br>08:43 (16) | 08:20<br>16:55 |
| 12                  | 08:29<br>17:16 | 07:56<br>18:00              | 50 08:25 (16)<br>09:15 (16) | 07:06<br>18:42 | 07:05<br>20:26 | 06:14<br>21:07 | 05:49<br>21:39 | 06:00<br>21:40 | 06:35<br>21:05 | 07:16<br>20:07 | 07:56<br>19:07 | 07:42<br>17:15              | 33 08:10 (16)<br>08:43 (16) | 08:20<br>16:55 |
| 13                  | 08:28<br>17:16 | 07:55<br>18:00              | 50 08:26 (16)<br>09:15 (16) | 07:04<br>18:42 | 07:03<br>20:26 | 06:13<br>21:07 | 05:48<br>21:39 | 06:01<br>21:40 | 06:37<br>21:03 | 07:17<br>20:05 | 07:58<br>19:05 | 07:43<br>17:13              | 30 08:11 (16)<br>08:41 (16) | 08:21<br>16:55 |
| 14                  | 08:28<br>17:17 | 07:53<br>18:02              | 50 08:26 (16)<br>09:16 (16) | 07:02<br>19:44 | 07:01<br>20:27 | 06:12<br>21:08 | 05:48<br>21:40 | 06:02<br>21:40 | 06:38<br>21:03 | 07:19<br>20:05 | 07:59<br>19:05 | 07:45<br>17:12              | 28 08:13 (16)<br>08:41 (16) | 08:22<br>16:55 |
| 15                  | 08:27<br>17:19 | 07:52<br>18:03              | 49 08:26 (16)<br>09:15 (16) | 07:00<br>19:45 | 06:59<br>20:29 | 06:10<br>21:10 | 05:48<br>21:40 | 06:03<br>21:39 | 06:39<br>21:02 | 07:20<br>20:03 | 08:01<br>19:03 | 07:46<br>17:12              | 26 08:14 (16)<br>08:41 (16) | 08:23<br>16:55 |
| 16                  | 08:27<br>17:20 | 07:50<br>18:05              | 48 08:27 (16)<br>09:14 (16) | 07:58<br>19:47 | 06:57<br>20:30 | 06:09<br>21:11 | 05:48<br>21:41 | 06:04<br>21:38 | 06:41<br>21:00 | 07:21<br>20:01 | 08:02<br>19:02 | 07:48<br>17:11              | 26 08:16 (16)<br>08:40 (16) | 08:24<br>16:55 |
| 17                  | 08:26<br>17:21 | 07:48<br>18:06              | 48 08:27 (16)<br>09:15 (16) | 07:56<br>19:48 | 06:55<br>20:31 | 06:08<br>21:12 | 05:48<br>21:41 | 06:05<br>21:38 | 06:42<br>20:58 | 07:23<br>19:59 | 08:04<br>19:00 | 16 09:09 (16)<br>17:10      | 23 09:09 (16)<br>08:39 (16) | 08:25<br>16:55 |
| 18                  | 08:25<br>17:23 | 07:47<br>18:08              | 47 08:27 (16)<br>09:14 (16) | 07:54<br>19:50 | 06:54<br>20:33 | 06:07<br>21:13 | 05:48<br>21:42 | 06:06<br>21:37 | 06:43<br>20:56 | 07:24<br>19:57 | 08:05<br>18:56 | 23 09:07 (16)<br>17:09      | 21 09:07 (16)<br>08:39 (16) | 08:25<br>16:55 |
| 19                  | 08:25<br>17:24 | 07:45<br>18:09              | 46 08:29 (16)<br>09:13 (16) | 07:52<br>19:51 | 06:52<br>20:34 | 06:06<br>21:15 | 05:48<br>21:42 | 06:07<br>21:36 | 06:45<br>20:55 | 07:25<br>19:55 | 08:06<br>18:54 | 28 09:05 (16)<br>17:08      | 18 09:05 (16)<br>08:37 (16) | 08:26<br>16:55 |
| 20                  | 08:24<br>17:25 | 07:43<br>18:11              | 44 08:29 (16)<br>09:13 (16) | 07:50<br>19:52 | 06:50<br>20:36 | 06:04<br>21:16 | 05:48<br>21:43 | 06:08<br>21:35 | 06:46<br>20:53 | 07:27<br>19:53 | 08:08<br>18:52 | 31 09:03 (16)<br>17:07      | 16 09:03 (16)<br>08:37 (16) | 08:27<br>16:56 |
| 21                  | 08:23<br>17:27 | 07:42<br>18:13              | 43 08:30 (16)<br>09:12 (16) | 07:48<br>19:54 | 06:48<br>20:37 | 06:03<br>21:17 | 05:48<br>21:43 | 06:09<br>21:34 | 06:47<br>20:51 | 07:28<br>19:51 | 08:09<br>18:50 | 35 09:02 (16)<br>17:06      | 13 09:02 (16)<br>08:35 (16) | 08:27<br>16:56 |
| 22                  | 08:23<br>17:28 | 4 08:54 (16)<br>08:49 (16)  | 40 08:30 (16)<br>09:16 (16) | 07:48<br>19:55 | 06:48<br>20:38 | 06:03<br>21:18 | 05:48<br>21:43 | 06:09<br>21:33 | 06:47<br>20:50 | 07:28<br>19:49 | 08:09<br>18:49 | 38 09:02 (16)<br>17:05      | 10 09:02 (16)<br>08:34 (16) | 08:27<br>16:57 |
| 23                  | 08:22<br>17:30 | 8 08:57 (16)<br>08:48 (16)  | 38 08:31 (16)<br>09:09 (16) | 07:46<br>19:57 | 06:46<br>20:40 | 06:02<br>21:19 | 05:49<br>21:44 | 06:10<br>21:32 | 06:49<br>20:48 | 07:29<br>19:47 | 08:11<br>18:47 | 41 09:00 (16)<br>17:04      | 6 09:00 (16)<br>08:31 (16)  | 08:28<br>16:57 |
| 24                  | 08:21<br>17:31 | 11 08:59 (16)<br>08:47 (16) | 35 08:32 (16)<br>09:07 (16) | 07:44<br>19:58 | 06:45<br>20:41 | 06:01<br>21:21 | 05:49<br>21:44 | 06:11<br>21:31 | 06:50<br>20:46 | 07:31<br>19:45 | 08:12<br>18:45 | 42 09:00 (16)<br>17:03      | 2 09:00 (16)<br>08:58 (16)  | 08:28<br>16:57 |
| 25                  | 08:20<br>17:33 | 14 09:01 (16)<br>08:46 (16) | 32 08:34 (16)<br>09:06 (16) | 07:42<br>19:59 | 06:43<br>20:43 | 06:00<br>21:22 | 05:49<br>21:44 | 06:12<br>21:30 | 06:51<br>20:44 | 07:32<br>19:43 | 08:14<br>18:43 | 44 09:02 (16)<br>17:02      | 08:58 (16)<br>08:01         | 08:29<br>16:58 |
| 26                  | 08:19<br>17:34 | 17 09:03 (16)<br>08:45 (16) | 29 08:35 (16)<br>09:04 (16) | 07:40<br>20:01 | 06:41<br>20:44 | 05:59<br>21:23 | 05:49<br>21:44 | 06:13<br>21:29 | 06:53<br>20:42 | 07:33<br>19:41 | 08:15<br>18:42 | 45 09:03 (16)<br>17:01      | 45 08:58 (16)<br>08:57 (16) | 08:29<br>16:59 |
| 27                  | 08:18<br>17:36 | 20 09:05 (16)<br>08:44 (16) | 24 08:37 (16)<br>09:01 (16) | 07:38<br>20:02 | 06:39<br>20:45 | 05:58<br>21:24 | 05:50<br>21:44 | 06:14<br>21:28 | 06:54<br>20:40 | 07:35<br>19:39 | 08:17<br>18:40 | 46 09:04 (16)<br>17:01      | 46 08:59 (16)<br>08:57 (16) | 08:30<br>16:59 |
| 28                  | 08:17<br>17:37 | 22 09:06 (16)<br>08:43 (16) | 18 08:40 (16)<br>09:08 (16) | 07:36<br>20:04 | 06:38<br>20:47 | 05:57<br>21:25 | 05:50<br>21:44 | 06:15<br>21:27 | 06:55<br>20:39 | 07:36<br>19:37 | 08:18<br>18:38 | 47 09:05 (16)<br>17:00      | 47 08:58 (16)<br>08:56 (16) | 08:30<br>17:00 |
| 29                  | 08:16<br>17:39 | 25 09:08 (16)<br>08:41 (16) | 5 08:46 (16)<br>09:08 (16)  | 07:34<br>20:05 | 06:36<br>20:48 | 05:57<br>21:26 | 05:50<br>21:44 | 06:17<br>21:26 | 06:56<br>20:37 | 07:37<br>19:35 | 08:20<br>18:37 | 48 09:06 (16)<br>16:59      | 48 08:58 (16)<br>08:56 (16) | 08:30<br>17:01 |
| 30                  | 08:15<br>17:40 | 27 09:08 (16)<br>08:40 (16) |                             | 07:32<br>20:06 | 06:34<br>20:49 | 05:56<br>21:27 | 05:51<br>21:44 | 06:18<br>21:25 | 06:58<br>20:35 | 07:39<br>19:33 | 08:21<br>18:35 | 49 09:07 (16)<br>16:59      | 49 08:59 (16)<br>08:57 (16) | 08:31<br>17:01 |
| 31                  | 08:14<br>17:42 | 29 08:39 (16)<br>08:09 (16) |                             | 07:30<br>20:08 | 06:32<br>20:51 | 05:55<br>21:28 | 05:51<br>21:44 | 06:19<br>21:23 | 06:59<br>20:33 | 07:40<br>19:31 | 08:22<br>18:33 | 49 08:56 (16)<br>09:45 (16) | 49 08:58 (16)<br>09:45 (16) | 08:31<br>17:02 |
| Potential sun hours | 277            | 286                         |                             | 367            | 406            | 466            | 475            | 481            | 443            | 380            | 339            | 282                         | 711                         | 266            |
| Total, worst case   | 209            | 1123                        |                             |                |                |                |                |                |                |                |                | 632                         | 711                         |                |
| Sun reduction       | 0.54           | 0.52                        |                             |                |                |                |                |                |                |                |                | 0.53                        | 0.42                        |                |
| Oper. time red.     | 1.00           | 1.00                        |                             |                |                |                |                |                |                |                |                | 1.00                        | 1.00                        |                |
| Wind dir. red.      | 0.66           | 0.66                        |                             |                |                |                |                |                |                |                |                | 0.66                        | 0.66                        |                |
| Total reduction     | 0.35           | 0.34                        |                             |                |                |                |                |                |                |                |                | 0.35                        | 0.28                        |                |
| Total, real         | 74             | 383                         |                             |                |                |                |                |                |                |                |                | 219                         | 196                         |                |

Table layout: For each day in each month the following matrix apply

|              |                  |                                 |                                  |
|--------------|------------------|---------------------------------|----------------------------------|
| Day in month | Sun rise (hh:mm) | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|              | Sun set (hh:mm)  | Minutes with flicker            | Last time (hh:mm) with flicker   |
|              |                  |                                 | (WTG causing flicker last time)  |



Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

### Assumptions for shadow calculations

Reference year for calendar

2023

Shadow receptor: R148 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 90.0° (133)

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

|                     | January        | February       | March          | April          | May            | June           | July           | August         | September      | October        | November       | December       |
|---------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 1                   | 08:31<br>17:04 | 08:12<br>17:45 | 07:27<br>18:26 | 07:27<br>20:11 | 06:31<br>20:52 | 05:54<br>21:30 | 05:52<br>21:44 | 06:22<br>21:21 | 07:02<br>20:29 | 07:41<br>19:29 | 08:26<br>18:30 | 08:08<br>16:57 |
| 2                   | 08:31<br>17:05 | 08:11<br>17:46 | 07:26<br>18:28 | 07:25<br>20:12 | 06:29<br>20:54 | 05:53<br>21:31 | 05:52<br>21:44 | 06:23<br>21:20 | 07:03<br>20:27 | 07:43<br>19:27 | 08:27<br>18:29 | 08:10<br>16:57 |
| 3                   | 08:31<br>17:06 | 08:09<br>17:48 | 07:24<br>18:29 | 07:23<br>20:14 | 06:28<br>20:55 | 05:52<br>21:32 | 05:53<br>21:44 | 06:24<br>21:18 | 07:04<br>20:25 | 07:44<br>19:25 | 08:29<br>18:27 | 08:11<br>16:57 |
| 4                   | 08:31<br>17:07 | 08:08<br>17:49 | 07:22<br>18:31 | 07:21<br>20:15 | 06:26<br>20:56 | 05:52<br>21:33 | 05:54<br>21:44 | 06:25<br>21:17 | 07:06<br>20:23 | 07:46<br>19:23 | 08:30<br>18:26 | 08:12<br>16:56 |
| 5                   | 08:31<br>17:08 | 08:07<br>17:51 | 07:20<br>18:32 | 07:19<br>20:16 | 06:25<br>20:58 | 05:51<br>21:34 | 05:54<br>21:44 | 06:27<br>21:15 | 07:07<br>20:21 | 07:47<br>19:21 | 08:32<br>18:24 | 08:13<br>16:56 |
| 6                   | 08:31<br>17:09 | 08:05<br>17:53 | 07:18<br>18:34 | 07:17<br>20:18 | 06:23<br>20:59 | 05:51<br>21:35 | 05:55<br>21:43 | 06:28<br>21:14 | 07:08<br>20:19 | 07:48<br>19:19 | 08:33<br>18:23 | 08:14<br>16:55 |
| 7                   | 08:31<br>17:10 | 08:04<br>17:54 | 07:16<br>18:35 | 07:15<br>20:19 | 06:22<br>21:00 | 05:50<br>21:36 | 05:56<br>21:43 | 06:29<br>21:13 | 07:10<br>20:17 | 07:50<br>19:17 | 08:34<br>18:21 | 08:16<br>16:55 |
| 8                   | 08:30<br>17:11 | 08:02<br>17:56 | 07:14<br>18:37 | 07:13<br>20:20 | 06:20<br>21:02 | 05:50<br>21:37 | 05:57<br>21:42 | 06:30<br>21:11 | 07:11<br>20:16 | 07:51<br>19:15 | 08:36<br>18:20 | 08:17<br>16:55 |
| 9                   | 08:30<br>17:13 | 08:01<br>17:57 | 07:12<br>18:38 | 07:11<br>20:22 | 06:19<br>21:03 | 05:50<br>21:37 | 05:57<br>21:42 | 06:32<br>21:10 | 07:12<br>20:14 | 07:52<br>19:13 | 08:37<br>18:19 | 08:18<br>16:55 |
| 10                  | 08:30<br>17:14 | 08:00<br>17:59 | 07:10<br>18:40 | 07:09<br>20:23 | 06:17<br>21:04 | 05:49<br>21:38 | 05:58<br>21:42 | 06:33<br>21:08 | 07:14<br>20:12 | 07:54<br>19:11 | 08:39<br>18:17 | 08:19<br>16:55 |
| 11                  | 08:29<br>17:15 | 07:58<br>18:00 | 07:08<br>18:41 | 07:07<br>20:25 | 06:16<br>21:06 | 05:49<br>21:39 | 05:59<br>21:41 | 06:34<br>21:06 | 07:15<br>20:10 | 07:55<br>19:09 | 08:40<br>18:16 | 08:20<br>16:55 |
| 12                  | 08:29<br>17:16 | 07:56<br>18:00 | 08:06<br>18:42 | 07:05<br>20:26 | 06:14<br>21:07 | 05:49<br>21:39 | 06:00<br>21:40 | 06:36<br>21:05 | 07:16<br>20:08 | 07:57<br>19:07 | 08:42<br>18:15 | 08:21<br>16:55 |
| 13                  | 08:29<br>17:17 | 07:55<br>18:02 | 08:04<br>19:44 | 07:03<br>20:27 | 06:13<br>21:08 | 05:48<br>21:40 | 06:01<br>21:40 | 06:37<br>21:03 | 07:18<br>20:06 | 07:58<br>19:05 | 08:43<br>18:13 | 08:22<br>16:55 |
| 14                  | 08:28<br>17:19 | 07:53<br>18:03 | 08:02<br>19:45 | 07:01<br>20:29 | 06:12<br>21:10 | 05:48<br>21:41 | 06:02<br>21:39 | 06:38<br>21:02 | 07:19<br>20:03 | 07:59<br>19:04 | 08:45<br>18:12 | 08:23<br>16:55 |
| 15                  | 08:27<br>17:20 | 07:52<br>18:05 | 08:00<br>19:47 | 06:59<br>20:30 | 06:10<br>21:11 | 05:48<br>21:41 | 06:03<br>21:38 | 06:39<br>21:00 | 07:20<br>20:01 | 08:01<br>19:02 | 08:46<br>18:11 | 08:23<br>16:55 |
| 16                  | 08:27<br>17:21 | 07:50<br>18:06 | 07:58<br>19:48 | 06:57<br>20:32 | 06:09<br>21:12 | 05:48<br>21:42 | 06:04<br>21:38 | 06:41<br>20:58 | 07:21<br>19:59 | 08:02<br>19:00 | 08:48<br>18:10 | 08:24<br>16:55 |
| 17                  | 08:26<br>17:23 | 07:48<br>18:08 | 07:56<br>19:50 | 06:56<br>20:33 | 06:08<br>21:13 | 05:48<br>21:42 | 06:05<br>21:37 | 06:42<br>20:57 | 07:23<br>19:57 | 08:04<br>18:56 | 08:49<br>18:09 | 08:25<br>16:55 |
| 18                  | 08:26<br>17:24 | 07:47<br>18:10 | 07:54<br>19:51 | 06:54<br>20:34 | 06:07<br>21:15 | 05:48<br>21:43 | 06:06<br>21:36 | 06:43<br>20:55 | 07:24<br>19:55 | 08:05<br>18:54 | 08:51<br>18:08 | 08:26<br>16:56 |
| 19                  | 08:25<br>17:25 | 07:45<br>18:11 | 07:52<br>19:52 | 06:52<br>20:36 | 06:06<br>21:16 | 05:48<br>21:43 | 06:07<br>21:35 | 06:45<br>20:53 | 07:25<br>19:53 | 08:07<br>18:52 | 08:52<br>18:07 | 08:26<br>16:56 |
| 20                  | 08:24<br>17:27 | 07:43<br>18:13 | 07:50<br>19:54 | 06:50<br>20:37 | 06:04<br>21:17 | 05:48<br>21:43 | 06:08<br>21:34 | 06:46<br>20:51 | 07:27<br>19:51 | 08:08<br>18:51 | 08:54<br>18:06 | 08:27<br>16:56 |
| 21                  | 08:23<br>17:28 | 07:42<br>18:14 | 07:48<br>19:55 | 06:48<br>20:39 | 06:03<br>21:18 | 05:48<br>21:44 | 06:09<br>21:33 | 06:47<br>20:50 | 07:28<br>19:49 | 08:09<br>18:49 | 08:55<br>18:05 | 08:27<br>16:57 |
| 22                  | 08:22<br>17:30 | 07:40<br>18:16 | 07:46<br>19:57 | 06:46<br>20:40 | 06:02<br>21:20 | 05:49<br>21:44 | 06:10<br>21:32 | 06:49<br>20:48 | 07:29<br>19:47 | 08:11<br>18:47 | 08:56<br>18:04 | 08:28<br>16:57 |
| 23                  | 08:22<br>17:31 | 07:38<br>18:17 | 07:44<br>19:58 | 06:45<br>20:41 | 06:01<br>21:21 | 05:49<br>21:44 | 06:11<br>21:31 | 06:50<br>20:46 | 07:31<br>19:45 | 08:12<br>18:45 | 08:58<br>18:03 | 08:29<br>16:58 |
| 24                  | 08:21<br>17:33 | 07:36<br>18:19 | 07:42<br>20:00 | 06:43<br>20:43 | 06:00<br>21:22 | 05:49<br>21:44 | 06:12<br>21:30 | 06:51<br>20:44 | 07:32<br>19:43 | 08:14<br>18:43 | 08:59<br>18:02 | 08:29<br>16:58 |
| 25                  | 08:20<br>17:34 | 07:35<br>18:20 | 07:40<br>20:01 | 06:41<br>20:44 | 05:59<br>21:23 | 05:49<br>21:44 | 06:13<br>21:29 | 06:53<br>20:42 | 07:33<br>19:41 | 08:15<br>18:42 | 09:01<br>18:01 | 08:29<br>16:59 |
| 26                  | 08:19<br>17:36 | 07:33<br>18:22 | 07:38<br>20:02 | 06:39<br>20:45 | 05:58<br>21:24 | 05:50<br>21:45 | 06:14<br>21:28 | 06:54<br>20:41 | 07:35<br>19:39 | 08:17<br>18:40 | 09:02<br>18:01 | 08:30<br>16:59 |
| 27                  | 08:18<br>17:37 | 07:31<br>18:23 | 07:36<br>20:04 | 06:38<br>20:47 | 05:58<br>21:25 | 05:50<br>21:45 | 06:16<br>21:27 | 06:55<br>20:39 | 07:36<br>19:37 | 08:18<br>18:38 | 09:03<br>18:00 | 08:30<br>17:00 |
| 28                  | 08:16<br>17:39 | 07:29<br>18:25 | 07:34<br>20:05 | 06:36<br>20:48 | 05:57<br>21:26 | 05:50<br>21:45 | 06:17<br>21:26 | 06:57<br>20:37 | 07:37<br>19:35 | 08:20<br>18:37 | 09:05<br>18:05 | 08:30<br>17:01 |
| 29                  | 08:15<br>17:40 | 07:32<br>18:26 | 07:37<br>20:07 | 06:34<br>20:50 | 05:56<br>21:27 | 05:51<br>21:45 | 06:18<br>21:25 | 06:58<br>20:35 | 07:39<br>19:33 | 08:21<br>18:35 | 09:06<br>18:06 | 08:31<br>17:01 |
| 30                  | 08:14<br>17:42 | 07:30<br>18:28 | 07:30<br>20:08 | 06:33<br>20:51 | 05:55<br>21:28 | 05:51<br>21:45 | 06:19<br>21:24 | 06:59<br>20:33 | 07:40<br>19:31 | 08:23<br>18:33 | 09:07<br>18:08 | 08:31<br>17:02 |
| 31                  | 08:13<br>17:43 | 07:28<br>18:29 | 07:28<br>20:09 | 05:54<br>21:29 | 05:54<br>21:29 | 05:54<br>21:22 | 06:20<br>20:31 | 07:00<br>20:31 | 08:24<br>18:32 | 09:08<br>18:39 | 09:10<br>18:09 | 08:31<br>17:03 |
| Potential sun hours | 277            | 286            | 367            | 406            | 466            | 475            | 481            | 443            | 380            | 339            | 282            | 266            |
| Total, worst case   |                |                |                |                |                |                |                |                |                |                |                |                |
| Sun reduction       |                |                |                |                |                |                |                |                |                |                |                |                |
| Oper. time red.     |                |                |                |                |                |                |                |                |                |                |                |                |
| Wind dir. red.      |                |                |                |                |                |                |                |                |                |                |                |                |
| Total reduction     |                |                |                |                |                |                |                |                |                |                |                |                |
| Total, real         |                |                |                |                |                |                |                |                |                |                |                |                |

Table layout: For each day in each month the following matrix apply

|              |                      |                                 |                                  |
|--------------|----------------------|---------------------------------|----------------------------------|
| Day in month | Sun rise (hh:mm)     | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|              | Sun set (hh:mm)      | Last time (hh:mm) with flicker  | (WTG causing flicker last time)  |
|              | Minutes with flicker |                                 |                                  |

Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: R157 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 90.0° (140)

### Assumptions for shadow calculations

Reference year for calendar

2023

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

|                     | January        | February       | March                     | April                          | May            | June           | July           | August         | September      | October        | November       | December       |                                |                |
|---------------------|----------------|----------------|---------------------------|--------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|--------------------------------|----------------|
| 1                   | 08:31<br>17:04 | 08:11<br>17:45 | 07:27<br>18:26            | 43<br>08:03 (34)<br>08:46 (34) | 07:26<br>20:10 | 06:31<br>20:52 | 05:54<br>21:30 | 05:52<br>21:44 | 06:21<br>21:21 | 07:02<br>20:29 | 07:41<br>19:29 | 08:25<br>18:30 | 13<br>08:52 (34)<br>09:05 (34) | 08:08<br>16:57 |
| 2                   | 08:31<br>17:05 | 08:10<br>17:46 | 07:25<br>18:28            | 42<br>08:03 (34)<br>08:45 (34) | 07:24<br>20:12 | 06:29<br>20:53 | 05:53<br>21:31 | 05:52<br>21:44 | 06:23<br>21:19 | 07:03<br>20:27 | 07:43<br>19:27 | 08:27<br>18:29 | 8<br>08:51 (34)                | 08:09<br>16:57 |
| 3                   | 08:31<br>17:06 | 08:09<br>17:48 | 07:23<br>18:29            | 40<br>08:04 (34)<br>08:44 (34) | 07:22<br>20:13 | 06:28<br>20:55 | 05:52<br>21:32 | 05:53<br>21:44 | 06:24<br>21:18 | 07:04<br>20:25 | 07:44<br>19:25 | 08:28<br>18:27 |                                | 08:10<br>16:56 |
| 4                   | 08:31<br>17:07 | 08:08<br>17:49 | 07:21<br>18:31            | 39<br>08:04 (34)<br>08:43 (34) | 07:20<br>20:15 | 06:26<br>20:56 | 05:52<br>21:33 | 05:54<br>21:43 | 06:25<br>21:16 | 07:06<br>20:23 | 07:45<br>19:23 | 08:30<br>18:26 | 13<br>08:53 (34)<br>09:06 (34) | 08:12<br>16:56 |
| 5                   | 08:31<br>17:08 | 08:06<br>17:51 | 07:20<br>18:32            | 37<br>08:05 (34)<br>08:42 (34) | 07:18<br>20:16 | 06:24<br>20:57 | 05:51<br>21:34 | 05:54<br>21:43 | 06:26<br>21:15 | 07:07<br>20:21 | 07:47<br>19:21 | 08:31<br>18:24 | 20<br>08:50 (34)<br>09:10 (34) | 08:13<br>16:56 |
| 6                   | 08:30<br>17:09 | 08:05<br>17:52 | 07:18<br>18:33            | 36<br>08:05 (34)<br>08:41 (34) | 07:16<br>20:17 | 06:23<br>20:59 | 05:51<br>21:34 | 05:55<br>21:43 | 06:28<br>21:14 | 07:08<br>20:19 | 07:48<br>19:19 | 08:14<br>17:23 | 26<br>08:46 (34)<br>09:12 (34) | 08:15<br>16:55 |
| 7                   | 08:30<br>17:10 | 08:03<br>17:54 | 07:16<br>18:35            | 33<br>08:06 (34)<br>08:39 (34) | 07:14<br>20:19 | 06:21<br>21:00 | 05:50<br>21:35 | 05:56<br>21:42 | 06:29<br>21:12 | 07:09<br>20:17 | 07:49<br>19:17 | 08:15<br>17:21 | 29<br>08:45 (34)<br>09:14 (34) | 08:16<br>16:55 |
| 8                   | 08:30<br>17:11 | 08:02<br>17:55 | 07:14<br>18:36            | 29<br>08:08 (34)<br>08:37 (34) | 07:12<br>20:20 | 06:20<br>21:01 | 05:50<br>21:36 | 05:56<br>21:42 | 06:30<br>21:11 | 07:11<br>20:15 | 07:51<br>19:15 | 08:16<br>17:20 | 32<br>08:43 (34)<br>09:15 (34) | 08:17<br>16:55 |
| 9                   | 08:30<br>17:12 | 08:01<br>17:57 | 07:12<br>18:38            | 26<br>08:10 (34)<br>08:36 (34) | 07:11<br>20:22 | 06:18<br>21:03 | 05:49<br>21:37 | 05:57<br>21:42 | 06:32<br>21:09 | 07:12<br>20:13 | 07:52<br>19:13 | 08:17<br>17:18 | 35<br>08:41 (34)<br>09:16 (34) | 08:18<br>16:55 |
| 10                  | 08:29<br>17:14 | 07:59<br>17:59 | 5<br>07:10<br>18:29 (34)  | 21<br>08:12 (34)<br>08:23 (34) | 07:09<br>20:23 | 06:17<br>21:04 | 05:49<br>21:38 | 05:58<br>21:41 | 06:33<br>21:08 | 07:13<br>20:11 | 07:53<br>19:11 | 08:18<br>17:17 | 37<br>08:40 (34)<br>09:17 (34) | 08:19<br>16:55 |
| 11                  | 08:29<br>17:15 | 07:58<br>18:00 | 12<br>07:08<br>18:35 (34) | 13<br>08:06<br>08:21 (34)      | 07:07<br>20:24 | 06:16<br>21:05 | 05:49<br>21:38 | 05:59<br>21:41 | 06:34<br>21:06 | 07:15<br>20:09 | 07:55<br>19:09 | 08:19<br>17:16 | 39<br>08:38 (34)<br>09:17 (34) | 08:20<br>16:55 |
| 12                  | 08:29<br>17:16 | 07:56<br>18:00 | 16<br>08:06<br>18:37 (34) |                                | 07:05<br>20:26 | 06:14<br>21:07 | 05:49<br>21:39 | 06:00<br>21:40 | 06:35<br>21:04 | 07:16<br>20:07 | 07:56<br>19:07 | 08:20<br>17:15 | 40<br>08:38 (34)<br>09:18 (34) | 08:21<br>16:55 |
| 13                  | 08:28<br>17:17 | 07:55<br>18:02 | 20<br>08:04<br>18:19 (34) |                                | 07:03<br>20:27 | 06:13<br>21:08 | 05:48<br>21:39 | 06:01<br>21:39 | 06:37<br>21:03 | 07:17<br>20:05 | 07:58<br>19:05 | 08:21<br>17:13 | 41<br>08:37 (34)<br>09:18 (34) | 08:22<br>16:55 |
| 14                  | 08:28<br>17:17 | 07:53<br>18:03 | 23<br>08:02<br>18:16 (34) |                                | 07:01<br>20:28 | 06:12<br>21:09 | 05:48<br>21:40 | 06:02<br>21:39 | 06:38<br>21:01 | 07:19<br>20:03 | 07:59<br>19:03 | 08:22<br>17:12 | 43<br>08:36 (34)<br>09:19 (34) | 08:23<br>16:55 |
| 15                  | 08:27<br>17:20 | 07:51<br>18:05 | 26<br>08:00<br>18:16 (34) |                                | 06:59<br>20:30 | 06:10<br>21:11 | 05:48<br>21:41 | 06:03<br>21:38 | 06:39<br>21:00 | 07:20<br>20:01 | 08:00<br>19:01 | 08:23<br>17:11 | 44<br>08:35 (34)<br>09:20 (34) | 08:24<br>16:55 |
| 16                  | 08:26<br>17:21 | 07:50<br>18:06 | 29<br>07:58<br>18:13 (34) |                                | 06:57<br>20:31 | 06:09<br>21:12 | 05:48<br>21:41 | 06:04<br>21:37 | 06:41<br>20:58 | 07:21<br>19:59 | 08:02<br>19:00 | 08:24<br>17:10 | 44<br>08:35 (34)<br>09:21 (34) | 08:25<br>16:55 |
| 17                  | 08:26<br>17:23 | 07:48<br>18:08 | 32<br>07:56<br>18:11 (34) |                                | 06:55<br>20:33 | 06:08<br>21:13 | 05:48<br>21:42 | 06:04<br>21:36 | 06:42<br>20:56 | 07:23<br>19:57 | 08:03<br>18:56 | 08:25<br>17:09 | 44<br>08:35 (34)<br>09:22 (34) | 08:26<br>16:55 |
| 18                  | 08:25<br>17:24 | 07:46<br>18:09 | 34<br>07:54<br>18:13 (34) |                                | 06:53<br>20:34 | 06:07<br>21:14 | 05:48<br>21:42 | 06:06<br>21:36 | 06:43<br>20:54 | 07:24<br>19:55 | 08:05<br>18:54 | 08:26<br>17:08 | 44<br>08:36 (34)<br>09:23 (34) | 08:27<br>16:55 |
| 19                  | 08:24<br>17:25 | 07:45<br>18:11 | 37<br>07:52<br>18:16 (34) |                                | 06:52<br>20:35 | 06:05<br>21:16 | 05:48<br>21:42 | 06:07<br>21:35 | 06:45<br>20:53 | 07:25<br>19:53 | 08:06<br>18:52 | 08:27<br>17:07 | 44<br>08:37 (34)<br>09:24 (34) | 08:28<br>16:56 |
| 20                  | 08:24<br>17:27 | 07:43<br>18:12 | 39<br>07:50<br>18:08 (34) |                                | 06:50<br>20:37 | 06:04<br>21:17 | 05:48<br>21:43 | 06:08<br>21:34 | 06:46<br>20:51 | 07:27<br>19:51 | 08:08<br>18:50 | 08:29<br>17:06 | 44<br>08:38 (34)<br>09:25 (34) | 08:29<br>16:56 |
| 21                  | 08:23<br>17:28 | 07:41<br>18:14 | 41<br>07:48<br>18:06 (34) |                                | 06:48<br>20:38 | 06:03<br>21:18 | 05:48<br>21:43 | 06:09<br>21:33 | 06:47<br>20:49 | 07:28<br>19:49 | 08:09<br>18:49 | 08:30<br>17:05 | 44<br>08:39 (34)<br>09:26 (34) | 08:30<br>16:57 |
| 22                  | 08:22<br>17:30 | 07:40<br>18:16 | 43<br>07:46<br>18:04 (34) |                                | 06:46<br>20:40 | 06:02<br>21:19 | 05:49<br>21:43 | 06:10<br>21:32 | 06:48<br>20:47 | 07:29<br>19:47 | 08:11<br>18:47 | 08:31<br>17:04 | 42<br>08:40 (34)<br>09:27 (34) | 08:31<br>16:58 |
| 23                  | 08:21<br>17:31 | 07:38<br>18:17 | 44<br>07:44<br>18:03 (34) |                                | 06:44<br>20:41 | 06:01<br>21:20 | 05:49<br>21:44 | 06:11<br>21:31 | 06:50<br>20:46 | 07:30<br>19:45 | 08:12<br>18:45 | 08:32<br>17:03 | 40<br>08:41 (34)<br>09:28 (34) | 08:32<br>16:57 |
| 24                  | 08:20<br>17:33 | 07:36<br>18:19 | 44<br>07:42<br>18:03 (34) |                                | 06:43<br>20:42 | 06:00<br>21:21 | 05:49<br>21:44 | 06:12<br>21:30 | 06:51<br>20:44 | 07:32<br>19:43 | 08:13<br>18:43 | 08:33<br>17:02 | 37<br>08:42 (34)<br>09:29 (34) | 08:33<br>16:58 |
| 25                  | 08:19<br>17:34 | 07:34<br>18:20 | 44<br>07:40<br>18:04 (34) |                                | 06:41<br>20:44 | 05:59<br>21:23 | 05:49<br>21:44 | 06:13<br>21:29 | 06:52<br>20:42 | 07:33<br>19:41 | 08:15<br>18:42 | 08:34<br>17:01 | 35<br>08:43 (34)<br>09:30 (34) | 08:34<br>16:59 |
| 26                  | 08:18<br>17:36 | 07:33<br>18:22 | 45<br>07:38<br>18:03 (34) |                                | 06:39<br>20:45 | 05:58<br>21:24 | 05:50<br>21:44 | 06:14<br>21:28 | 06:54<br>20:40 | 07:34<br>19:39 | 08:16<br>18:40 | 08:35<br>17:00 | 32<br>08:44 (34)<br>09:31 (34) | 08:35<br>16:59 |
| 27                  | 08:17<br>17:37 | 07:31<br>18:23 | 44<br>07:36<br>18:03 (34) |                                | 06:37<br>20:46 | 05:57<br>21:25 | 05:50<br>21:44 | 06:15<br>21:27 | 06:55<br>20:38 | 07:36<br>19:37 | 08:18<br>18:38 | 08:36<br>17:00 | 30<br>08:45 (34)<br>09:32 (34) | 08:36<br>16:59 |
| 28                  | 08:16<br>17:39 | 07:29<br>18:25 | 44<br>07:34<br>18:03 (34) |                                | 06:36<br>20:48 | 05:57<br>21:26 | 05:50<br>21:44 | 06:17<br>21:26 | 06:56<br>20:36 | 07:37<br>19:35 | 08:19<br>18:37 | 08:37<br>17:01 | 27<br>08:46 (34)<br>09:33 (34) | 08:37<br>16:59 |
| 29                  | 08:15<br>17:40 |                |                           |                                | 06:34<br>20:49 | 05:56<br>21:27 | 05:51<br>21:44 | 06:18<br>21:24 | 06:58<br>20:33 | 07:38<br>19:33 | 08:21<br>18:35 | 08:38<br>17:01 | 24<br>08:47 (34)<br>09:34 (34) | 08:38<br>16:59 |
| 30                  | 08:14<br>17:42 |                |                           |                                | 06:32<br>20:51 | 05:55<br>21:28 | 05:51<br>21:44 | 06:19<br>21:23 | 06:59<br>20:33 | 07:40<br>19:31 | 08:22<br>18:33 | 08:39<br>17:02 | 21<br>08:48 (34)<br>09:35 (34) | 08:39<br>16:59 |
| 31                  | 08:13<br>17:43 |                |                           |                                | 06:30<br>21:29 | 05:54<br>21:29 | 05:54<br>21:44 | 06:20<br>21:22 | 07:00<br>20:31 | 08:24<br>19:32 | 08:24<br>18:32 | 08:40<br>17:03 | 17<br>08:49 (34)<br>09:36 (34) | 08:40<br>16:59 |
| Potential sun hours | 278            | 286            | 367                       | 406                            | 466            | 475            | 481            | 442            | 380            | 340            | 283            | 21             |                                | 266            |
| Total, worst case   |                | 622            | 359                       |                                |                |                |                |                |                | 968            | 0.53           | 0.42           |                                |                |
| Sun reduction       |                | 0.52           | 0.61                      |                                |                |                |                |                |                | 1.00           | 0.67           | 0.67           |                                |                |
| Oper. time red.     |                | 1.00           | 1.00                      |                                |                |                |                |                |                | 0.36           | 0.28           | 0.28           |                                |                |
| Wind dir. red.      |                | 0.67           | 0.67                      |                                |                |                |                |                |                | 0.36           | 0.28           | 0.28           |                                |                |
| Total reduction     |                | 0.35           | 0.41                      |                                |                |                |                |                |                | 0.36           | 0.28           | 0.28           |                                |                |
| Total, real         |                | 218            | 147                       |                                |                |                |                |                |                | 345            | 6              |                |                                |                |



Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: R158 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (141)

### Assumptions for shadow calculations

Reference year for calendar

2023

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

|                     | January | February | March      |     | April      | May        |            | June       | July       | August     |       | September | October    | November   | December |            |            |       |       |       |
|---------------------|---------|----------|------------|-----|------------|------------|------------|------------|------------|------------|-------|-----------|------------|------------|----------|------------|------------|-------|-------|-------|
| 1                   | 08:31   | 08:11    | 07:27      |     | 07:26      | 07:54 (47) | 06:31      |            | 07:09 (48) | 05:53      | 05:52 | 06:21     | 07:01      | 07:50 (47) | 07:41    | 08:25      | 08:08      |       |       |       |
|                     | 17:04   | 17:44    | 18:26      |     | 20:10      | 44         | 08:38 (47) | 20:52      | 22         | 07:31 (48) | 21:30 | 21:44     | 21:21      | 20:29      | 45       | 08:35 (47) | 19:29      | 18:30 | 16:57 |       |
| 2                   | 08:31   | 08:10    | 07:25      |     | 07:24      |            | 07:53 (47) | 06:29      |            | 07:10 (48) | 05:53 | 05:52     | 06:22      | 07:03      |          | 07:49 (47) | 07:42      | 08:27 | 08:09 |       |
|                     | 17:05   | 17:46    | 18:27      |     | 20:12      | 45         | 08:38 (47) | 20:53      | 20         | 07:30 (48) | 21:31 | 21:44     | 21:19      | 20:27      | 46       | 08:35 (47) | 19:27      | 18:28 | 16:57 |       |
| 3                   | 08:31   | 08:09    | 07:23      |     | 07:22      |            | 07:52 (47) | 06:27      |            | 07:11 (48) | 05:52 | 05:53     | 06:24      | 07:04      |          | 07:48 (47) | 07:44      | 08:28 | 08:11 |       |
|                     | 17:06   | 17:48    | 18:29      |     | 20:13      | 47         | 08:39 (47) | 20:55      | 18         | 07:29 (48) | 21:32 | 21:44     | 21:18      | 20:25      | 47       | 08:35 (47) | 19:25      | 18:27 | 16:56 |       |
| 4                   | 08:31   | 08:08    | 07:21      |     | 07:20      |            | 07:51 (47) | 06:26      |            | 07:13 (48) | 05:51 | 05:53     | 06:25      | 07:05      |          | 07:47 (47) | 07:45      | 08:30 | 08:12 |       |
|                     | 17:07   | 17:49    | 18:30      |     | 20:15      | 48         | 08:39 (47) | 20:56      | 13         | 07:26 (48) | 21:33 | 21:43     | 21:16      | 20:23      | 48       | 08:35 (47) | 19:23      | 18:25 | 16:56 |       |
| 5                   | 08:31   | 08:06    | 07:20      |     | 07:18      |            | 07:50 (47) | 06:24      |            | 07:16 (48) | 05:51 | 05:54     | 06:26      | 07:07      |          | 07:47 (47) | 07:47      | 07:31 | 08:13 |       |
|                     | 17:08   | 17:51    | 18:32      |     | 20:16      | 48         | 08:38 (47) | 20:57      | 8          | 07:24 (48) | 21:34 | 21:43     | 21:15      | 20:21      | 48       | 08:35 (47) | 19:21      | 17:24 | 16:55 |       |
| 6                   | 08:31   | 08:05    | 07:18      |     | 07:16      |            | 07:51 (47) | 06:23      |            | 05:50      | 05:55 | 06:28     |            | 07:08      |          | 07:46 (47) | 07:48      | 07:33 | 08:14 |       |
|                     | 17:09   | 17:52    | 18:33      |     | 20:17      | 48         | 08:39 (47) | 20:59      |            | 21:35      | 21:43 | 21:14     |            | 20:19      | 49       | 08:35 (47) | 19:19      | 17:22 | 16:55 |       |
| 7                   | 08:30   | 08:03    | 07:16      |     | 07:14      |            | 07:51 (47) | 06:21      |            | 05:50      | 05:55 | 06:29     |            | 07:09      |          | 07:46 (47) | 07:49      | 07:34 | 08:15 |       |
|                     | 17:10   | 17:54    | 18:35      |     | 20:19      | 48         | 08:39 (47) | 21:00      |            | 21:35      | 21:42 | 21:12     |            | 20:17      | 49       | 08:34 (47) | 19:15      | 17:20 | 16:55 |       |
| 8                   | 08:30   | 08:02    | 07:14      |     | 07:12      |            | 07:50 (47) | 06:20      |            | 05:50      | 05:56 | 06:30     |            | 07:11      |          | 07:45 (47) | 07:51      | 07:36 | 08:16 |       |
|                     | 17:11   | 17:55    | 18:36      |     | 20:20      | 48         | 08:38 (47) | 21:01      |            | 21:36      | 21:42 | 21:11     |            | 20:15      | 49       | 08:34 (47) | 19:15      | 17:20 | 16:55 |       |
| 9                   | 08:30   | 08:01    | 07:12      |     | 07:10      |            | 07:50 (47) | 06:18      |            | 05:49      | 05:57 | 06:31     |            | 07:26 (48) | 07:12    | 07:46 (47) | 07:52      | 07:37 | 08:17 |       |
|                     | 17:12   | 17:57    | 18:38      |     | 20:21      | 48         | 08:38 (47) | 21:03      |            | 21:37      | 21:42 | 21:09     | 6          | 07:32 (48) | 07:13    | 08:34 (47) | 19:13      | 17:18 | 16:55 |       |
| 10                  | 08:29   | 07:59    | 07:10      |     | 07:08      |            | 07:50 (47) | 06:17      |            | 05:49      | 05:58 | 06:33     |            | 07:22 (48) | 07:13    | 07:46 (47) | 07:53      | 07:39 | 08:18 |       |
|                     | 17:13   | 17:58    | 18:39      |     | 20:23      | 47         | 08:37 (47) | 21:04      |            | 21:38      | 21:41 | 21:08     | 13         | 07:35 (48) | 07:11    | 47         | 08:33 (47) | 19:11 | 17:17 | 16:54 |
| 11                  | 08:29   | 07:58    | 07:08      |     | 07:07      |            | 07:50 (47) | 06:15      |            | 05:49      | 05:59 | 06:34     |            | 07:20 (48) | 07:15    | 07:45 (47) | 07:55      | 07:40 | 08:19 |       |
|                     | 17:15   | 18:00    | 18:41      |     | 20:24      | 47         | 08:37 (47) | 21:05      |            | 21:38      | 21:41 | 21:06     | 16         | 07:36 (48) | 07:09    | 47         | 08:32 (47) | 19:09 | 17:16 | 16:54 |
| 12                  | 08:29   | 07:56    | 08:06      |     | 07:05      |            | 07:50 (47) | 06:14      |            | 05:48      | 06:00 | 06:35     |            | 07:19 (48) | 07:16    | 07:45 (47) | 07:56      | 07:42 | 08:20 |       |
|                     | 17:16   | 18:00    | 18:42      |     | 20:26      | 46         | 08:36 (47) | 21:07      |            | 21:39      | 21:40 | 21:04     | 20         | 07:39 (48) | 07:16    | 46         | 08:31 (47) | 19:07 | 17:14 | 16:54 |
| 13                  | 08:28   | 07:55    | 08:04      |     | 07:03      |            | 07:50 (47) | 06:13      |            | 05:48      | 06:00 | 06:37     |            | 07:18 (48) | 07:17    | 07:46 (47) | 07:58      | 07:43 | 08:21 |       |
|                     | 17:17   | 18:01    | 19:44      |     | 20:27      | 45         | 08:35 (47) | 21:08      |            | 21:40      | 21:39 | 21:03     | 21         | 07:39 (48) | 07:05    | 44         | 08:30 (47) | 19:05 | 17:13 | 16:54 |
| 14                  | 08:28   | 07:53    | 08:02      |     | 07:01      |            | 07:50 (47) | 06:11      |            | 05:48      | 06:01 | 06:38     |            | 07:16 (48) | 07:19    | 07:46 (47) | 07:59      | 07:45 | 08:22 |       |
|                     | 17:18   | 18:03    | 19:45      |     | 20:28      | 44         | 08:34 (47) | 21:09      |            | 21:40      | 21:39 | 21:01     | 24         | 07:40 (48) | 07:03    | 43         | 08:29 (47) | 19:03 | 17:12 | 16:54 |
| 15                  | 08:27   | 07:51    | 08:00      |     | 06:59      |            | 07:22 (48) | 06:10      |            | 05:48      | 06:02 | 06:39     |            | 07:15 (48) | 07:20    | 07:47 (47) | 08:00      | 07:46 | 08:23 |       |
|                     | 17:20   | 18:05    | 19:46      |     | 20:30      | 48         | 08:32 (47) | 21:11      |            | 21:41      | 21:38 | 21:00     | 25         | 07:40 (48) | 07:01    | 40         | 08:27 (47) | 19:01 | 17:11 | 16:55 |
| 16                  | 08:26   | 07:50    | 07:58      |     | 06:57      |            | 07:21 (48) | 06:09      |            | 05:48      | 06:03 | 06:40     |            | 07:15 (48) | 07:21    | 07:48 (47) | 08:02      | 07:47 | 08:24 |       |
|                     | 17:21   | 18:06    | 19:48      |     | 20:31      | 50         | 08:32 (47) | 21:12      |            | 21:41      | 21:37 | 20:58     | 26         | 07:41 (48) | 07:19    | 39         | 08:27 (47) | 18:58 | 17:10 | 16:55 |
| 17                  | 08:26   | 07:48    | 07:56      |     | 06:55      |            | 07:19 (48) | 06:08      |            | 05:48      | 06:04 | 06:42     |            | 07:14 (48) | 07:22    | 07:49 (47) | 08:03      | 07:49 | 08:24 |       |
|                     | 17:22   | 18:08    | 19:49      |     | 20:33      | 53         | 08:31 (47) | 21:13      |            | 21:42      | 21:37 | 20:56     | 27         | 07:41 (48) | 07:17    | 36         | 08:25 (47) | 18:56 | 17:08 | 16:55 |
| 18                  | 08:25   | 07:46    | 07:54      |     | 06:53      |            | 07:17 (48) | 06:06      |            | 05:48      | 06:05 | 06:43     |            | 07:14 (48) | 07:24    | 07:50 (47) | 08:05      | 07:50 | 08:25 |       |
|                     | 17:24   | 18:09    | 19:51      |     | 20:34      | 53         | 08:29 (47) | 21:14      |            | 21:42      | 21:36 | 20:55     | 27         | 07:41 (48) | 07:15    | 33         | 08:23 (47) | 18:54 | 17:07 | 16:55 |
| 19                  | 08:24   | 07:45    | 07:52      |     | 06:51      |            | 07:15 (48) | 06:05      |            | 05:48      | 06:06 | 06:44     |            | 07:13 (48) | 07:25    | 07:51 (47) | 08:06      | 07:52 | 08:26 |       |
|                     | 17:25   | 18:11    | 19:52      |     | 20:35      | 52         | 08:27 (47) | 21:16      |            | 21:43      | 21:35 | 20:53     | 28         | 07:41 (48) | 07:15    | 29         | 08:20 (47) | 18:52 | 17:06 | 16:56 |
| 20                  | 08:24   | 07:43    | 07:50      |     | 06:50      |            | 07:13 (48) | 06:04      |            | 05:48      | 06:07 | 06:46     |            | 07:13 (48) | 07:26    | 07:53 (47) | 08:08      | 07:53 | 08:26 |       |
|                     | 17:27   | 18:12    | 19:54      |     | 20:37      | 52         | 08:25 (47) | 21:17      |            | 21:43      | 21:34 | 20:51     | 29         | 07:42 (48) | 07:15    | 25         | 08:18 (47) | 18:50 | 17:05 | 16:56 |
| 21                  | 08:23   | 07:41    | 07:48      |     | 06:48      |            | 07:12 (48) | 06:03      |            | 05:48      | 06:08 | 06:47     |            | 07:13 (48) | 07:28    | 07:56 (47) | 08:09      | 07:55 | 08:27 |       |
|                     | 17:28   | 18:14    | 19:55      |     | 20:38      | 50         | 08:23 (47) | 21:18      |            | 21:43      | 21:33 | 20:49     | 40         | 08:21 (47) | 07:19    | 18         | 08:14 (47) | 18:48 | 17:04 | 16:56 |
| 22                  | 08:22   | 07:40    | 07:46      |     | 06:46      |            | 07:10 (48) | 06:02      |            | 05:48      | 06:10 | 06:48     |            | 07:14 (48) | 07:29    | 08:01 (47) | 08:10      | 07:56 | 08:28 |       |
|                     | 17:29   | 18:15    | 19:56      |     | 20:40      | 48         | 08:21 (47) | 21:19      |            | 21:43      | 21:32 | 20:47     | 45         | 08:24 (47) | 07:19    | 7          | 08:08 (47) | 18:47 | 17:04 | 16:57 |
| 23                  | 08:21   | 07:38    | 07:44      |     | 06:44      |            | 07:08 (48) | 06:01      |            | 05:48      | 06:11 | 06:50     |            | 07:15 (48) | 07:30    |            | 08:12      | 07:58 | 08:28 |       |
|                     | 17:31   | 18:17    | 19:58      | 11  | 08:24 (47) | 20:41      | 43         | 08:17 (47) | 21:20      | 21:44      | 21:31 | 20:46     | 49         | 08:26 (47) | 07:15    |            | 18:45      | 17:03 | 16:57 |       |
| 24                  | 08:20   | 07:36    | 07:42      |     | 06:42      |            | 07:07 (48) | 06:00      |            | 05:49      | 06:12 | 06:51     |            | 07:17 (48) | 07:32    |            | 08:13      | 07:59 | 08:29 |       |
|                     | 17:32   | 18:18    | 19:59      | 21  | 08:29 (47) | 20:42      | 28         | 07:35 (48) | 21:22      | 21:44      | 21:30 | 20:44     | 52         | 08:29 (47) | 07:13    |            | 18:43      | 17:02 | 16:58 |       |
| 25                  | 08:19   | 07:34    | 07:40      |     | 06:41      |            | 07:07 (48) | 05:59      |            | 05:49      | 06:13 | 06:52     |            | 07:18 (48) | 07:33    |            | 08:15      | 08:00 | 08:29 |       |
|                     | 17:34   | 18:20    | 20:01      | 26  | 08:31 (47) | 20:44      | 29         | 07:36 (48) | 21:23      | 21:44      | 21:29 | 20:42     | 52         | 08:30 (47) | 07:19    |            | 18:41      | 17:01 | 16:58 |       |
| 26                  | 08:18   | 07:33    | 07:38      |     | 06:39      |            | 07:07 (48) | 05:58      |            | 05:49      | 06:14 | 06:54     |            | 07:19 (48) | 07:34    |            | 08:16      | 08:02 | 08:29 |       |
|                     | 17:35   | 18:21    | 20:02      | 30  | 08:33 (47) | 20:45      | 28         | 07:35 (48) | 21:24      | 21:44      | 21:28 | 20:40     | 53         | 08:31 (47) | 07:19    |            | 18:40      | 17:00 | 16:59 |       |
| 27                  | 08:17   | 07:31    | 07:36      |     | 06:37      |            | 07:07 (48) | 05:57      |            | 05:50      | 06:15 | 06:55     |            | 07:20 (48) | 07:36    |            | 08:18      | 08:03 | 08:30 |       |
|                     | 17:37   | 18:23    | 20:03      | 33  | 08:34 (47) | 20:46      | 27         | 07:34 (48) | 21:25      | 21:44      | 21:27 | 20:38     | 53         | 08:32 (47) | 07:19    |            | 18:37      | 17:00 | 16:59 |       |
| 28                  | 08:16   | 07:29    | 07:34      |     | 06:36      |            | 07:08 (48) | 05:56      |            | 05:50      | 06:16 | 06:56     |            | 07:22 (48) | 07:37    |            | 08:19      | 08:04 | 08:30 |       |
|                     | 17:38   | 18:24    | 20:05      | 37  | 08:36 (47) | 20:48      | 26         | 07:34 (48) | 21:26      | 21:44      | 21:26 | 20:36     | 51         | 08:33 (47) | 07:15    |            | 18:36      | 16:59 | 17:00 |       |
| 29                  | 08:15   | 07:32    | 07:32      |     | 06:34      |            | 07:08 (48) | 05:56      |            | 05:51      | 06:18 | 06:58     |            | 07:23 (48) | 07:38    |            | 08:21      | 08:06 | 08:30 |       |
|                     | 17:40   | 18:26    | 20:06      | 40  | 08:37 (47) | 20:49      | 25         | 07:33 (48) | 21:27      | 21:44      | 21:24 | 20:35     | 50         | 08:34 (47) | 07:13    |            | 18:35      | 16:58 | 17:01 |       |
| 30                  | 08:14   | 07:30    | 07:30      |     | 06:32      |            | 07:09 (48) | 05:55      |            | 05:51      | 06:19 | 06:59     |            | 07:24 (48) | 07:40    |            | 08:22      | 08:07 | 08:30 |       |
|                     | 17:41   | 18:27    | 20:08      | 41  | 08:37 (47) | 20:51      | 24         | 07:33 (48) | 21:28      | 21:44      | 21:23 | 20:33     | 45         | 08:34 (47) | 07:19    |            | 18:33      | 16:58 | 17:02 |       |
| 31                  | 08:13   | 07:28    | 07:55 (47) |     | 05:54      |            |            |            |            | 06:20      | 07:00 |           |            | 07:50 (47) |          |            | 08:24      | 08:31 |       |       |
|                     | 17:43   | 18:29    | 20:09      | 43  | 08:38 (47) | 21:29      |            |            |            | 21:22      | 20:31 | 44        | 08:34 (47) |            |          |            | 18:32      | 17:03 |       |       |
| Potential sun hours | 278     | 286      | 367        |     | 406        |            | 466        |            | 475        | 481        | 443   |           | 380        |            | 339      | 282        | 266        |       |       |       |
| Total, worst case   |         |          |            | 282 |            | 1          |            |            |            |            |       |           |            |            |          |            |            |       |       |       |

Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: R159 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 90.0° (142)

## Assumptions for shadow calculations

Reference year for calendar

2023

Sunshine probability S/50 (Sun hours/Possible sun hours) []

| Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  |
|------|------|------|------|------|------|------|------|------|------|------|------|
| 0.54 | 0.52 | 0.61 | 0.58 | 0.64 | 0.67 | 0.75 | 0.72 | 0.67 | 0.53 | 0.42 | 0.45 |

Operational time

| N   | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW | NW  | NNW | Sum   |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| 376 | 314 | 339 | 425 | 445 | 474 | 693 | 570 | 488 | 386 | 872 | 609 | 772 | 651 | 677 | 667 | 8,758 |

|                     | January        | February       | March          | April          | May                         | June           | July           | August         | September      | October        | November                    | December       |                |                |
|---------------------|----------------|----------------|----------------|----------------|-----------------------------|----------------|----------------|----------------|----------------|----------------|-----------------------------|----------------|----------------|----------------|
| 1                   | 08:31<br>17:04 | 08:12<br>17:44 | 07:27<br>18:26 | 07:26<br>20:10 | 22 08:03 (38)<br>08:25 (38) | 06:31<br>20:52 | 05:53<br>21:30 | 05:52<br>21:44 | 06:21<br>21:21 | 07:02<br>20:29 | 07:41<br>19:29              | 08:25<br>18:30 | 08:08<br>16:57 |                |
| 2                   | 08:31<br>17:05 | 08:10<br>17:46 | 07:25<br>18:27 | 07:24<br>20:12 | 19 08:04 (38)<br>08:23 (38) | 06:29<br>20:53 | 05:53<br>21:31 | 05:52<br>21:44 | 06:23<br>21:19 | 07:03<br>20:27 | 07:43<br>19:27              | 08:27<br>18:28 | 08:09<br>16:57 |                |
| 3                   | 08:31<br>17:06 | 08:09<br>17:48 | 07:23<br>18:29 | 07:22<br>20:13 | 16 08:05 (38)<br>08:21 (38) | 06:27<br>20:55 | 05:52<br>21:32 | 05:53<br>21:44 | 06:24<br>21:18 | 07:04<br>20:25 | 07:44<br>19:25              | 08:28<br>18:27 | 08:11<br>16:56 |                |
| 4                   | 08:31<br>17:07 | 08:08<br>17:49 | 07:21<br>18:30 | 07:20<br>20:15 | 9 08:08 (38)<br>08:17 (38)  | 06:26<br>20:56 | 05:52<br>21:33 | 05:53<br>21:44 | 06:25<br>21:17 | 07:05<br>20:23 | 07:45<br>19:23              | 08:30<br>18:25 | 08:12<br>16:56 |                |
| 5                   | 08:31<br>17:08 | 08:06<br>17:51 | 07:20<br>18:32 | 07:18<br>20:16 |                             | 06:24<br>20:58 | 05:51<br>21:34 | 05:54<br>21:43 | 06:26<br>21:15 | 07:07<br>20:21 | 07:47<br>19:21              | 07:31<br>17:24 | 08:13<br>16:55 |                |
| 6                   | 08:31<br>17:09 | 08:05<br>17:52 | 07:18<br>18:33 | 07:16<br>20:17 |                             | 06:23<br>20:59 | 05:50<br>21:35 | 05:55<br>21:43 | 06:28<br>21:14 | 07:08<br>20:19 | 07:48<br>19:19              | 07:33<br>17:22 | 08:14<br>16:55 |                |
| 7                   | 08:30<br>17:10 | 08:04<br>17:54 | 07:16<br>18:35 | 07:14<br>20:19 |                             | 06:21<br>21:00 | 05:50<br>21:35 | 05:55<br>21:43 | 06:29<br>21:12 | 07:09<br>20:17 | 07:49<br>19:17              | 07:34<br>17:21 | 08:15<br>16:55 |                |
| 8                   | 08:30<br>17:11 | 08:02<br>17:55 | 07:14<br>18:36 | 07:12<br>20:20 |                             | 06:20<br>21:02 | 05:50<br>21:36 | 05:56<br>21:42 | 06:30<br>21:11 | 07:11<br>20:15 | 07:51<br>19:15              | 07:36<br>17:20 | 08:16<br>16:55 |                |
| 9                   | 08:30<br>17:12 | 08:01<br>17:57 | 07:12<br>18:38 | 07:10<br>20:22 |                             | 06:18<br>21:03 | 05:49<br>21:37 | 05:57<br>21:42 | 06:31<br>21:09 | 07:12<br>20:13 | 07:52<br>19:13              | 07:37<br>17:18 | 08:17<br>16:55 |                |
| 10                  | 08:30<br>17:13 | 07:59<br>17:58 | 07:10<br>18:39 | 07:09<br>20:23 |                             | 06:17<br>21:04 | 05:49<br>21:38 | 05:58<br>21:41 | 06:33<br>21:08 | 07:13<br>20:11 | 1 08:08 (38)<br>08:13 (38)  | 19:13<br>19:11 | 17:18<br>17:17 | 16:55<br>16:54 |
| 11                  | 08:29<br>17:15 | 07:58<br>18:00 | 07:08<br>18:41 | 07:07<br>20:24 |                             | 06:15<br>21:06 | 05:49<br>21:38 | 05:59<br>21:41 | 06:34<br>21:06 | 07:15<br>20:09 | 12 07:58 (38)<br>08:15 (38) | 07:55<br>19:09 | 07:40<br>17:16 | 08:19<br>16:54 |
| 12                  | 08:29<br>17:16 | 07:56<br>18:00 | 08:06<br>18:42 | 07:05<br>20:26 |                             | 06:14<br>21:07 | 05:48<br>21:39 | 06:00<br>21:40 | 06:35<br>21:05 | 07:16<br>20:07 | 17 07:55 (38)<br>08:16 (38) | 07:56<br>19:07 | 07:42<br>17:14 | 08:20<br>16:54 |
| 13                  | 08:28<br>17:17 | 07:55<br>18:02 | 08:04<br>19:44 | 07:03<br>20:27 |                             | 06:13<br>21:08 | 05:48<br>21:40 | 06:00<br>21:40 | 06:37<br>21:03 | 07:17<br>20:05 | 21 07:55 (38)<br>08:17 (38) | 07:58<br>19:05 | 07:43<br>17:13 | 08:21<br>16:54 |
| 14                  | 08:28<br>17:18 | 07:53<br>18:03 | 08:02<br>19:45 | 07:01<br>20:29 |                             | 06:11<br>21:09 | 05:48<br>21:40 | 06:01<br>21:39 | 06:38<br>21:01 | 07:19<br>20:03 | 22 07:53 (38)<br>08:18 (38) | 07:59<br>19:03 | 07:45<br>17:12 | 08:22<br>16:54 |
| 15                  | 08:27<br>17:20 | 07:51<br>18:05 | 08:00<br>19:46 | 06:59<br>20:30 |                             | 06:10<br>21:11 | 05:48<br>21:41 | 06:02<br>21:38 | 06:39<br>21:00 | 07:20<br>20:01 | 25 07:52 (38)<br>08:18 (38) | 07:46<br>19:01 | 08:23<br>17:11 | 08:24<br>16:55 |
| 16                  | 08:27<br>17:21 | 07:50<br>18:06 | 07:58<br>19:48 | 06:57<br>20:31 |                             | 06:09<br>21:12 | 05:48<br>21:41 | 06:03<br>21:37 | 06:40<br>20:58 | 07:21<br>19:59 | 26 07:52 (38)<br>08:19 (38) | 07:48<br>18:58 | 08:25<br>17:10 | 08:25<br>16:55 |
| 17                  | 08:26<br>17:22 | 07:48<br>18:08 | 07:56<br>19:49 | 06:55<br>20:33 |                             | 06:08<br>21:13 | 05:48<br>21:42 | 06:04<br>21:37 | 06:42<br>20:56 | 07:23<br>19:57 | 27 07:51 (38)<br>08:18 (38) | 07:49<br>18:56 | 08:26<br>17:09 | 08:25<br>16:55 |
| 18                  | 08:25<br>17:24 | 07:47<br>18:09 | 07:54<br>19:51 | 06:53<br>20:34 |                             | 06:06<br>21:14 | 05:48<br>21:42 | 06:05<br>21:36 | 06:43<br>20:55 | 07:24<br>19:55 | 28 07:50 (38)<br>08:18 (38) | 07:51<br>18:54 | 08:25<br>17:07 | 08:25<br>16:55 |
| 19                  | 08:25<br>17:25 | 07:45<br>18:11 | 07:52<br>19:52 | 06:52<br>20:35 |                             | 06:05<br>21:16 | 05:48<br>21:43 | 06:06<br>21:35 | 06:44<br>20:53 | 07:25<br>19:53 | 28 07:49 (38)<br>08:17 (38) | 07:52<br>18:52 | 08:26<br>17:06 | 08:26<br>16:56 |
| 20                  | 08:24<br>17:27 | 07:43<br>18:12 | 07:50<br>19:54 | 06:50<br>20:37 |                             | 06:04<br>21:17 | 05:48<br>21:43 | 06:07<br>21:34 | 06:46<br>20:51 | 07:27<br>19:51 | 26 07:51 (38)<br>08:17 (38) | 07:53<br>18:50 | 08:27<br>17:05 | 08:27<br>16:56 |
| 21                  | 08:23<br>17:28 | 07:41<br>18:14 | 07:48<br>19:55 | 06:48<br>20:38 |                             | 06:03<br>21:18 | 05:48<br>21:43 | 06:08<br>21:33 | 06:47<br>20:49 | 07:28<br>19:49 | 24 07:52 (38)<br>08:16 (38) | 07:55<br>18:48 | 08:27<br>17:04 | 08:27<br>16:56 |
| 22                  | 08:22<br>17:29 | 07:40<br>18:15 | 07:46<br>19:56 | 06:46<br>20:40 |                             | 06:02<br>21:19 | 05:48<br>21:44 | 06:10<br>21:32 | 06:48<br>20:48 | 07:29<br>19:47 | 22 07:53 (38)<br>08:15 (38) | 07:56<br>18:47 | 08:28<br>17:04 | 08:28<br>16:57 |
| 23                  | 08:21<br>17:31 | 07:38<br>18:17 | 07:44<br>19:58 | 06:44<br>20:41 |                             | 06:01<br>21:20 | 05:49<br>21:44 | 06:11<br>21:31 | 06:50<br>20:46 | 07:30<br>19:45 | 19 07:55 (38)<br>08:14 (38) | 07:58<br>18:45 | 08:29<br>17:03 | 08:28<br>16:57 |
| 24                  | 08:20<br>17:32 | 07:36<br>18:18 | 07:42<br>19:59 | 06:43<br>20:42 |                             | 06:00<br>21:22 | 05:49<br>21:44 | 06:12<br>21:30 | 06:51<br>20:44 | 07:32<br>19:43 | 16 07:56 (38)<br>08:12 (38) | 07:59<br>18:43 | 08:29<br>17:02 | 08:29<br>16:58 |
| 25                  | 08:19<br>17:34 | 07:34<br>18:20 | 07:40<br>20:01 | 06:41<br>20:44 |                             | 05:59<br>21:23 | 05:49<br>21:44 | 06:13<br>21:29 | 06:52<br>20:42 | 07:33<br>19:41 | 13 07:57 (38)<br>08:10 (38) | 08:15<br>18:41 | 08:30<br>17:01 | 08:29<br>16:58 |
| 26                  | 08:18<br>17:35 | 07:33<br>18:21 | 07:38<br>20:02 | 06:39<br>20:45 |                             | 05:58<br>21:24 | 05:49<br>21:44 | 06:14<br>21:28 | 06:54<br>20:40 | 07:34<br>19:39 | 9 07:59 (38)<br>08:08 (38)  | 08:16<br>18:40 | 08:30<br>17:00 | 08:30<br>16:59 |
| 27                  | 08:17<br>17:37 | 07:31<br>18:23 | 07:36<br>20:03 | 06:37<br>20:47 |                             | 05:57<br>21:25 | 05:50<br>21:44 | 06:15<br>21:27 | 06:55<br>20:38 | 07:36<br>19:37 | 2 08:00 (38)<br>08:02 (38)  | 08:18<br>18:38 | 08:30<br>17:00 | 08:30<br>17:00 |
| 28                  | 08:16<br>17:38 | 07:29<br>18:25 | 07:34<br>20:05 | 06:36<br>20:48 |                             | 05:56<br>21:26 | 05:50<br>21:44 | 06:16<br>21:26 | 06:56<br>20:37 | 07:37<br>19:35 |                             | 08:19<br>18:36 | 08:30<br>16:59 | 08:30<br>17:00 |
| 29                  | 08:15<br>17:40 |                | 07:32<br>20:06 | 06:34<br>20:49 |                             | 05:51<br>21:27 | 05:51<br>21:44 | 06:18<br>21:24 | 06:58<br>20:35 | 07:38<br>19:33 |                             | 08:21<br>18:35 | 08:30<br>16:58 | 08:30<br>17:01 |
| 30                  | 08:14<br>17:41 |                | 07:30<br>20:08 | 06:32<br>20:51 |                             | 05:55<br>21:28 | 05:51<br>21:44 | 06:19<br>21:23 | 06:59<br>20:33 | 07:40<br>19:31 |                             | 08:22<br>18:33 | 08:31<br>16:58 | 08:31<br>17:02 |
| 31                  | 08:13<br>17:43 |                | 07:28<br>20:09 | 06:30<br>20:46 |                             | 05:54<br>21:29 |                | 06:20<br>21:22 | 07:00<br>20:31 |                |                             | 08:24<br>18:32 | 08:31<br>16:57 | 08:31<br>17:03 |
| Potential sun hours | 277            | 286            | 367            | 406            |                             | 466            | 475            | 481            | 443            | 380            |                             | 339            | 282            | 266            |
| Total, worst case   |                |                |                | 297            |                             | 66             |                |                |                |                |                             | 365            |                |                |
| Sun reduction       |                |                |                | 0.61           |                             | 0.58           |                |                |                |                |                             | 0.67           |                |                |
| Oper. time red.     |                |                |                | 1.00           |                             | 1.00           |                |                |                |                |                             | 1.00           |                |                |
| Wind dir. red.      |                |                |                | 0.68           |                             | 0.68           |                |                |                |                |                             | 0.68           |                |                |
| Total reduction     |                |                |                | 0.42           |                             | 0.40           |                |                |                |                |                             | 0.46           |                |                |
| Total, real         |                |                |                | 123            |                             | 26             |                |                |                |                |                             | 167            |                |                |

Table layout: For each day in each month the following matrix apply

| Day in month | Sun rise (hh:mm) | Sun set (hh:mm) | Minutes with flicker | First time (hh:mm) with flicker | Last time (hh:mm) with flicker | (WTG causing flicker first time) | (WTG causing flicker last time) |
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|



Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

## Assumptions for shadow calculations

Reference year for calendar

Shadow receptor: R176 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 90.0° (158)

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

2023

| Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  |
|------|------|------|------|------|------|------|------|------|------|------|------|
| 0.54 | 0.52 | 0.61 | 0.58 | 0.64 | 0.67 | 0.75 | 0.72 | 0.67 | 0.53 | 0.42 | 0.45 |

Operational time

| N   | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW | NW  | NNW | Sum   |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| 376 | 314 | 339 | 425 | 445 | 474 | 693 | 570 | 488 | 386 | 872 | 609 | 772 | 651 | 677 | 667 | 8,758 |

|                     | January | February | March |   | April     |       | May       |       | June  |       | July  |    | August    |       | September |       | October |       | November |  | December |
|---------------------|---------|----------|-------|---|-----------|-------|-----------|-------|-------|-------|-------|----|-----------|-------|-----------|-------|---------|-------|----------|--|----------|
| 1                   | 08:31   | 08:12    | 07:27 |   | 07:27     |       | 07:50 (6) | 06:31 | 05:54 | 05:52 | 06:22 |    | 07:02     |       | 07:41 (6) | 07:42 | 08:26   | 08:08 |          |  |          |
|                     | 17:04   | 17:45    | 18:26 |   | 20:11     | 13    | 08:03 (6) | 20:52 | 21:30 | 21:44 | 21:21 |    | 20:29     | 17    | 07:58 (6) | 19:29 | 18:30   | 16:58 |          |  |          |
| 2                   | 08:31   | 08:11    | 07:26 |   | 07:25     |       | 07:48 (6) | 06:29 | 05:53 | 05:53 | 06:23 |    | 07:03     |       | 07:39 (6) | 07:43 | 08:27   | 08:10 |          |  |          |
|                     | 17:05   | 17:46    | 18:28 |   | 20:12     | 16    | 08:04 (6) | 20:54 | 21:31 | 21:44 | 21:20 |    | 20:27     | 20    | 07:59 (6) | 19:27 | 18:29   | 16:57 |          |  |          |
| 3                   | 08:31   | 08:09    | 07:24 |   | 07:23     |       | 07:46 (6) | 06:28 | 05:53 | 05:53 | 06:24 |    | 07:05     |       | 07:37 (6) | 07:44 | 08:29   | 08:11 |          |  |          |
|                     | 17:06   | 17:48    | 18:29 |   | 20:14     | 18    | 08:04 (6) | 20:55 | 21:32 | 21:44 | 21:18 |    | 20:25     | 22    | 07:59 (6) | 19:25 | 18:27   | 16:57 |          |  |          |
| 4                   | 08:31   | 08:08    | 07:22 |   | 07:21     |       | 07:44 (6) | 06:26 | 05:52 | 05:54 | 06:25 |    | 07:06     |       | 07:37 (6) | 07:46 | 08:30   | 08:12 |          |  |          |
|                     | 17:07   | 17:50    | 18:31 |   | 20:15     | 21    | 08:05 (6) | 20:56 | 21:33 | 21:44 | 21:17 |    | 20:23     | 23    | 08:00 (6) | 19:23 | 18:26   | 16:56 |          |  |          |
| 5                   | 08:31   | 08:07    | 07:20 |   | 07:19     |       | 07:42 (6) | 06:25 | 05:51 | 05:55 | 06:27 |    | 07:07     |       | 07:36 (6) | 07:47 | 07:32   | 08:13 |          |  |          |
|                     | 17:08   | 17:51    | 18:32 |   | 20:16     | 23    | 08:05 (6) | 20:58 | 21:34 | 21:44 | 21:15 |    | 20:21     | 24    | 08:00 (6) | 19:21 | 17:24   | 16:56 |          |  |          |
| 6                   | 08:31   | 08:05    | 07:18 |   | 07:17     |       | 07:40 (6) | 06:23 | 05:51 | 05:55 | 06:28 |    | 07:08     |       | 07:35 (6) | 07:48 | 07:33   | 08:14 |          |  |          |
|                     | 17:09   | 17:53    | 18:34 |   | 20:18     | 24    | 08:04 (6) | 20:59 | 21:35 | 21:43 | 21:14 |    | 20:20     | 25    | 08:00 (6) | 19:19 | 17:23   | 16:56 |          |  |          |
| 7                   | 08:31   | 08:04    | 07:16 |   | 07:15     |       | 07:39 (6) | 06:22 | 05:50 | 05:56 | 06:29 |    | 07:10     |       | 07:36 (6) | 07:50 | 07:35   | 08:16 |          |  |          |
|                     | 17:10   | 17:54    | 18:35 |   | 20:19     | 25    | 08:04 (6) | 21:00 | 21:36 | 21:43 | 21:13 |    | 20:18     | 24    | 08:00 (6) | 19:17 | 17:21   | 16:55 |          |  |          |
| 8                   | 08:30   | 08:02    | 07:14 |   | 07:13     |       | 07:39 (6) | 06:20 | 05:50 | 05:57 | 06:31 |    | 07:11     |       | 07:36 (6) | 07:51 | 07:36   | 08:17 |          |  |          |
|                     | 17:12   | 17:56    | 18:37 |   | 20:21     | 24    | 08:03 (6) | 21:02 | 21:37 | 21:42 | 21:11 |    | 20:16     | 24    | 08:00 (6) | 19:15 | 17:20   | 16:55 |          |  |          |
| 9                   | 08:30   | 08:01    | 07:12 |   | 07:11     |       | 07:39 (6) | 06:19 | 05:50 | 05:57 | 06:32 |    | 07:12     |       | 07:37 (6) | 07:52 | 07:38   | 08:18 |          |  |          |
|                     | 17:13   | 17:57    | 18:38 |   | 20:22     | 24    | 08:03 (6) | 21:03 | 21:37 | 21:42 | 21:10 |    | 20:14     | 22    | 07:59 (6) | 19:13 | 17:19   | 16:55 |          |  |          |
| 10                  | 08:30   | 08:00    | 07:10 |   | 07:09     |       | 07:39 (6) | 06:17 | 05:49 | 05:58 | 06:33 |    | 07:14     |       | 07:38 (6) | 07:54 | 07:39   | 08:19 |          |  |          |
|                     | 17:14   | 17:59    | 18:40 |   | 20:23     | 23    | 08:02 (6) | 21:04 | 21:38 | 21:41 | 21:08 |    | 20:12     | 20    | 07:58 (6) | 19:11 | 17:17   | 16:55 |          |  |          |
| 11                  | 08:29   | 07:58    | 07:08 |   | 07:07     |       | 07:40 (6) | 06:16 | 05:49 | 05:59 | 06:34 |    | 07:15     |       | 07:40 (6) | 07:55 | 07:40   | 08:20 |          |  |          |
|                     | 17:15   | 18:00    | 18:41 |   | 20:25     | 21    | 08:01 (6) | 21:06 | 21:39 | 21:41 | 21:06 |    | 20:10     | 17    | 07:57 (6) | 19:09 | 17:16   | 16:55 |          |  |          |
| 12                  | 08:29   | 07:57    | 08:06 |   | 07:05     |       | 07:40 (6) | 06:15 | 05:49 | 06:00 | 06:36 |    | 07:16     |       | 07:41 (6) | 07:57 | 07:42   | 08:21 |          |  |          |
|                     | 17:16   | 18:00    | 18:43 |   | 20:26     | 19    | 07:59 (6) | 21:07 | 21:39 | 21:40 | 21:05 |    | 20:08     | 15    | 07:56 (6) | 19:07 | 17:15   | 16:55 |          |  |          |
| 13                  | 08:29   | 07:55    | 08:04 |   | 07:03     |       | 07:43 (6) | 06:13 | 05:49 | 06:01 | 06:37 |    | 07:18     |       | 07:42 (6) | 07:58 | 07:43   | 08:22 |          |  |          |
|                     | 17:18   | 18:02    | 19:44 |   | 20:27     | 15    | 07:58 (6) | 21:08 | 21:40 | 21:40 | 21:03 |    | 20:06     | 12    | 07:54 (6) | 19:06 | 17:14   | 16:55 |          |  |          |
| 14                  | 08:28   | 07:53    | 08:02 |   | 07:01     |       | 07:44 (6) | 06:12 | 05:48 | 06:02 | 06:38 |    | 07:19     |       | 07:43 (6) | 07:59 | 07:45   | 08:22 |          |  |          |
|                     | 17:19   | 18:03    | 19:45 |   | 20:29     | 11    | 07:55 (6) | 21:10 | 21:41 | 21:39 | 21:02 |    | 20:04     | 8     | 07:51 (6) | 19:04 | 17:12   | 16:55 |          |  |          |
| 15                  | 08:27   | 07:52    | 08:00 |   | 06:59     |       |           | 06:11 | 05:48 | 06:03 | 06:40 |    | 07:20     |       | 07:45 (6) | 08:01 | 07:46   | 08:23 |          |  |          |
|                     | 17:20   | 18:05    | 19:47 |   | 20:30     |       |           | 21:11 | 21:41 | 21:38 | 21:00 |    | 20:02     | 3     | 07:48 (6) | 19:02 | 17:11   | 16:55 |          |  |          |
| 16                  | 08:27   | 07:50    | 07:59 |   | 06:57     |       |           | 06:09 | 05:48 | 06:04 | 06:41 |    | 07:22     |       |           | 08:02 | 07:48   | 08:24 |          |  |          |
|                     | 17:22   | 18:07    | 19:48 |   | 20:32     |       |           | 21:12 | 21:42 | 21:38 | 20:58 |    | 20:00     |       |           | 19:00 | 17:10   | 16:55 |          |  |          |
| 17                  | 08:26   | 07:49    | 07:57 |   | 06:56     |       |           | 06:08 | 05:48 | 06:05 | 06:42 |    | 07:23     |       |           | 08:04 | 07:49   | 08:25 |          |  |          |
|                     | 17:23   | 18:08    | 19:50 |   | 20:33     |       |           | 21:13 | 21:42 | 21:37 | 20:57 |    | 19:57     |       |           | 18:56 | 17:09   | 16:55 |          |  |          |
| 18                  | 08:26   | 07:47    | 07:55 |   | 06:54     |       |           | 06:07 | 05:48 | 06:06 | 06:44 |    | 07:24     |       |           | 08:05 | 07:51   | 08:26 |          |  |          |
|                     | 17:24   | 18:10    | 19:51 |   | 20:34     |       |           | 21:15 | 21:42 | 21:36 | 20:55 |    | 19:55     |       |           | 18:54 | 17:08   | 16:56 |          |  |          |
| 19                  | 08:25   | 07:45    | 07:53 |   | 06:52     |       |           | 06:06 | 05:48 | 06:07 | 06:45 |    | 07:26     |       |           | 08:07 | 07:52   | 08:26 |          |  |          |
|                     | 17:26   | 18:11    | 19:53 |   | 20:36     |       |           | 21:16 | 21:43 | 21:35 | 20:53 |    | 19:53     |       |           | 18:52 | 17:07   | 16:56 |          |  |          |
| 20                  | 08:24   | 07:43    | 07:51 |   | 06:50     |       |           | 06:05 | 05:48 | 06:08 | 06:46 |    | 07:27     |       |           | 08:08 | 07:54   | 08:27 |          |  |          |
|                     | 17:27   | 18:13    | 19:54 |   | 20:37     |       |           | 21:17 | 21:43 | 21:34 | 20:51 |    | 19:51     |       |           | 18:51 | 17:06   | 16:56 |          |  |          |
| 21                  | 08:23   | 07:42    | 07:49 |   | 06:48     |       |           | 06:04 | 05:49 | 06:09 | 06:47 |    | 07:28     |       |           | 08:09 | 07:55   | 08:27 |          |  |          |
|                     | 17:28   | 18:14    | 19:55 |   | 20:39     |       |           | 21:18 | 21:44 | 21:33 | 20:50 |    | 19:49     |       |           | 18:49 | 17:05   | 16:57 |          |  |          |
| 22                  | 08:22   | 07:40    | 07:47 |   | 06:46     |       |           | 06:02 | 05:49 | 06:10 | 06:49 |    | 07:30     |       |           | 08:11 | 07:56   | 08:28 |          |  |          |
|                     | 17:30   | 18:16    | 19:57 |   | 20:40     |       |           | 21:20 | 21:44 | 21:32 | 20:48 |    | 19:47     |       |           | 18:47 | 17:04   | 16:57 |          |  |          |
| 23                  | 08:22   | 07:38    | 07:45 |   | 06:45     |       |           | 06:01 | 05:49 | 06:11 | 06:50 |    | 07:31     |       |           | 08:12 | 07:58   | 08:29 |          |  |          |
|                     | 17:31   | 18:17    | 19:58 |   | 20:41     |       |           | 21:21 | 21:44 | 21:31 | 20:46 |    | 19:45     |       |           | 18:45 | 17:03   | 16:58 |          |  |          |
| 24                  | 08:21   | 07:37    | 07:43 |   | 06:43     |       |           | 06:00 | 05:49 | 06:12 | 06:51 |    | 07:32     |       |           | 08:14 | 07:59   | 08:29 |          |  |          |
|                     | 17:33   | 18:19    | 20:00 |   | 20:43     |       |           | 21:22 | 21:44 | 21:30 | 20:44 |    | 19:43     |       |           | 18:44 | 17:02   | 16:58 |          |  |          |
| 25                  | 08:20   | 07:35    | 07:41 |   | 06:41     |       |           | 05:59 | 05:50 | 06:13 | 06:53 |    | 07:33     |       |           | 08:15 | 08:01   | 08:29 |          |  |          |
|                     | 17:34   | 18:20    | 20:01 |   | 20:44     |       |           | 21:23 | 21:44 | 21:29 | 20:42 |    | 19:41     |       |           | 18:42 | 17:02   | 16:59 |          |  |          |
| 26                  | 08:19   | 07:33    | 07:39 |   | 06:39     |       |           | 05:59 | 05:50 | 06:15 | 06:54 |    | 07:35     |       |           | 08:17 | 08:02   | 08:30 |          |  |          |
|                     | 17:36   | 18:22    | 20:02 |   | 20:45     |       |           | 21:24 | 21:45 | 21:28 | 20:41 |    | 19:39     |       |           | 18:40 | 17:01   | 16:59 |          |  |          |
| 27                  | 08:18   | 07:31    | 07:37 |   | 06:38     |       |           | 05:58 | 05:50 | 06:16 | 06:55 |    | 07:36     |       |           | 08:18 | 08:03   | 08:30 |          |  |          |
|                     | 17:37   | 18:23    | 20:04 |   | 20:47     |       |           | 21:25 | 21:45 | 21:27 | 20:39 |    | 19:37     |       |           | 18:38 | 17:00   | 17:00 |          |  |          |
| 28                  | 08:16   | 07:29    | 07:35 |   | 06:36     |       |           | 05:57 | 05:51 | 06:17 | 06:57 |    | 07:37     |       |           | 08:20 | 08:05   | 08:30 |          |  |          |
|                     | 17:39   | 18:25    | 20:05 |   | 20:48     |       |           | 21:26 | 21:45 | 21:26 | 20:37 |    | 19:35     |       |           | 18:37 | 16:59   | 17:01 |          |  |          |
| 29                  | 08:15   |          | 07:33 |   | 06:34     |       |           | 05:56 | 05:51 | 06:18 | 06:58 |    | 07:39     |       |           | 08:21 | 08:06   | 08:31 |          |  |          |
|                     | 17:40   |          | 20:07 |   | 20:50     |       |           | 21:27 | 21:45 | 21:25 | 20:35 |    | 19:33     |       |           | 18:35 | 16:59   | 17:02 |          |  |          |
| 30                  | 08:14   |          | 07:31 |   | 06:33     |       |           | 05:55 | 05:52 | 06:19 | 06:59 |    | 07:40     |       | 07:46 (6) | 08:23 | 08:07   | 08:31 |          |  |          |
|                     | 17:42   |          | 20:08 | 5 | 07:59 (6) | 20:51 |           | 21:28 | 21:45 | 21:24 | 20:33 | 7  | 07:53 (6) | 19:31 |           | 18:34 | 16:58   | 17:02 |          |  |          |
| 31                  | 08:13   |          | 07:29 |   | 07:52 (6) |       |           | 05:55 |       | 06:21 | 07:01 |    | 07:43 (6) |       |           | 08:24 |         | 08:31 |          |  |          |
|                     | 17:43   |          | 20:09 | 9 | 08:01 (6) |       |           | 21:29 |       | 21:22 | 20:31 | 14 | 07:57 (6) |       |           | 18:32 |         | 17:03 |          |  |          |
| Potential sun hours | 278     | 286      | 367   |   | 406       |       | 466       |       | 475   | 481   | 443   |    | 380       |       |           | 339   | 283     | 266   |          |  |          |
| Total, worst case   |         |          | 14    |   | 277       |       |           |       |       |       | 21    |    | 276       |       |           |       |         |       |          |  |          |
| Sun reduction       |         |          | 0.61  |   | 0.58      |       |           |       |       |       | 0.72  |    | 0.67      |       |           |       |         |       |          |  |          |
| Oper. time red.     |         |          | 1.00  |   | 1.00      |       |           |       |       |       | 1.00  |    | 1.00      |       |           |       |         |       |          |  |          |
| Wind dir. red.      |         |          | 0.68  |   | 0.68      |       |           |       |       |       | 0.68  |    | 0.68      |       |           |       |         |       |          |  |          |
| Total reduction     |         |          | 0.41  |   | 0.39      |       |           |       |       |       | 0.49  |    | 0.45      |       |           |       |         |       |          |  |          |
| Total, real         |         |          | 6     |   | 109       |       |           |       |       |       | 10    |    | 126       |       |           |       |         |       |          |  |          |

Table layout: For each day in each month the following matrix apply

| Day in month | Sun rise (hh:mm) | Sun set (hh:mm) | Minutes with flicker | First time (hh:mm) with flicker | Last time (hh:mm) with flicker | (WTG causing flicker first time) | (WTG causing flicker last time) |
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|

Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: R180 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 90.0° (162)

## Assumptions for shadow calculations

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Reference year for calendar

2023

| Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  |
|------|------|------|------|------|------|------|------|------|------|------|------|
| 0.54 | 0.52 | 0.61 | 0.58 | 0.64 | 0.67 | 0.75 | 0.72 | 0.67 | 0.53 | 0.42 | 0.45 |

## Operational time

| N   | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW | NW  | NNW | Sum   |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| 376 | 314 | 339 | 425 | 445 | 474 | 693 | 570 | 488 | 386 | 872 | 609 | 772 | 651 | 677 | 667 | 8,758 |

|                     | January        | February       | March              | April                        | May            | June           | July           | August         | September      | October        | November       | December               |                 |                |                |
|---------------------|----------------|----------------|--------------------|------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|------------------------|-----------------|----------------|----------------|
| 1                   | 08:31<br>17:05 | 08:12<br>17:45 | 07:27<br>18:26     | 20<br>08:14 (2)<br>08:34 (2) | 07:27<br>20:11 | 06:31<br>20:52 | 05:54<br>21:30 | 05:52<br>21:44 | 06:22<br>21:21 | 07:42<br>19:29 | 08:26<br>18:30 | 08:52 (2)<br>09:03 (2) | 08:08<br>16:58  |                |                |
| 2                   | 08:31<br>17:05 | 08:11<br>17:47 | 07:26<br>18:28     | 15<br>08:31 (2)<br>08:20 (2) | 07:25<br>20:12 | 06:30<br>20:54 | 05:53<br>21:31 | 05:53<br>21:44 | 06:23<br>21:20 | 07:43<br>20:27 | 08:27<br>18:29 | 08:53 (2)<br>08:59 (2) | 08:10<br>16:57  |                |                |
| 3                   | 08:31<br>17:06 | 08:09<br>17:48 | 07:24<br>18:29     | 8<br>08:28 (2)               | 07:23<br>20:14 | 06:28<br>20:55 | 05:53<br>21:32 | 05:53<br>21:44 | 06:24<br>21:18 | 07:44<br>20:25 | 08:28<br>18:27 |                        | 08:11<br>16:57  |                |                |
| 4                   | 08:31<br>17:07 | 08:08<br>17:50 | 07:22<br>18:31     |                              | 07:21<br>20:15 | 06:26<br>20:56 | 05:52<br>21:33 | 05:54<br>21:44 | 06:26<br>21:17 | 07:46<br>20:23 | 08:30<br>18:26 |                        | 08:12<br>16:56  |                |                |
| 5                   | 08:31<br>17:08 | 08:07<br>17:51 | 07:20<br>18:32     |                              | 07:19<br>20:16 | 06:25<br>20:58 | 05:52<br>21:34 | 05:55<br>21:43 | 06:27<br>21:15 | 07:47<br>20:21 | 07:31<br>17:24 |                        | 08:13<br>16:56  |                |                |
| 6                   | 08:31<br>17:09 | 08:05<br>17:53 | 07:18<br>18:34     |                              | 07:17<br>20:18 | 06:23<br>20:59 | 05:51<br>21:35 | 05:55<br>21:43 | 06:28<br>21:14 | 07:48<br>20:19 | 07:33<br>17:23 |                        | 08:14<br>16:56  |                |                |
| 7                   | 08:31<br>17:11 | 08:04<br>17:54 | 07:16<br>18:35     |                              | 07:15<br>20:19 | 06:22<br>21:00 | 05:51<br>21:36 | 05:56<br>21:43 | 06:29<br>21:12 | 07:50<br>20:18 | 07:34<br>17:22 |                        | 08:15<br>16:56  |                |                |
| 8                   | 08:30<br>17:12 | 08:02<br>17:56 | 07:14<br>18:37     |                              | 07:13<br>20:20 | 06:20<br>21:02 | 05:50<br>21:36 | 05:57<br>21:42 | 06:31<br>21:11 | 07:51<br>20:16 | 07:36<br>17:20 |                        | 08:16<br>16:55  |                |                |
| 9                   | 08:30<br>17:13 | 08:01<br>17:57 | 07:12<br>18:38     |                              | 07:11<br>20:22 | 06:19<br>21:03 | 05:50<br>21:37 | 05:58<br>21:42 | 06:32<br>21:09 | 07:52<br>20:14 | 07:37<br>17:19 |                        | 08:18<br>16:55  |                |                |
| 10                  | 08:30<br>17:14 | 07:59<br>17:59 | 07:10<br>18:28 (2) |                              | 07:09<br>20:23 | 06:17<br>21:04 | 05:50<br>21:38 | 05:58<br>21:41 | 06:33<br>21:08 | 07:54<br>20:12 | 07:39<br>19:11 |                        | 08:19<br>16:55  |                |                |
| 11                  | 08:29<br>17:15 | 07:58<br>18:00 | 07:08<br>18:32 (2) | 9                            | 07:08<br>18:41 | 07:07<br>20:25 | 06:16<br>21:06 | 05:49<br>21:39 | 05:59<br>21:41 | 06:34<br>21:06 | 07:15<br>20:10 | 07:55<br>19:09         | 07:40<br>17:16  | 08:20<br>16:55 |                |
| 12                  | 08:29<br>17:16 | 07:56<br>18:00 | 08:06<br>18:34 (2) | 13                           | 08:06<br>18:43 | 07:05<br>20:26 | 06:15<br>21:07 | 05:49<br>21:39 | 06:00<br>21:40 | 06:36<br>21:05 | 07:16<br>20:08 | 07:57<br>19:08         | 6<br>09:00 (2)  | 07:42<br>17:15 | 08:20<br>16:55 |
| 13                  | 08:28<br>17:18 | 07:55<br>18:02 | 08:04<br>18:20 (2) | 16                           | 08:04<br>19:44 | 07:03<br>20:27 | 06:13<br>21:08 | 05:49<br>21:40 | 06:01<br>21:40 | 06:37<br>21:03 | 07:18<br>20:06 | 07:58<br>19:06         | 15<br>09:05 (2) | 07:43<br>17:14 | 08:21<br>16:55 |
| 14                  | 08:28<br>17:19 | 07:53<br>18:04 | 08:02<br>18:18 (2) | 19                           | 08:02<br>19:45 | 07:01<br>20:29 | 06:12<br>21:10 | 05:49<br>21:40 | 06:02<br>21:39 | 06:38<br>21:02 | 07:19<br>20:04 | 07:59<br>19:04         | 20<br>09:07 (2) | 07:45<br>17:12 | 08:22<br>16:55 |
| 15                  | 08:27<br>17:20 | 07:52<br>18:05 | 08:00<br>18:17 (2) | 22                           | 08:00<br>19:47 | 06:59<br>20:30 | 06:11<br>21:11 | 05:49<br>21:41 | 06:03<br>21:38 | 06:40<br>21:00 | 07:20<br>20:02 | 08:01<br>19:02         | 23<br>09:09 (2) | 07:46<br>17:11 | 08:23<br>16:55 |
| 16                  | 08:27<br>17:22 | 07:50<br>18:07 | 07:59<br>18:15 (2) | 25                           | 07:59<br>19:48 | 06:58<br>20:32 | 06:09<br>21:12 | 05:48<br>21:41 | 06:04<br>21:38 | 06:41<br>20:58 | 07:22<br>19:59 | 08:02<br>19:00         | 25<br>09:09 (2) | 07:48<br>17:10 | 08:24<br>16:55 |
| 17                  | 08:26<br>17:23 | 07:48<br>18:08 | 07:57<br>18:13 (2) | 27                           | 07:57<br>19:50 | 06:56<br>20:33 | 06:08<br>21:13 | 05:48<br>21:42 | 06:05<br>21:37 | 06:42<br>20:57 | 07:23<br>19:57 | 08:04<br>18:56         | 26<br>09:10 (2) | 07:49<br>17:09 | 08:25<br>16:56 |
| 18                  | 08:25<br>17:24 | 07:47<br>18:10 | 07:55<br>18:11 (2) | 29                           | 07:55<br>19:51 | 06:54<br>20:34 | 06:07<br>21:15 | 05:48<br>21:42 | 06:06<br>21:36 | 06:44<br>20:55 | 07:24<br>19:55 | 08:05<br>18:54         | 29<br>09:11 (2) | 07:51<br>17:08 | 08:26<br>16:55 |
| 19                  | 08:25<br>17:26 | 07:45<br>18:11 | 07:53<br>18:11 (2) | 30                           | 07:53<br>19:53 | 06:52<br>20:36 | 06:06<br>21:16 | 05:48<br>21:43 | 06:07<br>21:35 | 06:45<br>20:53 | 07:26<br>19:53 | 08:07<br>18:53         | 29<br>09:11 (2) | 07:52<br>17:07 | 08:26<br>16:56 |
| 20                  | 08:24<br>17:27 | 07:43<br>18:13 | 07:51<br>18:10 (2) | 31                           | 07:51<br>19:54 | 06:50<br>20:37 | 06:05<br>21:17 | 05:49<br>21:43 | 06:08<br>21:34 | 06:46<br>20:51 | 07:27<br>19:51 | 08:08<br>18:51         | 30<br>09:11 (2) | 07:54<br>17:06 | 08:27<br>16:56 |
| 21                  | 08:23<br>17:29 | 07:42<br>18:14 | 07:49<br>18:10 (2) |                              | 07:49<br>19:55 | 06:48<br>20:39 | 06:04<br>21:18 | 05:49<br>21:43 | 06:09<br>21:33 | 06:48<br>20:50 | 07:28<br>19:49 | 08:09<br>18:49         | 31<br>09:12 (2) | 07:55<br>17:05 | 08:27<br>16:57 |
| 22                  | 08:22<br>17:30 | 07:40<br>18:16 | 07:47<br>18:10 (2) | 30                           | 07:47<br>19:57 | 06:47<br>20:40 | 06:03<br>21:19 | 05:49<br>21:44 | 06:10<br>21:32 | 06:49<br>20:48 | 07:30<br>19:47 | 08:11<br>18:47         | 31<br>09:11 (2) | 07:56<br>17:04 | 08:28<br>16:57 |
| 23                  | 08:21<br>17:31 | 07:38<br>18:17 | 07:45<br>18:10 (2) |                              | 07:45<br>19:58 | 06:45<br>20:41 | 06:02<br>21:21 | 05:49<br>21:44 | 06:11<br>21:31 | 06:50<br>20:46 | 07:31<br>19:45 | 08:12<br>18:45         | 31<br>09:12 (2) | 07:58<br>17:03 | 08:28<br>16:58 |
| 24                  | 08:20<br>17:33 | 07:36<br>18:19 | 07:43<br>18:10 (2) | 30                           | 07:43<br>20:00 | 06:43<br>20:43 | 06:01<br>21:22 | 05:49<br>21:44 | 06:12<br>21:30 | 06:51<br>20:44 | 07:32<br>19:43 | 08:14<br>18:44         | 31<br>09:11 (2) | 07:59<br>17:02 | 08:29<br>16:58 |
| 25                  | 08:20<br>17:34 | 07:35<br>18:20 | 07:41<br>18:11 (2) |                              | 07:41<br>20:01 | 06:41<br>20:44 | 06:00<br>21:23 | 05:50<br>21:44 | 06:14<br>21:29 | 06:53<br>20:42 | 07:34<br>19:41 | 08:15<br>18:42         | 30<br>09:11 (2) | 08:01<br>17:02 | 08:29<br>16:59 |
| 26                  | 08:19<br>17:36 | 07:33<br>18:22 | 07:39<br>18:28 (2) | 27                           | 07:39<br>20:02 | 06:40<br>20:45 | 05:59<br>21:24 | 05:50<br>21:44 | 06:15<br>21:28 | 06:54<br>20:41 | 07:35<br>19:39 | 08:17<br>18:40         | 28<br>09:10 (2) | 08:02<br>17:01 | 08:30<br>17:00 |
| 27                  | 08:17<br>17:37 | 07:31<br>18:23 | 07:37<br>18:37 (2) | 25                           | 07:37<br>20:04 | 06:38<br>20:47 | 05:58<br>21:25 | 05:50<br>21:44 | 06:16<br>21:27 | 06:55<br>20:39 | 07:36<br>19:37 | 08:18<br>18:39         | 25<br>09:09 (2) | 08:03<br>17:00 | 08:30<br>17:00 |
| 28                  | 08:16<br>17:39 | 07:29<br>18:25 | 07:35<br>18:36 (2) | 23                           | 07:35<br>20:05 | 06:36<br>20:48 | 05:57<br>21:26 | 05:51<br>21:44 | 06:17<br>21:26 | 06:57<br>20:37 | 07:38<br>19:35 | 08:20<br>18:37         | 23<br>09:08 (2) | 08:05<br>16:59 | 08:30<br>17:01 |
| 29                  | 08:15<br>17:40 |                | 07:33<br>20:07     |                              | 07:33          | 06:34<br>20:50 | 05:56<br>21:27 | 05:51<br>21:44 | 06:18<br>21:25 | 06:58<br>20:35 | 07:39<br>19:33 | 08:21<br>18:35         | 20<br>09:07 (2) | 08:06<br>16:59 | 08:31<br>17:02 |
| 30                  | 08:14<br>17:42 |                | 07:31<br>20:08     |                              | 07:31          | 06:33<br>20:51 | 05:55<br>21:28 | 05:52<br>21:44 | 06:19<br>21:23 | 06:59<br>20:33 | 07:40<br>19:31 | 08:23<br>18:34         | 17<br>09:06 (2) | 08:07<br>16:58 | 08:31<br>17:03 |
| 31                  | 08:13<br>17:43 |                | 07:29<br>20:09     |                              | 07:29          | 05:55<br>21:29 | 05:55          | 06:21          | 07:01          | 07:01          | 08:24          | 08:50 (2)              | 14<br>09:04 (2) | 08:31<br>17:03 | 08:31<br>17:03 |
| Potential sun hours | 278            | 286            | 367                |                              | 406            | 466            | 475            | 481            | 442            | 380            | 340            |                        | 283             |                | 266            |
| Total, worst case   |                | 449            | 43                 |                              |                |                |                |                |                |                | 484            |                        | 17              |                |                |
| Sun reduction       |                | 0.52           | 0.61               |                              |                |                |                |                |                |                | 0.53           |                        | 0.42            |                |                |
| Oper. time red.     |                | 1.00           | 1.00               |                              |                |                |                |                |                |                | 1.00           |                        | 1.00            |                |                |
| Wind dir. red.      |                | 0.67           | 0.67               |                              |                |                |                |                |                |                | 0.67           |                        | 0.67            |                |                |
| Total reduction     |                | 0.35           | 0.41               |                              |                |                |                |                |                |                | 0.36           |                        | 0.28            |                |                |
| Total, real         |                | 157            | 18                 |                              |                |                |                |                |                |                | 172            |                        | 5               |                |                |

Table layout: For each day in each month the following matrix apply

| Day in month | Sun rise (hh:mm) | Sun set (hh:mm) | Minutes with flicker | First time (hh:mm) with flicker | Last time (hh:mm) with flicker | (WTG causing flicker first time) | (WTG causing flicker last time) |
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|
|--------------|------------------|-----------------|----------------------|---------------------------------|--------------------------------|----------------------------------|---------------------------------|



Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

### Assumptions for shadow calculations

Reference year for calendar

Shadow receptor: R181 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 90.0° (163)

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

|                     | January        | February       | March          | April          | May            | June           | July           | August         | September      | October        | November       | December       |
|---------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 1                   | 08:31<br>17:05 | 08:12<br>17:45 | 07:27<br>18:26 | 07:27<br>20:11 | 06:31<br>20:52 | 05:54<br>21:30 | 05:52<br>21:44 | 06:22<br>21:21 | 07:02<br>20:29 | 07:42<br>19:29 | 08:26<br>18:30 | 08:08<br>16:58 |
| 2                   | 08:31<br>17:05 | 08:11<br>17:47 | 07:26<br>18:28 | 07:25<br>20:12 | 06:30<br>20:54 | 05:53<br>21:31 | 05:53<br>21:44 | 06:23<br>21:20 | 07:03<br>20:27 | 07:43<br>19:27 | 08:27<br>18:29 | 08:10<br>16:57 |
| 3                   | 08:31<br>17:06 | 08:09<br>17:48 | 07:24<br>18:29 | 07:23<br>20:14 | 06:28<br>20:55 | 05:53<br>21:32 | 05:53<br>21:44 | 06:24<br>21:18 | 07:05<br>20:25 | 07:44<br>19:25 | 08:29<br>18:27 | 08:11<br>16:57 |
| 4                   | 08:31<br>17:07 | 08:08<br>17:50 | 07:22<br>18:31 | 07:21<br>20:15 | 06:26<br>20:56 | 05:52<br>21:33 | 05:54<br>21:44 | 06:26<br>21:17 | 07:06<br>20:23 | 07:46<br>19:23 | 08:30<br>18:26 | 08:12<br>16:56 |
| 5                   | 08:31<br>17:08 | 08:07<br>17:51 | 07:20<br>18:32 | 07:19<br>20:16 | 06:25<br>20:58 | 05:52<br>21:34 | 05:55<br>21:43 | 06:27<br>21:15 | 07:07<br>20:21 | 07:47<br>19:21 | 07:31<br>17:24 | 08:13<br>16:56 |
| 6                   | 08:31<br>17:10 | 08:05<br>17:53 | 07:18<br>18:34 | 07:17<br>20:18 | 06:23<br>20:59 | 05:51<br>21:35 | 05:55<br>21:43 | 06:28<br>21:14 | 07:09<br>20:20 | 07:48<br>19:19 | 07:33<br>17:23 | 08:14<br>16:56 |
| 7                   | 08:31<br>17:11 | 08:04<br>17:54 | 07:16<br>18:35 | 07:15<br>20:19 | 06:22<br>21:00 | 05:51<br>21:36 | 05:56<br>21:43 | 06:29<br>21:12 | 07:10<br>20:18 | 07:50<br>19:17 | 07:34<br>17:22 | 08:15<br>16:56 |
| 8                   | 08:30<br>17:12 | 08:02<br>17:56 | 07:14<br>18:37 | 07:13<br>20:21 | 06:20<br>21:02 | 05:50<br>21:36 | 05:57<br>21:42 | 06:31<br>21:11 | 07:11<br>20:16 | 07:51<br>19:15 | 07:36<br>17:20 | 08:16<br>16:55 |
| 9                   | 08:30<br>17:13 | 08:01<br>17:57 | 07:12<br>18:38 | 07:11<br>20:22 | 06:19<br>21:03 | 05:50<br>21:37 | 05:58<br>21:42 | 06:32<br>21:09 | 07:12<br>20:14 | 07:52<br>19:13 | 07:37<br>17:19 | 08:18<br>16:55 |
| 10                  | 08:30<br>17:14 | 07:59<br>17:59 | 07:10<br>18:40 | 07:09<br>20:23 | 06:17<br>21:04 | 05:50<br>21:38 | 05:58<br>21:41 | 06:33<br>21:08 | 07:14<br>20:12 | 07:54<br>19:11 | 07:39<br>17:18 | 08:19<br>16:55 |
| 11                  | 08:29<br>17:15 | 07:58<br>18:01 | 07:08<br>18:41 | 07:07<br>20:25 | 06:16<br>21:06 | 05:49<br>21:39 | 05:59<br>21:41 | 06:35<br>21:06 | 07:15<br>20:10 | 07:55<br>19:09 | 07:40<br>17:16 | 08:20<br>16:55 |
| 12                  | 08:29<br>17:17 | 07:56<br>18:01 | 08:06<br>18:43 | 07:05<br>20:26 | 06:15<br>21:07 | 05:49<br>21:39 | 06:00<br>21:40 | 06:36<br>21:05 | 07:16<br>20:08 | 07:57<br>19:08 | 07:42<br>17:15 | 08:20<br>16:55 |
| 13                  | 08:28<br>17:18 | 07:55<br>18:02 | 08:04<br>19:44 | 07:03<br>20:27 | 06:13<br>21:08 | 05:49<br>21:40 | 06:01<br>21:40 | 06:37<br>21:03 | 07:18<br>20:06 | 07:58<br>19:06 | 07:43<br>17:14 | 08:21<br>16:55 |
| 14                  | 08:28<br>17:19 | 07:53<br>18:04 | 08:02<br>19:45 | 07:01<br>20:29 | 06:12<br>21:10 | 05:49<br>21:40 | 06:02<br>21:39 | 06:38<br>21:02 | 07:19<br>20:04 | 07:59<br>19:04 | 07:45<br>17:13 | 08:22<br>16:55 |
| 15                  | 08:27<br>17:20 | 07:52<br>18:05 | 08:01<br>19:47 | 06:59<br>20:30 | 06:11<br>21:11 | 05:49<br>21:41 | 06:03<br>21:38 | 06:40<br>21:00 | 07:20<br>20:02 | 08:01<br>19:02 | 07:46<br>17:11 | 08:23<br>16:55 |
| 16                  | 08:27<br>17:22 | 07:50<br>18:07 | 07:59<br>19:48 | 06:58<br>20:32 | 06:09<br>21:12 | 05:49<br>21:41 | 06:04<br>21:38 | 06:41<br>20:58 | 07:22<br>20:00 | 08:02<br>19:00 | 07:48<br>17:10 | 08:24<br>16:55 |
| 17                  | 08:26<br>17:23 | 07:48<br>18:08 | 07:57<br>19:50 | 06:56<br>20:33 | 06:08<br>21:13 | 05:48<br>21:42 | 06:05<br>21:37 | 06:42<br>20:57 | 07:23<br>19:58 | 08:04<br>18:56 | 07:49<br>17:09 | 08:25<br>16:56 |
| 18                  | 08:25<br>17:24 | 07:47<br>18:10 | 07:55<br>19:51 | 06:54<br>20:34 | 06:07<br>21:15 | 05:48<br>21:42 | 06:06<br>21:36 | 06:44<br>20:55 | 07:24<br>19:55 | 08:05<br>18:54 | 07:51<br>17:08 | 08:25<br>16:56 |
| 19                  | 08:25<br>17:26 | 07:45<br>18:11 | 07:53<br>19:53 | 06:52<br>20:36 | 06:06<br>21:16 | 05:49<br>21:43 | 06:07<br>21:35 | 06:45<br>20:53 | 07:26<br>19:53 | 08:07<br>18:53 | 07:52<br>17:07 | 08:26<br>16:56 |
| 20                  | 08:24<br>17:27 | 07:43<br>18:13 | 07:51<br>19:54 | 06:50<br>20:37 | 06:05<br>21:17 | 05:49<br>21:43 | 06:08<br>21:34 | 06:46<br>20:51 | 07:27<br>19:51 | 08:08<br>18:51 | 07:54<br>17:06 | 08:27<br>16:57 |
| 21                  | 08:23<br>17:29 | 07:42<br>18:14 | 07:49<br>19:55 | 06:48<br>20:39 | 06:04<br>21:18 | 05:49<br>21:43 | 06:09<br>21:33 | 06:48<br>20:50 | 07:28<br>19:49 | 08:09<br>18:49 | 07:55<br>17:05 | 08:27<br>16:57 |
| 22                  | 08:22<br>17:30 | 07:40<br>18:16 | 07:47<br>19:57 | 06:47<br>20:40 | 06:03<br>21:19 | 05:49<br>21:44 | 06:10<br>21:32 | 06:49<br>20:48 | 07:30<br>19:47 | 08:11<br>18:47 | 07:56<br>17:04 | 08:28<br>16:57 |
| 23                  | 08:21<br>17:32 | 07:38<br>18:17 | 07:45<br>19:58 | 06:45<br>20:41 | 06:02<br>21:21 | 05:49<br>21:44 | 06:11<br>21:31 | 06:50<br>20:46 | 07:31<br>19:45 | 08:12<br>18:45 | 07:58<br>17:03 | 08:28<br>16:58 |
| 24                  | 08:21<br>17:33 | 07:36<br>18:19 | 07:43<br>20:00 | 06:43<br>20:43 | 06:01<br>21:22 | 05:49<br>21:44 | 06:12<br>21:30 | 06:52<br>20:44 | 07:32<br>19:43 | 08:14<br>18:44 | 07:59<br>17:02 | 08:29<br>16:58 |
| 25                  | 08:20<br>17:34 | 07:35<br>18:20 | 07:41<br>20:01 | 06:41<br>20:44 | 06:00<br>21:23 | 05:50<br>21:44 | 06:14<br>21:29 | 06:53<br>20:42 | 07:34<br>19:41 | 08:15<br>18:42 | 08:01<br>17:02 | 08:29<br>16:59 |
| 26                  | 08:19<br>17:36 | 07:33<br>18:22 | 07:39<br>20:02 | 06:40<br>20:45 | 05:59<br>21:24 | 05:50<br>21:44 | 06:15<br>21:28 | 06:54<br>20:41 | 07:35<br>19:39 | 08:17<br>18:40 | 08:02<br>17:01 | 08:30<br>17:00 |
| 27                  | 08:17<br>17:37 | 07:31<br>18:23 | 07:37<br>20:04 | 06:38<br>20:47 | 05:58<br>21:25 | 05:50<br>21:44 | 06:16<br>21:27 | 06:55<br>20:39 | 07:36<br>19:37 | 08:18<br>18:39 | 08:03<br>17:00 | 08:30<br>17:00 |
| 28                  | 08:16<br>17:39 | 07:29<br>18:25 | 07:35<br>20:05 | 06:36<br>20:48 | 05:57<br>21:26 | 05:51<br>21:44 | 06:17<br>21:26 | 06:57<br>20:37 | 07:38<br>19:35 | 08:20<br>18:37 | 08:05<br>17:00 | 08:30<br>17:01 |
| 29                  | 08:15<br>17:40 |                | 07:33<br>20:07 | 06:34<br>20:50 | 05:56<br>21:27 | 05:51<br>21:44 | 06:18<br>21:25 | 06:58<br>20:35 | 07:39<br>19:33 | 08:21<br>18:35 | 08:06<br>16:59 | 08:31<br>17:02 |
| 30                  | 08:14<br>17:42 |                | 07:31<br>20:08 | 06:33<br>20:51 | 05:55<br>21:28 | 05:52<br>21:44 | 06:19<br>21:23 | 06:59<br>20:33 | 07:40<br>19:31 | 08:23<br>18:34 | 08:07<br>16:58 | 08:31<br>17:03 |
| 31                  | 08:13<br>17:44 |                | 07:29<br>20:09 |                | 05:55<br>21:29 |                | 06:21<br>21:22 | 07:01<br>20:31 |                | 08:24<br>18:32 |                | 08:31<br>17:03 |
| Potential sun hours | 278            | 286            | 367            | 406            | 465            | 475            | 481            | 442            | 380            | 340            | 283            | 266            |
| Total, worst case   |                |                |                |                |                |                |                |                |                |                |                |                |
| Sun reduction       |                |                |                |                |                |                |                |                |                |                |                |                |
| Oper. time red.     |                |                |                |                |                |                |                |                |                |                |                |                |
| Wind dir. red.      |                |                |                |                |                |                |                |                |                |                |                |                |
| Total reduction     |                |                |                |                |                |                |                |                |                |                |                |                |
| Total, real         |                |                |                |                |                |                |                |                |                |                |                |                |

Table layout: For each day in each month the following matrix apply

|              |                  |                                 |                                  |
|--------------|------------------|---------------------------------|----------------------------------|
| Day in month | Sun rise (hh:mm) | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|              | Sun set (hh:mm)  | Minutes with flicker            | Last time (hh:mm) with flicker   |
|              |                  |                                 | (WTG causing flicker last time)  |

Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM  
US-01824-3627 Chelmsford  
+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

### Assumptions for shadow calculations

Reference year for calendar

Shadow receptor: R182 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (164)

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

|                     | January        | February       | March          | April          | May            | June           | July           | August         | September      | October        | November       | December       |
|---------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 1                   | 08:31<br>17:05 | 08:12<br>17:45 | 07:27<br>18:26 | 07:27<br>20:11 | 06:31<br>20:52 | 05:54<br>21:30 | 05:52<br>21:44 | 06:22<br>21:21 | 07:02<br>20:29 | 07:42<br>19:29 | 08:25<br>18:30 | 08:08<br>16:58 |
| 2                   | 08:31<br>17:05 | 08:10<br>17:47 | 07:26<br>18:28 | 07:25<br>20:12 | 06:30<br>20:54 | 05:53<br>21:31 | 05:53<br>21:44 | 06:23<br>21:19 | 07:03<br>20:27 | 07:43<br>19:27 | 08:27<br>18:29 | 08:10<br>16:57 |
| 3                   | 08:31<br>17:06 | 08:09<br>17:48 | 07:24<br>18:29 | 07:23<br>20:14 | 06:28<br>20:55 | 05:53<br>21:32 | 05:53<br>21:44 | 06:24<br>21:18 | 07:05<br>20:25 | 07:44<br>19:25 | 08:28<br>18:27 | 08:11<br>16:57 |
| 4                   | 08:31<br>17:07 | 08:08<br>17:50 | 07:22<br>18:31 | 07:21<br>20:15 | 06:26<br>20:56 | 05:52<br>21:33 | 05:54<br>21:44 | 06:26<br>21:17 | 07:06<br>20:23 | 07:46<br>19:23 | 08:30<br>18:26 | 08:12<br>16:56 |
| 5                   | 08:31<br>17:08 | 08:07<br>17:51 | 07:20<br>18:32 | 07:19<br>20:16 | 06:25<br>20:58 | 05:52<br>21:34 | 05:55<br>21:43 | 06:27<br>21:15 | 07:07<br>20:21 | 07:47<br>19:21 | 08:31<br>18:24 | 08:13<br>16:56 |
| 6                   | 08:31<br>17:10 | 08:05<br>17:53 | 07:18<br>18:34 | 07:17<br>20:18 | 06:23<br>20:59 | 05:51<br>21:35 | 05:55<br>21:43 | 06:28<br>21:14 | 07:09<br>20:19 | 07:48<br>19:19 | 08:33<br>18:23 | 08:14<br>16:56 |
| 7                   | 08:31<br>17:11 | 08:04<br>17:54 | 07:16<br>18:35 | 07:15<br>20:19 | 06:22<br>21:00 | 05:51<br>21:36 | 05:56<br>21:43 | 06:29<br>21:12 | 07:10<br>20:17 | 07:50<br>19:17 | 08:34<br>18:22 | 08:15<br>16:56 |
| 8                   | 08:30<br>17:12 | 08:02<br>17:56 | 07:14<br>18:37 | 07:13<br>20:20 | 06:20<br>21:02 | 05:50<br>21:36 | 05:57<br>21:42 | 06:31<br>21:11 | 07:11<br>20:16 | 07:51<br>19:15 | 08:36<br>18:20 | 08:16<br>16:55 |
| 9                   | 08:30<br>17:13 | 08:01<br>17:57 | 07:12<br>18:38 | 07:11<br>20:22 | 06:19<br>21:03 | 05:50<br>21:37 | 05:58<br>21:42 | 06:32<br>21:09 | 07:12<br>20:14 | 07:52<br>19:13 | 08:37<br>18:19 | 08:17<br>16:55 |
| 10                  | 08:30<br>17:14 | 07:59<br>17:59 | 07:10<br>18:40 | 07:09<br>20:23 | 06:17<br>21:04 | 05:50<br>21:38 | 05:59<br>21:41 | 06:33<br>21:08 | 07:14<br>20:12 | 07:54<br>19:11 | 08:39<br>18:17 | 08:18<br>16:55 |
| 11                  | 08:29<br>17:15 | 07:58<br>18:00 | 07:08<br>18:41 | 07:07<br>20:25 | 06:16<br>21:06 | 05:49<br>21:38 | 05:59<br>21:41 | 06:35<br>21:06 | 07:15<br>20:10 | 07:55<br>19:09 | 08:40<br>18:16 | 08:19<br>16:55 |
| 12                  | 08:29<br>17:17 | 07:56<br>18:00 | 08:06<br>18:43 | 07:05<br>20:26 | 06:15<br>21:07 | 05:49<br>21:39 | 06:00<br>21:40 | 06:36<br>21:05 | 07:16<br>20:08 | 07:57<br>19:08 | 08:20<br>18:15 | 08:20<br>16:55 |
| 13                  | 08:28<br>17:18 | 07:55<br>18:02 | 08:04<br>19:44 | 07:03<br>20:27 | 06:13<br>21:08 | 05:49<br>21:40 | 06:01<br>21:40 | 06:37<br>21:03 | 07:18<br>20:06 | 07:58<br>19:06 | 08:21<br>18:14 | 08:21<br>16:55 |
| 14                  | 08:28<br>17:19 | 07:53<br>18:04 | 08:02<br>19:45 | 07:01<br>20:29 | 06:12<br>21:10 | 05:49<br>21:40 | 06:02<br>21:39 | 06:38<br>21:02 | 07:19<br>20:04 | 07:59<br>19:04 | 08:22<br>18:12 | 08:22<br>16:55 |
| 15                  | 08:27<br>17:20 | 07:52<br>18:05 | 08:00<br>19:47 | 06:59<br>20:30 | 06:11<br>21:11 | 05:49<br>21:41 | 06:03<br>21:38 | 06:40<br>21:00 | 07:20<br>20:02 | 08:01<br>19:02 | 08:23<br>18:11 | 08:23<br>16:55 |
| 16                  | 08:27<br>17:22 | 07:50<br>18:07 | 07:59<br>19:48 | 06:58<br>20:32 | 06:09<br>21:12 | 05:49<br>21:41 | 06:04<br>21:38 | 06:41<br>20:58 | 07:22<br>19:59 | 08:02<br>19:00 | 08:24<br>18:10 | 08:24<br>16:55 |
| 17                  | 08:26<br>17:23 | 07:48<br>18:08 | 07:57<br>19:50 | 06:56<br>20:33 | 06:08<br>21:13 | 05:48<br>21:42 | 06:05<br>21:37 | 06:42<br>20:57 | 07:23<br>19:57 | 08:04<br>18:56 | 08:25<br>18:09 | 08:25<br>16:56 |
| 18                  | 08:25<br>17:24 | 07:47<br>18:10 | 07:55<br>19:51 | 06:54<br>20:34 | 06:07<br>21:15 | 05:48<br>21:42 | 06:06<br>21:36 | 06:44<br>20:55 | 07:24<br>19:55 | 08:05<br>18:54 | 08:26<br>18:08 | 08:26<br>16:56 |
| 19                  | 08:25<br>17:26 | 07:45<br>18:11 | 07:53<br>19:53 | 06:52<br>20:36 | 06:06<br>21:16 | 05:49<br>21:43 | 06:07<br>21:35 | 06:45<br>20:53 | 07:26<br>19:53 | 08:07<br>18:53 | 08:27<br>18:07 | 08:27<br>16:56 |
| 20                  | 08:24<br>17:27 | 07:43<br>18:13 | 07:51<br>19:54 | 06:50<br>20:37 | 06:05<br>21:17 | 05:49<br>21:43 | 06:08<br>21:34 | 06:46<br>20:51 | 07:27<br>19:51 | 08:08<br>18:51 | 08:28<br>18:06 | 08:28<br>16:57 |
| 21                  | 08:23<br>17:29 | 07:42<br>18:14 | 07:49<br>19:55 | 06:48<br>20:38 | 06:04<br>21:18 | 05:49<br>21:43 | 06:09<br>21:33 | 06:48<br>20:50 | 07:28<br>19:49 | 08:09<br>18:49 | 08:29<br>18:05 | 08:29<br>16:57 |
| 22                  | 08:22<br>17:30 | 07:40<br>18:16 | 07:47<br>19:57 | 06:47<br>20:40 | 06:03<br>21:19 | 05:49<br>21:44 | 06:10<br>21:32 | 06:49<br>20:48 | 07:30<br>19:47 | 08:11<br>18:47 | 08:30<br>18:04 | 08:30<br>16:57 |
| 23                  | 08:21<br>17:32 | 07:38<br>18:17 | 07:45<br>19:58 | 06:45<br>20:41 | 06:02<br>21:21 | 05:49<br>21:44 | 06:11<br>21:31 | 06:50<br>20:46 | 07:31<br>19:45 | 08:12<br>18:45 | 08:31<br>18:03 | 08:31<br>16:58 |
| 24                  | 08:20<br>17:33 | 07:36<br>18:19 | 07:43<br>20:00 | 06:43<br>20:43 | 06:01<br>21:22 | 05:49<br>21:44 | 06:12<br>21:30 | 06:51<br>20:44 | 07:32<br>19:43 | 08:14<br>18:44 | 08:32<br>18:02 | 08:32<br>16:58 |
| 25                  | 08:19<br>17:34 | 07:35<br>18:20 | 07:41<br>20:01 | 06:41<br>20:44 | 06:00<br>21:23 | 05:50<br>21:44 | 06:14<br>21:29 | 06:53<br>20:42 | 07:33<br>19:41 | 08:15<br>18:42 | 08:33<br>18:00 | 08:33<br>16:59 |
| 26                  | 08:18<br>17:36 | 07:33<br>18:22 | 07:39<br>20:02 | 06:40<br>20:45 | 05:59<br>21:24 | 05:50<br>21:44 | 06:15<br>21:28 | 06:54<br>20:41 | 07:35<br>19:39 | 08:17<br>18:40 | 08:34<br>18:00 | 08:34<br>17:00 |
| 27                  | 08:17<br>17:37 | 07:31<br>18:23 | 07:37<br>20:04 | 06:38<br>20:47 | 05:58<br>21:25 | 05:50<br>21:44 | 06:16<br>21:27 | 06:55<br>20:39 | 07:36<br>19:37 | 08:18<br>18:39 | 08:35<br>18:00 | 08:35<br>17:00 |
| 28                  | 08:16<br>17:39 | 07:29<br>18:25 | 07:35<br>20:05 | 06:36<br>20:48 | 05:57<br>21:26 | 05:51<br>21:44 | 06:17<br>21:26 | 06:57<br>20:37 | 07:37<br>19:35 | 08:20<br>18:37 | 08:36<br>18:00 | 08:36<br>17:01 |
| 29                  | 08:15<br>17:40 |                | 07:33<br>20:07 | 06:34<br>20:49 | 05:56<br>21:27 | 05:51<br>21:44 | 06:18<br>21:25 | 06:58<br>20:35 | 07:39<br>19:33 | 08:21<br>18:35 | 08:37<br>18:00 | 08:37<br>17:02 |
| 30                  | 08:14<br>17:42 |                | 07:31<br>20:08 | 06:33<br>20:51 | 05:55<br>21:28 | 05:52<br>21:44 | 06:19<br>21:23 | 06:59<br>20:33 | 07:40<br>19:31 | 08:23<br>18:34 | 08:38<br>18:00 | 08:38<br>17:03 |
| 31                  | 08:13<br>17:44 |                | 07:29<br>20:09 | 05:55<br>21:29 | 05:55<br>21:29 | 06:21<br>21:22 | 07:01<br>20:31 | 08:24<br>18:32 |                | 08:39<br>18:32 |                | 08:39<br>17:03 |
| Potential sun hours | 278            | 286            | 367            | 406            | 465            | 475            | 481            | 442            | 380            | 340            | 283            | 266            |
| Total, worst case   |                |                |                |                |                |                |                |                |                |                |                |                |
| Sun reduction       |                |                |                |                |                |                |                |                |                |                |                |                |
| Oper. time red.     |                |                |                |                |                |                |                |                |                |                |                |                |
| Wind dir. red.      |                |                |                |                |                |                |                |                |                |                |                |                |
| Total reduction     |                |                |                |                |                |                |                |                |                |                |                |                |
| Total, real         |                |                |                |                |                |                |                |                |                |                |                |                |

Table layout: For each day in each month the following matrix apply

|              |                  |                                 |                                  |
|--------------|------------------|---------------------------------|----------------------------------|
| Day in month | Sun rise (hh:mm) | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|              | Sun set (hh:mm)  | Minutes with flicker            | Last time (hh:mm) with flicker   |
|              |                  |                                 | (WTG causing flicker last time)  |



Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM  
US-01824-3627 Chelmsford  
+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: U124 - Shadow Receptor: 1.0 x 1.0 Azimuth: 0.0° Slope: 90.0° (206)

### Assumptions for shadow calculations

Reference year for calendar

2023

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

| Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  |
|------|------|------|------|------|------|------|------|------|------|------|------|
| 0.54 | 0.52 | 0.61 | 0.58 | 0.64 | 0.67 | 0.75 | 0.72 | 0.67 | 0.53 | 0.42 | 0.45 |

Operational time

| N   | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW | NW  | NNW | Sum   |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| 376 | 314 | 339 | 425 | 445 | 474 | 693 | 570 | 488 | 386 | 872 | 609 | 772 | 651 | 677 | 667 | 8,758 |

|                     | January        | February       | March               | April          | May            | June           | July           | August         | September      | October        | November            | December            |
|---------------------|----------------|----------------|---------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|---------------------|
| 1                   | 08:31<br>17:04 | 08:11<br>17:44 | 07:27<br>18:26      | 07:26<br>20:10 | 06:30<br>20:52 | 05:53<br>21:30 | 05:51<br>21:44 | 06:21<br>21:20 | 07:01<br>20:29 | 07:41<br>19:28 | 08:25<br>18:30      | 08:51 (72)<br>16:57 |
| 2                   | 08:31<br>17:05 | 08:10<br>17:46 | 07:25<br>18:27      | 07:24<br>20:12 | 06:29<br>20:53 | 05:52<br>21:31 | 05:52<br>21:44 | 06:22<br>21:19 | 07:03<br>20:27 | 07:42<br>19:26 | 08:26<br>18:28      | 08:53 (72)<br>16:56 |
| 3                   | 08:31<br>17:06 | 08:09<br>17:47 | 07:22<br>18:29      | 07:22<br>20:13 | 06:27<br>20:54 | 05:52<br>21:32 | 05:53<br>21:43 | 06:23<br>21:18 | 07:04<br>20:25 | 07:44<br>19:24 | 08:28<br>18:27      | 08:55 (72)<br>16:56 |
| 4                   | 08:31<br>17:07 | 08:07<br>17:49 | 08:33 (72)<br>18:30 | 07:21<br>20:14 | 06:26<br>20:56 | 05:51<br>21:33 | 05:53<br>21:43 | 06:25<br>21:16 | 07:05<br>20:23 | 07:45<br>19:22 | 08:29<br>18:25      | 08:56 (72)<br>16:56 |
| 5                   | 08:30<br>17:08 | 08:06<br>17:50 | 08:32 (72)<br>18:32 | 07:19<br>20:16 | 06:24<br>20:57 | 05:51<br>21:33 | 05:54<br>21:43 | 06:26<br>21:15 | 07:06<br>20:21 | 07:46<br>19:20 | 08:31<br>17:24      | 08:57 (72)<br>16:55 |
| 6                   | 08:30<br>17:09 | 08:05<br>17:52 | 08:30 (72)<br>18:33 | 07:17<br>20:17 | 06:22<br>20:59 | 05:50<br>21:34 | 05:55<br>21:43 | 06:27<br>21:13 | 07:08<br>20:19 | 07:48<br>19:19 | 08:32<br>17:22      | 08:58 (72)<br>16:55 |
| 7                   | 08:30<br>17:10 | 08:03<br>17:53 | 08:29 (72)<br>18:35 | 07:15<br>20:18 | 06:21<br>21:00 | 05:50<br>21:35 | 05:55<br>21:42 | 06:29<br>21:12 | 07:09<br>20:17 | 07:49<br>19:17 | 08:34<br>17:21      | 08:01 (72)<br>16:55 |
| 8                   | 08:30<br>17:11 | 08:02<br>17:55 | 08:27 (72)<br>18:36 | 07:14<br>20:20 | 06:20<br>21:01 | 05:49<br>21:36 | 05:56<br>21:42 | 06:30<br>21:10 | 07:10<br>20:15 | 07:50<br>19:15 | 08:35<br>17:19      | 08:07 (72)<br>16:54 |
| 9                   | 08:30<br>17:12 | 08:00<br>17:57 | 08:26 (72)<br>18:37 | 07:12<br>20:21 | 06:18<br>21:03 | 05:49<br>21:37 | 05:57<br>21:41 | 06:31<br>21:09 | 07:12<br>20:13 | 07:52<br>19:13 | 08:37<br>17:18      | 08:07 (72)<br>16:54 |
| 10                  | 08:29<br>17:13 | 07:59<br>17:58 | 08:24 (72)<br>18:39 | 07:10<br>20:23 | 06:17<br>21:04 | 05:49<br>21:37 | 05:58<br>21:41 | 06:32<br>21:07 | 07:13<br>20:11 | 07:53<br>19:11 | 08:38<br>17:17      | 08:08<br>16:54      |
| 11                  | 08:29<br>17:14 | 07:57<br>18:00 | 08:23 (72)<br>18:40 | 07:06<br>20:24 | 06:15<br>21:05 | 05:48<br>21:38 | 05:58<br>21:40 | 06:34<br>21:06 | 07:14<br>20:09 | 07:55<br>19:09 | 08:39<br>17:15      | 08:09<br>16:54      |
| 12                  | 08:28<br>17:16 | 07:56<br>18:00 | 08:21 (72)<br>18:42 | 07:04<br>20:25 | 06:14<br>21:06 | 05:48<br>21:39 | 05:59<br>21:40 | 06:35<br>21:04 | 07:16<br>20:07 | 07:56<br>19:07 | 08:40<br>17:14      | 08:10<br>16:54      |
| 13                  | 08:28<br>17:17 | 07:54<br>18:01 | 08:19 (72)<br>19:43 | 07:02<br>20:27 | 06:12<br>21:08 | 05:48<br>21:39 | 06:00<br>21:39 | 06:36<br>21:03 | 07:17<br>20:05 | 07:57<br>19:05 | 08:41<br>17:13      | 08:11<br>16:54      |
| 14                  | 08:27<br>17:18 | 07:53<br>18:03 | 08:18 (72)<br>19:45 | 07:01<br>20:28 | 06:11<br>21:09 | 05:48<br>21:40 | 06:01<br>21:39 | 06:38<br>21:01 | 07:18<br>20:03 | 07:59<br>19:03 | 08:42<br>17:12      | 08:12<br>16:54      |
| 15                  | 08:27<br>17:19 | 07:51<br>18:04 | 08:16 (72)<br>19:46 | 06:59<br>20:30 | 06:10<br>21:10 | 05:48<br>21:38 | 06:02<br>21:38 | 06:39<br>20:59 | 07:20<br>20:01 | 08:00<br>19:01 | 08:43<br>17:10      | 08:13<br>16:54      |
| 16                  | 08:26<br>17:21 | 07:50<br>18:06 | 08:15 (72)<br>19:48 | 06:57<br>20:31 | 06:09<br>21:12 | 05:48<br>21:41 | 06:03<br>21:37 | 06:40<br>20:58 | 07:21<br>19:59 | 08:02<br>18:57 | 08:44<br>17:09      | 08:14<br>16:54      |
| 17                  | 08:26<br>17:22 | 07:48<br>18:07 | 08:14 (72)<br>19:49 | 06:55<br>20:32 | 06:07<br>21:13 | 05:48<br>21:41 | 06:04<br>21:36 | 06:42<br>20:56 | 07:22<br>19:57 | 08:03<br>18:55 | 08:45<br>17:08      | 08:15<br>16:55      |
| 18                  | 08:25<br>17:24 | 07:46<br>18:09 | 08:13 (72)<br>19:50 | 06:53<br>20:34 | 06:06<br>21:14 | 05:48<br>21:42 | 06:05<br>21:36 | 06:43<br>20:54 | 07:24<br>19:55 | 08:04<br>18:54 | 08:46<br>17:07      | 08:16<br>16:55      |
| 19                  | 08:24<br>17:25 | 07:45<br>18:11 | 08:12 (72)<br>19:52 | 06:51<br>20:35 | 06:05<br>21:15 | 05:48<br>21:42 | 06:06<br>21:35 | 06:44<br>20:53 | 07:25<br>19:53 | 08:06<br>18:52 | 08:47<br>17:06      | 08:17<br>16:55      |
| 20                  | 08:23<br>17:26 | 07:43<br>18:12 | 08:11 (72)<br>19:53 | 06:49<br>20:37 | 06:04<br>21:17 | 05:48<br>21:43 | 06:07<br>21:34 | 06:45<br>20:51 | 07:26<br>19:51 | 08:07<br>18:50 | 08:48<br>17:05      | 08:18<br>16:56      |
| 21                  | 08:23<br>17:28 | 07:41<br>18:14 | 08:10 (72)<br>19:55 | 06:48<br>20:38 | 06:03<br>21:18 | 05:48<br>21:43 | 06:08<br>21:33 | 06:47<br>20:49 | 07:28<br>19:49 | 08:09<br>18:48 | 08:49<br>17:04      | 08:19<br>16:56      |
| 22                  | 08:22<br>17:29 | 07:39<br>18:15 | 08:09 (72)<br>19:56 | 06:46<br>20:39 | 06:02<br>21:19 | 05:48<br>21:43 | 06:09<br>21:32 | 06:48<br>20:47 | 07:29<br>19:47 | 08:10<br>18:46 | 08:50 (72)<br>17:03 | 08:20<br>16:56      |
| 23                  | 08:21<br>17:31 | 07:38<br>18:17 | 08:08 (72)<br>19:58 | 06:44<br>20:41 | 06:01<br>21:20 | 05:48<br>21:43 | 06:10<br>21:31 | 06:49<br>20:45 | 07:30<br>19:45 | 08:12<br>18:45 | 08:51 (72)<br>17:02 | 08:21<br>16:57      |
| 24                  | 08:20<br>17:32 | 07:36<br>18:18 | 08:07 (72)<br>19:59 | 06:42<br>20:42 | 06:00<br>21:21 | 05:48<br>21:44 | 06:12<br>21:30 | 06:51<br>20:44 | 07:32<br>19:43 | 08:13<br>18:43 | 08:52 (72)<br>17:02 | 08:22<br>16:58      |
| 25                  | 08:19<br>17:34 | 07:34<br>18:20 | 08:06 (72)<br>20:00 | 06:41<br>20:43 | 05:59<br>21:22 | 05:49<br>21:44 | 06:13<br>21:29 | 06:52<br>20:42 | 07:33<br>19:41 | 08:15<br>18:41 | 08:53 (72)<br>17:01 | 08:23<br>16:58      |
| 26                  | 08:18<br>17:35 | 07:32<br>18:21 | 08:05 (72)<br>20:02 | 06:39<br>20:45 | 05:58<br>21:24 | 05:49<br>21:44 | 06:14<br>21:28 | 06:53<br>20:40 | 07:34<br>19:39 | 08:16<br>18:39 | 08:54 (72)<br>17:00 | 08:24<br>16:59      |
| 27                  | 08:17<br>17:37 | 07:30<br>18:23 | 08:04 (72)<br>20:03 | 06:37<br>20:46 | 05:57<br>21:25 | 05:50<br>21:44 | 06:15<br>21:27 | 06:55<br>20:38 | 07:36<br>19:37 | 08:18<br>18:38 | 08:55 (72)<br>16:59 | 08:25<br>16:59      |
| 28                  | 08:16<br>17:38 | 07:29<br>18:24 | 08:03 (72)<br>20:05 | 06:35<br>20:48 | 05:56<br>21:26 | 05:50<br>21:44 | 06:16<br>21:25 | 06:56<br>20:36 | 07:37<br>19:35 | 08:19<br>18:36 | 08:56 (72)<br>16:59 | 08:26<br>17:00      |
| 29                  | 08:15<br>17:40 | 07:27<br>18:24 | 08:02 (72)<br>20:06 | 06:34<br>20:49 | 05:55<br>21:27 | 05:50<br>21:44 | 06:17<br>21:24 | 06:57<br>20:34 | 07:38<br>19:33 | 08:21<br>18:34 | 08:57 (72)<br>16:58 | 08:27<br>17:01      |
| 30                  | 08:14<br>17:41 | 07:24<br>18:21 | 08:01 (72)<br>20:07 | 06:32<br>20:50 | 05:53<br>21:28 | 05:51<br>21:44 | 06:19<br>21:23 | 06:59<br>20:32 | 07:40<br>19:30 | 08:22<br>18:33 | 08:58 (72)<br>16:57 | 08:28<br>17:02      |
| 31                  | 08:12<br>17:43 | 07:21<br>18:22 | 08:00 (72)<br>20:09 | 06:30<br>20:51 | 05:51<br>21:29 | 05:50<br>21:44 | 06:20<br>21:22 | 07:00<br>20:31 | 19:30<br>18:31 | 08:23<br>18:31 | 08:59 (72)<br>16:57 | 08:29<br>17:03      |
| Potential sun hours | 277            | 286            | 367                 | 406            | 466            | 475            | 481            | 443            | 380            | 339            | 282                 | 266                 |
| Total, worst case   |                | 291            |                     |                |                |                |                |                |                | 198            |                     |                     |
| Sun reduction       |                | 0.52           |                     |                |                |                |                |                |                | 0.53           |                     |                     |
| Oper. time red.     |                | 1.00           |                     |                |                |                |                |                |                | 1.00           |                     |                     |
| Wind dir. red.      |                | 0.67           |                     |                |                |                |                |                |                | 0.67           |                     |                     |
| Total reduction     |                | 0.35           |                     |                |                |                |                |                |                | 0.35           |                     |                     |
| Total, real         |                | 101            |                     |                |                |                |                |                |                | 70             |                     |                     |

Table layout: For each day in each month the following matrix apply

| Day in month | Sun rise (hh:mm)     | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|--------------|----------------------|---------------------------------|----------------------------------|
|              | Sun set (hh:mm)      | Last time (hh:mm) with flicker  | (WTG causing flicker last time)  |
|              | Minutes with flicker |                                 |                                  |

Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM

US-01824-3627 Chelmsford

+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

Shadow receptor: U145 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (207)

### Assumptions for shadow calculations

Reference year for calendar

2023

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

| Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  |
|------|------|------|------|------|------|------|------|------|------|------|------|
| 0.54 | 0.52 | 0.61 | 0.58 | 0.64 | 0.67 | 0.75 | 0.72 | 0.67 | 0.53 | 0.42 | 0.45 |

Operational time

| N   | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW | NW  | NNW | Sum   |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| 376 | 314 | 339 | 425 | 445 | 474 | 693 | 570 | 488 | 386 | 872 | 609 | 772 | 651 | 677 | 667 | 8,758 |

|                     | January        | February       | March          | April          | May            | June           | July           | August         | September      | October        | November            | December       |
|---------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|----------------|
| 1                   | 08:31<br>17:04 | 08:12<br>17:44 | 07:27<br>18:26 | 07:26<br>20:10 | 06:31<br>20:52 | 05:53<br>21:30 | 05:52<br>21:44 | 06:21<br>21:21 | 07:02<br>20:29 | 07:41<br>19:29 | 08:05 (38)<br>18:30 | 08:08<br>16:57 |
| 2                   | 08:31<br>17:05 | 08:10<br>17:46 | 07:25<br>18:27 | 07:24<br>20:12 | 06:29<br>20:53 | 05:53<br>21:31 | 05:52<br>21:44 | 06:23<br>21:19 | 07:03<br>20:27 | 07:43<br>19:27 | 08:07 (38)<br>18:28 | 08:09<br>16:57 |
| 3                   | 08:31<br>17:06 | 08:09<br>17:48 | 07:23<br>18:29 | 07:22<br>20:13 | 06:27<br>20:55 | 05:52<br>21:32 | 05:53<br>21:44 | 06:24<br>21:18 | 07:04<br>20:25 | 07:44<br>19:25 | 08:08 (38)<br>18:27 | 08:11<br>16:56 |
| 4                   | 08:31<br>17:07 | 08:08<br>17:49 | 07:21<br>18:30 | 07:20<br>20:15 | 06:26<br>20:56 | 05:52<br>21:33 | 05:53<br>21:44 | 06:25<br>21:17 | 07:05<br>20:23 | 07:45<br>19:23 | 08:10 (38)<br>18:25 | 08:12<br>16:56 |
| 5                   | 08:31<br>17:08 | 08:06<br>17:51 | 07:20<br>18:32 | 07:18<br>20:16 | 06:24<br>20:58 | 05:51<br>21:34 | 05:54<br>21:43 | 06:26<br>21:15 | 07:07<br>20:21 | 07:47<br>19:21 | 08:11 (38)<br>18:24 | 08:13<br>16:55 |
| 6                   | 08:31<br>17:09 | 08:05<br>17:52 | 07:18<br>18:33 | 07:16<br>20:17 | 06:23<br>20:59 | 05:50<br>21:35 | 05:55<br>21:43 | 06:28<br>21:14 | 07:08<br>20:19 | 07:48<br>19:19 | 08:16 (38)<br>18:22 | 08:14<br>16:55 |
| 7                   | 08:30<br>17:10 | 08:04<br>17:54 | 07:16<br>18:35 | 07:14<br>20:19 | 06:21<br>21:00 | 05:50<br>21:35 | 05:55<br>21:43 | 06:29<br>21:12 | 07:09<br>20:17 | 07:49<br>19:17 | 08:16 (38)<br>18:21 | 08:15<br>16:55 |
| 8                   | 08:30<br>17:11 | 08:02<br>17:55 | 07:14<br>18:36 | 07:12<br>20:20 | 06:20<br>21:02 | 05:50<br>21:36 | 05:56<br>21:42 | 06:30<br>21:11 | 07:11<br>20:15 | 07:51<br>19:15 | 08:16 (38)<br>18:20 | 08:16<br>16:55 |
| 9                   | 08:30<br>17:12 | 08:01<br>17:57 | 07:12<br>18:38 | 07:10<br>20:22 | 06:18<br>21:03 | 05:49<br>21:37 | 05:57<br>21:42 | 06:31<br>21:09 | 07:12<br>20:13 | 07:52<br>19:13 | 08:17 (38)<br>18:19 | 08:17<br>16:55 |
| 10                  | 08:30<br>17:13 | 07:59<br>17:58 | 07:10<br>18:39 | 07:09<br>20:23 | 06:17<br>21:04 | 05:49<br>21:38 | 05:58<br>21:41 | 06:33<br>21:08 | 07:13<br>20:11 | 07:54<br>19:11 | 08:18 (38)<br>18:17 | 08:18<br>16:54 |
| 11                  | 08:29<br>17:15 | 07:58<br>18:00 | 07:08<br>18:41 | 07:07<br>20:24 | 06:15<br>21:06 | 05:49<br>21:38 | 05:59<br>21:41 | 06:34<br>21:06 | 07:15<br>20:09 | 07:55<br>19:09 | 08:19 (38)<br>18:16 | 08:19<br>16:54 |
| 12                  | 08:29<br>17:16 | 07:56<br>18:00 | 07:06<br>18:42 | 07:05<br>20:26 | 06:14<br>21:07 | 05:48<br>21:39 | 06:00<br>21:40 | 06:35<br>21:05 | 07:16<br>20:07 | 07:56<br>19:07 | 08:20 (38)<br>18:14 | 08:20<br>16:54 |
| 13                  | 08:28<br>17:17 | 07:55<br>18:02 | 07:04<br>18:44 | 07:03<br>20:27 | 06:13<br>21:08 | 05:48<br>21:40 | 06:00<br>21:40 | 06:37<br>21:03 | 07:17<br>20:05 | 07:58<br>19:05 | 08:21 (38)<br>18:13 | 08:21<br>16:54 |
| 14                  | 08:28<br>17:18 | 07:53<br>18:03 | 07:02<br>18:45 | 07:01<br>20:29 | 06:11<br>21:09 | 05:48<br>21:40 | 06:01<br>21:39 | 06:38<br>21:01 | 07:19<br>20:03 | 07:59<br>19:03 | 08:22 (38)<br>18:12 | 08:22<br>16:54 |
| 15                  | 08:27<br>17:20 | 07:51<br>18:05 | 07:00<br>18:46 | 06:59<br>20:30 | 06:10<br>21:11 | 05:48<br>21:41 | 06:02<br>21:38 | 06:39<br>21:00 | 07:20<br>20:01 | 08:01<br>19:01 | 08:23 (38)<br>18:11 | 08:23<br>16:55 |
| 16                  | 08:27<br>17:21 | 07:50<br>18:06 | 06:58<br>18:48 | 06:57<br>20:31 | 06:09<br>21:12 | 05:48<br>21:41 | 06:03<br>21:37 | 06:40<br>20:58 | 07:21<br>19:59 | 08:02<br>18:58 | 08:24 (38)<br>18:10 | 08:24<br>16:55 |
| 17                  | 08:26<br>17:22 | 07:48<br>18:08 | 06:56<br>18:49 | 06:55<br>20:33 | 06:08<br>21:13 | 05:48<br>21:42 | 06:04<br>21:37 | 06:42<br>20:56 | 07:23<br>19:57 | 08:03<br>18:56 | 08:25 (38)<br>18:09 | 08:25<br>16:55 |
| 18                  | 08:25<br>17:24 | 07:47<br>18:09 | 06:54<br>18:51 | 06:53<br>20:34 | 06:06<br>21:14 | 05:48<br>21:42 | 06:05<br>21:36 | 06:43<br>20:55 | 07:24<br>19:55 | 08:05<br>18:51 | 08:26 (38)<br>18:08 | 08:26<br>16:55 |
| 19                  | 08:25<br>17:25 | 07:45<br>18:11 | 06:52<br>18:52 | 06:52<br>20:35 | 06:05<br>21:16 | 05:48<br>21:43 | 06:06<br>21:35 | 06:44<br>20:53 | 07:25<br>19:53 | 08:06<br>18:52 | 08:27 (38)<br>18:07 | 08:27<br>16:56 |
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| 22                  | 08:22<br>17:29 | 07:40<br>18:15 | 06:46<br>18:56 | 06:46<br>20:40 | 06:02<br>21:19 | 05:48<br>21:44 | 06:10<br>21:32 | 06:48<br>20:48 | 07:29<br>19:47 | 08:11<br>18:47 | 08:30 (38)<br>18:04 | 08:30<br>16:57 |
| 23                  | 08:21<br>17:31 | 07:38<br>18:17 | 06:44<br>18:58 | 06:44<br>20:41 | 06:01<br>21:20 | 05:49<br>21:44 | 06:11<br>21:31 | 06:50<br>20:46 | 07:30<br>19:45 | 08:12<br>18:45 | 08:31 (38)<br>18:03 | 08:31<br>16:57 |
| 24                  | 08:20<br>17:32 | 07:36<br>18:18 | 06:42<br>18:59 | 06:43<br>20:42 | 06:00<br>21:22 | 05:49<br>21:44 | 06:12<br>21:30 | 06:51<br>20:44 | 07:32<br>19:43 | 08:13<br>18:43 | 08:32 (38)<br>18:02 | 08:32<br>16:58 |
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| 26                  | 08:18<br>17:35 | 07:33<br>18:21 | 06:38<br>19:02 | 06:39<br>20:45 | 05:58<br>21:24 | 05:49<br>21:44 | 06:14<br>21:28 | 06:54<br>20:40 | 07:34<br>19:39 | 08:15<br>18:40 | 08:34 (38)<br>18:00 | 08:34<br>16:59 |
| 27                  | 08:17<br>17:37 | 07:31<br>18:23 | 06:36<br>19:03 | 06:37<br>20:47 | 05:57<br>21:25 | 05:50<br>21:44 | 06:15<br>21:27 | 06:55<br>20:38 | 07:36<br>19:37 | 08:16<br>18:38 | 08:35 (38)<br>18:00 | 08:35<br>17:00 |
| 28                  | 08:16<br>17:38 | 07:29<br>18:25 | 06:34<br>19:05 | 06:36<br>20:48 | 05:56<br>21:26 | 05:50<br>21:44 | 06:16<br>21:26 | 06:56<br>20:37 | 07:37<br>19:35 | 08:17<br>18:36 | 08:36 (38)<br>18:00 | 08:36<br>17:00 |
| 29                  | 08:15<br>17:40 | 07:27<br>18:26 | 06:32<br>19:06 | 06:34<br>20:49 | 05:54<br>21:27 | 05:51<br>21:44 | 06:18<br>21:24 | 06:58<br>20:35 | 07:38<br>19:33 | 08:18<br>18:35 | 08:37 (38)<br>18:00 | 08:37<br>17:01 |
| 30                  | 08:14<br>17:41 | 07:26<br>18:28 | 06:30<br>19:08 | 06:32<br>20:51 | 05:55<br>21:28 | 05:51<br>21:44 | 06:19<br>21:23 | 06:59<br>20:30 | 07:40<br>19:31 | 08:19<br>18:33 | 08:38 (38)<br>18:00 | 08:38<br>17:02 |
| 31                  | 08:13<br>17:43 | 07:25<br>18:30 | 06:28<br>19:10 | 06:30<br>20:53 | 05:54<br>21:29 | 05:50<br>21:44 | 06:20<br>21:22 | 07:00<br>20:31 | 07:41<br>19:32 | 08:20<br>18:32 | 08:39 (38)<br>18:00 | 08:39<br>17:03 |
| Potential sun hours | 277            | 286            | 367            | 406            | 466            | 475            | 481            | 443            | 380            | 339            | 282                 | 266            |
| Total, worst case   |                |                | 347            |                |                |                |                |                |                |                |                     |                |
| Sun reduction       |                |                | 0.61           |                |                |                |                |                |                |                |                     |                |
| Oper. time red.     |                |                | 1.00           |                |                |                |                |                |                |                |                     |                |
| Wind dir. red.      |                |                | 0.68           |                |                |                |                |                |                |                |                     |                |
| Total reduction     |                |                | 0.41           |                |                |                |                |                |                |                |                     |                |
| Total, real         |                |                | 143            |                |                |                |                |                |                |                |                     |                |

Table layout: For each day in each month the following matrix apply

| Day in month | Sun rise (hh:mm) | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|--------------|------------------|---------------------------------|----------------------------------|
|              | Sun set (hh:mm)  | Last time (hh:mm) with flicker  | (WTG causing flicker last time)  |



Project:

Oliver IV Array 012 8/26/2023

Licensed user:

AECOM

250 APOLLO DR, AECOM  
US-01824-3627 Chelmsford  
+1 9789 052 260

Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023 Shadow receptor: U156 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (208)

## Assumptions for shadow calculations

Reference year for calendar

2023

Sunshine probability S/S0 (Sun hours/Possible sun hours) []

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec  
0.54 0.52 0.61 0.58 0.64 0.67 0.75 0.72 0.67 0.53 0.42 0.45

Operational time

N NNE NE ENE E ESE SE SSE S SSW SW WSW W WNW NW NNW Sum  
376 314 339 425 445 474 693 570 488 386 872 609 772 651 677 667 8,758

|                     | January        | February       | March          | April          | May            | June           | July                       | August         | September                | October                     | November       | December       |                |                |
|---------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------------------|----------------|--------------------------|-----------------------------|----------------|----------------|----------------|----------------|
| 1                   | 08:31<br>17:04 | 08:12<br>17:45 | 07:27<br>18:26 | 07:26<br>20:11 | 06:31<br>20:52 | 05:54<br>21:30 | 8 06:47 (17)<br>06:55 (17) | 05:52<br>21:44 | 06:22<br>21:21           | 26 06:49 (17)<br>07:15 (17) | 07:02<br>20:29 | 07:41<br>19:29 | 08:25<br>18:30 | 08:08<br>16:58 |
| 2                   | 08:31<br>17:05 | 08:10<br>17:46 | 07:25<br>18:28 | 07:24<br>20:12 | 06:29<br>20:53 | 05:53<br>21:31 | 05:53<br>21:44             | 06:23<br>21:19 | 06:50 (17)<br>07:15 (17) | 07:03<br>20:27              | 07:43<br>19:27 | 08:27<br>18:29 | 08:09<br>16:57 |                |
| 3                   | 08:31<br>17:06 | 08:09<br>17:48 | 07:23<br>18:29 | 07:22<br>20:13 | 06:28<br>20:55 | 05:53<br>21:32 | 05:53<br>21:44             | 06:24<br>21:18 | 06:51 (17)<br>07:14 (17) | 07:04<br>20:25              | 07:44<br>19:25 | 08:28<br>18:27 | 08:11<br>16:57 |                |
| 4                   | 08:31<br>17:07 | 08:08<br>17:49 | 07:22<br>18:31 | 07:21<br>20:15 | 06:26<br>20:56 | 05:52<br>21:33 | 05:54<br>21:43             | 06:25<br>21:17 | 06:52 (17)<br>07:14 (17) | 07:06<br>20:23              | 07:45<br>19:23 | 08:30<br>18:26 | 08:12<br>16:56 |                |
| 5                   | 08:31<br>17:08 | 08:06<br>17:51 | 07:20<br>18:32 | 07:19<br>20:16 | 06:25<br>20:57 | 05:51<br>21:34 | 05:55<br>21:43             | 06:27<br>21:15 | 06:54 (17)<br>07:14 (17) | 07:07<br>20:21              | 07:47<br>19:21 | 07:31<br>17:24 | 08:13<br>16:56 |                |
| 6                   | 08:30<br>17:09 | 08:05<br>17:53 | 07:18<br>18:34 | 07:17<br>20:18 | 06:23<br>20:59 | 05:51<br>21:35 | 05:55<br>21:43             | 06:28<br>21:14 | 06:55 (17)<br>07:13 (17) | 07:08<br>20:19              | 07:48<br>19:19 | 08:14<br>17:23 | 08:16<br>16:56 |                |
| 7                   | 08:30<br>17:10 | 08:04<br>17:54 | 07:16<br>18:35 | 07:15<br>20:19 | 06:22<br>21:00 | 05:51<br>21:35 | 05:56<br>21:42             | 06:29<br>21:12 | 06:56 (17)<br>07:12 (17) | 07:10<br>20:17              | 07:49<br>19:17 | 07:34<br>17:21 | 08:15<br>16:55 |                |
| 8                   | 08:30<br>17:12 | 08:02<br>17:56 | 07:14<br>18:37 | 07:13<br>20:20 | 06:20<br>21:01 | 05:50<br>21:36 | 05:57<br>21:42             | 06:30<br>21:11 | 06:57 (17)<br>07:11 (17) | 07:11<br>20:15              | 07:51<br>19:15 | 07:36<br>17:20 | 08:16<br>16:55 |                |
| 9                   | 08:30<br>17:13 | 08:01<br>17:57 | 07:12<br>18:38 | 07:11<br>20:22 | 06:19<br>21:03 | 05:50<br>21:37 | 05:58<br>21:42             | 06:32<br>21:09 | 06:58 (17)<br>07:09 (17) | 07:12<br>20:13              | 07:52<br>19:13 | 07:37<br>17:19 | 08:17<br>16:55 |                |
| 10                  | 08:29<br>17:14 | 07:59<br>17:59 | 07:10<br>18:39 | 07:09<br>20:23 | 06:17<br>21:04 | 05:49<br>21:38 | 05:58<br>21:41             | 06:33<br>21:08 | 07:00 (17)<br>07:08 (17) | 07:14<br>20:11              | 07:54<br>19:11 | 07:39<br>17:17 | 08:18<br>16:55 |                |
| 11                  | 08:29<br>17:15 | 07:58<br>18:00 | 07:08<br>18:41 | 07:07<br>20:24 | 06:16<br>21:05 | 05:49<br>21:38 | 05:59<br>21:41             | 06:34<br>21:06 | 07:01 (17)<br>07:06 (17) | 07:15<br>20:09              | 07:55<br>19:09 | 07:40<br>17:16 | 08:19<br>16:55 |                |
| 12                  | 08:29<br>17:16 | 07:56<br>18:00 | 07:06<br>18:42 | 07:05<br>20:26 | 06:15<br>21:07 | 05:49<br>21:39 | 06:00<br>21:40             | 06:36<br>21:05 | 07:16<br>20:07           | 07:56<br>19:07              | 07:42<br>17:15 | 08:20<br>16:55 |                |                |
| 13                  | 08:28<br>17:18 | 07:55<br>18:02 | 07:04<br>19:44 | 07:03<br>20:27 | 06:13<br>21:08 | 05:49<br>21:40 | 06:01<br>21:39             | 06:37<br>21:03 | 06:55 (17)<br>07:03 (17) | 07:17<br>21:03              | 07:58<br>20:05 | 07:43<br>19:05 | 08:21<br>16:55 |                |
| 14                  | 08:28<br>17:19 | 07:53<br>18:03 | 07:02<br>19:45 | 07:01<br>20:29 | 06:12<br>21:09 | 05:49<br>21:40 | 06:02<br>21:39             | 06:38<br>21:05 | 06:54 (17)<br>07:05 (17) | 07:19<br>21:01              | 07:59<br>20:03 | 07:45<br>19:04 | 08:22<br>17:12 | 16:55          |
| 15                  | 08:27<br>17:20 | 07:52<br>18:05 | 07:00<br>19:47 | 06:59<br>20:30 | 06:11<br>21:11 | 05:48<br>21:41 | 06:03<br>21:38             | 06:40<br>21:07 | 06:53 (17)<br>07:07 (17) | 07:20<br>21:00              | 08:01<br>20:01 | 07:46<br>19:02 | 08:23<br>17:11 | 16:55          |
| 16                  | 08:27<br>17:22 | 07:50<br>18:07 | 07:58<br>19:48 | 06:57<br>20:31 | 06:09<br>21:12 | 05:48<br>21:41 | 06:04<br>21:37             | 06:41<br>21:08 | 06:52 (17)<br>07:08 (17) | 07:21<br>20:58              | 08:02<br>19:59 | 07:48<br>19:00 | 08:24<br>17:10 | 16:55          |
| 17                  | 08:26<br>17:23 | 07:48<br>18:08 | 07:56<br>19:50 | 06:56<br>20:33 | 06:08<br>21:13 | 05:48<br>21:42 | 06:05<br>21:37             | 06:42<br>21:09 | 06:51 (17)<br>07:09 (17) | 07:23<br>20:56              | 08:03<br>19:57 | 07:49<br>18:56 | 08:24<br>17:09 | 16:55          |
| 18                  | 08:25<br>17:24 | 07:47<br>18:10 | 07:54<br>19:51 | 06:54<br>20:34 | 06:07<br>21:14 | 05:48<br>21:42 | 06:06<br>21:36             | 06:43<br>20:50 | 06:50 (17)<br>07:10 (17) | 07:24<br>20:55              | 08:05<br>19:55 | 07:50<br>18:54 | 08:25<br>17:08 | 16:56          |
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| 21                  | 08:23<br>17:28 | 07:42<br>18:14 | 07:48<br>19:55 | 06:48<br>20:38 | 06:04<br>21:18 | 05:49<br>21:43 | 06:09<br>21:33             | 06:47<br>20:49 | 06:49 (17)<br>07:12 (17) | 07:28<br>20:49              | 08:09<br>19:49 | 07:55<br>18:49 | 08:27<br>17:05 | 16:57          |
| 22                  | 08:22<br>17:30 | 07:40<br>18:16 | 07:46<br>19:57 | 06:46<br>20:40 | 06:02<br>21:19 | 05:49<br>21:43 | 06:10<br>21:32             | 06:49<br>20:48 | 06:48 (17)<br>07:13 (17) | 07:29<br>20:48              | 08:11<br>19:47 | 07:56<br>18:47 | 08:28<br>17:04 | 16:57          |
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| 27                  | 08:17<br>17:37 | 07:31<br>18:23 | 07:36<br>20:04 | 06:38<br>20:47 | 05:58<br>21:25 | 05:50<br>21:44 | 06:16<br>21:27             | 06:55<br>20:38 | 06:46 (17)<br>07:15 (17) | 07:36<br>20:38              | 08:18<br>19:37 | 08:03<br>18:38 | 08:30<br>17:00 |                |
| 28                  | 08:16<br>17:39 | 07:29<br>18:25 | 07:34<br>20:05 | 06:36<br>20:48 | 05:57<br>21:26 | 05:51<br>21:44 | 06:17<br>21:26             | 06:57<br>20:37 | 06:46 (17)<br>07:15 (17) | 07:37<br>20:57              | 08:19<br>19:35 | 08:04<br>18:37 | 08:30<br>16:59 | 17:01          |
| 29                  | 08:15<br>17:40 |                | 07:32<br>20:06 | 06:34<br>20:49 | 05:56<br>21:27 | 05:51<br>21:44 | 06:18<br>21:24             | 06:58<br>20:35 | 06:46 (17)<br>07:15 (17) | 07:37<br>20:58              | 08:21<br>19:33 | 08:06<br>18:35 | 08:30<br>17:02 |                |
| 30                  | 08:14<br>17:42 |                | 07:30<br>20:08 | 06:33<br>20:51 | 05:55<br>21:28 | 05:52<br>21:44 | 06:19<br>21:23             | 06:59<br>20:33 | 06:47 (17)<br>07:16 (17) | 07:39<br>20:33              | 08:22<br>19:31 | 08:07<br>18:33 | 08:30<br>16:58 | 17:02          |
| 31                  | 08:13<br>17:43 |                | 07:28<br>20:09 |                | 05:55<br>21:29 | 05:55<br>21:44 | 06:17<br>21:22             | 07:00<br>20:31 | 06:48 (17)<br>07:15 (17) | 07:00<br>20:31              | 08:24<br>18:32 |                | 08:31<br>17:03 |                |
| Potential sun hours | 278            | 286            | 367            | 406            | 465            | 475            | 481                        | 442            |                          |                             | 380            | 340            | 283            | 266            |
| Total, worst case   |                |                |                |                | 605            | 8              | 428                        | 188            |                          |                             |                |                |                |                |
| Sun reduction       |                |                |                |                | 0.64           | 0.67           | 0.75                       | 0.72           |                          |                             |                |                |                |                |
| Oper. time red.     |                |                |                |                | 1.00           | 1.00           | 1.00                       | 1.00           |                          |                             |                |                |                |                |
| Wind dir. red.      |                |                |                |                | 0.66           | 0.66           | 0.66                       | 0.66           |                          |                             |                |                |                |                |
| Total reduction     |                |                |                |                | 0.42           | 0.44           | 0.49                       | 0.47           |                          |                             |                |                |                |                |
| Total, real         |                |                |                |                | 254            | 4              | 210                        | 89             |                          |                             |                |                |                |                |

Table layout: For each day in each month the following matrix apply

|              |                      |                                 |                                  |
|--------------|----------------------|---------------------------------|----------------------------------|
| Day in month | Sun rise (hh:mm)     | First time (hh:mm) with flicker | (WTG causing flicker first time) |
|              | Sun set (hh:mm)      | Last time (hh:mm) with flicker  | (WTG causing flicker last time)  |
|              | Minutes with flicker |                                 |                                  |

Project:

**Oliver IV Array 012 8/26/2023**

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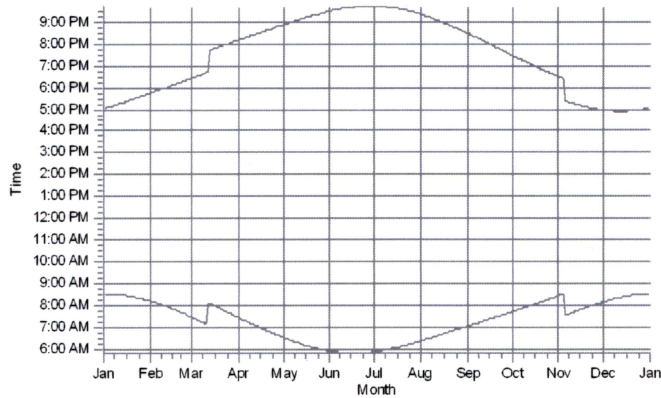
Calculated:

8/26/2023 2:11 PM/3.4.424

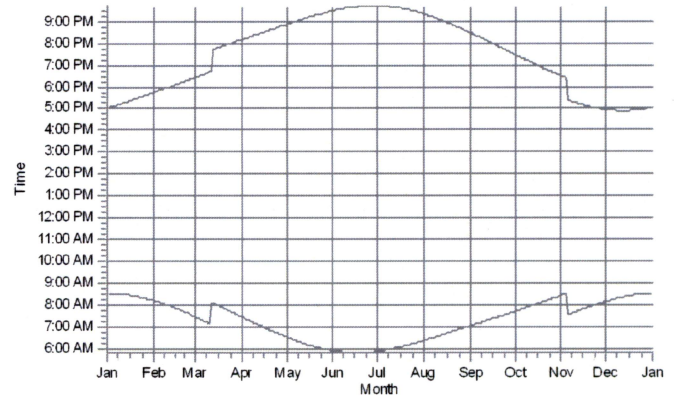
## SHADOW - Calendar, graphical

**Calculation:** Oliver IV Array 012 with 3 Alts 8/26/2023

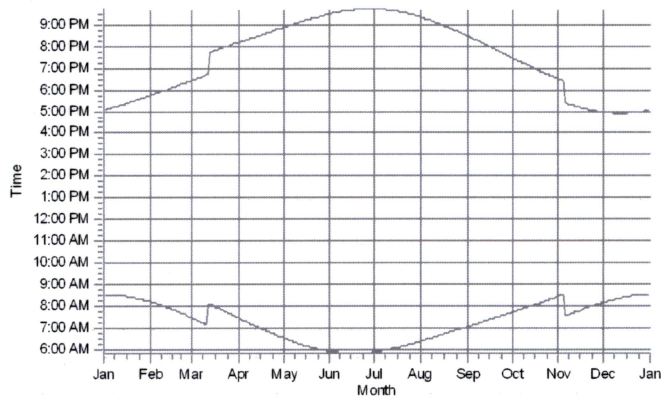
R010: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (10)



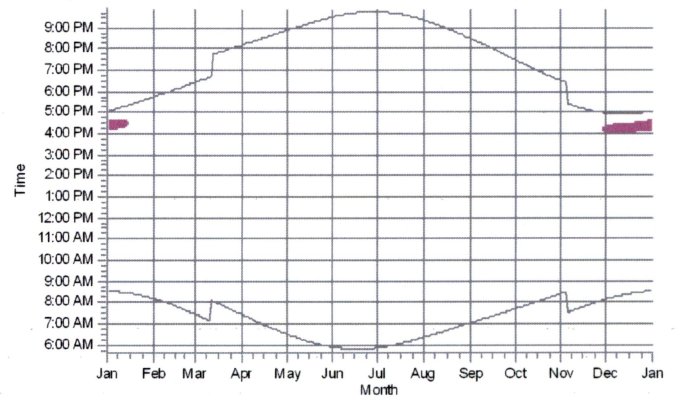
R011: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (11)



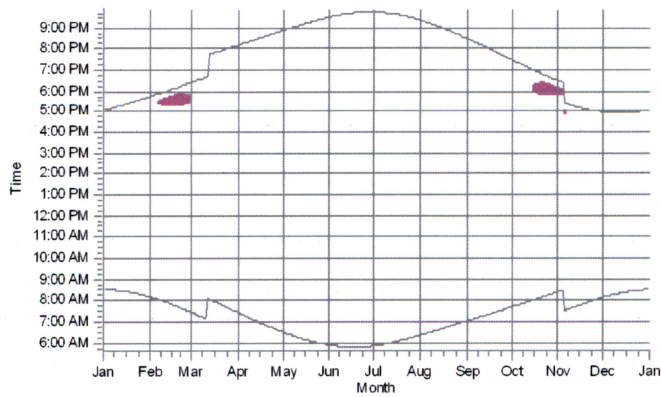
R012: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (12)



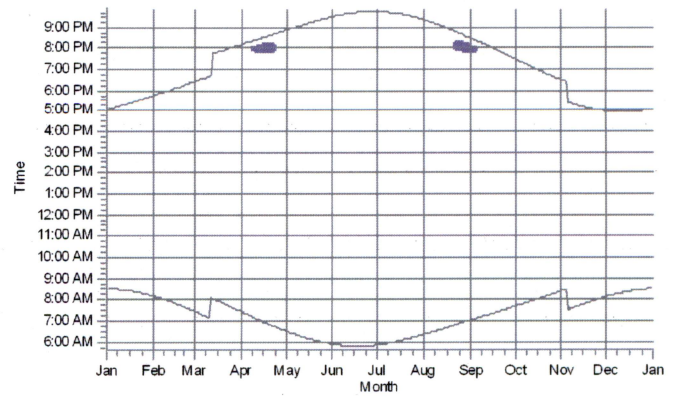
R013: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (13)



R015: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (14)



R016: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (15)



WTG:

71: GE WIND ENERGY GE 2.52-127.2620 127.0 (OI) hub: 89.0 m (TOT: 152.5 m) (996)

72: GE WIND ENERGY GE 2.52-127.2620 127.0 (OI) hub: 89.0 m (TOT: 152.5 m) (997)



Project:

**Oliver IV Array 012 8/26/2023**

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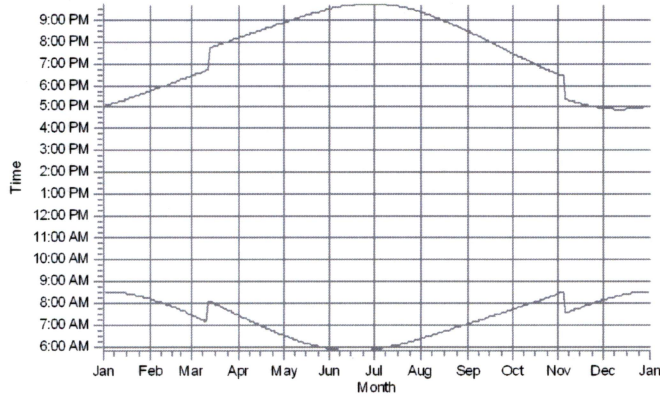
Calculated:

8/26/2023 2:11 PM/3.4.424

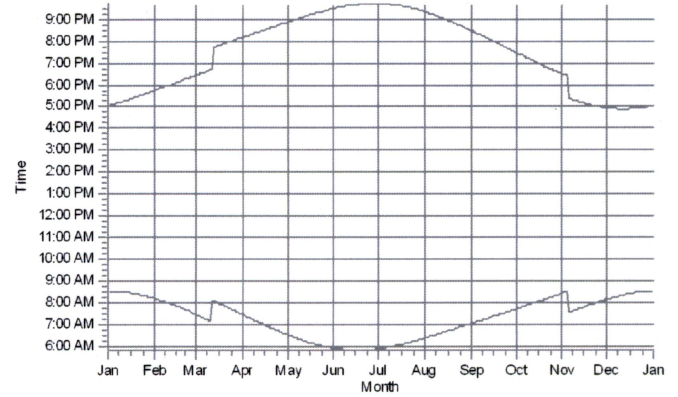
## SHADOW - Calendar, graphical

**Calculation:** Oliver IV Array 012 with 3 Alts 8/26/2023

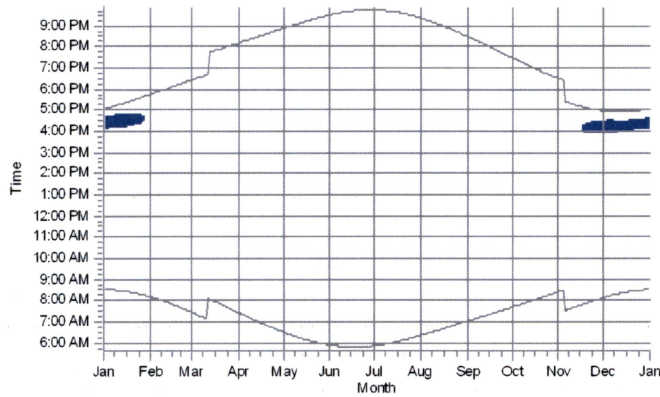
R019: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (18)



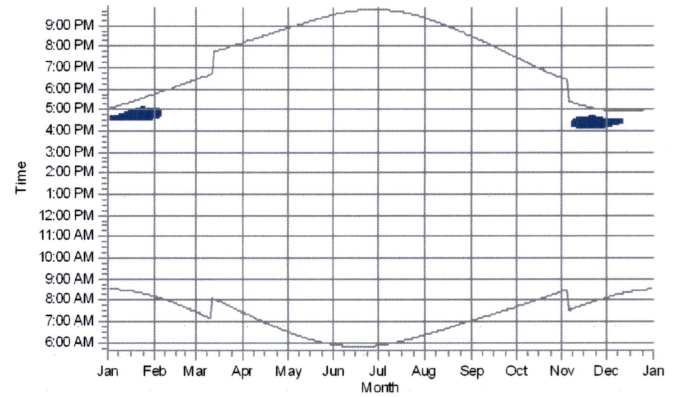
R020: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (19)



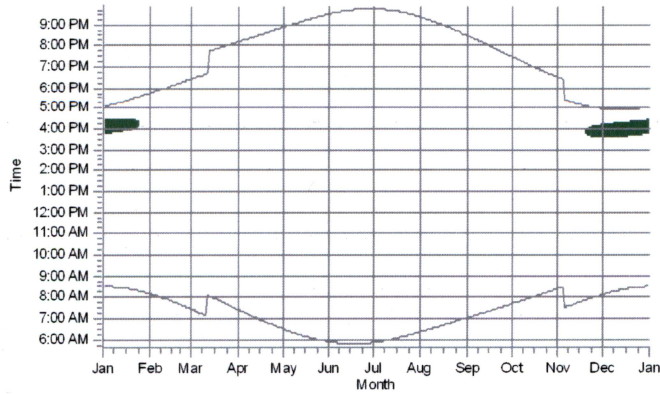
R024: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (23)



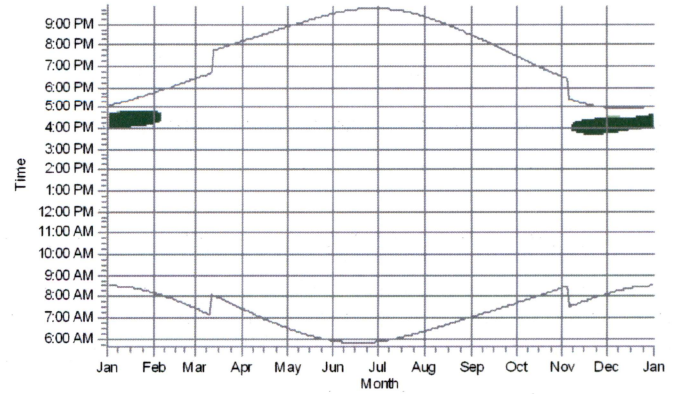
R025: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (24)



R034: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (30)



R035: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (31)



WTG:

69: GE WIND ENERGY GE 2.82-127.2620 127.0 (OI hub: 89.0 m (TOT: 152.5 m) (636))

70: GE WIND ENERGY GE 2.82-127.2620 127.0 (OI hub: 89.0 m (TOT: 152.5 m) (637))

67: GE WIND ENERGY GE 2.82-127.2620 127.0 (OI hub: 89.0 m (TOT: 152.5 m) (639))

Project:

**Oliver IV Array 012 8/26/2023**

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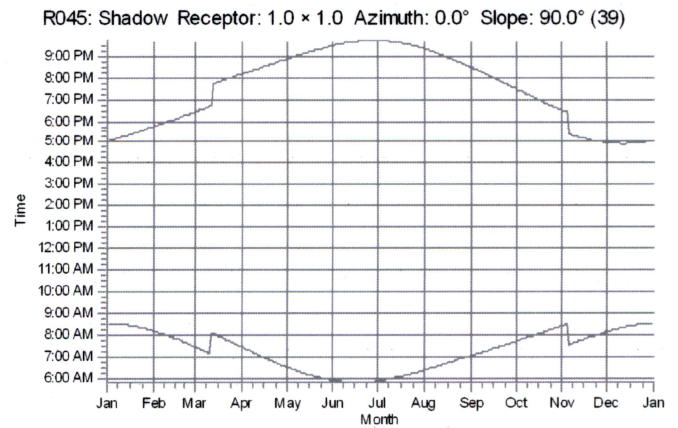
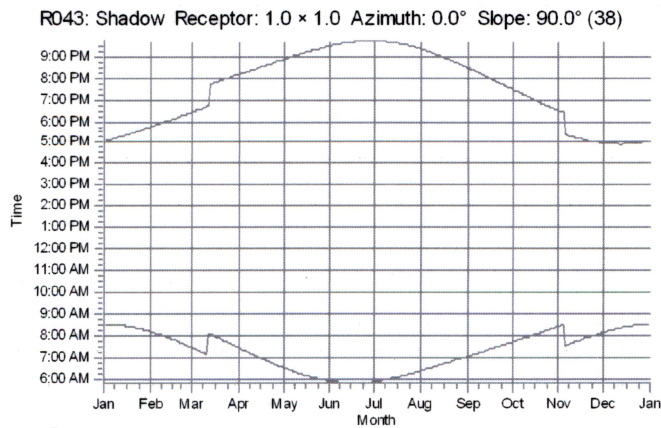
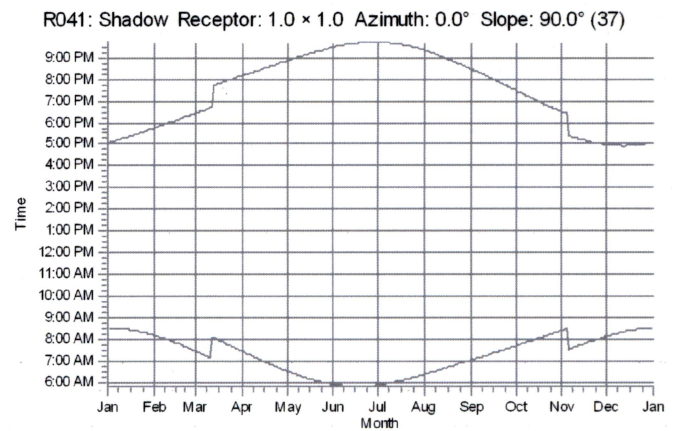
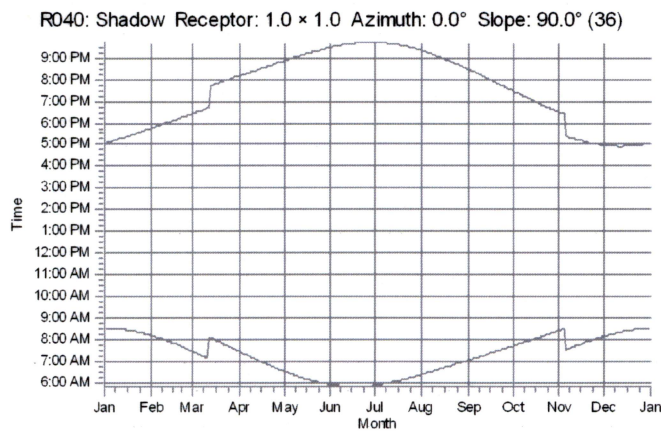
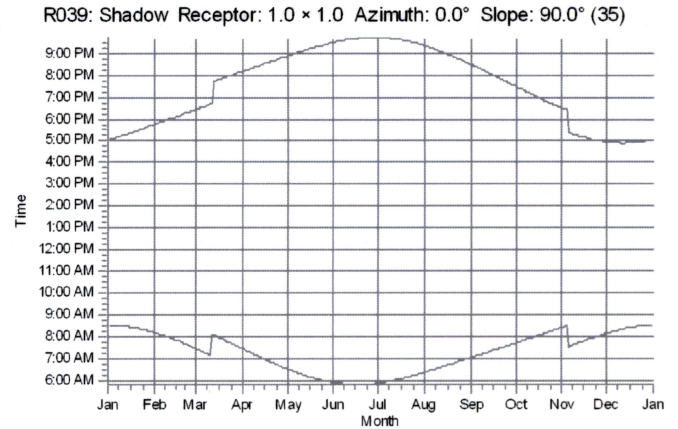
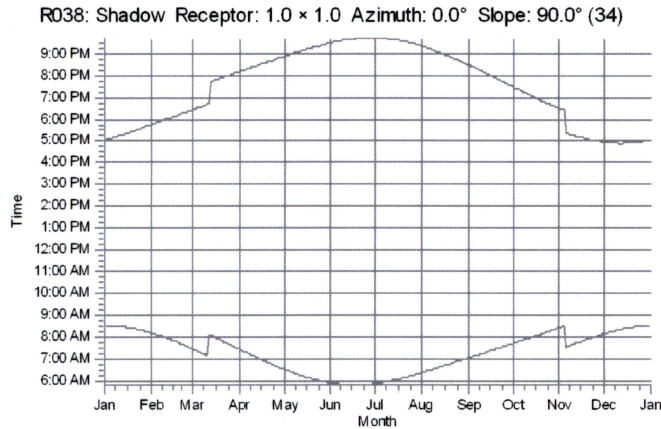
Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar, graphical

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023



WTG



Project:

**Oliver IV Array 012 8/26/2023**

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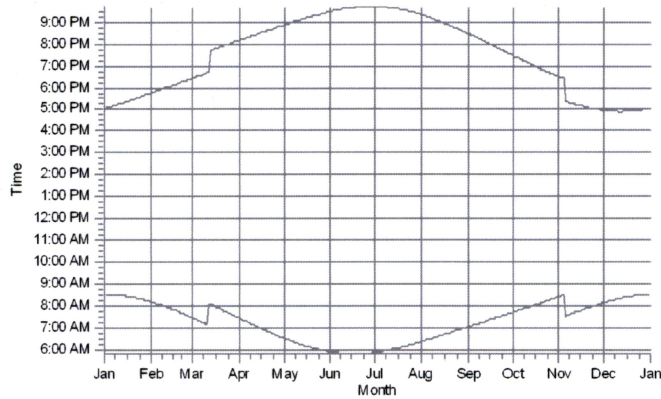
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8/26/2023 2:11 PM/3.4.424

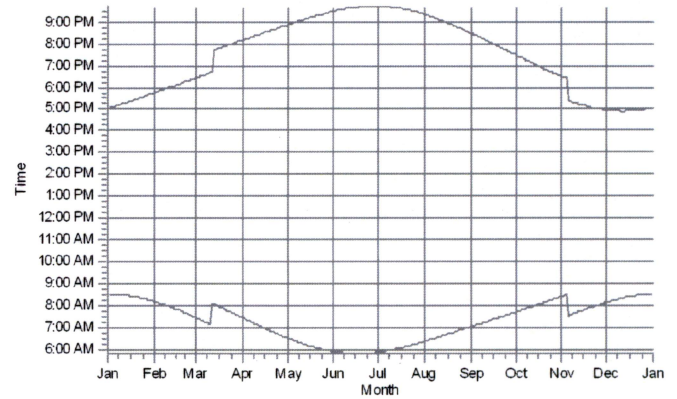
## SHADOW - Calendar, graphical

**Calculation:** Oliver IV Array 012 with 3 Alts 8/26/2023

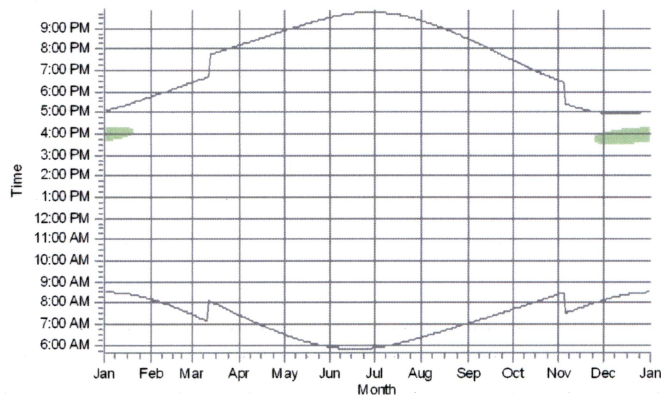
R046: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (40)



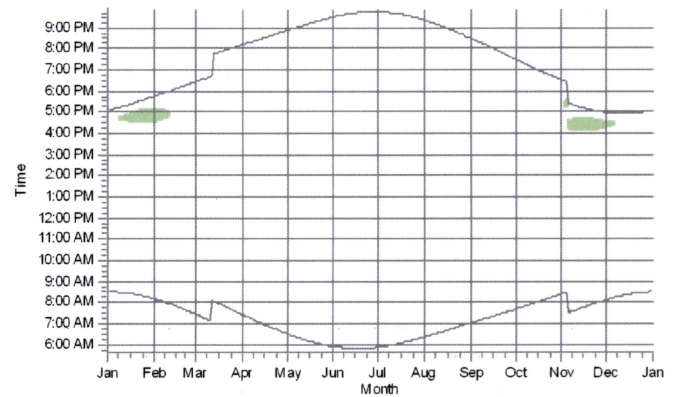
R047: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (41)



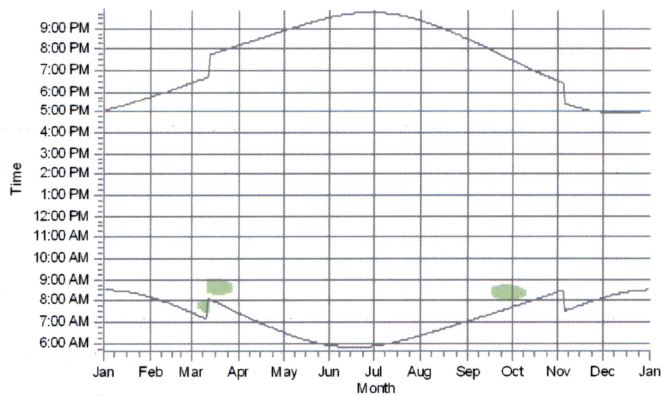
R048: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (42)



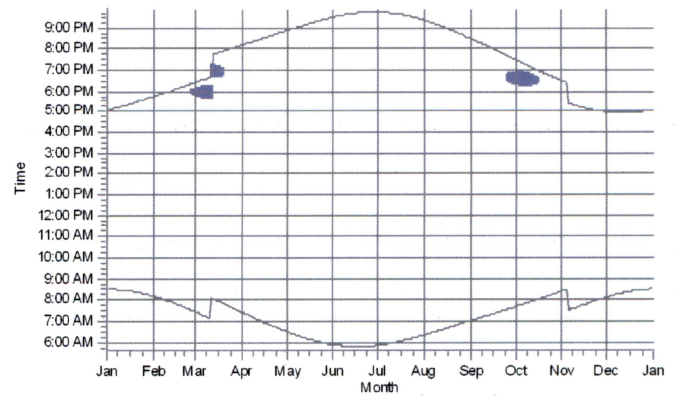
R049: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (43)



R085: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (76)



R086: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (77)



WTG:

54: GE WIND ENERGY GE 2.82-127-2820 127.0 IOW hub: 89.0 m (TOT: 152.5 m) (633) A1: GE WIND ENERGY GE 2.82-127-2820 127.0 IOW hub: 89.0 m (TOT: 152.5 m) (640)

Project:

**Oliver IV Array 012 8/26/2023**

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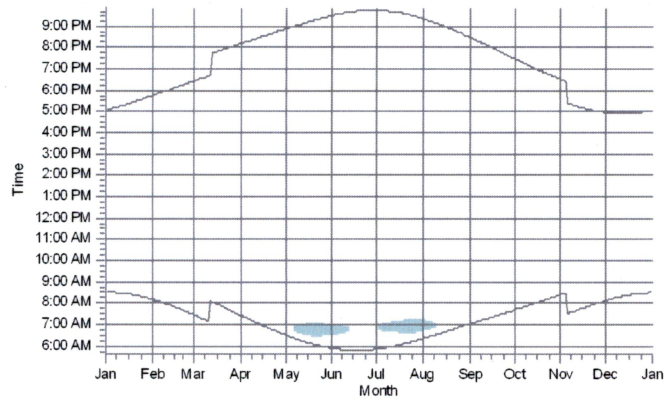
Calculated:

8/26/2023 2:11 PM/3.4.424

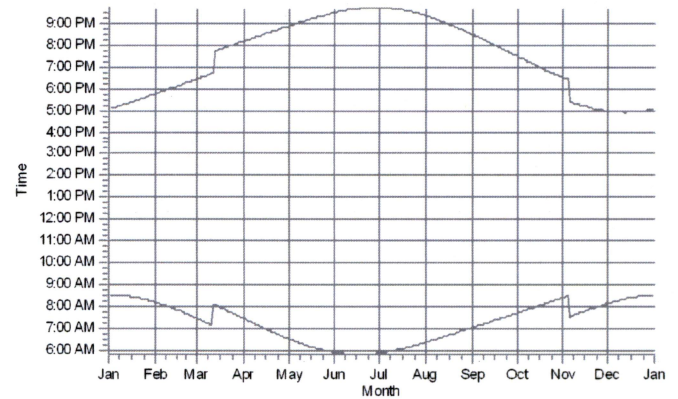
## SHADOW - Calendar, graphical

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

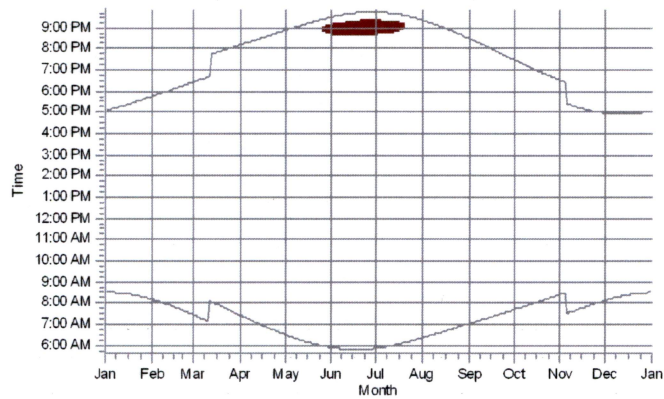
R092: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (83)



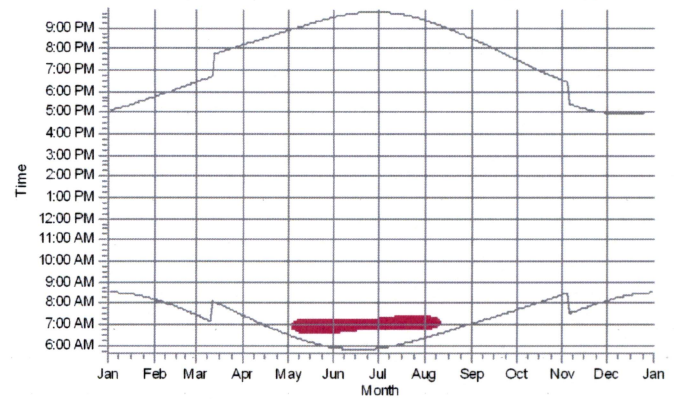
R093: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (84)



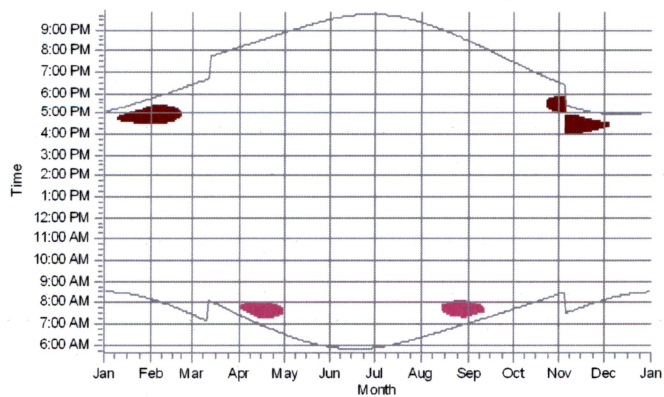
R094: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (85)



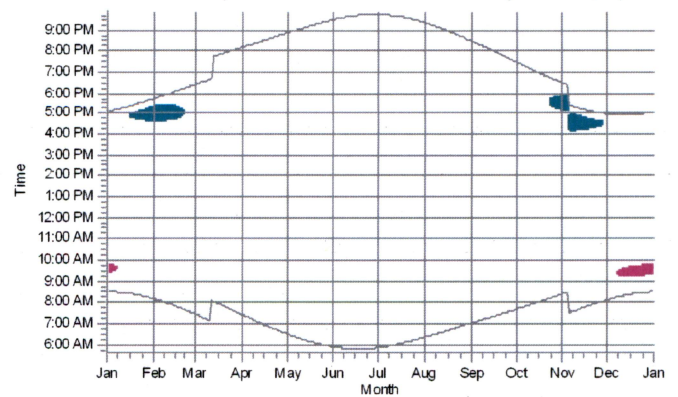
R095: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (86)



R096: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (87)



R097: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (88)



WTG:

33: GE WIND ENERGY GE 2.82-127.2620 127.0 ICI hub: 89.0 m (TOT: 152.5 m) (567)  
30: GE WIND ENERGY GE 2.82-127.2620 127.0 ICI hub: 89.0 m (TOT: 152.5 m) (568)  
29: GE WIND ENERGY GE 2.82-127.2620 127.0 ICI hub: 89.0 m (TOT: 152.5 m) (570)  
17: GE WIND ENERGY GE 2.82-127.2620 127.0 ICI hub: 89.0 m (TOT: 152.5 m) (611)  
45: GE WIND ENERGY GE 2.82-127.2620 127.0 ICI hub: 89.0 m (TOT: 152.5 m) (600)



Project:

**Oliver IV Array 012 8/26/2023**

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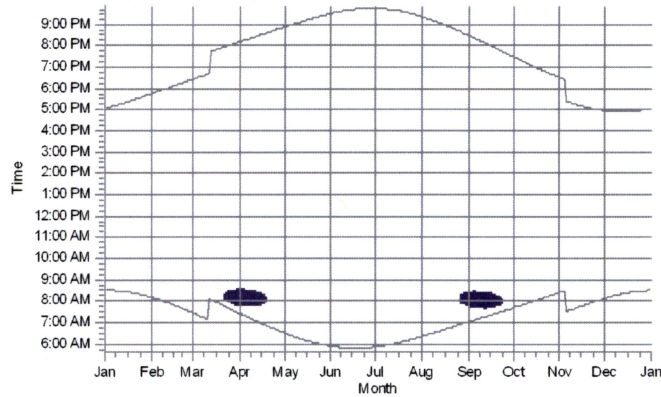
Calculated:

8/26/2023 2:11 PM/3.4.424

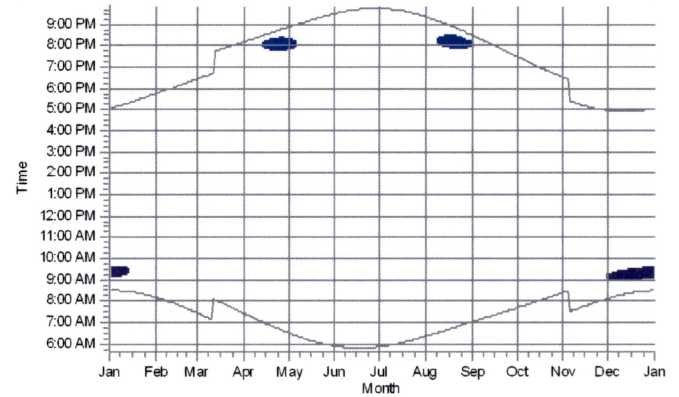
## SHADOW - Calendar, graphical

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

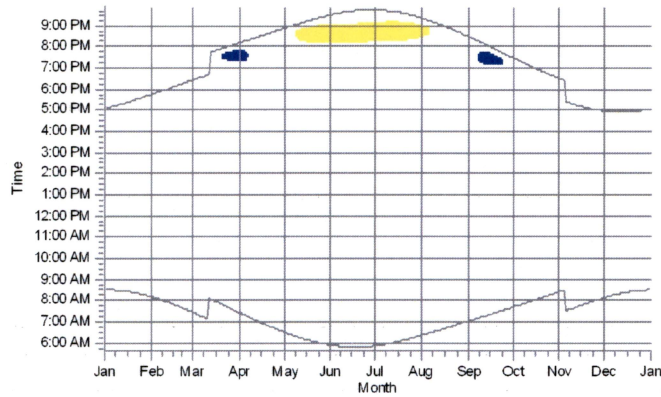
R098: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (89)



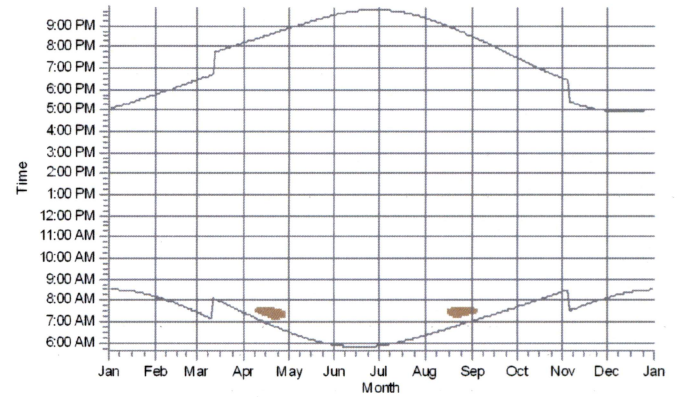
R100: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (90)



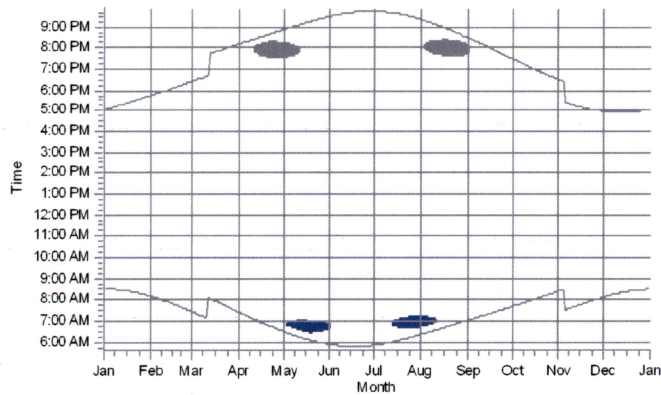
R101: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (91)



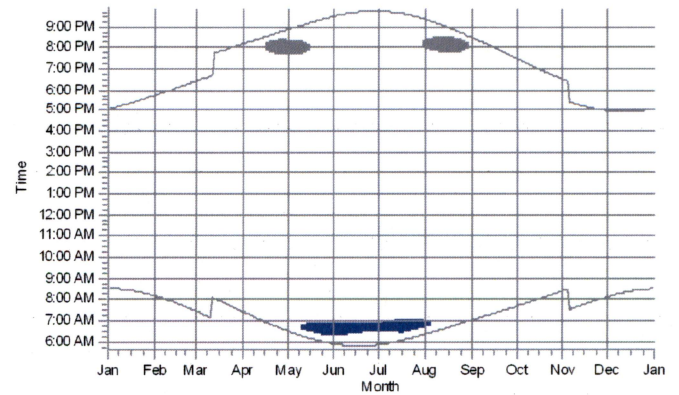
R102: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (92)



R103: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (93)



R104: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (94)



WTG:

43: GE WIND ENERGY GE 2.82-127.2620 127.0 101 hub: 89.0 m (TOT: 152.5 m) (S64) 57: GE WIND ENERGY GE 2.82-127.2620 127.0 101 hub: 89.0 m (TOT: 152.5 m) (S66) 66: GE WIND ENERGY GE 2.82-127.2620 127.0 101 hub: 89.0 m (TOT: 152.5 m) (S65) 67: GE WIND ENERGY GE 2.82-127.2620 127.0 101 hub: 89.0 m (TOT: 152.5 m) (S69)

42: GE WIND ENERGY GE 2.82-127.2620 127.0 101 hub: 89.0 m (TOT: 152.5 m) (S63) 56: GE WIND ENERGY GE 2.82-127.2620 127.0 101 hub: 89.0 m (TOT: 152.5 m) (S62)

52: GE WIND ENERGY GE 2.82-127.2620 127.0 101 hub: 89.0 m (TOT: 152.5 m) (S68)

Project:

**Oliver IV Array 012 8/26/2023**

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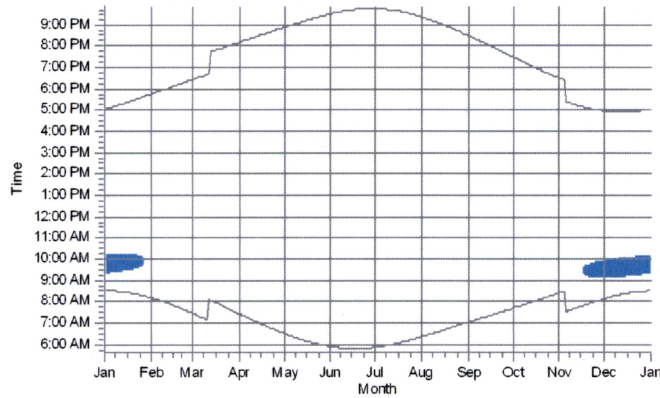
Calculated:

8/26/2023 2:11 PM/3.4.424

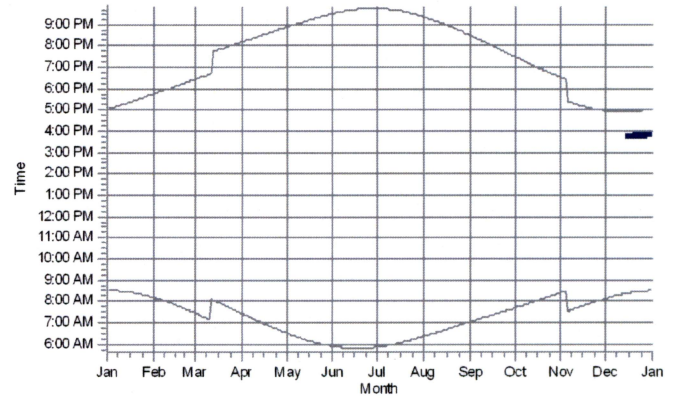
## SHADOW - Calendar, graphical

**Calculation:** Oliver IV Array 012 with 3 Alts 8/26/2023

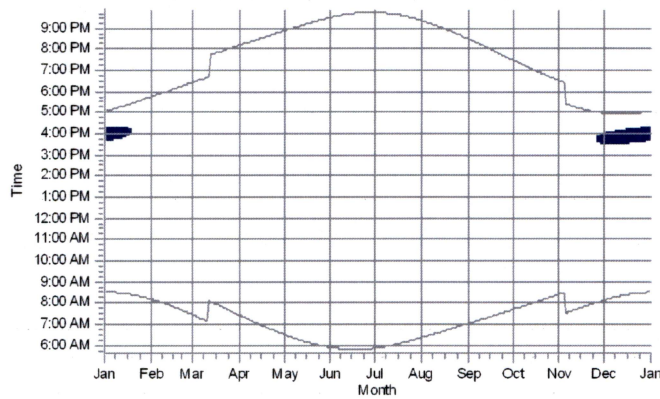
R105: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (95)



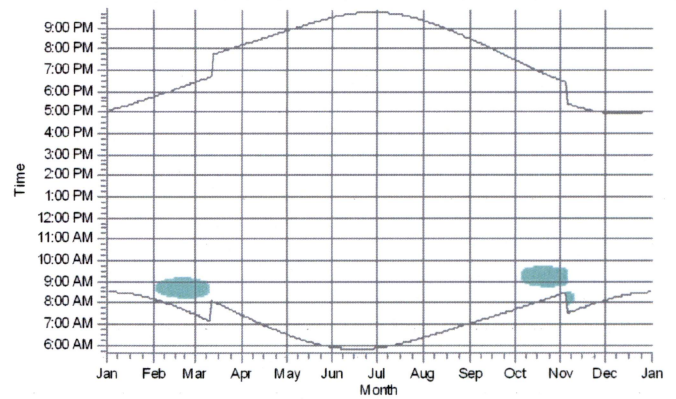
R106: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (96)



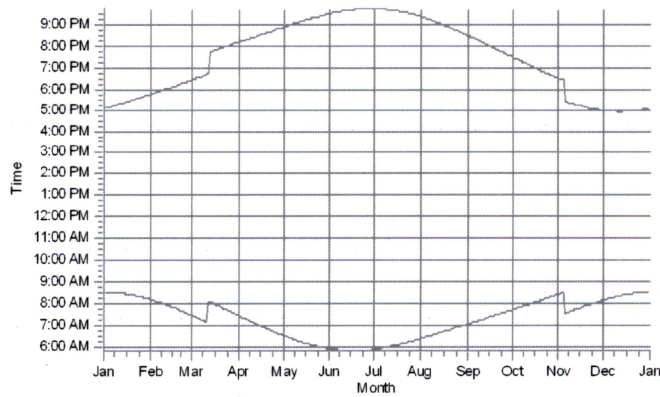
R107: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (97)



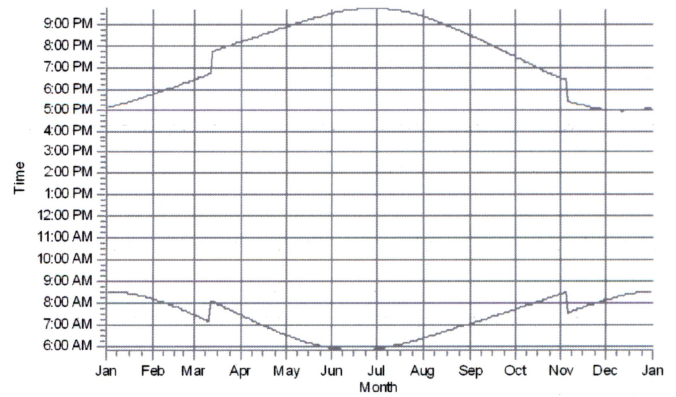
R108: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (98)



R109: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (99)



R110: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (100)



WTO

23: GE WIND ENERGY GE 2.82-127 2820 127.0 (T01: 152.5 m) (969)

34: GE WIND ENERGY GE 2.82-127 2820 127.0 (T01: 152.5 m) (961)

1: GE WIND ENERGY GE 2.82-127 2820 127.0 (T01: 152.5 m) (659)



Project:

**Oliver IV Array 012 8/26/2023**

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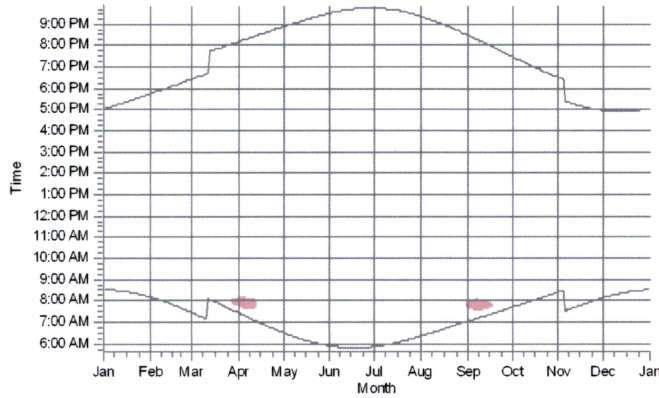
Calculated:

8/26/2023 2:11 PM/3.4.424

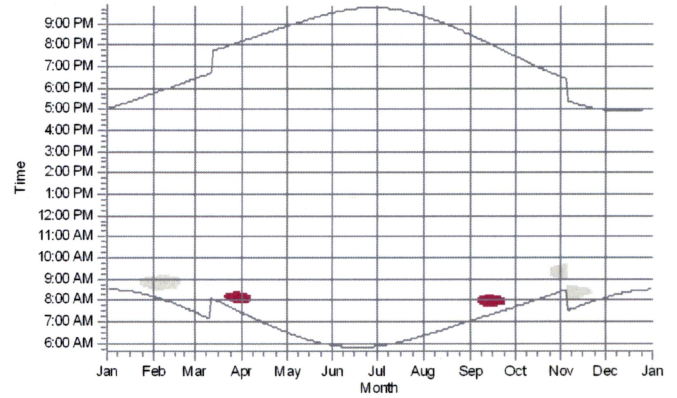
## SHADOW - Calendar, graphical

**Calculation:** Oliver IV Array 012 with 3 Alts 8/26/2023

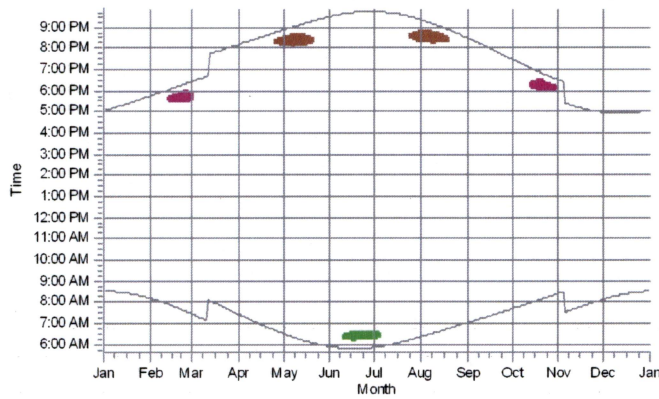
R111: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (101)



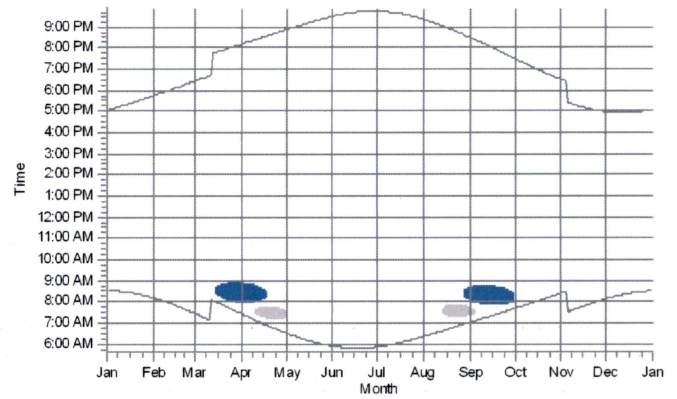
R112: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (102)



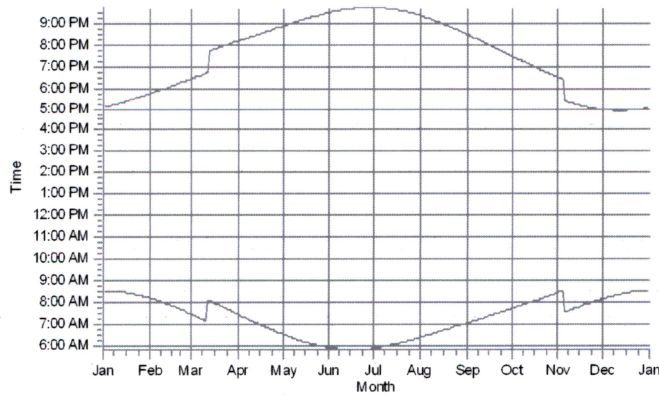
R113: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (103)



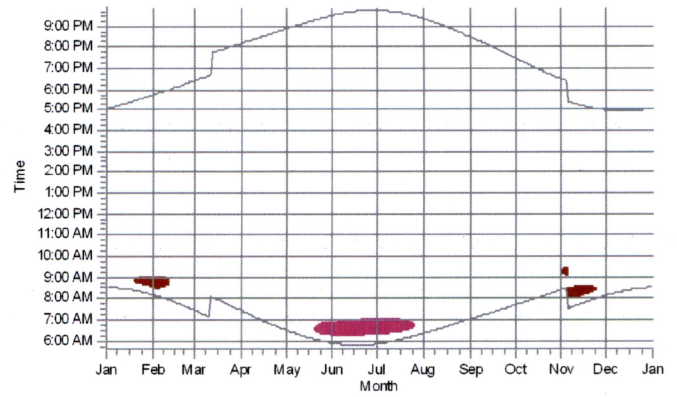
R114: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (104)



R115: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (105)



R116: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (106)



WTO

19: GE WIND ENERGY GE 2.82-127.2820 127.0 101 hub: 89.0 m (TOT: 152.5 m) (571)  
47: GE WIND ENERGY GE 2.82-127.2820 127.0 101 hub: 89.0 m (TOT: 152.5 m) (594)  
60: GE WIND ENERGY GE 2.82-127.2820 127.0 101 hub: 89.0 m (TOT: 152.5 m) (596)

46: GE WIND ENERGY GE 2.82-127.2820 127.0 101 hub: 89.0 m (TOT: 152.5 m) (587)  
12: GE WIND ENERGY GE 2.82-127.2820 127.0 101 hub: 89.0 m (TOT: 152.5 m) (603)  
11: GE WIND ENERGY GE 2.82-127.2820 127.0 101 hub: 89.0 m (TOT: 152.5 m) (604)

14: GE WIND ENERGY GE 2.82-127.2820 127.0 101 hub: 89.0 m (TOT: 152.5 m) (622)  
15: GE WIND ENERGY GE 2.82-127.2820 127.0 101 hub: 89.0 m (TOT: 152.5 m) (623)  
59: GE WIND ENERGY GE 2.82-127.2820 127.0 101 hub: 89.0 m (TOT: 152.5 m) (624)

6: GE WIND ENERGY GE 2.82-127.2820 127.0 101 hub: 89.0 m (TOT: 152.5 m) (622)

Project:

Oliver IV Array 012 8/26/2023

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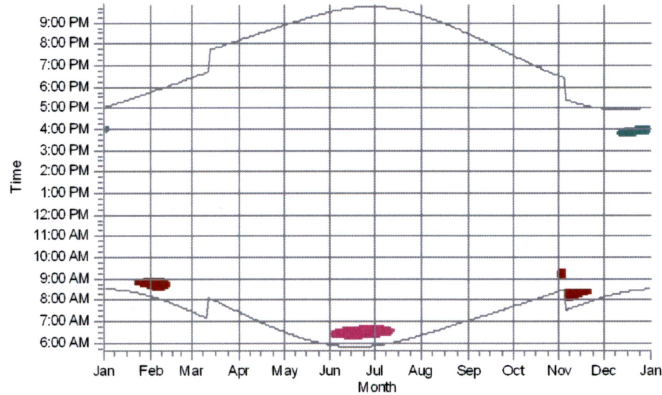
Calculated:

8/26/2023 2:11 PM/3.4.424

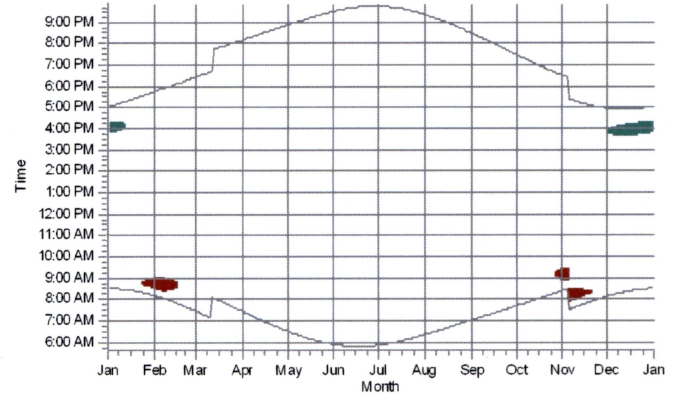
## SHADOW - Calendar, graphical

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

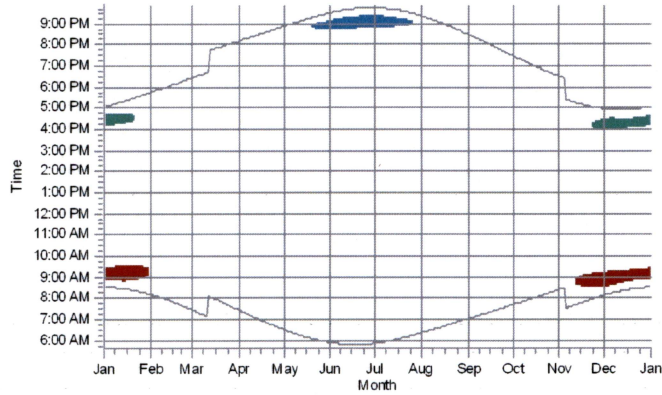
R117: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (215)



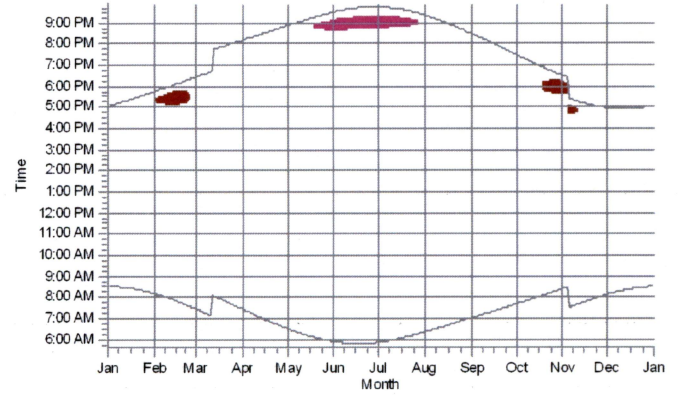
R118: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (107)



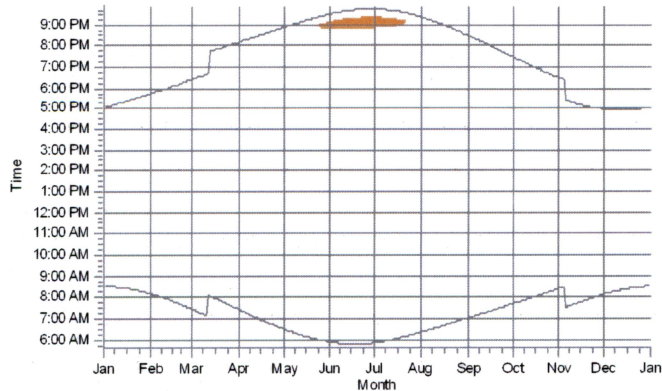
R119: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (108)



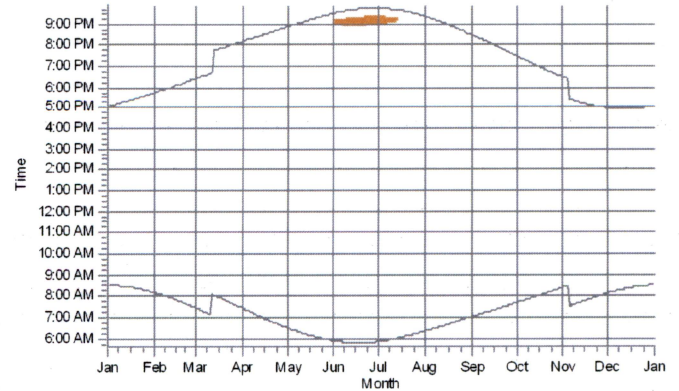
R120: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (109)



R121: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (110)



R122: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (111)



WTG:

47: GE WIND ENERGY GE 2.82-127.2820 127.0 ICI hub: 89.0 m (TOT: 152.5 m) (S94) 60: GE WIND ENERGY GE 2.82-127.2820 127.0 ICI hub: 89.0 m (TOT: 152.5 m) (S86) 39: GE WIND ENERGY GE 2.82-127.2820 127.0 ICI hub: 89.0 m (TOT: 152.5 m) (S14)

65: GE WIND ENERGY GE 2.82-127.2820 127.0 ICI hub: 89.0 m (TOT: 152.5 m) (S85) 46: GE WIND ENERGY GE 2.82-127.2820 127.0 ICI hub: 89.0 m (TOT: 152.5 m) (S91)



Project:

**Oliver IV Array 012 8/26/2023**

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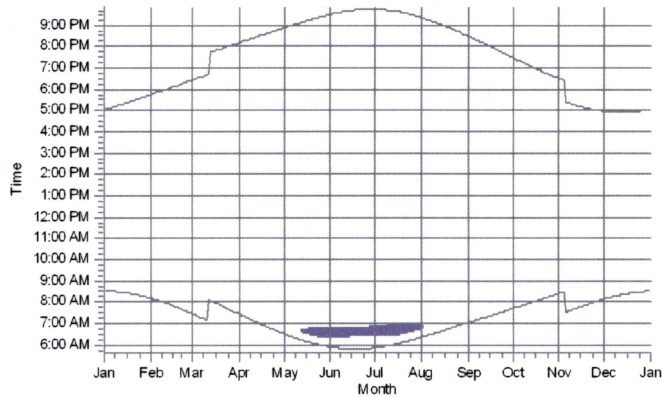
Calculated:

8/26/2023 2:11 PM/3.4.424

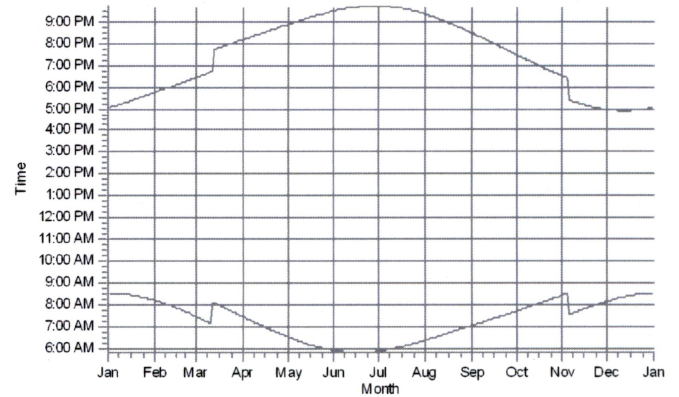
## SHADOW - Calendar, graphical

**Calculation:** Oliver IV Array 012 with 3 Alts 8/26/2023

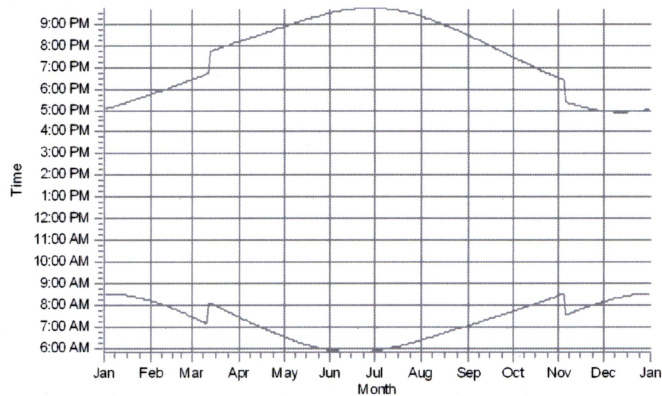
R123: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (112)



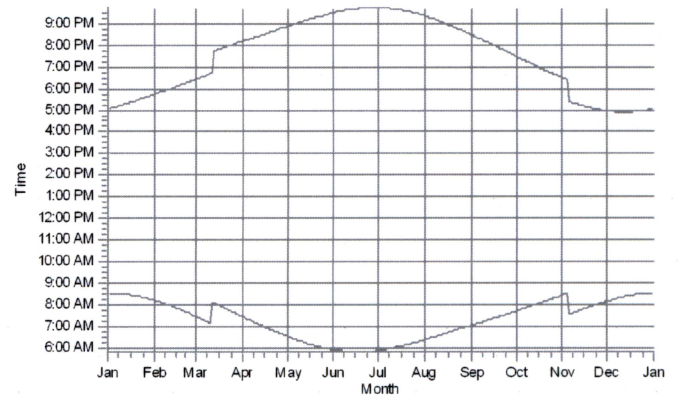
R125: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (113)



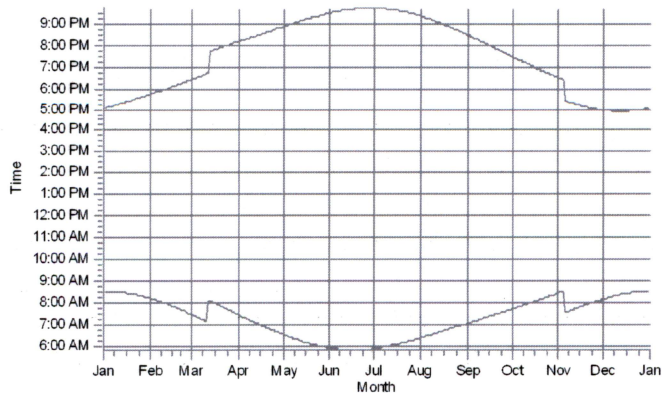
R126: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (114)



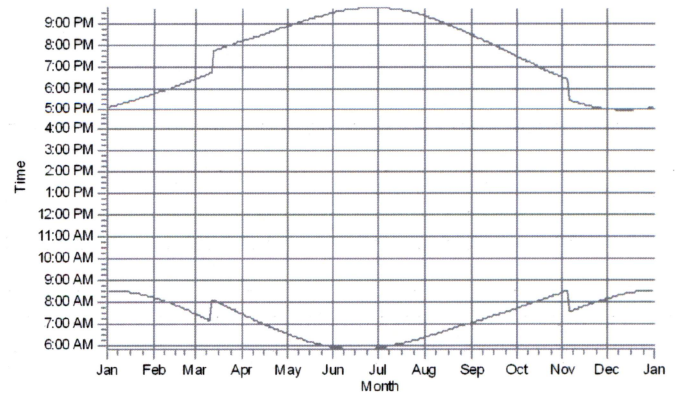
R129: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (116)



R130: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (117)



R131: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (118)



WTG:

71: GE WIND ENERGY GE 2.82-127.000 (127.0 ft) hub: 99.0 m (TOT: 152.5 m) (996)

Project:

Oliver IV Array 012 8/26/2023

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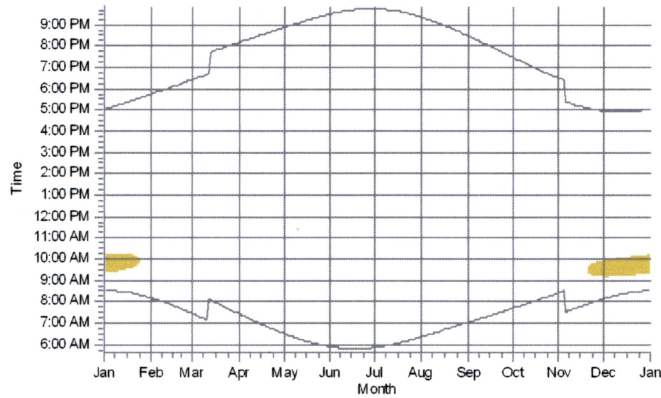
Calculated:

8/26/2023 2:11 PM/3.4.424

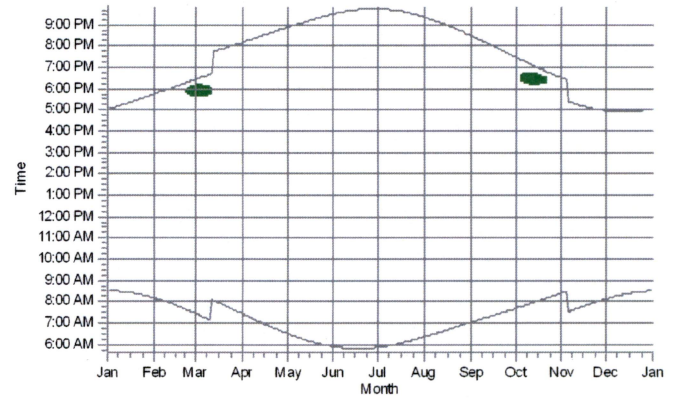
## SHADOW - Calendar, graphical

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023

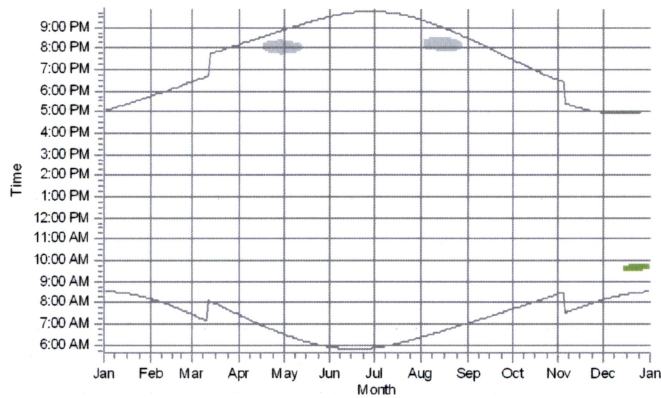
R138: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (125)



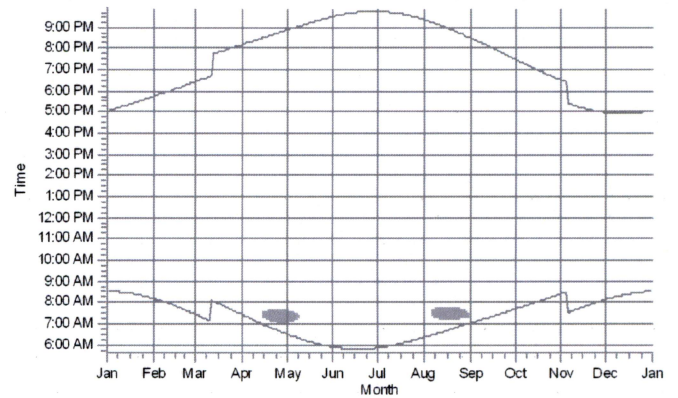
R142: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (129)



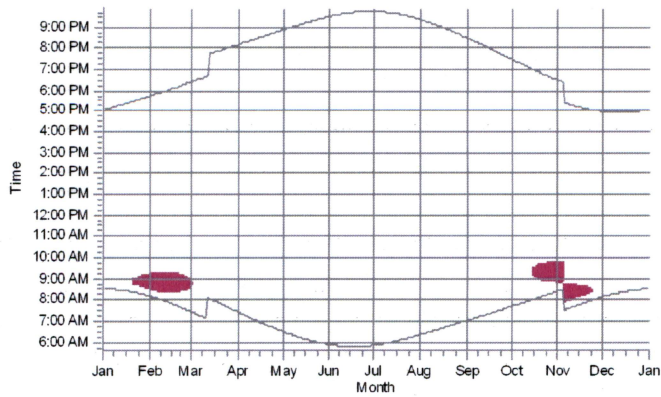
R143: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (130)



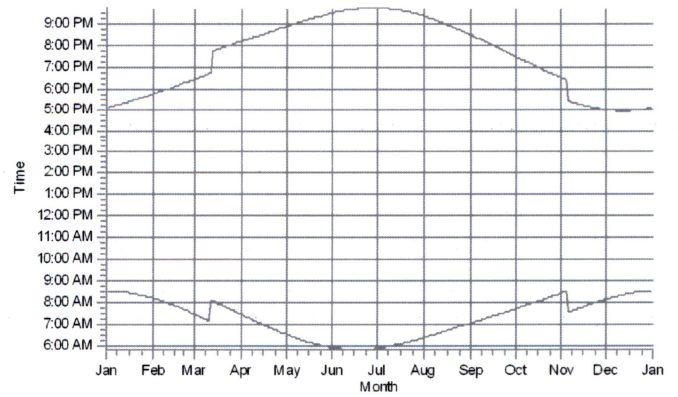
R144: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (131)



R147: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (132)



R148: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (133)



WTG:

20: GE WIND ENERGY GE 2.82-127.2820 127.0 ICI hub: 89.0 m (TOT: 152.5 m) (563)

27: GE WIND ENERGY GE 2.82-127.2820 127.0 ICI hub: 89.0 m (TOT: 152.5 m) (578)

35: GE WIND ENERGY GE 2.82-127.2820 127.0 ICI hub: 89.0 m (TOT: 152.5 m) (615)

26: GE WIND ENERGY GE 2.82-127.2820 127.0 ICI hub: 89.0 m (TOT: 152.5 m) (574)

61: GE WIND ENERGY GE 2.82-127.2820 127.0 ICI hub: 89.0 m (TOT: 152.5 m) (592)

36: GE WIND ENERGY GE 2.82-127.2820 127.0 ICI hub: 89.0 m (TOT: 152.5 m) (620)



Project:

**Oliver IV Array 012 8/26/2023**

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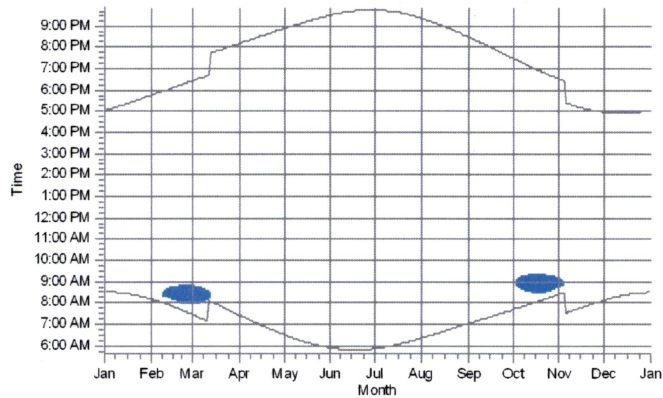
Calculated:

8/26/2023 2:11 PM/3.4.424

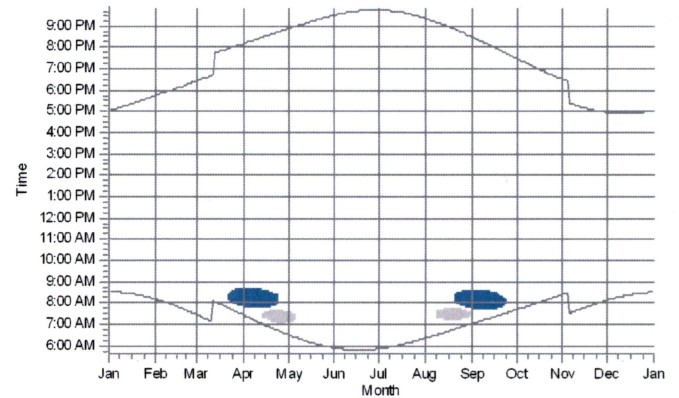
## SHADOW - Calendar, graphical

**Calculation:** Oliver IV Array 012 with 3 Alts 8/26/2023

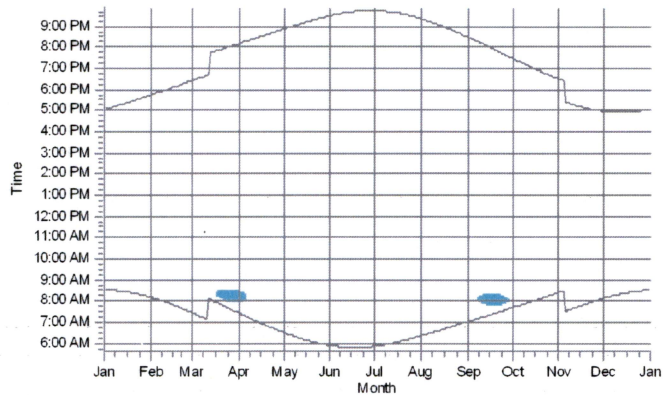
**R157: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (140)**



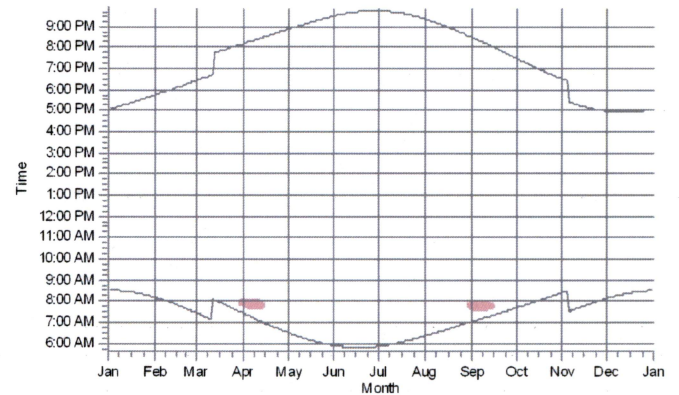
**R158: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (141)**



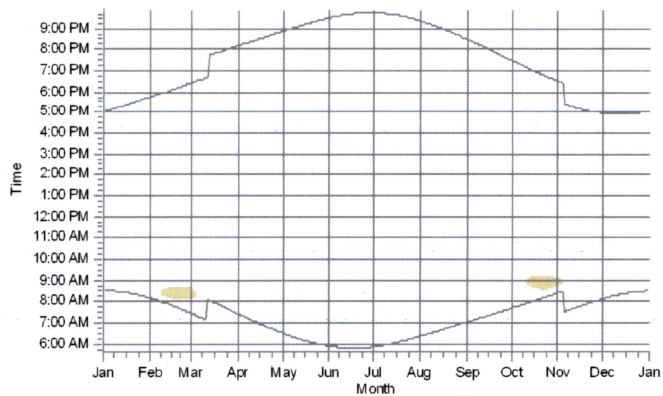
**R159: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (142)**



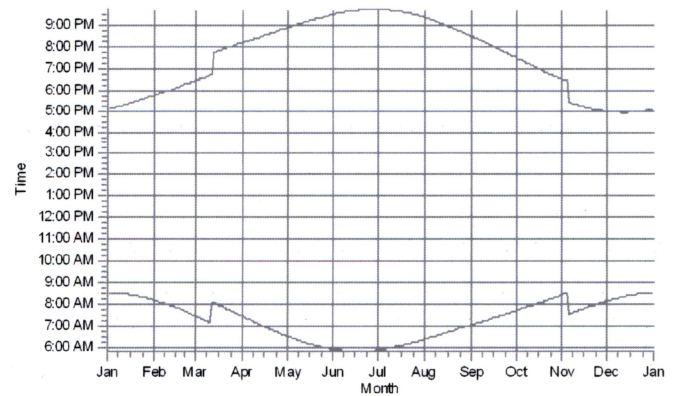
**R176: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (158)**



**R180: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (162)**



**R181: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (163)**



WTG

36 GE WIND ENERGY GE 2.82-127.2620 127.0 ICI hub: 89.0 m (TOT: 152.5 m) (S81)

46 GE WIND ENERGY GE 2.82-127.2620 127.0 ICI hub: 89.0 m (TOT: 152.5 m) (S87)

2 GE WIND ENERGY GE 2.82-127.2620 127.0 ICI hub: 89.0 m (TOT: 152.5 m) (S21)

47 GE WIND ENERGY GE 2.82-127.2620 127.0 ICI hub: 89.0 m (TOT: 152.5 m) (S94)

38 GE WIND ENERGY GE 2.82-127.2620 127.0 ICI hub: 89.0 m (TOT: 152.5 m) (S81)

6 GE WIND ENERGY GE 2.82-127.2620 127.0 ICI hub: 89.0 m (TOT: 152.5 m) (S21)

Project:

**Oliver IV Array 012 8/26/2023**

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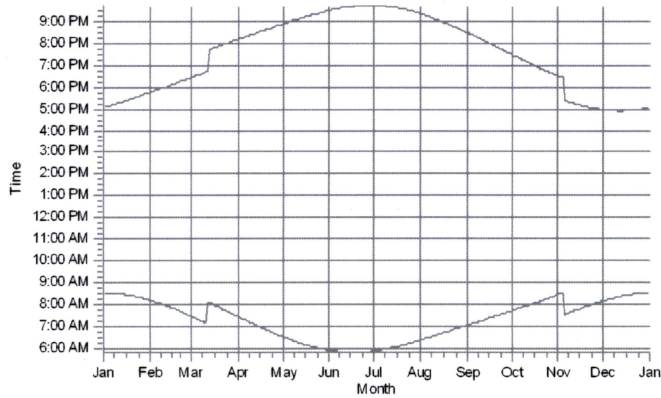
Calculated:

8/26/2023 2:11 PM/3.4.424

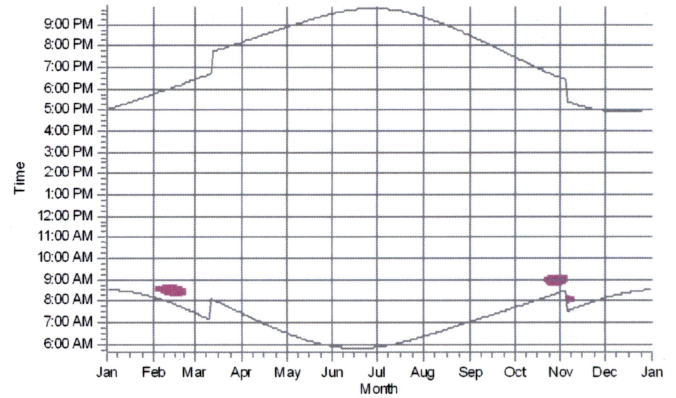
## SHADOW - Calendar, graphical

**Calculation:** Oliver IV Array 012 with 3 Alts 8/26/2023

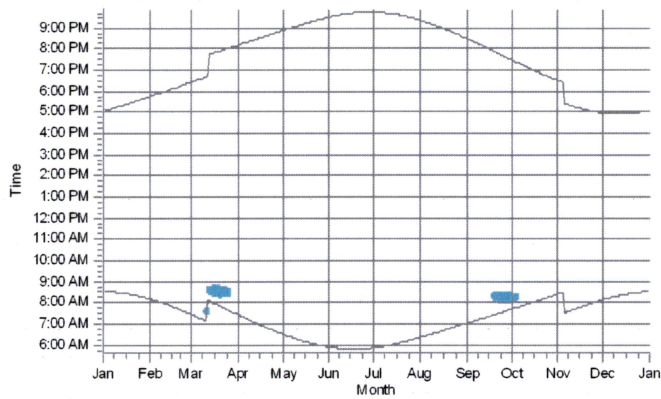
R182: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (164)



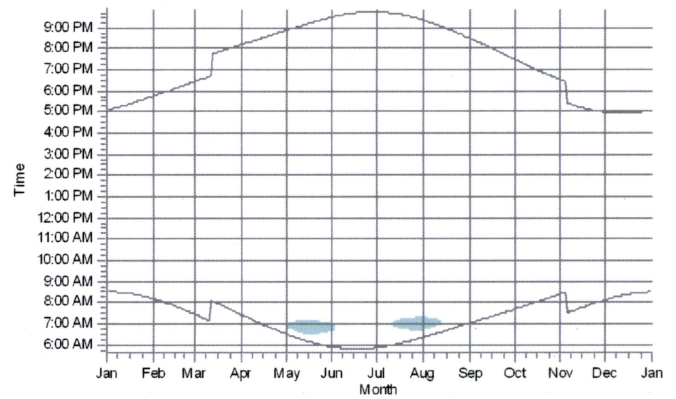
U124: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (206)



U145: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (207)



U156: Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (208)



WTG:

36: GE WIND ENERGY GE 2.82-127.2820 127.0 ICI hub: 89.0 m (TOT: 152.5 m) (S61)

72: GE WIND ENERGY GE 2.82-127.2820 127.0 ICI hub: 89.0 m (TOT: 152.5 m) (S97)

17: GE WIND ENERGY GE 2.82-127.2820 127.0 ICI hub: 89.0 m (TOT: 152.5 m) (S11)



Project:

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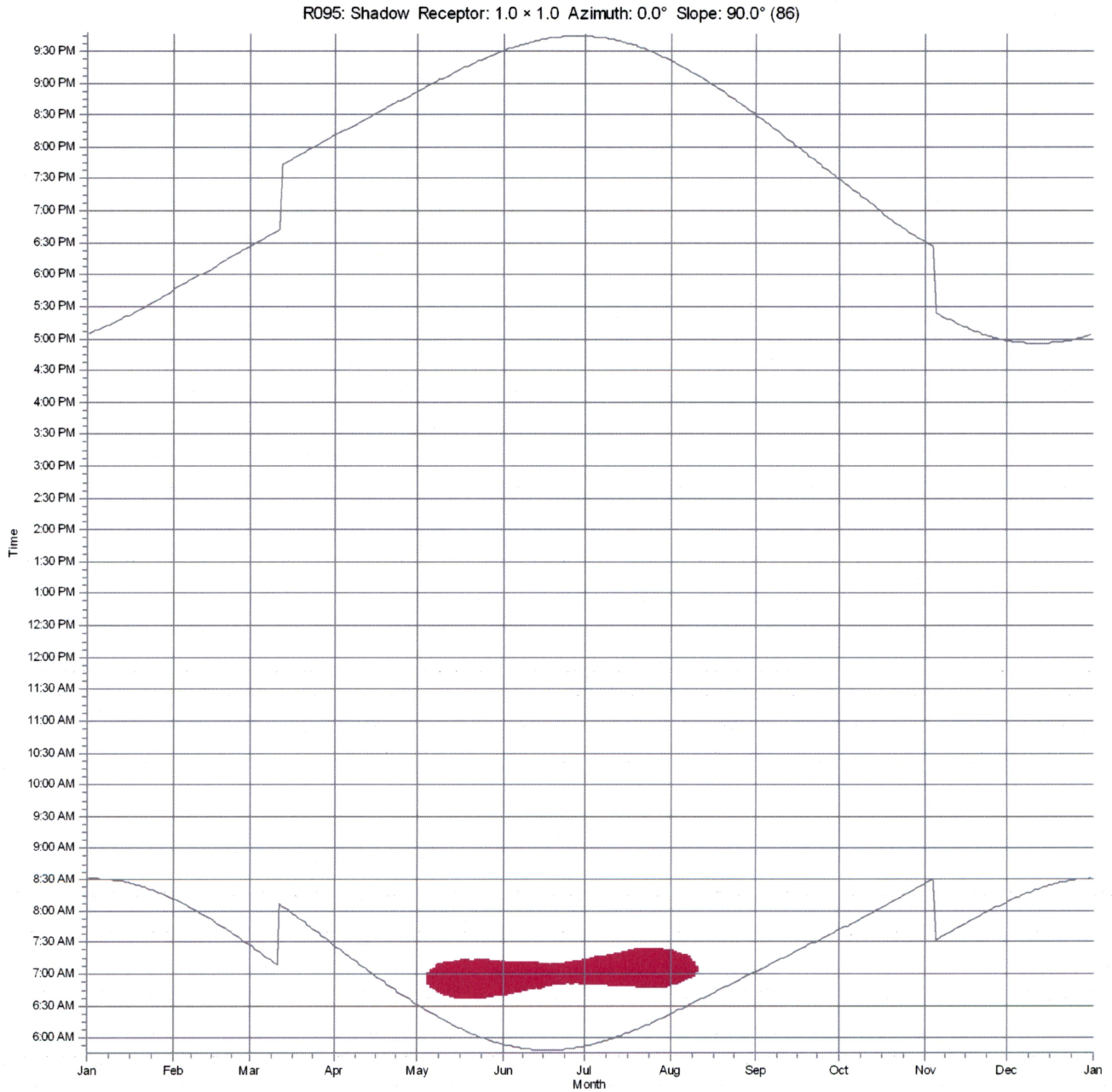
Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar, graphical

**Calculation:** Oliver IV Array 012 with 3 Alts 8/26/2023



WTG:

41: GE WIND ENERGY GE 2.82-127 2820 127.0 (1) Hub: 89.0 m (TOT: 152.5 m) (630)

Project:

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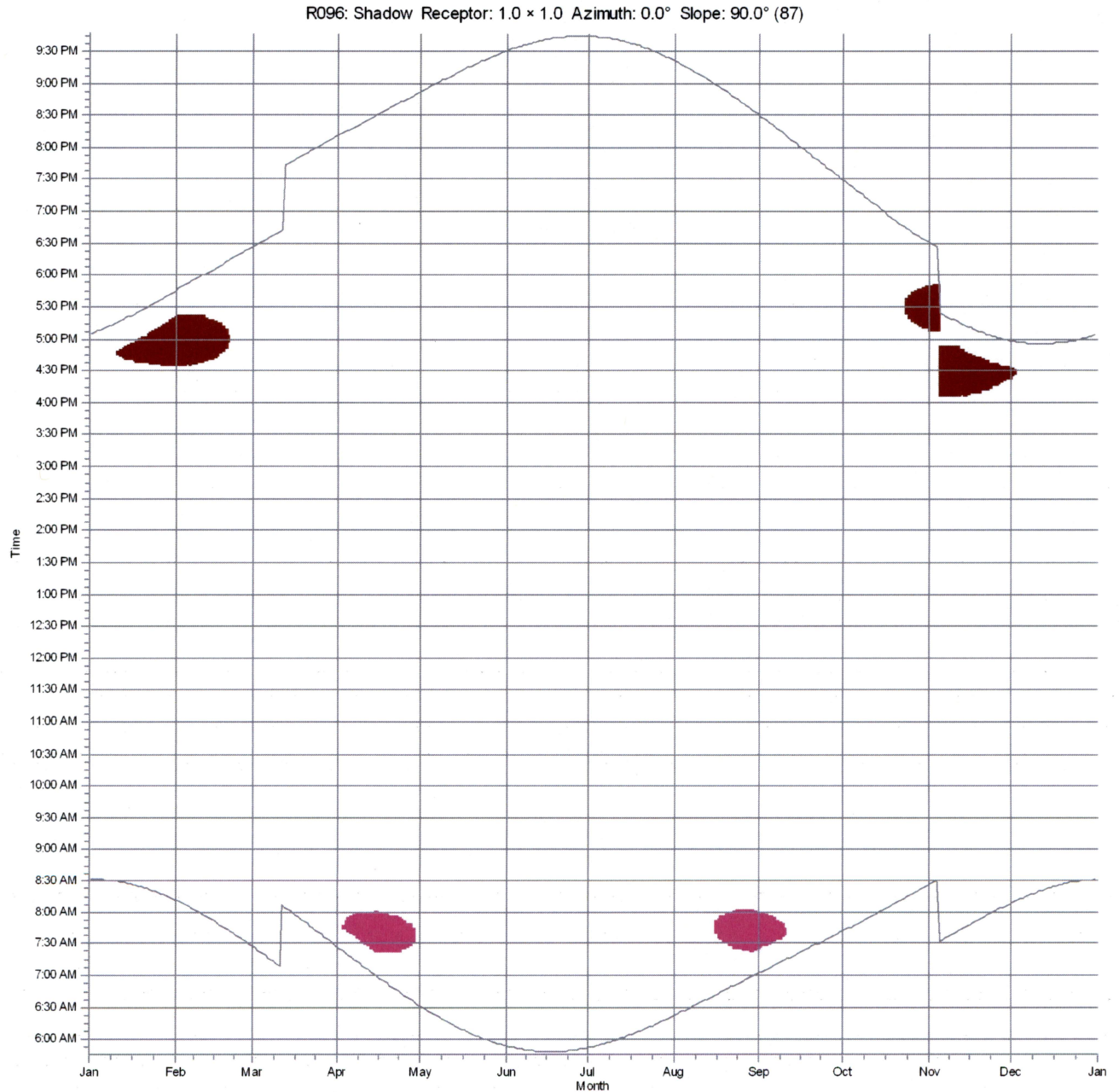
Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar, graphical

**Calculation:** Oliver IV Array 012 with 3 Alts 8/26/2023 **Shadow receptor:** R096 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (87)



WTG:

33: GE WIND ENERGY GE 2.82-127.2820 127.0 101 hub: 89.0 m (TOT: 152.5 m) (867)

26: GE WIND ENERGY GE 2.82-127.2820 127.0 101 hub: 89.0 m (TOT: 152.5 m) (570)



Project:

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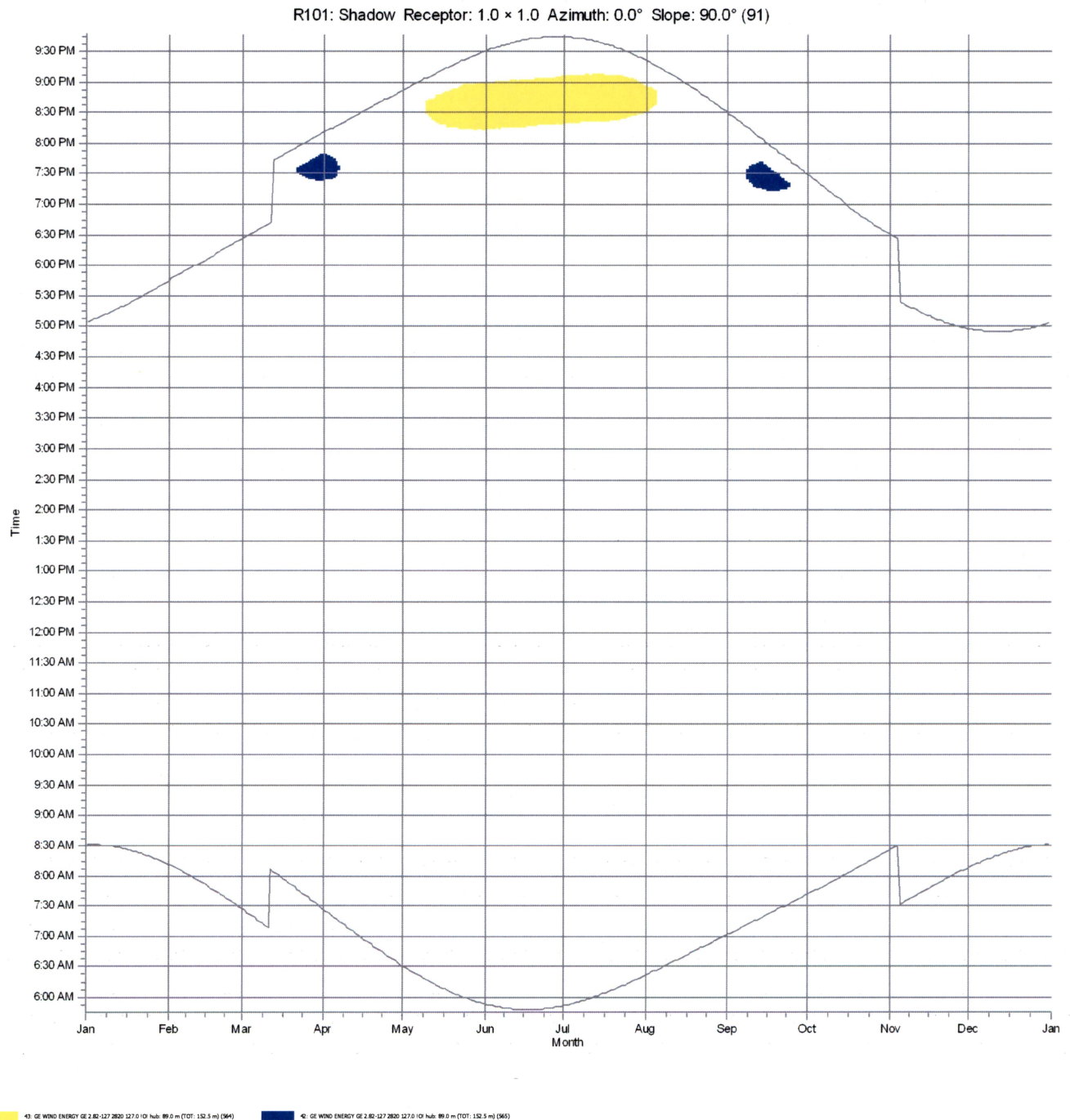
Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar, graphical

Calculation: Oliver IV Array 012 with 3 Alts 8/26/2023



Project:

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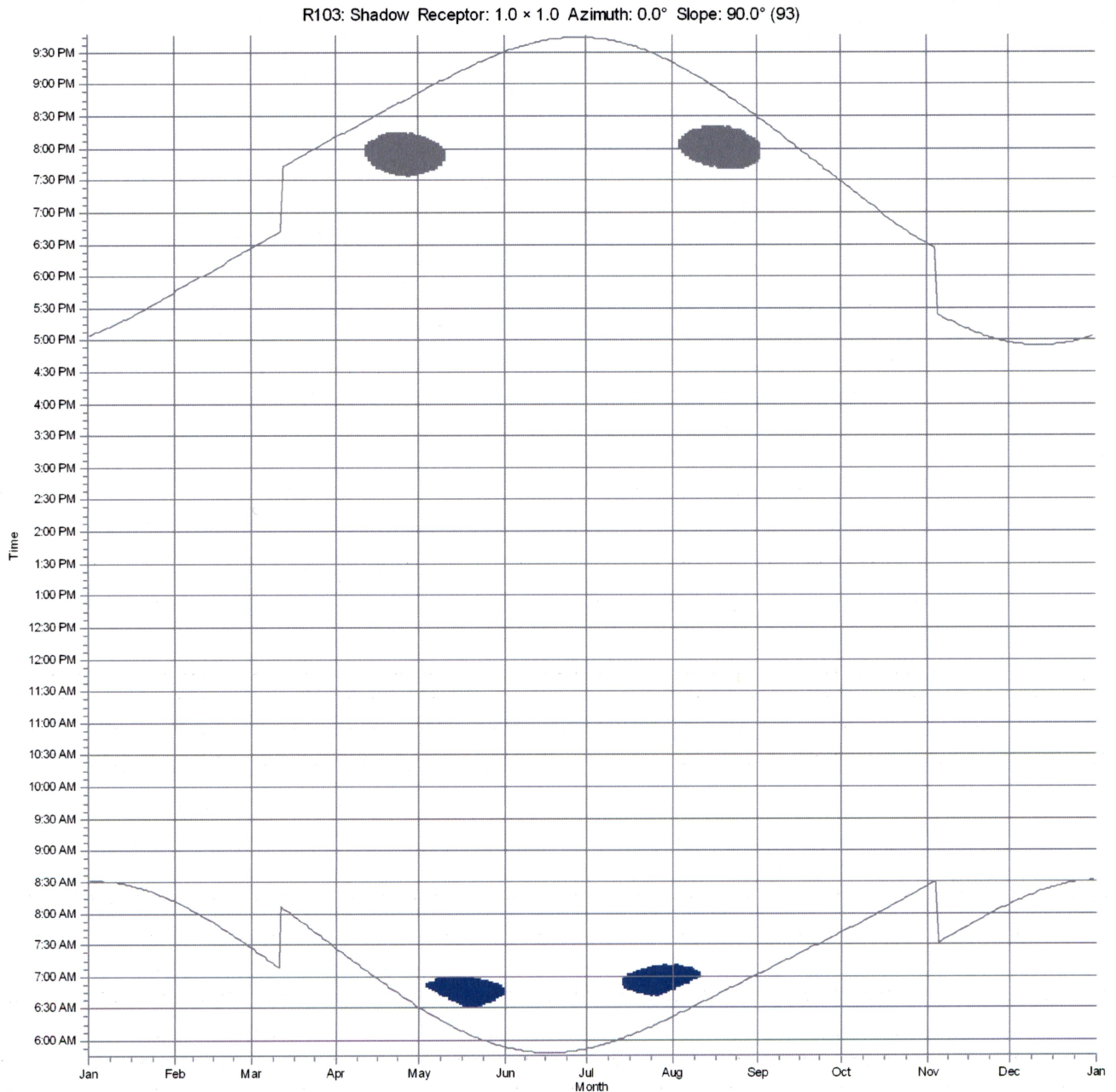
Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar, graphical

**Calculation:** Oliver IV Array 012 with 3 Alts 8/26/2023



WTG:

57: GE WIND ENERGY GE 2.82-127 2800 127.0 101 hub: 99.0 m (TOT: 152.5 m) (596)

67: GE WIND ENERGY GE 2.82-127 2800 127.0 101 hub: 99.0 m (TOT: 152.5 m) (639)



Project:

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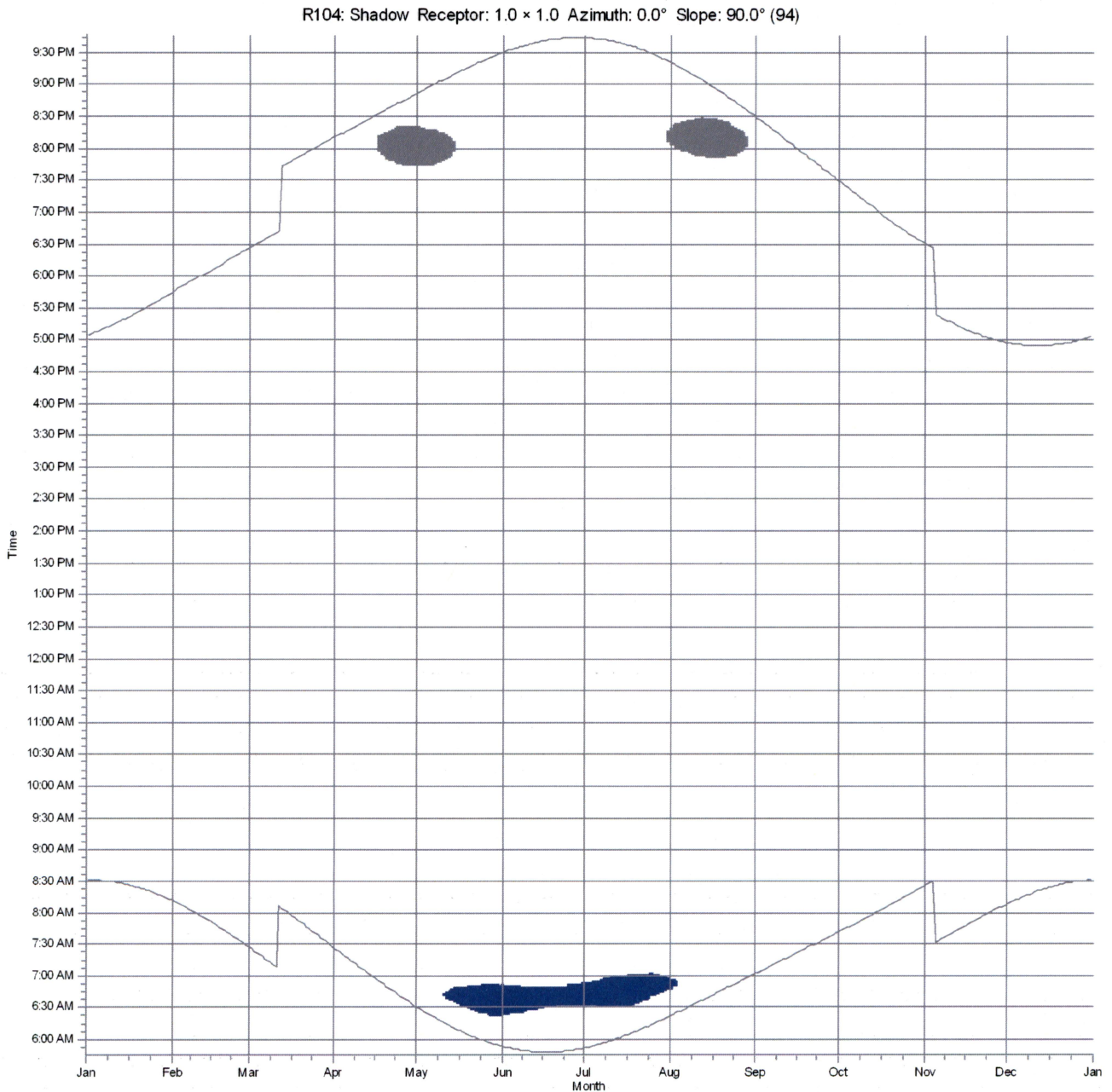
Mary Kaplan / mary.kaplan@aecom.com

Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar, graphical

**Calculation:** Oliver IV Array 012 with 3 Alts 8/26/2023 **Shadow receptor:** R104 - Shadow Receptor: 1.0 × 1.0 Azimuth: 0.0° Slope: 90.0° (94)



WTG:

57: GE WIND ENERGY GE 2.82-127.2620 127.0 (1) Hub: 89.0 m (TOT: 152.5 m) (946)

67: GE WIND ENERGY GE 2.82-127.2620 127.0 (1) Hub: 89.0 m (TOT: 152.5 m) (839)

Project:

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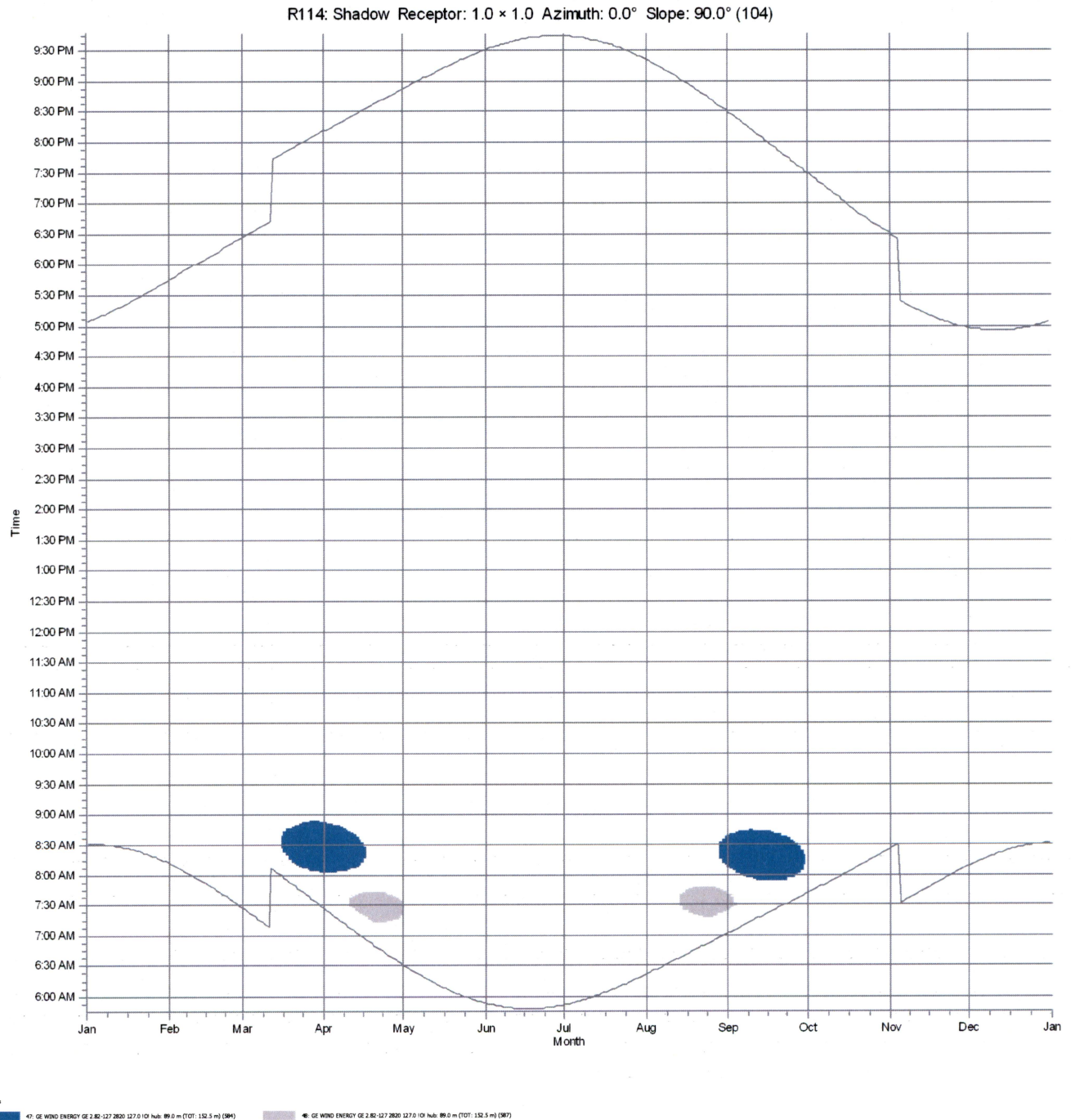
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Calculated:

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## SHADOW - Calendar, graphical

**Calculation:** Oliver IV Array 012 with 3 Alts 8/26/2023





Project:

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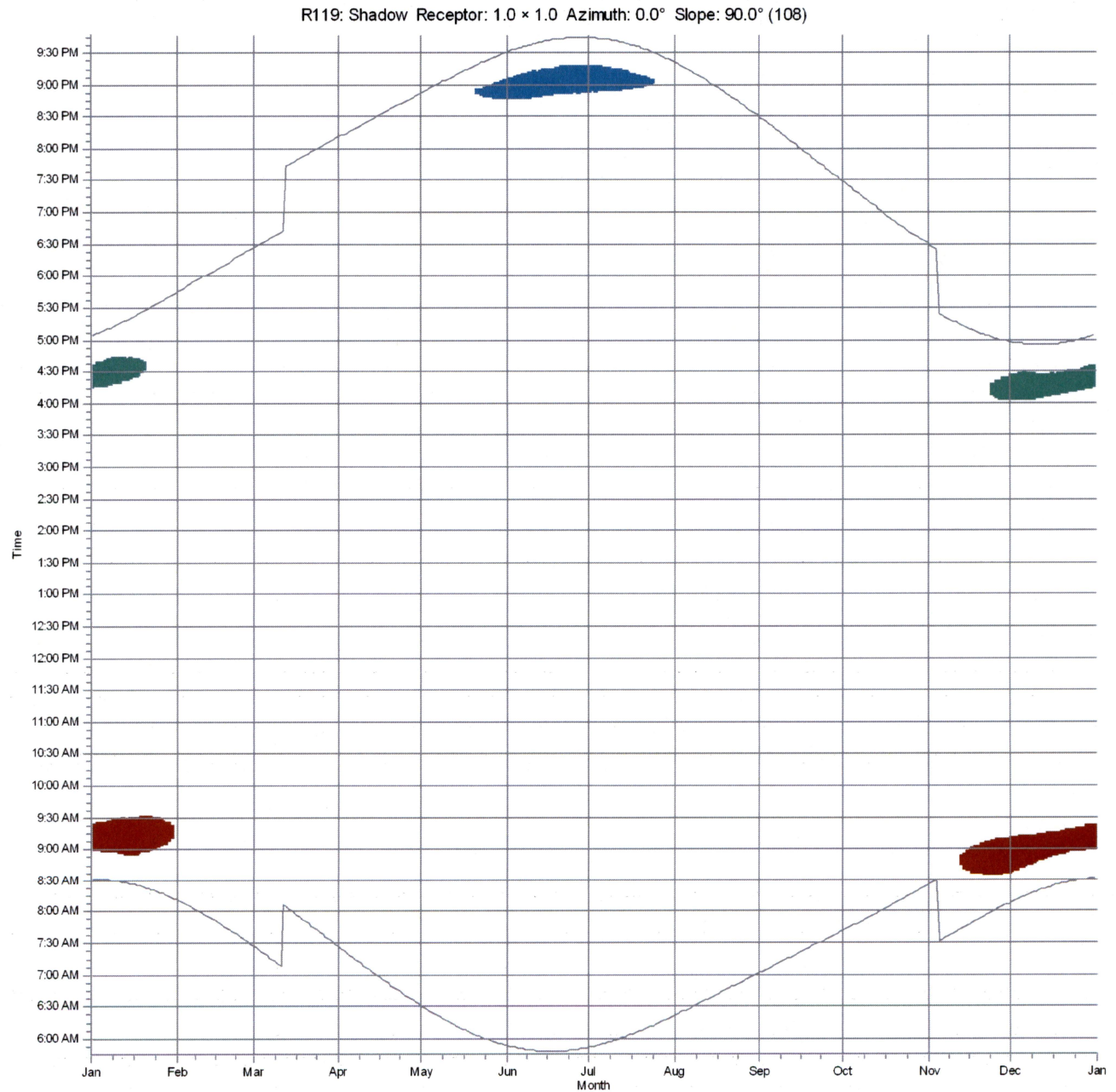
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Calculated:

8/26/2023 2:11 PM/3.4.424

## SHADOW - Calendar, graphical

**Calculation:** Oliver IV Array 012 with 3 Alts 8/26/2023



WTG:

47: GE WIND ENERGY GE 2.82-127.2620 127.0 ICI hub: 89.0 m (TOT: 152.5 m) (394)

46: GE WIND ENERGY GE 2.82-127.2620 127.0 ICI hub: 89.0 m (TOT: 152.5 m) (391)

39: GE WIND ENERGY GE 2.82-127.2620 127.0 ICI hub: 89.0 m (TOT: 152.5 m) (324)

R101

AECOM



Google Earth

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