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Our ref: 101602-01

Dear Mr Herod

**Re: Coopers Gap Wind Farm Obstacle Lighting Design**

Aviation Projects was engaged by AECOM to undertake an Obstacle Lighting Design for the proposed Coopers Gap Wind Farm.

AECOM requested Aviation Projects to document the findings of the Obstacle Lighting Design for further consultation with the Civil Aviation Safety Authority (CASA) to determine the final number of obstacle lights required on the wind turbines.

References:

- AECOM, STG2 Topo.pdf, elevation data for Wind Turbines over topographic contours;
- AECOM, ElevDataBasedOn25DEM, elevation data excel;
- AECOM, CoopersGapProposedTurbines123.kmz, location of wind turbines in Google Earth;
- AECOM, STG2\_TurbineLayout\_Aviation.pdf,
- Civil Aviation Safety Authority, *Manual of Standards Part 139 – Aerodromes*, version 1.14: dated January 2017, section 9.4.3.4A

*(c) obstacle lights must be provided on a sufficient number of individual wind turbines to indicate the general definition and extent of the wind farm, with intervals between lit turbines not exceeding 900 m.*

Aviation projects assessed each wind turbine to determine if MOS 139 requires the turbine to be lit and recommends 65 lit turbines. The Coopers Gap Wind Farm study area and turbine layout are shown in Figure 1 (Source, AECOM). This figure defines the wind farm corridors and those wind turbines at the edge that are required to be lit to indicate the general wind farm extent to comply with MOS 139 lighting requirements.

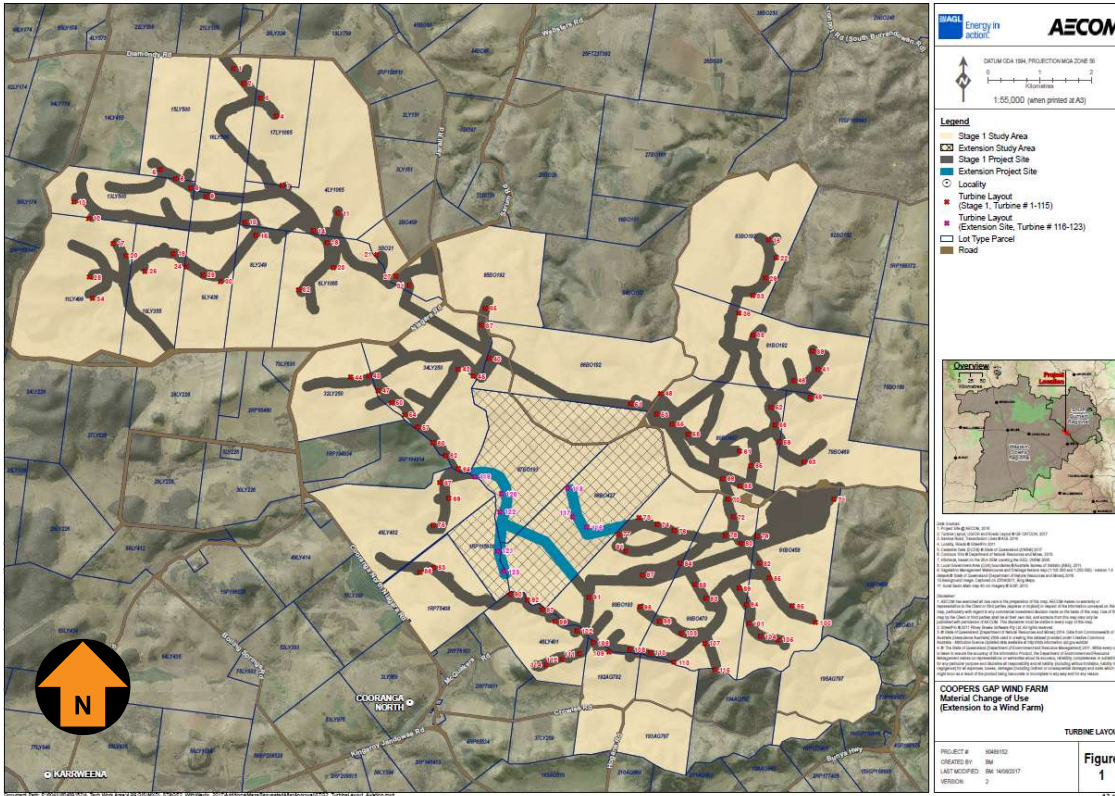


Figure 1 Turbine Layout

The analysis of the elevation data provided by AECOM of the Coopers Gap Wind Farm area was considered to ensure wind turbines located at the highest terrain were also lit. Figure 2 provides the Coopers Gap Wind Farm topography and locates WTG101, WTG104 and WTG105 on the highest elevation ranging from 807 m to 822 m Australian Height Datum (AHD), which requires obstacle lighting.

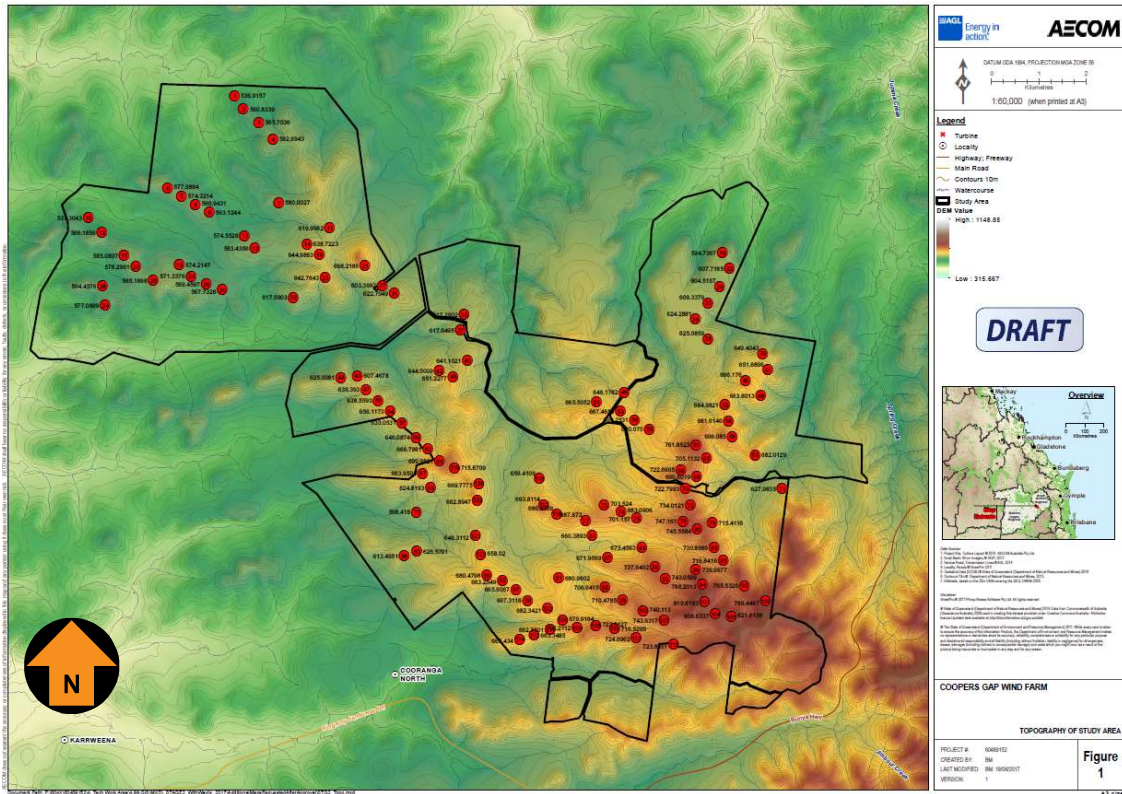


Figure 2 Coopers Gap Wind Farm topography

The Cooper Gap Wind Farm Obstacle Lighting Design in Figure 3 (Source, AECOM, Google Earth). The colours of the wind turbines relate to Stage 1 and Stage 2 of the wind farm development as follows:

- Stage 1 wind turbines are orange or red (if lit); and
- Stage 2 wind turbines are grey or red (if lit).

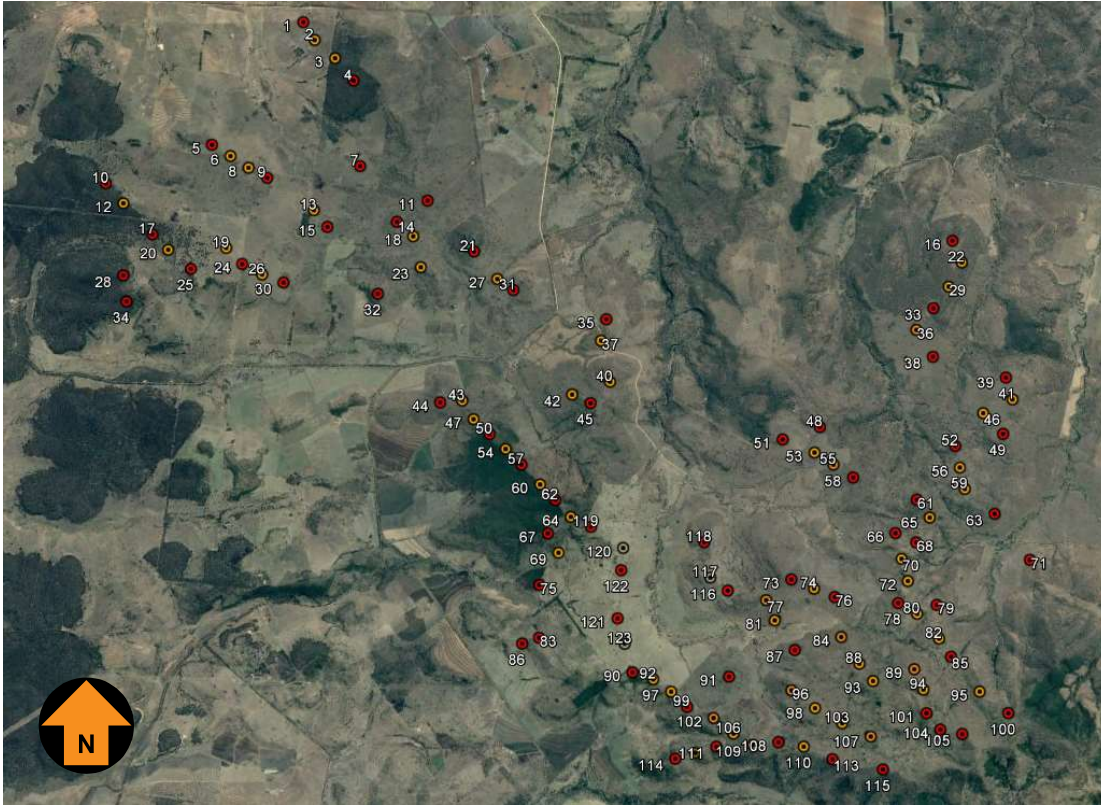


Figure 3 Coopers Gap Wind Farm Obstacle Lighting Design

The findings of the Obstacle Lighting Design for each wind turbine are outlined in Table 1.

Table 1 Coopers Gap Wind Farm Obstacle Lighting Design findings.

| WTG | Stage   | Elevation (m AHD) | Obstacle Lighting required | Findings   |
|-----|---------|-------------------|----------------------------|--|
| 1   | Stage 1 | 537               | Yes                        | WTG1 is on the perimeter edge and should be lit. |
| 2   | Stage 1 | 561               | No                         | Within 900 m from lit WTG1.                      |
| 3   | Stage 1 | 566               | No                         | Within 900 m from lit WTG1 and lit WTG4.         |
| 4   | Stage 1 | 583               | Yes                        | WTG4 is on the perimeter edge and should be lit. |
| 5   | Stage 1 | 578               | Yes                        | WTG5 is on the perimeter edge and should be lit. |
| 6   | Stage 1 | 574               | No                         | Within 900 m from lit WTG5.                      |
| 7   | Stage 1 | 580               | Yes                        | WTG7 is more than 900 m from other WTGs.         |
| 8   | Stage 1 | 581               | No                         | Within 900 m from lit WTG5 and lit WTG9.         |

| <i>WTG</i> | <i>Stage</i> | <i>Elevation<br/>(m AHD)</i> | <i>Obstacle Lighting<br/>required</i> | <i>Findings</i>                                   |
|------------|--------------|------------------------------|---------------------------------------|---|
| 9          | Stage 1      | 563                          | Yes                                   | WTG9 is approximately 900 m from WTG13            |
| 10         | Stage 1      | 537                          | Yes                                   | WTG10 is on the perimeter edge and should be lit. |
| 11         | Stage 1      | 620                          | Yes                                   | WTG11 is on the perimeter edge and should be lit. |
| 12         | Stage 1      | 566                          | No                                    | Within 900 m from lit WTG10.                      |
| 13         | Stage 1      | 575                          | No                                    | Within 900 m from lit WTG15.                      |
| 14         | Stage 1      | 639                          | Yes                                   | WTG14 is on the perimeter edge and should be lit. |
| 15         | Stage 1      | 583                          | Yes                                   | WTG7 is more than 900 m from closest lit WTG30.   |
| 16         | Stage 1      | 595                          | Yes                                   | WTG16 is on the perimeter edge and should be lit. |
| 17         | Stage 1      | 585                          | Yes                                   | WTG17 is on the perimeter edge and should be lit. |
| 18         | Stage 1      | 645                          | No                                    | Within 900 m from lit WTG14.                      |
| 19         | Stage 1      | 574                          | No                                    | Within 900 m from lit WTG24.                      |
| 20         | Stage 1      | 578                          | No                                    | Within 900 m from lit WTG17.                      |
| 21         | Stage 1      | 668                          | Yes                                   | WTG21 is on the perimeter edge and should be lit. |
| 22         | Stage 1      | 608                          | No                                    | Within 900 m from lit WTG16.                      |
| 23         | Stage 1      | 643                          | No                                    | Within 900 m from lit WTG14                       |
| 24         | Stage 1      | 571                          | Yes                                   | WTG24 is more than 900 m from closest lit WTG25.  |
| 25         | Stage 1      | 585                          | Yes                                   | WTG25 is on the perimeter edge and should be lit. |
| 26         | Stage 1      | 569                          | No                                    | Within 900 m from lit WTG30 and lit WTG24.        |
| 27         | Stage 1      | 603                          | No                                    | Within 900 m from lit WTG31                       |
| 28         | Stage 1      | 564                          | Yes                                   | WTG28 is on the perimeter edge and should be lit. |
| 29         | Stage 1      | 605                          | No                                    | Within 900 m from lit WTG16 and lit WTG33.        |
| 30         | Stage 1      | 568                          | Yes                                   | WTG30 is on the perimeter edge and should be lit. |
| 31         | Stage 1      | 623                          | Yes                                   | WTG31 is on the perimeter edge and should be lit. |
| 32         | Stage 1      | 618                          | Yes                                   | WTG32 is on the perimeter edge and should be lit. |
| 33         | Stage 1      | 609                          | Yes                                   | WTG33 is more than 900 from closest lit WTG38.    |
| 34         | Stage 1      | 577                          | Yes                                   | WTG34 is on the perimeter edge and should be lit. |
| 35         | Stage 1      | 617                          | Yes                                   | WTG35 is on the perimeter edge and should be lit. |
| 36         | Stage 1      | 624                          | No                                    | Within 900 m from lit WTG38.                      |
| 37         | Stage 1      | 618                          | No                                    | Within 900 m from lit WTG35.                      |

| <i>WTG</i> | <i>Stage</i> | <i>Elevation<br/>(m AHD)</i> | <i>Obstacle Lighting<br/>required</i> | <i>Findings</i>                                   |
|------------|--------------|------------------------------|---------------------------------------|---|
| 38         | Stage 1      | 625                          | Yes                                   | WTG38 is on the perimeter edge and should be lit. |
| 39         | Stage 1      | 649                          | Yes                                   | WTG39 is on the perimeter edge and should be lit. |
| 40         | Stage 1      | 641                          | No                                    | Within 900 m from lit WTG45.                      |
| 41         | Stage 1      | 652                          | No                                    | Within 900 m from lit WTG39.                      |
| 42         | Stage 1      | 645                          | No                                    | Within 900 m from lit WTG45.                      |
| 43         | Stage 1      | 607                          | No                                    | Within 900 m from WTG44.                          |
| 44         | Stage 1      | 625                          | Yes                                   | WTG44 is on the perimeter edge and should be lit. |
| 45         | Stage 1      | 651                          | Yes                                   | WTG45 is more than 900 from closest lit WTG57.    |
| 46         | Stage 1      | 666                          | No                                    | Within 900 m from lit WTG49.                      |
| 47         | Stage 1      | 639                          | No                                    | Within 900 m from lit WTG50.                      |
| 48         | Stage 1      | 646                          | Yes                                   | WTG48 is on the perimeter edge and should be lit. |
| 49         | Stage 1      | 664                          | Yes                                   | WTG49 is on the perimeter edge and should be lit. |
| 50         | Stage 1      | 639                          | Yes                                   | WTG50 more than 900 m from closest lit WTG57.     |
| 51         | Stage 1      | 666                          | Yes                                   | WTG51 is on the perimeter edge and should be lit. |
| 52         | Stage 1      | 685                          | Yes                                   | WTG52 more than 900 m from closest lit WTG49.     |
| 53         | Stage 1      | 667                          | No                                    | Within 900 m from lit WTG51.                      |
| 54         | Stage 1      | 656                          | No                                    | Within 900 m from lit WTG50.                      |
| 55         | Stage 1      | 669                          | No                                    | Within 900 m from lit WTG58.                      |
| 56         | Stage 1      | 682                          | No                                    | Within 900 m from WTG52.                          |
| 57         | Stage 1      | 633                          | Yes                                   | WTG57 more than 900 m from closest lit WTG50.     |
| 58         | Stage 1      | 680                          | Yes                                   | WTG58 more than 900 m from closest lit WTG48.     |
| 59         | Stage 1      | 696                          | No                                    | Within 900 m from lit WTG63.                      |
| 60         | Stage 1      | 646                          | No                                    | Within 900 m from lit WTG57.                      |
| 61         | Stage 1      | 762                          | Yes                                   | WTG49 is at end of a corridor and should be lit.  |
| 62         | Stage 1      | 669                          | Yes                                   | WTG62 is lit to enable WTG60 not lit in corridor. |
| 63         | Stage 1      | 682                          | Yes                                   | WTG63 is on the perimeter edge and should be lit. |
| 64         | Stage 1      | 700                          | No                                    | Within 900 m from lit WTG62.                      |
| 65         | Stage 1      | 705                          | No                                    | Within 900 m from lit WTG61.                      |
| 66         | Stage 1      | 723                          | Yes                                   | WTG66 is at end of a corridor and should be lit.  |

| <i>WTG</i> | <i>Stage</i> | <i>Elevation<br/>(m AHD)</i> | <i>Obstacle Lighting<br/>required</i> | <i>Findings</i>                                   |
|------------|--------------|------------------------------|---------------------------------------|---|
| 67         | Stage 1      | 684                          | Yes                                   | WTG67 is on the perimeter edge and should be lit. |
| 68         | Stage 1      | 691                          | Yes                                   | WTG68 is on the perimeter edge and should be lit. |
| 69         | Stage 1      | 625                          | No                                    | Within 900 m from lit WTG119.                     |
| 70         | Stage 1      | 723                          | No                                    | Within 900 m from lit WTG68.                      |
| 71         | Stage 1      | 628                          | Yes                                   | WTG71 is on the perimeter edge and should be lit. |
| 72         | Stage 1      | 734                          | No                                    | Within 900 m from lit WTG78.                      |
| 73         | Stage 1      | 704                          | Yes                                   | WTG73 is at end of a corridor and should be lit.  |
| 74         | Stage 1      | 683                          | No                                    | Within 900 m from lit WTG76.                      |
| 75         | Stage 1      | 598                          | Yes                                   | WTG75 is on the perimeter edge and should be lit. |
| 76         | Stage 1      | 701                          | Yes                                   | WTG52 more than 900 m from closest lit WTG76.     |
| 77         | Stage 1      | 688                          | No                                    | Within 900 m from lit WTG73.                      |
| 78         | Stage 1      | 747                          | Yes                                   | WTG78 is lit to enable WTG80 not lit in corridor. |
| 79         | Stage 1      | 715                          | Yes                                   | WTG78 is on the perimeter edge and should be lit. |
| 80         | Stage 1      | 745                          | No                                    | Within 900 m from lit WTG78.                      |
| 81         | Stage 1      | 660                          | No                                    | Within 900 m from lit WTG87.                      |
| 82         | Stage 1      | 731                          | No                                    | Within 900 m from lit WTG85.                      |
| 83         | Stage 1      | 627                          | Yes                                   | WTG83 is on the perimeter edge and should be lit. |
| 84         | Stage 1      | 673                          | No                                    | Within 900 m from WTG76.                          |
| 85         | Stage 1      | 717                          | Yes                                   | WTG85 is lit to enable WTG82 not lit in corridor. |
| 86         | Stage 1      | 614                          | Yes                                   | WTG86 is on the perimeter edge and should be lit. |
| 87         | Stage 1      | 672                          | Yes                                   | WTG87 is more than 900 from closest lit WTG73.    |
| 88         | Stage 1      | 738                          | No                                    | Internal to overall layout.                       |
| 89         | Stage 1      | 740                          | No                                    | Internal to overall layout                        |
| 90         | Stage 1      | 680                          | Yes                                   | WTG90 is on the perimeter edge and should be lit. |
| 91         | Stage 1      | 681                          | Yes                                   | WTG87 is more than 900 from closest lit WTG99.    |
| 92         | Stage 1      | 663                          | No                                    | Within 900 m from WTG90.                          |
| 93         | Stage 1      | 743                          | No                                    | Internal to overall layout.                       |
| 94         | Stage 1      | 788                          | No                                    | Internal to overall layout.                       |
| 95         | Stage 1      | 766                          | No                                    | Within 900 m from lit WTG100.                     |

| <i>WTG</i> | <i>Stage</i> | <i>Elevation<br/>(m AHD)</i> | <i>Obstacle Lighting<br/>required</i> | <i>Findings</i>   |
|------------|--------------|------------------------------|---------------------------------------|---|
| 96         | Stage 1      | 707                          | No                                    | Internal to overall layout.   |
| 97         | Stage 1      | 666                          | No                                    | Within 900 m from lit WTG99.  |
| 98         | Stage 1      | 710                          | No                                    | Internal to overall layout.   |
| 99         | Stage 1      | 667                          | Yes                                   | WTG99 is lit to enable WTG102 not lit in corridor.                                    |
| 100        | Stage 1      | 789                          | Yes                                   | WTG100 is on the perimeter edge and should be lit.                                    |
| 101        | Stage 1      | 820                          | Yes                                   | WTG104 is located on high terrain and should be lit.                                  |
| 102        | Stage 1      | 682                          | No                                    | Within 900 m from lit WTG99.  |
| 103        | Stage 1      | 740                          | No                                    | Internal to overall layout.   |
| 104        | Stage 1      | 807                          | Yes                                   | WTG104 is located on high terrain and should be lit.                                  |
| 105        | Stage 1      | 822                          | Yes                                   | WTG105 is located on the highest terrain and on the perimeter edge and should be lit. |
| 106        | Stage 1      | 680                          | No                                    | Internal to overall layout.   |
| 107        | Stage 1      | 744                          | No                                    | Within 900 m from lit WTG115.   |
| 108        | Stage 1      | 722                          | Yes                                   | WTG108 is lit to enable WTG109 not lit in corridor.                                   |
| 109        | Stage 1      | 702                          | No                                    | Within 900 m from lit WTG108.   |
| 110        | Stage 1      | 717                          | No                                    | Within 900 m from lit WTG113.   |
| 111        | Stage 1      | 663                          | Yes                                   | WTG111 is lit to enable WTG112 not lit in corridor.                                   |
| 112        | Stage 1      | 663                          | No                                    | Within 900 m from lit WTG111.   |
| 113        | Stage 1      | 725                          | Yes                                   | WTG113 is on the perimeter edge and should be lit.                                    |
| 114        | Stage 1      | 665                          | Yes                                   | WTG114 is on the perimeter edge and should be lit.                                    |
| 115        | Stage 1      | 724                          | Yes                                   | WTG115 is on the perimeter edge and should be lit.                                    |
| 116        | Stage 2      | 687                          | Yes                                   | WTG116 is lit to enable WTG117 not lit in corridor.                                   |
| 117        | Stage 2      | 694                          | No                                    | Within 900 m from lit WTG116.   |
| 118        | Stage 2      | 656                          | Yes                                   | WTG118 is on the perimeter edge and should be lit.                                    |
| 119        | Stage 2      | 716                          | Yes                                   | WTG119 lit to enable WTG64 not lit in corridor.                                       |
| 120        | Stage 2      | 670                          | No                                    | Within 900 m from lit WTG122.   |
| 121        | Stage 2      | 646                          | Yes                                   | WTG121 is more than 900 from closest lit WT122.                                       |
| 122        | Stage 2      | 663                          | Yes                                   | WTG122 is more than 900 from closest lit WT121.                                       |
| 123        | Stage 2      | 658                          | No                                    | Within 900 m from lit WTG121.   |



**Recommendation**

A total of 65 Wind Turbines are recommended for obstacle lighting.

If you wish to clarify or discuss of the contents of this correspondence, please contact me on 0417 631 681.

Kind regards



Keith Tonkin

Managing Director

23 June 2017