

## Conjunction Assessment and Orbital Lifetime Analysis

AST&Science has performed an updated conjunction assessment as well as an expected orbital lifetime representative of the updated orbital characteristics. In summary, no significant changes or deviations are demonstrated from the initial filing.

The conjunction assessment assumes a near-zero eccentricity and 53-degree inclination in addition to the altitude representative of the updated 513 km altitude. If a conjunction event exceeds the probability threshold of  $P_c \geq 10^{-4}$ , the satellite's electric propulsion system will be capable of providing an altitude changing maneuver in order to mitigate the conjunction event. The altitude will be increased or decreased by 100 m then returned to its operational altitude prior to the conjunction mitigation. This maneuver can be performed in a matter of hours and meets the requirement to react to a high-risk conjunction within 24 hours. CARA analysis codes indicate that screened conjunctions for BW3 among currently cataloged satellites will occur at a rate of about 26 unique-events per week (cataloged satellites penetrating BlueWalker 3's box-shaped screening volume with RIC (Radial In-track Cross-track) dimensions of  $2 \times 44 \times 51$  km). The predicted rate of screened conjunctions matches that experienced by the currently-orbiting ICESat-2 satellite (SCN 43613). BlueWalker 3's rate of red-level events with a last-update  $P_c \geq 10^{-4}$  will occur at a rate of approximately 0.45 per year (i.e., about one red-level event every two years among currently cataloged satellites), which is lower than that estimated for ICESat-2 by 6%, a difference due to the different hard-body radii of the two satellites. NASA and ESA satellites in LEO typically perform an average of two collision avoidance maneuvers per year, more than a factor of four larger than the expected red-level events for BlueWalker 3.

The propellant budget maintains a very conservative reserve of three collision avoidance maneuvers per year in addition to 10% margin on the total budget. The rate of events from the conjunction assessment does not impact the BlueWalker 3 mission, nor does it warrant any changes to the planned operations of the satellite.

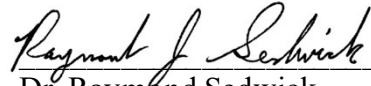
The final effect of the updated altitude is on the satellite dwell, where dwell includes mission operations, deorbit, and re-entry. In order to achieve the BlueWalker 3 mission lifetime, periodic orbit maintenance of the spacecraft will be performed, using the propulsion system. The electric propulsion system maintains sufficient propellant to perform a deorbiting maneuver at the end of life of the satellite. Even in the unlikely event of a thruster failure, the expected dwell is 32-38 months depending upon the levels of solar activity. This maximum expected dwell is

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still significantly below the 25-year requirement. The updated altitude will have no impact on the BlueWalker 3 mission as it relates to the orbital dwell of the satellite.

CERTIFICATION OF PERSON RESPONSIBLE FOR PREPARING  
ENGINEERING INFORMATION

I hereby certify that I am the technically qualified person responsible for preparation of the engineering information contained in this application, that I am familiar with Part 25 of the Commission's rules, that I either prepared or reviewed the engineering information submitted in this application, and that it is complete and accurate to the best of my knowledge and belief.



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July 29, 2022