

SkyFall Frequently Asked Questions (FAQ)

Through 9/30/26:

- What is the expected flight altitude of helicopters?

The expected flight altitude of helicopter flights is between 5 and 20 m above the surface.

- Does the GPR operate during flight, or will it operate while landed?

The GPR operates during flights, it does not operate when landed.

- Does the landing site constraint of < -3 km MOLA elevation for EDL apply only to the landing ellipse, or also to terrain within the surrounding exploration zone?

The constraint applies only to the landing ellipse, although helicopters must always conduct surface operations in locations with air density $\geq 0.015 \text{ kg/m}^3$.

- Is there a maximum elevation for helicopter flight operations, including the sol-to-sol landings and takeoffs during a traverse?

Modeled air densities at the design reference site (-3900 m MOLA elevation) support flights at altitudes of at least 1 km above ground level. Other locations on Mars will need to be evaluated individually, but flights over terrain that rises above the maximum landing site elevation of -3 km can be considered.

- For the two camera NIR imaging system, how many bands are planned, and is band selection open?

One band pass filter is planned per NIR camera. Each camera may have a different band, but exact wavelengths are still TBD. No broad community input is anticipated as filter selection will be limited by existing hardware and schedule constraints well in advance of the workshop.

- What is the bit depth of the NIR images, and will uncompressed images be available?

The NIR cameras will capture images/video at 10- or 8-bits depth. Due to limited downlink bandwidth, returned images/video are expected to be compressed, but select high-priority raw images may be returned.

- Is there a calibration target on the helicopter for the NIR cameras?

No, and no helicopter hardware is expected to be visible within the NIR cameras' field of view. Pre-flight calibrations will be performed to determine CAHVORE model parameters. CAHVORE model description can be found at <https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2003JE002199>.

- For the RGB cameras, what is the planned stereo imaging approach (roles of the nadir and horizon cameras, image overlap)?

Stereo images would primarily be obtained by the nadir RGB camera taking images with ~80% overlap during flight for subsequent 3-D scene reconstruction using structure from motion techniques. Additional stereo resulting from lateral offsets using the forward-looking camera may also be possible.

- How strictly must slope and rock constraints be satisfied within the landing site ellipse? For example, is there tolerance for a candidate ellipse that demonstrates 98–99% compliance to those constraints, rather than 100%?

~98% confidence should be OK to propose a site. There is a density distribution of landing points within a ballistic ellipse that is heavily weighted towards the center (similar to a 2-D Gaussian), so hazards near the edge of the ellipse have a much lower chance of encounter than those near the center.

- How much lateral divert capability does each helicopter have between release at ~1 km and touchdown?

The helicopters would laterally separate during EDL on the order of hundreds of meters to avoid recontact with the entry vehicle, but egress separation does not involve terrain-relative navigation or hazard avoidance. A divert for hazard avoidance during each helicopter's final descent is anticipated to be approximately ≤ 10 m.