

Introduction: Understanding and judging adequacy of a site for all Lunar mission phases and functions (launch/landing, surface transport, science collection, habitability, energy, communication, storage, etc.) is imperative to reduce threats to science return and site-specific risk factors, and maintain mission safety and success. It is the process of site analysis that employs the concept of examining environment and facility interaction to create an optimal relationship between all site elements that comprise these phases and functions.

Site analysis considers historical, current, and potential future conditions, and evolving functions and usage. It is thus an iterative process and requires progressive influx of scientific data to support review, adjustment, implementation, and evaluation of results leading to optimal design and advancement. Site analysis establishes a physical and functional infrastructure of mission elements. Mission elements include, for example, science gathering site planning, distances and directional paths required between landing areas, and habitation facility placement and construction affected by landscape obstacles, geophysical and geochemical proximity, soil composition, bearing conditions, terrain and topographical attributes, in-situ resource identification, climatically influenced light/shade, sun angles, thermal balance, landing/launch debris and dust control and energy sources/depots and conservation, and the like.

Following research and data collection, synthesis of collected information will establish the suitability of the site and proposed site design with the desired purpose, the feasibility to accommodate the exploration goals, a linkage and relationship of components, trades and alternative design and programmatic solutions, and a basis for effective use of imported and in-situ resources. Thus, science not only enables site analysis and the creation of lunar facilities and resources but is also enabled by the analysis itself. This essential relationship and construct, the requirements, and the methodology to effect the analysis and outcome (e.g. lunar outpost development and lunar exploration progression) in the context of applied science will be presented.