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Utilizing Advances in Hydraulic Modeling for Siting Wind and Solar Projects

Project sites that are “easy” to design and construct are becoming a thing of the past. Whether dictated by transmission constraints, permitting concerns, or land availability, some wind and solar developments reach well into regions once considered off limits because of the engineering and construction challenges posed in those areas. Recent technologies have helped to alleviate those challenges.

Many wind and solar projects in the southwestern U.S. are being situated on **alluvial fans** at the bases of mountains and ridge tops. As a result, a unique approach to planning and designing for development in such areas may be necessary. The unstable and braided channels of an alluvial fan present a unique challenge that often requires the aide of advanced hydraulic modeling software such as FLO-2D.

FLO-2D is a dynamic 2-dimensional flood routing model that simulates channel flow, unconfined overland sheet flow, and floods over complex topography, specifically alluvial fans. This stormwater modeling provides the user with flow characteristics such as direction of flow, depth, velocity, and volume of water at any location across an entire project area. This 2-dimensional model is being used by developers to intelligently micro-site their turbines and solar structures in areas of least risk to overland flow, flooding, and scour.

Understanding the hydraulic characteristics across a project area on an alluvial fan will ensure high value infrastructure is sited in areas of least amount of risk from overland flow, flooding, and scour. Design elevations and scour protection for turbines and solar racking can be designed on an as-needed, structure by structure basis, ensuring the correct level of protection is designed into each location, keeping construction costs manageable and risks low.

As developers tackle today’s wind and solar engineering and construction challenges, the methods for efficiently designing their project sites will require a keen focus on systems thinking and technical innovation.



An **alluvial fan** is a fan-shaped deposit of sediment commonly found at the base of mountain formations in desert climates. They are formed where a fast flowing stream flattens, slows, and spreads, typically at the exit of a canyon onto a flatter plain. This picture depicts an extreme example. Photo courtesy of <http://www.marlimillerphoto.com>



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