A common complaint when undertaking capital projects is the cost of engineered designs added late in the project to mitigate hazards or risks. Due to the typical phasing of these project activities, the facility siting study (FSS) or other consequence or risk modeling is not completed until the layout of the facility has been established. It can be extremely difficult to move hazards or populations to safer locations when a site layout is already in a mature state due to the substantial amount of rework that would be required. With mitigation through relocation limited or unavailable, increasing safety systems within the unit or protection layers at buildings becomes the only option. Costs could be reduced and designs made safer if FSS or similar studies could be conducted earlier in the design process.

Moving the FSS up into the early design phases comes with its own hurdles. These often revolve around lack of developed process information and the constantly shifting layout. This requires that any FSS done in the early stages of design must be flexible and expedient to meet the rapidly evolving plant layout and process changes. This paper details a method for performing a FSS during the feasibility stages of a greenfield project through the creation of a design library of hazards and buildings that can be easily moved and edited.

Through the use of a case study, examples of early mitigation of blast, fire, and toxic hazards are explored, and examples of both consequence-based and risk-based decisions are provided. A discussion of how to use the FSS process in design workshops and hazard communication to project managers is also explored along with a basic cost saving analysis. Through the use of FSS early in a design process, the capital project can create an optimized design that meets geographic constraints and corporate safety goals while providing a potential reduction in overall project cost.

**Keywords:** Hazards, Risk, Facility, Layout, Siting, Building, Construction, Optimization, Fires, Explosions, Personnel, Capital Projects, Greenfield, Cost