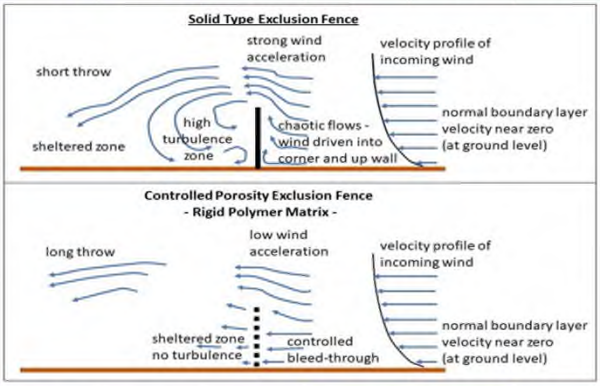
Key Factors in Designing the Right Exclusion Barrier

ERTEC®

Key Design Criteria vs. Performance by Exclusion Fence Type	Fence Type: Open Types — E-Fence™ Rigid Polymer Matrix™ (High POA*)	Open Types — Metal Mesh	Solid Types — Solid Barrier Woven Silt Fence	Solid Types — Solid Barrier Thin HDPE Polymer Sheet	Solid Types — Solid Barrier Plywood Sheets	Solid Types — Perforated Solid Barrier Polymer Sheet (Low POA*)
Stormwater Scouring and Undermining	Excellent	Excellent	Poor	Poor	Poor	Poor
Stormwater runoff will cause perforated, solid type exclusion barriers to fail in two modes: 1) if installed along contours, head-pressure from stormwater runoff ponding against the barrier can penetrate weak points along the trench. Storm water flows will then concentrate and cause unwanted and sometimes severe land erosion. Ponding occurs because the barrier's Percentage Open Area (POA) is very low, causing it to quickly blind-off to flow, 2) if solid barriers are installed up and down contours (which is routinely required), runoff will collect and concentrate along the barrier as it flows downhill. Runoff will scour out the base of the barrier, creating loss of integrity. Weep holes drilled or formed into solid barriers will not allow enough water to flow through (POA is often less than 1%). Weep holes will blind-off very quickly in stormwater events. To control damage, it is important to design with a barrier with at least 50% Open Area (Open Type) or with a flow rate greater than 600 gallons/ft2/min. Open Type barriers such as E-Fence™ Rigid Polymer Matrix™ allows stormwater to flow through. 						
Wind and its Negative Effects Around Solid Fences	Excellent	Excellent	Poor	Poor	Poor	Poor
High winds and gusts create turbulent, chaotic flows around solid type Wildlife Exclusion Fences. Computational Fluid Dynamics (CFD) modeling and field evidence tells us that chaotic windflows on both sides of solid WEFs can desiccate animals with moisture-sensitive skin. Amphibians, which are challenged with the maintenance of water balance, normally experience little air flow when there are no fences or barriers because wind velocity remains near zero at ground level in most conditions. This is not an issue with Porosity Controlled Barriers (for example, E-Fence™ Rigid Polymer Matrix™) because air readily flows-through, behaving very nearly as if there were no fence. CFD modeling also tells us that solid fences endure exponentially higher drag forces which translate to several issues. This sizeable increase of drag forces on solid fences can cause durability problems - such as pushing the fence up and out of its trench, or weakening the structure, leading to premature failure. See: Wind Effects Around Wildlife Exclusion Fences - E. Kim 2019 						
Joint Security - Thermal Expansion and Contraction	Excellent	Excellent	Excellent	Average	Average	Poor
HDPE has a very high **Linear Coefficient of Thermal Expansion**. This is a problem for solid fences made from HDPE. With solid type fences, forces are generated at the overlap joints when the material expands and contracts during natural daily temperature cycles. These forces work the joints continuously. Solid fences tend to have shorter roll lengths requiring many more joints. After a period of time, the joints work themselves apart, eventually enough to allow animals to pass-through. This is not compatible on long term road ecology projects where there are long periods between inspections. This concern is not seen with open fences as mesh and matrix type fences which have more absorptive capacity. The open areas absorb expansion and contraction avoiding the continous grinding of forces on the joints.						
Animal Safety	Excellent	Poor	Average	Average	Average	Average
Animals should be safe from laceration, entrapment or desiccation over the duration of installation (for example, silt fence will become more porous over time). Metal Mesh has been known to entrap. Solid fences cause local environment degradation. Solid rigid fences expand and contract daily which causes the overlapped joints to loosen and separate which allow animals to eventually pass through. Smooth, low friction surfaces, and if an Open Type, flexible barrier with rigid immovable strands are important for animal safety.						
Rate of Decay (UV or Corrosion), Property Retention	Excellent	Poor	Poor	Excellent	Average	Excellent
Consider Functional Longevity in the face of ultraviolet radiation, heavy weather and/or corrosion.						
Ease of Installation & Removal Translates to Safety	Excellent	Poor	Average	Poor	Poor	Poor
Consider the weight, density and flexibility of the barrier material, ease of mobilization, average speed of installation, sharp edges, and worker safety. Barrier types which require a horizontal flap in the trench (solid types), meant to reduce loss of integrity from scour, undermining and blow-outs, become "locked-in" when soil hardens and become very difficult to remove. Solid fences can be extremely slow to install due to special fasteners and hand-tools needed to create thru-holes in the barrier.						
ZERO Waste	Excellent	Average	Poor	Excellent	Average	Excellent
Why solve one environmenal challenge by creating another? Exclusion barriers should have zero impact on landfills. Consider barriers with readily available recycle streams and that are easy to remove and transport.						
Design & Installation Support: get the job done right!	Excellent	None	None	None	None	Unknown
When working with special-status species, design and installation support for successful installations is critical. Some barrier types are designed expressly for special-status species and supplied by companies which provide both design support and on-site crew support at no additional cost. Other types are supplied by generic construction supply with little or no pre- or post-sale support to the Engineer and Contractor.						