

The Environmental Effects of Reef Capital Partner's Plan to Place Chemically Toxic Golf Courses on Shivwits Trust Land

- **Using chemically contaminated secondary wastewater irrigation and pesticide applications over the extensive land mass used by three golf courses on Shivwits Trust Lands will destroy the natural environment, harm plants and animals, and pollute the water.**
- The long-term use of wastewater-irrigation containing dangerous Forever Chemicals (PFAS), microplastics, nanoparticles, pharmaceuticals, and other chemicals-of-emerging concern (CEC), and the large-scale use of pesticides, insecticides, and herbicides on golf courses near to Shivwits wells, and waterways and the environmental effects on wildlife, fish, and will be devastating.
- **Research shows that wind carries drifted pesticide particles and wastewater chemicals from evaporation or spraying for many miles.** Pesticide and chemically contaminated wastewater drift from the area's frequent, gusty winds will taint a wide swath of the reservation, posing a significant risk to the area's soil, water, and land. Shivwits land has soft red dirt silt which is more likely to blow toxins in wind farther than the thicker, heavier soil found elsewhere.
- **Forever-chemicals (PFAS) and pesticides leech into soil and are damaging to water supplies.** Forever-chemicals move with percolating water from irrigation and torrential rainstorms into deeper soil layers and reach groundwater reserves. This chemical migration can be relatively rapid in some forever-chemicals or take longer for others. Unfortunately, the very same forever-chemicals proven to rapidly trickle down into soil layers and groundwater are those created and even increased by wastewater treatment in Washington County and elsewhere.
- **Shivwits Trust Land soil, groundwater, and wells will be at greater risk for more rapid accumulation of forever-chemicals and pesticides than soil or water elsewhere.** The United States Geological Society has found harmful chemicals like PFAS in groundwater, especially in at-risk landscapes which evidence fractured rocks such as that of the Shivwits Trust Lands.
- Rainstorms on the Shivwits Reservation are so frequently torrential that the Red Mountains above the planned golf courses form cascading waterfalls. This rain rivets through landscapes and will pour downhill over the top of golf course greens, pulling red dirt and pesticide and wastewater residue into streams of water, discharging chemical contaminants into wells, groundwater, and the Santa Clara River. The clay liners some courses say they use might reduce, but do not eliminate the risk for groundwater, well, and aquatic contamination, especially in the context of chronic long-term toxin use and year-round torrential downpours.

What are the Environmental Effects on Wildlife, Plants, and Fish?

- **The direct and indirect harmful ecological influence of chemicals of emerging concern, pesticides, and forever chemicals on wildlife behavior, ecology, and evolution have proven to be considerable.** The effects of long-term low level “chronic exposures” from pesticide applications and chemical contaminated wastewater irrigation “can be equally deleterious” to animals and the environment. Animals as diverse as cougars, bob cats, coyotes, jackrabbits, and desert tortoises will be negatively impacted, as will birds, bees, trees, bushes, plants, and fish.
- **There is toxicological evidence that forever-chemicals negatively affect the ability of animals to reproduce, have healthy immune systems, and develop normally.** The CDC toxic disease registry summarizes extensive research literature on how forever-chemicals adversely affect animals: “These animal studies have found that PFAS can cause damage to the liver and the immune system. Forever-chemicals have also caused low birth weight, birth defects, delayed development, and newborn deaths” in animals.
- **Pesticides and other chemical contaminants cause direct toxic effects when released into aquatic environments.** The EPA confirms that sensitive species are negatively affected by pesticides, PFAS, microplastics, pharmaceuticals, and other chemicals of emerging concern in aquatic environments. This chemical contamination alters the ecology of rivers such as the Santa Clara River, which is close to and downhill from the proposed golf courses. This aquatic contamination initiates a cascade of secondary negative effects on even more species, compounding ecological destruction.
- The United States Geological Survey (USGS) states that contaminants of emerging concern, including forever chemicals, pesticides, pharmaceuticals, and wastewater-indicator-compounds “*have a detrimental effect on fish and other aquatic species.*” These contaminants “*have also been shown to bioaccumulate up the food web - putting even non-aquatic species at risk when they eat contaminated fish.*”
- **According to the National Institute of Health, forever chemical exposure harms plants by causing effects which “further damages plant cell structure” and function.** An interconnected ecosystem of birds and bees relies on healthy trees, plants, and bushes for survival.
- Pesticide and contaminated secondary wastewater drift poses risks to wildlife, plants, streams and other bodies. Drift from chronic pesticide use and chemically contaminated wastewater irrigation use on golf courses damages biological biodiversity and causes the death of pollinating bees, plants, and animals. **Black Desert’s planned golf courses will imperil the environment of Shivwits lands and devastate an ancient, intact ecosystem and an essential desert water supply.**