



**Supporting infrastructure
delivery at the intersection of
built and natural environments**

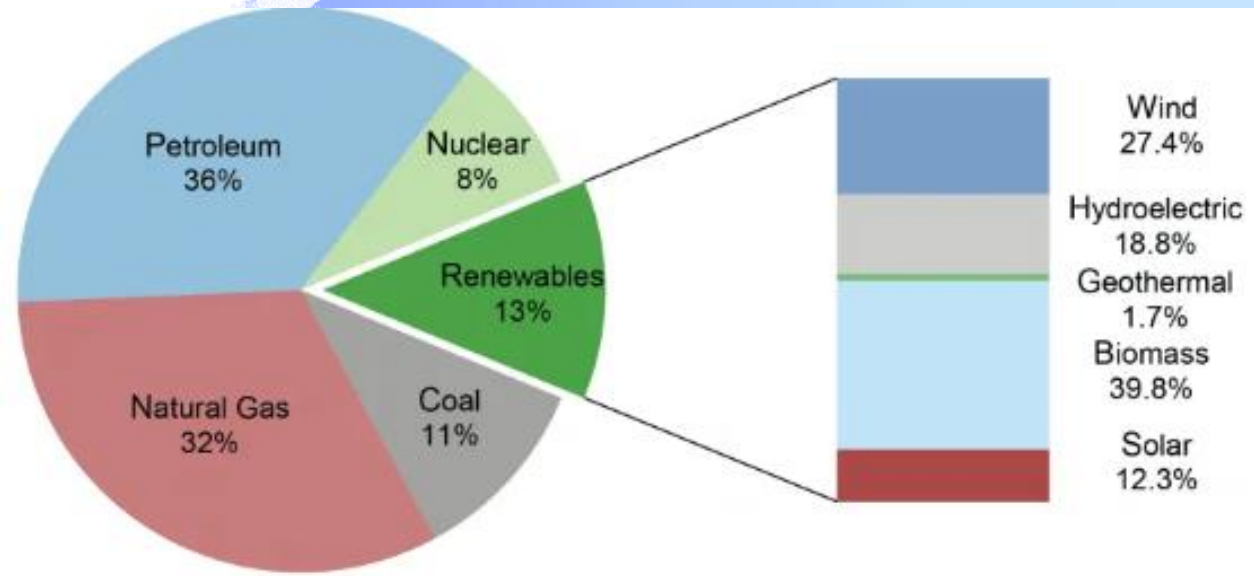
Barry Fagan, PE/PLS, ENV SP, CPMSM, CPESC
Owner/Vice President

Utility-Scale Solar Site Construction
Stormwater Management

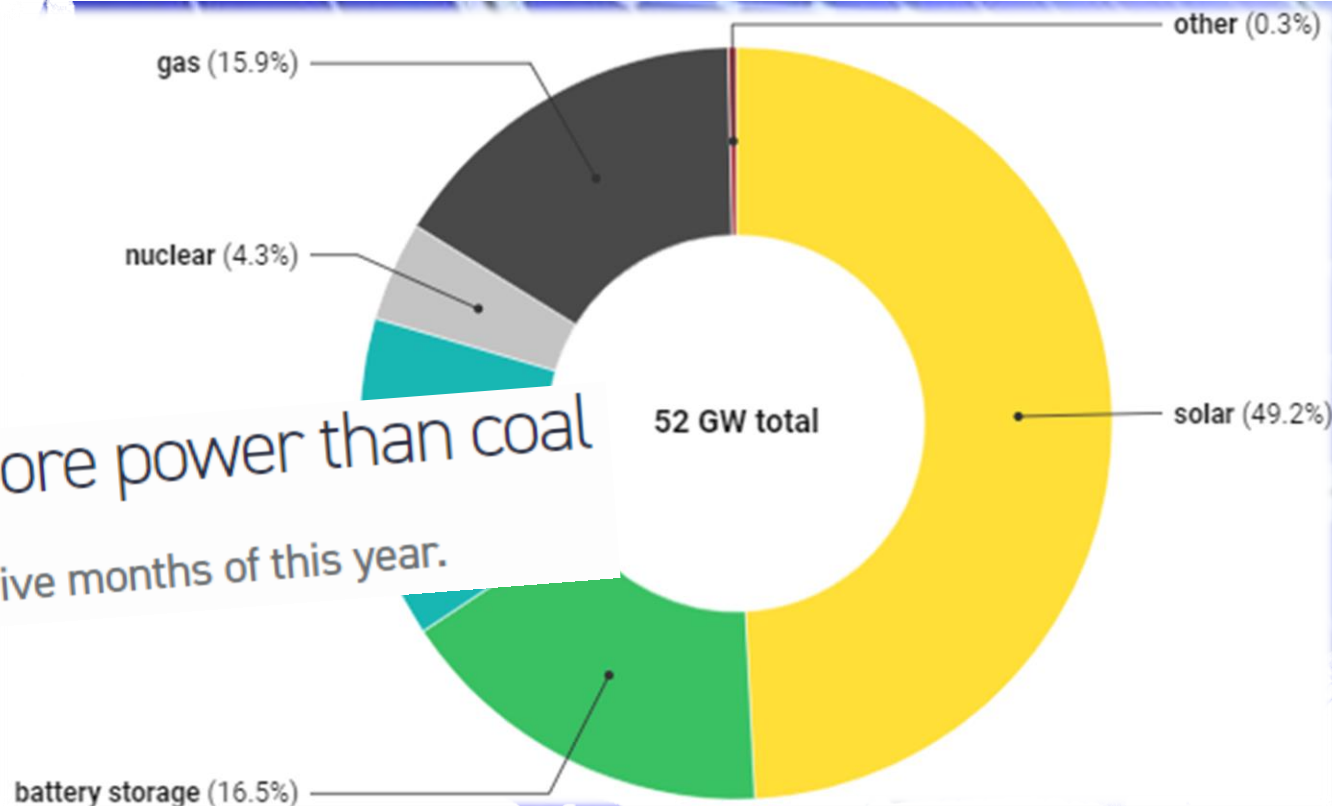
FAGAN
FAGAN CONSULTING LLC

What's happening with solar?

- Clean energy to make up 84% of new US power capacity in 2023
- The US is a world leader in producing electricity generated by the sun.



In a first, wind and solar generated more power than coal
U.S. coal experienced a precipitous drop during the first five months of this year.

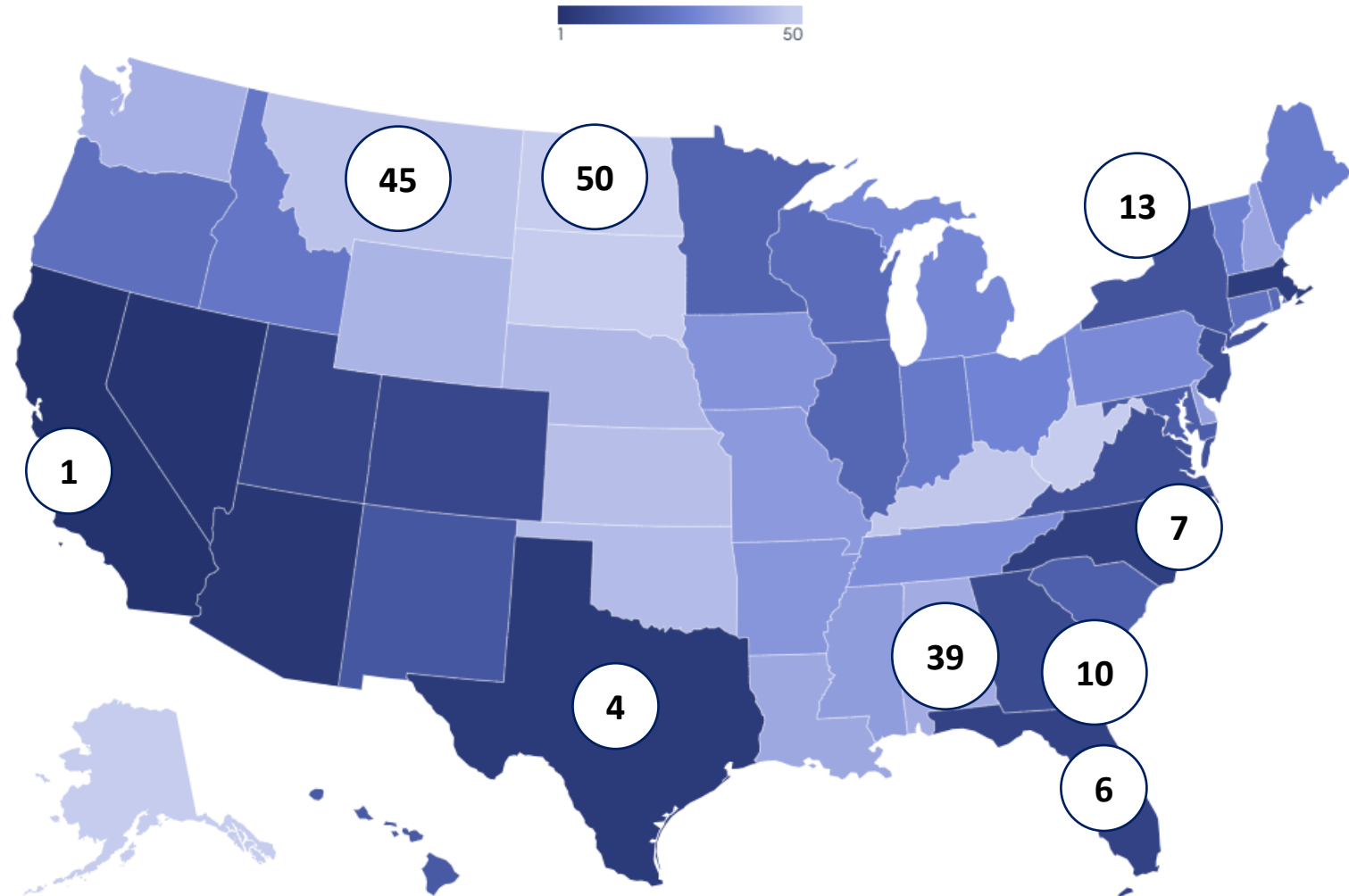


What's happening with solar?

- ▼ Solar development in the US doesn't seem to be completely driven by the sun, or by alternate energy sources, or by politics.

Ranked: The Best and Worst States for Solar Energy

Forbes Home ranked the best and worst states for solar based off of six key metrics.



What's driving solar?

“I am totally for any source of new energy that is cheap, easy to use, and doesn't pollute.”

– Governor Kay Ivey

- ▼ Solar energy is cost effective.
 - ▼ Solar - \$24/MWh
 - ▼ Coal - \$36/MWh
- ▼ Utility-scale solar has zero emissions.
- ▼ Solar energy generation offsets +73 million metric tons of CO2 emissions/year (equivalent to planting ±1.2 billion trees).



WHEN THERE IS A
HUGE **SOLAR SPILL**,
IT'S JUST CALLED
A NICE DAY.

1st Annual **TRACTOR SHOW**
& Auction Here November 10-12
Industrial Solar Sprawl
From Taking Our Farmlands
"Harvest Days at Duck Creek"
By "Citizens Against Solar Pollution"
Live Demonstrations & Good Music
Free Admission: Great Food & Vendors

WE MUST
STOP

No Solar Panels

On Prime Farmland

SAVE OUR FARMLAND
STOP INDUSTRIAL SOLAR
CITIZENSFORGREENEACRES.ORG

SAVE PAHRUMP DESERTS
NO!
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WEST 160
Tonopah 165



The land.



The water.



Renewable Energy

**Four Solar Projects Settle \$1.3M EPA Clean Water
Construction Suit**

The land.

The water.



Scandia sand spill: Solar company pays \$40,000 for 2018 stormwater damage

Solar farm operator will fund wetland restoration elsewhere to compensate for erosion and sand deposition.

By Greg Seitz | February 6, 2020 | 4 minute read

Facebook Twitter Email Print More



After sand spill, Sept. 27, 2018. (Greg Seitz, St. Croix 360)

HELLO
my name is
conflicted

Green solar farm is turning an Essex County watershed brown

Critics hot over work on massive Spotsylvania solar farm
NEIGHBORS WANT BETTER OVERSIGHT



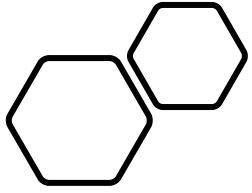
News Releases from Region 01

EPA Enforcement Ensures that Solar Company Follows Stormwater Discharge Requirements at Warren, Mass. Facility





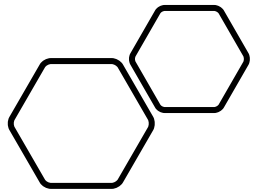
We're not in the desert anymore.



"At [my company], we're used to building more on the west coast and in desert areas like California, Arizona, Utah, and some in Idaho. We're used to flat land and generally square to rectangular-shaped projects. Coming to Alabama was quite the surprise. The topography was a lot more extreme for a solar site."

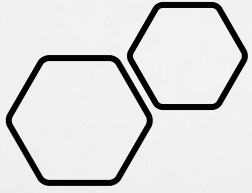
We're not in the desert anymore.





The State of Practice?

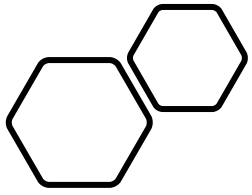




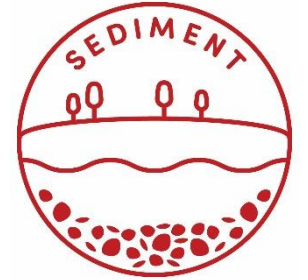
Risk

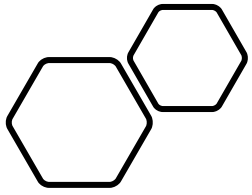
- ▼ Regulatory
- ▼ Environmental
- ▼ Community Expectations
- ▼ Legal Expectations
- ▼ Operation and Maintenance
- ▼ Contractual





The **Five Pillars** of Construction Stormwater Management

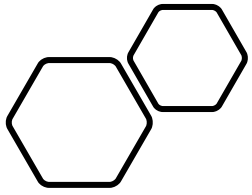




The **Five Pillars** of Construction Stormwater Management



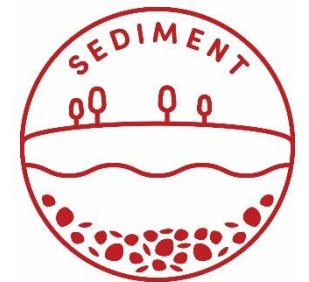
▼ Investors	▼ EPC Contractor
▼ Developer	▪ EPC Design Consultant
▼ Project Company	▪ EPC Construction Contractor

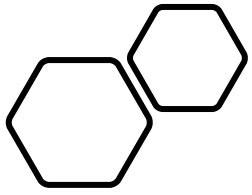


The **Five Pillars** of Construction Stormwater Management

1. **Managing Communication**

includes all efforts to convey information among project stakeholders to increase effectiveness in project planning, design, and implementation.

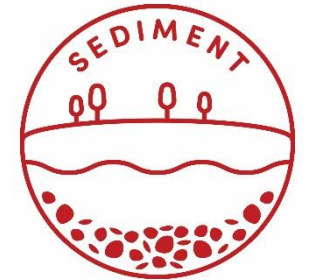




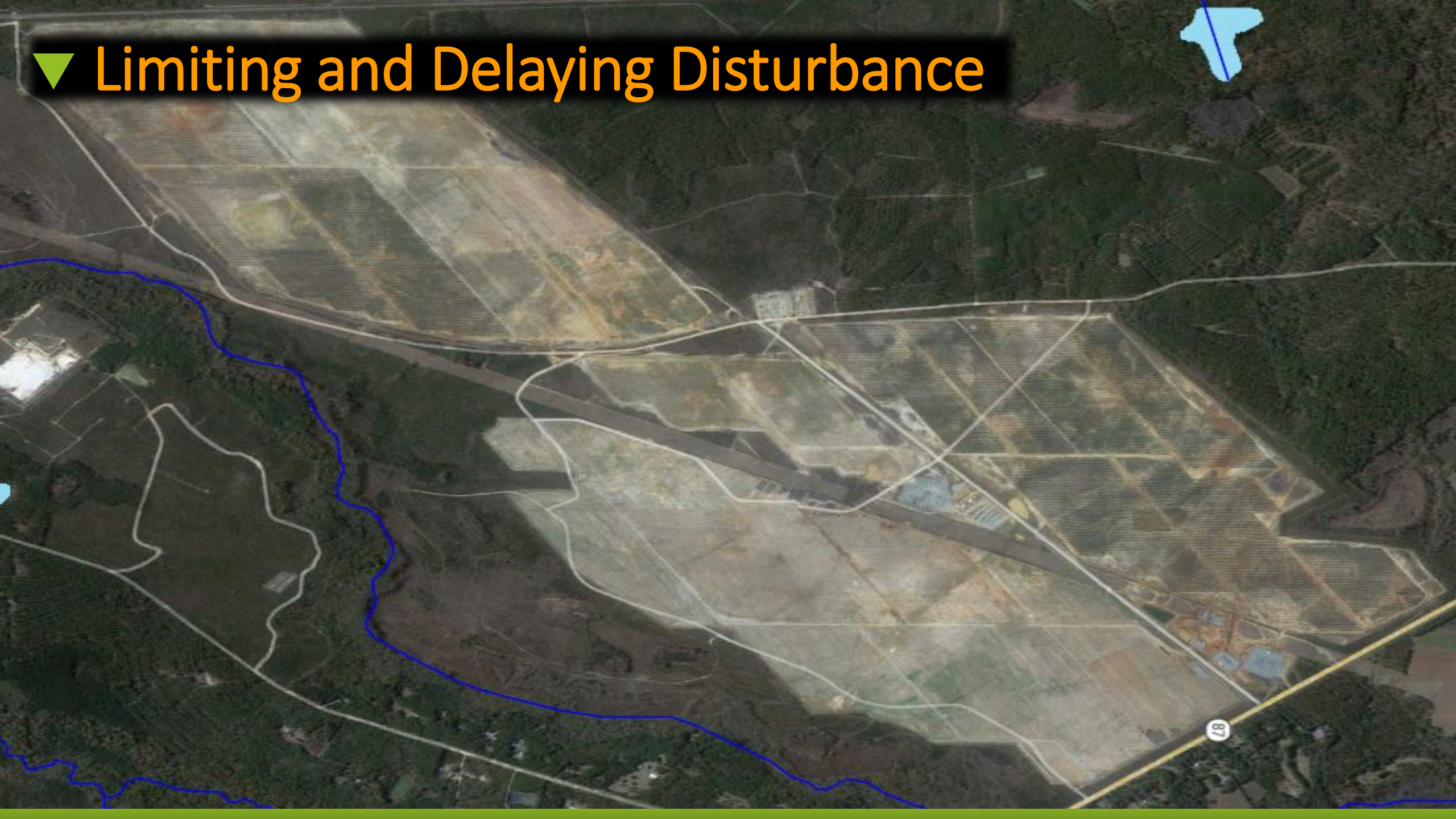
The **Five Pillars** of Construction Stormwater Management

2. Managing Work

includes all operational efforts to ensure that work proceeds in a manner that is protective of the owner's interests and environmental responsibilities.



▼ Limiting and Delaying Disturbance



▼ Limiting and Delaying Disturbance



▼ Limiting and Delaying Disturbance



▼ Limiting and Delaying Disturbance



- ▼ Limiting and Delaying Disturbance
- ▼ Access Management

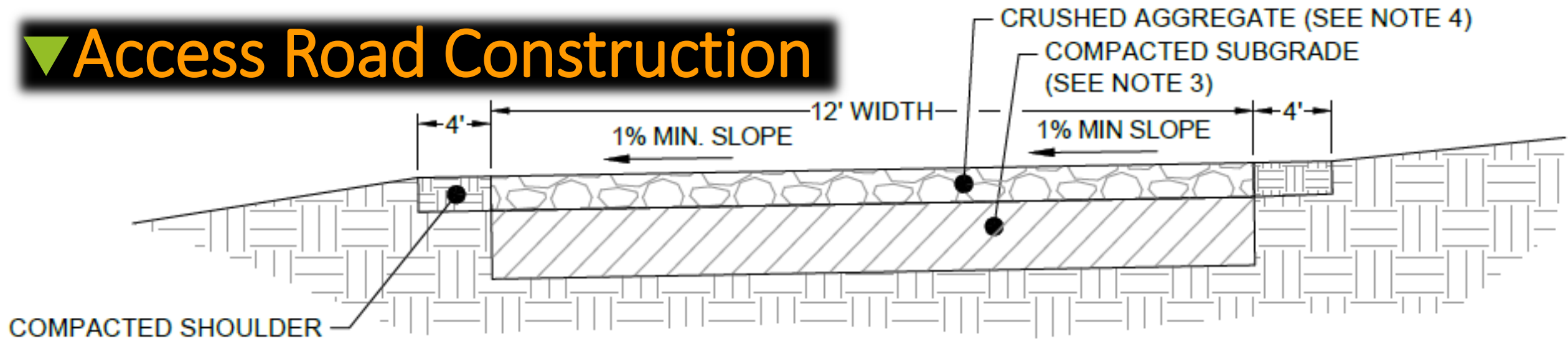


▼ Limiting and Delaying Disturbance

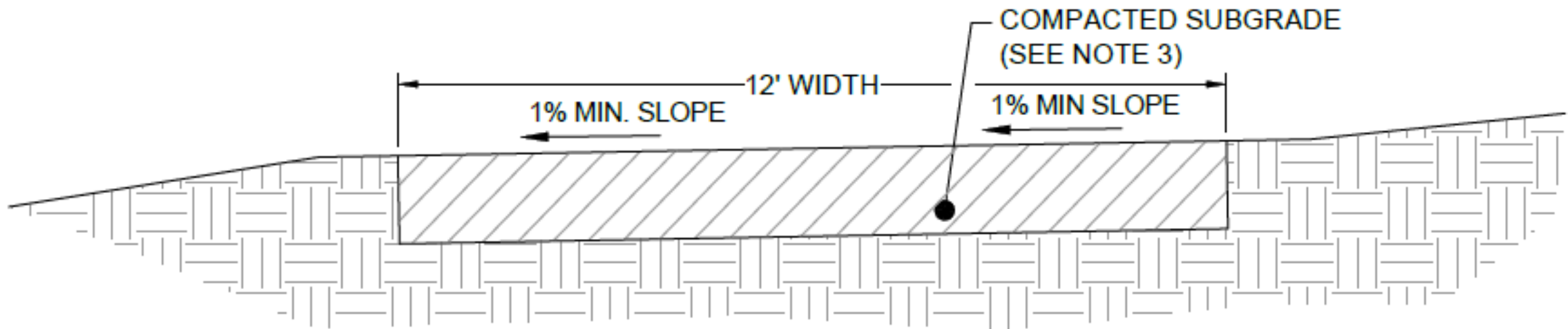
▼ Access Management



▼ Access Road Construction



PRIMARY ACCESS ROAD



SECONDARY ACCESS ROAD

▼ Access Road Construction

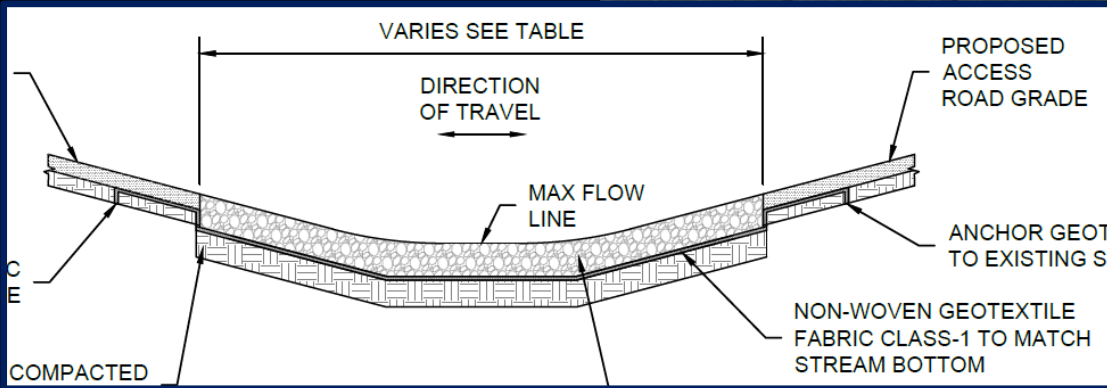
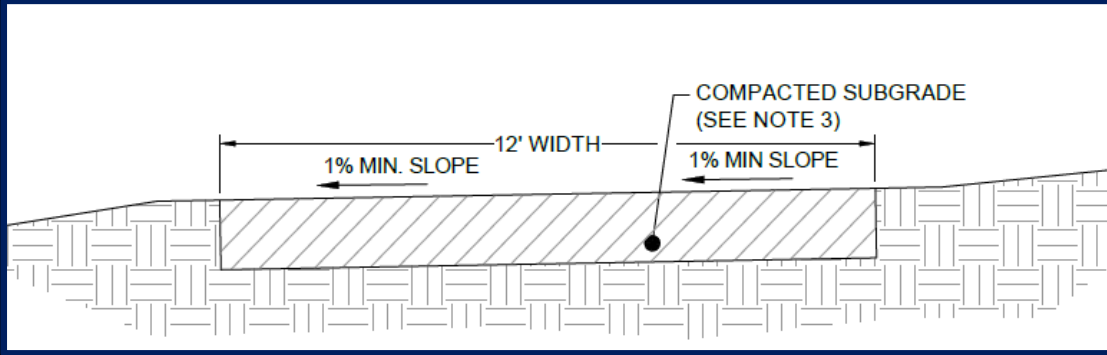


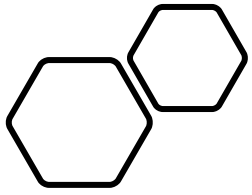
▼ Access Road Construction

▼ Low Water Crossings



▼ Low Water Crossings

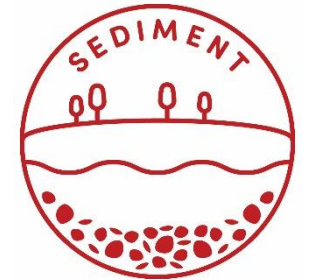




The **Five Pillars** of Construction Stormwater Management

3. **Managing Water**

includes all efforts that address the flow of waters through the project to protect the work area and minimize the work of managing erosion and sediment.





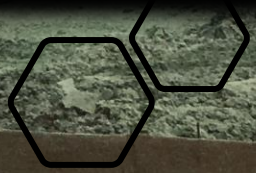
- ▼ Water is dumb – we get to tell it where to go.
- ▼ Fast water carries more sediment than slow water.
- ▼ Fast water is more erosive than slow water.

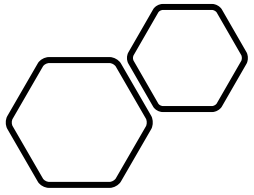






▼ Water is dumb?

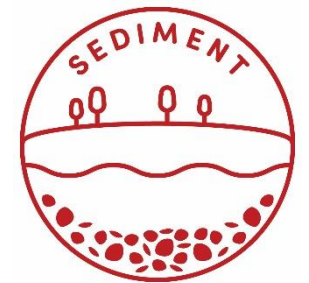




The **Five Pillars** of Construction Stormwater Management

4. Managing Erosion

includes all efforts to minimize the displacement of soil particles by splash, sheet, rill, and channel erosion to minimize negative project impacts and reduce the work of managing sediment.



▼ Proper Vegetative Species and Rate of Application



▼ Proper Perennial Vegetative Species



▼ Invasive, Noxious, and Nuisance Weeds

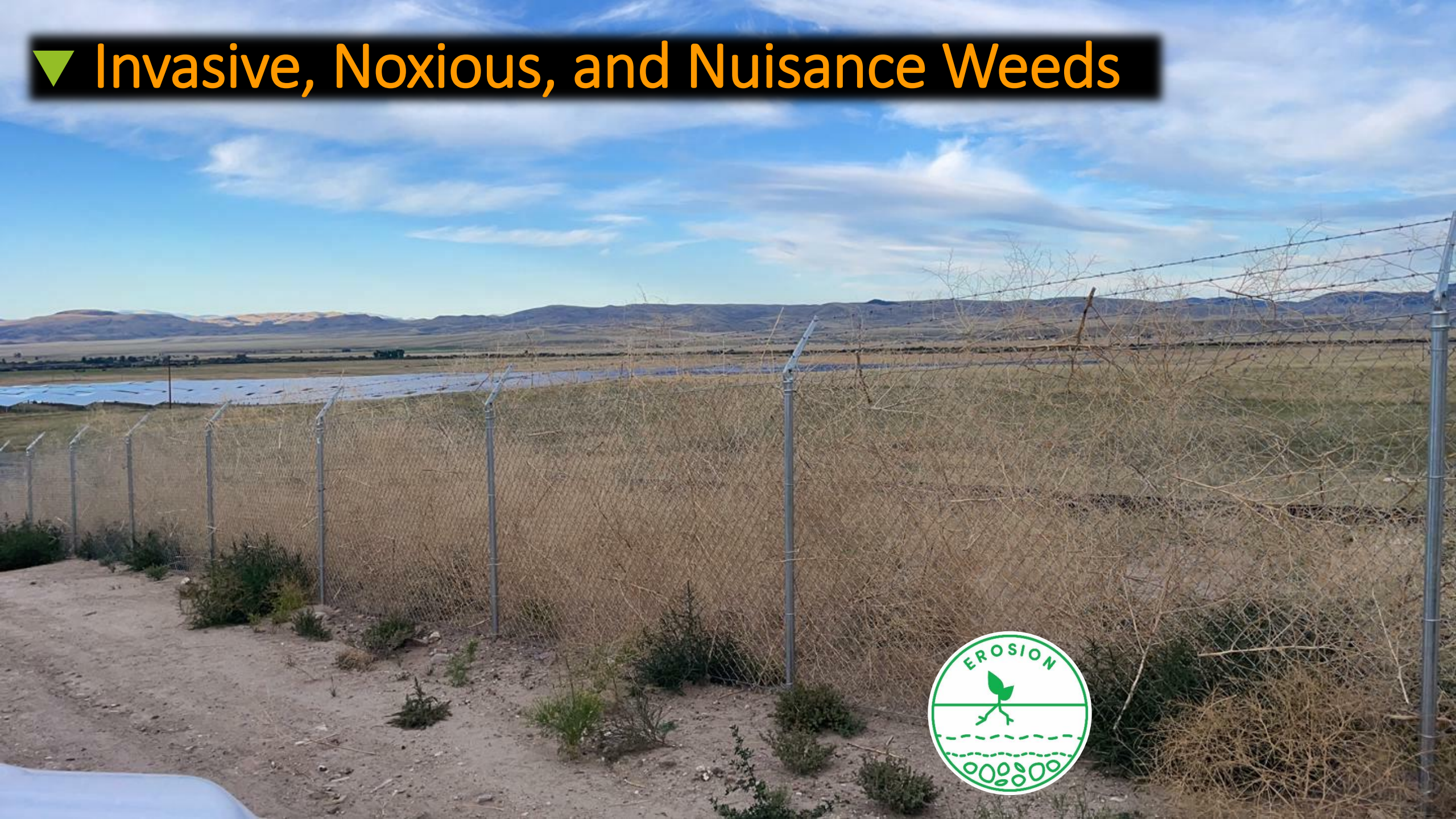
good

not good

good

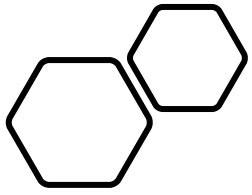


▼ Invasive, Noxious, and Nuisance Weeds





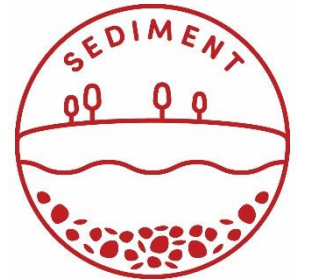
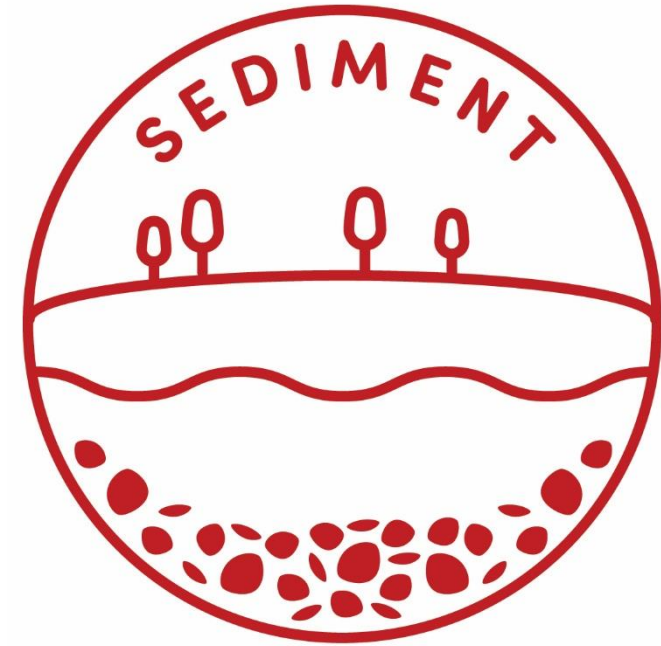




The **Five Pillars** of Construction Stormwater Management

5. **Managing Sediment**

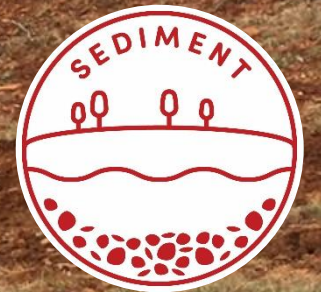
includes all efforts to influence the transport and deposition of suspended soil particles displaced by erosion.





Risk

- ▼ Regulatory
- ▼ Environmental
- ▼ Community Expectations
- ▼ Legal Expectations
- ▼ Operation and Maintenance
- ▼ Contractual





▼ Area = \$
▼ 100 sed basins = ±40 acres





Utility-Scale Solar Site Construction Stormwater Management

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NEWS

Alabama still at the bottom in solar power rankings, but has potential to rise

Published: Jun. 17, 2023, 7:00 a.m.

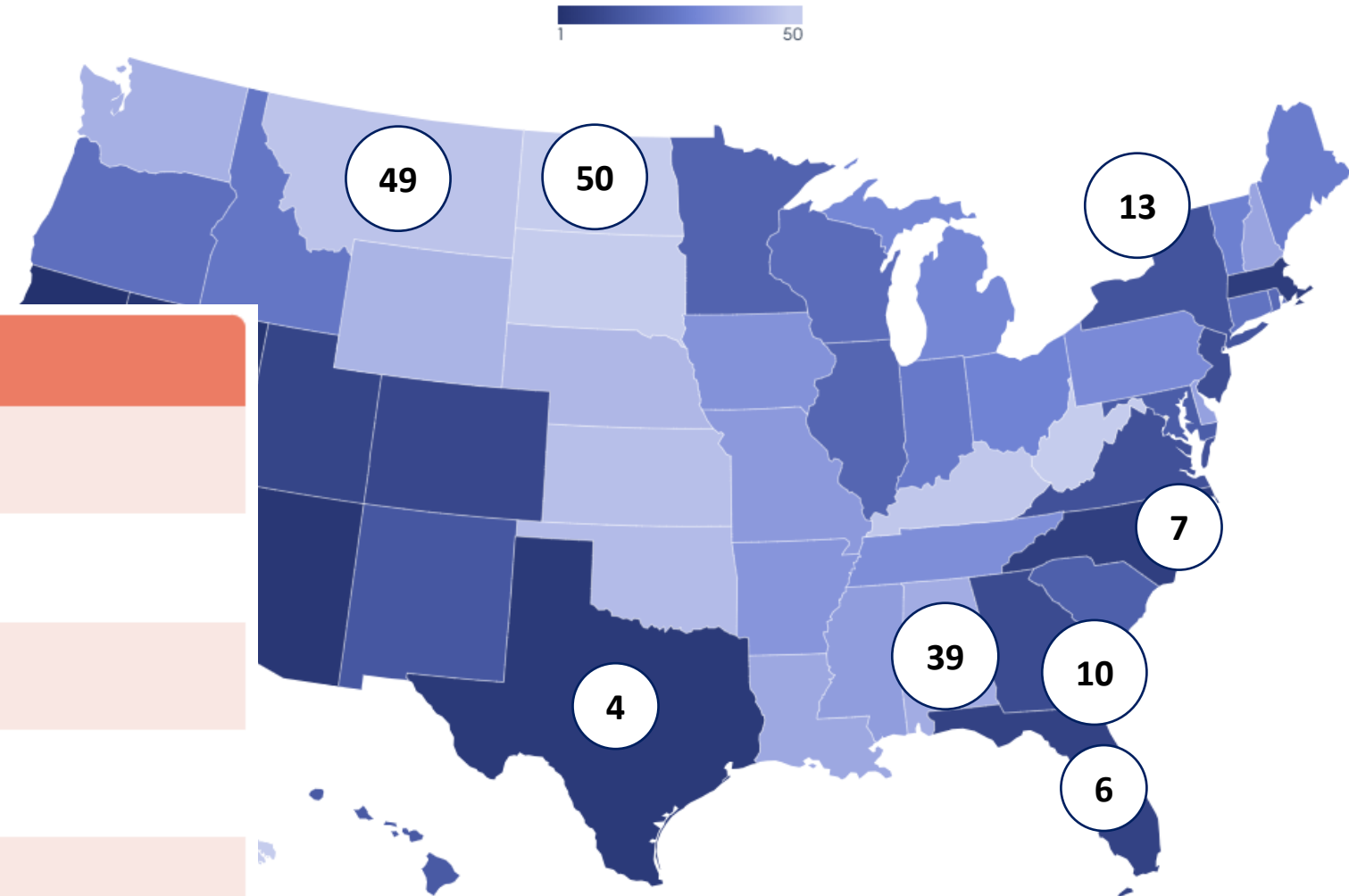
State	Total Solar Capacity	Distributed Solar
Florida	7,288 MW	1,293 MW
North Carolina	4,273 MW	443 MW
Georgia	3,769 MW	302 MW
South Carolina	2,226 MW	282 MW
Tennessee	595 MW	78 MW
Alabama	348 MW	18 MW
Mississippi	277 MW	10 MW

What's happening with solar?

▼ Solar = Jobs

Ranked: The Best and Worst States for Solar Energy

Forbes Home ranked the best and worst states for solar based off of six key metrics.



State	Solar Jobs
California	75,712
Florida	11,761
Massachusetts	10,548
New York	10,524
Texas	10,346

Download image



- ▼ Regulatory
- ▼ Environmental
- ▼ Community Expectations
- ▼ Legal Expectations





▼ Operation and
Maintenance

▼ Contractual

