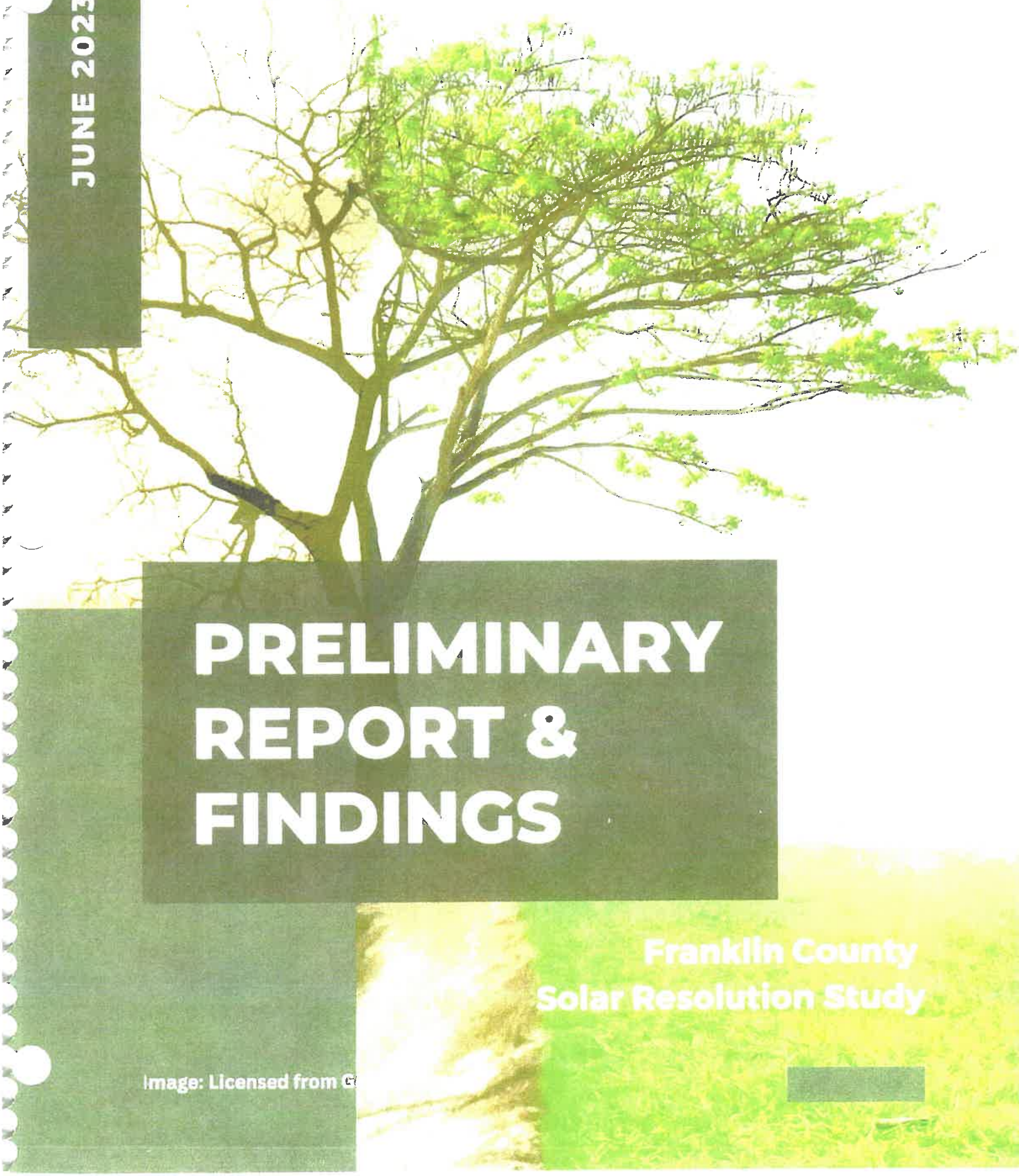
JUNE 2023



PRELIMINARY REPORT & FINDINGS

Franklin County Solar Resolution Study

Image: Licensed from G

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FRANKLIN COUNTY SOLAR RESOLUTION STUDY

DISCLAIMER: This report was compiled and edited by Susan Wingfield Olsen in her personal capacity. The views and opinions expressed in this report are hers and do not represent official policy or positions of the Commissioners Court of Franklin County, Texas. All liability with respect to actions taken or not taken based on the content of this report are hereby expressly disclaimed. The content in this report is provided "as is"; no representations are made that the content is error-free.

ES.1

EXECUTIVE SUMMARY

Following months of increasingly rancorous county-wide, anti-solar facility protests, on December 30, 2022, the Franklin County Commissioners Court adopted a resolution[1] stating that the "construction of industrial-scale solar and wind farms in the unincorporated areas of Franklin County would not be beneficial to the economic development of Franklin County" and that the Court would "not grant a tax abatement under Chapter 312 of the Texas Tax Code or provide any other investment incentive that would encourage, facilitate, or contribute to the construction of any industrial-scale solar or wind energy production facility in Franklin County."

That same day, the Court adopted standardized road use agreements[2] to more realistically address the potential for damage to county roads arising from large, commercial construction projects like utility-scale solar and wind farms facilities, the terms of which treat any applicant identically, but ensuring County roads would not be abused by anyone and left for taxpayers to repair.

Finally, the County also adopted standardized "Tax Abatement Guidelines and Criteria[3]" for commercial or industrial projects that met the objective standards. The guidelines set minimum levels for capital investment, associated job creation and length of abatement periods. Applicants would have to meet those minimum thresholds - and meet certain environmental standards - before the County would entertain offering tax abatements in exchange for economic development.

However, the lack of guidelines - federal or state - for the construction, operation and ultimate decommissioning of utility-scale solar and wind facilities poses significant threats to small, rural, historically agricultural counties like Franklin and spurred the Commissioners to undertake an identification of the potential effects and develop a plan to protect the health and safety of its economy and its residents.

[1] CCM Vol: 70 P. 287
[2] CCM Vol: 70 P. 290
[3] CCM Vol: 70 P. 302

ES.2

Therefore, on February 27, 2023, the Court amended[4] the December resolution and suspended for not more than 180 days the approval of the use of county roads for the development and construction of commercial, utility-scale solar energy facilities.

Concurrently, the Court established a task force to "1) develop a set of rules and orders to identify, manage and mitigate their impacts on County roads and the health and safety of our citizens; and, 2) develop a template detailing the potential impacts of the siting of commercial, utility-scale solar energy facilities on the rural portions of the County which provide agricultural benefits and products."

This report presents the preliminary findings and recommendations of that study.

[4] CCM Vol: 70 P 650

1.0

PRELIMINARY FINDINGS AND RECOMMENDATIONS

BASIS OF REVIEW

The current statutory authority[5] given to Franklin County by the state of Texas grants it oversight of the general economic, health and safety of its residents and responsibility for the construction and maintenance of county roads. The environmental impacts that may be associated with utility-scale, solar facilities cannot be disassociated and, as such, must be considered as either contributing to, or adversely affecting, the general economic well-being of the County.

[5] https://www.county.org/About-Texas-Counties

PRELIMINARY FINDINGS & RECOMMENDATIONS

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1.1

HEALTH AND SAFETY

HEALTH AND SAFETY

The presence of 10s of 1000s of lithium-ion batteries housed in energy storage containers[6] installed near inhabited structures poses the danger of fires[7] that cannot be extinguished using traditional firefighter measures. The concurrent potential for the release and or explosion of toxic and hazardous gases[8] must be weighed as well. Were utility-scale solar facilities not to be constructed in Franklin County, those dangers would not exist.

However, the dangers are such that amending and incorporating these recommendations in the current County Mitigation Plan[9] are appropriate. As these new threats are the direct result of the presence of utility-scale solar facilities, the costs of implementation should be for the account of developers.

Recommendations:

- Staff and equip local fire departments and personnel with full-time firefighters, additional vehicles, personal protective gear. [See Exhibit 1]
- During construction, establish - in coordination with affected precinct commissioners - schedules and routes over which hazardous materials may be delivered to sites.
- Require clear marking and identification of hazardous vehicular traffic.
- Give priority to local traffic - especially school buses and student transport - use to county roads over use by commercial transport and haulage.
- Require fire-breaks be constructed and maintained around switchyard and solar field perimeters.
- Develop a warning system and accessible, identified routes in the event of fires and/or the need for evacuation.
- Adopt FEMA[10] and NFPA[11] recommendations on solar generation risk-level assignment and procedures. [See Exhibit 2]

[6] https://www.energy-storage.news/batteries-not-cause-of-overheating-or-smoke-that-forced-worlds-biggest-battery-project-offline/
[7] https://www.utilitydive.com/news/battery-fires-protection-safety-utility-scale-duke-aps/642793/
[8] https://www.sciencedirect.com/science/article/abs/pii/S0304389419308696
[9] https://www.co.franklin.tx.us/upload/page/1853/docs/Mitigation%20Plan%207.11.2016Draft.pdf[1]
[10]https://www.utilitydive.com/news/xcel-first-solar-clean-energy-wind-solar-building-code-icc/634474/
[11]]http://www.nfpa.org/News-and-Research/Resources/Emergency-Responders/High-risk-hazards/Energy-Storage-Systems

PRELIMINARY FINDINGS & RECOMMENDATIONS

1.2

COUNTY ROADS

COUNTY ROADS

During construction of utility-scale solar facilities, repetitive heavy hauling of bulk materials[12] and the use of ultra-heavy[13] transport vehicles will cause significant damage to county roads and disruptions of local and resident traffic.

Recommendations:

- In addition to agreed-upon, controlled movement, require developers to sign binding road use agreements and procure bonds in the aggregate amount of precinct road mile costs to ensure developers and their contractors cannot impact roads outside of the construction and operating sites without the assurance of full reimbursement to the precinct and County. Bonds can be adjusted accordingly post-construction and initialization of a facility's commercial operation.
- Give priority to local traffic - especially school buses and student transport - use to county roads over use by commercial transport and haulage.
- Because neither[14] the Texas Department of Transportation (TxDoT) nor Texas Federal Emergency Manager have established non-radioactive hazardous transportation routes for the Paris TxDoT district or Franklin County, during construction, establish - in coordination with county emergency management officials, fire department and affected precinct commissioners - schedules and routes over which hazardous materials may be delivered to sites with the least potential for exposure to residents.

[12] https://www.mccarthy.com/projects/red-rock-solar-plant
[13] https://www.globetrailers.com/wp-content/uploads/brochures/lowboy-65ton.pdf?pdf=Lowboy65ton
[14] TXDot TPIA R026606-051723

1.3

ENVIRONMENT

ENVIRONMENT

Literature reviews indicate the potential for significant wildlife habitat disruption and destruction and possible contamination of regional and local watersheds. As no utility-scale facility has been constructed in Franklin County, it is not possible to predict damage with any certainty. Recommendations are informed by those same literature reviews as well as accounts of actual damage in adjacent Hopkins County. Literature reviews do present clear examples and highly probable scenarios of the breadth of effects across the environmental landscape.

Recommendations:

- Reviews - and ultimately, physical examinations - of properties surrounding developer-published footprints can permit estimates and extrapolation of the types of fauna, flora and watershed damage that can be expected.
- Invite - and cooperate with - local entities and organizations to build a "snapshot" views of existing wildlife populations and watershed qualities to serve as a baseline for future comparisons.
- Require developers to produce evidence of possession of required federal and state required environmental filings - specifically EPA Section 401 and 404 certifications[15].

[15] https://www.epa.gov/cwa-401/overview-cwa-section-401-certification

2.0

BACKGROUND

In the late summer of 2022, Franklin County residents learned that the Mount Vernon Independent School District (MVISD) had submitted Texas Tax Code 313[16] ("313") proposed value limitation agreements on behalf of two solar facility developers for three utility-scale[17], solar energy facilities to the Texas Comptroller's Office.

Under 313, a "... value limitation is an agreement in which a taxpayer agrees to build or install property and create jobs in exchange for a 10-year limitation on the taxable property value for school district maintenance and operations tax (M+O) purposes.[18]" While the school district would lose tax revenue as a function of the value limitations, 313 allowed the district to recover any losses directly from the developer and or, ultimately, taxpayers through the state of Texas.

The 313 process did not require school districts make their submission of the value limitation agreements public and MVISD did not. The law only required public hearings to be held upon approval of the value limitation agreements by the Comptroller's Office. The three projects - Mount Stockyard Solar, Lupinus 1 Solar and Lupinus 2 Solar - proposed to install nearly 1.5 million solar voltaic panels across three parcels totaling approximately 10,000 acres of unincorporated land in northern Franklin County: Mount Stockyard northeast of Mount Vernon in Precinct 2 and Lupinus 1 and 2 northwest of Mount Vernon in Precinct 1.

The leasing of land for the projects began in early 2020 and continued through the summer of 2022. It was only by chance that Franklin County residents discovered the applications and subsequently embarked in the summer of 2022 on an organized opposition to not only potentially adverse property tax implications but the health, safety and environmental dangers posed county-wide. A considerable amount of additional opposition was directed at the school district for agreeing to waive a statutory jobs requirement during the 10 years of the value limitations.

[16] Texas Tax Code 313 Value Limitation Agreements
[17] National Renewable Energy Laboratory - "utility-scale" means a facility with 5 MW (5 million watts) of solar energy capacity.
[18] https://comptroller.texas.gov/economy/local/ch313/

2.1

From town hall meetings and gatherings across the county to addressing meetings of the Commissioners Court, activists circulated petitions, placed yard signs calling for opposition, wrote anti-solar editorials and purchased anti-solar advertising in order to rally residents against a potential school board final approval of the agreements. A petition to remove the school board president for violating his duties of stewardship was even filed[19].

On October 24, 2022, the Franklin County Commissioners Court adopted a 180-day "moratorium[20]" against "...the siting, construction, installation, operation, permitting, and licensing of any Commercial, Utility Scale Solar Energy Facility within the County..." Despite being advised by the county attorney that the court had no statutory authority[21] to undertake such an action, a two to two tie vote broken - and in favor - by the county judge.

Some three weeks later, the Mount Vernon Independent School District withdrew the three "313" applications from further consideration by the Office of the Comptroller stating the "intangible costs" to the relationship between the District and the community would not be outweighed by the "financial benefits[22]." In the absence of taxpayer-underwritten value limitations, the three projects then became private transactions between private parties, making meaningful public opposition problematic

On December 30, 2022, upon advice of the County Attorney, the Court voted to rescind the October 24, 2022 moratorium and replace it with a resolution generally opposing wind and solar development in Franklin County and denying financial incentives to encourage or help facilitate their development. That same day, exercising its statutory authority over county roads and economic development, the Commissioners' Court voted to adopt standardized Road-Use Agreements and formal Guidelines and Criteria for County Tax Abatements, each of which would place specific financial and information requirements on any commercial or industrial developer who chose to do business in Franklin County

[19] Olsen v Sanders
[20]CCM Vol. 69, pg. 982-986
[21] https://law.justia.com/codes/texas/2019/local-government-code/title-7/subtitle-a/chapter-212/subchapter-e/section-212-1351/
[22] MVISD Resolution, November 14, 2022

2.2

Anti-solar activists were outraged over the "moratorium" being rescinded and sides began to be taken as to how to proceed with continued opposition to what they believed to be the absence and refusal of formal County action against solar development.

On February 27, 2023, the December 30 resolution was amended to "...suspend[s], for not more than 180 days, the approval of the use of County Roads for the development and construction of industrial-scale solar and wind energy electric generation facilities so the County may: a) develop a set of rules and orders to identify, manage and mitigate their impacts on County roads and the health and safety of our citizens; and, b) develop a template to quantify potential impacts of the siting of industrial-scale solar and wind energy electric generation facilities which provide agricultural benefits and products. Prior to adoption, the Court will hold public hearings on the findings not later than 14 days following initial publication.[23]"

A task force to implement the amended resolution was also proposed and formally adopted on March 27, 2023, approving initial funding to cover postage, printing, volunteer mileage and development of a media presence. Three study teams were formed - Health and Safety, County Roads and Environmental - and shortly thereafter, embarked upon that work.

[23] CCM Vol 70 P 651

HEALTH AND SAFETY

3.0

HEALTH AND SAFETY

BASIS OF REVIEW:

The presence of utility-scale, solar generating facilities poses new - and potentially deadly - hazards to the health, safety and property of the residents of Franklin County.

Franklin County has always faced - and sought to prepare for - a range of natural hazards[24] including floods, tornadoes, extreme heat and wildfires. None of these hazards can be eliminated but the County, its agencies and its citizens can and do practice awareness and build resiliency, both of which can serve to mitigate the aftermath of a natural hazard event. Ironically, Franklin County's actual natural hazards - floods, tornadoes, extreme and wildfires - can worsen the effects of the known and emerging manmade hazards posed by these facilities. Therefore, it is important to understand the components of a utility-scale solar facility, the hazards posed by each and the manner in which they can be mitigated - if at all - by County actions.

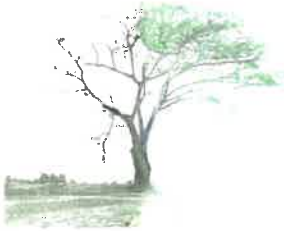
Specifically:

- Battery Energy Storage Systems (BESS) composed of 100s of 1,000s of lithium-ion batteries capable of producing unquenchable fires[25] and toxic and hazardous gases; and,
- Photovoltaic panels whose impervious surfaces and chemical and electronic components can produce toxic and damaging runoff[26] into land and watersheds as well as DC-arc electrical fires.

What is a Utility-Scale Solar Facility?

A 'utility-scale' solar project is usually defined as such if it produces 10 megawatts (MW) or more of energy[27]. For comparison, the average American household uses approximately 900 kWh (0.9 MWh) per month[28]. From a land-use perspective, a rule of thumb calls for 10 acres per megawatt (MW) of generating capacity[29].

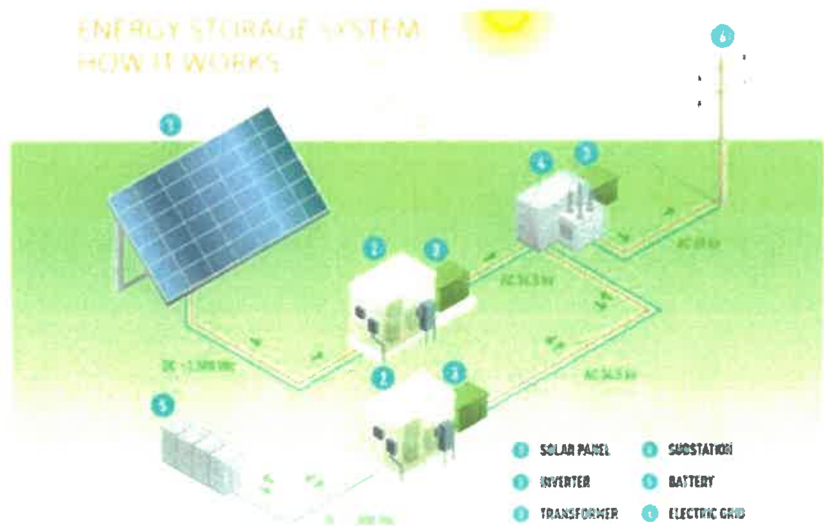
[24] Franklin County Emergency Management Plan, 2016
[25] https://www.fema.gov/fr/case-study/emerging-hazards-battery-energy-storage-system-fires
[26] https://www.popsci.com/environment/solar-farm-construction-epa-water-violations/
[27] https://www.targray.com/media/articles/solar-project-types
[28] Ibid.
[29] https://www.seia.org/initiatives/land-use-solar-development



3.1

One of the three utility-scale solar facilities planned for Franklin County is called Mount Stockyard Solar. The initial Mount Stockyard 313 application[30] described it as a 210 MW[31] generating facility "featuring" 485,000 solar panels, 63 central inverters[32]" and "70 MW of battery energy storage." The project footprint[33] proposes to cover some 2,000 acres of land located generally east of Mount Vernon, along or north of CR 2010 and along or west of FM 1896.

The project can generally be broken into two separate, but conjoined, footprints: 1) the 485,000 photovoltaic (PV) array, likely to be constructed north of CR 2010 along and aside FM 1896; and, 2) the switchyard and BESS[34], the entrance to which is described in the ERCOT interconnection agreement as being off CR 2010[35] in order to access the high voltage transmission lines it needs to get onto the grid. A simplified schematic of the functional parts of a utility-scale solar facility is shown on below (Source: PV Magazine-USA.com, 2021/12/23)



[30] Texas Tax Code 313 project #1871, https://comptroller.texas.gov/economy/local/ch313/agreement-docs.php
[31] MW = 1 million watts of electrical capacity
[32] Central inverters convert the DC power collected from an array of solar modules into AC for connection to the grid"
[33] Image credit: Mount Solar Stockyard, LLC
[34] https://blog.norcalcontrols.net/bess-battery-energy-storage-systems-pv-solar
[35] Project No. 35077-Oncor Electric Delivery Company's Transmission Contract Filing, p.28

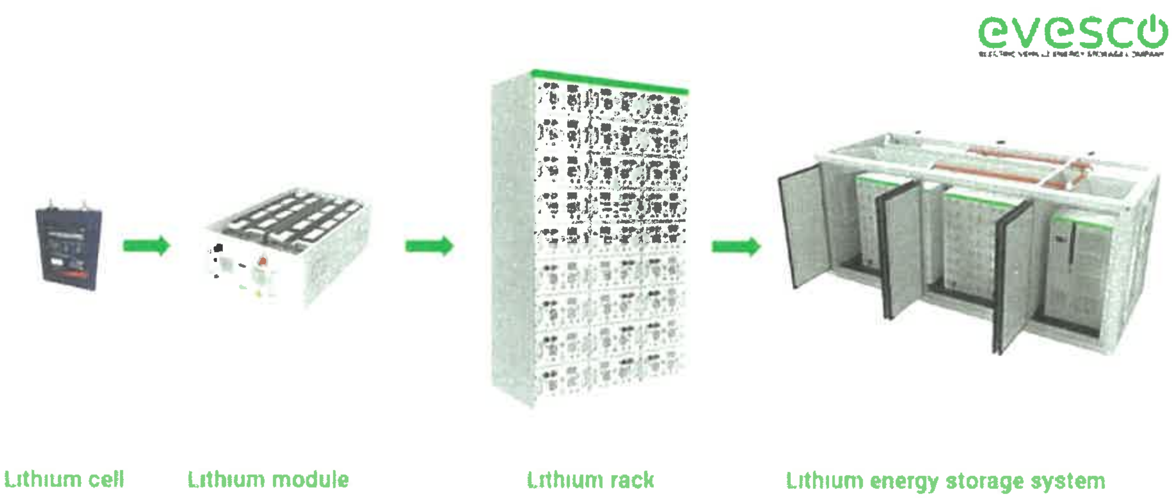
HEALTH AND SAFETY

3.2

As shown, the panels collect and transform solar energy into direct current - or DC - electric energy. The inverter converts the DC output power into alternating current - or AC - output power. The transformer "steps" the power's voltage up to match that of the transmission system to which the plant's switchyard is interconnected; in the case of Mount Stockyard, to 345kV, and then onto the transmission system. Excess power that is generated can be sent to the BESS and can be called upon when required or necessary.

"At their smallest element, BESS systems begin with a single aluminum, sealed battery unit of lithium iron phosphate[36] (LiFePO4). These units are packaged together to become a battery cell - a single anode and cathode separated by electrolyte - used to produce a voltage and current. A single battery can be made up of one or more of these cells. Battery cells are then connected in series or in parallel to become a battery module.

The battery module is a combination of several single battery cells which are electrically connected and housed in a shell forming the module. These modules are then packaged and connected together into battery packs - sets of any number of identical battery modules or individual battery cells - configured in a series, parallel or a mixture of both to deliver the desired voltage, capacity, or power density, then placed in racks."[37]



[36] https://www.batteryspace.com/LiFePO4/LiFeMnPO4-Batteries.aspx
[37] Ibid

3.3

There is a limitation to the number of battery packs in a rack, based on the planned "capacity" of storage. However, to use an existing example of how many modules, battery packs and racks form a utility-scale BESS, a 300MW California facility[38] and battery system consists of "more than 4,500 racks or cabinets that each contain 22 battery modules...that's 100,000 modules.[39]"

For comparison purposes, the Mount Stockyard Solar project proposes to contain a 70 MW BESS. Using a dramatically simplified extrapolation, there could be more than 23,000 lithium modules housed in more than 1,000 racks. To grasp the potential physical size of an individual BESS, according to one energy storage company, 10 MW of battery energy storage is generally housed in a standard shipping container 53' long, by 9' wide by 10' tall. These containers alone can weigh as much as 22 tons.[40]

BESS Container Cutway
Image: GE

[38] Moss Landing, CA
[39] https://www.solarpowerworldonline.com/2021/01/worlds-largest-lithium-based-energy-storage-system-storing-1200-mwh-of-power-now-online-in-california/
[40] https://sunpalpower.en.made-in-china.com/product/AFbayLscLvkR/China-Large-Scale-1MW-2MW-3MW-BESS-Battery-Storage-Container-System-For-Project.html#productDescription

3.4

In its "[B]ESS Fact Sheet"[41], the National Fire Protection Agency ("a global self-funded nonprofit organization, established in 1896, devoted to eliminating death, injury, property and economic loss due to fire, electrical and related hazards") describes some of the hazards associated with BESS and reasons for BESS failures delineated below.

What Are Some of the Hazards?

Thermal Runaway

Thermal runaway is a term used for the rapid uncontrolled release of heat energy from a battery cell; it is a condition when a battery creates more heat than it can effectively dissipate. Thermal runaway in a single cell can result in a chain reaction that heats up neighboring cells. As this process continues, it can result in a battery fire or explosion. This can often be the ignition source for larger battery fires.

Stranded Energy

As with most electrical equipment, there is a shock hazard present; but what is unique about "[B]ESS is that often, even after being involved in a fire, there is still energy within the " [B]ESS. This is difficult to discharge since the terminals are often damaged and presents a hazard to those performing overhaul after a fire. Stranded energy can also cause reignition of the fire hours or even days later.

Toxic and Flammable Gases Generated

Most batteries create toxic and flammable gases when they undergo thermal runaway. If the gases do not ignite before the lower explosive limit is reached, it can lead to the creation of an explosive atmosphere inside of the "[B]ESS room or container.

Deep Seated Fires

"[B]ESS are usually comprised of batteries that are housed in a protective metal or plastic casing within larger cabinets. These layers of protection help prevent damage to the system but can also block water from accessing the seat of the fire. This means that it takes large amounts of water to effectively dissipate the heat generated from "[B]ESS fires since cooling the hottest part of the fire is often difficult."

[41] https://www.nfpa.org/~/media/Files/Code%20or%20topic%20fact%20sheets/ESSFactSheet.ashx

3.5

Failure Modes
These are ways the batteries can fail, often leading to thermal runaway and subsequent fires or explosions.

Mechanical Abuse
Mechanical abuse is when a battery is physically compromised by either being dropped, crushed, or penetrated.

Thermal Abuse
Thermal abuse can occur when a battery is exposed to external heat sources.

Electrical Abuse
Electrical abuse can happen when the battery is overcharged, charged too rapidly or at high voltage, or discharged too rapidly.

Environmental Impacts
Environmental impacts that can lead to battery failure include seismic activity, rodent damage to wiring, extreme heat, and floods.

Of these, thermal runaway is the biggest hazard associated with lithium-ion batteries, whether it is a single-cell phone battery, an electric vehicle battery or a massive energy storage system composed of 10s of 1,000s of individual cells and batteries.

Restating, thermal runaway is "a phenomenon in which the lithium-ion cell enters an uncontrollable, self-heating state. Thermal runaway can result in extremely high temperatures, violent cell venting, smoke and fire. Faults in a lithium-ion cell can result in a thermal runaway. These faults can be caused by internal failure or external conditions.

One example of such internal failure is an internal short circuit. In a lithium-ion cell, the cathode and anode electrodes are physically separated by a component called the separator. Defects in the cell that compromise the separator's integrity can cause an internal short circuit condition that can result in thermal runaway. This is especially likely in cells of poor quality. External, "off-nominal" conditions can also cause thermal runaway.[42]"

[42] https://ul.org/research/electrochemical-safety/getting-started-electrochemical-safety/what-causes-thermal

3.6

THERMAL RUNAWAY

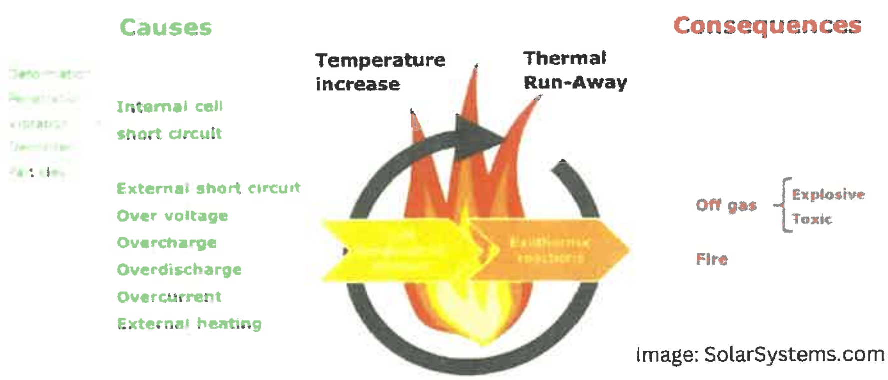


Image: SolarSystems.com

Examples of off-nominal conditions include:

• Overcharge: Can be due to incompatibility between cell and charger, or poorly designed battery management system (BMS)
• Multiple over-discharges followed by charge: Discharging the cell or battery below the cell manufacturer-recommended lower voltage threshold multiple times, then charging the cell
• External short circuit
• High- and low-temperature environments [43]"

Flammable gases[44](Exhibit 3)) produced by battery fires and explosions include hydrogen, ethylene, methane and carbon monoxide. Toxic gases[45] include hydrogen chloride, hydrogen cyanide and hydrogen fluoride. Environmentally hazardous substances[46] (Exhibit 4) include cobalt oxide, cobalt lithium, nickel oxide, copper oxide, copper hydroxide, dicopper chloride trihydroxide and copper chloride. These present dangers of "acute and chronic" hazards to aquatic environment and, according to the authors, the list of environmentally hazardous substance is "indicative only, not exhaustive.[47]"

[43] iBID
[441 ResearchGate.net, DOI: 10.13140/RG.2.2.35893.76005, March 2022
[45 Ibid.
[46] Ibid.
[47] Ibid.

3.7

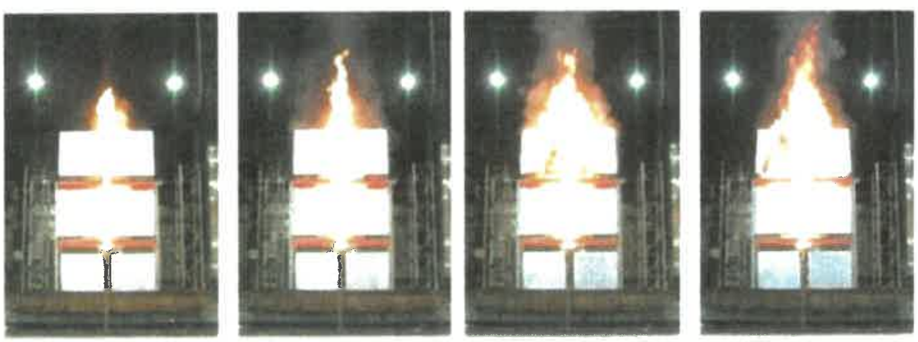
"Battery Fire" at Drogenbos, Belgium 11 Nov 2017. 1 MWh facility; fire occurred during commissioning. Taken at the start of the incident . **Image**: Wade William Fergusen

3.8

Lithium-ion battery fires cannot be extinguished using traditional fire fighting techniques and equipment.

"...in battery pack fires, "each cell may burn on a different timeline. [48]"

Test Demonstration of the Speed of Flame Propagation in BESSs (in seconds)



30 s | 60 s | 90 s | 120 s

Photo Courtesy of NFPA

Water cannot reach interior cells to cool them. As each cell wall fails, it releases more flammable electrolyte that is ignited by the existing fire, so fires can last a long time regardless of firefighting actions.[49]"

"The application of water on electronics can cause electrical faults (such as short circuits in the BESS). Additionally, damage to surrounding unburned batteries is likely. The rack installation of cells often impeded the water from reaching the fire.

There [also] is a concern regarding the environmental impact of applying copious amounts of water during suppression activities that can permeate into the ground water. This water must be contained and processed through a water treatment facility. Lastly, many BESSs are located in remote areas where water supply is limited or not available.[50]"

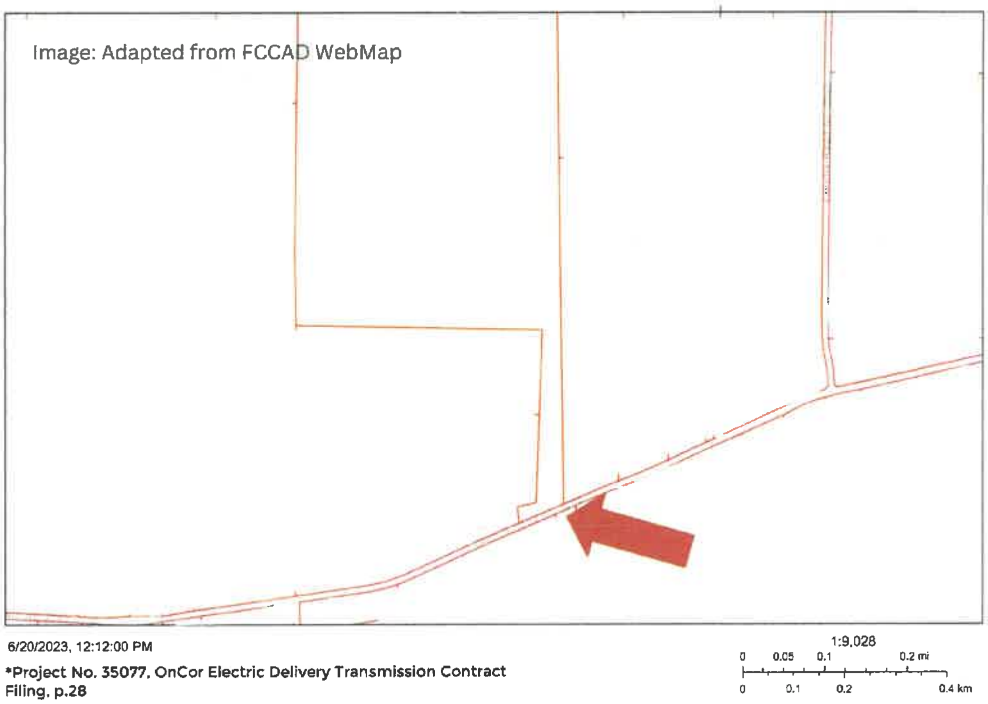
[48] https://textechindustries.com/blog/how-do-you-extinguish-a-lithium-battery-fire/
[49] https://www.tuvsud.com/en-us/services/risk-management/fire-protection-engineering/lithium-ion-batteries
[50] https://www.statx.com/fire-education/what-you-need-to-know-about-energy-storage-system-fire-protection/

3.9

What does the presence of battery energy storage systems and their inherent hazards mean for Franklin County?

At present, the general location of only one proposed battery energy storage system is known - Mount Stockyard Solar - and is to be constructed off County Road 2010, east of Mount Vernon. As described in the November 11, 2022 interconnection agreement filed by Oncor[51], the regional transmission service provider, ENEL - Mount Stockyard's owner - will build the switchyard and accompanying BESS. Both will be accessed by an all-weather road to be constructed at and entered from CR 2010, adjacent to a transmission easement running south-east and north-west.

REPORTED ACCESS TO BESS & SWITCHYARD SITE*



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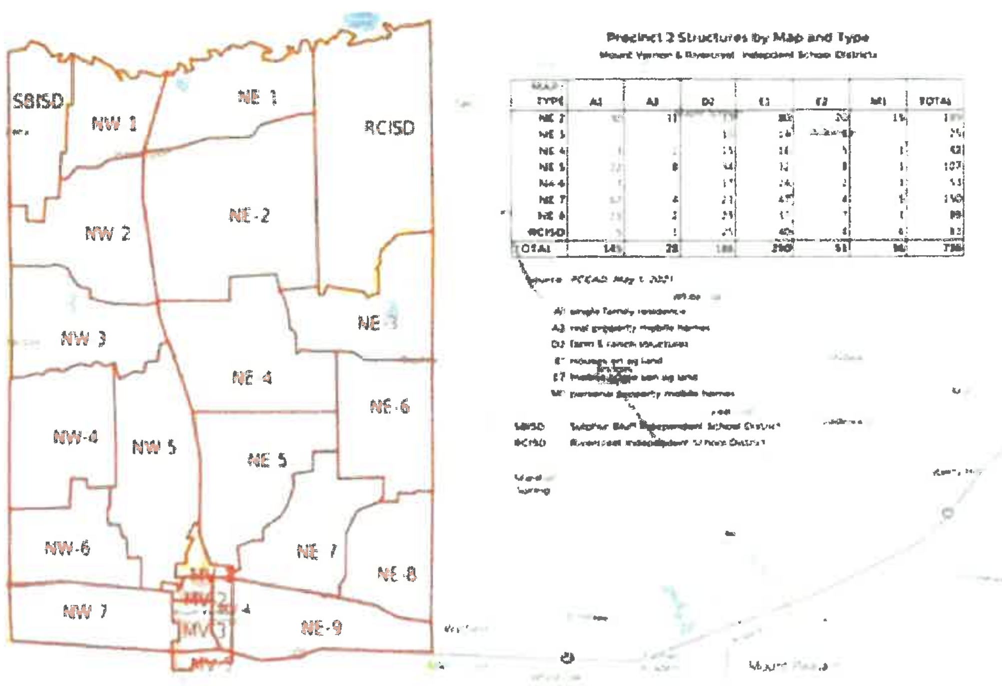
***Project No. 35077. OnCor Electric Delivery Transmission Contract Filing. p.28**

[51] Project 35077, Interconnection Agreement, OnCor , November 11, 2022, p. 28

3.10

To the immediate east and west of the site are private properties, a mix of single family homes and agricultural enterprises. According to the Franklin County Certified Appraisal District, there are more than 700 structures[52]: single family homes, real property mobile homes, farm and ranch structures, houses on agricultural land, mobile homes on agricultural land and personal property mobile homes.Each of these, particularly those in NE-5 and NE-7 - which are in relatively close proximity to the proposed Mount Stockyard BESS - are at risk, not only from natural disasters, but now, from a singularly man-made disaster waiting to happen.

NORTHEAST FRANKLIN COUNTY STRUCTURE MAP BY STRUCTURE TYPE & NUMBER



[52] Image Courtesy Franklin County CAD, May 2, 2023

3.11

The acreage on which the BESS will be located will only be accessible by that all weather-road making access by emergency and fire department vehicles problematic, if not impossible. A schematic of the switchyard included in the Oncor filing does not indicate a provision for or construction of any independent or self-contained firefighting systems.

What does the presence of 485,000 photovoltaic solar panels and their inherent hazards mean for Franklin County?

If identifying the failure of one of 10s of 1,000s of lithium-ion batteries in a BESS is problematic - the hazards of such a failure notwithstanding - the ability to identify the failure of 1 of 485,000 photovoltaic (PV) panels is unquantifiable. Installed across some 2,000 acres of land, by the time an individual panel failure IS identified, the ability to actually access the affected panel(s) will likely be not only too late, but likely impossible.

PV failure can be physical or electrical.

"A common PV module is build up with four different materials: glass, metals, polymers and some type of semiconductor. These materials are used for the front cover (glass), the frame (metal) if there is one, as encapsulation material (polymer), where the active solar cells (semiconductor) are embedded, as back sheet (polymer or glass), as fingers, cell and string connectors and cables (metals) and as junction box (polymers, metals).[53] The main causes of failure are from manufacturing defects, improper installation, operating stress and accidents.[54] However, PV panel electrical failures pose the most serious hazard to the facility and the surrounding property.

The following are the most common causes of electrical fires at a solar power generation site:

- Improperly installed connectors
- Cable chaffing causing a short circuit
- Failure of solar inverter electrical component (e.g., breaker, capacitor, transformer, etc.)

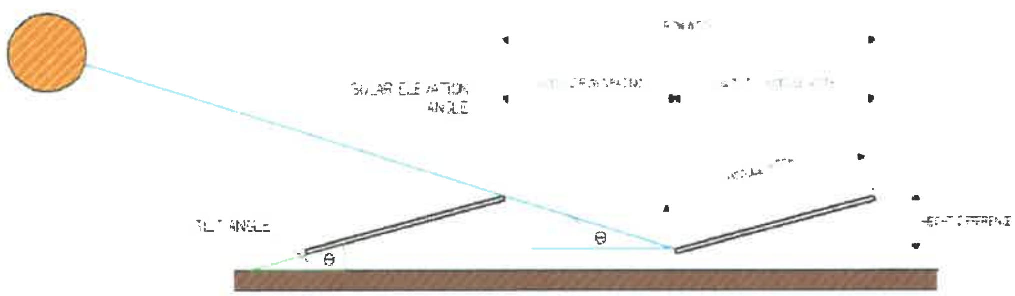
[53] International Conference on Materials for Advanced Technologies 2011, Symposium O, "Why Do PV Modules Fail?", 2012
[54] Failure Causes in Solar PV Systems, SolarGen.com, March 7, 2019

3.12

Additionally, solar equipment often reaches high temperatures because it is constantly moving, inverting, transforming, and manipulating high voltages—this increases fire risk as well. Ultimately, in any situation where high voltages are present, the risk of fire is escalated. [55]

Mount Stockyard Solar proposes to install 485,000 solar panels in rows across some 2,000 acres. Regardless of the size of a given panel, the distance between each row of panels is determined by the need "to avoid accidental shading from the modules that are ahead of each row[56] ".

Image: GreenTechRenewables.com



Being unable to identify an individual panel - or panels - on fire is complicated by the ability of plant-owned and or emergency vehicles to access them.

[55] https://www.firetrace.com/fire-protection-blog/how-to-extinguish-a-solar-farm-fire
[56] https://www.greentechrenewables.com/article/determining-module-inter-row-spacing

3.13

Franklin County Firefighting Capability

"Volunteer departments cover approximately 76 percent of Texas and are often the only service in many parts of the state. Unfortunately, the ratio of volunteer firefighters per 1,000 residents dropped from eight in the late 1980s to less than six today."[57]

Franklin County is home to 4 volunteer fire departments, 2 located north of Interstate 30, 2 located south of Interstate 30:

- Mount Vernon Volunteer Fire Department, located in the county seat;
- North Franklin Volunteer Fire Department, located some 10 miles due north of Mount Vernon in Hagansport;
- Purley Fire Volunteer Department; located 8 miles south of Mount Vernon at 513 FM 900 W, Mount Vernon; and,
- South Franklin Volunteer Fire Department, located of Highway 115, south of Lake Cypress Springs, in Scroggins, Texas.

According to an October 2022 report, the Texas A&M University Forest Service reports a total of 46 volunteer fire fighters in Franklin County, or approximately 4 per 1,000 residents. Perhaps more startling is the knowledge that Franklin County encompasses some 180,000 acres. Taken to absurdity and ignoring possible assistance via mutual aid agreements, that means only 1 volunteer firefighter for every 3,900 acres.

Regardless of the number of Franklin County's firefighters, the county - like most in Texas - is not equipped to respond to the hazards of lithium-ion battery fires and or PV DC-arc fires. Increased manpower, specialized training - and highly specialized personal protective gear - along with additional firefighting vehicles will be required to begin to address the threats.

A working group of department chiefs and firefighters met on several occasions to discuss the threats posed by the proposed solar facilities and developed a comprehensive schedule (See Exhibit 1) of manpower and equipment upgrades minimally required to meet them. A serious discussion of the need to create alert and evacuation scenarios also took place. Finally, the need to amend the county's emergency management plan to recognize and incorporate this dangerous and man-made threat was agreed upon.

[57] https://capitol.texas.gov/tlodocs/88R/analysis/html/SB00567I.htm

To that end, it is also important to examine proximities, possible response times and access to the solar facility most likely to be commissioned first - Mount Stockyard.

See Exhibit 5 to view the relative distances between fire departments and Mount Stockyard's solar array field and battery energy storage system locations.

Mount Vernon Volunteer Fire Department[58]

According to the Texas A&M University Forest Service, the Mount Vernon fire department is home to 16 volunteer firefighters, all but 1 one of whom is active.

Located on Hwy 37 just south of Hwy 67, the department is approximately 4 miles from the proposed site of the all weather road to access the Mount Stockyard Solar switchyard and BESS; and approximately 8 miles from a mid-way point on FM 1896 where the solar field array might be accessed.

North Franklin Volunteer Fire Department[59]

Located approximately 10 miles north of the Franklin County Court House, North Franklin is home to 10 volunteer firefighters, 5 of whom are active.

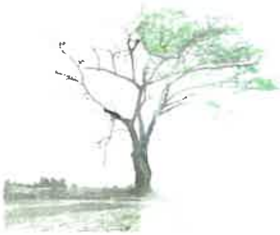
The department is approximately 13 miles north and west from the proposed site of the all weather road to access the Mount Stockyard Solar switchyard and BESS; and approximately 15 miles from a mid-way point on FM 1896 where the solar field array might be accessed.

Purley Fire Volunteer Department[60]

Located 8 miles south of the Franklin County Court House, Purley is also home to 10 volunteer firefighters, 3 of whom are active.

The department is approximately 11 miles south and west from the proposed site of the all weather road to access the Mount Stockyard Solar switchyard and BESS; and approximately 13 miles from a mid-way point on FM 1896 where the solar field array might be accessed.

[58] https://fireconnect.tfs.tamu.edu/FireDepartments/545
[59] Ibid.
[60] Ibid.



3.15

South Franklin Volunteer Fire Department[61]

Located 12 miles south of the Franklin County Court House, South Franklin is home to 20 volunteer firefighters, 13 of whom are active. The department is approximately 14 miles south and west from the proposed site of the all weather road to access the Mount Stockyard Solar switchyard and BESS; and approximately 16 miles from a mid-way point on FM 1896 where the solar field array might be accessed.

[61] Ibid.

4.0

IMPACT ON COUNTY ROADS

BASIS OF REVIEW

A county road is a public road that has been accepted for maintenance by the Commissioners Court pursuant to the standards set by the Commissioners Court. These roads are located in the unincorporated areas of the county[62].

According to the Texas Department of Transportation, a county road must meet the following criteria to be eligible for inclusion in the County Road Inventory

- The road must be open to the public, 24 hours a day, 7 days a week.
- The road must be clear of obstructions that would prevent public use.
- Must be passable by standard passenger vehicle.
- Must be free of barriers, such as fallen trees, flowing water, or eroded stream banks, that would prevent reasonable passage by standard passenger vehicle.
- Accessible to public travel

Franklin County is the ninth smallest county in the State of Texas[63] . According to the 2020 U.S. Census Bureau report, the County's total area is 294.8 square miles of which 284.4 square miles are land. That translates to 182,000 total acres of land of which approximately 80,000 acres are considered impermeable - or built - with the remaining 100,000 acres in pasture, timber or agricultural uses. Its population is approximately 10,000 residents, one-quarter of whom reside in the county seat of Mount Vernon.

Divided in half north and south by Interstate 30, the county is home to some 288 total county road miles[64] and approximately 24.5 miles of city roads. Franklin County's county roads are divided among its four Commissioners as follows (see Exhibit 6):

- Precinct 1: 88
- Precinct 2: 60
- Precinct 3: 70
- Precinct 4: 64

[62] https://countyprogress.com/county-roads-101-4/
[63] http://www.usa.com/rank/texas-state--land-area--county-rank.htm
[64] https://txcip.org/tac/census/profile.php?FIPS=48159

4.1

However, these numbers[65] only paint part of the picture when contemplating access for the scale and size of the commercial and industrial traffic involved in constructing utility-scale solar installations.

According to the Texas Department of Transportation,[66] Franklin County is home to nearly 500 TOTAL miles of roads.

Data Source: YE2021 Certified Files
Annual Report - Highway Status Open To Traffic Only

TEXAS DEPARTMENT OF TRANSPORTATION
Transportation Planning and Programming Division
by County by Highway System

County	Highway System	Centerline	Lane	DVMT	Truck DVMT
Franklin (81)					
	IH Highways	10 685	42.740	311,297 787	182 918 966
	US Highways	11 504	24.052	23,547 830	2,496 115
	State Highways, Spurs, Loops, Business Routes	32.883	72.920	101,857.180	24,283.518
	Farm or Ranch to Market Roads and Spurs	80 667	161.334	80,062.753	5,930.540
	Frontage Roads	21 420	42 840	8,710.125	736 886
	On-System Subtotal	157 159	343 886	525,475 675	216.366 025
	City Streets	24.496	49.034	5,772.409	186.492
	Certified County Roads	313.483	631 997	26,023 779	848.733
	Off-System Subtotal	337.979	681 031	31,796 188	1 035 225
	County Total	495.138	1,024.917	557.271.863	217.401.250

While Mount Stockyard's project footprint rests almost entirely in Precinct 2, examining access by road for the delivery of material and equipment, reviewing other solar projects can be illustrative of the number and types of vehicle and equipment movements that can be expected.

For example, the 40 MW Red Rock Solar Plant, built in 2017 in Casa Grande, Arizona, was built to able to take advantage of existing transmission and utility facilities by McCarthy Construction[67] , the general contractor. On its website, McCarthy stated that it installed "2,286 single-axis trackers supporting 182,880 photovoltaic panels ".[68]

[65] https://txcip.org/tac/census/profile.php?FIPS=48159
[66] https://ftp.txdot.gov/pub/txdot-info/tpp/roadway-inventory/2021.pdf
[67] https://www.mccarthy.com/projects/red-rock-solar-plant
[68] Ibid.

4.2

It went on to describe the project "by the numbers":

"By The Numbers[69]

- 40 MW
- 400 acres of land
- 182,880 solar panels
- 246,300 cubic yards earth moved
- 650 container trucks of material delivered
- 14 retention basins built (1.8 million gallons of water)
- 1,043 miles of DC string cabling
- 4 million pounds of steel piles
- 2,286 single-axis trackers
- 731,520 of glass fastening pins
- 20 inverters (2.1 MW)'"

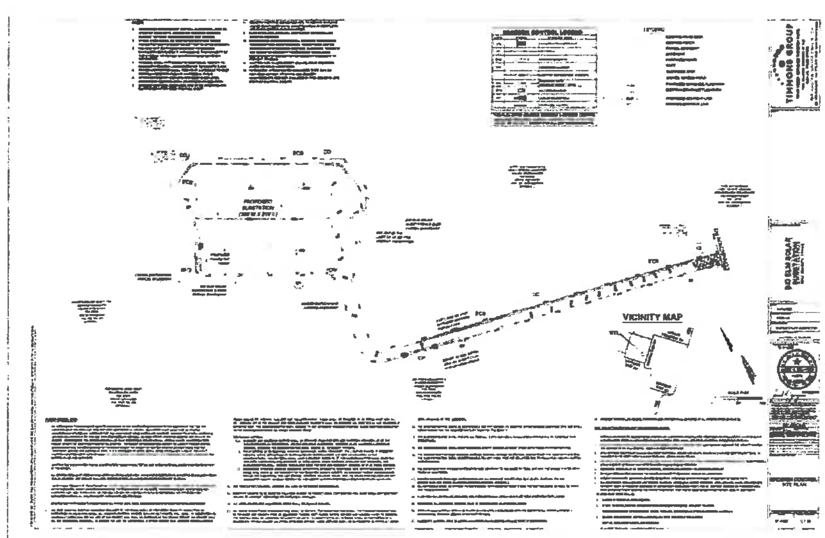
[69] Ibid

IMPACT ON COUNTY ROADS

4.3

Using a simple extrapolation of only the solar field construction for Mount Stockyard - a proposed 210 MW facility -a 5 times multiplier would not be a stretch. The project could entail more than 3,000 container truck trips of material being moved in and the same number of truck trips leaving empty; as much as - or more - 1,000,000 cubic yards of material being moved with empty trucks leaving; and - depending upon the design - 20 or more inverters (weighing in excess of 30 tons each) being delivered and installed. Access to the solar field location would likely be off FM 1896; however, the origin of the vehicles and materials is unknown.

As for the switchyard and battery energy storage system, the contractually-stated construction entrance will be on CR 2010, just a few miles east of Mount Vernon. The interconnection agreement[70] Oncor Electric Delivery filed with the Texas Public Utility Commission last October details the construction of the proposed switchyard that will connect Mount Stockyard to OnCor's delivery system. It describes an "All Weather Road" being constructed and maintained leading from CR 2010 to location of the switchyard. While Stockyard plans are not available for public viewing, below is an exhibit from a solar project to be constructed in Bell County that shows a similar layout - its entrance off a county road and leading to the project's switchyard.



[70] November 9, 2022, PUC Control Number 35077, item 1516

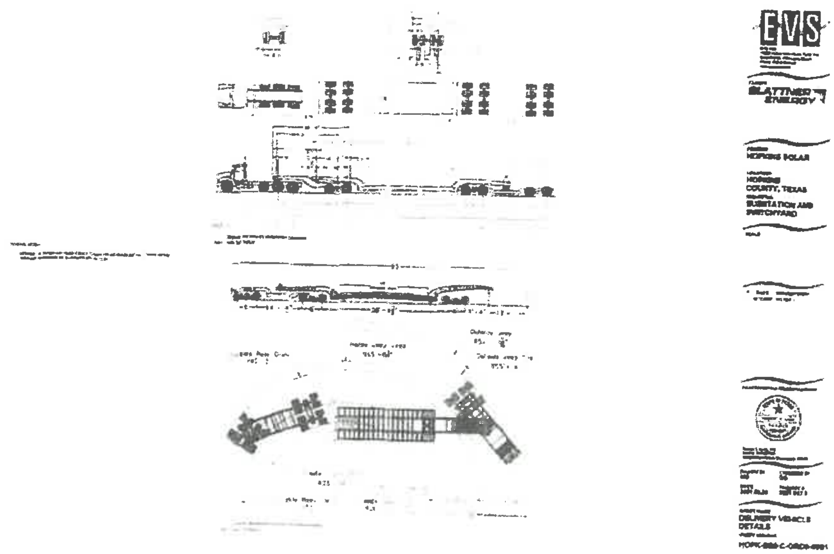
4.4

Dump trucks, motor graders, excavators and similar construction equipment will be used for constructing to access road and switchyard pad. Later, tractor trailers and oversize lowboys will be required to transport and place the switchyard apparatus and battery energy storage containers. A 345 kV transformer (BELOW) can weigh as much as 350,000 pounds[71] - or 175 tons and Mount Stockyard's switchyard calls for two of them, not to mention the breakers, pylons, and other necessary equipment.

[71] https://www.stearnselectric.org/extra-long-semi-load-rolls-into-riverview-project-gre-delivers-transformer-to-new-substation/

4.5

Regardless of where these ultra-heavy loads originate, unless the project "all weather road" entrance and location are moved, a left or right-hand turn off of CR 2010 or onto it will require material changes and upgrades before such movements can even be contemplated.



State law[72] permits county commissioners to impose weight limits, limit traffic, set speed limits, establish load limits on a county roads and bridges and "authorizes the county judge to issue a temporary permit for 90 days for the transportation of an overweight, oversize, or overlength commodity that cannot be reasonably dismantled on county roads that are not part of the state highway system[73].

Construction of each the solar field and switchyard/BESS are estimated to be approximately 24 months; developers should be aware of the constraints that can be imposed on their timing.

[72] https://www.county.org/TAC/media/TACMedia/Legal/Legal%20Publications%20Documents/2021/2021-05-Roads.pdf
[73] ex. Transp. Code §623.018(a

4.6

Further, the initial 48 month lease terms contemplated construction and project commissioning to occur during the last of the 24 month terms. That being said, Mount Stockyards suite of leases for the project began in 2020 and were 4 or 5 years in duration, subject to a renewal option of 30 years.

Of that suite of leases:

- +/- 1,100 acres were leased in June and July 2020 and are due to expire - in the absence of a re-opener - in July of 2024
- +/- 479 acres were leased in 2021
- +/- 730 acres were leased in April of 2022 with a renewal option of 40 years plus 5

Thus, half of the +/- 2,000 acres acquired for the project - primarily for the solar field - could be at risk of expiring before construction might be completed. These expiration dates have no bearing on county roads but to say that the agreement Oncor/Stockyard submitted to the PUC will likely have to be amended. Delays of any kind of major construction contacts DO have bearing on the availability and sourcing of materials; in particular, unless Mount Stockyard has contracted for/purchased its major switchyard components like transformers, breakers and BESS, those might go to customers ready to purchase, install and commission.

If Mount Stockyard is built, county roads will be absolutely affected by vehicular traffic and significant damage. Ultra-heavy loads, repetitive hauls and the transport of extremely hazardous lithium-ion battery energy storage systems must be carefully managed to minimize impact on county roads and the traffic patterns associated with normal commuter, neighborhood service and school buses.

The County adopted new road-use agreements last November that will allow that management AND require bonding on the part of developers like Mount Stockyard to ensure that the cost of repairing and restoring any roads damaged by the project be borne by them, not the County or its residents.

5.0

ENVIRONMENTAL IMPACT

POTENTIAL IMPACT ON THE ENVIROMENT, WILDLIFE AND WATER RESOURCES OF FRANKLIN COUNTY

Basis of review:

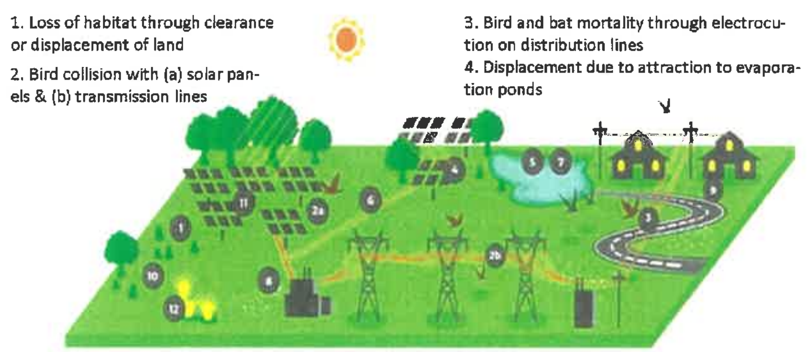
No utility-scale solar generating facility has reached its end-of-life to either reveal the true condition of the land underneath or become an actual reference point in environmental studies.

Not surprisingly, of the three study areas undertaken, impacts on the environment, wildlife and water resources of the County are the most difficult to quantify. However, they can be broadly categorized as follows:

- Habitat Loss & Stormwater Runoff
- Ecosystem Disruption
- Water Use
- Exposure to hazardous materials

Impacts on biodiversity and the associated ecosystem services due to PV.

©ICUN and TBC, 2021



5. Wildlife mortality due to attraction to evaporation ponds
6. Barrier effects to terrestrial biodiversity movements.
7. Habitat degradation due to changes in hydrology and water availability and quality
8. Pollution (e.g. dust, noise and vibration, solid/liquid waste)
9. Indirect impacts from displaced land uses, induced access or increased economic activity
10. Associated ecosystem service impacts
11. Habitat alteration due to changes in microclimatic effect of solar panels
12. Introduction of alien species

5.1

As shown in the previous image, from loss of habitat to the introduction of alien species, utility-scale solar PV installations cannot avoid impacting the environment during construction and throughout their lifetimes. Franklin County can expect no fewer or less serious impacts:

"DURING CONSTRUCTION/OPERATION[75]:

- Barrier effects - Large areas of PV panels and their associated facilities can disrupt wildlife movement and/or migrations by acting as a barrier. For example, important stopover sites for migratory birds may be lost due to cumulative impacts from several large PV plants along their flyway. Solar plants typically have security perimeter fencing installed. In some cases, existing ground clearance under fences, gaps in the fence weave, and gates allow small to medium sized mammals to pass. However, such fencing could still pose a barrier to large mammal movement and/or migrations. Although direct evidence of the barrier effect of solar facilities is largely unquantified, the barrier effects related to large scale developments and infrastructure components, such as fencing, has been demonstrated to impact species movement, and reduction of range size.
- Habitat degradation due to changes in hydrology and water availability and quality
- Habitat alteration: "Operation Shadow" effects caused by solar panels can alter the species composition and diversity of underlying habitats as a result of air and soil microclimate variation. A study of a UK solar plant revegetated with grassland showed that species diversity was lower under PV panels as a result of differences in soil and air temperature.
- Introduction of invasive alien species: Construction movement of equipment, people or components may facilitate the introduction of invasive alien species (IAS) by various pathways, for example, by being transported in soil on machinery or attached to clothing. The creation of new habitats, for instance by land disturbance during construction or creating open spaces, may also facilitate the spread of IAS already present on the site.

[75] Bennun, L., van Bochove, J., Ng, C., Fletcher, C., Wilson, D., Phair, N., Carbone, G. (2021). Mitigating biodiversity impacts associated with solar and wind energy development. Guidelines for project developers. Gland, Switzerland: IUCN and Cambridge, UK: The Biodiversity Consultancy.

ENVIRONMENTAL IMPACT

5.2

During operation:

- Bird collisions with solar panels and/or, transmission lines
- Bird and bat mortality through electrocution on distribution lines
- Displacement due to attraction to reflective surface of solar panels
- Wildlife mortality due to attraction to evaporation ponds"

Effect		Taxa affected	Source[1]
Direct injury/mortality	Solar flux	Birds, insects	2, 3, 4, 6, 7, 8, 9, 10
	Undefined trauma	Birds	8
	Impact trauma	Birds, bats	1, 2, 3, 5, 6, 8, 11
	Electrocution	Birds	6, 8, 11
	Entrapment/drowning in water in-take structures and evaporation ponds	Birds, mammals, insects	4, 6, 7
	Entrapment in soil ruts from vehicle passage	Amphibians, reptiles	10
Secondary mortality	Predation trauma	Amphibians, birds, reptiles	10, 8
	Light pollution	Amphibians, birds, bats, other mammals, insects, reptiles	4, 5, 10
	Electromagnetic field effects	Amphibians, bats, insects, reptiles	4, 10
	Other anthropogenic effects	Amphibians, birds, bats, other mammals, insects, reptiles	5, 7, 8, 10

Note: 1. Costantini, Gustin, Ferrarini, and Dell Omo ([illegible]); 2. Diehl, Valdez, Preston, Wellik and Cryan ([illegible]); 3. Ho [illegible]; 4. Horvath et al. ([illegible]); 5. Huso, Dietsch, and Nicolai ([illegible]); 6. Jeal, Perold, Ralston-Paton, and Ryan ([illegible]); 7. Jeal, Perold, Seymour, Ralston Paton, and Ryan ([illegible]); 8. Kagan, Viner, Trail and Espinoza ([illegible]); 9. Loss, Dorning, and Diffendorfer ([illegible]); 10. Lovich and Ennen ([illegible]); 11. McCrary, McKernan, Schreiber, Wagner, and Sciarrotta ([illegible])

37

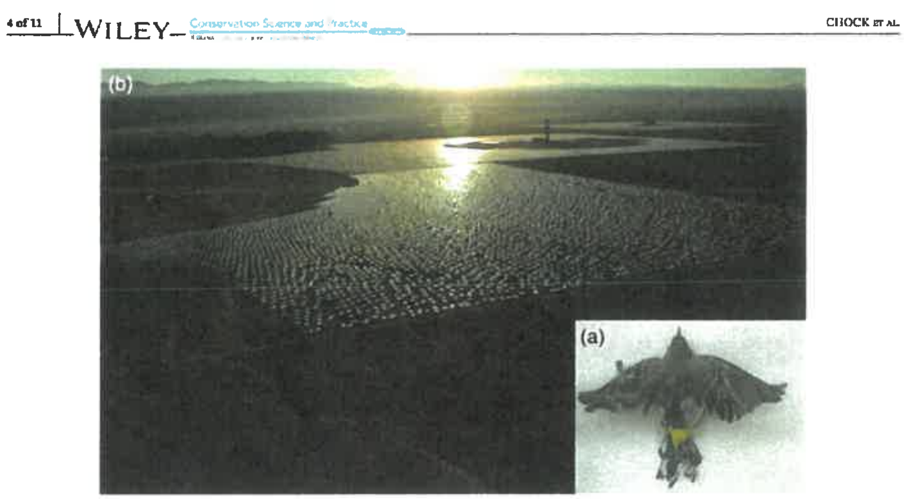
5.3

Habitat Loss & Stormwater Runoff

According to Texas Parks & Wildlife Department's list of the "Species of Greatest Conservation Need (SGCN)[76], one can find in Franklin County 3 amphibians, 9 birds, 11 mammals, 6 reptiles and 5 plants that meet that criteria While all may not be impacted, the long-term effects of habitat loss on these species cannot ignored.

"Solar facility construction and operation directly and indirectly alter habitat use via functional habitat fragmentation, dispersal limitations, population isolation, and altered habitat quality. Compared to other groups of species, migratory birds appear to suffer disproportionately higher mortality from solar facilities, particularly those located on migration routes and/or near breeding and wintering grounds (Walston et al., 2016). The greater abundance of insect prey attracted by the high structures and light (Diehl et al., 2016) likely attracts aerial insectivores, resulting in a higher risk to burning via solar flux from concentrated solar power).

Migratory water bird species are also susceptible because solar facilities may be perceived as waterbodies (a hypothesized "lake effect"), attracting them to land and injuring, killing, or stranding them in the process ."[77]



761] TPWD County Species Record
[77] McCrary et al., 1986; Kagan et al., 2014

5.4

Simply the presence of perimeter fencing can block and alter habitat migration; in the case of Mount Stockyard, onto roadways instead of through pasture and timber lands.

"Solar plants typically have security perimeter fencing installed. In some cases, existing ground clearance under fences, gaps in the fence weave, and gates allow small to medium sized mammals to pass. However, such fencing could still pose a barrier to large mammal movement and/or migrations.

Although direct evidence of the barrier effect of solar facilities is largely unquantified, the barrier effects related to large scale developments and infrastructure components, such as fencing, has been demonstrated to impact species movement, and reduction of range size.[78]"

Utility-scale solar facilities are estimated to require 10 acres[79] of land for every 1 MW of installed capacity; Mount Stockyard's proposed 210 MW facility has +/- 2,000 acres under lease. The land leased is primarily pasture, dairy and timber land. Solar facilities require the land on which they are constructed to be stripped of vegetation in order to be graded which, in turn, can lead to run-off from impermeable panel surfaces, soil erosion and compaction, each of which can then affect drainage and potentially contaminate adjacent watersheds.

Photos below (Michael O'Brien Pickens) of timberland beings cleared for a solar facility, Dike, Texas

[78] https://www.iucn.org/sites/default/files2022-0603_biodiversity_impacts_associated_to_solar_power_projects.pdf
[79] https://betterenergy.org/blog/the-true-land-footprint-of-solar-energy/

5.5

In adjacent Hopkins County, a contractor for Engie North America, Inc.'s Dike Solar Plant has been cited and fined three times by the Texas Commission on Environmental Quality (TCEQ) for failing to "to install and maintain effective erosion controls and sediment controls[80] " while clearing the proposed site. [See TCEQ Evidentiary Photo below]

Further, the contractor was cited for '"failure to utilize outlet structures that withdraw water from the surface when discharging from basins". Specifically, this refers to improper or poorly constructed retention areas that are constructed to control sediment erosion from a construction site. Due to its failure to properly construct these basins, sediment was allowed to erode and wash into the nearby tributaries including on neighboring property owners. Lastly, it was charged and resolved a third violation regarding "failure to prevent the unauthorized discharge of sediment into or adjacent to the Waters in the State of Texas per Texas Water Code, Chapter 26.121.[81]]

The owner of the affected property did not share in the proceeds of the fine.

TCEQ Evidentiary Photographs

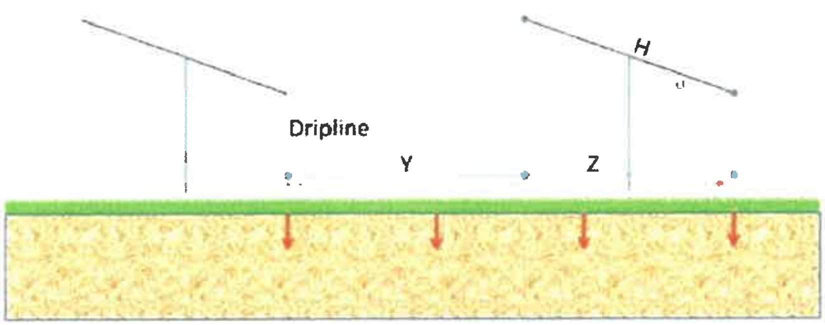
[80] https://www.ksstradio.com/2023/04/blattner-battles-state-of-texas-on-damages-from-building-solar-plant/
[81] Ibid.

5.6

But solar field construction is not the only cause of runoff.

"Stormwater runoff from solar PV facilities is generated primarily from rain that falls on access roads, inverter pads, and solar PV panels themselves. Water that falls on solar PV panels runs down the panel to the dripline, and eventually falls to the underlying surface, potentially causing localized erosion and/or scour. The primary factors that influence the potential for erosion and/or scour are shown below. Some of the water falling on solar PV panels will infiltrate and some may run-off downslope and eventually to a collection basin or off site.

Elevated ground-mount solar PV arrays may have the potential to alter the volume, velocity, and discharge pattern of stormwater runoff at a site during and after construction. According to the Mississippi Pollution Control Agency, sites can expect a 15 – 50% increase in volume due to the installation of solar PV panels. Additionally, a solar PV development site stripped of vegetation may result in erosive stormwater flows[82]."



- Water flow path

Y = Pervious length between panels in adjacent rows

Z = Average horizontal distance below panel

H = Length of panel

α = angle of solar panel from horizontal

[82] https://www.kennedyjenks.com/2017/11/10/a-rainy-day-at-a-solar-farm/

5.7

The Franklin County Commissioners Court solar study called for the creation of a soil quality database for properties abutting the Mount Stockyard footprint so landowners could establish a pre-and-post construction comparison of soil qualities. Two universities expressed interest in setting up long-term monitoring sites and abutting landowners were offered sampling tools, instruction and testing and analyses as part of that study. That project is expected to begin in early July, 2023 before construction begins at Mount Stockyard in order to be meaningful.

Ecosystem Disruption

"The presence of solar panels has the potential to alter multiple meteorological properties... change the balance of incoming solar radiation and emitted radiation, in turn, altering soil temperature and evapo-transpiration[83]." There are anecdotal reports of changes in soil temperatures and changed or delayed germination periods.

"The significance of biodiversity impacts will vary depending on the level of degradation of the previous habitat and the geographic location. During operation, vegetation is significantly lost or altered. Solar plants typically require some form of vegetation management under, and in the gaps between solar panel arrays. Unwanted vegetation is sometimes discouraged using herbicides, or by covering the ground with gravel to facilitate facility operations. In other cases, some form of vegetation cover is grown but mowed frequently to keep it short[84]."

Water Use

Fears regarding the impact of solar facility construction and operation on Franklin County water resources are widespread and unresolved. Early local concerns focused on the Cypress Springs Special Utility District[85] (CSSUD) supplying water an ENEL facility being constructed at Saltillo, Texas. Because CSSUD is one of four wholesale customers of the Franklin County Water District[86] - owner and operator of Lake Cypress Springs - lake levels that could result from increased commercial and industrial demand[87] have spawned intense debate. Reports have estimated[88] total water usage for dust control alone during construction of utility-scale solar facilities can exceed 400 million gallons.

[83] https://iopscience.iop.org/article/10.1088/2634-4505/ac76dd/pdf
[84] https://www.iucn.org/biodiversity_impacts_associated_to_solar_power_projects.pdf
[85] https://www.cssud.info/
[86] https://www.fcwd.com/index.php
[87] https://www.cssud.info/water_supply.html
[88] https://interestingengineering.com/science/renewable-energy-paradox-solar-panels-and-their-toxic-waste

5.8

According to the Massachusetts Institute for Technology, "cleaning solar panels currently is estimated to use about 10 billion gallons of water per year.[89]" There are no reliable data on water use for "washing" of solar panels; however, anecdotal information suggest another 6 to 7 million could be used annually at just one utility-scale facility[90]. Backing that up, one report stated that "Solar energy systems require a significant amount of water for cleaning and cooling. The exact amount of water used depends on the type of solar technology, but it can be anywhere from two to four gallons per watt installed.[91]"

Using those numbers, Mount Stockyard could use an average of 4-8 million gallons of water per year for cleaning and cooling panels alone.

According to the Franklin County Clerk's records[92], each of the leases contains the following rights reserved to Mount Stockyard in clause 1.3: Mount Stockyard will have 30 plus years to drill for, and consume - without reservation - water across some 2,000 acres and even add a meter onto the landowner's existing CSSUDs meter

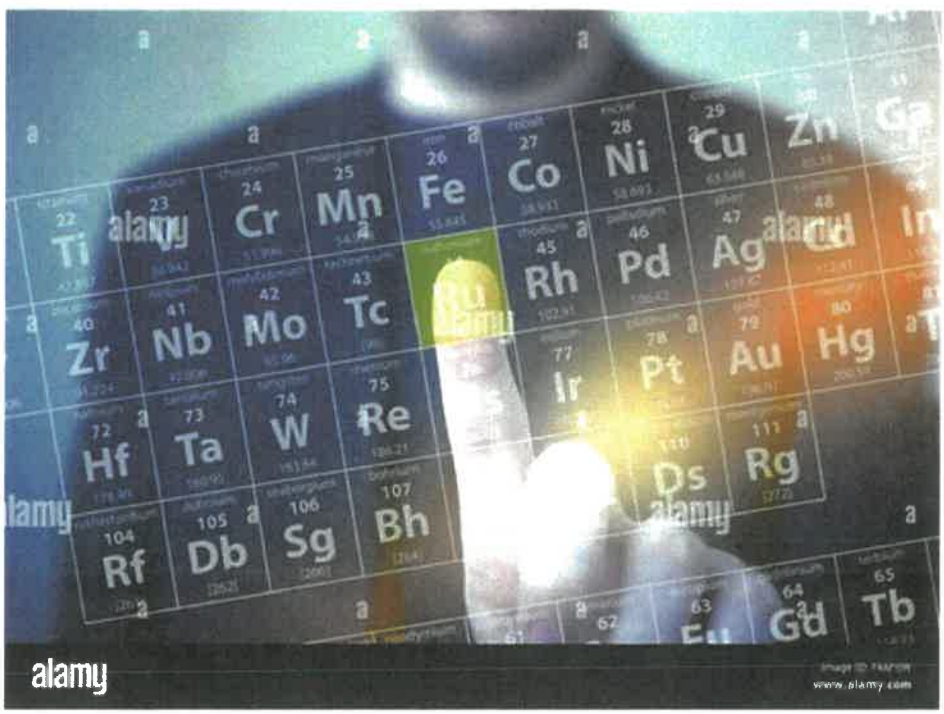
> (viii) roads, bridges, culverts, and erosion control facilities, (ix) signs, fences, and gates, (x) maintenance, operations and administration buildings, and (xi) other improvements, fixtures, facilities, machinery and equipment associated or connected with the generation, conversion, storage, switching, metering, step-up, step-down, transmission, distribution, conducting, wheeling, sale or other use or conveyance of electricity (all of the foregoing, including the Solar Energy Facilities and Transmission Facilities, collectively a "***Solar Energy System***");
>
> 1.3 Using any existing water well or drilling, digging and excavating one or more wells on the Property for the purposes of servicing, operating and maintaining the Solar Energy System that is located on the Property, including the right to tap into (at Lessee's sole cost and expense under a separate meter) any municipal, township, county, or other public water service;
>
> 1.4 During the Extended Term, removing, trimming, pruning, topping, clearing, or otherwise controlling the growth of any tree, shrub, plant or other vegetation; dismantling, demolishing, and removing any improvement, structure, embankment, impediment, berm, wall, fence, engineering works, or other object, on or that intrudes (or upon maturity could intrude) into the Property that could obstruct, interfere with or impair the Solar Energy System or the use of the Property intended by Lessee hereunder, provided, however, that the overall drainage off the property remain materially unaffected if any portion of the Property is utilized for agricultural purposes, and provided

[89] https://news.mit.edu/2022/solar-panels-dust-magnets-0311
[90]] Ibid.
[91] https://makechange.aspiration.com/the-environmental-impact-of-solar-energy/
[92] https://franklintx.countygovernmentrecords.com/FranklinTXRecorder/

5.9

Exposure to Hazardous Materials

Hazard and toxic explosive gases from battery thermal runaway was already been discussed in detail; however, the materials used in the production of photovoltaic panels include hazardous materials like "cadmium can be toxic to humans and the environment if it's released into the air or water.[93]"



For landowners who have leased their property to solar developers - and to landowners who live adjoining solar facilities - comes a warning from a 2020 study :

[93] https://makechange.aspiration.com/the-environmental-impact-of-solar-energy/[

5.10

"Despite their many advantages, solar photovoltaic (PV) cells used for electricity generation can have negative environmental impacts. The chemicals necessary for their fabrication can be released into the environment during their disposal or following damage, such as that from natural disasters. The principle objective of this study was to assess the leaching potential of chemical species, primarily heavy metals, from perovskite solar cells (PSC), monocrystalline (MoSC) silicon solar cells, and polycrystalline (PoSC) silicon solar cells under worst-case natural scenarios. In all cases, real solar cells were used as opposed to the pure component. The toxicity characteristic leaching procedure (TCLP) was used to analyze the leachates from PSCs to determine the concentrations of major component species.

The results showed that broken PSCs released silicon (Si), lead (Pb), aluminium (Al), arsenic (As), and nickel (Ni) under TCLP conditions; lead, a major component of PSCs, was released at around 1.0 mg/L at a pH of 4.93, from both broken and unbroken PSCs. However, the concentrations of these elements in the leachate were within the toxicity characteristic (TC) limits. Encapsulation of the PSCs inhibited the release of hazardous substances, but did not completely eliminate the release of metals.

TCLP results from broken MoSCs revealed that metals leached at relatively high levels: Al: 182 mg/L, Ni: 7.7 mg/L, and copper) Cu: 3.6 mg/L. The results from broken PoSCs indicated the release of 43.9 mg/L of Cu and 6.6 mg/L of Pb, which are higher than the TC limits. These high levels may be attributed to the welding materials used on the rear side of crystalline-Si (c-Si) solar cells.[94]"

[94] https://www.sciencedirect.com/science/article/abs/pii/S0957582020318310

5.11

At the end of their lives, photovoltaic panels are not dissimilar from hazardous waste and pose enormous numerical challenges - "by 2050, the International Renewable Energy Agency projects that up to 78 million metric tons of solar panels will have reached the end of their life.[95]"

These numbers are staggering but, to put them in perspective, contemplate the 485,000 PV deployed across 2,000 acres proposed by Mount Stockyard reaching their end of life.

It's not just the panels that must be removed. It's 10s of 1,000s of racks on which they are mounted, 100s of 1,000s of connecters, 1,000s of miles of the underground cabling, dozens of inverters, enclosures, roadways, perimeter fencing, lighting, associated switchyards, transformers, transmission pylons, etc, that must also be removed. Once removed, restoration of the land to approximate original contour, re-vegetation and rehabilitation of retention ponds are critical.

[95] International Renewable Energy Agency

6.0

CONCLUSIONS / UNANSWERED QUESTIONS

If industrial, utility-scale solar is coming to Franklin County, how does the county - how CAN the county - set up guardrails to keep its residents, its land and its environment safe from the dangers posed by this purely manmade hazard?

At the end of the thirty or forty year leases, at the end of the useful life for a couple of generations of PV panels and 100s of 1000s of lithium-ion batteries, who will remember how it all got started?

For whom will the land have value? Can it, will it, ever be restored to its original condition and purpose? Who will undertake this work?

The original developers will have long since moved on. Thirty or forty years from now, chances are, the landowners will likely have changed, or reached their own "end-of-life". Whoever the "then" owners of the properties leased to Mount Stockyard are will have these questions and more to answer when the end-of-life comes for the project. The same is true for the property owners whose land abuts the project.

Franklin County has taken a first look at these questions and, because construction has not yet begun, has taken advantage of that fact and has begun steps to find those answers. This brief report and summary is meant to help in that process.


Image: Licensed from Getty Images

EXHIBITS

EX. 1

FIRE FIGHTING CAPACITY UPGRADE BUDGET

Cost Estimates for Staffing and Equipment		
Item/Category	**Year 1**	**Annual Costs (To be adjusted for inflation)**
Station renovations to accommodate full time staffing of Mt. Vernon and North Franklin stations	$1,000,000	
New station near 67 & 1896. Cost of building and equipment for the new station.	$1,000,000	
Purchase four 2000 gal. tender/pumpers complete with all hose, equipment, foam pumps, etc..	$5,200,000	
One Quint/Ladder Truck	$2,000,000	
Five new brush trucks	$1,500,000	
SCBA fill stations (for self contained breathing apparatus)	$160,000	
SCBA, masks, etc.	$162,000	
Fire Chief response vehicle	$60,000	
Annual vehicle maintenance budget	$50,000	
Personal Protective Equipment for 46 personnel	$230,000	
Uniforms for 46 personnel	$23,000	
Portable radios	$250,000	
Early warning sirens	$180,000	
County Fire Chief Position	$80,000	$80,000
Staffing of three stations, 24/7/365 with four firefighters per station with three shifts, 36 firefighters.	$2,160,000	$2,160,000
One company officer per crew, nine total.	$630,000	$630,000
Annual overtime budget for training, hire back to cover to sick time etc..	$360,000	$360,000
Annual benefits budget, insurance	$940,000	$940,000
Annual training budget	$10,000	$10,000
HazMat Equipment	$10,000	$10,000
Fuel	$30,000	$30,000
Station supplies	$10,000	$10,000
ESTIMATED TOTALS	$16,045,000	$4,230,000

Source: Chief Andy Emery, *North Franklin Volunteer Fire Department*

EX. 2

TABLE 1604.5 RISK CATEGORY OF BUILDINGS AND OTHER STRUCTURES

RISK CATEGORY	NATURE OF OCCUPANCY
I	Buildings and other structures that represent a low hazard to human life in the event of failure, including but not limited to: Agricultural facilities. Certain temporary facilities Minor storage facilities.
II	Buildings and other structures except those listed in Risk Categories I, III and IV.
III	Buildings and other structures that represent a substantial hazard to human life in the event of failure, including but not limited to: Buildings and other structures whose primary occupancy is public assembly with an occupant load greater than 300. Buildings and other structures containing one or more public assembly spaces, each having an occupant load greater than 300 and a cumulative occupant load of these public assembly spaces of greater than 2,500. Buildings and other structures containing Group E or Group I-4 occupancies or combination therof, with an occupant load greater than 250. Buildings and other structures containing educational occupancies for students above the 12th grade with an occupant load greater than 500. Group I-2, Condition 1 occupancies with 50 or more care recipients. Group I-2, Condition 2 occupancies not having emergency surgery or emergency treatment facilities. Group I-3 occupancies Any other occupancy with an occupant load greater than 5,000.[a] ~~Power-generating stations, water treatment facilities for potable water, wastewater treatment facilities and other public~~ Public utility facilities not included in Risk Category IV. Buildings and other structures not included in Risk Category IV containing quantities of toxic or explosive materials that: Exceed maximum allowable quantities per control area as given in Table 307.1(1) or 307.1(2) or per outdoor control area in accordance with the *International Fire Code*, and Are sufficient to pose a threat to the public if released.[b]
IV	Buildings and other structures designated as essential facilities and buildings where loss of function represents a substantial hazard to occupants or users, including but not limited to: Group I-2, Condition 2 occupancies having emergency surgery or emergency treatment facilities. Ambulatory care facilities having emergency surgery or emergency treatment facilities. Fire, rescue, ambulance and police stations and emergency vehicle garages Designated earthquake, hurricane or other emergency shelters. Designated emergency preparedness, communications and operations centers and other facilities required for emergency response. Public utility facilities providing power generation, potable water treatment, or wastewater treatment. Power-generating stations and other public utility facilities required as emergency backup facilities for *Risk Category* IV structures. Buildings and other structures containing quantities of highly toxic materials that: Exceed maximum allowable quantities per control area as given in Table 307.1(2) or per outdoor control area in accordance with the *International Fire Code*, and

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Name of Gas	Chemical formula	HSC ("Seveso") hazard category	GHS[34] Hazard Codes, Classes and Categories as listed in the C&L Inventory of ECHA or GB Mandatory Classification and Labelling List	Controlled Quantity (tonnes)	Source of data
Hydrogen	H_2	P2 Flammable Gas (Part 1) Named substance (Part 2)	H220 Flammable Gas, Cat. 1A	2 (named, HSC) 5 (COMAH) & for Aggregation Rule	HSC Regs C&L Inventory[35]
Ethylene	C_2H_4	P2 Flammable Gas	H220 Flammable Gas, Cat. 1A H336 STOT SE, Cat. 3	10 (P2)	HSC Regs C&L Inventory
Methane	CH_4	P2 Flammable Gas	H220 Flammable Gas, Cat. 1A	10 (P2)	HSC Regs C&L Inventory
Carbon Monoxide	CO	P2 Flammable Gas H2 Acute Toxic, Cat. 3, inhalation	H220 Flammable Gas, Cat 1A. H331 Acute Toxicity, inhalation, Cat. 3 H372 STOT RE 1 H360D Reproductive Toxicity, Cat. 1	10 (P2) 50 (H2)	HSC Regs C&L Inventory
Hydrogen Chloride	HCl	H2 Acute Toxic, Cat. 3, inhalation Named substance (Part 2) if liquefied	H331 Acute Toxicity, inhalation, Cat. 3 H314 Skin corrosion, Cat. 1A,B,C	50 (H2) 25 (named)	HSC Regs C&L Inventory
Hydrogen Cyanide	HCN	H1 Acute Toxic (as mixture) H2 Acute Toxic (as pure substance) E1 Aquatic Hazard Acute, Cat. 1 E1 Aquatic Hazard Chronic, Cat. 1	H300 Acute Toxic, oral, Cat. 2 H330 Acute Toxic, inhalation, Cat. 2 H310 Acute Toxic, dermal, Cat. 1 H400 Aquatic Hazard, Acute, Cat. 1 H410 Aquatic hazard, Chronic, Cat 1	5 (H1) 50 (H2) 100 (E1)	GB Mandatory Classification and Labelling List, HSE[36]
Hydrogen Fluoride	HF	H1 Acute Toxic (dermal) H2 Acute Toxic (oral, inhalation)	H300 Acute Toxic, oral, Cat. 2 H310 Acute Toxic, dermal, Cat. 1 H330 Acute Toxic, inhalation, Cat. 2 H314 Skin Corrosion, Cat. 1A	5 (H1) 50 (H2)	HSC Regs C&L Inventory
Phosphoryl Fluoride	POF_3	Not determined but precursor of HF so likely to be H1 Acute Toxic per Note 6	Not listed in C&L Inventory or GB MCL List but "provisionally assigned" H310 per Note 6	5 (H1)	HSC Regs

Table 1: Gaseous Hazardous Substances generated in BESS loss of control accidents

[34] GHS= Global Harmonised System is a UN-sponsored classification to which the EU and UK voluntarily adhere for the purposes of the CLP Regulation. Hazard codes are defined and explained in multiple chemicals databases and in UNECE documents e.g. https://unece.org/DAM/trans/danger/publi/ghs/ghs_rev07/English/06e_annex3.pdf

[35] The C&L Inventory is a database of the European Chemicals Agency ECHA containing many Harmonised Classifications for the purposes of the CLP Regulation https://echa.europa.eu/information-on-chemicals/cl-inventory-database?p_p_id=dissclinventory_WAR_dissclinventoryportlet&p_p_lifecycle=0&p_p_state=normal&p_p_mode=view

[36] Harmonised Classification is only H2 for the pure substance though the great majority of Notified Classifications reckon HCN as Acute Toxic Category 1 hence H1. The HSE GB MCL list is authoritative for GB (though not for NI) after Brexit and was therefore consulted here. "All existing EU harmonised classification and labelling in force on 31 December 2020 are retained in GB as the GB Mandatory Classification and Labelling List" https://www.hse.gov.uk/chemical-classification/legal/clp-regulation.htm

EX. 3

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Name of Substance	Chemical formula	HSC ("Seveso") hazard category	GHS Hazard Codes, Classes and Categories as listed in the C&L Inventory of ECHA	M-factors	Controlled Quantity (tonnes)	Source of data
Cobalt (II) Oxide	CoO	E1 Hazard to Aquatic Environment, Acute 1 or Chronic 1	H400 Aquatic Acute Cat. 1 H410 Aquatic Chronic Cat. 1 H370 STOT SE 1 is Notified to CLP but not Harmonised	10	100 (E1)	EC List number 215-154-6
Cobalt (II,III) Oxide	Co_3O_4	Provisionally E1 Aquatic hazard, per Note 6	No harmonised classification found but likely to be H400 and H410 for same reasons as for CoO	Not found	100 (E1)	EC List number 215-157-2
Cobalt Lithium Nickel Oxide	Complex. IUPAC name: cobalt dihydrate lithium hydride nickel	E1 Hazard to Aquatic Environment, Acute 1 or Chronic 1 H3 STOT SE Cat. 1	H400 Aquatic Acute Cat. 1 H410 Aquatic Chronic Cat. 1 H372 STOT RE 1	Not found	100 (E1) 50 (H3)	EC List number 442-750-5
Copper (I) oxide	Cu_2O	E1 Hazard to Aquatic Environment, Acute 1 or Chronic 1	H400 Aquatic Acute Cat. 1 H410 Aquatic Chronic Cat. 1 Harmonised classification	100 (acute) 10 (chronic)	100 (E1)	EC List number 215-270-7
Copper (II) oxide	CuO	E1 Hazard to Aquatic Environment, Acute 1 or Chronic 1	H400 Aquatic Acute Cat. 1 H410 Aquatic Chronic Cat. 1 Harmonised classification	100 (acute) 10 (chronic)	100 (E1)	EC List number 215-269-1
Copper (II) hydroxide	$Cu(OH)_2$	E1 Hazard to Aquatic Environment, Acute 1 or Chronic 1	H400 Aquatic Acute Cat. 1 H410 Aquatic Chronic Cat. 1 Harmonised classification	10 10 (chronic)	100 (E1)	EC List number 243-815-9
Copper (II) Fluoride	CuF_2	Provisional E1 – see text	Not found in C&L Inventory	Use value for $Cu(OH)_2$	100 (E1)	Listing in Wikipedia
Dicopper chloride trihydroxide	$Cu_2Cl(OH)_3$	E1 Hazard to Aquatic Environment, Acute 1 or Chronic 1	H400 Aquatic Acute Cat. 1 H410 Aquatic Chronic Cat. 1 (Harmonised Classification)	10 10 (chronic)	100 (E1)	EC List number 215-572-9
Copper (I) chloride	$CuCl$	E1 Hazard to Aquatic Environment, Acute 1 or Chronic 1	H400 Aquatic Acute Cat. 1 H410 Aquatic Chronic Cat. 1 (Harmonised Classification)	Not found	100 (E1)	EC List number 231-842-9

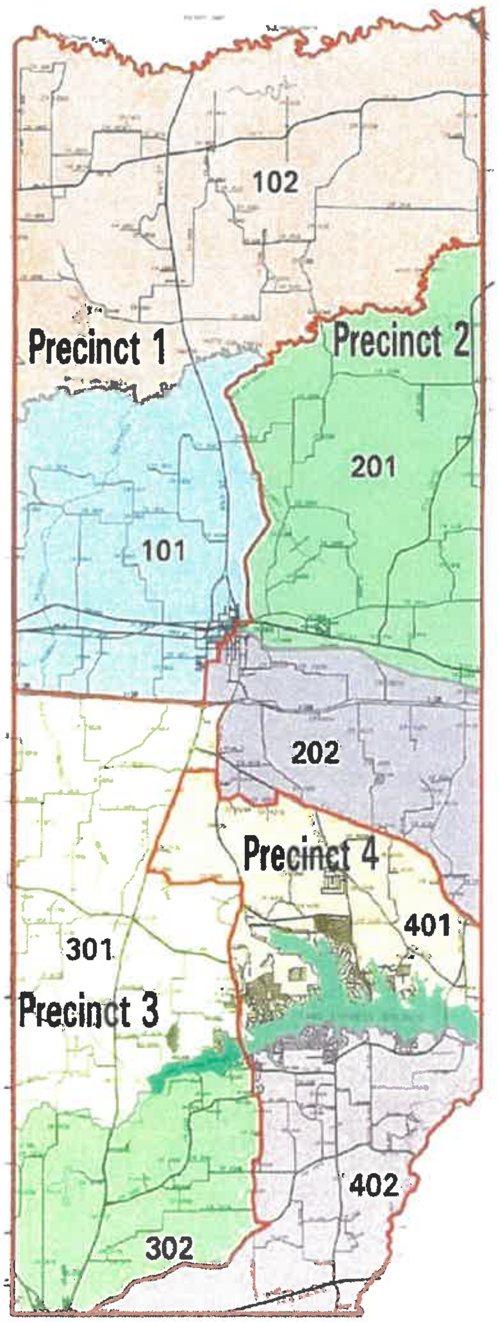
Table 2: Environmentally Hazardous Substances potentially generated from electrode materials in BESS loss of control accidents
(indicative only: not exhaustive)

EX. 4

EX. 5

APPROXIMATE LOCATION OF MT. STOCKYARD SOLAR 210 MW FOOTPRINT IN RELATION TO FRANKLIN COUNTY FIRE DEPARTMENTS

EX. 6



FRANKLIN COUNTY ROAD MILES

Precinct 1:	88
Precinct 2:	60
Precinct 3:	70
Precinct 4:	64

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ACKNOWLEDGEMENTS

Scott Lee Franklin County Judge
Jerry Cooper Franklin County Commissioner, Precinct 1
Toby Godfrey Franklin County Commissioner, Precinct 2
Charlie Emerson Franklin County Commissioner, Precinct 3
Scott Smith Franklin County Commissioner, Precinct 4
Landon Ramsay Franklin County Attorney

Sara Brod County Extension Agent, Texas A&M AgriLife Extension Service

Russell McCurdy Chief Appraiser, Franklin County Appraisal District

Tim Dial Franklin County Emergency Management Coordinator
Andy Emery Chief, North Franklin Volunteer Fire Department
Colin Clasby Chief, Mount Vernon Fire Department
Daniel Gary Chief, Purley Volunteer Fire Department
Eddie Rhoades Chief, South Franklin Fire Department

Dan Johnson Retired Firefighter, Fixed-wing and Helicopter Pilot