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Risk Methodology

Fiscal Year (FY) 2023 Report to Congress

Calculating Risk for the FY 2023 Department of Homeland Security

Preparedness Grant Programs

April 18, 2024



Homeland
Security

*Federal Emergency
Management Agency*

Foreword from the Administrator

I am pleased to present the report, “Calculating Risk for the FY 2023 Department of Homeland Security Preparedness Grant Programs,” which was compiled in response to the requirements of the *Homeland Security Act of 2002*, as amended (Pub. L. No. 107-296). The report provides a comprehensive explanation of the methodologies used to calculate risk and compute the allocation of funds for several risk-based grant programs administered by the Federal Emergency Management Agency (FEMA) in FY 2023.

Pursuant to congressional requirements, this report is provided to the following Members of Congress:



The Honorable Gary C. Peters
Chairman, Senate Committee on Homeland Security and Governmental Affairs

The Honorable Rand Paul
Ranking Member, Senate Committee on Homeland Security and Governmental Affairs

The Honorable Mark E. Green
Chairman, House Committee on Homeland Security

The Honorable Bennie G. Thompson
Ranking Member, House Committee on Homeland Security

Inquiries relating to this report may be directed to FEMA’s Congressional Affairs Division at (202) 646-4500.

Sincerely,

A handwritten signature in black ink that reads "Deanne Criswell". The signature is fluid and cursive, with the first name "Deanne" and last name "Criswell" clearly legible.

Deanne Criswell
Administrator
Federal Emergency Management Agency

Executive Summary

Section 2022 of the *Homeland Security Act of 2002*, as amended (Pub. L. No. 107-296), requires FEMA to provide an annual report on the methodologies used to calculate risk and compute the allocation of funds for the risk-based preparedness grant programs administered by the United States Department of Homeland Security (DHS).

FEMA's Grant Programs Directorate (GPD), in preparing this report, has:

- Assessed all variables, and the weights assigned to each variable included in the risk assessment;
- Explained how each variable, as weighted, correlates to risk, and the basis for concluding there is a correlation; and,
- Identified any change in the methodologies from the previous fiscal year, including changes in variables considered, weighting of those variables, and computational methods.

This report, "Calculating Risk for the FY 2023 DHS Preparedness Grant Programs," fulfills the annual legislative reporting requirements and details the scope and applicability of the preparedness grant programs including FY 2023 funding levels and enhancements to the risk methodology. The report also discusses the terrorism risk methodology used by DHS and how it is applied to the suite of preparedness grant programs.

Finally, the last two sections of this report discuss the components of the risk assessment methodology: threat, vulnerability, and consequence. This portion of the report provides a more granular level of detail for each of the programs that use risk to determine eligibility or make funding allocation decisions, including the data elements and data sources for each. Those programs are the State Homeland Security Program (SHSP), Urban Area Security Initiative (UASI), Port Security Grant Program (PSGP), Transit Security Grant Program (TSGP), and Operation Stonegarden (OPSG).



FY 2023 Risk Methodology

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1. Legislative Requirement

This document fulfills the reporting requirement set forth in Section 2022(c)(2) of the *Homeland Security Act of 2002*, as amended (P.L. 107-296), (6 U.S.C. § 612(c)(2)). Section 2022(c)(2) states in part:

(2) RISK ASSESSMENT

(A) IN GENERAL — For each fiscal year, the Administrator shall provide to the appropriate committees of Congress a detailed and comprehensive explanation of the methodologies used to calculate risk and compute the allocation of funds for grants administered by the Department, including—

- (i) all variables included in the risk assessment and the weights assigned to each such variable;
- (ii) an explanation of how each such variable, as weighted, correlates to risk, and the basis for concluding there is such a correlation; and
- (iii) any change in the methodologies from the previous fiscal year, including changes in variables considered, weighting of those variables, and computational methods.

2. Scope and Applicability

DHS administers a suite of preparedness grant programs, as illustrated in **Table 1**. Although some of the eligibility or allocation criteria are formula-based, as required by statute, allocations under several of these programs are informed by risk. DHS uses a comprehensive risk methodology to determine target allocations for SHSP, and both target allocations and eligibility for the UASI grant program. In addition, PSGP, TSGP, and OPSG use elements of risk to determine eligibility and funding amounts. These five programs are listed first in Table 1 and include light gray highlighting. The risk methodology is based on requirements outlined in the *Homeland Security Act of 2002*, as amended.

Table 1: Preparedness Grant Funding for FY 2022 and FY 2023¹

Program Name	FY 2022 Allocation	FY 2023 Allocation
UASI	\$615 million	\$615 million
SHSP	\$415 million	\$415 million
PSGP	\$100 million	\$100 million
OPSG ²	\$90 million	\$90 million
TSGP	\$93 million	\$93 million
Nonprofit Security Grant Program: Urban Area	\$125 million	\$152.5 million
NSGP: State	\$125 million	\$152.5 million
Tribal Homeland Security Grant Program	\$15 million	\$15 million
Intercity Passenger Rail (Amtrak) Program	\$10 million	\$10 million
Intercity Bus Security Grant Program	\$2 million	\$2 million
Emergency Management Performance Grant Program	\$405.1 million	\$355.1 million
Regional Catastrophic Preparedness Grant Program	\$12 million	\$12 million
Presidential Residence Protection Assistance Grant	\$3 million	\$3 million
Assistance to Firefighters Grant Program	\$324 million	\$324 million
Staffing for Adequate Fire and Emergency Response Program	\$360 million	\$360 million
Fire Prevention and Safety Program	\$36 million	\$36 million
Emergency Operations Center Grant Program	\$49 million	\$89.1 million

The following content provides additional information on risk methodologies and any changes to those methodologies for FY 2023.

Historical Risk Methodology Enhancements

From FY 2008 through FY 2010, the risk methodology was largely unchanged. The combined Vulnerability and Consequence component was weighted at 80%, with threat weighted as 20%. However, in FY 2011, FEMA, in coordination with other DHS components including the Office

¹ The shaded rows in Table 1 indicate programs for which allocations are primarily informed by the risk methodologies described in this report.

² OPSG awards are informed by a U.S. Customs and Border Protection risk assessment.

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of Intelligence and Analysis (I&A), the Cybersecurity and Infrastructure Security Agency (CISA) (and prior to CISA forming in 2018, the former National Protection and Programs Directorate), and the Science and Technology (S&T) Directorate, made several modifications to the Vulnerability component of the grants risk methodology. Specifically, FEMA created a separate vulnerability assessment for SHSP, UASI, and PSGP that accounted for 20% of the overall risk assessment. This was replicated in FY 2012 for TSGP. The weights for the two other elements of the risk methodology were modified to account for this change – Threat accounted for 30% of the methodology and Consequence accounted for the remaining 50%.

From FY 2012 through FY 2017, the weights for the Threat, Vulnerability, and Consequence components did not change. Notable changes to data elements in those years are outlined below:

- FY 2012 – Domestic terrorism was added to the threat component;
- FY 2014 – Threat analysis changed to review only a two-year window of threat reporting, and international air and water crossings were added to the border crossings data component. Previously any threat reports were considered no matter how old they were;
- FY 2015 – States, territories, and Metropolitan Statistical Areas (MSAs) were able to drop threat levels, when the data supported such a decision. Previously, states and MSAs could only rise into higher threat levels; levels would not be lowered once a state or MSA had reached a higher level;
- FY 2016 – Domestic visitor values for the U.S. Virgin Islands, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands were added to the domestic visitor dataset; and
- FY 2017 – International visitor data from the Department of Commerce, National Travel & Tourism Office, Statistics Canada, and Banco de México was added to the population index.

In FY 2018, there were more methodology changes. The weight of Threat in the SHSP and UASI risk methodology was reduced from 30% to 25%, and the weight of Vulnerability was increased from 20% to 25%. Additionally, within the Vulnerability component, a Soft Target Index (STI) was included that contains both a raw visitor count and a special events metric, and an isolation element was added to the Border Index. Within the Consequence component, the defense industrial base count was removed from the National Security Index and included within the National Infrastructure Index (NII).

In FY 2019, there were no changes to the SHSP and UASI risk methodology. However, the PSGP and TSGP risk methodologies were updated. PSGP and TSGP component weights were updated to align with SHSP and UASI, with Threat and Vulnerability both weighted at 25%, and Consequence unchanged at 50%. For PSGP, the soft target, border, and hazardous materials (HAZMAT) indices were created within the vulnerability component. The Soft Target Index contained a new data element and accounted for the five percentage-point increase in the Vulnerability weight. In addition, the PSGP Consequence component was rearranged to contain the NII under the economic index. The Military Mission Index was renamed from the National Security Index but did not change its composition. Previously all three data elements within the Military Mission Index were equally weighted. In FY 2019, the naval priority was increased from 3.3 % to 5% and naval presence and military personnel both decreased from 3.3% to 2.5%.

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For TSGP, a new data element was added in FY 2019 to create the Soft Target Index within the Vulnerability component, accounting for the five percentage-point increase in weight. Within the TSGP Rail Consequence component, the Population Index for TSGP rail entities was increased from 25% to 37.5% and the NII containing Underground Track Miles (UTM) was renamed to the Economic Index and was decreased from 25% to 12.5%.

In FY 2020, there were no changes to the overall risk methodology used for SHSP and UASI, but minor changes were made to the data used in the methodology. For the SHSP and UASI risk methodology, two risk data sources received updates. The first was that the NII was updated to include Chemical Facilities Anti-Terrorism Standards (CFATS) facilities, ensuring that all Level 1 and Level 2 facilities were included in the count of critical infrastructure facilities for the risk methodology. The other data source update was that the Military Personnel Index data source was transitioned from Department of Defense's Base Structure Report to the Defense Manpower Data Center's Total Force by Duty Location Report, which uses ZIP code data rather than personnel count at each base.

For the TSGP methodology in FY 2020, changes were made within the Vulnerability and Consequence components, including indices, data elements, and weights.

TSGP Vulnerability Component

- The Assessed Vulnerability Index was added to the risk graphic incorporating Baseline Assessment for Security Enhancement (BASE) data at 5%³ (BASE data alone was included at 5% within Vulnerability in FY 2019);
- A new data element, the Top Transit Asset List (TTAL) Service Binary was added to the Transit Infrastructure Index (TII), weighted at 2.5% for Rail and 15% for Bus, to give credit to transit systems that serviced a station on the TTAL regardless of whether they owned it or not; and
- UTM was moved from Consequence to the TII in Vulnerability, weighted at 12.5%.

TSGP Consequence Component

- The TTAL count was moved to the new NII in Consequence for both Rail and Bus, as it accounts for the extent to which identified vulnerabilities are remediated by TSGP projects and other efforts and was weighted at 12.5%;
- The NII was added to Rail and Bus and weighted at 12.5%;
- The Population Index remained at 37.5% for Rail and was reduced to 37.5% for Bus to accommodate the newly added Bus NII within consequence; and
- Bus and Rail calculations were changed slightly. FEMA attributed rail and/or bus data to a transit agency only if that agency provided rail and/or bus service. If ridership for bus or rail was zero, then the Consequence score was calculated as zero, resulting in a risk score of 0 because risk is multiplied – Threat x Vulnerability x Consequence.

³ The numbers displayed in this TSGP section outlining changes to percentages and weights in FY 2020 cannot be directly compared to the values assigned in FY 2021. In FY 2021, FEMA updated the percentages on all risk graphics to total to 100% within each component to more accurately reflect the true ratios represented in the model within each component.

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For the PSGP methodology in FY 2020, there were no changes to the overall risk methodology or to the data used in the methodology. In FY 2021, there were no changes to the methodology used for PSGP and TSGP. The FY 2021 SHSP and UASI methodology was updated with the changes outlined below. SHSP and UASI risk methodology changes were made within the Threat and Vulnerability components, including changes to indices and data elements.

- The Threat Index was updated to add Cybersecurity and Transnational Organizational Crime (TOC) components to the existing Counterterrorism (CT) Threat component;
- The Isolation component was expanded to include jurisdictions within the continental United States, calculated using the inverse of the population within 100 miles of a jurisdiction. No changes to the methodology were made to the jurisdictions outside the continental United States; and
- The Special Event Metric (SEM) was expanded to include two years of Special Event Assessment Rating (SEAR) data and removed the division of event risk by population (the per capita calculation).

In FY 2022, FEMA introduced several enhancements to the risk methodology and began a comprehensive review of the methodology for possible additional enhancements in FY 2023 and beyond. Terrorist actors are continuing to shift to using simpler tactics, small-scale attacks, and focusing on targets of opportunity or soft targets. Although foreign terrorist organizations have a continued desire for large-scale attacks, they will likely remain constrained in their ability to direct such plots⁴. U.S.-based lone actors and small groups pose the most significant and persistent terrorism-related threat to our country at this time, with an increasingly diffuse distribution of threats by homegrown violent extremists (HVE) and domestic violent extremists (DVE). The changes to the methodology for FY 2022 are detailed below.

Vulnerability Component

Within the Vulnerability component, weights were shifted to create an equal focus on the Soft Target Index and Border Index. The weight of the Border Index was adjusted from 40% to 30% and the weight of the STI was adjusted from 20% to 30%. This change was made to add more emphasis on soft targets and reflect the increased threat from HVEs and DVEs, who tend to act locally. It also accounts for the continued shift in the threat environment where foreign terrorists gaining entry through U.S. land and sea borders is of much lower likelihood than the increased vulnerability created by lone actors and small cell DVEs already in existence within the United States.

Within the STI, the Visitor Impact data element was added to calculate the ratio of daily visitors to resident population. Measures of healthcare and emergency services response capacity, such as number of hospitals or fire stations, are correlated with permanent resident population totals. This new element identifies jurisdictions with a high visitor to resident ratio, which is indicative of more soft targets and additional vulnerability for those targets.

⁴ [DHS Homeland Threat Assessment](#), October 2020, p. 17

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FEMA and DHS Special Events Program (SEP) updated the SEM to include three years of event data to best reflect the special event risk throughout the nation. The SEAR data from 2020, 2021, and 2022 are utilized together to create aggregate SEM scores for each entity. The weight distribution/ratio within the Border Index and STI remained the same as in FY 2021. The ratio of 60% Visitors (Daily Visitor Count + Visitor Impact) and 40% SEM also remain the same. Inclusion of Visitor Impact resulted in a FY 2022 breakdown of a 9% weight for Daily Visitor, 9% weight for Visitor Impact, and 12% weight for SEM within the total 30% STI weight.

Consequence Component

Within the Population data elements, Total Population was included as a separate data element. In FY 2021, the Population Index was only the population density metric, which is now represented as “Population Density Metric.” For FY 2022, the Population Index was a weighted addition of both Population Density Metric (40%) and Total Population (20%) for the total 60% Population Index weight within Consequence. The inclusion of a separate measure for total population better reflects the relative consequences of small-scale attacks, which do not produce extensive peripheral impacts.

The changes for FY 2023 are detailed in *Section 7: FY 2023 Risk Methodology Enhancements*.

3. FY 2023 State, Territory, and MSA Risk Validation Process

It is an annual requirement in accordance with the *Homeland Security Act of 2002*, as amended (Public Law 107-296), that each fiscal year, FEMA provides all states, territories, and the 100 most populous MSAs the opportunity to review the relative risk data that is used in the annual risk assessment process under the SHSP and the UASI grant programs. The FY 2023 Risk Validation Process followed the same procedure used in FY 2022 and prior years. All states, territories, and the top 100 most populous MSAs were provided with their individual draft risk profiles and the opportunity to review and comment on their individual threat, vulnerability, and consequence risk data contained in the risk profiles.

The Risk Validation Process allows each state, territory, and the 100 most populous MSAs the chance to review the relative risk data for errors and discrepancies to ensure that the values are accurate based on the available data sources. If a jurisdiction so chooses, they have the opportunity to review each data value listed on the Risk Profiles and provide feedback to FEMA if they believe that the values require adjustment. FEMA has a rigorous data validation process, and this process allows the stakeholders to be included in the data review to increase engagement and provide transparency.

The Risk Validation Process for the FY 2023 grant year began on January 17, 2023 and ended on January 25, 2023. FEMA provided all states, territories, and the 100 most populous MSAs the following documentation on January 17, 2023, along with instructions for providing feedback. An example of the risk profile is shown for a notional MSA in **Figure 1**.

1. Letter outlining the MSA Risk Validation Process and instructions;
2. FY 2023 DRAFT risk profile for each specific MSA/state/territory (FOUO);
3. Data and Sources used to populate the Risk Assessment Methodology;
4. Risk Assessment Methodology Graphic;
5. SEAR Event List for each specific MSA/state/territory; and
6. FY 2023 Threat FAQs (FOUO) for CT, TOC, and Cybersecurity.

The Data and Sources Document provided links to the data elements that are available online. For example, jurisdictions can review their GDP and Total Population values and confirm their values on the Risk Profile. In addition, jurisdictions can review some of the data from FEMA's partners at DHS I&A, CISA, and SEP. For example, if a jurisdiction submits special events through the DHS SEP National Special Events Data Call (NSEDCC), these events can be compared to the specific list of special events that FEMA sends with the Risk Profiles. The states, territories, and the 100 most populous MSAs can also review their critical infrastructure counts in the Level 1/Level 2 asset lists.

To increase stakeholder engagement, FEMA held outreach webinars on January 18 and 19, 2023, to offer FEMA stakeholders additional information regarding the state, territory, and MSA annual risk assessment approach. These webinars informed new SHSP and UASI stakeholders and served as a review and reference aid for experienced stakeholders. The webinars, conducted

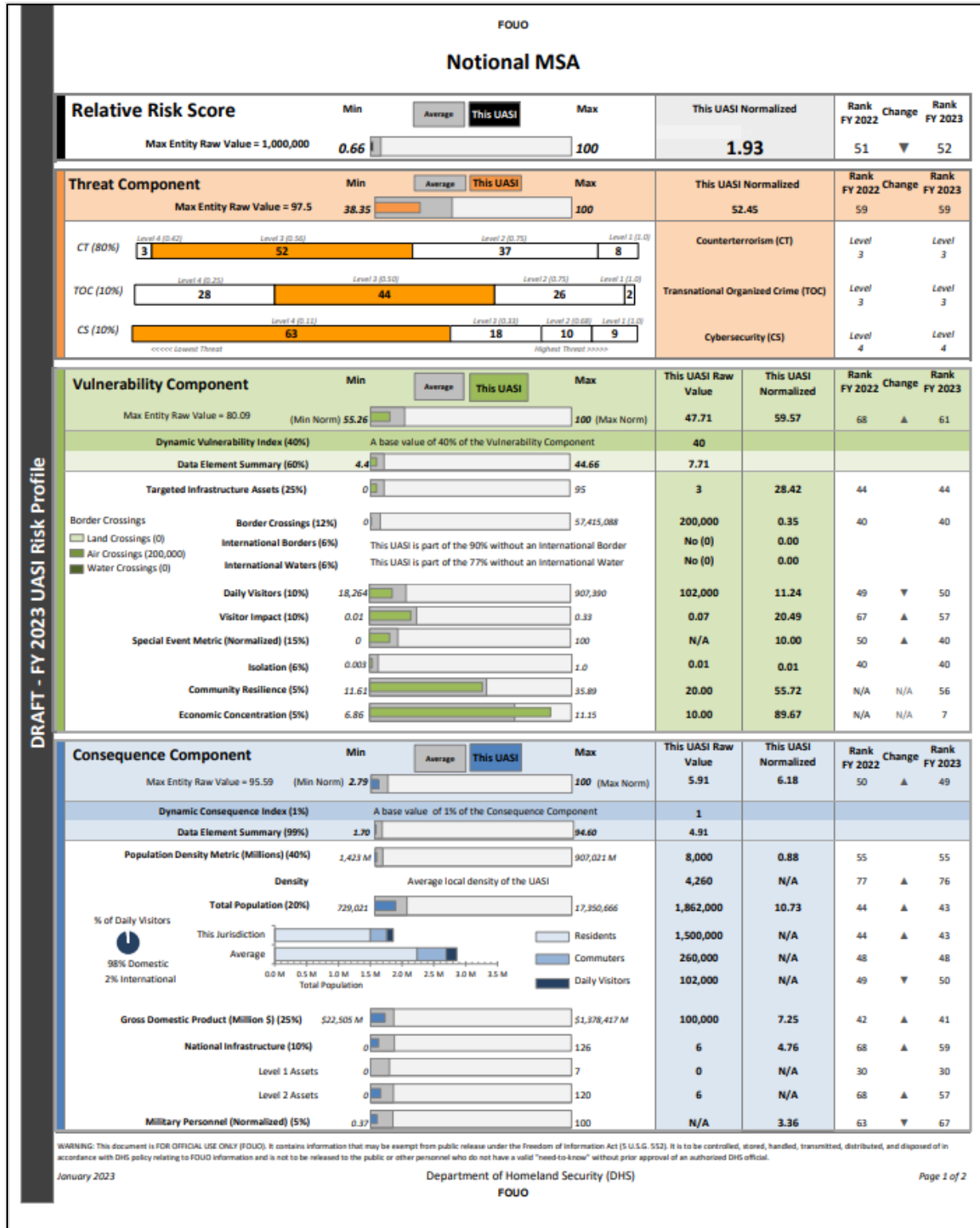
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in plain language and via Zoom, outlined the Risk Validation Process, reviewed the data sources and notional risk profile layout, discussed the enhancements to the FY 2023 Risk Methodology, and informed participants on how to comment on the risk data and process. A PDF copy of the webinar slides was provided to all stakeholders.

During the outreach period, FEMA reviewed all the email feedback and comments received and responded to stakeholders. Additionally, FEMA reviewed the feedback and coordinated with FEMA's federal partners at DHS I&A, SEP, and CISA and provided responses to the technical submissions. Once the feedback was reviewed and analyzed, FEMA, in coordination with our federal partners, finalized the risk data and risk analysis for SHSP and UASI and produced final risk profiles. FEMA provided all states, territories, and the 100 most populous MSAs with their Final Risk Profiles for FY 2023 at the conclusion of the outreach process.

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Figure 1. Notional Risk Profile as an Example of the Data Provided to Stakeholders



4. Standard Risk Theory and Issues of Application

The *Homeland Security Act of 2002*, as amended, requires that the “relative threat, vulnerability, and consequences from acts of terrorism” be considered when allocating funds for FEMA’s preparedness grant programs. Additionally, DHS’s official definition of risk is the “potential for an unwanted outcome as determined by its likelihood and consequences.”⁵

For the risk analysis supporting the preparedness grant programs, FEMA uses a composite construction in which individual data elements (e.g., population, population density, commuters) are combined to create one value (e.g., population), and then multiple data elements are combined to create a single scaled value (e.g., consequence component risk score). The component’s scaled value of the combined data elements is multiplied by others representing Threat, Vulnerability, and Consequence. This composite methodology permits assessment and comparison of relative risk, based on multiple input factors. Because FEMA assesses risk to inform the allocation of finite grant dollars, the agency evaluates *relative risk*⁶ among eligible grant entities. Using this approach, the risk from terrorism to one grant entity can be directly compared to the risk to all other jurisdictions within the same program. Each of the variables comprising the risk formulas for the preparedness grants are calculated on a relative, ratio scale, as well.

Why not Absolute Risk?

Absolute Risk: “level of risk expressed with real-world units of measurement that allows for independent interpretation without comparison to estimates of other risks” (DHS Lexicon, 2018 Edition, p.3).

In addition to being an inappropriate evaluation method for the distribution of finite grant funds, the calculation of Absolute Risk of all grant jurisdictions against all potential terrorist acts, if possible, would be cost and time prohibitive.

⁵ DHS Lexicon, 2018 Edition, p. 663

⁶ Relative Risk definition: “measure of risk that represents the ratio of risks when compared to each other or a control,” DHS Risk Lexicon, 2018 Edition, p. 618

5. Top-Down and Bottom-Up Risk Methodologies

Calculating the risk of a terrorist attack to an individual asset is relatively straightforward conceptually, but difficult to compute. There are two different approaches for calculating the risk to an entire high-risk urban area or state from any number of different types of terrorist attacks, as FEMA is tasked with doing to support preparedness grant allocations. One approach is to calculate the risks to each asset from all known attack methods and to sum these individual risks over all possible scenarios (attack methods and assets) in a geographic region to determine that region's overall risk. This bottom-up, or aggregation, approach suffers from both theoretical and practical shortcomings. In theory, the aggregation approach assumes that the whole is simply the sum of its parts. It does not easily accommodate interdependencies or multiple impacts from one event and may therefore misjudge risk. On the practical side, it is difficult to compile a sufficiently accurate assessment of all the critical assets in any particular jurisdiction. This is because there are no reliable, national-level databases of critical assets that contain an assessment of the current vulnerabilities of all assets.

The second approach, and the one employed by FEMA, is a top-down approach to assess risk that is more appropriate for informing national-level resource allocation. The top-down approach treats the entire jurisdiction (e.g., state, high-risk urban area, port, or transit system) as a single "asset" for computational purposes. Using this approach, a jurisdiction is assigned a single threat value, a single vulnerability value, and a single consequence value. Although these values are informed by the critical infrastructure assets present in the jurisdiction, and by other considerations, they are not determined by considering each asset individually. Instead, the Threat component represents the aggregate intent and capability of the nation's adversaries to target a particular jurisdiction; the Vulnerability component measures the probability of a successful attack; and the Consequence component measures the potential impacts of an attack on that jurisdiction.

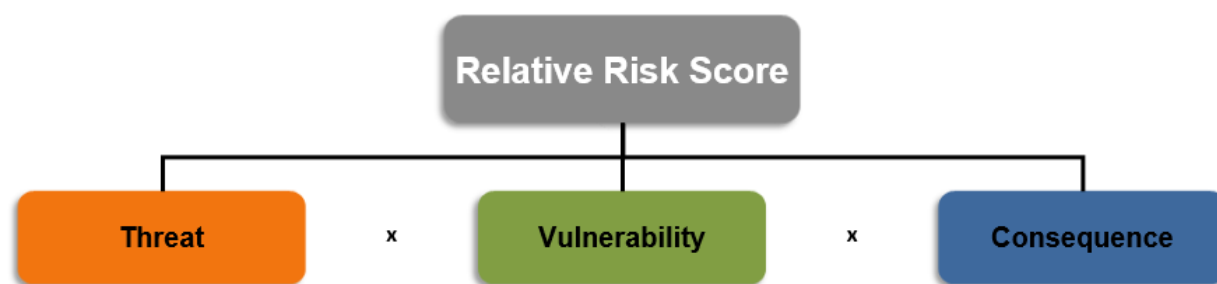
It is important to note that because FEMA does not assess absolute risk, the Vulnerability component of the formula does not reflect the actual vulnerability of the state, high-risk urban area, port, or transit system to an attack; however, the data elements are *indicative* of the vulnerability of that entity. Similarly, the Consequence component does not reflect the expected amount of damage from a terrorist attack but rather assesses the relative potential damage in that jurisdiction compared to the relative potential damage in other jurisdictions. For example, because an attack could disrupt the local economy, an appropriate element of calculating consequence is the gross domestic product (GDP) of that local economy. This does not mean that the cost of the attack is directly equivalent to the GDP; it simply means that the potential economic consequences of an attack could be twice as much in one jurisdiction as compared to another location with a GDP that is half as large.

6. Generalized Risk Methodology

The grant programs supported by the risk methodology (SHSP, UASI, PSGP, and TSGP) fund preparedness activities to support the goal of a more secure and resilient Nation.⁷ Under the *Homeland Security Act of 2002*, as amended, FEMA “shall consider, for each State or high-risk urban area . . . its relative threat, vulnerability, and consequences from acts of terrorism” when allocating preparedness grant funding. The weighting of each of the overall components of the risk methodology are assigned to best measure the relative threat, vulnerability, and consequences from acts of terrorism for each of the grant programs informed by risk.

The generalized risk methodology used across SHSP, UASI, PSGP, and TSGP is shown in **Figure 2**. The risk methodology for SHSP, UASI, PSGP, and TSGP multiply the Threat component by the Vulnerability component by the Consequence component.

Figure 2: Generalized Risk Methodology



The FY 2023 grant programs discussed in this report all use a variation of this generalized methodology in which risk is assessed as a function of Threat, Vulnerability, and Consequence. Because this methodology represents a relative scale (ratio) for risk, the units of risk cannot be considered as a measure of the *absolute* risk of that entity; instead, risk scores are relative comparisons among different risk levels (e.g., entity A has twice as much risk as entity B). FEMA uses relative risk scores to inform allocation decisions. Therefore, jurisdictions (e.g., states, high-risk urban areas, port areas, or transit systems) are compared against the entity with the greatest risk. That entity is assigned a relative risk score of 100 and all other risk scores are normalized in relationship to that highest-risk entity.

6.1. Weighting of Data Elements

Each data element in the Threat, Vulnerability, and Consequence components is normalized using the maximum value before the weights are applied. For instance, GDP is determined by first dividing each state’s GDP by the GDP of the state with the highest GDP (i.e., California). California’s normalized GDP value is 1.0, and all other states will be something less than 1.0. After max value normalizing the GDP value, the economic data element weight is 40%, then California’s economic data score is 0.4, and all other states will be proportionately less than 0.4.

⁷ The OPSG risk assessment is defined separately and is designed to identify the risk to border security and the potential risk that certain threats pose to border security. Its description and definition are including in Section 7.4.

This max value normalization and simple additive weight method makes the interpretation of the Vulnerability and Consequence weights straightforward: data elements with the largest weights have the greatest impact on their component score.

6.2. Weight Assignments

FEMA annually reviews the risk model weights to ensure that the focus of each grant program is aligned with FEMA's mission and goals. For FY 2023, FEMA collaborated with subject matter experts (SMEs), federal partner agencies, and the Homeland Security Grant Program (HSGP) stakeholder community to solicit feedback on the relative weights for each data element. The final decision for the weights is based on DHS policy determinations and direction informed by FEMA's internal research and analysis, evaluation of stakeholder feedback, consultation with DHS partners, and past precedents.

7. FY 2023 Risk Methodology Enhancements

For FY 2023, FEMA conducted the most in-depth review of the terrorism risk model in over a decade at the Secretary's direction. Over an 18-month period, FEMA consulted and collaborated with DHS I&A, SEP, CISA, U.S. Customs and Border Protection (CBP), S&T, U.S. Census Bureau, other federal agencies, and terrorism SMEs, and requested stakeholder comments and feedback from each. Based on this review, DHS/FEMA introduced several enhancements to the risk methodology to simplify the methodology and better account for the evolving threats that we face in the U.S., while continuing to conduct a comprehensive review of the risk methodology for possible additional enhancements in FY 2024 and beyond.

In FY 2023, DHS/FEMA aimed to simplify the risk methodology calculations for SHSP, UASI, PSGP, and TSGP to increase the clarity and provide greater transparency of the models for stakeholders by removing normalization at the index level. The normalization at the index level was included in the original risk methodology to focus on broad areas (border, critical infrastructure, soft targets, military, etc.). However, with the removal of the normalization at the index level, the focus has moved to specific data elements instead of the broader areas. The calculation process used in FY 2022 within the Consequence and Vulnerability components of the risk methodology aggregated the data elements to the index level as an intermediary step in creating component-level scores. Removing the index level normalization preserved all the benefits of the existing mathematical model, produced minimal changes in risk scores and ranks, but helped simplify the risk methodology calculations. All data elements continue to be max normalized, but index level computations are no longer used. Normalized data element values are added together to make up the full Vulnerability or full Consequence component score after multiplying by the data element weights.

DHS/FEMA also added new data elements for Community Resilience (CR) and Economic Concentration (EC) to enhance Vulnerability for SHSP and UASI. Including a measure of CR in the risk methodology allows for increased ability to differentiate between jurisdictions with high/low capacity to absorb, endure, and recover from the impacts of a terrorist attack. FEMA used the U.S. Census Community Resilience Estimates (CRE) as the data source for adding the CR element to the risk methodology. This data source was selected because access to individual microdata allows the U.S. Census Bureau to provide the most granular, accurate, and timely community resilience measure.

EC accounts for the dependency of a state, territory, or MSA on certain markets that make an economy more vulnerable to external shocks, like a terrorist attack. The more concentrated a local economy is in each sector, the more vulnerable that locality is to attack or damage affecting the largest economic sector and, therefore, the less economically resilient it is. EC can be of significant concern for small, rural communities, but urban markets that have one or two dominant industries are equally or even more vulnerable given the size of their population. FEMA used the U.S. Bureau of Economic Analysis (BEA) employment data and U.S. Census County Business Patterns (CBPs) employment data to calculate the EC for each state, territory, and urban area.

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In addition to the new data elements, DHS/FEMA adjusted the individual data element weights within the SHSP and UASI Vulnerability and Consequence components as follows:

Vulnerability Data Element Weights

Data Element	FY 2022 Weight	FY 2023 Weight
Targeted Infrastructure	40%	25%
Special Event Metric	12%	15%
Daily Visitors	9%	10%
Visitor Impact	9%	10%
Economic Concentration	N/A	5%
Community Resilience	N/A	5%
Isolation	6%	6%
Border Crossings	12%	12%
International Borders	6%	6%
International Waters	6%	6%

Consequence Data Element Weights

Data Element	FY 2022 Weight	FY 2023 Weight
Population Density	40%	40%
Total Population	20%	20%
Gross Domestic Product	26%	25%
National Infrastructure	10%	10%
Military Personnel	4%	5%

An additional enhancement was removal of the complex background calculations for constraints needed to create “weights” or ratios between the Threat, Vulnerability, and Consequence components, and introduction of a measure to account for unknown elements of terrorism. The previous methodology for SHSP, UASI, PSGP, and TSGP, which included component weights of Threat at 25%, Vulnerability at 25%, and Consequence at 50% by using constraints, was established to control the ratios among the components to best match the changing U.S. terrorism risk. To create component-level weights, constraint ranges were chosen to represent percentages by applying relative range sizes or vector lengths that are then multiplied together. This constraining calculation added complexity to the model and created confusion around the mathematical relationship between the Threat, Vulnerability, and Consequence components. Eliminating this step helps make the calculations more transparent and more easily understood. It also removes the interdependencies among the three components, meaning that if the weight of one component was increased or decreased, the weight(s) of one or all other components needed to be updated as well to add to 100%.

In conjunction with removing the constraint methodology, FEMA added a Baseline element designed to capture threats, vulnerabilities, and consequences that are currently unknown, unquantifiable, or not differentiable among states, territories, and MSAs. This Baseline element is added in place of the constraining methodology used in FY 2022 and previous years. The Baseline is inserted into the SHSP and UASI Vulnerability and Consequence components to

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account for unknown or unquantifiable universal elements in each component's composition, and to establish a mathematical lower-bound or floor for each component.

In the PSGP and TSGP risk methodologies, the Baseline is inserted into the Vulnerability component. Within the Threat component, a data baseline or lower bound is already established for all threat scores provided by DHS I&A. DHS I&A sets the lowest non-zero score/baseline value for the lowest threat level within each Threat data element. Additionally, the Baseline element will simplify the mathematical calculation by removing constraints, treating Threat, Vulnerability, and Consequence as independent variables, allowing component data elements and weights to play a more influential role, and making it easier to identify the specific data elements that drive changes to a jurisdiction's risk score.

Each urban area, state, territory, port area, and transit agency received the same score within the appropriate grant program for this Baseline element, ensuring that, no matter what the other data elements report for this jurisdiction, the full Vulnerability and Consequence scores acknowledge the presence of a universal vulnerability and consequence that otherwise cannot be quantified. This created a simpler approach (compared to that of constraining variables), and this one-step calculation contributed to greater clarity and simplicity. For FY 2023, the baseline weight for Vulnerability is 40% for SHSP, UASI, PSGP, and TSGP, and 1% for Consequence for SHSP and UASI.

The following table summarizes the above discussion of the enhancements for FY 2023 by the applicable grant program:

FY 2023 Enhancement	Applicable Grant Program
Removal of index level normalization	SHSP, UASI, PSGP, and TSGP
Addition of the CR and EC data elements	SHSP and UASI
Removal of the constraining methodology	SHSP, UASI, PSGP, and TSGP
Addition of the Vulnerability Baseline	SHSP, UASI, PSGP, and TSGP
Addition of the Consequence Baseline	SHSP and UASI

7.1. Stakeholder Engagement

DHS/FEMA undertook a comprehensive, coordinated, and collaborative review of the SHSP and UASI risk methodology, including soliciting feedback from stakeholders to develop recommendations for enhancements to the methodology. This review was undertaken to deliver a comprehensive assessment of the current terrorism risk methodology to better account for the changing U.S. terrorism risk environment and to identify areas of simplification that could improve the transparency and comprehension of the model.

The review included outreach and coordination from August 2021 to March 2022 with all 56 states/territories and the 100 most populous MSAs stakeholders, as well as federal and external partners and SMEs, to gather feedback on the terrorist risk environment and the makeup of the risk methodology. Additionally, DHS/FEMA conducted a series of webinars during the fall 2022 timeframe to inform and gather additional feedback.

8. Individual Grant Program Risk Methodologies

The general risk methodology construct described above is used throughout SHSP, UASI, PSGP, and TSGP. The Threat component applies to the SHSP, UASI, PSGP, and TSGP programs. However, the implementation of the Vulnerability and Consequence components is tailored to each program based on risk and mitigation priorities, as well as data suitability. The weights of the individual data elements are set by the DHS Secretary as authorized by the *Homeland Security Act of 2002*, as amended, to reflect current and emerging risk and mitigation priorities. The data elements that comprise each component are determined by the type of entity being considered (i.e., state, territory, high-risk urban area, port area, or transit system). The variations in the Vulnerability and Consequence components for each grant program are described in the following sections. For OPSG, CBP developed and administers the formula that is used to determine sector-level risk in each of its regions. Section 8.4 describes the components of the OPSG risk methodology in detail.

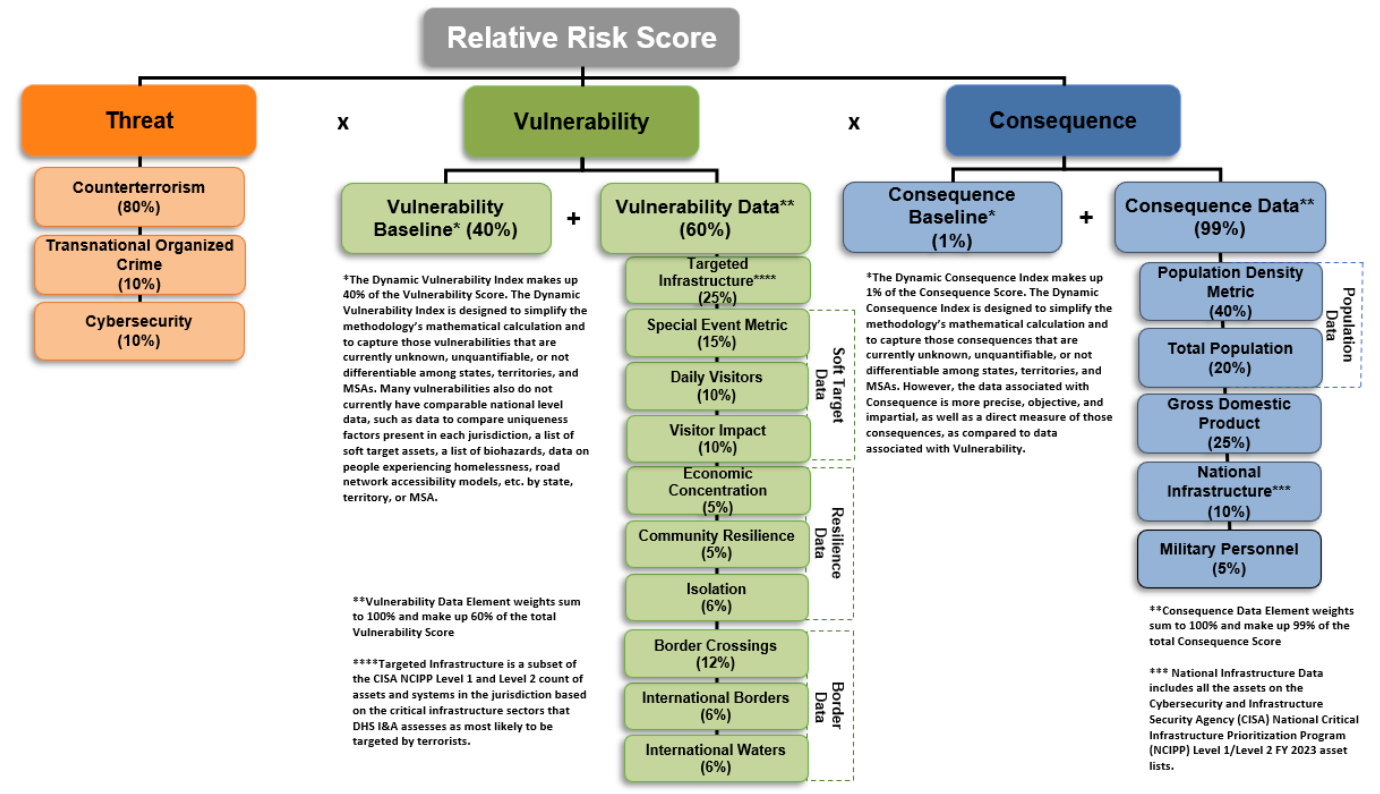
8.1. State and High-Risk Urban Area Risk Methodologies

The risk methodologies for SHSP and UASI were designed to be as consistent with each other as possible and are discussed together. Their methodologies and weights are identical, and the sources for the data are the same wherever possible.

The geographical boundaries for jurisdictions in the SHSP methodology are the state and territory borders. For the UASI methodology, the boundaries for each high-risk urban area are the MSA boundaries as defined by Office of Management and Budget (OMB) for use by all agencies that conduct statistical activities to collect and publish data for MSAs, Metropolitan Divisions, Micropolitan Statistical Areas, Combined Statistical Areas, and New England City and Town Areas. FEMA's use of the MSA definitions is required by the *Homeland Security Act of 2002*, as amended. The FY 2023 MSA definitions are based on the MSA delineations released by OMB in March 2020.

Figure 3 illustrates the weights and data elements associated with the SHSP and UASI risk methodologies. **Table 2** summarizes the data elements and sources used in the FY 2023 SHSP and UASI risk methodologies.

Figure 3: FY 2023 State and High-Risk Urban Area Risk Methodology



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Table 2: Data and Sources used in the SHSP and UASI Risk Methodologies

Components	Data	Source
Threat		
<p><u>Counterterrorism Levels:</u></p> <p>Data sources include serialized reporting disseminated by the U.S. Intelligence Community (IC), open source and field intelligence reports collected by DHS I&A, incidents cited in DHS and other IC finished intelligence products, and news media, criminal indictments, Department of Justice (DOJ) press releases, and other open-source reports of activity with a nexus to terrorism. DHS I&A also relies on data provided by fusion centers in response to its annual request for information, such as legal records and serialized law enforcement reporting disseminated by state or local partners. DHS I&A reviews these sources to identify concrete, geographically specific terrorist threats—both express and implied—including terrorist plots and attacks, as well as prosecutions for terrorism-related offenses such as the provision of material support.</p>	CT Level	<p>DHS I&A, using data from:</p> <ul style="list-style-type: none"> National Counterterrorism Center and other IC agencies, open-source media, DOJ, I&A, and state and local holdings.
<p><u>Cybersecurity Levels:</u></p> <p>Analysis considers IC and private sector cyber security reporting through the DHS CISA involving attempted, suspected, and confirmed cyber intrusions, data exfiltration, and disruptive cyber-attacks targeting U.S. critical infrastructure. This reporting is supplemented with all source IC reporting on nation-state and illicit actor intent and capability to conduct cyber-attacks.</p>	Cyber Level	<p>DHS I&A, using data published as of late September 2022 from:</p> <ul style="list-style-type: none"> CISA reporting (covering activity from January 2021 to September 2022). IC reporting (covering activity from January 2021 to September 2022). The most recently available Bureau of Labor Statistics datasets (covering a time period from May 2020 to May 2021).
<p><u>Transnational Organized Crime Levels:</u></p> <p>Analysis considers a combination of data sources identifying the secondary impacts of actors, as well as reports identifying named TOC actors operating in a given area. Secondary impacts of TOC activity are drawn from overdose data from narcotic types smuggled by TOC actors.</p>	TOC Level	<p>DHS I&A, using data from:</p> <ul style="list-style-type: none"> Centers for Disease Control and Prevention, National Center for Health Statistics, National Vital Statistics System, Vital Statistics Rapid Release, Provisional Drug Overdose Death Counts. Figure 1b. percent Change in reported 12 Month-ending Count of Drug Overdose Deaths, by Jurisdiction: June 2021-June 2022 Reported number of Deaths, Percent Change for United States 2.3% increase. Accessed 11/21/2022. High Intensity Drug Trafficking Area (HIDTA) Program, and State and Local Fusion Center Reports: FY23 San Diego and Imperial Valley HIDTA Threat Assessment;

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Components	Data	Source
		<p>Northern California HIDTA 2022 Threat Assessment; Puerto Rico/US Virgin Islands HIDTA 2022 Threat Assessment; Ohio High Intensity Drug Trafficking Area 2022 Threat Assessment; New York - New Jersey 2023 Threat Assessment; NM HITDA: 2022 New Mexico Drug Threat Assessment; 2023 LMA HIDTA Threat Assessment; 2022 Los Angeles HIDTA: Baseline Assessment; 2022 Atlanta-Carolinas HIDTA threat Assessment; South Texas HIDTA Annual Threat Assessment; West Texas HIDTA Annual Threat Assessment 2021; 2022 West Texas Quarterly Bulletin; Washington-Baltimore HIDTA 2022 Threat Assessment; Gulf Coast HIDTA 2022 threat Assessment; Oregon-Idaho HIDTA Threat Assessment; New England HIDTA Threat Assessment; South Florida HIDTA Threat Assessment, 2022 Chicago HIDTA Threat Assessment; Rocky Mountain HIDTA 2021 Utah Threat Assessment; 2022 Threat Assessment Final (Rocky Mountain); 2022 Midwest HIDTA Threat Assessment, 2022 Michigan HIDTA Threat Assessment; 2022 Central Valley California Threat Assessment; 2022 Houston HIDTA; Tennessee Statewide Threat Assessment; 2022 Nevada HIDTA Threat Assessment; 2023 North Central HIDTA Threat Assessment; 2022 Central Florida HIDTA threat Assessment Final; 2021 Oklahoma Statewide Threat Assessment; Arizona HIDTA Threat Assessment 2021; Northwest HIDTA Threat Assessment for Program Year 2022 2023 Oregon-Idaho HIDTA Threat Assessment; 2021 Utah State Assessment; 2023 Washington Baltimore HIDTA Threat Assessment; Northwest HIDTA Threat Assessment for Program Year 2023; 2022 Missouri Threat Assessment; North Florida HIDTA CY 2022 DHE Assessment.</p>

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Components	Data	Source
Vulnerability		
<u>Targeted Infrastructure:</u> The targeted infrastructure count is provided by the DHS CISA National Risk Management Center (NRMC). It is a subset of the Level 1 and Level 2 count of assets and systems in the jurisdiction based on the critical infrastructure sectors that DHS I&A assesses as most likely to be targeted by terrorists. The targeted sectors are the following five with all included subsectors: 1) Commercial Facilities; 2) Government Facilities; 3) Transportation Systems; 4) Healthcare and Public Health; and 5) Energy.	Targeted Infrastructure Counts	<ul style="list-style-type: none"> DHS CISA NRMC National Critical Infrastructure Prioritization Program (NCIPP) Level 1/Level 2 FY 2023 List, with input from DHS I&A.
<u>Border Crossings:</u> The number of border crossings is provided by CBP and includes crossings of international borders into the U.S. by train, bus, commercial truck, personal vehicle, pedestrian, ferries and other waterborne vessels, and both commercial and private aircraft.	Border Crossings – total number of crossings	<ul style="list-style-type: none"> CBP Office of Field Operations/Planning, Program Analysis and Evaluation (crossing counts for the 12-month period spanning January 1, 2019, through December 31, 2019). Public CBP data can be found through the Traveler and Conveyance Statistics. However, it is important to note that some differences are possible because the FEMA data set is provided directly from CBP and may have a different date range than the webpage. Additionally, it includes the Site Crossings as well as crossings by water that are not currently included in CBP's webpage.
<u>International Borders:</u> The presence of international borders. Each jurisdiction received either full credit or no credit (i.e., Yes or No).	International Borders	<ul style="list-style-type: none"> Inspection of National Geospatial-Intelligence Agency's US-Canada and US-Mexico border geographic information system (GIS) shapefiles. Tiger/Line Shape Files for state outlines – Northern and Southern Boundaries (2021).
<u>International Waters:</u> The presence of a coastline bordering international waters. Each jurisdiction received either full credit or no credit (i.e., Yes or No).	International Waters	<ul style="list-style-type: none"> Inspection of National Oceanic and Atmospheric Administration's Office of Coast Survey GIS dataset "Collision Regulation Lines in U.S. Waters".
<u>Daily Visitors:</u> The summation of the average daily international and domestic visitor population within a jurisdiction. Additional detail is described within the Population section.	Daily Visitors	<ul style="list-style-type: none"> Same domestic and international visitor data as detailed in the Population section.
<u>Visitor Impact:</u> This metric is the calculation of the Total Visitors divided by Resident Population. The metric is an indicator of a jurisdiction's economic dependence on	Visitor Impact	<ul style="list-style-type: none"> Same resident, domestic visitor, and international visitor data detailed in the Population section.

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Components	Data	Source
tourism and the jurisdiction's preparedness to provide emergency response services to the visiting population (services that are correlated with the resident population of the jurisdiction).		
<p><u>Special Event Metric:</u> The SEM metric incorporates both SEAR data and population data. The SEAR Methodology determines the relative risk of a terrorist attack for each special event submitted using a scenario-based risk assessment, which includes terrorist attack scenarios, as well as vulnerability and consequence data. The number of events considered for the SEM metric is proportional to the full population of each jurisdiction, relative to the total population of all participating jurisdictions.</p>	Special Event Metric	<ul style="list-style-type: none"> DHS Office of Operations Coordination SEAR 2021, 2022, 2023 data, with the Total Population (residents, commuters, and visitors) as calculated in the Population section. SEAR Events Fact Sheet Homeland Security (dhs.gov).
<p><u>Economic Concentration:</u> The EC metric highlights jurisdictions that are more vulnerable due to less diverse economies, making recovery from an attack more difficult. The jurisdictions with the highest scores are those that are undiversified and have a high degree of employment sector concentration and are thereby less resilient. EC can be of significant concern for small, rural communities, but urban markets that have one or two dominant industries are equally or even more vulnerable given the size of their population.</p>	Economic Concentration	<ul style="list-style-type: none"> BEA 2019 employment data, along with supplemental economic sector proportions from the CBP 2019 employment data. Employment BEA. CBP.
<p><u>Community Resilience:</u> The CR metric reflects that less resilient populations can be significantly impacted by a shock from a terrorist attack because of their lack of resources and alternatives to mitigate or absorb that shock. FEMA utilizes the rate of individuals considered low resilience/high vulnerability, those with three or more risk factors from CRE.</p>	Community Resilience	<ul style="list-style-type: none"> CRE, 2019 data, based on American Community Survey data Community Resilience Estimates (census.gov).
<p><u>Isolation:</u> States, territories, and MSAs isolated from the rest of the U.S. must be self-sufficient for longer when the need arises. Jurisdictions outside the continental U.S. receive the highest possible value. Jurisdictions in the continental U.S. receive an isolation value based on Census Population within 100 miles of the entity. An inverse population proportion is used to assign areas with low surrounding populations a higher isolation value.</p>	Isolation	<ul style="list-style-type: none"> OCONUS/CONUS Definition Tiger/Line Shape Files for state, territory, MSA outlines (2021). Same resident data detailed in the Population section.
<p><u>Baseline:</u> States, territories, and MSAs all present vulnerabilities to terrorist threats that cannot be fully captured by the indicator data elements currently present in the Vulnerability component.</p> <p>The Baseline is designed to capture those vulnerabilities that are currently unknown,</p>	Baseline	<ul style="list-style-type: none"> All states, territories, and MSAs receive the same value to capture vulnerabilities that are currently unknown, unquantifiable, or not differentiable among states, territories, and MSAs.

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Components	Data	Source
<p>unquantifiable, or not differentiable among states, territories, and MSAs.</p> <p>Many vulnerabilities do not currently have national level comparable data, such as data to compare the uniqueness factors present in each jurisdiction, a list of soft target assets, list of biohazards, homeless data, or road network accessibility models, etc. by state, territory, or MSA. Even with more localized models, like that of a single building, unknowns still exist within a relative terrorism risk model that must account for such a wide range of terrorism types.</p> <p>Each jurisdiction receives the same score for this baseline element so that, no matter what the other data elements report for this jurisdiction, the full vulnerability score acknowledges the presence of some level of universal vulnerability that cannot otherwise be quantified.</p>		
Consequence		
<p><u>Population Density Metric:</u> This metric calculates population density at the Census block group level to account for variations in population distribution with each jurisdiction. Population density is calculated by dividing each block group's population (residents, commuters, and visitors) by its land area, and these calculated values are summed up to their respective jurisdiction. The final step of the calculation is to sum up the density for every person in the jurisdiction. This is accomplished by multiplying the block group population by the density of that block group and summing all of these values together. This calculation produces a metric that is heavily oriented towards dense localities as people in dense block groups contribute more than people in sparse block groups. Population Density is capped for the densest 1% of block groups. The block groups in this top 1% receive the same population density as the 99th percentile block group.</p> <p><u>Total Population:</u> This metric is a standalone total population count, which is the sum of all residents, commuters, and daily visitors in the jurisdiction. This population value is different than the Population Density Metric because each person in a jurisdiction contributes a constant value regardless of the density of their local environment. Total Population is designed to better capture the possible consequences of a small-scale attack.</p>	Census (resident) Population	<ul style="list-style-type: none"> U.S. Department of Commerce, Census Bureau (2020 Census).
	Commuters – daily estimate	<ul style="list-style-type: none"> U.S. Department of Commerce, Census Bureau (2012-2016 American Community Survey updated using the 2016-2020 version).
	Domestic Visitors – daily estimate	<ul style="list-style-type: none"> D.K. Shifflet & Associates (2018, 2019 and 2021).
	International Visitors – daily estimate	<ul style="list-style-type: none"> U.S. Department of Commerce, National Travel & Tourism Office (2018, 2019, 2021); XBorder Canada Research Program (2018, 2019, 2021); and Banco de México as published by Mexico's National Institute of Statistics and Geography (2018, 2019, 2021).
	Land Area	<ul style="list-style-type: none"> U.S. Department of Commerce, Census Bureau (2020 census).
<p><u>Gross Domestic Product:</u> The GDP is a measure that is proportional to the amount of economic disruption that could be caused by</p>	GDP by State	<ul style="list-style-type: none"> U.S. Department of Commerce (GDP by state, 2021 estimates).

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Components	Data	Source
a generalized attack on an area. It is taken to be the GDP of the jurisdiction.	GDP by U.S. Territories	<ul style="list-style-type: none"> U.S. Department of Commerce, BEA (GDP for American Samoa and Guam, 2021 estimates, Puerto Rico and Virgin Islands, 2020 estimates, and Northern Mariana Islands, 2019 estimates).
	GDP by MSA	<ul style="list-style-type: none"> U.S. Department of Commerce, BEA (GDP by County and MSA, 2021 estimates).
	GDP for San Juan, PR	<ul style="list-style-type: none"> U.S. Department of Commerce, BEA (Puerto Rico GDP, 2020 estimate) and U.S. Department of Labor, Bureau of Labor Statistics (Puerto Rico and San Juan Labor Force, 2021).
<u>National Infrastructure:</u> The National Infrastructure is developed from the DHS CISA NRMCC Level 1/Level 2 Program and represents the count of Level 1/Level 2 assets/systems within a jurisdiction. These counts include both Chemical Facility Anti-Terrorism Standards facilities and Defense Industrial Base facilities.	Level 1/2 Asset/System Counts	<ul style="list-style-type: none"> DHS CISA NRMCC NCIPP Level 1/Level 2 FY 2023 List.
<u>Military Personnel:</u> The Military Personnel is composed of the number of U.S. military personnel stationed within a jurisdiction (e.g., state, MSA). The count of military personnel includes the number of active duty, reserve, and guard troops, as well as civilian personnel.	Military Personnel	<ul style="list-style-type: none"> U.S. Department of Defense (DoD), Defense Manpower Data Center Total Force by Duty Location Report (data as of July 2022).
<u>Baseline:</u> States, territories, and MSAs all have a certain level of potential consequences due to terrorist attacks that are not captured by the data elements currently present in the Consequence component. For example, an attack may have universal psychological effects no matter where it occurs. The Baseline is designed to capture those potential consequences that are currently unknown, unquantifiable, or not differentiable among states, territories, and MSAs. Each jurisdiction receives the same score for this baseline element ensuring that, no matter what the other data elements report for this jurisdiction, the full consequence score acknowledges the presence of some level of universal consequence that cannot otherwise be quantified.	Baseline	<ul style="list-style-type: none"> All states, territories, and MSAs receive the same value to capture consequences that are currently unknown, unquantifiable, or not differentiable among states, territories, and MSAs.

8.1.1. Threat Component

The Threat component includes three data elements:

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1. Counterterrorism threat levels;
2. Transnational Organized Crime threat levels; and
3. Cyber threat levels.

Each Threat element is normalized to a maximum of 1.0 and then summed with corresponding weights of 80%, 10%, and 10%.

Counterterrorism Threat Levels – 80% of Threat Component

The FY 2023 SHSP and UASI counterterrorism levels consider express and implied physical terrorist threats to states and MSAs, derived from IC and DHS Component-disseminated threat reporting and other vetted sources of information regarding international or domestic violent extremist plots, threats, or attacks, including by HVEs. DHS I&A assigns MSAs to one of four categories, and states to one of three categories, commensurate with express and implied threats. This assessment uses National Counterterrorism Center, DOJ, and state and local information to supplement I&A reporting on the homeland threat picture.

Transnational Organized Crime Threat Levels – 10% of Threat Component

TOC and Cyber threat assessments were added to the Threat component in FY 2021. TOC analysis considers a combination of data sources identifying the secondary impacts of actors, as well as reports identifying named TOC actors operating in a given area. Secondary impacts of TOC activity are drawn from overdose data from narcotic types smuggled by TOC actors, as well as crimes reported to the Uniform Crime Report.

Cyber Threat Levels – 10% of Threat Component

Cyber threat analysis considers IC and private sector cyber security reporting through CISA involving attempted, suspected, and confirmed cyber intrusions; data exfiltration; and disruptive cyber-attacks targeting U.S. critical infrastructure. This reporting is supplemented with all source IC reporting on nation-state and illicit actor intent and capability to conduct cyber-attacks. Similarly, to the Counterterrorism levels, DHS I&A assigns MSAs to one of four categories, and states to one of three categories, commensurate with specific and implied threats.

After receiving the threat levels from DHS I&A, FEMA establishes threat values between 0.0 and 1.0 for each threat level for MSAs and states for Counterterrorism, TOC, and Cyber threat. These values represent the relative likelihood of attack on an MSA or state in that threat level. All jurisdictions in the highest threat level receive the same raw threat value of 1.0, and jurisdictions from the other levels receive lower scores, which are assessed by FEMA and DHS I&A to reflect their lower relative likelihood of being attacked.

8.1.2. Vulnerability Component

The Vulnerability component is the weighted sum of 11 data elements: Targeted Infrastructure (previously called TII); Special Event Metric; Daily Visitors; Visitor Impact; Economic Concentration; Community Resilience; Isolation; Border Crossings; International Borders; and International Water. Each Vulnerability data element is normalized to a maximum of 1.0 and make up 60% of the total Vulnerability score.

Targeted Infrastructure– 25% of Vulnerability Component

Targeted Infrastructure, developed in conjunction with DHS I&A, is a subset of the CISA NCIPP Level 1/Level 2 counts. The NCIPP Level 1/Level 2 critical infrastructure list identifies those assets, systems, and clusters whose destruction or disruption could cause catastrophic national or regional consequences. See explanation of the NCIPP Level 1/Level 2 counts under the Consequence component.

The Targeted Infrastructure represents the number of Level 1/Level 2 assets/systems within sectors that DHS I&A deems terrorists are more likely to attack. In FY 2023, DHS I&A added one new sector to the list of sectors within the Level 1/Level 2 list that are considered for the Targeted Infrastructure which now include: Commercial Facilities; Government Facilities; Transportation Systems; Healthcare and Public Health; and Energy.

Border Data – 24% of Vulnerability Component

The current border data elements provide indicators of vulnerability for states/territories and high-risk urban areas exposed to additional security risks based on proximity to an international border/waterway; risks that may be attributed to the volume of international visitors; and isolation. The border data elements include the following data elements:

1. The presence of an international land border with either Canada or Mexico;
2. The presence of a coastline facing out onto international waters (e.g., Pacific Ocean, Atlantic Ocean, or Gulf of Mexico);
3. The number of people legally crossing at land, air, and water crossings; and

Within border data, the border crossing data are assigned a weight of 12% and the international borders and international waters are weighted at 6% each for a total of 24% of the Vulnerability component.

The presence of international borders is determined by inspection of the National Geospatial-Intelligence Agency's U.S.-Canada and U.S.-Mexico border GIS shapefiles. The method for determining international waters remained unchanged: FEMA used the "*International Regulations for Preventing Collisions at Sea (72 COLREGS)*" published by the International Maritime Organization to determine international waters. Each jurisdiction received either full credit or no credit for International Borders or International Waters.

Consistent with our approach from FY 2015 through FY 2022, FEMA's FY 2023 border crossing data includes the number of crossings by air, water, and land. Border crossing data was provided by the CBP Office of Field Operations/Planning, Program, Analysis, and Evaluation and includes crossings of international borders into the United States by train, bus, commercial truck, personal vehicle, pedestrian means, ferries, other waterborne vessels, and both commercial and private aircraft. As in previous years, FEMA receives border crossing data at both the Port of Entry (POE) as well as those individual sites which are separate from the POEs from CBP. These two types of data were used in the risk assessment to augment the POE data for POEs that cross states or MSAs. Due to unequal effects of the pandemic travel restrictions on the border crossing

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data, the border crossing data covered the 12-month period from January 1, 2019, through December 31, 2019.

Soft Target Data – 35% of Vulnerability Component

The Soft Target data elements include the Daily Visitors; Visitor Impact; and SEM data elements. It is designed to account for the emerging and more diffused threat against soft targets, specifically mass-gathering events and other locations where large crowds congregate.

Daily Visitor data used in soft targets is identical to the domestic and international visitor data detailed in population within the Consequence component (see below). This data element reflects where people visit for tourism, conferences, and other gatherings.

In FY 2022, FEMA added the Visitor Impact data element to calculate the ratio of daily visitors to resident population. This new element identifies jurisdictions with a high visitor to resident ratio which is indicative of more soft targets and additional vulnerability for those targets. The data sources for this data element are the same as used in population data described in the next section.

The SEM data indicates places of “temporary” soft target vulnerability where responder resources can become strained. SEAR event data from the DHS SEP is processed to attribute all events to each participating state, territory, and MSA. The SEM utilizes a population-weighted approach to determine a cap of how many events will be considered per jurisdiction in the overall metric calculation. The cap is derived by the calculation of the relative proportion of the jurisdiction’s population, which is then multiplied by the total number of events submitted. For example, if there were 10,000 SEAR events reported and an MSA had a population equal to 5% of the total of all the top 100 MSA populations, that MSA would have up to 500 SEAR events considered for its soft target. This cap was implemented to ensure that one jurisdiction’s score was not immensely inflated due to high levels of SEAR event reporting.

In both FY 2022 and FY 2023, FEMA and DHS SEP updated the SEM to include three years of event data to best reflect the special event risk throughout the nation. Previously only one year of SEAR data was used. For FY 2023, FEMA used SEAR data from 2021, 2022, and 2023 together to create aggregate SEM scores for each entity, and then normalized to achieve a relative ranking.

Resilience Data – 16% of Vulnerability Component

New for FY 2023, Resilience Data includes EC; CR; and Isolation data making up 16% of the Vulnerability component. EC and CR both make up 5% of Resilience Data, and Isolation 6%.

The CR data element allows the risk methodology to better differentiate between jurisdictions with high/low capacity to absorb, endure, and recover from the external stresses of the impacts of a terrorist attack. This data element is based on the U.S. Census Community Resilience Estimates as the data source. Access to individual microdata allows the U.S. Census Bureau to provide the most granular, accurate, and timely community resilience measure.

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The EC data element accounts for the dependency of a state, territory, or MSA on certain markets that make an economy more vulnerable to external shocks, like a terrorist attack. The more concentrated a local economy is in each sector, the more vulnerable that locality is to attack or damage affecting the largest economic sector and, therefore, the less economically resilient it is. EC can be of significant concern for small, rural communities, but urban markets that have one or two dominant industries are equally or even more vulnerable given the size of their population. FEMA will utilize U.S. BEA employment data and CBP's employment data to calculate the EC for each state, territory, or urban area.

The isolation data element reflects the fact that some states, territories, and MSAs are geographically isolated and beyond the reach of immediate mutual aid or outside assistance in the event of a catastrophic event. Isolation recognizes these entities' need for heightened self-reliance. This data element has been expanded to the Continental United States (CONUS) jurisdictions by calculating scores based on the inverse of the population within 100 miles of a jurisdiction. This update uses population within 100 miles as an indicator of nearby resources and determines that jurisdictions with low nearby population are more isolated. With this enhancement, Outside the Continental United States entities will continue to receive full credit, and the isolation metric will also extend to certain CONUS entities.

8.1.3. Consequence Component

The consequence component is comprised of five data elements:

Population Density Metric; Total Population; Gross Domestic Product; National Infrastructure (previously called NII); and Military Personnel.

Population Data Elements – 60% of Consequence Component

Population Data Elements represent the potential consequences to the population of an area from a generalized terrorist attack. Updated population figures were drawn from the 2020 Census.

As required by the *Homeland Security Act of 2002*, as amended, population includes both population and population density. New in FY 2022, the total population was included as a separate data element. In FY 2021, Population was based solely on a density-centered measure of population concentration, which is now represented as "Population Density Metric." For FY 2023, the Population Data Elements include both Total Population (20%) and Population Density Metric (40%) for the total 60% weight within Consequence. The inclusion of a separate measure for total population better reflects the relative consequences of small-scale attacks, which do not produce extensive peripheral impacts.

The Total Population includes residents, commuters, and visitors for each census block group. Block group values are summed up to the respective state or MSA, giving the total population for full entities. Separately, the total population value for each block group is also used in computing the block group density by dividing this value by land area. To produce the Population Density Metric for each state or MSA, the total population is multiplied by the population density for that census block group and the calculated values are summed up to their respective state or MSA.

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The resulting entity values are normalized based on the highest value on either the state or MSA list, separately for the Total Population and Population Density Metric, and the full population is composed by weighted addition. This is suitable for use in both the SHSP methodology and the UASI methodology and can be compared across jurisdictions with different scales (e.g., counties, MSAs, or states). The model presents final results at the MSA and state/territory level.

In computing population density, results are capped for the densest 1% of census block groups. The block groups in this top 1% receive the same population density as the 99th percentile block group. In the years before this approach was introduced (FY 2017 and before), population density heavily favored modeling for large-scale destruction events affecting whole areas of high-rise buildings. The population density cap enables the risk assessment to reflect less destructive soft target attacks in unsheltered environments.

The FY 2023 commuter data is based on tract-level commuting flow estimates provided in the five-year American Community Survey from 2012-2016 at the tract level and updated with the 2016-2020 data at the county level. The commuter value is the net inflow of commuters into census tracts. Tracts are the most granular level at which the commuter data is available from the U.S. Census Bureau. The visitor data obtained from D.K. Shifflet & Associates⁸ includes visitor volume for the 2018, 2019, and 2021 travel years (in million person-days) for all 50 states plus the District of Columbia and Puerto Rico, as well as for the 210 most visited counties. For both visitor and commuter data, the values are apportioned to the block group-level prior to final calculations.

In summary, the FY 2023 population data elements use the following data sources to account for the resident (nighttime) population, commuters, and visitors and to incorporate population density:

- 2020 Census for resident population;
- U.S. Census Bureau, American Community Survey for commuters from 2012 to 2016 updated using the 2016-2020 version; and
- D.K. Shifflet & Associates for visitors from 2018, 2019, and 2021, U.S. Department of Commerce, National Travel & Tourism Office (2018, 2019, 2021); XBorder Canada Research Program (2018, 2019, 2021); and Banco de México as published by Mexico's National Institute of Statistics and Geography (2018, 2019, 2021).

Gross Domestic Product – 25% of Consequence Component

GDP is used as a universal comparison of the size of state and MSA economies, which indicates the relative potential for economic losses as a consequence of terrorist attacks. The methodology for determining the element value was kept consistent in FY 2022. The BEA at the U.S. Department of Commerce publishes annual GDP estimates and the share of GDP contributed by each state and MSA. For FY 2023, FEMA used BEA's official release of GDP by county statistics for 2021 for all counties in the U.S. The release of BEA's GDP by county statistics replaces BEA's GDP by metropolitan area statistics. BEA released 2021 GDP estimates for

⁸ This data is purchased as there is no federal or publicly available dataset on domestic visitors that estimates at the county level the total number of days domestic visitors have spent in each of the 50 states and 6 territories.

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American Samoa and Guam, 2020 values for Puerto Rico and the U.S. Virgin Islands, and 2019 values for Northern Mariana Islands. These estimates were used in FY 2023.

This data was used to compute the economic data element for the SHSP and UASI risk methodologies, respectively:

- 2021 GDP estimates by MSA;
- 2021 GDP estimates by state;
- 2021 GDP estimates for Guam and American Samoa;
- 2020 GDP estimates for the U.S. Virgin Islands and Puerto Rico;
- 2019 estimates for the Northern Mariana Islands; and
- 2021 data for San Juan, Puerto Rico.

National Infrastructure Data Element – 10% of Consequence Component

The NI Data Element is a weighted sum of critical infrastructure and key resource assets in or near a state or MSA. CISA compiles classified lists of the Nation's most critical, highly consequential assets and systems, categorized by infrastructure sector. The most critical of these are considered "Level 1" assets, and the rest are considered "Level 2" assets. All Level 1 and Level 2 assets within a state or MSA are counted. CISA counts assets for a state or MSA if the state or MSA outline was within 25 miles of a chemical facility and within 75 miles of a nuclear facility as Level 2 regardless of whether the infrastructure is Level 1 or Level 2. This accounts for the potential of a larger distribution of materials from a chemical or nuclear facility if there is an incident.

In FY 2020, the NII was updated to include CFATS facilities, ensuring that all Level 1 and Level 2 facilities were included in the count of critical infrastructure facilities for the risk methodology. Consistent with FY 2019, DIB facilities continue to be included in NII to better align their relative effect on each jurisdiction's risk assessment with the rest of the critical infrastructure.

Level 1 assets are weighted at twice the value of Level 2 assets. Because the data element is ultimately normalized to a maximum of 1.0, the values of these weights are not as important as the ratio between the consequences from Level 1 and Level 2 assets. The range of likely consequences of a terrorist attack on a typical Level 1 asset was estimated to be roughly two times as high as the consequences of a terrorist attack on a typical Level 2 asset.

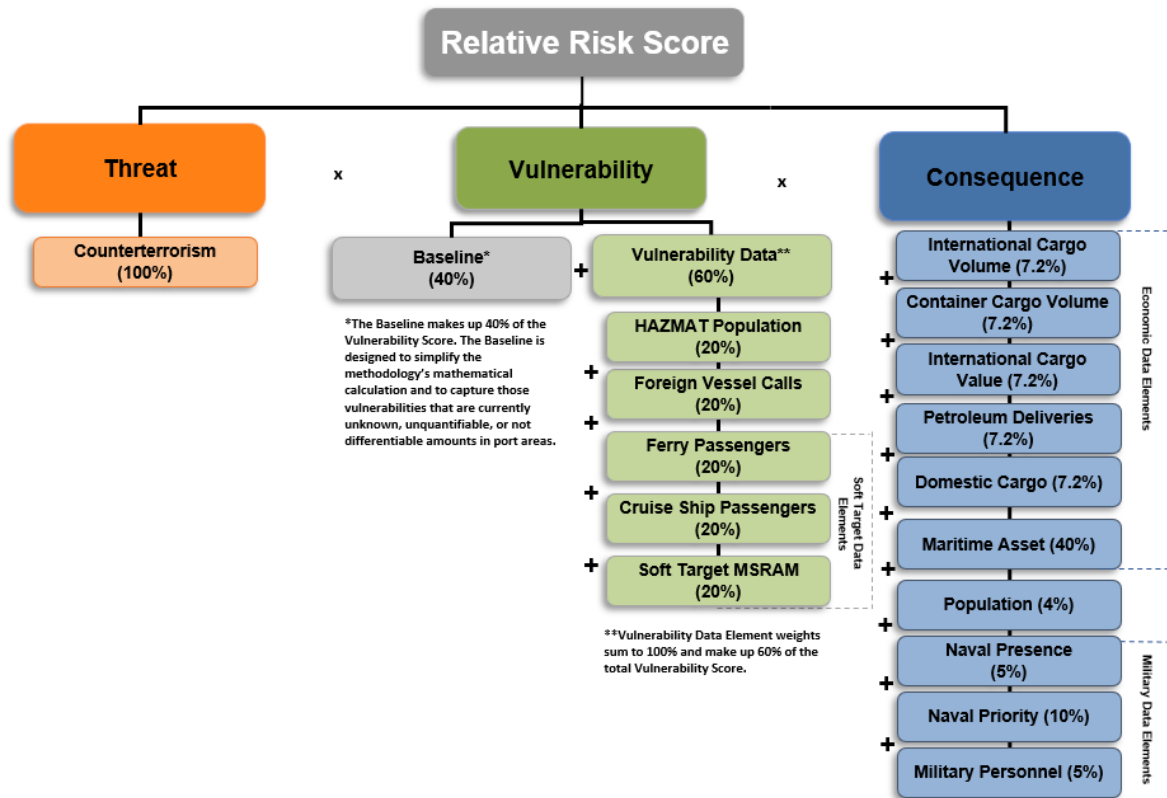
Military Personnel – 5% of Consequence Component

The military personnel data element is the number of U.S. military personnel stationed within a jurisdiction (e.g., state or MSA). In FY 2020, the military personnel data source was transitioned to the Defense Manpower Data Center's Total Force by Duty Location Report due to the discontinuation of personnel reporting in the Department of Defense's Base Structure Report used in previous years. The count of military personnel includes active duty, reserve, guard troops, and civilian personnel assigned to each zip code, rather than personnel counts at each base. FEMA attributes personnel from zip codes to the appropriate states/territories and high-risk urban areas.

8.2. Port Security Grant Program Risk Methodology

The PSGP risk methodology was developed in coordination with the U.S. Coast Guard (USCG). **Figure 4** illustrates the components and weights of the PSGP risk methodology. **Table 3** summarizes the data elements and sources used in the FY 2023 PSGP risk methodology.

Figure 4: FY 2023 PSGP Risk Methodology



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Table 3: Data and Sources used in the 2023 PSGP Risk Methodology

Components	Data	Source
Threat		
Data sources IC reporting, DOJ information, news media, and field and open-source intelligence reports collected by the DHS I&A. DHS I&A also relies on data provided by fusion centers in response to its annual request for information, such as legal records and law enforcement reports within state and local holdings. I&A reviews these sources to identify concrete, geographically specific terrorist threats—both express and implied—including terrorist plots, attacks, and aspirations, as well as prosecutions for terrorism-related offenses such as the provision of material support.	Threat Level	<ul style="list-style-type: none"> DHS I&A, using data from the National Counterterrorism Center, DOJ, I&A, and state and local holdings.
Vulnerability		
<u>Soft Target Maritime Security Risk Analysis Model (MSRAM):</u> The USCG provides an assessment of the maritime infrastructure in and around each PSGP port area.	Soft Target MSRAM	<ul style="list-style-type: none"> USCG provides the count of maritime assets and determines which are considered as measures of potentially vulnerable crowds.
<u>Ferry Passengers:</u> Ferry passengers represent the annual ferry ridership for any ferry lines that begin or end in a port area.	Ferry Passengers	<ul style="list-style-type: none"> U.S. Department of Transportation (DOT), Bureau of Transportation Statistics (BTS) (2020 with some 2018 data); additional GPD analysis.
<u>Cruise Ship Passengers:</u> A count of the annual number of foreign and domestic passengers and crew as reported on CBP Vessel Entrance or Clearance Statements.	Cruise Ship Passengers	<ul style="list-style-type: none"> CBP data for the 12 months from January 2022 to December 2022 including domestic and foreign passengers and crew.
<u>Foreign Vessel Calls:</u> The number of foreign-flagged vessels that arrive in a port area based on data from the USCG.	Foreign Vessel Calls	<ul style="list-style-type: none"> USCG subset from the Ship Arrival Notification System (SANS) data for 12 months and October 1, 2021, to September 30, 2022, for foreign-flagged vessels with a foreign port as their last port of call, and the October 1, 2021, to September 30, 2022 High Interest Vessel (HIV) arrivals; additional GPD analysis.
<u>HAZMAT Population:</u> The HAZMAT Population measures the vulnerability of a population to HAZMAT exposure if an attack on a vessel occurred in the port. It is calculated as the total HAZMAT volume multiplied by the total population (residents, visitors, and commuters) within a two-mile radius of the port.	HAZMAT Volume	<ul style="list-style-type: none"> U.S. Department of Energy (DOE), Energy Information Administration (EIA) (January 2022 to December 2022 data in barrels). U.S. Army Corps of Engineers (USACE), Waterborne Commerce of the United States (2020 tonnage data).
	Two-Mile Population	<ul style="list-style-type: none"> U.S. Department of Commerce, Census Bureau (2020 Census and 2020 Census Estimate, 2012-2016 American Community Survey updated using the 2016-2020 version; D.K. Shifflet & Associates (2018, 2019, 2021 data), U.S. Department of Commerce, National Travel & Tourism Office (2018, 2019, 2021); Statistics Canada (2018, 2019, 2021); and Banco de México as published by Mexico's National Institute of Statistics and Geography (2018,

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Components	Data	Source
		2019, 2021); additional GPD analysis for two-mile radius.
<p>Ports and port areas all present vulnerabilities to terrorist threats that cannot be fully captured by the indicator data elements currently present in the Vulnerability component.</p> <p>The Vulnerability Baseline is designed to capture those vulnerabilities that are currently unknown, unquantifiable, or not differentiable among port areas.</p> <p>Many vulnerabilities do not currently have national level comparable data, such as data to compare the uniqueness factors present in each jurisdiction, a list of soft target assets, list of biohazards, network accessibility models, etc. by port area. Even with more localized models, like that of a single building, unknowns still exist within a relative terrorism risk model that must account for such a wide range of terrorism types.</p> <p>Each port area receives the same score for this Vulnerability Baseline element so that, no matter what the other data elements report for this port area, the full vulnerability score acknowledges the presence of some level of universal vulnerability that cannot otherwise be quantified.</p>	Vulnerability Baseline	<ul style="list-style-type: none"> All port areas receive the same value to capture vulnerabilities that are currently unknown, unquantifiable, or not differentiable among port areas.
Consequence		
<p><u>Population:</u> The population captures the potential consequences to people from an attack occurring at the port area. People potentially affected by a port attack are port workers and people living, working, and visiting within a two-mile radius of the port area.</p>	Census (nighttime) Population	<ul style="list-style-type: none"> U.S. Department of Commerce, Census Bureau (2010 Census and 2020 estimates).
	Commuters	<ul style="list-style-type: none"> U.S. Department of Commerce, Census Bureau (2012-2016 American Community Survey updated using the 2016-2020 version).
	Visitors	<ul style="list-style-type: none"> D.K. Shifflet & Associates (2018, 2019, and 2021). U.S. Department of Commerce, National Travel & Tourism Office (2018 2019, 2021); Statistics Canada (2018, 2019, 2021); and Banco de México as published by Mexico's National Institute of Statistics and Geography (2018, 2019, 2021).
	Latitude and Longitude (ports)	<ul style="list-style-type: none"> USACE, Master Docks Plus Public Extract database (data as of September 2022)
	Latitude and Longitude (census geography)	<ul style="list-style-type: none"> U.S. Department of Commerce, Census Bureau (2020 Census), additional GPD analysis for two-mile radius.
<u>Economic Data Elements:</u>	Domestic Cargo Volume	<ul style="list-style-type: none"> USACE, Waterborne Commerce of the United States (2020 tonnage data).

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Components	Data	Source
The economic data elements represent a measure of the economic activity at the port area, using domestic and international cargo volume, international cargo value, and petroleum deliveries to measure that activity.	International Cargo Volume	<ul style="list-style-type: none"> USACE, Waterborne Commerce of the United States (2020 tonnage data).
	Container Cargo Volume	<ul style="list-style-type: none"> USACE, Waterborne Commerce Statistics Center (2020 data, total in-/out-bound twenty-foot equivalent units (TEUs)).
	International Cargo Value	<ul style="list-style-type: none"> U.S. Department of Commerce, Census Bureau, Foreign Trade Division, USA Trade Online (January 2022 to December 2022 import and export vessel in USD).
	Petroleum Deliveries	<ul style="list-style-type: none"> Department of Energy, EIA (January 20.22 to December 2022 data in barrels).
	Maritime Assets	<ul style="list-style-type: none"> USCG. The USCG provides a count of the number of high-risk assets (those meeting a risk threshold determined by the USCG) in each port area. These are the remaining sectors once the soft target sectors are removed.
<u>Military Mission Data Elements:</u> The Military Mission Data Elements captures the importance of port areas to the military with three factors: (1) Whether the U.S. Navy has a presence in the port area; (2) the naval priority of the port area; and (3) the number of personnel is composed of the number of U.S. military personnel stationed within the 2-mile radius that makes up the port area. The count of military personnel includes the number of active duty, reserve, and guard troops, as well as civilian personnel.	Naval Presence	<ul style="list-style-type: none"> Naval Presence is a count of the number of U.S. Navy vessels home-ported at each PSGP port area of interest. U.S. Navy homeport designations as listed in the Naval Vessel Register (NVR).
	Naval Priority	<ul style="list-style-type: none"> Naval Priority is a three-stage value (0, 0.5, or 1), whereby a port receives a value of 1 if it is designated by the National Port Readiness Network (NPRN) as a Commercial or Military port, or a value of 0.5 if it is designated as an Alternate port or Other port. NPRN data as provided by USCG.
	Military Personnel	<ul style="list-style-type: none"> DoD's Defense Manpower Data Center Total Force by Duty Location Report (data as of July 2022). The PSGP military personnel count includes active duty, reserve, guard troops, and civilian personnel. Only those military personnel whose bases are located within two-mile radius around the port are counted.

8.2.1. Threat Component

The FY 2023 PSGP Threat component considers express and implied physical terrorist threats to port areas based on data from DHS I&A for states and MSAs.⁹ This data is derived from IC disseminated threat reporting and other vetted sources of information regarding international or domestic violent extremist plots, threats, and attacks, including by HVEs.

The PSGP risk methodology utilizes both the UASI and SHSP counterterrorism threat levels. The threat level assigned to an MSA is given to any port within that MSA. If a port is not within one of the 100 most populous MSAs, it is given the threat level of the state where the port area resides. If the port area spans two or more MSAs or states, the port area will receive the highest threat level of the MSAs or states.

8.2.2. Vulnerability Component

The Vulnerability component contains six data elements: Vulnerability Baseline, HAZMAT Population, Foreign Vessel Calls, Ferry Passengers, Cruise Ship Passengers, and Soft Target MSRAM. Each data element is normalized to a maximum of 1.0 and the data element weights make up 60% of the total vulnerability score.

HAZMAT Population – 20% of Vulnerability Component

The HAZMAT Population represents the vulnerability to the population surrounding the port due to an attack on a hazardous material shipment in the port that causes a HAZMAT release into the surrounding environment. This calculation is the product of the total number of HAZMAT deliveries that could cause significant damage to the port and the total population within a two-mile radius of the port. The assumption is that anyone within two miles of a port could be vulnerable to a HAZMAT release at the port, and that the risk of release affecting the population increases as more hazardous materials are transported into the port. Population includes residents, commuters, and visitors, as in the SHSP and UASI risk methodologies, and the data sources are the same (these data sources are provided in the population data element section). The result of the “HAZMAT x Population” calculation ensures that only ports with large numbers of people in the vicinity and with a large volume of HAZMAT deliveries that could cause significant damage will receive high scores on this metric. Both population and HAZMAT deliveries are unit-normalized (0 to 1) before multiplying together so that the units of measurements do not affect the result.

FEMA and USCG continued with the previous determination that the two-mile radius captures the footprint of people who could be exposed to hazardous materials released during an attack on the port. The two-mile radius population was determined based on Census Bureau data; visitor data from D.K. Shifflet & Associates; U.S. Department of Commerce, National Travel & Tourism Office; Statistics Canada; and Banco de México international visitor data; as well as port latitudes and longitudes from the USACE Master Docks Plus Public Extract Database.

⁹ MSA boundaries are defined by OMB for use by all agencies that conduct statistical activities to collect and publish data for MSAs, Metropolitan Divisions, Micropolitan Statistical Areas, Combined Statistical Areas, and New England City and Town Areas.

Two separate data sources are used to fully capture the importation and transportation of hazardous materials at ports. The first source is petroleum deliveries, as published by the DOE EIA. The data used in the FY 2023 methodology represents the 12-month period from January 2022 to December 2022. The second source includes qualifying hazardous materials tonnage transported from ports as tracked by the USACE, through the Waterborne Commerce of the United States (2020 tonnage data). FEMA matched USACE cargo volume publication groups to the National Fire Protection Association (NFPA) 704 ratings system to determine which USACE groupings have hazardous materials that could cause significant damage, as defined by chemicals that have an NFPA rating of two or higher in any one category or are water-reactive. Each data set is unit-normalized (0 to 1) and added to create the total HAZMAT volume figure.

Foreign Vessel Calls – 20% of Vulnerability Component

USCG and FEMA determined that a high volume of foreign-flagged vessels that had previously been in a foreign port indicates a higher level of vulnerability to terrorist attack. Foreign vessel call data includes the number of foreign-flagged vessels that enter a port. Consistent with FY 2022, this data is based on a subset from the USCG SANS data (October 1, 2021, to September 30, 2022) as well as HIV data from the same time period for foreign-flagged vessels with a foreign port as their last port of call.

Soft Target Data Elements – 60% of Vulnerability Component

Soft Target Data Elements include three equally weighted data elements:

1. Ferry passengers,
1. Cruise ship passengers; and
2. Soft target MSRAM.

Ferry Passengers

Ferry passengers represent the annual ferry ridership for any ferry lines that begin or end in the port. Ferry ridership data are publicly available from DOT's BTS. FEMA used the updated 2018 and 2020 data as updated in 2021 BTS data—the most recent available—for the FY 2023 PSGP risk methodology.

For FY 2023, as in previous grant years, FEMA adjusted the ferry passenger counts to accommodate Segment IDs that had zero passengers in the 2020 BTS data. As the BTS data is self-reported, the 2020 data was used in a similar process as the 2018 data. If a Segment ID reported zero passengers in 2020, but had previously reported data in 2018, the 2018 value was attributed to the 2020 Segment ID. This replaced the zero value that was reported in the more recent dataset with a more accurate value of ferry ridership.

Cruise Ship Passengers

Cruise ship passengers represent the annual number of passengers that depart from the port via a cruise ship. As in previous years, FEMA requested and obtained this data from CBP based on vessel entrance and clearance documents. This data represents the number of foreign and domestic cruise passengers as well as the number of foreign and domestic crew by U.S. ports from the 12-month period from January 2021 to December 2021.

Soft Target MSRAM

The soft target data for the PSGP risk methodology comes from USCG's asset-based risk measurement tool – the MSRAM. MSRAM calculates a scenario-based risk measure for critical port assets. For the PSGP risk methodology, USCG provides the maritime targets by latitude and longitude location that meet the relevant risk threshold as determined by MSRAM analytics. For Soft Target MSRAM, USCG provides the count of maritime assets that are considered likely to attract potentially vulnerable crowds. FEMA used geospatial analysis to determine the asset count for each port area. Through consultation with USCG, FEMA removed internal weights within the Soft Target MSRAM counts. The aggregated and weighted value is then unit-normalized (0 to 1) for all ports to a maximum of 1.0, resulting in the Soft Target MSRAM for the PSGP risk methodology.

8.2.3. Consequence Component

The Consequence component includes ten data elements: International Cargo Volume, Container Cargo Volume, International Cargo Volume, Petroleum Deliveries, Domestic Cargo, Maritime Asset, Population, Naval Presence, Naval Priority, and Military Personnel.

Population – 4% of Consequence Component

The population data element captures the risk to people resulting from an attack on the port. People potentially affected by an attack on a port are ship passengers and people living near the port. The population data sources are the same as those used in the population data in the SHSP and UASI methodologies (see the data sources for the SHSP and UASI population data), and therefore includes residents, visitors, and commuters.

Economic Data Elements – 76% of Consequence Component

The economic data elements represent a measure of the economic activity of a port and is computed as a weighted sum of six variables. As with the PSGP population, each variable is normalized to a maximum of 1.0 before summing. The six elements of the FY 2023 PSGP economic data remain consistent with those used in FY 2022.

Domestic and international cargo volumes (2020 tonnage data) are obtained from the USACE's Waterborne Commerce of the United States 2020 report. Container cargo volume data (2020 data in number of TEUs) is the most recent data provided by the USACE Waterborne Commerce Statistics Center. The international cargo value (January to December 2022 import and export vessel in USD) is obtained from the U.S. Department of Commerce, Census Bureau, Foreign Trade Division, USA Trade Online. Petroleum deliveries represent data from the DOE EIA (January to December 2022 data in barrels). Although these variables are not wholly independent (e.g., international cargo volume and international cargo value), they each capture a different aspect of the economic activity of a port.

The Maritime Asset data comes from USCG's MSRAM. For the PSGP risk methodology, the USCG provides the count of maritime targets by latitude and longitude location that meet the high-risk threshold as determined by MSRAM analytics. FEMA used geospatial analysis to determine the asset count for each port area. Unit-normalizing the MSRAM assets in all ports to a maximum of 1.0 results in the MAI for the PSGP risk methodology. To avoid double-counting,

the Maritime Asset data does not include the soft target MSRAM, which was removed from this measure starting in FY 2019.

Military Personnel – 20% of Consequence Component

The Military Personnel data element captures the importance of ports to the military. This importance is measured by aggregating three factors: the presence of the United States Navy (USN) in the port; the naval priority of the port; and the number of personnel at U.S. military bases near the port. Naval presence is a unit-normalized (maximum set to 1.0) count of the number of USN vessels homeported at each port as reported by the USN's NVR. Naval Priority is determined based on designations by the NPRN¹⁰ as one of the Strategic Commercial or one of the Strategic Military Seaports. For FY 2016 through FY 2023, this list included ports that serve as alternative strategic ports, in addition to the previously identified primary strategic ports. Ports identified as primary strategic ports received a value of 1.0, while alternate ports received a value of 0.5 at the request of USCG. The count of military personnel comes from the DoD's Defense Manpower Data Center Total Force by Duty Location at the zip code level (data as of July 2022). FEMA uses the Census Bureau's Zip Code Tabulation Areas polygonal representations of these zip codes and intersects these with the two-mile buffers around each PSGP port definition. Military personnel in zip codes overlaying these buffers are then summed up for each port. After unit-normalizing the three military data elements, weighting them, and adding them, the resulting score is normalized again to a maximum of 1.0 to yield the Military Personnel for each port.

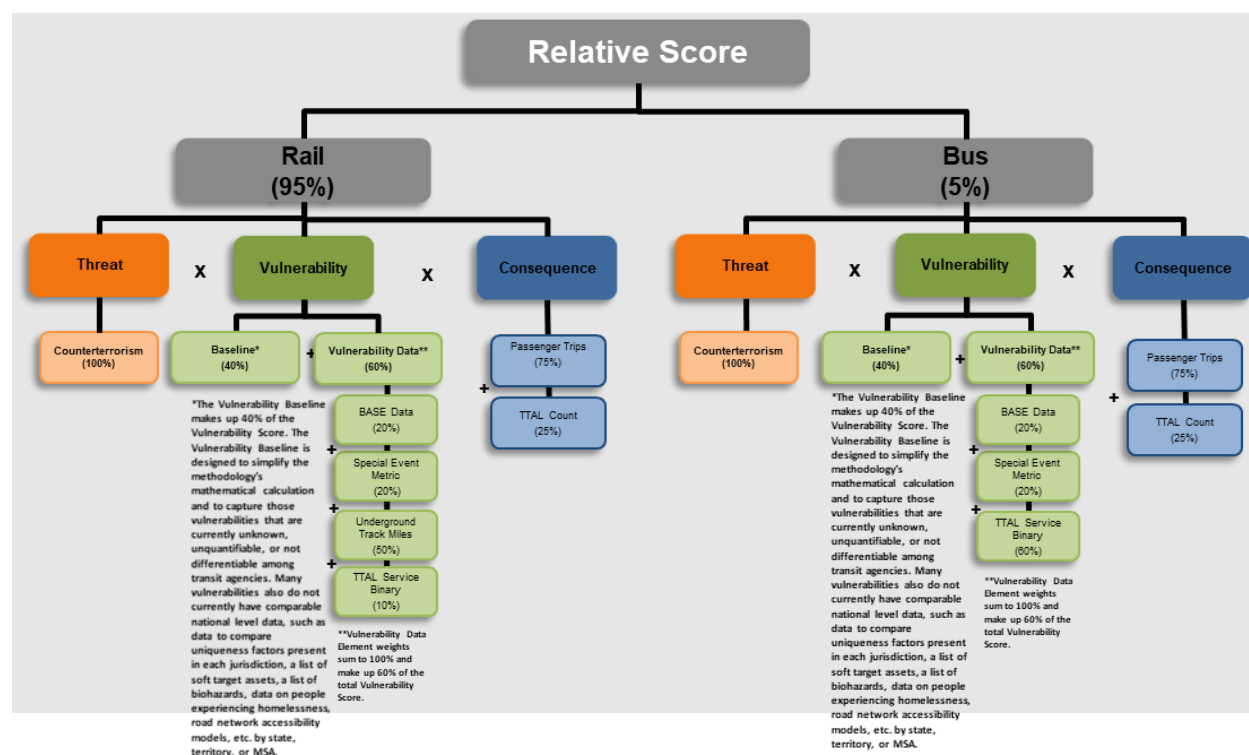
¹⁰ The NPRN is a council of U.S. Government organizations designed to promote the readiness of certain designated seaports and related intermodal systems to support the secure deployment of military personnel and cargo in the event of mobilization under one or more national contingency plans or other national emergency. The NPRN also includes local port level Port Readiness Committees established in each Strategic Commercial Seaport. The Strategic Seaports are selected based on their proximity to deploying units, transportation links to those units, and port characteristics. Strategic Seaports also include primary military ammunition ports whose operations would impact unit deployments due to their proximity to other Strategic Seaports and the nature of their activities during deployment. Source: USCG.

8.3. Transit Security Grant Program Risk Methodology

The TSGP risk methodology was developed in conjunction with the Transportation Security Administration (TSA), and includes Threat, Vulnerability, and Consequence components that align with the SHSP, UASI, and PSGP risk methodologies. All Vulnerability and Consequence component data were provided by TSA, except for the Special Event Metric. The TSGP methodology accounts for risks to both intra-city bus and rail systems (e.g., heavy rail, commuter rail, light rail). Intercity bus and intercity passenger rail are not considered, as those entities are not eligible under the TSGP. Because rail and bus systems have qualitatively different characteristics, the risks to these two types of systems are calculated separately and added together to arrive at an overall TSGP relative risk score for each transit agency. Also, because the Rail and Bus risk scores are calculated on different scales, they must be normalized and weighted before being summed. In the overall TSGP risk score, rail risk is weighted at 95 % and bus risk at 5%.

Figure 5 illustrates the components and weights of the TSGP risk methodology. **Table 4** summarizes the data elements and sources used in the FY 2023 TSGP risk methodology.

Figure 5: FY 2023 TSGP Risk Methodology



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Table 4: Data and Sources used in the FY 2023 TSGP Risk Methodology

Components	Data	Source
Threat		
Data sources include IC reporting, DOJ information, news media, and field and open-source intelligence reports collected by DHS I&A. DHS I&A also relies on data provided by fusion centers in response to its annual request for information, such as legal records and law enforcement reports within state and local holdings. I&A reviews these sources to identify concrete, geographically specific terrorist threats—both express and implied—including terrorist plots and attacks, as well as prosecutions for terrorism-related offenses such as the provision of material support.	Threat Level	<ul style="list-style-type: none"> DHS I&A, using data from the National Counterterrorism Center, DOJ, I&A, and state and local holdings.
Vulnerability		
<u>Assessed Vulnerability Data:</u> The Assessed Vulnerability Data uses BASE data from TSA. The BASE metric is based on TSA evaluation of a transit system’s security posture on the Security and Emergency Preparedness Action Items. Selected items are considered for TSGP as indicators of the operational capabilities of a transit system.	Average score for five criteria to measure operational capabilities	<ul style="list-style-type: none"> TSA.
<u>Soft Target Data:</u> Rail Soft Target: Rail entity Soft Target is based on event data used in DHS SEP’s SEAR. The metric includes passenger ridership, transit station distribution, county resident populations, and special event risk. Bus Soft Target: Bus entities receive the SEM value of the MSA they serve (as assessed for the most recent UASI risk assessment).	Rail Soft Target: Ratio of event risk to the ridership rate of the transit area’s county resident populations	<ul style="list-style-type: none"> Rail STI: DHS SEP SEAR data 2021, 2022, & 2023. 2021 County Population Estimates; Homeland Infrastructure Foundation-Level Data (Rail Station locations); passenger trips (see population data).
	Bus Soft Target: SEM value for the MSA they serve	<ul style="list-style-type: none"> Bus Soft Target: SEAR data 2021, 2022, 2023.
<u>Transit Infrastructure Data:</u> Transit Infrastructure is based on two data sets: the TTAL Service Binary, and Underground Track Miles (rail only). TTAL Service Binary: based on the TTAL, which is a list of assets that DHS considers nationally critical to surface transportation. A transit agency is given a binary score of 1 if it services a TTAL asset and a 0 if it does not. Rail entity underground track miles: based on TSA’s records of rail tracks located in underground tunnels (rail only).	TTAL Service Binary	<ul style="list-style-type: none"> DHS TSA.
	UTM	<ul style="list-style-type: none"> DHS TSA.

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Components	Data	Source
<p><u>Vulnerability Baseline:</u> Transit agencies all present vulnerabilities to terrorist threats that cannot be fully captured by the indicator data elements currently present in the Vulnerability component.</p> <p>The Vulnerability Baseline is designed to capture those vulnerabilities that are currently unknown, unquantifiable, or not differentiable among transit agencies.</p> <p>Many vulnerabilities do not currently have national level comparable data, such as data to compare the uniqueness factors present in each jurisdiction, a list of soft target assets, list of biohazards, network accessibility models, etc. by transit agency. Even with more localized models, like that of a rail station, unknowns still exist within a relative terrorism risk model that must account for such a wide range of terrorism types.</p>	Vulnerability Baseline	<ul style="list-style-type: none"> Each transit agency receives the same score for this Vulnerability Baseline element so that, no matter what the other data elements report for this transit agency, the full vulnerability score acknowledges the presence of some level of universal vulnerability that cannot otherwise be quantified.
Consequence		
<p><u>Population Data:</u> The Population Data measures average weekday ridership for each eligible transit agency.</p>	Passenger Trips	<ul style="list-style-type: none"> American Public Transportation Association (APTA) National Transit Database (NTDB) weekday unlinked passenger trips, as provided by TSA (January 1, 2022 – December 31, 2022).
<p><u>National Infrastructure Data:</u> The National Infrastructure data is based on the TTAL. These assets are evaluated by TSA to determine the extent to which identified vulnerabilities are remediated by TSGP projects and other efforts. These assets are counted and rated based on their current level of vulnerability and remediation.</p>	TTAL Count	<ul style="list-style-type: none"> DHS TSA.

8.3.1. Threat Component

The FY 2023 TSGP Threat component considers specific and implied physical terrorist threats to transit agencies and MSAs¹¹, derived from IC disseminated threat reporting and other vetted sources of information regarding international or domestic violent extremist plots, threats, and attacks, including by HVEs. For consistency across the grants risk methodologies, the TSGP risk methodology utilizes the MSA counterterrorism threat levels and values. The threat level assigned to an MSA is given to any transit agency that is within that MSA.

8.3.2. Vulnerability Component

The Vulnerability component in the TSGP risk methodology was modified in FY 2019, when the Special Event Metric was added. In FY 2020, the data elements within the Transit Infrastructure Data were modified. The TTAL count was moved from transit infrastructure data within the Vulnerability component to the Consequence component and replaced with the TTAL Service Binary in both Rail and Bus. For rail, UTM was moved to transit infrastructure data from Consequence. In addition, the assessed vulnerability data was added to the Vulnerability component and BASE data was incorporated into it.

¹¹ The MSAs are defined by OMB and implemented by the U.S. Census Bureau.

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Similar to the HSGP model described earlier in this report, the TSGP risk model also removed constraining and normalization in the index level calculations. All data elements continue to be max normalized, but index level calculations have been removed. Normalized data element values are added to the full Vulnerability or Consequence component score after multiplying by the data element weights. Constraints in the risk model have been removed instead now using a “Baseline” in the Vulnerability component. This preserves the beneficial properties of constraining while removing the limiting ones.

Baseline – 40% of Vulnerability Component

Introduced in FY 2023, the Baseline is part of the Vulnerability component. The “Baseline” in each Vulnerability’s data element lineup is used to account for the part of Vulnerability that is unknown, unquantifiable, or not differentiable for each jurisdiction. The Baseline weight was set at 40% in Vulnerability based on the analysis between constraint values in FY 2022 and lower bounds utilizing combined data elements and Baseline values.

Assessed Vulnerability – 20% of Vulnerability Component

The Assessed Vulnerability uses BASE data provided by TSA. The BASE data is an indicator of the security capabilities of a transit system. The data was based on TSA’s evaluation of transit system security postures using 17 Security and Emergency Preparedness Action Items. TSA selected five of these items that are most indicative of a transit system’s agency-wide security capabilities: Security and Response Plans, Security and Emergency Training, Public Awareness, Drills and Exercises, and Established Risk Assessment. The average of these five scores forms the BASE data element.

Soft Target Data – 20% of Vulnerability Data

Soft Target contains one metric that uses SEAR data. As in SHSP/UASI the SEAR data now includes three years of data: 2021, 2022, and 2023. The rail entity soft target data is based on event data used in DHS SEP’s SEAR. The metric includes passenger ridership, transit station distribution, county resident populations, and special event risk. It is a calculation that creates a ratio of risk to people attending events to the ridership rate of the relevant population. The bus entity Soft Target data is based on the SEM value of the MSA they serve (as assessed for the most recent UASI risk assessment).

Transit Infrastructure (TI) – 60% of Vulnerability Data

Both the Rail and Bus Transit Infrastructure data contain the TTAL service binary element, with rail TTAL service binary weighted at 1/6 of TI, and bus TTAL service binary weighted at 60% of the overall vulnerability component. The rail TI also contains UTM weighted at 5/6 of TI data.

The TTAL service metric was introduced in FY 2020 and references the TTAL maintained by TSA. The TTAL includes surface transportation assets that are considered critical nationwide. The TTAL service binary score represents whether or not a transportation agency services a TTAL asset, regardless of whether they own the asset. If the agency services a TTAL asset, the agency receives a score of 1; if it does not service a TTAL asset, it receives a score of 0.

The UTM element, also provided by TSA, was moved from the consequence component into the TI within vulnerability for rail set at a weight of 5/6 of TI data, so that TI contributes 60% to the overall vulnerability component. UTMs serve as a proxy for areas of a rail system that are more vulnerable to attack, as they exist within a condensed and confined area with limited or no egress options. Underground locations are more difficult to monitor, protect, and repair compared to locations at- or above-ground where many vulnerability-reducing measures can be more easily implemented and maintained.

8.3.3. Consequence Component

The TSGP Consequence component is calculated using the population data and national infrastructure data. The National Infrastructure data was introduced in FY 2020 for Rail and Bus. The TSGP risk methodology does not include a national security data element because public transit systems typically have minor impacts on national military missions.

Population Data – 75% of Consequence Component

For both the Rail and Bus methodologies, the population data includes the average weekday unlinked passenger trips made on the system. These data are collected and made public by APTA through its NTDB, which is updated on a quarterly basis. The FY 2023 risk methodology used the 12 months of data, from January 1, 2022, through December 31, 2022. Specifically, the data used are unlinked trips which represent the number of passengers who board public transportation vehicles. Passengers are counted each time they board vehicles no matter how many vehicles they use to travel from their origin to their destination. The trips are normalized to a maximum of 1.0. For both the Rail and Bus methodologies, population data is weighted at 75% of consequence.

National Infrastructure Data – 25% of Consequence Component

National Infrastructure Data was introduced in FY 2020 for both the rail and bus risk methodologies, weighted at 25% of Consequence. In both the rail and bus calculations, NI data replaced the economic index which included the Underground Track Miles. The NI contains the TTAL count, which has been moved from the Vulnerability component. TTAL assets are evaluated by TSA to determine the extent to which identified vulnerabilities are remediated (or funded to be remediated) by TSGP projects and other efforts. The assets are counted and weighted based on their current level of vulnerability and remediation. The weighted count of these assets forms the TTAL data element.

8.4. Operation Stonegarden Risk Methodology

The OPSG Risk Methodology was developed by and is administered by CBP. The FY 2023 OPSG Risk Assessment is designed to identify the risk to border security and to assist with distribution of funds for the grant program. Entities eligible are local units of government at the county level or equivalent level of government and federally recognized tribal governments in states bordering Canada or Mexico and states and territories with international water borders. For the purposes of OPSG, risk is defined as the potential for an adverse outcome assessed as a function of threats, vulnerabilities, and consequences associated with an incident, event, or occurrence.

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Using ongoing intelligence analysis and extensive security reviews, CBP continued to focus OPSG funds based upon its risk analysis. The risk model used to allocate OPSG funds considers the potential risk that certain threats pose to border security and estimate the relative risk faced by a given area. In evaluating risk, CBP considers intelligence, situational awareness, criminal trends, and statistical data specific to each of the border sectors, and the potential impacts that these threats pose to the security of the border area. For Vulnerability and Consequence, CBP considers the expected impact and consequences of successful border events occurring in specific areas.

To determine the level of risk, three primary categories are considered:

- **Threat:** natural or man-made occurrence, individual, entity, or action that has or indicates the potential to harm life, information, operations, the environment, and/or property. OPSG uses the effect of the threat to the border to evaluate consequence.
- **Vulnerability:** characteristic of design, location, security posture, operation, or any combination thereof, that renders an asset, system, network, or entity susceptible to disruption, destruction, or exploitation.
- **Consequence:** effect of an event, incident, or occurrence. OPSG uses the effect of the threat to the border to evaluate consequence.

Threat and Vulnerability are evaluated by assigning each factor a value based on specific operational data from CBP Components. Threat components present in each of the sectors are used to determine the overall threat score. These components are terrorism, criminal illegal aliens, drug trafficking organizations, and alien smuggling organizations.

9. Conclusion

The FY 2023 Report to Congress, “Calculating Risk for the FY 2023 DHS Preparedness Grant Programs,” has been submitted to meet the annual reporting requirement set forth in Section 2022(c)(2) of the *Homeland Security Act of 2002*, as amended (Pub. L. No. 107-296), (6 U.S.C. § 612(c)(2)). This report outlined the scope and applicability of risk analysis that informs the preparedness grant programs, provided details of the terrorism risk methodology that is applied to FEMA’s preparedness grant programs, and provided a detailed account of data elements and data sources for each program.

The SHSP, UASI, PSGP, and TSGP include risk methodologies that FEMA developed and has refined since taking over these grants in 2006 for the specific purpose of distributing finite federal grant resources. For OPSG, the risk methodology has been developed and administered by CBP and evaluated to ensure finite federal grant resources are best allocated. These risk methodologies are consistent at the component level of Threat, Vulnerability, and Consequence, but have been tailored with unique data elements and weights that align to the goals of the individual grant programs. Each year, FEMA considers enhancements based on feedback and collaboration from grant stakeholders, FEMA and DHS leadership, and FEMA’s partners, including DHS I&A, CISA, SEP, TSA, CBP, and USCG. This feedback and collaboration are used to evaluate each grant program and determine if any changes to the methodology, model, or data sources are required. FEMA strives to continually improve the risk methodologies for each of these grant programs to capture the unique risk faced by states, high-risk urban areas, ports, and transit systems.