

Chemical Security Map Tool User Guide

January 2020

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Prepared for
the U.S. Defense Threat Reduction Agency
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Summary

This user guide provides instructions for interacting with the Chemical Security Map Tool developed by Pacific Northwest National Laboratory.

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Acronyms and Abbreviations

CSMT	Chemical Security Map Tool
GTD	Global Terrorism Database
ICC-CCS	International Chamber of Commerce Commercial Crime Services
NAMRIA	National Mapping and Resource Information Authority
SPIK	Samahan Sa Philipinas Ng Mga Indstriyang Kimika (Chemical Industries Association of the Philippines)

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1.0 Introduction

The primary goal of the Chemical Threat Mapping Project is transformation of data into actionable information to enhance strategic decision-making in a threat intelligence visualization platform. The Chemical Security Map Tool (CSMT) fuses critical information about the chemical industry and domestic and external threats of the Philippines. Operationally relevant tools such as this reduce uncertainty through space-time activity patterns and locations of facilities storing, manufacturing, or disposing of chemicals of concern, enabling informed resource allocation to conduct specific interventions and support for law enforcement and emergency response.

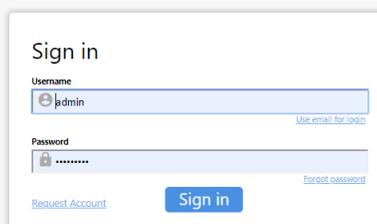
CSMT comprises three main panels: the Layers Panel on the left, the Info Panel on the bottom, and the Map Area, which is center right. Interacting with the panels is described in detail in the sections that follow.

2.0 Log-in Screen

For new users, the administrator should create their accounts through Amazon Web Services Cognito. They will have received an email with a username and temporary password. Upon arriving to the log-in screen, they will need to:

- Enter username
- Enter temporary password
- If correct, they will be prompted to enter a new password
- If successful, they will be logged into the application
- If any errors occur, they need to follow the on-screen prompts
- If still unable to log in, they need to contact the system administrator or application owner

Chemical Security Mapping Tool



The screenshot shows a 'Sign in' form with the following elements:

- Sign in** (Title)
- Username** field: Contains 'admin', with a 'Use email for login' link.
- Password** field: Contains masked characters '.....', with a 'Forgot password' link.
- Request Account** link (bottom left).
- Sign in** button (bottom center).

3.0 Layers Panel

When you open the application, you're presented with a default view of the map with no layers selected. When connected to the network (and database), layers should have automatically loaded in the left panel.

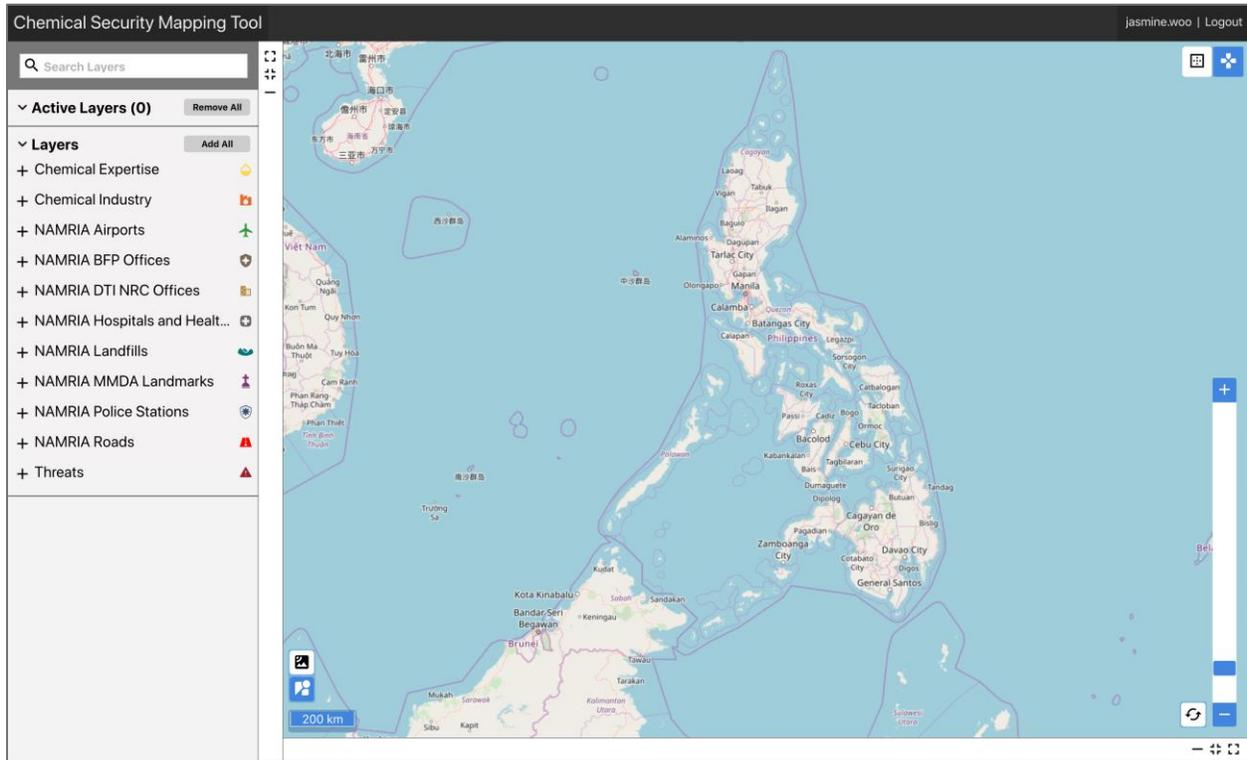


Figure 1. Default View of CSMT

To get started, activate a layer you're interested in by clicking the plus (+) symbol next to the layer name. The layer will then be moved to "Active Layers," and features associated with it will become visible on the map, represented by its icon, and the Info Panel will have a tab labeled with the layer name that will be populated with information, such as record count and description, associated with the layer you chose.

To change the icon color, in the Info Panel, click **Change** under **Primary Color**.

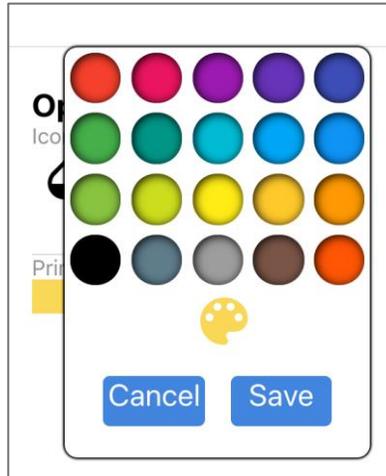


Figure 2. Click **Change** under **Primary Color** to View and Select a New Color

Continue activating the layers you're interested in by clicking the **+** symbol next to their names.

To deactivate a layer, simply click the minus (-) symbol next to the layer name.

All layers can be removed from active layers by clicking the **Remove All** button. This will also remove all of the associated data in the Map Panel and Info Panel.

If you want to add all layer data to the application, then click the **Add All** button and all layers will be added to the Active Layers section.

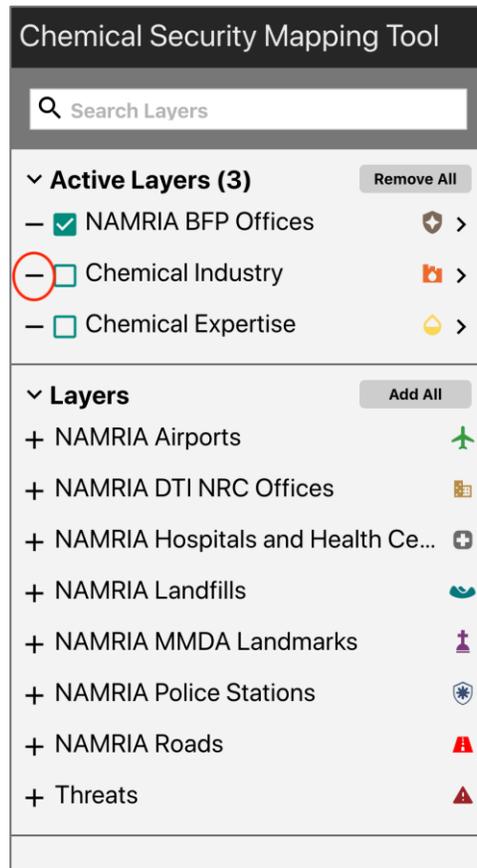


Figure 3. Click the - to Remove the Layer from the Map and Info Panel

3.1 Data Filtering

When a layer is in the Active Layers section, a right-pointing chevron will appear next to the layer icon. Clicking this chevron opens data filter options for that layer's data.

By selecting a layer's data filter, the associated features on the Map Panel and data in the Info Panel spreadsheet will be filtered. Data filters often have parent and children hierarchy of filters. Selecting a parent filter will select all its children filters.

Click the **X** in the filter panel to hide the filter panel, although the filters will still be applied.

To quickly remove a data filter or see what is currently being filtered, breadcrumbs of the filters are at the top of the application window.

4.0 Map Panel

To zoom in or out on the map, use the mouse wheel, double-click an area, or use the zoom slider on the map. Map layers have a minimum and maximum resolution to which they are visible, so zooming too far beyond the extent could cause them to disappear.

A **Reset-View** button is located in the lower right area of the map, next to the zoom slider. Click it to instantly reset the map zoom level, including the entire extent of the layers.

The base-map toggle is located on the lower left section of the map. This toggle swaps between a street map and satellite map when selected.



Figure 4. The Map Panel's Zoom Slider Tool

4.1 Geospatial Feature Selection and Filtering

The upper right of the map area has several buttons to assist with selecting features and/or filtering them.

The farthest right button (selected by default) allows you to select individual layer features when clicked. Clicking it again will deselect them.

The second button from the right is a geospatial filter. Click and drag on the map to create a bounding box in which data is filtered to only the features inside that area. When the geospatial filter is in use, the farthest button from the right will clear all geospatial filters.

The third button from the right (when at least one feature is selected) is the **Zoom to selected features** button. It will pan/zoom the map to only the selected features.

The furthest button from the right (when at least one feature is selected) is the **Clear selected features** button. Clicking this will deselect all selected features.

5.0 Info Panel

The default view in the Info Panel below the map is Layer Overview. To see a tabular view of the information, click the Spreadsheet tab. All available records are listed. You can sort the data by clicking a column header.

Organization Name	Organization Location	Contact Name	Contact Information	Organization Type	Details	Latitude	Longitude	Selected
Caraga Regional Hospital	Rizal Street, Brgy. Washington, Surigao City	Dr. Ponciano S. Lincangco	+63 86-826-2459	Healthcare/Medicine		9.7843783	125.4878433	false
Adela Serra Ty Memorial Medical Center	Tandag, Surigao Del Sur	Dr. Panfilo Jorge M. Tremedal III	+63 86-211-3700	Healthcare/Medicine		9.0685923	126.1881967	false
Southern Philippines Medical Center	Davao City	Dr. Leopoldo Vega	+63 82-227-2731	Healthcare/Medicine		7.098378	125.6176482	false
Davao Regional Medical Center	Tagum, Davao Del Norte	Dr. Bryan O. Dalid	+63 84-216-9127	Healthcare/Medicine		7.4225483	125.8265125	false
Amal Pakpak Medical Center	Marawi City, Lanao Del Sur	Dr. Shalimar S. Rakin	+63 83-876 0001	Healthcare/Medicine		8.0045342	124.2818008	false
Northern Mindanao Medical Center	Capitol Cmpd., Cagayan De Oro City	Dr. Jose Chan	+63 88-272-6362	Healthcare/Medicine		8.4858877	124.6472807	false
Mayor Hilarion A. Ramiro Sr. Medical Center	Ozamis City	Dr. Jesus Martin Sanciangco III	+63 88-521-0440	Healthcare/Medicine		8.1697903	123.8557293	false
Cotabato Regional And Medical Center	Sinsuat Ave., Cotabato City	Dr. Helen P. Yambao	+63 84-421-2340	Healthcare/Medicine		7.2004533	124.2340853	false
Zamboanga City Medical Center	Zamboanga City	Dr. Nida C. Tan	+63 62-991-2934	Healthcare/Medicine		6.9069732	122.0789409	false
Margosatubig Regional Hospital	Margosatubig, Zamboanga Del Sur	Dr. Richard Sison	+63 62-211-5634	Healthcare/Medicine		7.5751983	123.1622033	false
Labuan Public Hospital	Labuan, Zamboanga Del Sur	Dr. Waldo M. Mandal	7.0975161	Healthcare/Medicine		121.9016518	false	
Dr. Jose Rizal Memorial Hospital	Lawa-An, Dapitan City, Zamboanga Del Norte	Dr. Maria Dinna Viray-Parlas	+63 65-213-6421	Healthcare/Medicine		8.6390443	123.4135625	false

Figure 5. Info Panel's Spreadsheet View

To add or remove columns, click the icon at the far right of the table. The **Spreadsheet Options** pop-up window will open. Toggle columns to include/exclude, and then click **Save**.

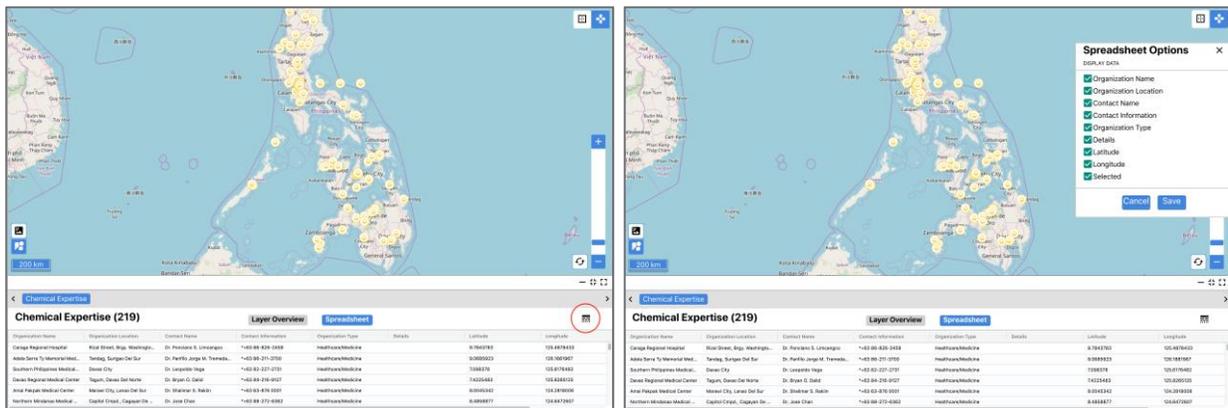


Figure 6. Info Panel's Spreadsheet View Table Data Options

The table will update with your selected columns.

You can also select more than one record via CTRL + click on each row, or SHIFT + click for a group and all rows in between (this is the same functionality as Windows file selection).

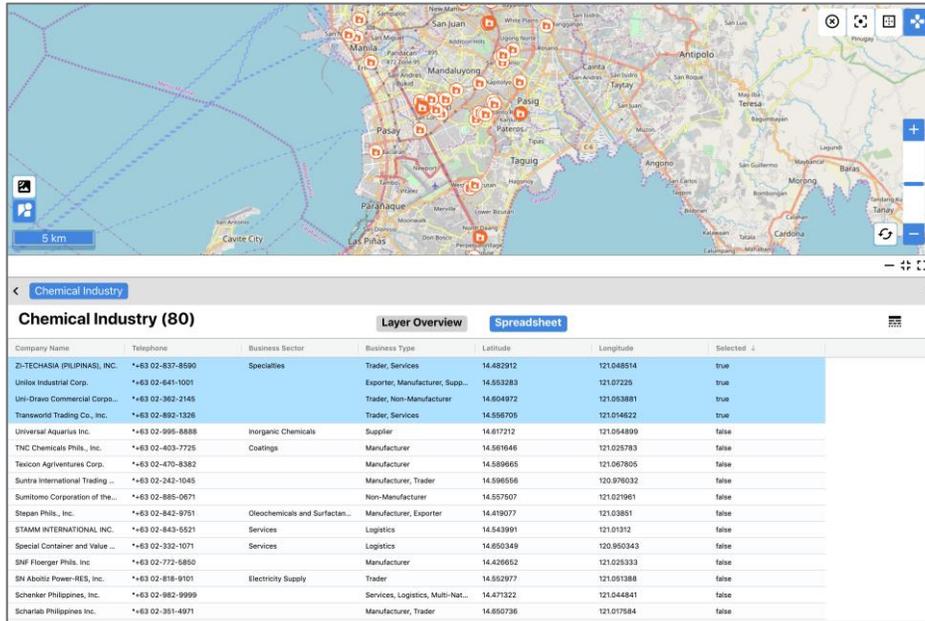


Figure 7. Select Multiple Records

To deselect a record (feature), click it again with CTRL or select it on the map. The record will be deselected in both the map and table (Spreadsheet view). To deselect all records, click the **Clear Selected Features** button on the map; this feature is especially useful if you have numerous records selected and you want to start over.

Also, the Info Panel only shows a dataset for one Active Layer at a time. To select a different layer's data, click the layer's name in the tabs above the Info Panel.

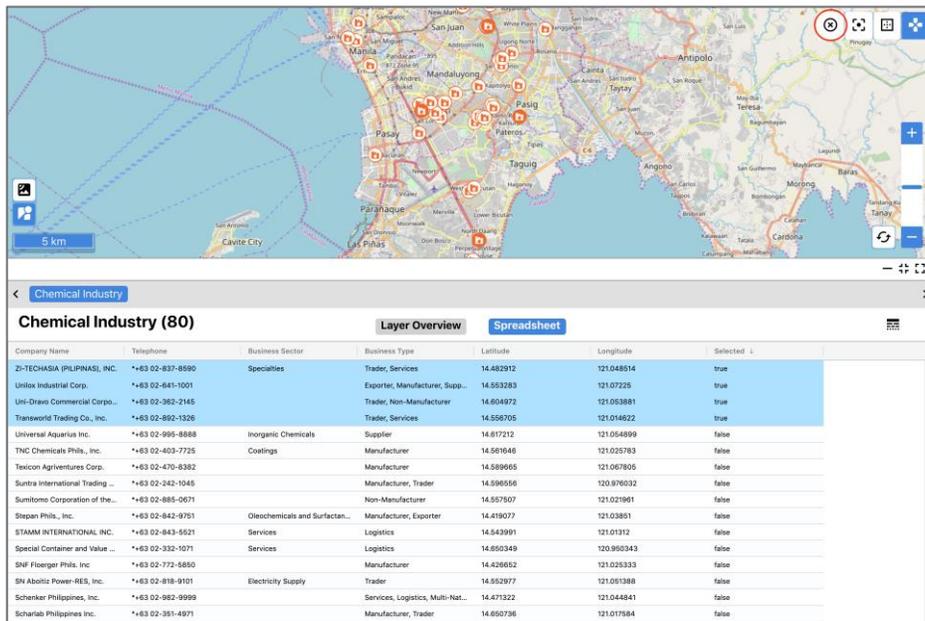


Figure 8. Clear Record Selection

6.0 Map Layer Data Provenance

This section provides a high-level description of each of the map layers, including the source of information used to create or replicate the map layer. Non-National Mapping and Resource Information Authority (NAMRIA) map layers' data owner or originator, the date the data was collected, and background information are included. In some cases, entries may be missing information.

6.1 Chemical Expertise Layer

Chemical Expertise data incorporates information about **higher education institutions, professional organizations, hospitals, and research institutions** (both government and private) operating in the Philippines. These organizations provide expertise on the professional practice of chemistry in research, industry, and healthcare. Chemical expertise data was collected between July and September 2019.

Information on chemical expertise was collected from the data sources displayed in Table 1.

Table 1. Chemical Expertise Data

Data Type	Data Source	URL
Professional Organizations	The Chemical Society of the Philippines, Inc	https://kcp.org.ph/
	Integrated Chemists of the Philippines	https://www.icp.org.ph/
	Philippine Federation of Chemistry Societies	https://www.pfcs.org.ph/
	Philippine Institute of Chemical Engineers	https://www.pichenet.org/index.html
Government Agency	Department of Health Hospitals	https://www.doh.gov.ph/doh-hospitals-directory
Commercial Database	Scopus	https://www.scopus.com

Specific information collected for the above data types is contained in Table 2. Some entities (e.g., individuals, groups, or laboratories) are missing information.

Table 2. Chemical Expertise Metadata

Metadata	Description
Organization Name	Name of organization as provided on website.
Organization Location	Physical address; if not available, nearest administrative area was used.
Contact Name	For hospitals, the chief administrator named in the hospital directory was used; for higher education institutions and research institutions, the names of authors identified through Scopus were used; for professional organizations, the name of the organization was used.

Metadata	Description
Contact Information	Phone number for organization/institution provided by website or found via Google search. For professional organizations, the professional affiliation (university, private research organization, company) was used.
Organization Type	Healthcare/medicine or higher ed or private research facility or govt. research facility/lab or professional organization depending on determination.
Details	Research field as identified by Scopus query or laboratory characteristics. For professional organizations, the title within the organization was used.
Latitude	Collected via Google maps by searching address provided on website using the USG1984 standard.
Longitude	Collected via Google maps by searching address provided on website using the USG1984 standard.

6.1.1 Additional Chemical Expertise Information

In some cases, individuals identified in the chemical expertise map layer held senior leadership positions in multiple professional organizations. Those individuals were included in the data more than once, accounting for the multiple professional organizations that they belong to and identifying their respective titles within each organization.

Data for higher education and research institutions data was collected using Scopus, a commercial database. Using the search function, we identified the top ten most published Filipino institutions and Philippines-based authors researching and publishing in a variety of key subject areas, including agricultural and biological sciences; biochemistry, genetics, and molecular biology; chemistry; chemical engineering; environmental science; immunology and microbiology; materials science; medicine; and pharmacology, toxicology, and pharmaceuticals.

6.2 Chemical Industry

Chemical industry data incorporates information about **commercial chemical businesses** operating in the Philippines. Samahan Sa Philipinas Ng Mga Indstriyang Kimika, or Chemical Industries Association of the Philippines (SPIK), is the primary organization representing the Filipino chemical industry. Chemical industry data was collected between July and September 2019.

Information on chemical industry was collected from the data source displayed in Table 3.

Table 3. Chemical Industry Data

Data Type	Data Source	URL
Industry Organization	SPIK	http://www.spik.com.ph/chemical-industries/

Specific information collected for the above data type is contained in Table 4. Some entities are missing information due to inconsistent reporting.

Table 4. Chemical Industry Metadata

Metadata	Description
Company name	Name of organization as provided on website.
Telephone	Phone number for organization as provided on website. Phone numbers that did not provide country or area code were normalized to fit the "+63-XX-XXX-XXXX" format. Area codes were projected based on business location given. If multiple phone numbers were given, the first one provided was chosen.
Business Sector	Industry sector as provided on website. Normalization changes were made as documented below: Deleted "Chemical" from "Sector" and "Business Type." Replaced "Oleochem" and "Surfactants" with "Oleochemicals and Surfactants." Replaced "Surface Coatings" with "Coatings." Replaced "Inorganics" with "Inorganic Chemicals."
Business Type	Business type as provided on website. Normalization changes were made as documented below: Deleted "Chemical" from "Sector" and "Business Type." Moved "Services" from "Sector" to "Business Type." Moved "Multinational" to "Business Type." Moved "Manufacturer" and "Non-Manufacturer" to "Business Type." Moved "Trader" to "Business Type." Replaced "Export Market" with "Exporter."
Latitude	Latitude/longitude information was gathered by pinpointing the address provided by SPIK through Google maps using the USG1984 standard. If multiple addresses were provided, the first one listed was chosen.
Longitude	Latitude/longitude information was gathered by pinpointing the address provided by SPIK through Google maps using the USG1984 standard. If multiple addresses were provided, the first one listed was chosen.

6.2.1 Additional Chemical Industry Information

The telephone numbers, sector, and business type went through data normalization to match the data schema due to inconsistencies in SPIK's reporting.

6.3 NAMRIA Airports Layer

This 2013 dataset contains information about the name, location, classification (international, principal class 1, principal class 2, community) of airports in the Philippines. An airport is defined as any area of land or water that is used or intended to be used for the landing and take-off of aircraft, including its appurtenant areas that are used or intended to be used for airport buildings or installations, or the airport facilities or right-of-way, together with all airport buildings and facilities located thereon. Geoportal Philippines data layer name: National Airport. See: <http://www.namria.gov.ph/projects.aspx>

6.4 NAMRIA Bureau of Fire Protection Offices

This 2017 dataset contains locations of fire stations nationwide managed by the Bureau of Fire Protection. Geoportal Philippines data layer name: BFP Regional/Provincial Office. See: <http://www.namria.gov.ph/projects.aspx>

6.5 NAMRIA Department of Trade and Industry Nuclear Regulatory Commission Offices

This dataset contains location of Department of Trade and Industry offices in Metro Manila. This data layer was provided to NAMRIA in 2015. Geoportal Philippines data layer name: DTI NCR Office. See: <http://www.namria.gov.ph/projects.aspx>

6.6 NAMRIA Hospitals and Health Centers

This 2013 dataset contains location information of health facilities in the National Health Facility Registry of the Department of Health. The National Health Facility Registry is the official master list of health facilities for the Philippines and contains geographical coordinate (latitude/longitude) of health facilities in sixty-five provinces. Geoportal Philippines data layer name: Hospital and Health Facilities (DOH). See: <http://www.namria.gov.ph/projects.aspx>

6.7 NAMRIA Landfills

This 2013 dataset contains 23 records of locational information (barangay, municipal, province, region), category and capacity of sanitary landfill sites in the Philippines recognized by the Department of Environment and Natural Resources consistent with the Guidelines on the Categorized Final Disposal Facilities or Sanitary Landfills (Department of Environment and Natural Resources Administrative Order No. 10 Series of 2006), and Ecological Solid Waste Management Act of 2000 (RA 9003) and its Implementing Rules and Regulations (Department of Environment and Natural Resources Administrative Order No. 2001-34). Geoportal Philippines data layer name: Sanitary Landfill Site. See: <http://www.namria.gov.ph/projects.aspx>

6.8 NAMRIA Metropolitan Manila Development Authority Landmarks

This 2013 dataset contains information about locations of fire stations, places of worship or churches, hospitals/health centers, police precincts/stations, and public office government offices in Metro Manila at the scale of 1:10,000. Data is generated by the Metropolitan Manila Development Authority. Geoportal Philippines data layer name: MMDA Landmarks 1:10,000 Scale. See: <http://www.namria.gov.ph/projects.aspx>

6.9 NAMRIA Police Stations

There is no date or description available for this data layer. Geoportal Philippines data layer name: PNP Police Precinct/Station. See: <http://www.namria.gov.ph/projects.aspx>

6.10 NAMRIA Roads

This 2013 dataset contains public infrastructure information about road networks at 1:10,000 scale classified into expressway, highway, and major road. The producer of this dataset is Photogrammetry Division, Mapping and Geodesy Branch, NAMRIA. Geoportal Philippines data layer name: Road 1:10,000. See: <http://www.namria.gov.ph/projects.aspx>

6.11 Threats Layer

Threat data incorporates information about **terrorism** and **maritime piracy** in the Philippines. Terrorism data is derived from the 2018 release of the Global Terrorism Database (GTD), an open-source database developed by the National Consortium for the Study of Terrorism and Response to Terrorism (GTD 2018). GTD tracks worldwide terrorist incidents beginning in 1970 through 2017. Data on **maritime piracy** was compiled from two data sources: The International Chamber of Commerce Commercial Crime Services (ICC-CCS) and the International Maritime Organization, a specialized agency of the United Nations. All piracy incidents spanning from the western Philippines to eastern Malaysia from 2000–September 2019 are included. Threats data was collected between July and September 2019.

Information on threats was collected from the data sources displayed in Table 5.

Table 5. Threats Data

Data Type	Data Source	URL
Professional Organization	International Chamber of Commerce, Commercial Crime Services	https://www.icc-ccs.org/index.php/piracy-reporting-centre/live-piracy-map
Professional Organization	International Maritime Organization, Global Integrated Shipping Information System	https://gisis.imo.org/Public/PAR/Default.aspx
Public Database	Global Terrorism Database	https://www.start.umd.edu/gtd/

Specific information collected for the above data types is contained in Table 6. Some entities are missing information due to incomplete incident information.

Table 6. Threats Metadata

Metadata	Description
Threat Actor	Match with the “gname” column in GTD; for piracy databases, use incident details if group responsibility attributable
Type of Threat Actor	Terrorist or Unknown
Event Date	Consolidated from the “iyear,” “imonth,” and “iday” columns in the GTD; for piracy databases, use incident date provided
Address	Match with “city” column in GTD; for piracy databases, use location named in incident details
Attack Type	Consolidated from “attacktype1_txt”, “attacktype2_txt”, and “attacktype3_txt” columns in the GTD; for piracy databases, use incident details to generate categories

Metadata	Description
Attack Method	Consolidated from “weaptype1_txt,” “weaptype2_txt,” “weaptype3_txt,” and “weaptype4_txt” columns in GTD; for piracy databases, use incident details to generate categories
Latitude	Match with “Latitude” column in GTD; for piracy databases, use incident latitude provided
Longitude	Match with “Longitude” column in GTD; for piracy databases, use incident longitude provided
Data Source	GTD or ICC-CCS or Global Integrated Shipping Information System

6.11.1 Additional Threats Information

The column titled “Event Location” was gathered from the “city” column in GTD. This column contains the “city, village, or town in which the incident occurred.” When that information is not available, GTD uses the “smallest administrative area” that can be identified for the incident. “Latitude” and “Longitude” for each incident comes from the city in which the event occurred using WSG1984 standards.

“Attack Type” data was gathered from the “attacktype1_txt,” “attacktype2_txt,” and “attacktype3_txt” columns in GTD. For each incident, the database allows for one to three types of attacks. The types of attacks include Assassination, Hijacking, Kidnapping, Barricade Incident, Bombing/Explosion, Armed Assault, Unarmed Assault, Facility/Infrastructure Attack, and Unknown. When multiple attack types are indicated for an incident, each type is separated by a “semi-colon, space” (;) to account for the “one-to-many” relationship. Explanations for each category of attack type are available in the GTD Codebook, <https://www.start.umd.edu/gtd/downloads/Codebook.pdf>.

“Attack Method” data was gathered from the “weaptype1_txt,” “weaptype2_txt,” “weaptype3_txt,” and “weaptype4_txt” columns in GTD. For each incident, the database allows for one to four types of weapons used in the attack. The types of weapons include Biological, Chemical, Radiological, Nuclear, Firearms, Explosives, Fake Weapons, Incendiary, Melee, Vehicle, Sabotage Equipment, Other, Unknown. When multiple weapon types are indicated for an incident, each type is separated by a “semi-colon, space” (;) to account for the “one-to-many” relationship. Explanations for each category of weapon type are available in the GTD Codebook, <https://www.start.umd.edu/gtd/downloads/Codebook.pdf>.

Each report contained in the ICC-CCS piracy database provides incident date, location, latitude/longitude, and a brief description of the incident. For events where the perpetrator was formally named, they were included in the “Threat Actor” column. When they were not named, “Unknown” was entered. When the “Threat Actor” was not named in the report but the details of the incident demonstrated enough supporting evidence, “Terrorist” was entered in the “Type of Threat Actor” column.

To gather Global Integrated Shipping Information System incident data, a search was conducted to narrow the timeframe from 2000–2017 within the geographical region of the South China Sea. We chose to make the cutoff in 2000 because it conveyed a sufficient timeframe to analyze piracy events while allowing more of a focus on recent trends. Incidents previously gathered from the ICC-CCS were not included to avoid event duplication. The “Attack Type” categories gathered from GTD were applied when the details of the incident contained in the report qualified for such a designation. Similarly, the “Attack Method” column is populated

through the incident descriptions maintaining consistency with the GTD's weapon type categorizations.

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