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October 14, 2022 *Via Email*

Mr. Ben Potter, RAPCE
NYSDEC Region 4 Division of Air Resources
1130 North Westcott Road
Schenectady, New York 12306

*RE: Revised Air Modeling Protocol*
*Shelter Enterprises Inc. Cohoes, New York Facility*
*C.T. Male Associates Project No. 13.3449*

Dear Mr. Potter:

Please find enclosed the Air Modeling Protocol for the Shelter Enterprises Inc. facility located in Cohoes, New York which has been revised to address DEC comments provided in the August 10, 2022 memorandum. The DEC comments are listed below along with the corresponding revisions in response to each comment.

1. More detail is requested on the bag room and molding area sources listed in Table 1. A discussion should be included as to the reason that these sources are being considered as volume vs. area sources.

   **Response:** See paragraph 2 added to Section 3.1, which describes the selection process for volume versus area sources.

2. All available stack parameters for each source should be listed in a table in mks units.

   **Response:** See Table 4 added to Section 4.2

3. Just to be clear, the emission rates in the modeling must be the maximum potential emission rates as reflected in the permit conditions. Ideally, the emissions data would be contained in the protocol for proper review by all NYSDEC staff, if they are available.

   **Response:** The protocol proposes a modeling scenario where the maximum allowable emissions (i.e., the facility's VOC emissions cap of 99,000 pounds of total VOC consisting only of pentane) would be distributed among the three emission sources based on historical facility emissions data. See calculations in Table 3 added to Section 4.2.

4. The years of surface and upper air meteorological data to be used in the modeling must be identified in the discussion within Section 3.4.

**Response:** The years of meteorological data to be used will be the most recent five year period available from NYSDEC (presumably 2017 through 2021), this information has been added to Section 3.4.

5. All buildings should be listed in tabular form or clearly listed within Figure 2.

   **Response:** See Table 5 added to Section 4.2.

6. A statement should be included in Section 3.5 which states that a continuous fence line or a fence line and other barriers prohibit public access to the facility site, if indeed this is the case.

   **Response:** See the second paragraph of Section 3.5 for an explanation of the property line and receptor locations.

7. Since the new version of AERMOD is now available for use (v. 22112), this version should be used in the modeling. The most recent version of AERMAP should be identified in Section 3.3 as well.

   **Response:** The most recent version of AERMOD has been identified in both Sections 2.1 and 3.3 (Version 22112).

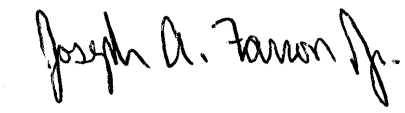
8. A more detailed Part 212 discussion should be presented in the protocol. At minimum, Pentane should be identified as an HTAC or a non-HTAC and listed in a table with its corresponding AGC and SGC, whichever is applicable.

   **Response:** See Part 212 discussion added as paragraph 2 in Section 4.0.

As always, please feel free to contact me at (518) 786-7471 or via email at j.farron@ctmale.com should you have any questions or require additional information.

Respectfully submitted,

C.T. MALE ASSOCIATES



Joseph A. Farron, Jr.
Project Environmental Engineer

ec: Dustin Pusatere (Shelter Enterprises), Nancy Garry (C.T. Male)

Enclosures

June 1, 2022
Revised October 14, 2022

# Protocol for Emission Point Modeling Using AERMOD Software

## Shelter Enterprises Inc.
## 8 Saratoga Street
## Cohoes, New York Facility

*Prepared for:*

SHELTER ENTERPRISES INC.
8 Saratoga Street
Cohoes, New York 12047

*Prepared by:*

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*C.T. Male Project No.: 13.3449*

**PROTOCOL FOR EMISSION POINT MODELING USING AERMOD SOFTWARE**
**SHELTER ENTERPRISES INC. FACILITY**
**CITY OF COHOES, ALBANY COUNTY, NEW YORK**

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## 1.0 PROJECT OVERVIEW

The Shelter Enterprises Inc. facility is located at 8 Saratoga Street in the City of Cohoes, Albany County, New York (see Figure 1). Shelter Enterprises Inc. is a manufacturer of expanded polystyrene (EPS) building material products for residential, commercial, and civil markets. Emissions from the facility include pentane (a volatile organic compound) generated during production processes and combustion emissions from exempt sources.

The facility's previous New York State Department of Environmental Conservation (NYSDEC) Air State Facility Permit (4-0103-00057/00002) expired on June 22, 2021 and the facility is in the process of submitting a permit application to reinstate a State Facility Permit to continue operations as previously permitted. As a step in the permitting process, NYSDEC requires that the facility submit a protocol to conduct air dispersion modeling of the facility operations in order to evaluate the level of impacts associated with emissions from the facility with respect to the NYSDEC Annual Guidance Concentrations (AGCs) and Short-Term Guidance Concentrations (SGCs) in order to demonstrate compliance with 6 NYCRR Part 212.

Under this protocol, air dispersion modeling will be completed in accordance with generally accepted modeling practices and will utilize software which runs the current version of the USEPA AERMOD software. The hourly emission rate of pentane will be estimated based on maximum facility operations under the existing VOC emission cap listed within the permit application. A maximum annual concentration for pentane will be derived from the model to assess compliance with the applicable AGC. A maximum hourly concentration will not be derived from the model as pentane does not have an SGC to compare the model results against.

## 2.0 SELECTION OF MODELING SOFTWARE

In accordance with NYSDEC Policy DAR-10: NYSDEC Guidelines on Dispersion Modeling Procedures for Air Quality Impact Analysis, this protocol intends to follow the Division of Air Resources' recommended dispersion modeling procedures for conducting ambient impact analyses. By following these procedures, the protocol also follows the Environmental Protection Agency's (EPA) approved methodologies, as incorporated in Appendix W of 40 CFR Part 51 regulations. In performing such assessments, a set of recommended and acceptable procedures has been defined by EPA and NYSDEC to assist source applicants to assure the proper application of the modeling analysis. As detailed within DAR-10, source analyses at major sources should adhere strictly to the requirements and preferred modeling procedures described in the EPA Guidelines, with the added requirements of NYSDEC on the application of AERMOD.

EPA's Modeling Guideline revisions of November 9, 2005 allowed the substitution of AERMOD for ISC3 during the one year transition period until December 9, 2006, after which AERMOD has been the recommended refined model.

### 2.1 Description of AERMOD Software

AERMOD is a regulatory steady-state plume modeling system with three separate components: AERMOD (Dispersion Model), AERMAP (Terrain Preprocessor), and AERMET (Meteorological Preprocessor). AERMAP characterizes the terrain, and generates receptor grids for the AERMOD dispersion model, while AERMET provides AERMOD with the meteorological information it needs to characterize the planetary boundary layer.

AERMET uses meteorological data and surface characteristics to calculate boundary layer parameters (e.g. mixing height, friction velocity, etc.) needed by AERMOD. This data is representative of the meteorology in the modeling domain.

AERMAP uses gridded terrain data for the modeling area to calculate a representative terrain-influence height associated with each receptor location. The gridded data is supplied to AERMAP in the format of the Digital Elevation Model (DEM) data from the

United States Geological Survey (USGS). The terrain preprocessor can also be used to compute elevations for both discrete receptors and receptor grids.

In developing AERMOD, AERMIC adopted design criteria to yield a model with desirable regulatory attributes. It was felt that the model should: 1) provide reasonable concentration estimates under a wide variety of conditions with minimal discontinuities; 2) be user friendly and require reasonable input data and computer resources as is the case with the ISCST3 model; 3) capture the essential physical processes while remaining fundamentally simple; and, 4) accommodate modifications with ease as the science evolves.

In order to provide consideration to downwash, cavity impacts, and building wakes and eddies, the software incorporates a feature known as the Building Profile Input Program (BPIP). The BPIP incorporates a program that calculates building heights (BH) and projected building widths (PBW), and is designed to determine whether or not a stack is being subjected to wake effects from a structure or structures, and may lead to different BH and PBW values than those calculated for GEP. These calculations are performed only if a stack is being influenced by structure wake effects.

The current version of AERMOD, version 22112 will be used to complete the proposed Air Dispersion Modeling. If a newer version of AERMOD is released during the review period for this protocol, the most current version would be used in place of 22112.

## 3.0 SUMMARY OF MODEL INPUTS

### 3.1 Facility Modeling Parameters

Design data for the facility's layout and emission points will be used as the basis for running the model in conjunction with the facility's requested emission cap for VOC per year. The facility has a Regenerative Thermal Oxidizer (RTO) which discharges emissions through a point source. Additionally, off-gassing in the Bagroom (Prepuff Aging) Area and the Molding Area generates fugitive emissions (i.e., not point sources) which are discharged from facility the through non-discrete sources (i.e., cracks in walls, windows, doors, vents, etc.). The emission sources will be modeled as shown in Table 1.

**Table 1 – Summary of Emission Sources**

| Emission Source | Source Description | Model Source Type |
|---|---|---|
| Regenerative Thermal Oxidizer (RTO) | Post-control emissions routed from production | Point Source |
| Expansion | All emissions from this process are fully routed to the RTO | N/A |
| Bagroom (Prepuff Aging) Area | Fugitive emissions from process area (i.e., emissions not routed to the RTO) | Volume Source |
| Molding Area | Fugitive emissions from process area (i.e., emissions not routed to the RTO) | Volume Source |

In selecting the modeling source type (volume source versus area source) for the fugitive emissions, the definition and input parameters of each source type were considered. The USEPA's AERMOD Users Guide states that area sources are used to model low level or ground level releases with no plume rise, and volume sources are used to model a variety of industrial sources with both vertical and lateral dimensions. Additionally, Lakes Environmental Software support has stated that "In general, fugitive emissions are often quantified as volume sources which allows flexibility in defining the physical characteristics of the release while maintaining some of the model's important algorithms such as plume meander in the extreme near-field." The

facility's fugitive emissions are discharged through non-discrete sources along the length of the building's walls and roof, and therefore they will be most accurately modeled as volume sources defined as the vertical height of the building with the dimensions of each production area.

The input data includes emission point parameters for each emission source (including diameter, emission rate, exit velocity, stack height, exit temperature and flow rate for point sources and release height, emission rate, and process area dimensions for volume sources), as well as building footprints and heights. The model is capable of being run using specific area settings (i.e., urban or rural settings), and will utilize the rural setting based on the layout of the facility and surrounding area. Figure 2 depicts the facility layout, inclusive of buildings, emission points, elevations and property line.

### 3.2 Receptor Area to be Modeled

The modeling will be conducted for the area in the vicinity of the site, with the receptors oriented in a Cartesian grid pattern set up following the initial receptor grid spacing suggested in DAR-10: NYSDEC Guidelines on Dispersion Modeling Procedures for Air Quality Impact Analysis:

- Receptor spacing of 10 m along the building perimeter rather than 25m along the fence line since the facility is not surrounded completely by perimeter fencing;
- 70m receptor spacing from the center of the facility to 1km;
- 100m spacing from 1km to 2km; and
- 250m spacing from 2km to 5km.

A total of 3,598 receptors (including sensitive receptors) will be modeled under this scenario, covering an area of approximately 25,000,000 square meters (±6,178 acres), excluding the area within the site property encompassed by the facility building, where the public would not have access. All receptor data corresponds to the interpolated ground level elevation as calculated by AERMAP. For the purposes of the air dispersion modeling, AERMAP will be used to assign elevations to the receptor grid points.

Online resources were consulted to identify the location of additional, discrete sensitive receptors such as schools, hospitals, parks, nursing homes and daycares within the

modeling area. A summary of the sensitive receptors within 2 km of the site are summarized in Table 2. Figure 3 provides a depiction of the receptor grid including the sensitive receptors.

**Table 2 – Summary of Sensitive Receptors**

| Facility Name | Location (UTM Coordinates) | Approximate Distance from Facility (km) |
|---|---|---|
| Abram Lansing School | 605647.37, 4735942.98 | 1.31 |
| Berkley Park | 604784.03, 4737375.86 | 1.79 |
| Cohoes Falls | 605697.02, 4737632.59 | 1.10 |
| Cohoes High School | 604804.45, 4736629.66 | 1.72 |
| Cohoes Middle School | 605493.62, 4736134.78 | 1.26 |
| Craner Park | 605639.76, 4737599.84 | 1.10 |
| Joyful Beginnings Early Education Program | 606717.80, 4737424.03 | 0.57 |
| Learning Essentials Childcare | 606497.08, 4738613.12 | 1.72 |
| Peebles Island State Park | 607552.49, 4737449.46 | 0.73 |
| Samaritan Hospital | 606346.23, 4736782.87 | 0.36 |
| Sonshine Patch Pre School | 606377.05, 4736482.12 | 0.41 |
| St. Peter's Hospital Addiction Recover Center | 606205.80, 4736736.17 | 0.17 |
| Van Schaick Grade School | 607388.92, 4735920.76 | 1.25 |

### 3.3 AERMAP Data Input

The current version of AERMAP, version 18081 will be used to complete the proposed Air Dispersion Modeling. The AERMAP terrain preprocessor will utilize USGS 7.5 Minute Native Format DEM topographical data for the Troy North, Troy South, Albany and Niskayuna, New York quadrangles, data which provides a resolution of 10 meters.

### 3.4 AERMET Data Input

The AERMET meteorological preprocessor will utilize surface and upper air data for the most recently available five year period from NYSDEC for the Albany Airport. It is anticipated the most recent data period will include the years 2017-2021. The National Weather Service (NWS) website indicates that climate data for the region of the project site is available from five regional climatology reporting locations: Albany, NY; Bennington, VT; Glens Falls, NY; Pittsfield, MA; and Poughkeepsie, NY. The Albany location is closest to the site, and as such, Albany was chosen as the most representative climate data for the facility.

### 3.5 AERMOD Data Input

Facility-wide emission rate estimates for on-site activities will be generated based on the proposed VOC annual emission cap, actual emission ratios between emission sources based on 2021 facility emission data (i.e., breakdown of each unit operation as a percentage of the VOC cap), and annual operating hours (assuming continuing operations of one shift per weekday). Using the emission source data, estimated emission rates, and the layout of the facility, the model will calculate the maximum annual concentration of pentane from the facility operations.

The maximum annual concentration at or beyond the building footprint will be presented in the summary report. The layout of the facility includes a variety of barriers (i.e., the Mohawk River forms the northern site boundary, railroad tracks form the western site boundary, and a combination of guardrails intermittent fencing and multiple changes in elevation are present along the southern and eastern site boundaries to discourage public access to the facility. As the facility is not completely surrounded by perimeter fencing, receptors will be included up to the building limits in each direction.

The modeling scenario will not consider wet or dry deposition which would deplete mass from the plume, and as such, the modeled result will be conservative. The model will consider complex terrain through incorporating the AERMAP program into the modeling scenario. USGS topographical data will be imported into the modeling software to account for the complex terrain (i.e., those areas where the terrain exceeds the stack base elevation).

## 4.0 SUMMARY OF MODELING RESULTS

The AERMOD modeling analysis will account for the operations currently contemplated for the facility, including a portion of VOC emissions being captured and routed to the RTO as well as a portion of VOC emissions being emitted as fugitive emissions from the Bagroom (Prepuff Aging) Area and the Molding Area. Modeling data will include the dimensions and footprints of the facility's buildings, as well as specific information relative to the emission point. The model will incorporate topographical data from the USGS, and meteorological data from the Albany Airport.

Within the NYSDEC DAR-1, pentane is identified as a low toxicity contaminant (i.e., non-HTAC) with no established SGC and an AGC of 70,250 ug/$m^3$. The modeled maximum annual concentration value will be presented within the summary report to compare against pentane's AGC.

### 4.1 Locations of Maximum Concentration Receptor

The location of the receptor for the maximum concentration will be provided within the summary report. Isopleths indicating the results of the modeling demonstrating the concentration of emissions will also be included within the summary report.

### 4.2 Additional Modeling Information

In order to model maximum allowable emissions under the facility's permit, the permit emission cap (99,000 ton VOC/year) will be distributed between the three (3) emission source unit operations based on the percentage of total emissions in 2021 attributable to that unit operation (i.e., emitted via RTO, emitted from Bagroom, or emitted from Molding Area). Pentane is the only VOC emitted from these production processes at the facility. Emission rate calculations for the modeling scenario are included in Table 3 and assume that the facility would continue to operate on a similar schedule of 1 shift per day, 5 days per week in order to be most conservative.

**Table 3 – Model Emission Rate Calculations**

| Source | Total 2021 Emissions per Source (lb/yr) | Percent of Total Emissions (%) | Model Emission Rate (lb/year) | Model Emission Rate (g/s)[1] |
|---|---|---|---|---|
| RTO | 7,944 | 21.27 | 21,057 | 1.28 |
| Bagroom Area | 6,276 | 16.81 | 16,642 | 1.01 |
| Molding Area | 23,122 | 61.92 | 61,301 | 3.71 |

[1] – g/s Emission Rate Based on lb/yr divided by 2,080 hr/yr (1 shift per day, 5 days/week)

Emission source information, including emissions data and stack parameters is included in Table 4.

**Table 4 – Summary of Emission Source Parameters**

| Emission Point | Source Type | Emission Rate (g/s) | Release Height (m) | Diameter / Length of Side (m) | Exit Temp (°C) | Velocity (m/sec) | Flow Rate ($m^3/s$) |
|---|---|---|---|---|---|---|---|
| RTO | Point | 1.28 | 12.5 | 0.5 | 93 | 15.4 | 3.13 |
| Bagroom Area | Volume | 1.01 | 9.5 | 12.2 | N/A[2] | N/A[2] | N/A[2] |
| Molding Area | Volume | 3.71 | 9.5 | 15.2 | N/A[2] | N/A[2] | N/A[2] |

[2] – These parameters are not required for volume sources. The model calculates dispersion based on the size and total emission rate of the volume source.

The facility consists of one (1) irregularly shaped building where the height is approximately consistent along the roofline. Information regarding the facility building as it will be modeled is included in Table 5.

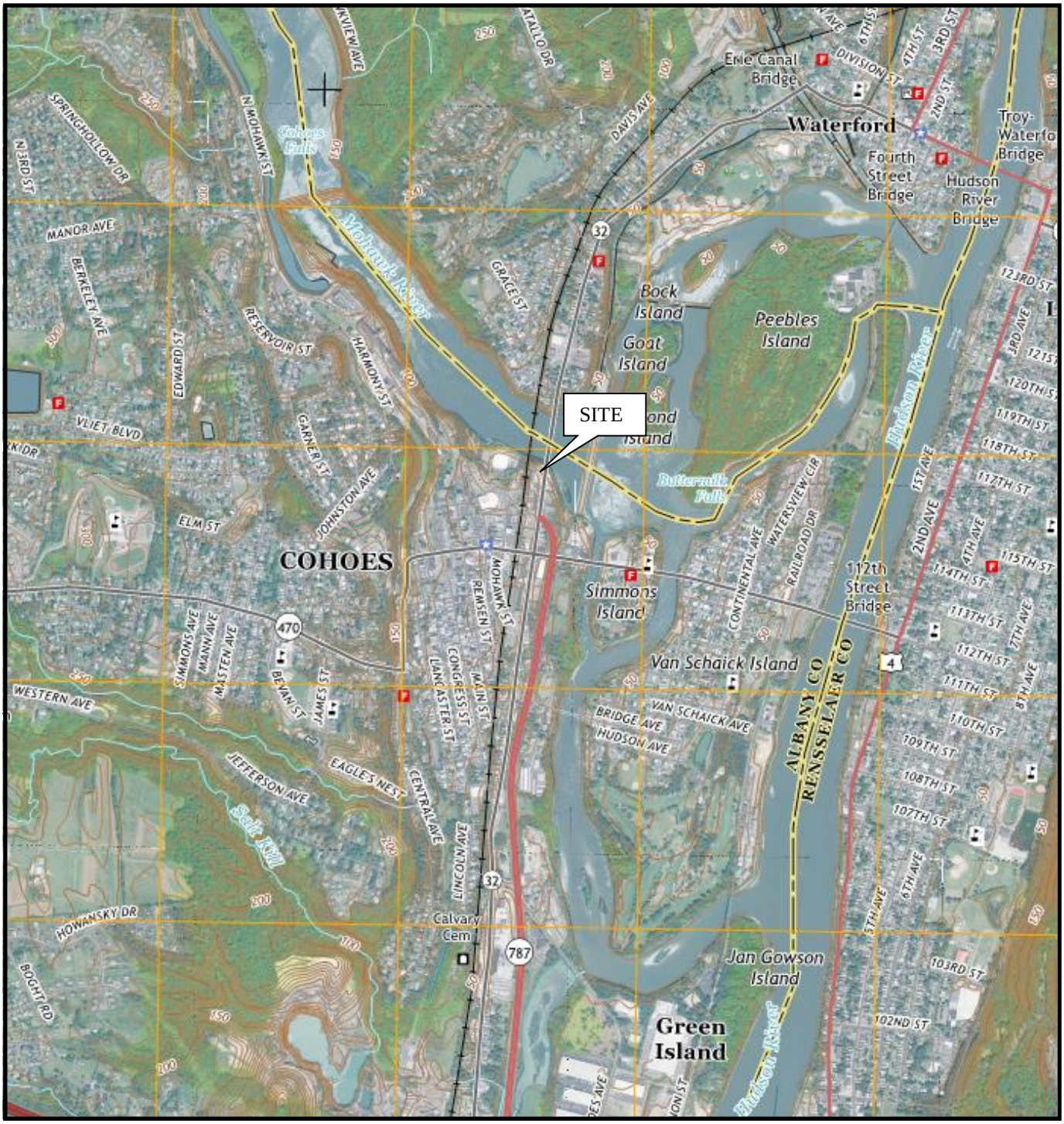
**Table 5 – Building Information**

| Building | Description | Height |
|---|---|---|
| Entire Facility | Irregular Shaped Building – Maximum Width - ±18.3 m; Maximum Length - ±38.6 m | 9.5 m |

# FIGURES

# Figure 1

# Site Location Map




**MAP REFERENCE**
United States Geological Survey
7.5 Minute Series Topographic Maps
Quadrangle: Troy North, N.Y. (2016)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# FIGURE 1 SITE LOCATION MAP

## SHELTER ENTERPRISES INC. FACILITY

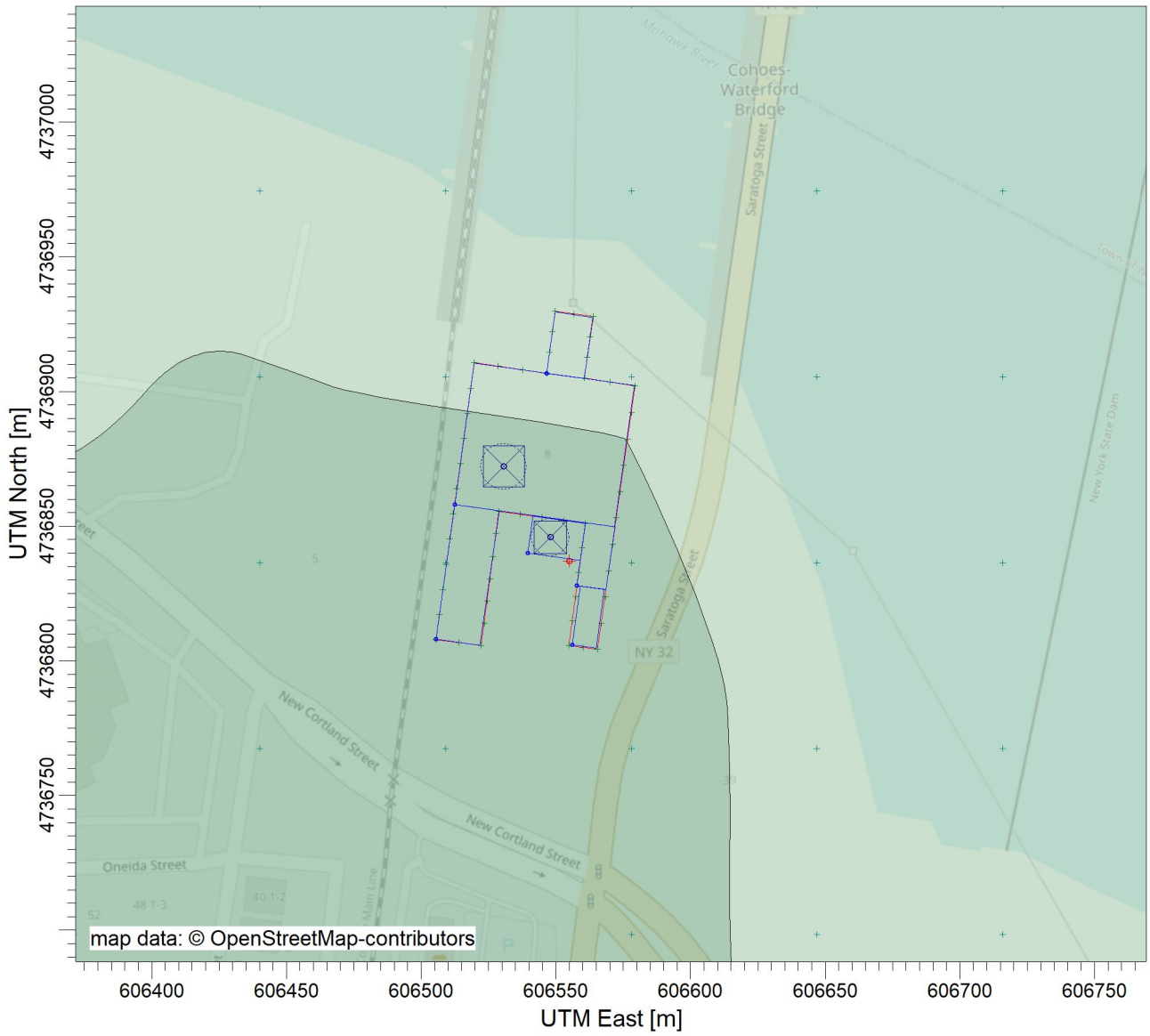
| CITY OF COHOES | ALBANY COUNTY, NY |
|---|---|
| SCALE: ±1" = 2,000' | |
| DRAFTER: J.FARRON | |
| PROJECT No. 13.3449 | |

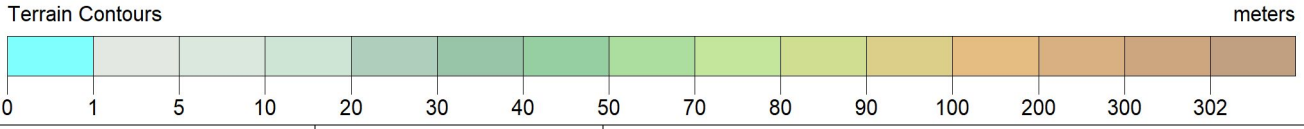
# Figure 2

# Facility Building, Emission Points, Elevations and Property Line Depiction

PROJECT TITLE:

**Air Dispersion Modeling - Shelter Enterprises Inc.**
**Facility Building, Emission Points, Elevations, Property Line and Receptor Grid Depiction**



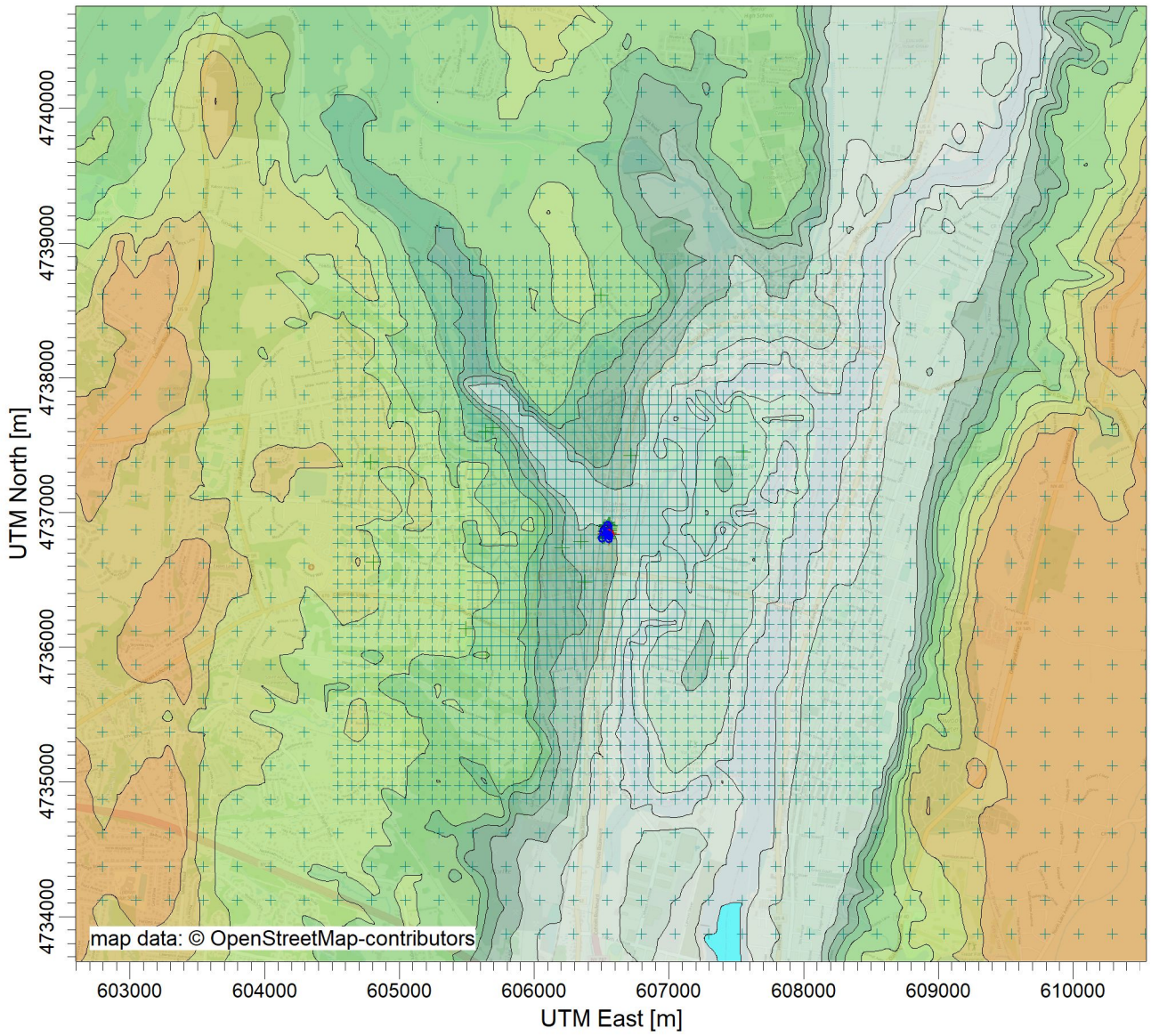

| | | | |
|---|---|---|---|
| COMMENTS: | SOURCES: **3** | COMPANY NAME: **C.T. Male Associates** | |
| | RECEPTORS: **3598** | MODELER: **J.Farron** | |
| | | SCALE: 1:2,500 0 0.05 km | |
| | | DATE: **9/16/2022** | PROJECT NO.: **13.3449** |

# Figure 3

# Receptor Grid Depiction

PROJECT TITLE:

**Air Dispersion Modeling - Shelter Enterprises Inc.**
**Facility Building, Emission Points, Elevations, Property Line and Receptor Grid Depiction**





| | | | |
|---|---|---|---|
| COMMENTS: | SOURCES: **3** | COMPANY NAME: **C.T. Male Associates** | |
| | RECEPTORS: **3598** | MODELER: **J.Farron** | |
| | | SCALE: 1:50,000 — 0 — 2 km | |
| | | DATE: **9/16/2022** | PROJECT NO.: **13.3449** |