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**To:** Tyler Rynne | Hillman Energy Center, LLC

**From:** Frank Holmes, P.E. | Langan

**Date:** 05 November 2025

**Re:** Stormwater Management Memorandum  
Hillman Energy Center  
73 & 75 Hillman Street, Tewksbury, MA 01876  
Langan Project No.: 151043401

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## Summary

Hillman Energy Center, LLC proposes to construct a Battery Energy Storage System (BESS) project to be located on two lots at 73 and 75 Hillman Street in Tewksbury, Massachusetts. The site is bound by Hillman Street to the south, high voltage power lines to the west, railroad tracks to the north, and Clinton Street to the east. The approximately 4.34-acre site is currently occupied by a residential house and two one-story slab-on-grade commercial masonry buildings. The exterior portions of the site are used for parking and material storage, including a Quonset hut and several trailers. Refer to Figure 1, Figure 2, and Figure 3 in Appendix A.

As part of this development, battery energy storage system modules consisting of lithium-ion batteries housed in above-ground storage cabinets and transformers on concrete slabs will be installed on the site with an ancillary electric substation located on the southern side of the parcel. The predevelopment site impervious area is 2.05 acres (47% of the site) and the post-development site impervious area is approximately 1.56 acres (36% of the site).

## Existing Conditions

The site is in Zone X unshaded (areas outside of the 0.2% annual chance flood). The site is within a Zone II Wellhead Protection Zone. There is an isolated wetland in the most northern part of the site and bordering vegetated wetlands to the west of the site. Hydrologically, the site is mostly in the Merrimack River watershed with the northern tip of the site in the Shawsheen River watershed.

Runoff from the 4.34-acre site is split into three watersheds. The northeast portion of the site drains via overland flow to the isolated vegetated wetland in the north portion of the site. The western portion of the site drains via overland flow to the bordering vegetated wetlands to the west of the site. The southeast portion of the site, which includes the two commercial masonry buildings and some of the surrounding area drains to catch basins to the west, south, and east of the buildings. The catch basins are piped to the storm drain line at the intersection of Hillman and Clinton Street. See attached EX-WS in Appendix B for the existing watershed map.

According to the USDA Natural Resources Conservation Service (NRCS) Web Soil Survey, the site soil type is comprised of Windsor loamy sand and Deerfield loamy fine sand. See Figure 4:

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NRCS Soils Map in Appendix A. The Web Soil Survey has classified these soils as hydrologic soil group A. The applicant's soil evaluator conducted four test pits within the infiltration areas. The soils on site were classified as loamy sand. Soil mottling indicating seasonal high groundwater elevation was observed in the test pits 4 to 5.5 feet from existing grade. Refer to Appendix D for the test pit logs and test pit location map.

## Proposed Stormwater Management Design

In the proposed conditions, runoff from the 4.34-acre site is still split into three watersheds. The northeast portion of the site drains via overland flow to the isolated vegetated wetland (Design Point A). Most of 75 Hillman Street drains via overland flow to the bordering vegetated wetlands to the west of the site (Design Point B). The substation area and the BESS yard drains to water quality units and then to underground infiltration system B-1A, B-1B, B-4 and B-5 which discharge to level spreaders towards the western bordering vegetated wetlands (Design Point B). A small strip of area to the south and east of the sound wall along Hillman and Clinton Street sheet flows into the street to catch basins that are part of the town stormwater system in Hillman Street (Design Point C). See attached PR-W5 in Appendix C for the proposed watershed map.

The project is designed to meet the Massachusetts Department of Environmental Protection (MassDEP) Stormwater Management Standards and the most recent version of the town of Tewksbury Stormwater Management and Erosion Control Regulations. The stormwater management systems are designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. The site uses water quality units for pretreatment to provide at least 44% removal of average annual load of TSS before the stormwater is discharged into an underground infiltration system. The overall stormwater quality treatment achieved is equal to the removal of 80% of the average annual load of TSS from the total post-construction impervious surface area on the site as required by the Town of Tewksbury Stormwater Rules and Regulations.

Below are the features used in the proposed design:

1. Water quality units: hydrodynamic separators with inlet grates
2. Underground Infiltration Systems: proprietary chambers and crushed stone

## Methodology and Calculations

The peak runoff discharges for the existing and proposed conditions were analyzed using Soil Conservation Service (SCS) methodology, which outlines procedures for calculating peak rates of runoff resulting from precipitation events, and procedures for developing runoff hydrographs. Values for area, curve number, and time of concentration were calculated for the existing and proposed conditions.

The curve number for the crushed stone yard, which contains significant voids was estimated by using the SCS equation for the potential maximum retention.

$$CN = 1000 / (S + 10)$$

$$CN = 1000 / (1.8 + 10) = 85$$

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S is the available voids in the stone in inches. Therefore, 6 inches of crushed stone with 30% maximum retention of 1.8 inches, corresponding to a CN value of 85.

The storms analyzed include the following:

- A 2-year, 24-hour storm consisting of 3.18 inches of rainfall
- A 10-year, 24-hour storm consisting of 4.99 inches of rainfall
- A 25-year, 24-hour storm consisting of 6.12 inches of rainfall
- A 50-year, 24-hour storm consisting of 6.96 inches of rainfall
- A 100-year, 24-hour storm consisting of 7.87 inches of rainfall

These events are based on the National Weather Service (NOAA) Precipitation Frequency Data Server (PFDS).

The peak flow rates were obtained using HydroCAD. The existing and proposed conditions peak flow rate comparison can be found in Table 1 below.

## MassDEP Stormwater Performance Standards

A summary of MassDEP Stormwater Performance Standards as well as a method of ensuring compliance with each standard are summarized below:

1. Standard 1: No new stormwater conveyances may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

Response: There will be no new untreated stormwater conveyances to wetlands or waters of the Commonwealth.

2. Standard 2: Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR 10.04.

Response: The development of this site will result in a decrease of peak discharge rates from the existing condition, see Table 1 below for a summary. Existing and proposed stormwater discharge calculations are included in Appendix B and C of the memo.

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**Table 1.** Peak Flow Runoff Rate Comparison, Existing vs. Proposed Conditions

Design Point	Condition	2-year	10-year	25-year	50-year	100-year
<b>A</b>	Pre (cfs)	2.47	4.91	6.48	7.65	8.92
	Post (cfs)	0.46	1.77	2.77	3.58	4.49
	Delta	-2.01	-3.14	-3.71	-4.07	-4.43
	% Delta	-81%	-64%	-57%	-53%	-50%
<b>B</b>	Pre (cfs)	5.08	8.50	10.61	12.17	13.86
	Post (cfs)	0.13	7.32	8.69	9.63	13.67
	Delta	-4.95	-1.18	-1.92	-2.54	-0.19
	% Delta	-97%	-14%	-18%	-21%	-1%
<b>C</b>	Pre (cfs)	4.94	7.95	9.82	11.21	12.70
	Post (cfs)	0.00	0.01	0.07	0.13	0.25
	Delta	-4.94	-7.94	-9.75	-11.08	-12.45
	% Delta	-100%	-100%	-99%	-99%	-98%

3. Standard 3: Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures including environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.

Response: This project proposes underground infiltration system to promote groundwater recharge. Required and provided recharge volume calculations are included in Appendix F. Refer to a summary below

### Required Recharge

Total Required Recharge Volume for the Project = 3,515 cubic feet  
 Total Provided Recharge Volume for the Project = 15,836 cubic feet  
 15,836 cubic feet > 3,515 cubic feet

### Drawdown Time

Infiltration structures must be able to drain fully within 72 hours. The underground infiltration system drawdown time for the systems is less than 72 hours. Refer to Appendix F for the drawdown time calculations.

In addition to the 72 draw down time, there must be at least a two-foot separation between the bottom of the infiltration structure and the seasonal high groundwater table.

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Test pits were conducted February 26, 2025 and observed by Langan's Soil Evaluator and a representative from the Town Engineer's Department. The bottom elevation of the underground infiltration system B-1A and B-1B is 117.8 feet and estimated seasonal high groundwater elevation was observed at elevation 115.8 feet in TP-3. The vertical separation is 2 feet. The bottom elevation of the underground infiltration system B-1 is 116.25 feet and estimated seasonal high groundwater elevation was observed at elevation 114.2 feet in TP-2. The vertical separation is 2.05 feet. The bottom elevation of the underground infiltration system C-2 is 117.33 feet and estimated seasonal high groundwater elevation was observed at elevation 115.33 feet in TP-1. The vertical separation is 2 feet.

Mounding analysis is required when the vertical separation from the bottom of an exfiltration system to seasonal high groundwater is less than four feet and the recharge system is proposed to attenuate the peak discharge from a 10-year or higher 24-hour storm. In such cases, the mounding analysis must demonstrate that the Required Recharge Volume is fully dewatered within 72 hours. The mounding analysis must also show that the groundwater mound that forms under the recharge system will not break out above the land. A mounding analysis for each underground infiltration system using the Hantush method can be found in Appendix H. The mounding height and does not break above the bottom elevation of the underground infiltration systems.

4. Standard 4: Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). This Standard is met when:
- Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan, and thereafter are implemented and maintained;
  - Structural stormwater best management practices are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook; and
  - Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.

Response: Runoff generated from the proposed project will meet the water quality requirements of this standard using hydrodynamic separators to provide at least 44% TSS removal pretreatment prior to discharge to the infiltration systems and meet the overall 80% TSS removal requirement. Proposed treatment train features include water quality units and an underground infiltration system. TSS Removal worksheets can be found in Appendix E. A Long-Term Pollution Prevention Operation and Maintenance Plan can be found in Appendix G.

The hydrodynamic separators were sized to treat the equivalent Water Quality Flow for the 1 inch of rainfall over all new impervious surfaces to meet Water Quality Volume (WQV) requirement. See Appendix F for the water quality volume calculations.

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5. Standard 5: For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable. If through source control and/or pollution prevention all land uses with higher potential pollutant loads cannot be completely protected from exposure to rain, snow, snow melt, and stormwater runoff, the proponent shall use the specific structural stormwater BMPs determined by the Department to be suitable for such uses as provided in the Massachusetts Stormwater Handbook. Stormwater discharges from land uses with higher potential pollutant loads shall also comply with the requirements of the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53 and the regulations promulgated thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.

Response: The site is not considered a high pollutant load generator.

6. Standard 6: Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply and stormwater discharges near or to any other critical area require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas as provided in the Massachusetts Stormwater Handbook. A discharge is near a critical area, if there is a strong likelihood of a significant impact occurring to said area, taking into account site-specific factors. Stormwater discharges to Outstanding Resource Waters and Special Resource Waters shall be removed and set back from the receiving water or wetland and receive the highest and best practical method of treatment. A "storm water discharge" as defined in 314 CMR 3.04(2)(a)1 or (b) to an Outstanding Resource Water or Special Resource Water shall comply with 314 CMR 3.00 and 314 CMR 4.00. Stormwater discharges to a Zone I or Zone A are prohibited unless essential to the operation of a public water supply.

Response: The project is located within the Zone II Wellhead Protection Area of a public water supply. For discharges to the ground within a Zone II Wellhead Protection Area at least 44% of the total suspended solids must be removed prior to discharge to the infiltration structure. The proposed hydrodynamic separators provide at least 44% TSS removal pretreatment prior to discharge to the infiltration systems TSS Removal worksheets can be found in Appendix E. The required water quality volume equals 1.0 inch of runoff times the total impervious area of the post-development project site for a discharge within a Zone II Wellhead Protection Area. The hydrodynamic separators are sized to treat the Water Quality Flow equivalent of the 1.0 inch Water Quality Volume. See Appendix F for the water quality volume calculations.

7. Standard 7: A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all

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other requirements of the Stormwater Management Standards and improve existing conditions.

Response: The site is considered a redevelopment project. The project will meet the requirements of the MassDEP Stormwater Standards.

8. Standard 8: A plan to control construction related impacts including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.

All redevelopment projects shall fully comply with Standard 8.

Response: Soil erosion and sediment control plan has been developed for this project and can be found in the plan set. The plans have been designed in accordance with the Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas.

9. Standard 9: A long-term operation and maintenance plan shall be developed and implemented to ensure that stormwater management systems function as designed.

Response: The owner shall maintain the stormwater management systems as outlined in the Massachusetts Stormwater Handbook and Stormwater Standards. A Long-Term Pollution Prevention Operation and Maintenance Plan is included in Appendix G.

10. Standard 10: All illicit discharges to the stormwater management system are prohibited.

Response: The stormwater management system for this site does not include any illicit connections to the stormwater system. A signed illicit discharge compliance statement will be provided prior to the issuance of a building permit.

## Conclusion

The proposed stormwater management system has been designed in accordance with the town of Tewksbury Stormwater Management and Erosion Control Regulations, Massachusetts Stormwater Management Handbook, and the Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas. The system incorporates stormwater quality measures and maintains or decreases the existing rate of runoff for all storm events analyzed.

We believe based on the findings of this memo that the proposed stormwater system, as designed, will effectively manage quality and quantity of stormwater runoff for the proposed redevelopment.

## Appendices

- Appendix A – Figures
- Appendix B – Existing Stormwater Discharge Calculations
- Appendix C – Proposed Stormwater Discharge Calculations
- Appendix D – Soil Test Pit Logs

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Appendix E – TSS Removal

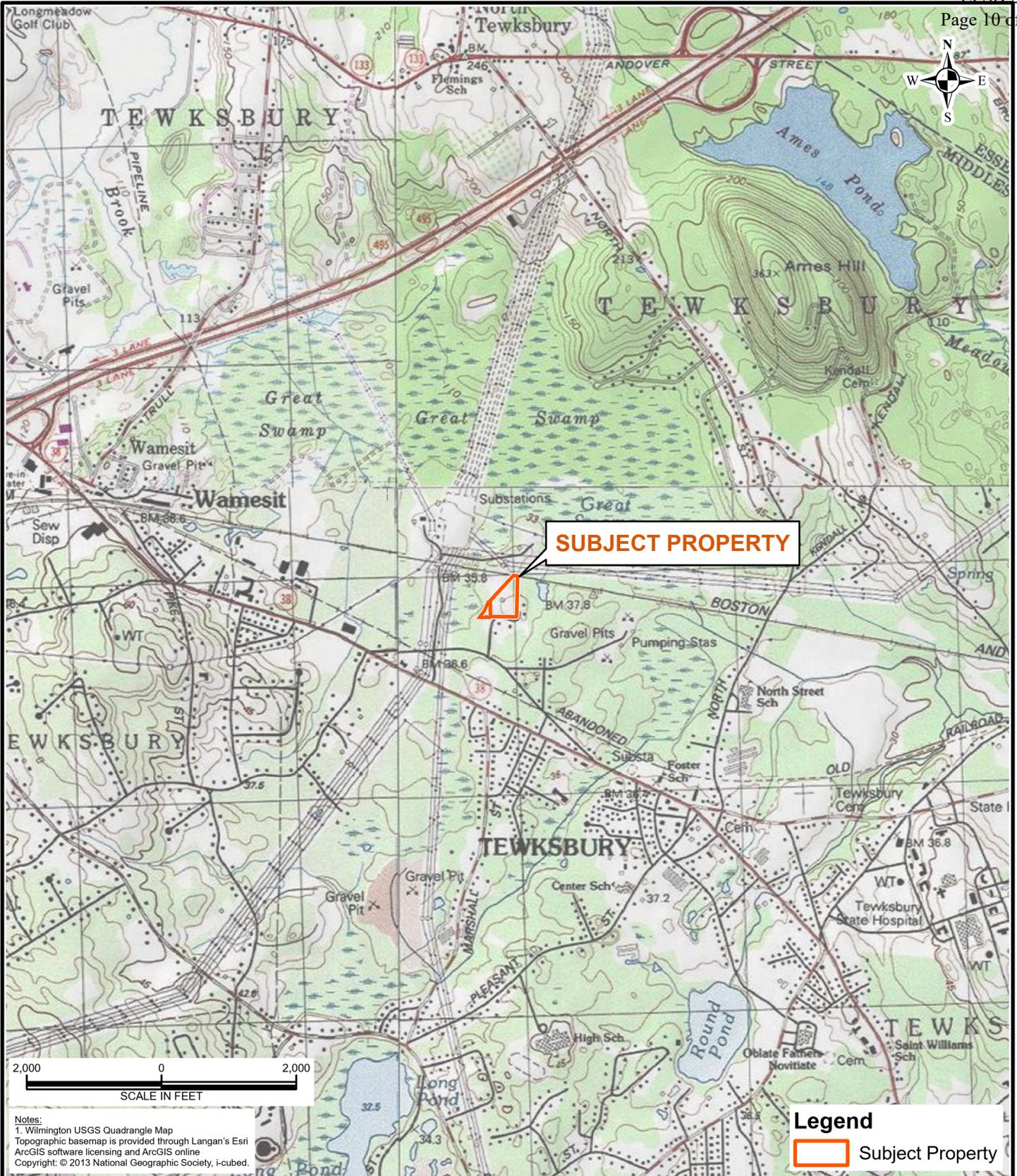
Appendix F – Water Quality Volume Calculations

Appendix G – Long-Term Pollution Prevention Operation and Maintenance Plan

Appendix H – Groundwater Mounding Analysis

## **APPENDIX A**

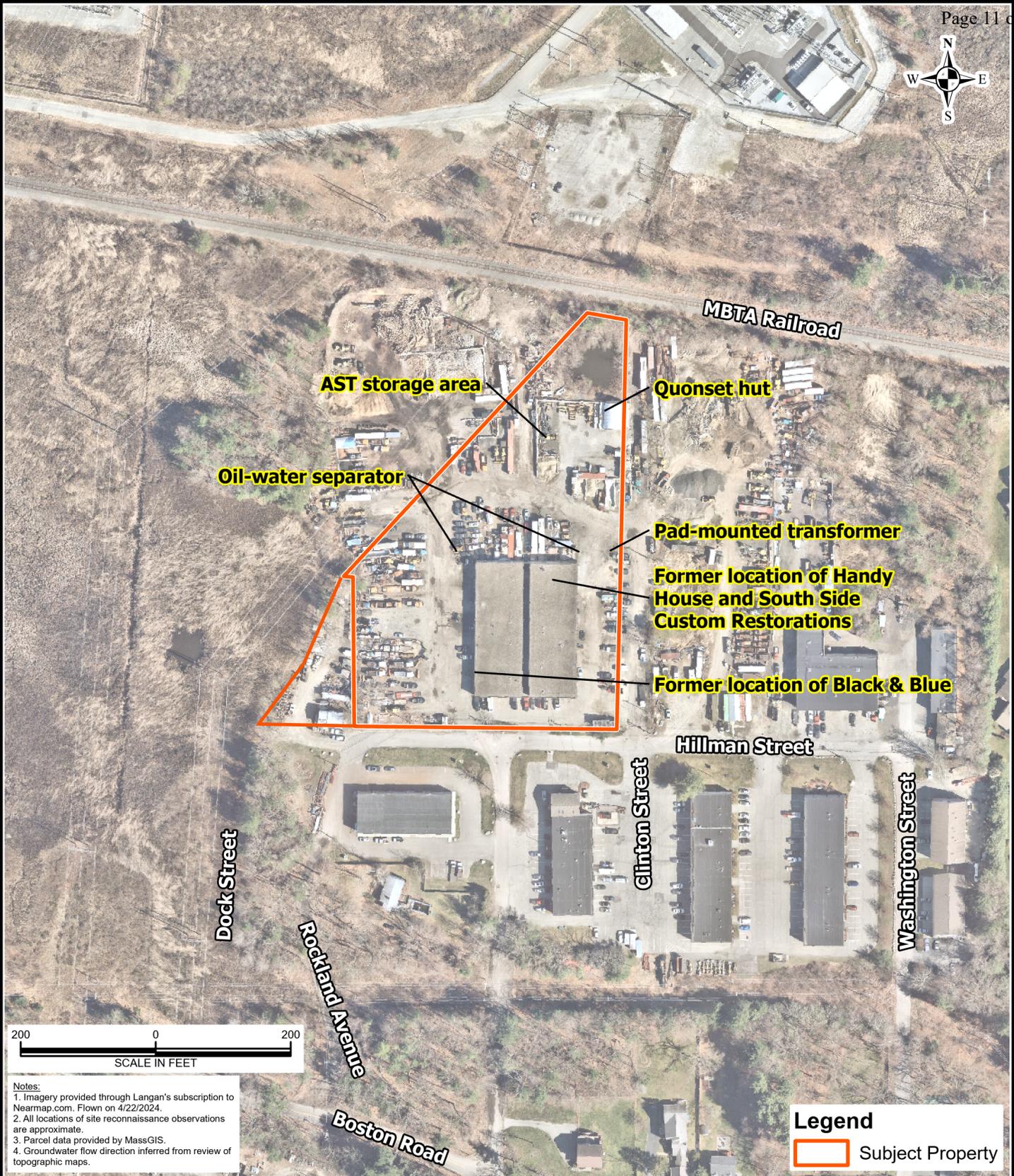
### **Figures**



Notes:  
 1. Wilmington USGS Quadrangle Map  
 Topographic basemap is provided through Langan's Esri  
 ArcGIS software licensing and ArcGIS online  
 Copyright: © 2013 National Geographic Society, i-cubed.

**Legend**  
 Subject Property

 Langan Engineering and Environmental Services, Inc. 100 Cambridge Street, Suite 1310 Boston, MA 02114 T: 617.824.9100 F: 617.824.9101 www.langan.com	Project	Figure Title	Project No.	Figure
	73 HILLMAN STREET	<b>SUBJECT PROPERTY LOCATION MAP</b>	151043401	1
	TEWKSBURY		Date	
	MIDDLESEX COUNTY MA		7/10/2024	
			Scale	
			1" = 2,000 feet	
			Drawn By	
			TO	



**Notes:**  
 1. Imagery provided through Langan's subscription to Nearmap.com. Flown on 4/22/2024.  
 2. All locations of site reconnaissance observations are approximate.  
 3. Parcel data provided by MassGIS.  
 4. Groundwater flow direction inferred from review of topographic maps.

**Legend**  
 Subject Property

 Langan Engineering and Environmental Services, Inc. 100 Cambridge Street, Suite 1310 Boston, MA 02114 T: 617.824.9100 F: 617.824.9101 www.langan.com	Project	Figure Title	Project No.	Figure
	73 HILLMAN STREET	SUBJECT PROPERTY LAYOUT	151043401	2
	TEWKSBURY		Date	
	MIDDLESEX COUNTY MA		7/24/2024	
			Scale	
			1" = 200 feet	
			Drawn By	
			TO	