BLUEWAVE

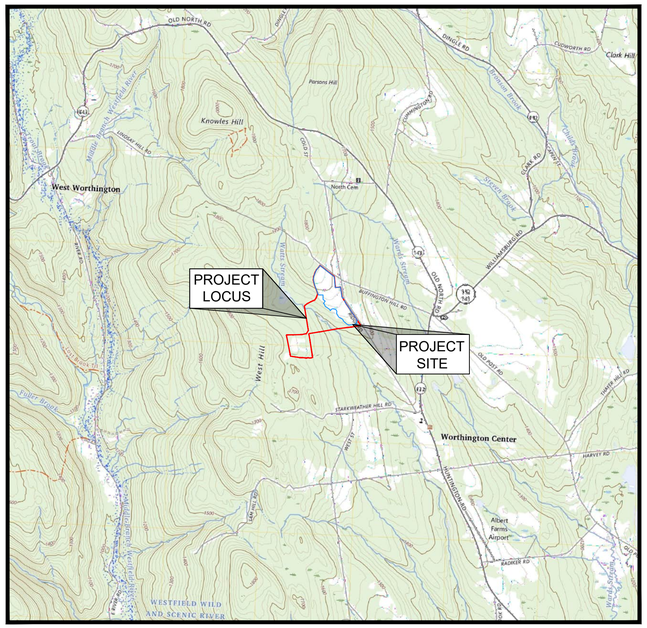
Appendix A: Revised Issued for Permitting Plan Set

***A revised Stormwater Management Report associated with this updated design will be shared once finalized**

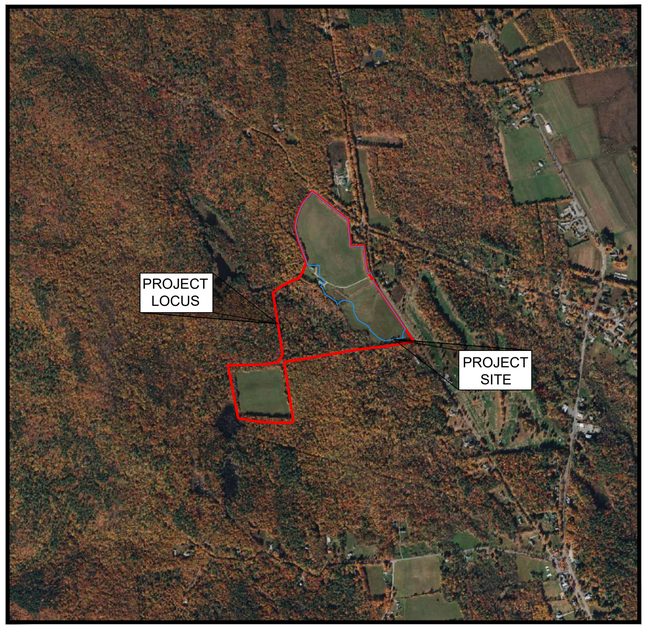
BWC WADES STREAM, LLC

2.0 MW AC GROUND-MOUNT SOLAR PV DEVELOPMENT
190 RIDGE ROAD
WORTHINGTON, MA 01098
SEPTEMBER 23, 2025
LAST REVISED DECEMBER 23, 2025
ISSUED FOR PERMITTING/NOT FOR CONSTRUCTION

DRAFT



LOCUS MAP
1"=2500'



AERIAL IMAGE
1"=1000'

DRAWING INDEX

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	COVER SHEET	
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MATERIAL SPECIFICATIONS AND PLACEMENT REQUIREMENTS:

1.1 ANGULAR ROCK FILL

ANGULAR ROCK FILL SHALL BE USED FOR THE CONSTRUCTION ENTRANCE AS SHOWN ON THE DRAWINGS, AND SHALL MEET THE GRADATION REQUIREMENTS LISTED BELOW.

U.S. STANDARD SIEVE	PERCENT PASSING
3 INCH	100
2 INCH	80 - 100
1 INCH	50 - 80
NO. 200	0 - 10

PRIOR TO USE, THE ANGULAR ROCK FILL SHALL BE TESTED FOR APPROVAL AS DESCRIBED IN SECTION 2.0 AND SHALL BE PLACED AS DESCRIBED IN SECTION 3.0.

1.2 DENSE GRADED CRUSHED STONE

DENSE GRADED CRUSHED STONE SHALL BE USED TO CONSTRUCT THE CRUSHED STONE ACCESS ROAD, AND SHALL MEET THE REQUIREMENTS OF A MATERIAL SUCH AS MASSDOT SPECIFICATION M2.01.7 CRUSHED STONE, OR APPROVED EQUAL. THIS MATERIAL SHALL BE PLACED AT A MINIMUM THICKNESS OF 6-INCHES AND SHALL BE IN DIRECT CONTACT WITH THE BALLAST BLOCKS. THIS MATERIAL SHALL CONSIST OF CLEAN, HARD, DURABLE CRUSHED ROCK OR CRUSHED GRAVEL STONE, FREE FROM LOAM AND CLAY AND DELETERIOUS MATERIAL AND NO MORE THAN 10 PERCENT PASSING THE U.S. NO. 200 SIEVE. THIS MATERIAL SHALL MEET THE FOLLOWING GRADATION:

SIEVE DESIGNATION	PERCENT PASSING
2-INCH	100
1.5-INCH	70-100
¾-INCH	50-85
NO. 4	30-55
NO. 50	8-24
NO. 200	3-10

PRIOR TO USE, THE DENSE GRADED CRUSHED STONE SHALL BE TESTED FOR APPROVAL AS DESCRIBED BELOW IN SECTION 2.0 AND SHALL BE PLACED AS DESCRIBED BELOW IN SECTION 3.0.

1.3 GRANULAR FILL MATERIAL

CLEAN GRANULAR FILL MAY BE USED FOR FILL OR GRADING MATERIAL. GRANULAR FILL SHALL CONSIST OF MASSDOT MATERIAL M1.03.0, GRAVEL BORROW, TYPE C, OR APPROVED EQUAL, AND MEET THE FOLLOWING GRADATION:

SIEVE DESIGNATION	PERCENT PASSING
2-INCH	100
½-INCH	50-85
NO. 4	40-75
NO. 50	8-28
NO. 200	0-10

PRIOR TO USE, THE GRANULAR FILL SHALL BE TESTED FOR APPROVAL AS DESCRIBED IN SECTION 2.0 AND SHALL BE PLACED AS DESCRIBED IN SECTION 3.0.

1.4 LOAM BORROW MATERIAL

THE LOAM BORROW SHALL CONFORM TO MASSACHUSETTS HIGHWAY DEPARTMENT STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES, DIVISION III - MATERIALS SPECIFICATIONS, SECTION M1.05.0 "LOAM BORROW". THE LOAM SHALL CONTAIN NOT LESS THAN 4% NOR MORE THAN 20% ORGANIC MATTER.

1.5 GEOTEXTILE FABRIC

FIBERS USED IN MANUFACTURING OF THE GEOTEXTILES SHALL CONSIST OF POLYPROPYLENE, POLYVINYL CHLORIDE, NYLON, POLYOLEFINS, POLYAMIDES, OR POLYESTER. THE FIBERS SHALL BE FORMED INTO A NETWORK SUCH THAT THE FILAMENTS OR YARNS RETAIN DIMENSIONAL STABILITY RELATIVE TO EACH OTHER, INCLUDING SELVAGES. THE GEOTEXTILE SHALL CONTAIN STABILIZERS AND/OR INHIBITORS TO MAKE THE FIBERS RESISTANT TO DETERIORATION RESULTING FROM EXPOSURE TO SUNLIGHT, WATER, OR HEAT. THE GEOTEXTILE SHALL BE FREE OF DEFECTS OR FLAWS WHICH WILL AFFECT ITS PHYSICAL PROPERTIES. PROVIDE A GEOTEXTILE MEETING THE PROPERTIES LISTED IN TABLE 1:

TABLE 1

REQUIRED PHYSICAL PROPERTIES OF GEOTEXTILE FABRIC			
PROPERTY	TEST METHOD	NON-WOVEN	WOVEN
MASS PER UNIT AREA	D 5261	6	N/A
GRAB TENSILE STRENGTH (LBS)	D 4632	170	N/A
TENSILE STRENGTH (LBS/FT)	D 4595	N/A	7200
ELONGATION (%)	D 4632	50	N/A
PUNCTURE STRENGTH (LBS)	D 6241	435	N/A
TRAPEZOID TEAR (LBS)	D 4533	70	N/A
PERMITTIVITY (SEC^{-1})	D 4491	1.50	0.90
WATER FLOW RATE (GPM/FT^2)	D 4491	110	65
ULTRAVIOLET STABILITY (% FOR MIN 500 HRS)	D 4355	70	80
APPARENT OPENING SIZE (AOS) (STANDARD SIEVE)	D 4751	70	20

TABLE NOTES:

1. ALL NUMERICAL VALUES EXCEPT AOS AND ULTRAVIOLET STABILITY REPRESENT MINIMUM AVERAGE ROLL VALUES (MARV), IN THE WEAKER PRINCIPAL DIRECTION.
2. AOS VALUE IS A MAXIMUM AVERAGE ROLL VALUE OR MAXARV.
3. ULTRAVIOLET STABILITY IS MEASURED AS A MINIMUM AVERAGE PERCENTAGE.
4. SEE DETAILS ON DRAWING C-501 FOR LOCATIONS OF WOVEN AND NON-WOVEN GEOTEXTILES.

2.0 BORROW SOURCE TESTING REQUIREMENTS

PRIOR TO USE, BORROW SOURCE TESTING, INCLUDING GEOTECHNICAL CHARACTERIZATION REQUIREMENTS, SHALL BE CONDUCTED ON ALL SOIL MATERIALS PROPOSED FOR CONSTRUCTION AND SUBMITTED TO THE ENGINEER TO ASSESS CONFORMANCE TO MATERIAL SPECIFICATIONS.

3.0 MATERIAL PLACEMENT AND FIELD QUALITY CONTROL REQUIREMENTS

1. FILL MATERIAL SHALL NOT BE PLACED ON SURFACES THAT ARE MUDDY, FROZEN, OR CONTAIN FROST OR ICE.
2. SURFACES ON WHICH THE GEOTEXTILE WILL BE PLACED SHALL BE PREPARED TO A RELATIVELY SMOOTH SURFACE CONDITION. SURFACES SHALL BE FREE FROM OBSTRUCTION, DEBRIS, DEPRESSIONS, EROSION FEATURE, OR VEGETATION. ANY IRREGULARITIES SHALL BE REMOVED SO AS TO ENSURE CONTINUOUS, INTIMATE CONTACT OF THE GEOTEXTILE WITH THE SURFACE. ANY LOOSE MATERIAL, OR SOFT OR LOW DENSITY POCKETS OF MATERIAL, SHALL BE REMOVED, FILLED WITH SUITABLE SUBGRADE FILL, AND COMPACTED. EROSION FEATURES SUCH AS RILLS AND GULLIES MUST BE GRADED OUT OF THE SURFACE BEFORE GEOTEXTILE PLACEMENT.
3. AT THE TIME OF INSTALLATION, FABRIC SHALL BE REJECTED IF IT HAS DEFECTS, RIPS, HOLES, FLAWS, DETERIORATION OR DAMAGE INCURRED DURING MANUFACTURE, TRANSPORT OR STORAGE.
4. FABRIC SHALL LAY SMOOTH AND BE FREE OF TENSION, STRESS, FOLDS, WRINKLES, OR CREASES.
5. CRUSHED STONE FOR ACCESS ROADS SHALL BE PLACED IN MAXIMUM 6-INCH LOOSE LIFTS AND COMPACTED TO A MINIMUM OF 95% OF MAXIMUM DRY DENSITY (MODIFIED PROCTOR (ASTM D 1557)).
6. LOAM BORROW FOR STORMWATER INFILTRATION BEST MANAGEMENT PRACTICES (BMPS) SHALL BE PLACED IN MAXIMUM 6-INCH LOOSE LIFTS AND COMPACTED TO A MINIMUM OF 92% OF MAXIMUM DRY DENSITY (MODIFIED PROCTOR (ASTM D 1557)).

CONCEPTUAL CONSTRUCTION SEQUENCE:

1. ESTABLISHMENT OF LIMITS OF WORK;
2. PLACEMENT OF EROSION CONTROLS;
3. MINOR CLEARING AND GRUBBING AND SITE GRADING;
4. CONSTRUCTION OF ACCESS ROAD;
5. CONSTRUCTION OF THE SOLAR ARRAY AND APPURTENANT EQUIPMENT;
4. RESTORATION OF DISTURBED AREAS;
5. CONSTRUCTION OF STORMWATER INFILTRATION BMPS;
6. ERECTION OF THE PERIMETER FENCE; AND
7. FINAL STABILIZATION OF DISTURBED AREAS.

EROSION AND SEDIMENTATION CONTROL PLAN:

THIS PLAN HAS BEEN DEVELOPED TO PROVIDE A STRATEGY FOR CONTROLLING SOIL EROSION AND SEDIMENTATION DURING AND AFTER CONSTRUCTION OF THE PROPOSED PROJECT.

THIS PLAN IS BASED ON STANDARDS AND SPECIFICATIONS FOR EROSION PREVENTION IN DEVELOPING AREAS AS CONTAINED IN MASSACHUSETTS EROSION AND SEDIMENT CONTROL GUIDELINES FOR URBAN AND SUBURBAN AREAS, 2003.

GENERAL EROSION AND SEDIMENTATION CONSTRUCTION DETAIL NOTES:

DURING CONSTRUCTION, THE CONTRACTOR SHALL TAKE ALL REASONABLE MEASURES TO SCHEDULE EARTHWORK OPERATIONS SUCH THAT THE AREA OF EXPOSED AND DISTURBED SOIL IS MINIMIZED. CONSTRUCTION SHALL BE PHASED TO MINIMIZE THE AREA OF DISTURBED SOIL THAT IS EXPOSED AT ANY ONE TIME. UPGRADIENT STORM WATER DIVERSION AND DISPERSION MEASURES SHALL BE INSTALLED WHERE APPROPRIATE. ALL CUT AND FILL SLOPES SHALL BE STABILIZED UPON COMPLETION. THE FOLLOWING MEASURES WILL BE UNDERTAKEN TO PROVIDE MAXIMUM PROTECTION TO THE SOIL, WATER, AND ABUTTING LANDS:

PRIOR TO GRUBBING OR ANY EARTH MOVING OPERATION, SEDIMENT BARRIERS, OR OTHER APPROPRIATE PERIMETER CONTROL BMPS SHALL BE INSTALLED ACROSS THE SLOPE ON THE CONTOUR AT THE DOWNHILL LIMIT OF THE WORK AS PROTECTION AGAINST CONSTRUCTION RELATED EROSION. INSTALL ALL NECESSARY STORMWATER DIVERSIONS AND DISPERSION MEASURES.

1. PERMANENT SOIL STABILIZATION MEASURES FOR ALL SLOPES, OR ANY DISTURBED LAND AREA SHALL BE COMPLETED WITHIN FOURTEEN CALENDAR DAYS AFTER FINAL GRADING HAS BEEN COMPLETED. WHEN IT IS NOT POSSIBLE OR PRACTICAL TO PERMANENTLY STABILIZE DISTURBED LAND, TEMPORARY EROSION CONTROL MEASURES SHALL BE IMPLEMENTED ON DISTURBED AREAS (INCLUDING STOCKPILES) WITHIN FOURTEEN CALENDAR DAYS OF EXPOSURE OF SOIL OR FORMATION OF PILES, UNLESS THESE AREAS ARE TO BE SUBSEQUENTLY SURFACED WITH PERMANENT STRUCTURES. ALL DISTURBED AREAS SHALL BE MULCHED FOR EROSION CONTROL UPON COMPLETION OF ROUGH GRADING.
2. ANY EXPOSED SLOPES 3:1 OR GREATER SHALL BE STABILIZED WITH EROSION CONTROL BLANKETS (NORTH AMERICAN GREEN C125BN OR APPROVED EQUAL) TO PREVENT EROSION DURING CONSTRUCTION AND TO FACILITATE REVEGETATION AFTER TOPSOILING AND SEEDING.
3. EXISTING TOPSOIL SHALL BE SAVED, STOCKPILED, AND REUSED AS MUCH AS POSSIBLE ON SITE. SEDIMENT BARRIER SHALL BE INSTALLED AT THE BASE OF STOCKPILES AT THE DOWNHILL LIMIT TO PROTECT AGAINST EROSION. STOCKPILES ANTICIPATED TO REMAIN FOR MORE THAN 14 CALENDAR DAYS SHALL BE STABILIZED BY SEEDING AND MULCHING UPON FORMATION OF THE PILES. UPGRADIENT OF THE STOCKPILES, STABILIZED DITCHES AND/OR BERMS SHALL BE CONSTRUCTED TO DIVERT STORMWATER RUNOFF AWAY FROM THE PILES.
4. INTERCEPTED SEDIMENT SHALL BE REMOVED WHEN IT REACHES ONE-HALF THE HEIGHT OF THE SEDIMENT BARRIER, OR AS DIRECTED IN THE DRAWING DETAILS FOR OTHER BMPS, AND SHALL BE DEPOSITED IN AN AREA THAT SHALL NOT CONTRIBUTE TO SEDIMENT OFF-SITE AND CAN BE PERMANENTLY STABILIZED. ALL DAMAGED EROSION CONTROL DEVICES SHALL BE REPAIRED AND/OR REPLACED IMMEDIATELY. DEVICES NO LONGER SERVICEABLE DUE TO SEDIMENT ACCUMULATION SHALL ALSO BE REPAIRED AND/OR REPLACED AS REQUIRED.
5. ADDITIONAL EROSION CONTROL METHODS SHALL BE IMPLEMENTED IF CONSTRUCTION OCCURS BETWEEN NOVEMBER 1ST AND APRIL 15TH. ALL DISTURBED AREAS SHALL BE MINIMIZED TO THE EXTENT POSSIBLE. PRIOR TO FREEZING, ADDITIONAL EROSION CONTROL DEVICES SHALL BE INSTALLED AS APPROPRIATE. INSPECTION OF THESE EROSION CONTROL ITEMS SHALL BE FREQUENT, WITH PARTICULAR ATTENTION PAID TO WEATHER PREDICTIONS TO ENSURE THAT THESE MEASURES ARE PROPERLY IN PLACE TO HANDLE LARGE QUANTITIES OF RUNOFF RESULTING FROM HEAVY RAINS OR EXCESSIVE THAWS.
6. GENERAL EROSION AND SEDIMENTATION CONTROL ACTIONS SHALL BE EMPLOYED, INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
   - MARK SOIL DISTURBANCE LIMITS
   - INSTALL SEDIMENT BARRIERS BEFORE DISTURBING ANY SOILS
   - DIVERT AND DISPERSE STORM WATER RUNOFF TO UNDISTURBED AREAS WHEREVER POSSIBLE
   - MULCH DISTURBED AREAS
   - PROTECT STEEP SLOPES
   - INSPECT AND REPAIR EROSION CONTROLS AND SEDIMENT BARRIERS

DUST CONTROL:

1. CONSTRUCTION ACTIVITIES SHALL BE SCHEDULED TO MINIMIZE THE AREA OF DISTURBED SOIL THAT IS EXPOSED AT ONE TIME.
2. DUST CONTROL SHALL BE USED ON CONSTRUCTION ROUTES AND OTHER DISTURBED AREAS SUBJECT TO SURFACE DUST MOVEMENT AND DUST BLOWING.
3. MAINTAIN DUST CONTROL MEASURES PROPERLY THROUGH DRY WEATHER PERIODS UNTIL ALL DISTURBED AREAS HAVE BEEN PERMANENTLY STABILIZED.
4. DUST CONTROL METHODS SHALL BE APPROVED BY THE ENGINEER AND MAY INCLUDE VEGETATIVE COVER, MULCH (INCLUDING GRAVEL MULCH), SPRINKLING, STONE, AND BARRIERS.
5. VEGETATIVE COVER - FOR DISTURBED AREAS NOT SUBJECT TO TRAFFIC, VEGETATION PROVIDES THE MOST PRACTICAL METHOD OF DUST CONTROL.
6. MULCH (INCLUDING GRAVEL MULCH) - WHEN PROPERLY APPLIED, MULCH OFFERS A FAST, EFFECTIVE MEANS OF CONTROLLING DUST. SEE MANUFACTURER'S RECOMMENDATIONS OR THE MASSACHUSETTS EROSION AND SEDIMENT CONTROL GUIDELINES FOR URBAN AND SUBURBAN AREAS, 2003 FOR APPLICATION RATES.
7. SPRINKLING - EXPOSED SOILS MAY BE SPRINKLED UNTIL THE SURFACE IS WET. SPRINKLING IS ESPECIALLY EFFECTIVE FOR DUST CONTROL ON HAUL ROADS AND OTHER TRAFFIC ROUTES.
8. STONE - USED TO STABILIZE CONSTRUCTION ROADS; CAN ALSO BE EFFECTIVE FOR DUST CONTROL.
9. BARRIERS - A BOARD FENCE, WIND FENCE, SEDIMENT FENCE, OR SIMILAR BARRIER CAN CONTROL AIR CURRENTS AND BLOWING SOIL. ALL OF THESE FENCES ARE NORMALLY CONSTRUCTED OF WOOD AND THEY PREVENT EROSION BY OBSTRUCTING THE WIND NEAR THE GROUND AND PREVENTING THE SOIL FROM BLOWING OFFSITE.

MONITORING PROGRAM:

1. EROSION AND SEDIMENTATION CONTROLS SHALL BE INSPECTED AT LEAST ONCE EVERY 7 CALENDAR DAYS AND WITHIN 24 HOURS OF THE END OF A STORM EVENT OF 0.25 INCHES OR GREATER. DAILY RAINFALL SHALL BE MONITORED AND RECORDED BY THE CONTRACTOR. ALL STRUCTURES DAMAGED BY CONSTRUCTION EQUIPMENT, VANDALS, OR THE ELEMENTS SHALL BE REPAIRED OR REPLACED IMMEDIATELY, PRIOR TO CONTINUING THE CONSTRUCTION.
2. FOLLOWING THE FINAL SEEDING, THE SITE SHALL BE INSPECTED IN ACCORDANCE WITH THE SCHEDULE OUTLINED IN #1 ABOVE, TO ENSURE THAT THE VEGETATION HAS BEEN ESTABLISHED (90% COVER ACHIEVED). IN THE EVENT OF ANY UNSATISFACTORY GROWTH, RESEEDING WILL BE CARRIED OUT, WITH FOLLOW-UP INSPECTION.
3. AFTER THE CONSTRUCTION INSPECTOR HAS DETERMINED THAT THE PROJECT AREA HAS BEEN PERMANENTLY STABILIZED (70% COVER HAS BEEN ACHIVED OR NON-VEGETATED MEASURES HAVE BEEN IMPLEMENTED), THE CONTRACTOR SHALL REMOVE ALL SEDIMENT BARRIERS, TEMPORARY SEDIMENTATION CONTROL RISERS AND ANY OTHER TEMPORARY EROSION CONTROL MEASURES.

SEEDING AND REVEGETATION PLAN:

IMMEDIATELY FOLLOWING THE COMPLETION OF TREE CLEARING, ALL DISTURBED AREAS SHALL BE TREATED AS STATED BELOW IN ORDER TO MINIMIZE CONSTRUCTION-PERIOD EROSION.

APPLY SEED/TACKIFIER MIX ACCORDING TO THE FOLLOWING SPECIFICATIONS:

1. SEED: ERNST SEEDS QUICK EROSION CONTROL COVER MIX CONSISTING OF (% BY WEIGHT):
   - 50% LOLIUM MULTIFLORUM (ANNUAL RYEGRASS)
   - 50% LOLIUM PERENNE, 'BIGLEAGUE' (PERENNIAL RYEGRASS, 'BIGLEAGUE')

   1.1. SEEDING RATE: 50 LBS PER ACRE
2. TACKIFIER: GEOPERM BONDED FIBER MATRIX (OR APPROVED EQUAL) APPLIED PER MANUFACTURER SPECIFICATIONS.

UPON COMPLETION OF SITE CONSTRUCTION, ALL AREAS PREVIOUSLY DISTURBED WITHIN THE FENCED AREA SHALL BE TREATED AS STATED BELOW. THESE AREAS WILL BE CLOSELY MONITORED BY THE CONTRACTOR UNTIL SUCH TIME AS A SATISFACTORY GROWTH OF VEGETATION IS ESTABLISHED. SATISFACTORY GROWTH SHALL MEAN A MINIMUM OF 90% OF THE AREA IS VEGETATED WITH VIGOROUS GROWTH.

1. TOPSOIL WILL BE SPREAD OVER ALL DISTURBED AREAS TO BE REVEGETATED AND SHALL BE GRADED TO A UNIFORM DEPTH OF FOUR (4) TO SIX (6) INCHES.
2. APPLY SEED AS DIRECTED BY THE OWNER AND FARMER OF THE LAND TO MAINTAIN HAY PRODUCTION AND RESTORE SITE TO PRE-EXISTING CONDITIONS TO THE MAXIMUM EXTENT PRACTICABLE.
3. SEEDING METHODS MAY BE DRILL SEEDINGS, BROADCASTS AND ROLLED, CULTIPACKED, OR TRACKED WITH A SMALL TRACK PIECE OF CONSTRUCTION EQUIPMENT, OR HYDRO-SEEDING, WITH SUBSEQUENT TRACKING.
4. WATERING MAY BE REQUIRED DURING DRY PERIODS, THE CONTRACTOR MUST CONSULT SEED MANUFACTURER'S INSTRUCTIONS.
5. INSPECT SEEDED AREAS FOR FAILURE AND MAKE NECESSARY REPAIRS AND RESEED IMMEDIATELY. CONDUCT A FOLLOW-UP SURVEY AFTER ONE YEAR AND RESEED WHERE NECESSARY.
6. ALL SEDIMENT CONTROL STRUCTURES LOCATED DOWN GRADIENT OF SOILS STABILIZED BY VEGETATIVE MEASURES SHALL REMAIN IN PLACE UNTIL VEGETATION IS ESTABLISHED. ESTABLISHED MEANS A MINIMUM OF 70% OF THE AREA IS VEGETATED WITH VIGOROUS GROWTH.

UPON COMPLETION OF SITE CONSTRUCTION, ALL AREAS PREVIOUSLY DISTURBED OUTSIDE THE FENCED AREA SHALL BE TREATED AS STATED BELOW. THESE AREAS WILL BE CLOSELY MONITORED BY THE CONTRACTOR UNTIL SUCH TIME AS A SATISFACTORY GROWTH OF VEGETATION IS ESTABLISHED. SATISFACTORY GROWTH SHALL MEAN A MINIMUM OF 90% OF THE AREA IS VEGETATED WITH VIGOROUS GROWTH.

1. APPLY SEED AS DIRECTED BELOW:

   (APRIL 1ST THROUGH OCTOBER 1ST)

   - SEED DISTURBED AREAS AT THE RATE OF 30 LBS PER ACRE OF ERNST SEEDS NORTHEAST SOLAR POLLINATOR 4' MIX CONSISTING OF (% BY WEIGHT):
     - 35% BOUTELOUA CURTIPENDULA, BUTTE (SIDEOATS GRAMA, BUTTE)
     - 35% SCHIZACHYRIUM SCOPARIUM, 'CAMPER' (LITTLE BLUESTEM, 'CAMPER')
     - 10% PANICUM SPHAERONCARPON (ROUNDSEED PANICGRASS)
     - 4% ASCLEPIAS TUBEROSA (BUTTERFLY MILKWEED)
     - 4% CHAMAECRISTA FASCICULATA, PA ECOTYPE (PARTRIDGE PEA, PA ECOTYPE)
     - 4% COREOPSIS LANCEOLATA (LANCELEAF COREOPSIS)
     - 4% RUDBECKIA HIRTA (BLACKEYED SUSAN)
     - 0.9% PYCNANTHEMUM TENUIFOLIUM (NARROWLEAF MOUNTAINMINT)
     - 0.7% ASTER OBLONGIFOLIUS, (AROMATIC ASTER, PA ECOTYPE)
     - 0.5% ASTER PRENANTHOIDES, PA ECOTYPE (ZIGZAG ASTER, PA ECOTYPE)
     - 0.5% PENSTEMON DIGITALIS (TALL WHITE BEARDTONGUE)
     - 0.5% TRADESCANTIA OHIENSIS (OHIO SPIDERWORT, PA ECOTYPE)
     - 0.5% ZIZIA AUREA (GOLDEN ALEXANDERS)
     - 0.3% OENOTHERA FRUTICOSA VAR. FRUTICOSA (SUNDROPS)
     - 0.1% SOLIDAGO NEMORALIS, PA ECOTYPE (GRAY GOLDENROD, PA ECOTYPE)
   - APPLY WOOD FIBER MULCH AT A RATE OF 2,000 LBS PER ACRE FOR MAXIMUM MOISTURE RETENTION.
   - SEEDING SHALL HAVE A MINIMUM GERMINATION PERCENTAGE OF 85%.

   (NOVEMBER 1ST THROUGH DECEMBER 15TH)

   - SEED DISTURBED AREAS AT THE RATE OF 3 LBS PER 1,000 SQ. FT. OF WINTER RYE
   - APPLY HAY MULCH AT THE RATE OF 100 LBS PER 1,000 SQ. FT.

   (AFTER DECEMBER 15TH)

   - DO NOT SEED.
   - APPLY HAY MULCH AT THE RATE OF 100 LBS PER 1,000 SQ. FT.
2. SEEDING METHODS MAY BE DRILL SEEDINGS, BROADCASTS AND ROLLED, CULTIPACKED, OR TRACKED WITH A SMALL TRACK PIECE OF CONSTRUCTION EQUIPMENT, OR HYDRO-SEEDING, WITH SUBSEQUENT TRACKING.
3. WATERING MAY BE REQUIRED DURING DRY PERIODS CONSULT SEED MANUFACTURER'S INSTRUCTIONS.
4. INSPECT SEEDED AREAS FOR FAILURE AND MAKE NECESSARY REPAIRS AND RESEED IMMEDIATELY. CONDUCT A FOLLOW-UP SURVEY AFTER ONE YEAR AND RESEED WHERE NECESSARY.
5. ALL SEDIMENT CONTROL STRUCTURES LOCATED DOWN GRADIENT OF SOILS STABILIZED BY VEGETATIVE MEASURES SHALL REMAIN IN PLACE UNTIL VEGETATION IS ESTABLISHED. ESTABLISHED MEANS A MINIMUM OF 70% OF THE AREA IS VEGETATED WITH VIGOROUS GROWTH.

AGRIVOLTAICS SPECIFICS:

1. REMOVE TOPSOIL IN AREAS OF PROPOSED GRADING TO ACHIEVE REQUIRED RACKING SYSTEM SLOPES. STOCKPILE TOPSOIL SEPERATELY TO AVOID MIXING WITH OTHER SOILS AND INVERTING SOIL LAYERS. LOAM AND SEED DISTURBED AREAS WITH TEMPORARY SEEDING AND INSTALL INTERMEDIATE EROSION CONTROL MEASURES PARALLEL TO THE SLOPES IMMEDIATELY FOLLOWING COMPLETION OF GRADING.
2. TOPSOIL SHALL NOT BE MIXED WITH SUBGRADE MATERIALS. TOPSOIL SHALL NOT BE BURIED. NO TOPSOIL SHALL LEAVE THE SITE. CONTRACTOR SHALL EMPLOY BEST MANAGEMENT PRACTICES TO ENSURE NO INVERSION OF TOPSOIL AND PROVIDE DECOMPACTION FOR FUTURE SOIL PRESERVATION.
3. APPLY NPK FERTILIZER AND LIMESTONE (EQUIVALENT TO 50% CALCIUM PLUS MAGNESIUM OXIDE) AT MANUFACTURER'S RECOMMENDED RATES. FINE GRADE, LOAM DISTURBED AREAS AS NECESSARY AND SEED SITE FOLLOWING INSTALLATION OF PANELS. DISTURBED AREAS SHALL BE TREATED WITH SUFFICIENT TOPSOIL/LOAM TO PROMOTE VEGETATION GROWTH FOR STABILIZATION IN ACCORDANCE WITH THE NOTES IN THIS PLAN. DISTURBED AREAS SHALL BE RAKED AND SURFACE STONES LARGER THAN 6" SHALL BE REMOVED PRIOR TO PLACEMENT OF SEED.
4. REVEGETATION MEASURES WILL COMMENCE UPON COMPLETION OF CONSTRUCTION EXCEPT AS NOTED. ALL DISTURBED AREAS NOT OTHERWISE STABILIZED SHALL BE GRADED, SMOOTHED, AND PREPARED FOR FINAL SEEDING AS FOLLOWS:

   4.1. INTER-ROW AREAS SHALL BE DECOMPACTED TO A DEPTH OF 12", REMOVING STONES GREATER THAN 3" AND WOOD DEBRIS. ENSURE PROTECTIONS OF BURIED CONDUIT DURING DECOMPACTION.

   4.2. ANY TOPSOIL TO BE PLACED FOR REVEGETATION MEASURES (WHETHER SCREENED ON-SITE OR IMPORTED) SHALL HAVE A SANDY LOAM TEXTURE RELATIVELY FREE OF SUBSOIL MATERIAL, STONES, ROOTS, LUMPS OF SOIL, TREE LIMBS, TRASH OR CONSTRUCTION DEBRIS, AND SHALL BE PLACED TO A DEPTH OF FOUR (4) INCHES ON ALL LOAM AND SEED AREAS OR AS SPECIFIED ON THE DRAWINGS.

   4.3. APPLY FERTILIZER AND/OR LIMESTONE (EQUIVALENT TO 50% CALCIUM PLUS MAGNESIUM OXIDE) AT MANUFACTURER'S RECOMMENDED RATES.

   4.4. THE DESIGN MIXES FOR SEEDING SHALL BE IN ACCORDANCE WITH THE SEED MIX TABLES AS SHOWN IN THIS PLAN. THE SEED MIX SHALL BE INOCULATED WITHIN TWENTY-FOUR (24) HOURS, BEFORE MIXING AND PLANTING, WITH APPROPRIATE INOCULUM FOR EACH VARIETY. (ALTERNATIVE SEED MIXES SHALL BE APPROVED BY THE OWNER AND ENGINEER PRIOR TO CONSTRUCTION).

ISSUED FOR PERMITTING/NOT FOR CONSTRUCTION

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FAX: (978) 692-6633
WEB: WWW.WSP.COM

REVISION	DATE	ISSUE / REVISION DESCRIPTION	ISSUED	APPROVED
0	08/23/2025	ISSUED FOR PERMITTING/NOT FOR CONSTRUCTION	MRB	OAC
1	10/21/2025	RESVISED PER TOWN OF WORTHINGTON PLANNING BOARD COMMENTS	MRB	OAC
2	12/23/2025	RESPONSE TO COMMENTS	MRB	DRAFT

PROJECT:
2.0 MW AC GROUND-MOUNT SOLAR PV DEVELOPMENT
190 RIDGE ROAD
WORTHINGTON, MA 01098

TITLE:
CONSTRUCTION, EROSION, AND SEDIMENTATION CONTROL NOTES

CLIENT:
BWC WADES STREAM, LLC

SEAL:
DRAFT

DESIGNED BY: OAC	DRAWN BY: MRB
CHECKED BY: APV	SCALE: AS SHOWN
PROJECT NUMBER: US-EI-365230438	
DRAWING NUMBER: **G-001**	
SHEET NUMBER: **1 OF 10**	

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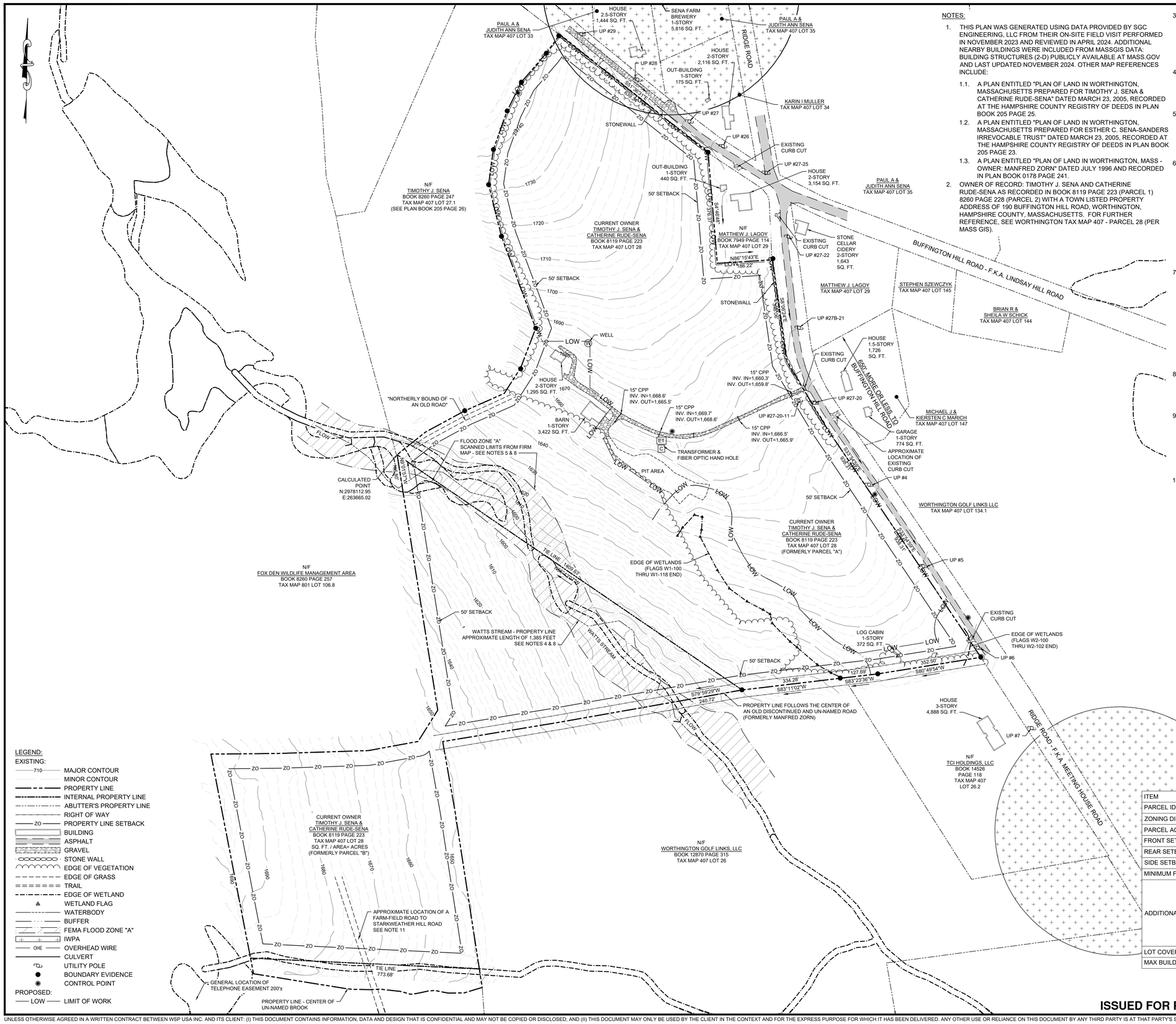

LEGEND:

EXISTING:

- MAJOR CONTOUR
- MINOR CONTOUR
- PROPERTY LINE
- INTERNAL PROPERTY LINE
- ABUTTER'S PROPERTY LINE
- RIGHT OF WAY
- PROPERTY LINE SETBACK
- BUILDING
- ASPHALT
- GRAVEL
- STONE WALL
- EDGE OF VEGETATION
- EDGE OF GRASS
- TRAIL
- EDGE OF WETLAND
- WETLAND FLAG
- WATERBODY
- BUFFER
- FEMA FLOOD ZONE "A"
- IWPA
- OVERHEAD WIRE
- CULVERT
- UTILITY POLE
- BOUNDARY EVIDENCE
- CONTROL POINT

PROPOSED:

- LIMIT OF WORK

NOTES:

1. THIS PLAN WAS GENERATED USING DATA PROVIDED BY SGC ENGINEERING, LLC FROM THEIR ON-SITE FIELD VISIT PERFORMED IN NOVEMBER 2023 AND REVIEWED IN APRIL 2024. ADDITIONAL NEARBY BUILDINGS WERE INCLUDED FROM MASSGIS DATA: BUILDING STRUCTURES (2-D) PUBLICLY AVAILABLE AT MASS.GOV AND LAST UPDATED NOVEMBER 2024. OTHER MAP REFERENCES INCLUDE:
   - 1.1. A PLAN ENTITLED "PLAN OF LAND IN WORTHINGTON, MASSACHUSETTS PREPARED FOR TIMOTHY J. SENA & CATHERINE RUDE-SENA" DATED MARCH 23, 2005, RECORDED AT THE HAMPSHIRE COUNTY REGISTRY OF DEEDS IN PLAN BOOK 205 PAGE 25.
   - 1.2. A PLAN ENTITLED "PLAN OF LAND IN WORTHINGTON, MASSACHUSETTS PREPARED FOR ESTHER C. SENA-SANDERS IRREVOCABLE TRUST" DATED MARCH 23, 2005, RECORDED AT THE HAMPSHIRE COUNTY REGISTRY OF DEEDS IN PLAN BOOK 205 PAGE 23.
   - 1.3. A PLAN ENTITLED "PLAN OF LAND IN WORTHINGTON, MASS - OWNER: MANFRED ZORN" DATED JULY 1996 AND RECORDED IN PLAN BOOK 0178 PAGE 241.
2. OWNER OF RECORD: TIMOTHY J. SENA AND CATHERINE RUDE-SENA AS RECORDED IN BOOK 8119 PAGE 223 (PARCEL 1) 8260 PAGE 228 (PARCEL 2) WITH A TOWN LISTED PROPERTY ADDRESS OF 190 BUFFINGTON HILL ROAD, WORTHINGTON, HAMPSHIRE COUNTY, MASSACHUSETTS. FOR FURTHER REFERENCE, SEE WORTHINGTON TAX MAP 407 - PARCEL 28 (PER MASS GIS).
3. HORIZONTAL DATUM IS BASED ON MASSACHUSETTS STATE GRID COORDINATE SYSTEM NAD83 (2011 - MAINLAND). VERTICAL DATUM IS REFERENCED TO NAVD 88. TOPOGRAPHY SHOWN WAS DEVELOPED UTILIZING THE MOST UP TO DATE ONLINE ELECTRONIC LIDAR FILES FROM NGS, IN COMBINATION WITH ON THE GROUND DATA COLLECTION WITH SURVEY GRADE GPS AND OR ROBOTIC TOTAL STATION. CONTOUR INTERVAL SHOWN ON PLAN IS 2 FOOT.
4. BUILDING STORY HEIGHTS WERE OBTAINED FROM PUBLICLY AVAILABLE PROPERTY RECORD CARDS AND GOOGLE IMAGERY. AN AVERAGE STORY IS APPROXIMATELY 10 FEET TALL FLOOR TO FLOOR AND ROOFING CAN PROVIDE AN ADDITIONAL AVERAGE 3 TO 7 FEET TO THE TOTAL BUILDING HEIGHT.
5. THE WETLANDS SHOWN ON THIS PLAN WERE REVIEWED, DEFINED, AND FLAGGED BY OTHERS AND FIELD LOCATED BY SGC ENGINEERING DATED NOVEMBER 22, 2023. ADDITIONAL WETLANDS SHOWN WITHOUT BUFFERS WERE INCLUDED FROM MASSGIS DATA: NATIONAL WETLANDS INVENTORY PUBLICLY AVAILABLE AT MASS.GOV AND LAST UPDATED SEPTEMBER 2025.
6. A PREDOMINATE PORTION OF THE PROPERTY LIES WITHIN ZONE "X" AND THE PROPOSED SOLAR DEVELOPMENT IS NOT AFFECTED (SEE PLAN). A SMALL CENTRAL PORTION OF THE LOCUS PARCEL IS AFFECTED BY ZONE "A" AND IS CATEGORIZED AS A SPECIFIED FLOOD HAZARD ZONE. FOR FURTHER REFERENCE SEE F.I.R.M. - FLOOD INSURANCE RATE MAP - COMMUNITY PANEL NUMBER 250175 0008 SUFFIX B / MAP NUMBER 8 OF 25 FOR THE TOWN OF WORTHINGTON, HAMPSHIRE COUNTY (ALL JURISDICTIONS), MASSACHUSETTS, WITH AN EFFECTIVE DATE OF JUNE 19, 1989. ZONE "A" (WATTS STREAM SO-CALLED) IS DESCRIBED AS AN AREA THAT NO BASE FLOOD ELEVATION HAS BEEN DETERMINED. THE BASE FLOOD ELEVATION IS THE WATER SURFACE ELEVATION OF THE 1% ANNUAL CHANCE FLOOD. ZONE "X" IS DETERMINED AS AREAS OUTSIDE 500 - YEAR FLOOD PLAIN.
7. NEITHER SGC ENGINEERING, LLC NOR WSP HAVE INDEPENDENTLY VERIFIED THE LOCATION, EXISTENCE, AND SERVICEABILITY OF ANY UTILITIES AND MAKE NO GUARANTEE TO THE COMPLETENESS OR THE ACCURACY OF ANY UTILITIES SHOWN ON THIS PLAN. UTILITIES SHOWN WERE FIELD LOCATED ABOVEGROUND AND VISUAL, AND OR REFERENCED FROM PLANS AND MAP REFERENCES. ADDITIONAL UTILITIES MAY EXIST IN THE FIELD, WHICH ARE NOT SHOWN ON THIS PLAN. ACTUAL LOCATIONS MUST BE DETERMINED IN THE FIELD PRIOR TO EXCAVATION OR OTHER CONSTRUCTION ACTIVITIES. CALL "DIG SAFE" AT 1-888-344-7233 OR DIAL 811. SGC ENGINEERING, LLC AND WSP USA INC. ASSUME NO RESPONSIBILITY FOR DAMAGES INCURRED AS A RESULT OF UTILITIES OMITTED OR INACCURATELY SHOWN ON THIS PLAN.
8. THIS SURVEY WAS PREPARED FOR THE EXCLUSIVE USE OF THE PERSON, PERSONS, OR ENTITY NAMED IN THE CERTIFICATION AND TITLE BLOCK OF THIS PLAN. THIS SURVEY DOES NOT EXTEND TO ANY UNNAMED PERSON, PERSONS, OR ENTITY WITHOUT HAVING SGC ENGINEERING'S CONSENT IN WRITING.
9. THE LOCATIONS OF THE WATTS STREAM, WITHIN PARCEL "A" (SO CALLED), AND AN UN-NAMED BROOK, THAT DEMARCATES A WESTERLY BOUNDARY LINE OF PARCEL "B", ARE BOTH BASED ON PHYSICAL FIELD EVIDENCE, DEED CALLS, AND OR PLANS OF RECORD AT TIME OF SURVEY. BOTH WATTS STREAM AND THE UN-NAMED BROOK MAY OR MAY NOT AFFECT THE PRESENT - FUTURE PROPERTY DUE TO AVULSION, ACCRETION, AND/OR RELICTION.
10. OBSERVATIONS OF THE PREMISES BY SGC IN NOVEMBER 2023:
    - 10.a. LOCUS PARCEL HAS FREE AND CLEAR ACCESS, IN AND TO BUFFINGTON HILL ROAD AND RIDGE ROAD AS SHOWN ON PLAN. BOTH ROADS ARE DEDICATED AND PUBLIC WAYS OF VARIABLE WIDTHS.
    - 10.b. THE LOCUS PARCEL IS THE SAME LAND AS DESCRIBED IN THE TITLE COMMITMENT AS EXHIBIT "A".
    - 10.c. NO EVIDENCE OF EARTH MOVING WORK, BUILDING CONSTRUCTION, AND BUILDING ADDITIONS WERE OBSERVED ON SURVEYED PREMISES.
    - 10.d. THE PROPERTY COMPRISES A SINGLE TAX LOT - TOWN OF WORTHINGTON TAX MAP NUMBER 407 PARCEL 28.
    - 10.e. NO EVIDENCE WAS NOTICED OF THE SITE BEING USED AS A SOLID WASTE DUMP.

ITEM	REQUIRED		PROPOSED
PARCEL ID NUMBER(S)	TAX MAP 407 0 28		
ZONING DISTRICT	RESIDENTIAL - AGRICULTURAL DISTRICT		
PARCEL ACREAGE	2.0		71.6
FRONT SETBACK (FT)	50		50
REAR SETBACK (FT)	50		>500
SIDE SETBACK (FT)	50		50
MINIMUM FRONTAGE (FT)	400		1542
ADDITIONAL SETBACKS	ACCESS TO SIDE-REAR (FT)	25	>400
	ACCESS EASEMENT (FT)	15	-
	UTILITY EASEMENT (FT)	20	-
	LEASE TO FENCE (FT)	25	-
	LEASE TO BASINS (FT)	15	-
	WETLANDS (FT)	100	-
LOT COVERAGE	<50%		7.7%
MAX BUILDING HEIGHT (FT)	35		10

0' 75' 150' 225'

1" = 150' WHEN PLOTTED 24" X 36"

ISSUED FOR PERMITTING/NOT FOR CONSTRUCTION

WSP USA INC.
100 APOLLO DRIVE, SUITE 302
CHELMSFORD MASSACHUSETTS 01824
TELEPHONE: (978) 692-9090
FAX: (978) 692-6633
WEB: WWW.WSP.COM

REVISION	DATE	ISSUE / REVISION DESCRIPTION	ISSUED	APPROVED
2	12/23/2025	RESPONSE TO COMMENTS RESVISED PER TOWN OF WORTHINGTON PLANNING BOARD COMMENTS ISSUED FOR PERMITTING/NOT FOR CONSTRUCTION	MRB	DRAFT
1	10/21/2025		MRB	OAC
0	09/23/2025		MRB	OAC

PROJECT:
2.0 MW AC GROUND-MOUNT SOLAR DEVELOPMENT
190 RIDGE ROAD
WORTHINGTON, MA 01098

TITLE:
EXISTING CONDITIONS

CLIENT:
BWC WADES STREAM, LLC

SEAL:
DRAFT

DESIGNED BY: OAC	DRAWN BY: MRB
CHECKED BY: APV	SCALE: AS SHOWN
PROJECT NUMBER:	US-EI-365230438
DRAWING NUMBER:	V-101
SHEET NUMBER:	2 OF 10

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NOTES:

1. ELECTRICAL DESIGN, INCLUDING UTILITY POLES, PERFORMED BY OTHERS. ELECTRICAL EQUIPMENT AND COMPONENTS SHOWN TO ILLUSTRATE LOCATIONS ONLY. REFER TO ELECTRICAL DRAWINGS FOR DETAILED ELECTRICAL SYSTEM.
2. ALL AREAS WITHIN LIMIT OF DISTURBANCE TO BE SEEDED AS SPECIFIED IN THE SEEDING & REVEGETATION PLAN ON SHEET G-001.

LEGEND:

EXISTING:
- 710 MAJOR CONTOUR
- MINOR CONTOUR
- PROPERTY LINE
- INTERNAL PROPERTY LINE
- ABUTTER'S PROPERTY LINE
- RIGHT OF WAY
- ZO PROPERTY LINE SETBACK
- BUILDING
- ASPHALT
- GRAVEL
- STONE WALL
- EDGE OF VEGETATION
- EDGE OF GRASS
- TRAIL
- EDGE OF WETLAND
- WETLAND FLAG
- WATERBODY
- BUFFER
- FEMA FLOOD ZONE "A"
- IWPA
- OHE OVERHEAD WIRE
- CULVERT
- UTILITY POLE
- BOUNDARY EVIDENCE
- CONTROL POINT

PROPOSED:
- LOW LIMIT OF WORK
- 1670 MAJOR CONTOUR
- MINOR CONTOUR
- FIXED KNOT GAME FENCE (10 C-501, 17 C-502)
- DOUBLE SWING GATE (7,11 C-501)
- SLIDING GATE (9 C-501)
- OHE OVERHEAD ELECTRIC
- SB SEDIMENT BARRIER (4 C-501)
- EROSION CONTROL BLANKET (18 C-503)
- EC ELECTRICAL CONDUIT (2 C-501)
- ACCESS ROAD (1 C-501)
- CONCRETE PAD (6 C-501)
- SOLAR PV ARRAY (8 C-501)
- UTILITY POLE
- CULVERT (3 C-501)
- INFILTRATION TRENCH (13 C-502)
- PERVIOUS BERM (13 C-502)
- VEGETATED FILTER STRIP (13 C-502)
- CONVEYANCE CHANNEL (16 C-502)
- RIPRAP APRON (14,15 C-502)
- LANDSCAPE SCREENING (19,20 C-503)

SYSTEM SIZE (MWDC; MWAC)	3.76 MWDC; 1.99 MWAC
PANEL COUNT (# OF PANELS)	6,480
PANEL SELECTION	HANWHA Q.CELL 580W
GROUND COVERAGE RATIO	19.5%
INTER-ROW SPACING (FT)	18.00
PITCH (FT)	
PROPOSED PANEL HEIGHT (FT)	16.0
LIMIT OF WORK AREA (ACRES)	29.15
VEGETATION CLEARING AREA (ACRES)	0.00
FENCED AREA (ACRES)	25.49
TOTAL EXISTING IMPERVIOUS AREA (SQFT)	42,040
TOTAL PROPOSED IMPERVIOUS AREA (SQFT)	58,527
TOTAL PROPOSED GRAVEL ROAD AREA (SQFT)	25,187
TOTAL ACCESS ROAD LENGTH (FT)	159.74
UTILITY MV RUN LENGTH (FT)	696
EQUIPMENT PAD AREA (SQFT)	4,000
WETLAND IMPACTS (SQFT)	0
EXISTING LAND USE	AGRICULTURAL
PROPOSED DUAL USE	AGRICULTURAL / INDUSTRIAL

ISSUED FOR PERMITTING/NOT FOR CONSTRUCTION

0' 50' 100' 150'
1" = 100' WHEN PLOTTED 24" X 36"

WSP USA INC.
100 APOLLO DRIVE, SUITE 302
CHELMSFORD MASSACHUSETTS 01824
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FAX: (978) 692-6633
WEB: WWW.WSP.COM

REVISION	DATE	ISSUE / REVISION DESCRIPTION	ISSUED	APPROVED
2	12/23/2025	RESPONSE TO COMMENTS	MRB	DRAFT
1	10/21/2025	RESVISED PER TOWN OF WORTHINGTON PLANNING BOARD COMMENTS	MRB	OAC
0	09/23/2025	ISSUED FOR PERMITTING/NOT FOR CONSTRUCTION	MRB	OAC

PROJECT:
2.0 MW AC GROUND-MOUNT SOLAR PV DEVELOPMENT
190 RIDGE ROAD
WORTHINGTON, MA 01098

TITLE:
PROPOSED CONDITIONS

CLIENT:
BWC WADES STREAM, LLC

SEAL:
DRAFT

DESIGNED BY: OAC	DRAWN BY: MRB
CHECKED BY: APV	SCALE: AS SHOWN

PROJECT NUMBER: US-EI-365230438

DRAWING NUMBER: **C-102**

SHEET NUMBER: **4 OF 10**

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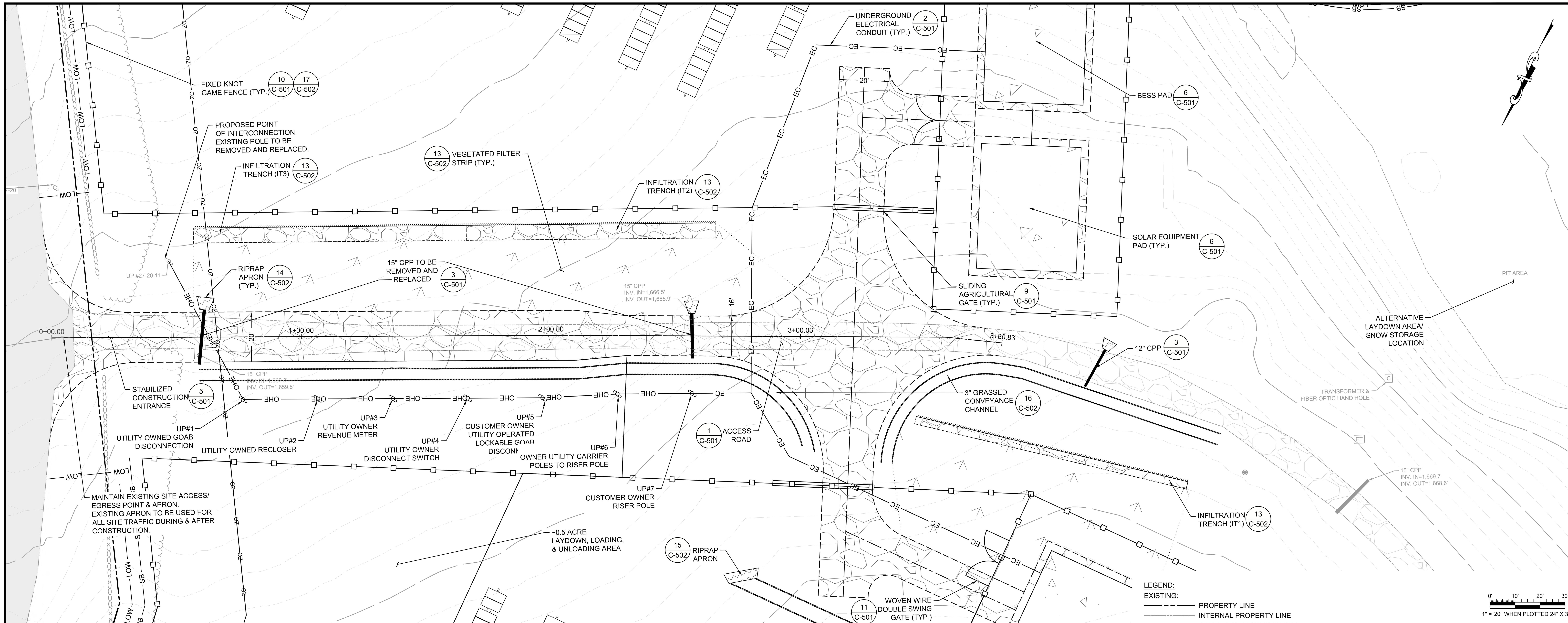

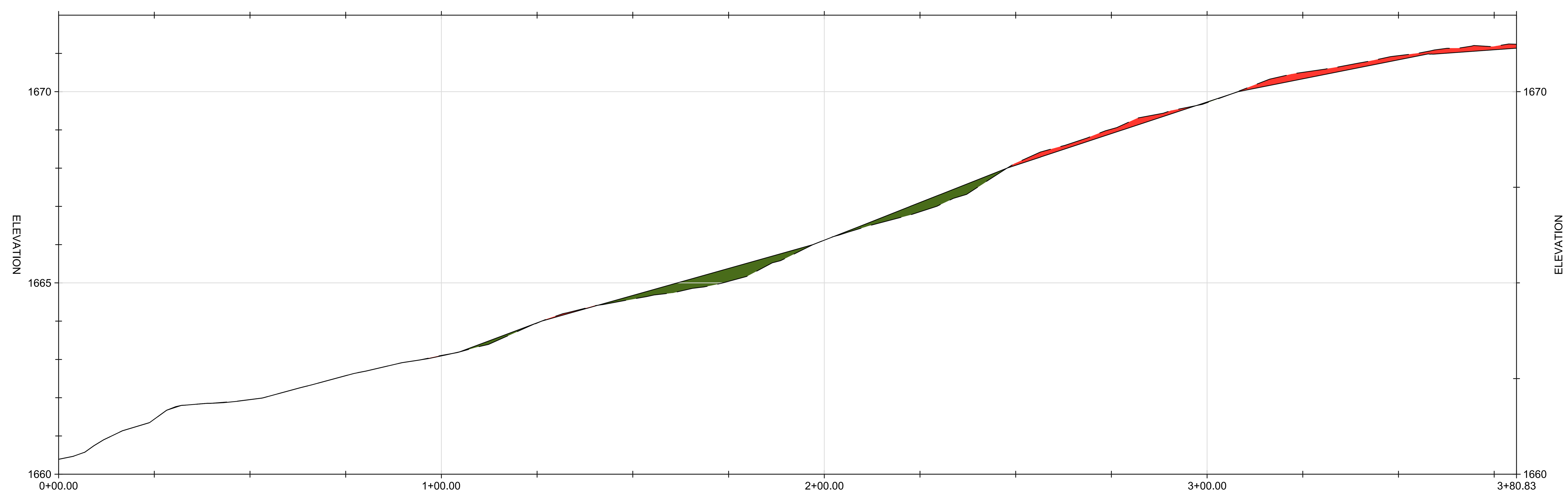

PROFILE LEGEND:
- EXISTING ELEVATION
- PROPOSED ELEVATION
- CUT AREA
- FILL AREA

NOTES:
1. ELECTRICAL DESIGN, INCLUDING UTILITY POLES, PERFORMED BY OTHERS. ELECTRICAL EQUIPMENT AND COMPONENTS SHOWN TO ILLUSTRATE LOCATIONS ONLY. REFER TO ELECTRICAL DRAWINGS FOR DETAILED ELECTRICAL SYSTEM.
2. ALL AREAS WITHIN LIMIT OF DISTURBANCE TO BE SEEDED AS SPECIFIED IN THE SEEDING & REVEGETATION PLAN ON SHEET G-001.
3. THE TOTAL GRADING CUT VOLUME FOR THE ACCESS ROAD AND EQUIPMENT PAD AREA IS 841.92 CUBIC YARDS. THE TOTAL GRADING FILL VOLUME IS 584.76 CUBIC YARDS. THE GRADING OF THE ACCESS ROAD AND EQUIPMENT PAD AREA WILL RESULT IN A NET CUT VOLUME OF 257.16 CUBIC YARDS.

LEGEND:

EXISTING:
- PROPERTY LINE
- INTERNAL PROPERTY LINE
- ABUTTER'S PROPERTY LINE
- RIGHT OF WAY
- ZO — PROPERTY LINE SETBACK
- BUILDING
- ASPHALT
- GRAVEL
- STONE WALL
- EDGE OF VEGETATION
- EDGE OF GRASS
- TRAIL
- EDGE OF WETLAND
- WETLAND FLAG
- WATERBODY
- BUFFER
- FEMA FLOOD ZONE "A"
- IWPA
- OHE — OVERHEAD WIRE
- CULVERT
- UTILITY POLE
- BOUNDARY EVIDENCE
- CONTROL POINT

PROPOSED:
- LOW — LIMIT OF WORK
- 1670 — MAJOR CONTOUR
- MINOR CONTOUR
- FIXED KNOT GAME FENCE 10 C-501 17 C-502
- DOUBLE SWING GATE 7,11 C-501
- SLIDING GATE 9 C-501
- OHE — OVERHEAD ELECTRIC
- SB — SEDIMENT BARRIER 4 C-501
- EROSION CONTROL BLANKET 18 C-503
- EC — ELECTRICAL CONDUIT 2 C-501
- ACCESS ROAD 1 C-501
- CONCRETE PAD 6 C-501
- SOLAR PV ARRAY 8 C-501
- UTILITY POLE
- CULVERT 3 C-501
- INFILTRATION TRENCH 13 C-502
- PERVIOUS BERM 13 C-502
- VEGETATED FILTER STRIP 13 C-502
- CONVEYANCE CHANNEL 16 C-502
- RIPRAP APRON 14,15 C-502
- LANDSCAPE SCREENING 19,20 C-503

ISSUED FOR PERMITTING/NOT FOR CONSTRUCTION

wsp
WSP USA INC.
100 APOLLO DRIVE, SUITE 302
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REVISION	DATE	ISSUE / REVISION DESCRIPTION	ISSUED	APPROVED
2	12/23/2025	RESPONSE TO COMMENTS	MRB	DRAFT
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0	09/23/2025	ISSUED FOR PERMITTING/NOT FOR CONSTRUCTION	MRB	OAC

PROJECT: 2.0 MW AC GROUND-MOUNT SOLAR PV DEVELOPMENT
190 RIDGE ROAD
WORTHINGTON, MA 01098

TITLE: ACCESS ROAD TOPOGRAPHIC PROFILE ANALYSIS

CLIENT: BWC WADES STREAM, LLC

SEAL: DRAFT

DESIGNED BY: OAC	DRAWN BY: MRB
CHECKED BY: APV	SCALE: AS SHOWN
PROJECT NUMBER: US-EI-365230438	
DRAWING NUMBER: C-103	
SHEET NUMBER: 5 OF 10	

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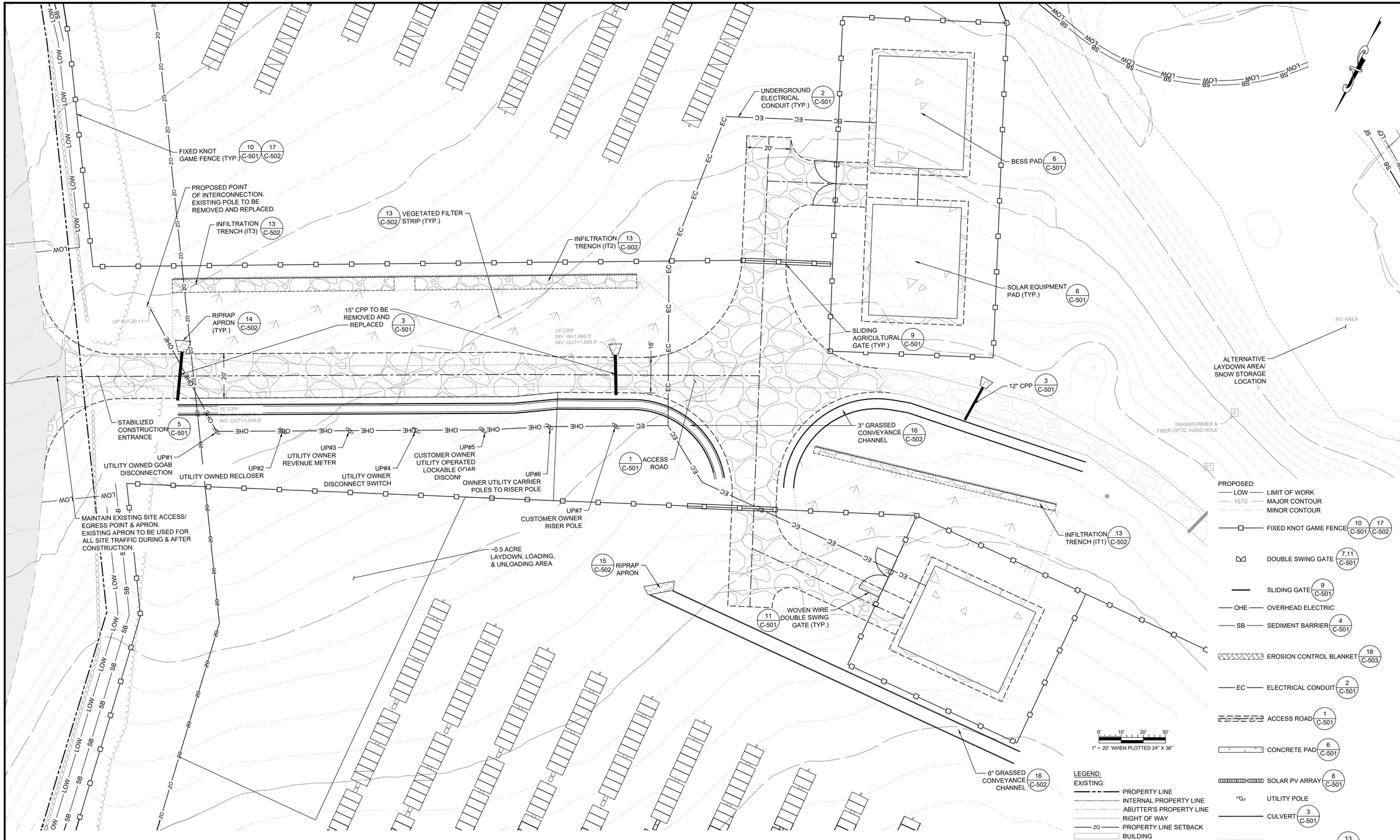

LEGEND:

EXISTING:
- PROPERTY LINE
- INTERNAL PROPERTY LINE
- ABUTTER'S PROPERTY LINE
- RIGHT OF WAY
- PROPERTY LINE SETBACK
- BUILDING
- ASPHALT
- GRAVEL
- STONE WALL
- EDGE OF VEGETATION
- EDGE OF GRASS
- TRAIL
- EDGE OF WETLAND
- WETLAND FLAG
- WATERBODY
- BUFFER
- FEMA FLOOD ZONE "A"
- IWPA
- OVERHEAD WIRE
- CULVERT
- UTILITY POLE
- BOUNDARY EVIDENCE
- CONTROL POINT

PROPOSED:
- LOW — LIMIT OF WORK
- 1670 — MAJOR CONTOUR
- MINOR CONTOUR
- FIXED KNOT GAME FENCE 10 C-501 17 C-502
- DOUBLE SWING GATE 7,11 C-501
- SLIDING GATE 9 C-501
- OHE — OVERHEAD ELECTRIC
- SB — SEDIMENT BARRIER 4 C-501
- EROSION CONTROL BLANKET 18 C-503
- EC — ELECTRICAL CONDUIT 2 C-501
- ACCESS ROAD 1 C-501
- CONCRETE PAD 6 C-501
- SOLAR PV ARRAY 8 C-501
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- CULVERT 3 C-501
- INFILTRATION TRENCH 13 C-502
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- VEGETATED FILTER STRIP 13 C-502
- CONVEYANCE CHANNEL 16 C-502
- RIPRAP APRON 14,15 C-502
- LANDSCAPE SCREENING 19,20 C-503

NOTES:
1. ELECTRICAL DESIGN, INCLUDING UTILITY POLES, PERFORMED BY OTHERS. ELECTRICAL EQUIPMENT AND COMPONENTS SHOWN TO ILLUSTRATE LOCATIONS ONLY. REFER TO ELECTRICAL DRAWINGS FOR DETAILED ELECTRICAL SYSTEM.
2. ALL AREAS WITHIN LIMIT OF DISTURBANCE TO BE SEEDED AS SPECIFIED IN THE SEEDING & REVEGETATION PLAN ON SHEET G-001.

ISSUED FOR PERMITTING/NOT FOR CONSTRUCTION

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PROJECT:
2.0 MW AC GROUND-MOUNT SOLAR PV DEVELOPMENT
190 RIDGE ROAD
WORTHINGTON, MA 01098

TITLE:
EQUIPMENT PADS

CLIENT:
BWC WADES STREAM, LLC

SEAL:
DRAFT

DESIGNED BY: OAC	DRAWN BY: MRB
CHECKED BY: APV	SCALE: AS SHOWN
PROJECT NUMBER:	US-EI-365230438
DRAWING NUMBER:	C-104
SHEET NUMBER:	6 OF 10

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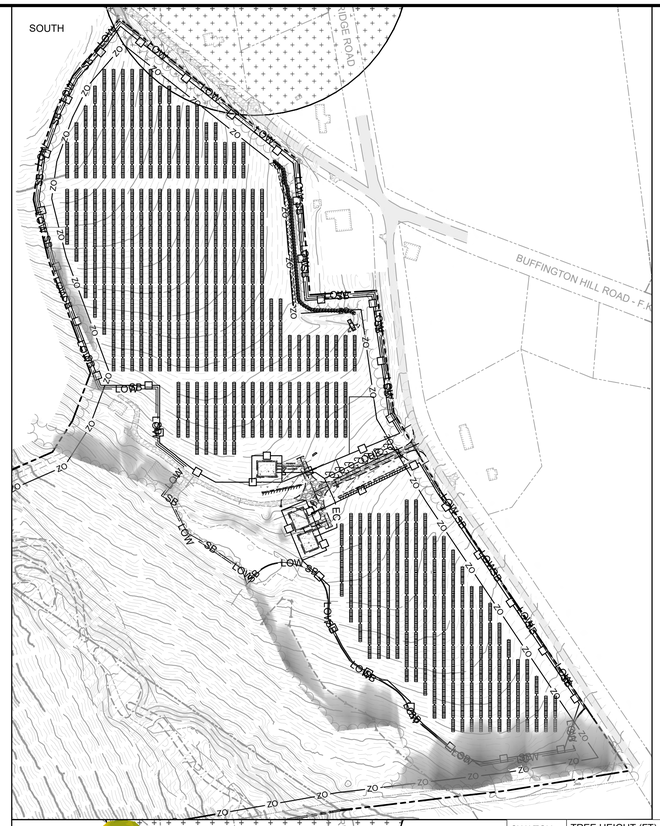
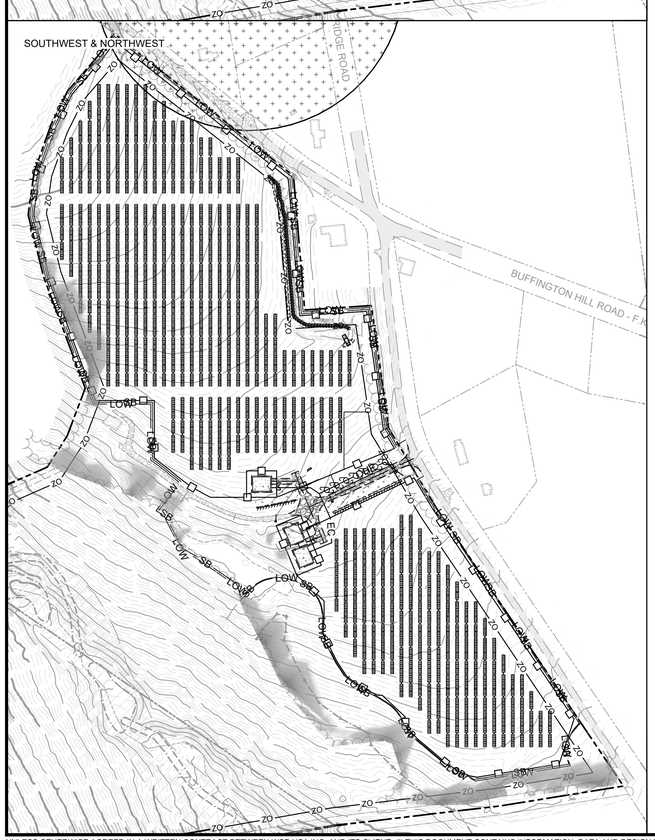
WEST

EAST

SOUTH

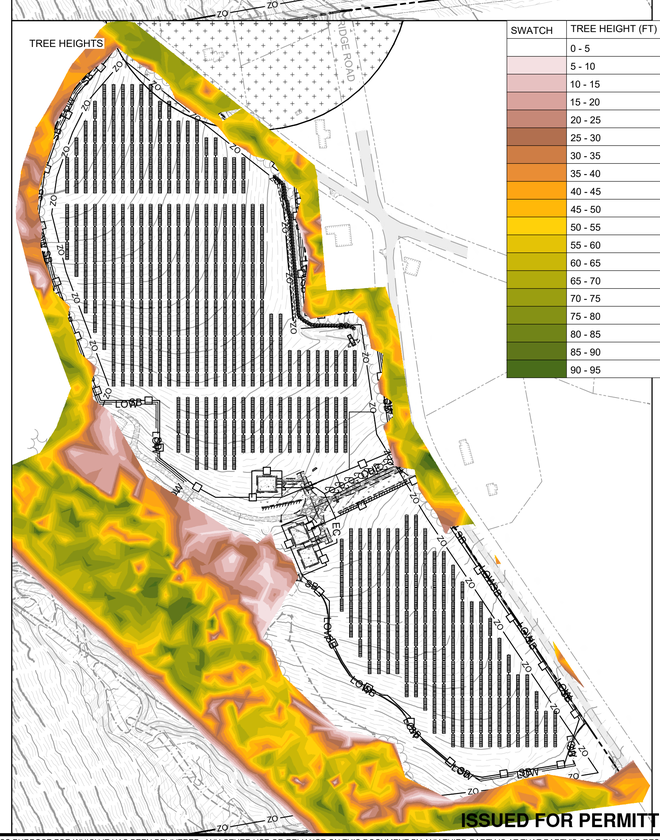


SOUTHWEST & NORTHWEST



SOUTHEAST & NORTHEAST

TREE HEIGHTS



SWATCH	TREE HEIGHT (FT)
	0 - 5
	5 - 10
	10 - 15
	15 - 20
	20 - 25
	25 - 30
	30 - 35
	35 - 40
	40 - 45
	45 - 50
	50 - 55
	55 - 60
	60 - 65
	65 - 70
	70 - 75
	75 - 80
	80 - 85
	85 - 90
	90 - 95

NOTES:

1. IDEAL SHADING SETBACKS:
   - 1.1. SOUTHERN TREES: 3X TREE HEIGHT
   - 1.2. EAST& WEST TREES: 2.5X TREE HEIGHT
   - 1.3. SOUTHWEST & SOUTHEAST TREES: 3X TREE HEIGHT
   - 1.4. NORTHWEST AND NORTHEAST TREES: 0.85X TREE HEIGHT

LEGEND:

EXISTING:

- 710 — MAJOR CONTOUR
- MINOR CONTOUR
- PROPERTY LINE
- INTERNAL PROPERTY LINE
- ABUTTER'S PROPERTY LINE
- RIGHT OF WAY
- ZO — PROPERTY LINE SETBACK
- BUILDING
- ASPHALT
- GRAVEL
- STONE WALL
- EDGE OF VEGETATION
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- TRAIL
- EDGE OF WETLAND
- WETLAND FLAG
- WATERBODY
- BUFFER
- FEMA FLOOD ZONE "A"
- IWPA
- OHE — OVERHEAD WIRE
- CULVERT
- UTILITY POLE
- BOUNDARY EVIDENCE
- CONTROL POINT

PROPOSED:

- LOW — LIMIT OF WORK
- 1670 — MAJOR CONTOUR
- MINOR CONTOUR
- FIXED KNOT GAME FENCE (10 / C-501) (17 / C-502)
- DOUBLE SWING GATE (7,11 / C-501)
- SLIDING GATE (9 / C-501)
- OHE — OVERHEAD ELECTRIC
- SB — SEDIMENT BARRIER (4 / C-501)
- EROSION CONTROL BLANKET (18 / C-503)
- EC — ELECTRICAL CONDUIT (2 / C-501)
- ACCESS ROAD (1 / C-501)
- CONCRETE PAD (6 / C-501)
- SOLAR PV ARRAY (8 / C-501)
- UTILITY POLE
- CULVERT (3 / C-501)
- INFILTRATION TRENCH (13 / C-502)
- PERVIOUS BERM (13 / C-502)
- VEGETATED FILTER STRIP (13 / C-502)
- CONVEYANCE CHANNEL (16 / C-502)
- RIPRAP APRON (14,15 / C-502)
- LANDSCAPE SCREENING (19,20 / C-503)

0' 100' 200' 300'

1" = 200' WHEN PLOTTED 24" X 36"

ISSUED FOR PERMITTING/NOT FOR CONSTRUCTION

WSP USA INC.
100 APOLLO DRIVE, SUITE 302
CHELMSFORD MASSACHUSETTS 01824
TELEPHONE: (978) 692-9090
FAX: (978) 692-6633
WEB: WWW.WSP.COM

REVISION	DATE	ISSUE / REVISION DESCRIPTION	ISSUED	APPROVED
2	12/23/2025	RESPONSE TO COMMENTS	MRB	DRAFT
1	10/21/2025	RESVISED PER TOWN OF WORTHINGTON PLANNING BOARD COMMENTS	MRB	OAC
0	08/23/2025	ISSUED FOR PERMITTING/NOT FOR CONSTRUCTION	MRB	OAC

PROJECT:
2.0 MW AC GROUND-MOUNT SOLAR DEVELOPMENT
190 RIDGE ROAD
WORTHINGTON, MA 01098

TITLE:
SHADOW ANALYSIS OF PROPOSED CONDITIONS

CLIENT:
BWC WADES STREAM, LLC

SEAL:
DRAFT

DESIGNED BY: OAC	DRAWN BY: MRB
CHECKED BY: APV	SCALE: AS SHOWN
PROJECT NUMBER: US-EI-365230438	
DRAWING NUMBER: **C-105**	
SHEET NUMBER: **7 OF 10**	

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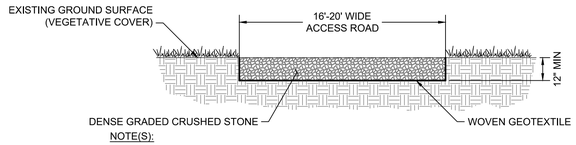
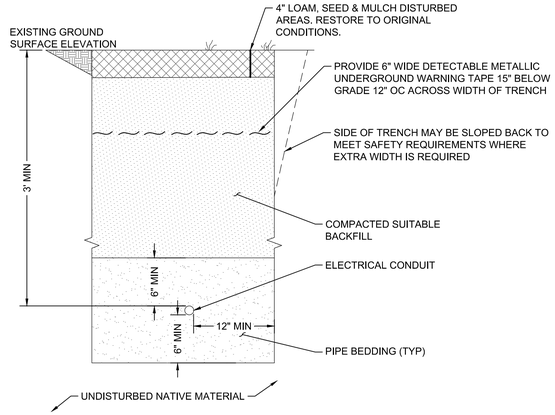


NOTE(S):

1. ACCESS ROAD TO BE CONSTRUCTED OF A MINIMUM 6" OF DENSE GRADED CRUSHED STONE.
2. WOVEN GEOTEXTILE TO BE PLACED BETWEEN THE GROUND SURFACE AND THE CRUSHED STONE.
3. CRUSHED STONE SHALL BE COMPACTED TO A FIRM AND NON-YIELDING CONDITION.

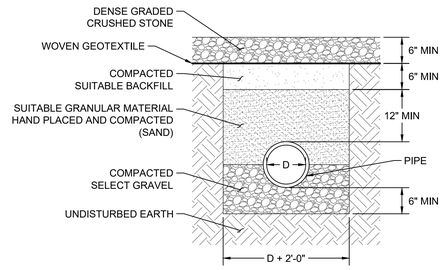
FLUSH CRUSHED STONE ACCESS ROAD — 1
NOT TO SCALE



NOTE(S):

1. DETAIL SHOWN FOR ILLUSTRATIVE PURPOSES ONLY. ELECTRICAL ENGINEER TO CONFIRM REGULATORY AND CODE COMPLIANCE.

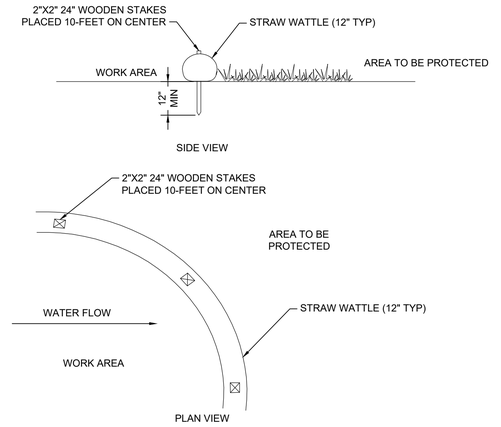
TYPICAL ELECTRICAL CONDUIT UTILITY TRENCH — 2
NOT TO SCALE



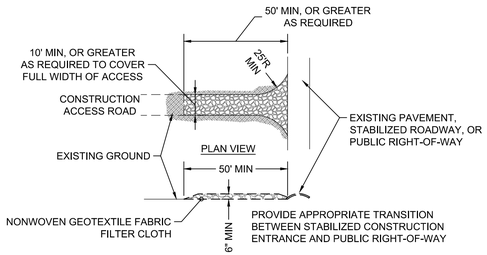
NOTE(S):

1. ALIGN CENTER OF PIPE WITH CENTERLINE OF DITCH AND BOTTOM OF PIPE WITH DITCH LINE.
2. PIPE EXTENDS A MINIMUM OF 3" BEYOND DENSE GRADED CRUSHED STONE AT INLET AND OUTLET.
3. PIPE SLOPE SHALL FOLLOW EXISTING DITCH LINE BUT BE NO LESS THAN 1.5% AND NO MORE THAN 10%.

TYPICAL CULVERT TRENCH — 3
NOT TO SCALE



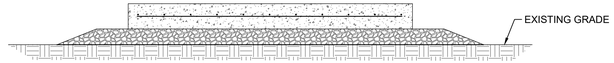
SEDIMENT BARRIER - STRAW WATTLE — 4
NOT TO SCALE



NOTE(S):

1. STONE TO BE 1"-3" STONE, RECLAIMED STONE, OR RECYCLED CONCRETE EQUIVALENT.
2. LENGTH - AS REQUIRED, BUT NOT LESS THAN 50 FT.
3. THICKNESS - NOT LESS THAN SIX (6) INCHES.
4. WIDTH - TEN (10) FT. MIN, BUT NOT LESS THAN THE FULL TRAVELED WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS.
5. FILTER CLOTH - SHALL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
6. SURFACE WATER - ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCE SHALL BE PIPED ACROSS OR BENEATH THE ENTRANCE.
7. MAINTENANCE - THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY.
8. WASHING - WHEELS SHALL BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTRANCE ONTO PUBLIC RIGHTS-OF-WAY. IF WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.
9. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.

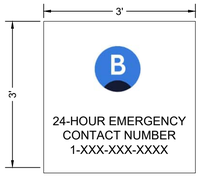
STABILIZED CONSTRUCTION ENTRANCE — 5
NOT TO SCALE



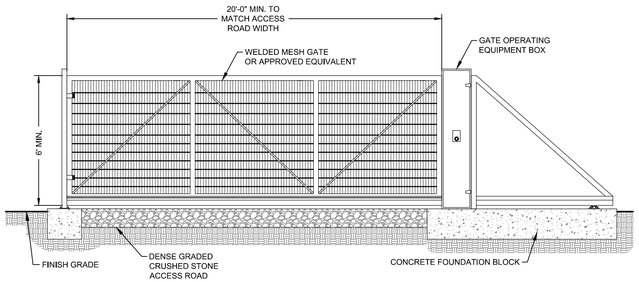
NOTE(S):

1. CONCRETE PAD SHOWN FOR ILLUSTRATIVE PURPOSES ONLY. DESIGN TO BE FINALIZED AT LATER DATE.

TYPICAL CONCRETE EQUIPMENT PAD SECTION — 6
NOT TO SCALE



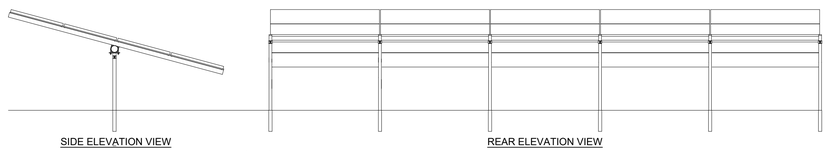
TYPICAL ENTRANCE SIGN — 7
NOT TO SCALE



NOTE:

1. TYPICAL GATE SHOWN FOR ILLUSTRATIVE PURPOSES ONLY. DESIGN TO BE FINALIZED AT LATER DATE.

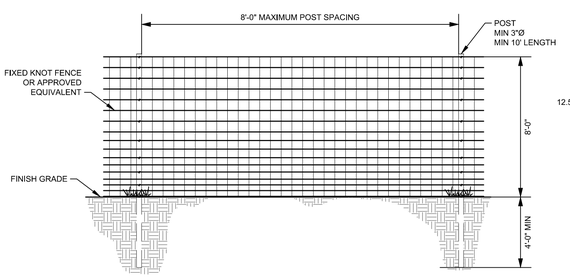
WELDED MESH ELECTRIC SLIDING GATE — 9
NOT TO SCALE



NOTE(S):

1. DESIGN FOR FOUNDATIONS, RACKING, AND MODULES BY OTHERS. DETAILS SHOWN FOR ILLUSTRATION PURPOSES ONLY.

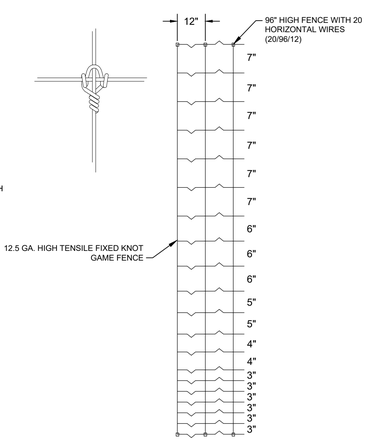
TRACKER SOLAR PV ARRAY — 8
NOT TO SCALE

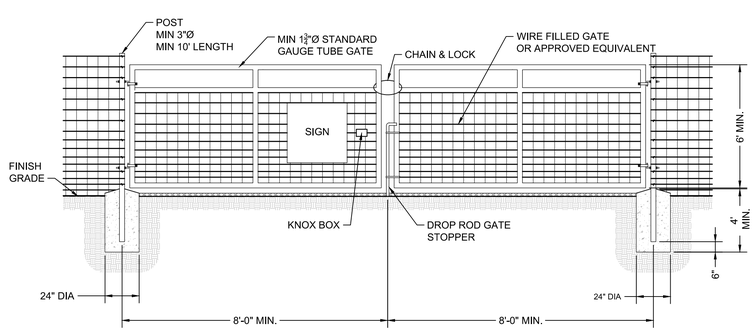


NOTE:

1. TYPICAL FENCE SHOWN FOR ILLUSTRATIVE PURPOSES ONLY. DESIGN TO BE FINALIZED AT LATER DATE.

WOVEN WIRE FENCE — 10
NOT TO SCALE

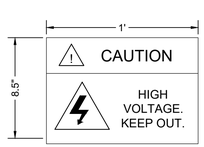




NOTE:

1. TYPICAL GATE SHOWN FOR ILLUSTRATIVE PURPOSES ONLY. DESIGN TO BE FINALIZED AT LATER DATE.

WOVEN WIRE DOUBLE SWING GATE — 11
NOT TO SCALE



NOTES:

1. PLACE ALONG PERIMETER FENCING AT AN INTERVAL NO LESS THAN 100 FEET.
2. DETAIL SHOWN FOR ILLUSTRATIVE PURPOSES ONLY. DESIGN TO BE FINALIZED AT LATER DATE.

HIGH VOLTAGE SIGN — 12
NOT TO SCALE

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PROJECT:
2.0 MW AC GROUND-MOUNT SOLAR PV DEVELOPMENT
190 RIDGE ROAD
WORTHINGTON, MA 01098

TITLE:
DETAILS (SHEET 1 OF 3)

CLIENT:
BWC WADES STREAM, LLC

SEAL:
DRAFT

DESIGNED BY: OAC	DRAWN BY: MRB
CHECKED BY: APV	SCALE: AS SHOWN

PROJECT NUMBER: US-EI-365230438

DRAWING NUMBER: **C-501**

SHEET NUMBER: **8 OF 10**

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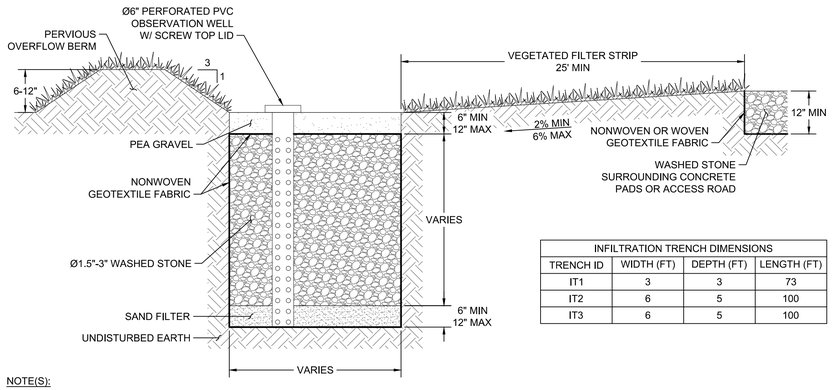
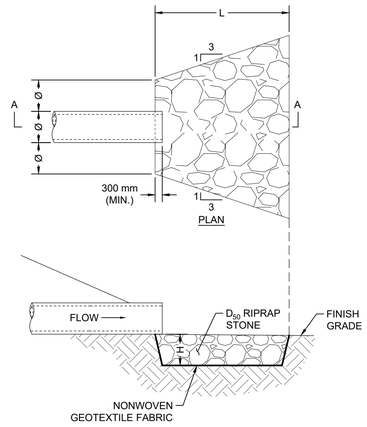


INFILTRATION TRENCH DIMENSIONS			
TRENCH ID	WIDTH (FT)	DEPTH (FT)	LENGTH (FT)
IT1	3	3	73
IT2	6	5	100
IT3	6	5	100

NOTE(S):

1. PERVIOUS BERM MAY VARY IN HEIGHT BETWEEN 6 TO 12 INCHES IN ORDER TO ACHEIVE A LEVEL ELEVATION ALONG THE TOP OF THE BERM TO THE MAXIMUM EXTENT POSSIBLE.
2. ONE SCREW TOP OBSERVATION WELL TO BE INSTALLED CENTRAL TO THE TRENCH LENGTH.

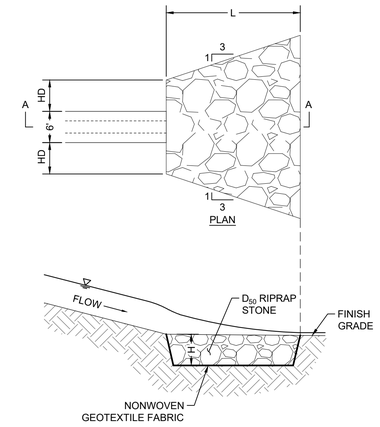
INFILTRATION TRENCH
NOT TO SCALE
13



SECTION A-A

RIPRAP APRON DIMENSIONS				
PIPE Ø	CLASS	D_{50} (IN)	LENGTH L (FT)	HEIGHT H (IN)
12"	1	5	4	18
15"	1	5	5	18

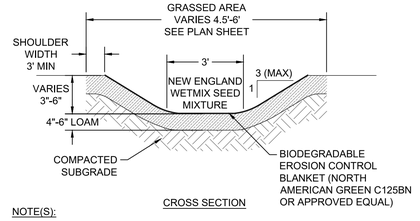
RIPRAP APRON (PIPE)
NOT TO SCALE
14



SECTION A-A

RIPRAP APRON DIMENSIONS				
HYDRAULIC DIAMETER (HD)	CLASS	D_{50} (IN)	LENGTH L (FT)	HEIGHT H (IN)
0.75'	3	10	4	24

RIPRAP APRON (CHANNEL)
NOT TO SCALE
15

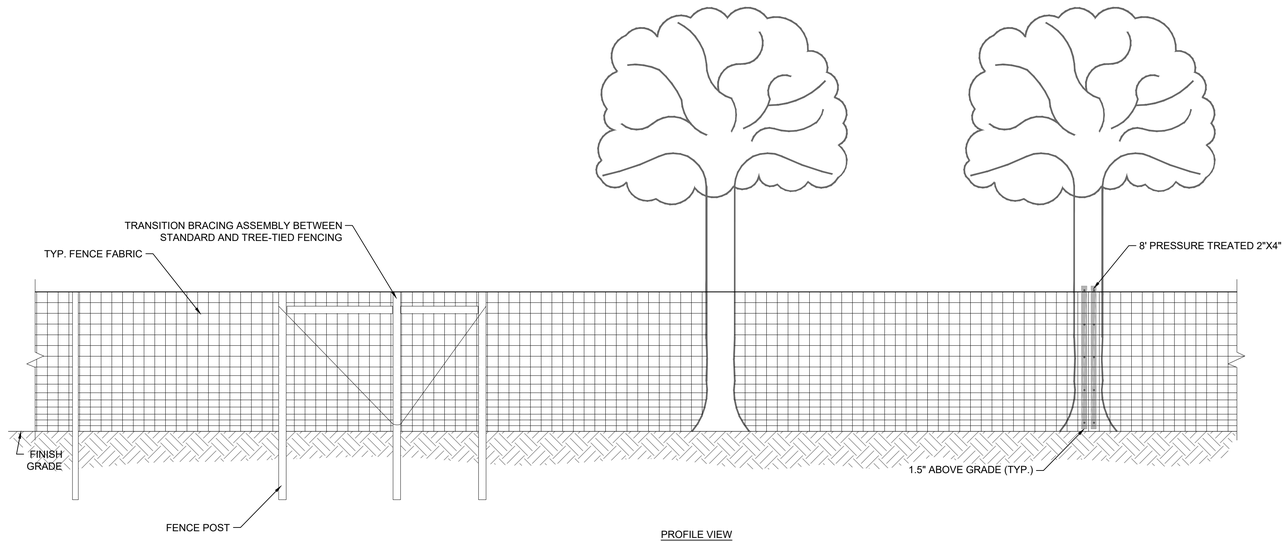


CROSS SECTION

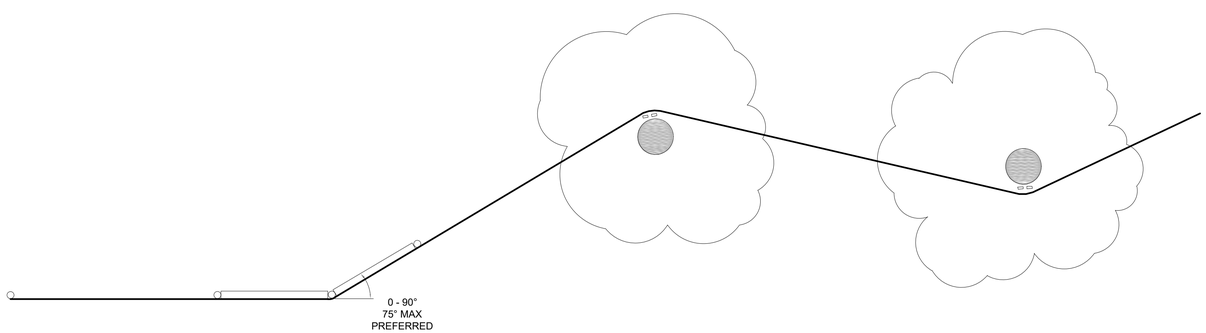
NOTE(S):

1. THE LONGITUDINAL SLOPE OF THE CHANNEL BOTTOM SHOULD BE AS FLAT AS POSSIBLE AND NO GREATER THAN 5%.

GRASSED CONVEYANCE CHANNEL
NOT TO SCALE
16

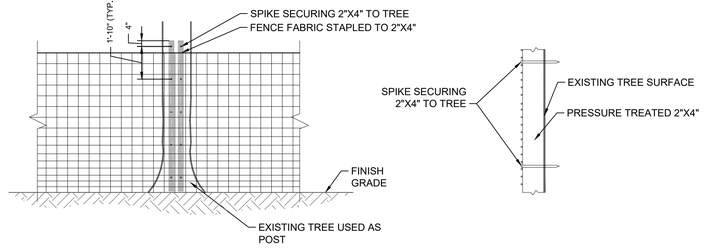


PROFILE VIEW

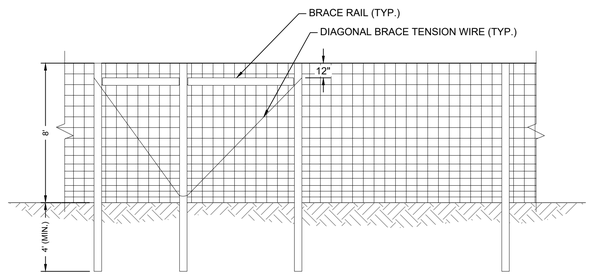


PLAN VIEW

TREE-TIED WOVEN WIRE FENCE
NOT TO SCALE
17



MOUNTING DETAIL



BRACING DETAIL

NOTE(S):

1. ALL FENCING AND HARDWARE SHALL BE GALVANIZED.
2. FIXED KNOT WIRE MESH TO BE BEKAERT SOLIDLOCK (R) PRO 30 (2096-3), 12.5AWG-16 HIGH TENSILE FIXED KNOT GAME FENCE OR APPROVED EQUIVALENT, INSTALLED AND BRACED PER MANUFACTURERS RECOMMENDATIONS. NOT TO EXCEED 2" GAP ABOVE GRADE.
3. ONLY SOUND, HEALTHY TREES GREATER THAN 6" DBH SPACED 10' - 40' APART SHALL BE USED.
4. ROUTE FENCE TO AVOID IMPINGING ON GROWTH OF ADJACENT TREES.
5. ADD 2"X4" SPACERS AS NEEDED BASED ON ANGLE AND DBH TO ENSURE FENCING DOES NOT CONTACT TREE.
6. OBSTRUCTIVE LIMBS TO BE CLIPPED FROM TRUNK OF TREE.

ISSUED FOR PERMITTING/NOT FOR CONSTRUCTION

WSP USA INC.
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PROJECT:
2.0 MW AC GROUND-MOUNT SOLAR PV DEVELOPMENT
190 RIDGE ROAD
WORTHINGTON, MA 01098

TITLE:
DETAILS (SHEET 2 OF 3)

CLIENT:
BWC WADES STREAM, LLC

SEAL:
DRAFT

DESIGNED BY: OAC	DRAWN BY: MRB
CHECKED BY: APV	SCALE: AS SHOWN
PROJECT NUMBER:	US-EI-365230438
DRAWING NUMBER:	C-502
SHEET NUMBER:	9 OF 10

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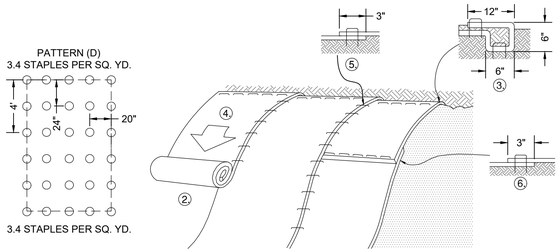


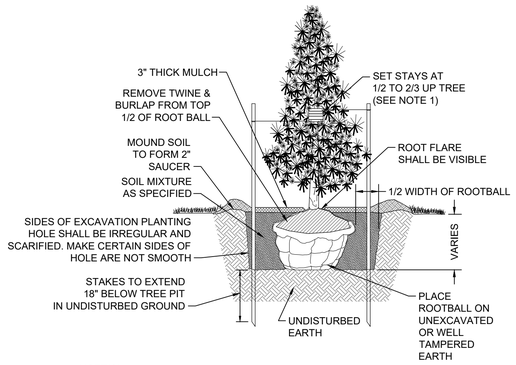
STAPLE PATTERN GUIDE
6.67' WIDE ROLLS

SLOPE INSTALLATION
(SEE STEPS BELOW)

NOTE(S):

1. THIS DETAIL REFERENCES PRODUCTS BY NORTH AMERICAN GREEN. EQUIVALENT PRODUCTS MAY BE USED AS APPROVED BY THE ENGINEER. EROSION CONTROL BLANKETS TO BE INSTALLATED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS AND INSTRUCTIONS.
2. EROSION CONTROL MATTING TO BE NORTH AMERICAN GREEN C125BN OR APPROVED EQUAL. INSTALL USING STAPLE PATTERN D.
3. PREPARE SOIL BEFORE INSTALLING ROLLED EROSION CONTROL PRODUCTS (RECPs), INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER, AND SEED (SEE DRAWING G-001).
4. BEGIN AT THE TOP OF THE SLOPE BY ANCHORING THE RECPs IN A 6" DEEP X 6" WIDE TRENCH WITH APPROXIMATELY 12" OF RECPs EXTENDED BEYOND THE UP-SLOPE PORTION OF THE TRENCH. ANCHOR THE RECPs WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" PORTION OF RECPs BACK OVER SEED AND COMPACTED SOIL. SECURE RECPs OVER COMPACTED SOIL WITH A ROW OF STAPLES/STAKES SPACED APPROXIMATELY 12" APART ACROSS THE WIDTH OF THE RECPs.
5. ROLL THE RECPs DOWN THE SLOPE. RECPs WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL RECPs MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES/STAKES IN APPROPRIATE LOCATIONS AS SHOWN IN THE STAPLE PATTERN GUIDE. WHEN USING THE DOT SYSTEM, STAPLES/STAKES SHOULD BE PLACED THROUGH EACH OF THE COLORED DOTS CORRESPONDING TO THE APPROPRIATE STAPLE PATTERN.
6. THE EDGES OF PARALLEL RECPs MUST BE STAPLED WITH AN APPROXIMATE 3" OVERLAP.
7. CONSECUTIVE RECPs SPLICED DOWN THE SLOPE MUST BE PLACED END OVER END (SHINGLE STYLE) WITH AN APPROXIMATE 3" OVERLAP. STAPLE THROUGH OVERLAPPED AREA, APPROXIMATELY 12" APART ACROSS ENTIRE RECPs WIDTH.
8. STAPLES LONGER THAN 6 INCHES SHALL NOT BE USED WITHIN THE LIMIT OF WASTE TO AVOID PENETRATION INTO THE LANDFILL CAP.

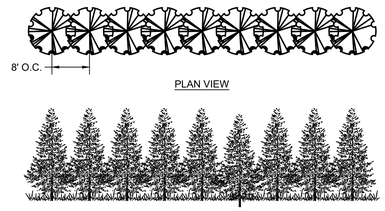
EROSION CONTROL BLANKET INSTALLATION 18
NOT TO SCALE



NOTE(S):

1. STAKE ALL TREES OVER 6 FEET TALL.
2. TREE SHALL BEAR SAME RELATION TO FINISHED GRADE AS IT BORE TO PREVIOUS GRADE (OR SLIGHTLY ABOVE).
3. NEVER CUT LEADERS.
4. PRUNE ONLY TO REMOVE DAMAGED OR BROKEN BRANCHES.
5. REMOVE ALL WIRE BRACKETS FROM ROOTBALL.
6. REMOVE ALL STAKES 1 YEAR AFTER PLANTING.

VEGETATIVE SCREENING PLANTING 19
NOT TO SCALE

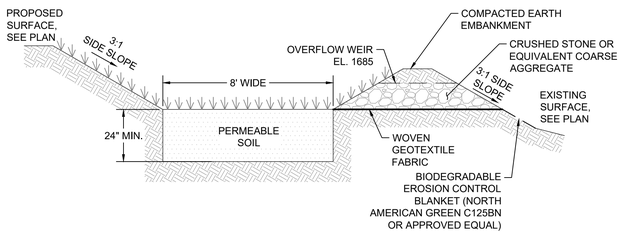


PLAN VIEW

PROFILE VIEW

SPECIES	COMMON NAME	HEIGHT WHEN PLANTED	MATURE HEIGHT	MATURE WIDTH	ROOT
THUJA PLICATA X STANDISHII 'GREEN GIANT'	GREEN GIANT ARBORVITAE	6'-7'	30'-50'	10'-15'	BALLED & BURLAPED (B&B)

VEGETATIVE SCREENING PLANTING PLAN 20
NOT TO SCALE



NOTE(S):

1. LONGITUDINAL SLOPE OF THE BOTTOM OF THE SWALE SHALL NOT EXCEED 5%.

WATER QUALITY DRY SWALE 21
NOT TO SCALE

ISSUED FOR PERMITTING/NOT FOR CONSTRUCTION

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DETAILS (SHEET 3 OF 3)

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SEAL:
DRAFT

DESIGNED BY: OAC	DRAWN BY: MRB
CHECKED BY: APV	SCALE: AS SHOWN
PROJECT NUMBER:	US-EI-365230438
DRAWING NUMBER:	C-503
SHEET NUMBER:	10 OF 10

C:\Users\WDS3_MO~1.MCD\AppData\Local\Temp\AcPublish_27\4898-10 - Ridge Rd - C-501-3.dwg - C-503 - Dec 23, 2025 6:10pm - wds_morgan.mcdonald

BLUEWAVE

Appendix B: Balloon Test Results

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BWC Wades Stream, LLC Balloon Test

*Balloons shown at 14 &10’, reflecting the highest possible position and horizontal position

Flag 3 looking north

Flags 2 and 3 looking southwest

Flags 1 and 2 looking north (standing at flag 9)

Flag 1 and 2

Flag 9

Flags 1, 2, and 9

standing near flag 8

Flag 3 standing near flag 8

Flag 8 looking north

Flag 8 looking North

Flags 1, 2, 3, and 9 standing near Flag 7

Flags 7, 3 and 2

Flag 5 standing at 4

Flags 4 and 5 standing
at southern equipment pad

Flags 4, 5, 6,and 7 looking south

BLUEWAVE

Appendix C: Massachusetts Historical Commission Project Notification Form and Proof of Delivery

APPENDIX A

MASSACHUSETTS HISTORICAL COMMISSION
220 MORRISSEY BOULEVARD
BOSTON, MASS. 02125
617-727-8470, FAX: 617-727-5128

PROJECT NOTIFICATION FORM

Project Name: BWC Wades Stream, LLC

Location / Address: 190 Ridge Rd

City / Town: Worthington

Project Proponent

Name: BWC Wades Stream, LLC

Address: 116 Huntington Avenue, Suite 601

City/Town/Zip/Telephone: Boston, MA 02116, 617-209-3122

Agency license or funding for the project (list all licenses, permits, approvals, grants, or other entitlements being sought from state and federal agencies).

Agency Name	Type of License or funding (specify)
USEPA	Constructions General Permit (CGP) eNOI
MADEP	Notice of Intent (NOI)
MADOER	Statement of Qualification (SoQ)
MADOER	Agicultural Solar Tariff Generation Unit (ASTGU)

Project Description (narrative):
Creation of a solar photovoltaic (PV) array, with a capacity of approximately 3.84 MW (DC). The site currently consists of farmland. The solar array will be a Single axis tracker ground-mounted tracker system with driven piles or ground screws. Electrical equipment will also be installed on-site on a concrete pad. (See attached project narrative)

Does the project include demolition? If so, specify nature of demolition and describe the building(s) which are proposed for demolition.

No

Does the project include rehabilitation of any existing buildings? If so, specify nature of rehabilitation and describe the building(s) which are proposed for rehabilitation.

No

Does the project include new construction? If so, describe (attach plans and elevations if necessary). Yes, the project includes the construction of a ground-mounted solar facility. Please see attached plan for more information.

APPENDIX A (continued)

To the best of your knowledge, are any historic or archaeological properties known to exist within the project's area of potential impact? If so, specify.

To the best of our knowledge, no historic or archaeological properties exist within the project area. The nearest historic properties/locations consist of the Buffington, Maj- House (0.1miles) and Kinne, John House (0.3miles) there are a few other neighboring locations that we have included here (See attached MACRIS Map)

What is the total acreage of the project area?

Woodland _____acres
Wetland _____acres
Floodplain _____acres
Open space _____ acres
Developed _____acres

Productive Resources:
Agriculture 16 acres
Forestry _____acres
Mining/Extraction _____acres
Total Project Acreage 16 acres

What is the acreage of the proposed new construction? 16 acres

What is the present land use of the project area?
Farmland.

Please attach a copy of the section of the USGS quadrangle map which clearly marks the project location.

Please see attached map.

This Project Notification Form has been submitted to the MHC in compliance with 950 CMR 71.00.

Signature of Person submitting this form: Michael Zhe (May 23, 2024 10:01 EDT) Date: 24/05/23

Name: Michael Zhe

Address: 116 Huntington Avenue, Suite 601

City/Town/Zip: Boston, MA 02116

Telephone: 617-431-8758

REGULATORY AUTHORITY

950 CMR 71.00: M.G.L. c. 9, §§ 26-27C as amended by St. 1988, c. 254.

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BWC Wades Stream, LLC
Project Description

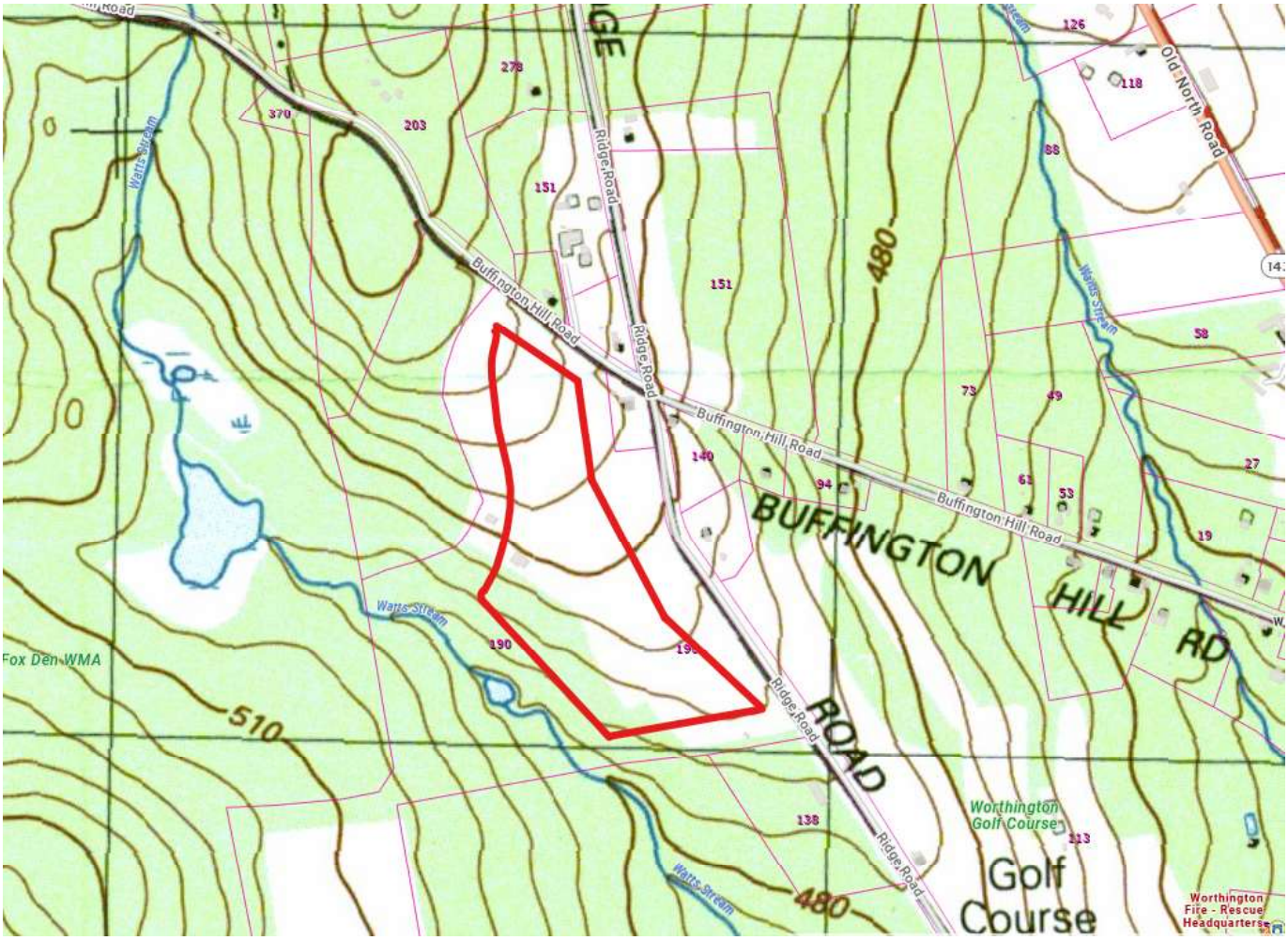
The proposed project is a 3.84 MW DC solar photovoltaic energy generating facility ("facility"). The proposed project is to be situated on parcels located 190 Ridge Rd, Worthington, State of Massachusetts and identified on the Worthington Assessor's Database as Tax Parcel 407 0 28, and being further described in Book 8119 at Page 223 in the and Tax Parcel 407 0 27.1 being further described in Book 8260 Page 247 in the Hampshire County Registry of Deeds. Total acreage of the project parcel is approximately 85.5 acres; however, 16 acres of the parcel can be considered the "project area". The solar facility is shown in detail on the attached plans.

This project has not yet been permitted. BlueWave anticipates being granted a special permit from the Worthington Planning Board and submitting a Notice of Intent (NOI) to the Worthington Conservation Commission.

The project area is currently farmland. A focus will be put on maintaining healthy soils and ecology as native, pollinator-friendly vegetation will be used within the project area.

Soils disturbances will be limited to only the construction phase of the project. Panels will be installed on racks that will consist of post or screw driven into the ground at a depth of 10' per pile to allow for the structural stability above grade to support the panels. In addition to the posts, some trenching will be required to run wire and conduit from the panels to the inverter and transformer pad.

The project will be interconnected to the electrical grid through Eversource utility poles located on Ridge Rd. Once the project is constructed, the system will require very little maintenance. When the project's operational period comes to an end, it can be extended, or the equipment will be removed, and the site will be restored to its pre-existing field conditions.



Key:

Pink: Parcel Outlines

Red: Approximate Project Location

Reference:

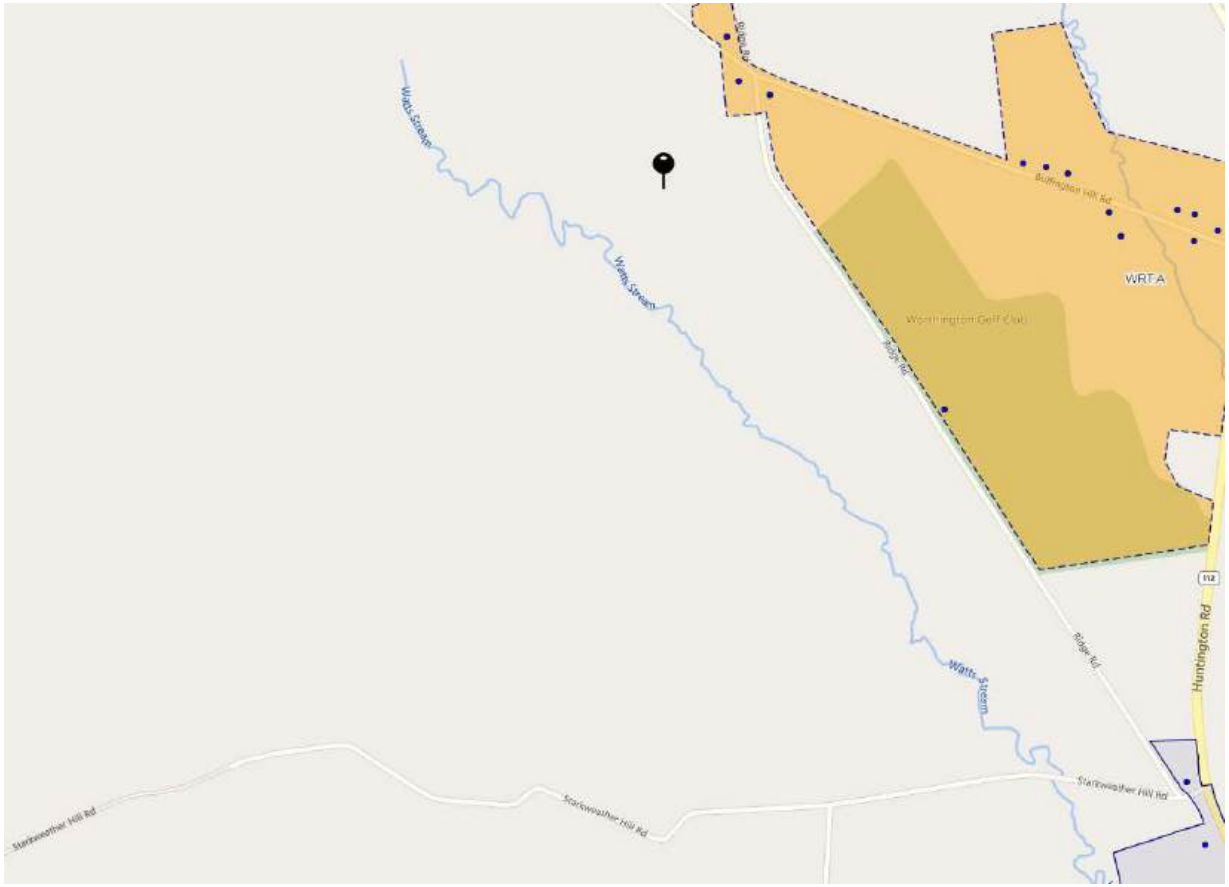
MassGIS

USGS Topo Map

BWC Wades Stream, LLC Site Photos

Above: Proposed Equipment Pad on the West Side Below: Northwest Field view	Above: Matt Lagoy Abutter House, Northeast Corner Below: North view at Driveway Culvert

BWC Wades Stream, LLC MACRIS Map



#	Demolished?	MHC #	Historic Name	Common Name	Address	Designations	Architectural Style
1		WRT.16	Kinne, John House		113 Ridge Rd Worthington		Greek Revival;
2		WRT.17	Buffington, Maj. House		140 Buffington Hill Rd Buffington Hill and Ridge Rds Worthington		Federal;
3		WRT.18			141 Buffington Hill Rd Buffington Hill and Ridge Rds Worthington		Colonial;
4		WRT.19	Cottrell, Gorum - Pierce, Noah House		61 Buffington Hill Rd Worthington		
5		WRT.20	Ward, William - Kilbourne, Alfred House		40 Buffington Hill Rd Worthington		Federal;
6		WRT.21	Cole, Horace House	Heacock Home	19 Buffington Hill Rd Worthington		Colonial Revival; Greek Revival;
7		WRT.22	Mills Tavern		10 Buffington Hill Rd Worthington		Federal;
8		WRT.24	Ward, William Store - Cole, Samuel Cobbler Shop	U. S. Post Office - Worthington Corners Branch	11 Buffington Hill Rd Worthington		Federal;
9		WRT.25	Worthington Lyceum Hall	Worthington Playschool and Nursery School	17 Buffington Hill Rd Worthington		Greek Revival;
10		WRT.58	Allen, Sarah - Jones, E. W. House		32 Buffington Hill Rd Worthington		Colonial Revival;

11		WRT.59	Carr, A. House		49 Buffington Hill Rd Worthington		
12		WRT.60	Cole, Horace House		53 Buffington Hill Rd Worthington		
13		WRT.65			Ridge Rd Worthington		Craftsman;
14		WRT.67	Adams, A. House		5 Starkweather Rd Worthington		Greek Revival;
15		WRT.78	Conwell, Russell H. Elementary School	Conwell Consolidated School	147 Huntington Rd Worthington		Colonial Revival;

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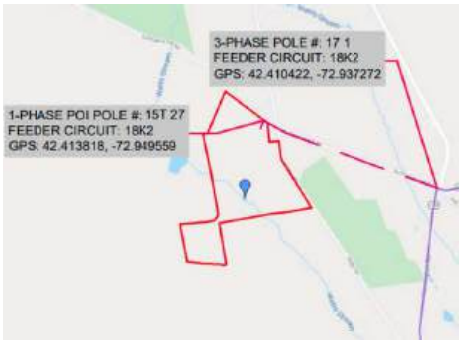
PHOTOVOLTAIC SYSTEM

MA Worthington Ridege Rd

1 PROPOSED GROUNDMOUNT PV ARRAY 3.84 MWDC: 1.99 MWAC

N



4 SITE LOCATION: Worthington Ridge Rd

N

3 SINGLE-AXIS TRACKER PV ARRAY

MODULES	580 W
ROW SPACING	18'
TRUE AZIMUTH	180°
SYSTEM SIZE DC	3.84
SYSTEM SIZE AC	1.99
ANNUAL ENERGY OUTPUT	6,417,140 kWh

2 TECHNICAL ANALYSIS

BLUEWAVE
BLUEWAVE
116 Huntington Ave
Suite 601
Boston, MA 02116
(617) 209-3122
bluewave.energy

COMMENTS

REV	DRN	DATE

PROJECT: MA WORTHINGTON RIDGE RD
190 RIDGE RD
WORTHINGTON, MA, 01098

SHEET TITLE: PRELIMINARY SITE PLAN

DRAWN BY: MG
PRINT DATE: 01/29/24
SHEET NAME: PV_P1

24-0523 Worthington Ridge Rd PNF Combined

Final Audit Report 2024-05-23

Created:	2024-05-23
By:	Melanie Guzman (mguzman@bluewavesolar.com)
Status:	Signed
Transaction ID:	CBJCHBCAABAAh544YgsuOMsaQ6bb-komR_jaMLG1ubQW

"24-0523 Worthington Ridge Rd PNF Combined" History

Document created by Melanie Guzman (mguzman@bluewavesolar.com)
2024-05-23 - 1:29:20 PM GMT

Document emailed to Michael Zhe (mzhe@bluewave.energy) for signature
2024-05-23 - 1:29:26 PM GMT

Email viewed by Michael Zhe (mzhe@bluewave.energy)
2024-05-23 - 2:00:36 PM GMT

Document e-signed by Michael Zhe (mzhe@bluewave.energy)
Signature Date: 2024-05-23 - 2:01:29 PM GMT - Time Source: server

Agreement completed.
2024-05-23 - 2:01:29 PM GMT

January 16, 2025

Dear Customer,

The following is the proof-of-delivery for tracking number: 776521187592

Delivery Information:			
Status:	Delivered	**Delivered To:**	
Signed for by:	M.MICHELLE	**Delivery Location:**	
Service type:	FedEx Express Saver		
Special Handling:	Deliver Weekday		DORCHESTER, MA,
		Delivery date:	May 24, 2024 11:38

Shipping Information:			
Tracking number:	776521187592	**Ship Date:**	May 23, 2024
		Weight:	

Recipient:	**Shipper:**
DORCHESTER, MA, US,	BOSTON, MA, US,

Proof-of-delivery details appear below; however, no signature is available for this FedEx Express shipment because a signature was not required.

Thank you for choosing FedEx

BLUEWAVE

Appendix D: ASTGU Pre-Determination Form

Commonwealth of Massachusetts

Executive Office of Energy and Environmental Affairs
DEPARTMENT OF ENERGY RESOURCES
DEPARTMENT OF AGRICULTURAL RESOURCES

PRE-DETERMINATION FORM

DESIGN ELIGIBILITY AND FARM PLAN FOR AN AGRICULTURAL SOLAR TARIFF GENERATION UNIT UNDER THE SOLAR MASSACHUSETTS RENEWABLE TARGET (SMART) PROGRAM

Purpose

This pre-determination form is required for all solar PV units in advance of submitting a Statement of Qualification Application to the MA Department of Energy Resources ("Department") for qualification of an Agricultural Solar Tariff Generation Unit ("ASTGU") under the SMART program. The form is provided to demonstrate conformance with the provisions required for ASTGUs in 225 CMR 20.06(1)(d) and in the *Guideline Regarding the Definition of Agricultural Solar Tariff Generation Units*.

The UMass Amherst Clean Energy Extension advises farmers and project developers to assist in the completion of this form and to provide the required collaboration with UMass Center for Agricultural, Food and the Environment, in advising the farm plan. In preparing your ASTGU pre-determination form, it is recommended that you review the information and fact sheets available on the UMass Clean Energy Extension (CEE) website (https://ag.umass.edu/clean-energy/current-initiatives/solar-pv-agriculture) and contact the Extension with any questions regarding this information. Before submitting your final pre-determination form to the Department, submit a draft version of the form to CEE, at energyextension@umass.edu. CEE will review the document with Agricultural Extension staff, and provide a letter to the applicant with any recommendations or comments regarding the proposed within about 10 days. Following CEE review, applicants seeking to be eligible as an ASTGU must submit the ASTGU pre-determination form, including the letter from CEE, to doer.smart@mass.gov.

This form is used by the Department and the MA Department of Agricultural Resources ("MDAR") to determine 1) that the farm site is eligible to host an ASTGU, 2) that the solar array and racking design conform with the requirements of an ASTGU, 3) that the farm plan is appropriately integrated with the shading profile determined by the required Shading Tool analysis, and demonstrates that an applicable range of productive agriculture can be maintained throughout the land covered by the array; and 4) that the farmer agrees to file annual reports on agricultural production and changes in the farm plan throughout the period of receiving the SMART tariff.

Pre-Determination Request Type

X Project meets the design criteria set forth for Agricultural Solar Tariff Generation Units in the *Guideline Regarding the Definition of Agricultural Solar Tariff Generation Units*, and the attached design materials demonstrate compliance.

☐ Project seeks a waiver to the design criteria set forth for Agricultural Solar Tariff Generation Units in the *Guideline Regarding the Definition of Agricultural Solar Tariff Generation Units*.

A. BASIC FARM INFORMATION

Farm Contact Person Name: Timothy Sena X Farm Owner X Farm Operator
Farm Name: Ridge Road Farm
Legal Structure: ☐ Sole Proprietor ☐ LLC ☐ Corporation
☐ Partnership X Other Double Proprietor
Mailing Address: 190 Ridge Road, Worthington, MA 01098
Street Address (if different):
Contact Phone : [redacted] Contact E-mail: [redacted]
Check all that apply: ☐Solar facility owner X Landowner X Applicant

(Update for PB: Redacted Farmer contact information)

Current Type of Operation (Check all that apply):
☐ Vegetables ☐ Fruit ☐ Livestock ☐ Poultry
☐ Nursery X Other Hay

Total Acreage in Production: 37

Estimated Annual Sales: ☐ Less than $5,000 X $5,000-$24,999 ☐ $25,000-$249,999
☐ $250,000-$499,999 ☐ $500,000 or more

Are any major modifications to the farm business expected in the next 5 years? X Yes ☐ No
(Check all that apply.)
☐ Business Legal Structure ☐ Operation Type ☐ Expansion X Diversification
☐ Retirement ☐ Sale ☐ Subdivision ☐ Other

SOLAR FACILITY OWNER CONTACT INFORMATION
(IF DIFFERENT FROM ABOVE)
Name: BWC Wades Stream, LLC Business (if applicable): BlueWave
Mailing Address: 116 Huntington Ave, Suite 601, Boston, MA 02116
Street Address (if different):
Contact Phone : (617) 209-3122 Contact E-mail: msylvia@bluewave.energy
Check all that apply: ☐Landowner X Applicant

LANDOWNER CONTACT INFORMATION
(IF DIFFERENT FROM ABOVE)
Name: Business (if applicable):
Mailing Address:
Street Address (if different):
Contact Phone : Contact E-mail:
Check all that apply: ☐Applicant

APPLICANT CONTACT INFORMATION
(IF DIFFERENT FROM ABOVE)
Name: Michael Zhe Business (if applicable): BlueWave
Mailing Address: 116 Huntington Ave, Suite 601, Boston, MA 02116
Street Address (if different):
Contact Phone : (585) 613-6245 Contact E-mail: mzhe@bluewave.energy

B. SITE INFORMATION

Street Address: 190 Ridge Road

Approximate Latitude/Longitude: 42.4101759, -72.9512116

Assessors Map/Plat Number:_____

Parcel/Lot Number: 407_0_28

Total Acreage: 40.8

Land Status: For qualifying under 61A, please provide proof of either current or previous enrollment; attach the proof to this application per below.

X currently enrolled in Chapter 61A

X enrolled in Chapter 61A in previous 5 years

☐ Important Agricultural Farmland: *Please attach MassGIS OLIVER map showing important farmland soils*

Will the project be implemented on APR-restricted land? ☐ Yes X No

If yes, please list: Name on APR restriction:_____ Year APR recorded: _____

Will the project be implemented on land restricted by an Agricultural Covenant under the Farm Viability Enhancement Program? ☐ Yes X No

Note: Please label and provide the following REQUIRED ATTACHMENTS as part of APPENDIX A: REQUIRED ATTACHMENTS, defined and found at the end of this application.

REQUIRED ATTACHMENTS for this section –

- Property map
- Soils map, if applicable
- Map of APR-restricted area, if applicable
- 61A current or previous enrollment documentation
- CEE Letter for DOER.SMART submission

C. EXCEPTION REQUEST

Please check off the design criteria requirement(s) the Applicant is seeking an exception from:

☐ Panel Height Requirements
☐ Maximum Direct Sunlight Reduction Requirements
☐ Growing Season/ Time of Day Considerations
☐ Other
X N/A

The Department recognizes the variety and, in some cases, the uniqueness of farming operations where some of the ASTGU system design parameters may not be required to achieve the objectives of the ASTGU. To address these such specific cases, an applicant may request that the Department, in consultation with MDAR, issue an exception from any of the system design parameters, for an ASTGU in Section 3b) above. All exception requests should be submitted to DOER.SMART@mass.gov. In no case will an exception be approved by the Department if it is contrary to the intent of the regulations.

An exception request shall include the following:

i. An Alternative Plan that:

1. details how the applicant will integrate the ASTGU into their farming operation;
2. demonstrates that the Alternative Plan does not result in a diminishment in the agricultural production capacity of the land; and
3. demonstrates that the primary use of the land is for agricultural or horticultural production, as defined by M.G. L. c. 61A.

ii. Justification and Substantiation An applicant must provide justification as to why an the alternative ASTGU design is necessary for the proposed agricultural operations on the relevant parcel of land.

iii. Additional Documentation An applicant must provide documentation for each specific aspect of the system design parameters set forth below for which the ASTGU is requesting an exception:

1. Panel Height Requirements: Provide documentation demonstrating how the proposed design will allow for the variety and flexibility of a variety of potential farming operations at the farm throughout the entire SMART tariff term.

2. Maximum Direct Sunlight Reduction Requirements

a. demonstrate how the proposed dual-use design will provide equal or greater total agricultural yields than if both the agricultural crop and solar array were grown and installed separately, utilizing the same amount of total land area for the comparison;

b. demonstrate how each square foot of land will be used for agriculture production; and c. demonstrate how the design will be able to accommodate a variety of potential agricultural products throughout the SMART tariff term.

3. Growing Season/Time of Day Considerations: Provide documentation on how the time of season and time of day data in the system design parameters is not relevant to the farming practice and operation, currently, and for the term of the SMART Tariff.

4. Other: For all other requirements for which an exception is being sought, please describe the exception(s) requested, why the proposed alternatives require an exception, and how these alternatives will meet the intent of the ASTGU requirements in the SMART Regulation and Guideline.

D. SOLAR ARRAY DESIGN

Please provide the following information regarding the solar array design:

Nameplate capacity AC (in MW): *1.99 (Note: 1 MW=1000 kW)*
Expected annual generation (in MWh): 6, 417 *(Note: 1 MWh=1000 kWh)*
Acreage of farmland over which array is to be installed: ~20 fenced acres, 4.28 acres covered by solar panels (Update for PB: ~27 acres, 4.73 acres covered by solar panels) Nameplate capacity DC (in MW): 3.67 (Update for PB: 3.93)

System type: ☐ Fixed X Tracking ☐ Other_____
Height of lowest panel edge (in feet): 6.5' at maximum rotation, 10' in horizontal position
Height of lowest elevated horizontal mounting (in feet): 10

Type of mounting structure and proposed materials (mono poles, I-Beams, racking, etc.):
Pile-driven or ground-screw mounted steel posts or A-frame structures depending on the results of geotechnical studies.

Description of materials and process to be used for ground penetration: *Standard solar construction equipment, materials and processes will be used to install galvanized-steel posts into the ground. The most probable, industry-standard equipment would be a rubber-tracked machine with ground pressures below those of standard agricultural tractor tires (35 psi) or duals or flotation tires at 21 psi. For example, screw piles would typically be installed with rubber-tracked excavators or track loaders operating at 3-10 psi ground pressure. As with good agricultural management practice, soil decompaction will be performed if necessary following racking and panel installation.*

Number of panels: 6336 (Update for PB: 7423)
Capacity per panel: 580-watt modules (Update for PB: 530-watt modules)
Panel dimensions: 7.925' x 3.725' x 1.38" (Update for PB: 7.47' x 3.72' x 1.6")
Panel spacing: 0.5" between panels
Number of rows: 52 (Update for PB: 53)
Distance between row mounting columns: 18' interrow, 26' center-to-center
For fixed systems horizontal tip-to-tip distance between top of panel in row in front and bottom of panel in the row behind N/A
For tracking systems distance between panels tip-to-tip in the horizontal position: 18'

If you wish to provide additional descriptive information regarding the solar array design, you may include this information below, or in a typed attachment labeled "Solar Array Design."

See attachments B1, B2 and B3.

Note: Please label and provide the following REQUIRED ATTACHMENTS as part of APPENDIX A: REQUIRED ATTACHMENTS, defined and found at the end of this application.

REQUIRED ATTACHMENTS for this section.

The following system drawings:

- A site plan (as viewed from above) of the impacted farmland with clear depiction of the layout of all array modules, including dimensions of the overall array, each module, and all applicable spacing.
- A design drawing (from the side) of a representative module with dimensions showing panel tilt and elevations from ground.
- A design drawing of the mounting structure with details showing dimensions and all materials of the ground penetrations.
- Panel Specification sheet

E. SHADING ANALYSIS

An ASTGU must demonstrate it is in compliance with the 50% maximum shading allowance through the use of the ASTGU Shading Analysis Tool provided by the Department. This shading analysis should be completed prior to the completion of this pre-determination form.

Provide all solar array design and layout information and input data used by the Shading Analysis Tool to conduct the shading analysis for the project.

Provide all output in the form of a screenshot from the Shading Analysis Tool, including a site map to clearly demonstrate the simulated percent of shading over the simulated growing season of all farmland impacted by the array. The map should be discernable down to at least a per square foot scale.

Note: Please label and provide the following REQUIRED ATTACHMENTS as part of APPENDIX A: REQUIRED ATTACHMENTS, defined and found at the end of this application.

REQUIRED ATTACHMENTS for this section

- Shading Tool Screenshot
- SMART Tool Export Spreadsheet

F. AGRICULUTRAL PLAN FOR DUAL-USE AREA

Planned agricultural use, Year 1. Check all that apply.
☐ Vegetable, fruit, grains, for human consumption
X Hay
☐ Livestock production
☐ Poultry production
☐ Horticulture
☐ Floriculture
☐ Aquaculture
☐ Other, please describe:_____

Please fill out the Crop Table for horticulture, flowers, vegetable, fruit, grain, and hay crops. Complete one line for each crop to be grown under the solar array, including the area to be planted within the array, and expected productivity using specific units (e.g., lbs./acre, quarts per row). Fill out one Crop Narrative for each crop, detailing anticipated crop management (planting, irrigation, soil amendments, harvesting) and equipment to be used.

Please fill out the Grazing Table for livestock and poultry production. Complete one line for each type of livestock or poultry to be raised under the solar array, including the area to be grazed within the array, and expected productivity using specific units (e.g. lbs of milk per year). Please also fill out the Grazing Narrative, detailing anticipated pasture and animal management and equipment to be used.

For all agricultural uses, please fill out the Farm Equipment Table. Complete one line for each farm vehicle to be used within the solar array.

Additional comments regarding agricultural plan for Year 1:

In Year 1, the array area will be used to produce hay, as it has for many years.

Do you expect to grow the same crops on the land in years 2 and 3? Briefly describe your crop rotation plan and what you expect to be growing on the land for the next 5 years. Will the same equipment be used? If not, is current array design compatible with future crop management needs and equipment?

In Years 2, 3 and beyond, the array area will continue to be used to produce hay. No crop rotation is expected. The equipment used in Year 1 will continue to be used.

SPECIFIC FARM INFORMATION RELATIVE TO THE ASTGU LOCATION

Please List Specific Crops Grown for the past five years with approximate acreage for the area beneath the newly proposed ASTGU array:

☐ Vegetables: _____

☐ Fruits: _____

☐ Livestock: _____

☐ Poultry: _____

☐ Nursery: _____

X Other: Hay, 20 acres (Update for PB: Hay, 27 acres)

SPECIFIC FARM INFORMATION RELATIVE TO GUIDELINE SECTIONS 4 & 5 FARMLAND COMPLIANCES

For eligible existing farmland/newly created farmland, please confirm meeting the following items per Sections 4 of the SMART Program Guidelines, revised and effective May 15, 2022.

4) Eligible Existing Farmland/Newly Created Farmland

a. All land intended to be newly created farmland shall be deemed eligible farmland if it has established agricultural production prior to the date when an application is submitted to the SMART program.

   Please describe how the newly created farmland was developed and what and when agricultural production was established.

This array will be built on existing farmland.

b. Fallow farmland, which is defined as open arable land that has not been cultivated or used in agriculture for a period of one to five years preceding the date of application, shall be considered existing farmland.

   Please document with an existing site map where any of the proposed ASTGU project utilizes fallow farmland and approximate acreage.

This array will be built on existing farmland.

c. No newly created farmland footprint shall be a result of the clearing or conversion of forest land.

   Please document with an existing site map that no newly created farmland was the result of forest clearing or conversion.

Forest clearing or conversion is not required for this project.

d. Soils tests shall be provided from the UMass Amherst Soils Testing Laboratory or equivalent, demonstrating pH and macronutrients are within optimum ranges for the crops proposed. In general, the pH should not be lower than 6.0 unless it is a specific crop requirement. Please provide soils tests as an attachment in APPENDIX A as noted at the end of this section.

See attachment D2.

5) For ASTGUs with newly proposed grazing of animals or production of hay projects on land in agricultural production on Important Agricultural Farmland, please confirm meeting the following items per Section 5 of the SMART Program Guidelines, revised and effective May 15, 2022.

Is the proposed project on Important Agricultural Farmland? *Yes.*

If so, is the applicant proposing a new grazing or production of hay operation for the ASTGU project? *No, this land has been used to produce hay for many years.*

If yes:

(1) Demonstrate that the production of hay or grazing of animals will be in combination with concurrent growing of crops comparable to the existing operation for the first five years of the ASTGU operation.

(a) For grazing projects, a rotational plan should be included with at least 33% of the ASTGU footprint devoted to comparable crops. Please provide a mapping plan as noted at the end of this section. Please note the comparable crops proposed.

(b) For hay projects at least 50% of the ASTGU footprint must be devoted to comparable crops. Please provide a mapping plan as noted at the end of this section. Please note the comparable crops proposed.

Please describe complying meeting 5)(1)(a) and (b) below:

This project is located on Prime Farmland and Farmland of Statewide Importance. All acres have been used to produce hay for many years and will continue to be used to produce hay.

(2) Projects may propose transitioning to new commodities from crops comparable to the existing operation for above provided the plans include the applicant's previous experience with or a working knowledge of the new commodity, an estimate or other information detailing the market viability for the new product, and provides a comparison of the economic value of the planned commodity relative to current production.

If transitioning to new commodities, please provide required information below.

The land has produced a vital supply of hay for local horse and cattle farmers for many years and will continue to do so while the array is installed. Ridge Road Farm may incorporate livestock grazing at some point in the future, but hay will continue to be the primary product.

Note: Please label and provide the following REQUIRED ATTACHMENTS as part of APPENDIX A: REQUIRED ATTACHMENTS, defined and found at the end of this application.

REQUIRED ATTACHMENTS for this section

- Please attach a *Crop or grazing diagram overlay on the shading analysis map.*
- Please attach a copy of *Soils Tests.* (if applicable)
- Please attach a mapping plan per 4.)b above (if applicable)
- Please attach a mapping plan per 4,)c above (if applicable)
- Please attach a mapping plan per 5)(1)(a) above (if applicable)
- Please attach a mapping plan per 5)(1)(b) above (if applicable)

FARM EQUIPMENT TABLE

Equipment Type	**Equipment Make & Model**	**Clearance (ft)**	**Width (ft)**	**Turning radius (ft)**	**Purpose(s) for Use within Solar Array**
Tractor	John Deere 5325	8 ft 2 in	6 ft 5 in	10 ft 3 in	Used in combination with attachments to cut, rake, dry, bale or pick up hay.
Mower-Conditioner	John Deere S250	4 ft	8 ft 2 in	16 ft	Cutting & crimping hay.
Baler	Hesston	5 ft	9 ft	20 ft	Baling hay.
Wagon		10 ft	8 ft	25 ft	Picking up hay. Wagon will only be driven in the center of the array rows so as to not interfere with the panels.

G. CROP NARRATIVE

*Please detail anticipated crop management, including approximate **dates** and **equipment** to be used. We recognize management is subject to weather, disease pressure, worker availability, etc. The purpose of this form is to demonstrate the solar array design is compatible with anticipated equipment usage and crop management needs. If you need additional space, please include a typed attachment labeled "Crop Narrative."*

Crop: *Hay*

Planting Plan: *The array area is already planted with a permanent hay mixture of timothy, orchardgrass, and clover. Any areas damaged by construction will be re-seeded with a seed mix that matches the existing pasture mix.*

Soil Amendment Plan: *Ridge Road Farm fertilizes the array area with a nitrogen-phosphorous-potassium mixture every year, with the exact formulation varying based on nutritional needs and availability. They rent a spreader from Nutrien Ag Solutions in South Deerfield to spread the fertilizer, usually at the rate of roughly 250-285 pounds per acre. Ridge Road Farm also spreads lime on the array area periodically. Lime and fertilizer will be applied during construction, after which Ridge Road Farm's typical schedule of liming & fertilizing will resume, with the spreader being driven down the center of the array rows to avoid contact with panels.*

Cultivation Plan: *As this field is seeded with perennial hay, following post-construction seeding, no further cultivation is planned at this time. The dominant species are timothy, orchardgrass and clover. Post-construction seeding will aim to match the current species mix.*

Irrigation Plan: *This field is not irrigated; no irrigation is planned. Worthington receives on average 52 inches of rain each year, which is sufficient for pasture growth.*

Pesticide/Herbicide Plan: *Ridge Road Farm does not currently use pesticides and does not anticipate using pesticides or herbicides in the array area.*

Harvest Plan: *Ridge Road Farm typically gets two cuttings of hay each year from this field. The hay will be mown when there is a dry spell expected and the grass is at an appropriate growth stage. When the hay has reached 15-20% moisture content, it will be raked and baled. The decision on when to bale is based on the practicalities of weather following mowing and the desired consumer. Ridge Road Farm sells mostly small square bales to horse and cow producers, with horse farms requesting hay baled at lower moisture percentages. Ridge Road Farm has many years of experience making hay and will use their best judgment to produce high quality hay.*

CROP TABLE

Crop	**Area to be planted** ***(Row length and width or acreage, as appropriate)***	**Planting date(s)** ***(approximate)***	**Harvest date(s)** ***(approximate)***	**Expected productivity, in absence of shading**	**Expected productivity, with shading**
Hay	The array will be constructed on ~20 acres of a 27-acre field of perennial hay. The acreage that will need to be reseeded following construction is not known at this time. (Update for PB: 27 acres)	Following construction, TBD.	Early June, late August	3.8 tons/acre based on USDA estimates of soil type productivity and historical yield data; 20 acres, 76 tons	25% productivity loss expected due to shading and reduced management efficiency; 20 acres, 2.85 tons per acre, 57 tons

H. GRAZING NARRATIVE

*Please detail anticipated animal and pasture management, including **dates** and **equipment** to be used. We recognize management is subject to weather, disease pressure, worker availability, etc. The purpose of this form is to demonstrate the solar array design is compatible with anticipated equipment usage and production needs. If you need additional space, please include a typed attachment labeled "Grazing Narrative."*

Type(s) of Animals to Be Grazed:

Pasture Management Plan: List any anticipated seeding, soil amendment, irrigation, pesticide, mowing, etc., including approximate dates and equipment to be used.

Animal Management Plan:
For each type of animal to be grazed, describe anticipated management regarding housing/shelter, water source, fencing, movement, disease treatment, harvest, etc. that is expected to be carried out within the solar array area. Describe equipment to be used in these activities, and list equipment in the Farm Equipment Table.

Describe any modifications to the solar array design made in order to reduce the risk of animal damage to the solar array, or risk of electrocution to animals.

GRAZING TABLE

Type(s) of animal to be grazed	**Area to be grazed** ***(acreage)***	**Grazing pressure** ***(# animals per acre)***	**Purpose (e.g. meat, dairy, eggs)**	**Grazing period(s)**	**Harvest date(s)** ***(if applicable)***	**Expected productivity (without solar array)**	**Expected productivity (with solar array)**

I. Compliance with Requirements of 225 CMR 20.00 and *Guideline Regarding the Definition of Agricultural Solar Tariff Generation Units.*

Please respond to each of the following relevant Regulatory and Guideline requirements to demonstrate compliance with all eligibility requirements for ASTGUs. You may refer to other sections within this document if you feel you have previously appropriately addressed a specific line item.

Regulations

225 CMR 20.06(1)(d) contains the following special provisions pertaining specifically to the eligibility of ASTGUs:

(d) Special Provisions for Agricultural Solar Tariff Generation Units. In order to qualify as an Agricultural Solar Tariff Generation Unit, a Solar Tariff Generation Unit must submit documentation itemized in 225 CMR 20.06(1)(d) below. All final determinations regarding the eligibility of such facilities will be made by the Department, in consultation with MDAR. A Solar Tariff Generation Unit must also submit satisfactory documentation to the Department as detailed in the Department's *Guideline Regarding the Definition of Agricultural Solar Tariff Generation Units*.

1. the Solar Tariff Generation Unit will not interfere with the continued use of the land beneath the canopy for agricultural purposes;

Farming will be allowed to continue unimpeded due to the following design features: (i) the canopy height of 10', (ii) inter-row spacing of +/- 18', (iii) a 40-foot setback from the perimeter fence to array components to allow free movement of equipment, (iv) multiple gates within the perimeter fence.

2. the Solar Tariff Generation Unit is designed to optimize a balance between the generation of electricity and the agricultural productive capacity of the soils beneath;

The proposed single-axis tracker design allows compliance with the 50% shade rule. The maximum shade under the proposed design with 18' inter-row spacing is at 49% shade. (Please see attachments C1 – Shading Analysis Tool Screenshot and C2 – Crop Shading Suitability.)

3. the Solar Tariff Generation Unit is a raised structure allowing for continuous growth of crops underneath the solar photovoltaic modules, with height enough for labor and/or machinery as it relates to tilling, cultivating, soil amendments, harvesting, *etc.* and grazing animals;

The proposed design has modules raised 10' off the ground in the horizontal position. The lowest panel edge of 6.5' at full-tilt is adequate height for labor. Tractors will be used in the middle of the inter-row spacing where height is not an issue, with implements fitting easily underneath the panels while tilted. In the event tractors must be used directly underneath panels, the farmer will stow the panels in the horizontal position or tilted away from the working row, depending on final racking design.

4. crop(s) to be grown to be provided by the farmer or farm agronomist in conjunction with UMass Amherst agricultural extension services, including compatibility with the design of the agricultural solar system for such factors as crop selection, sunlight percentage, *etc.*;

Shade in the array will not exceed 49%. Research on agroforestry indicates that the anticipated level of shade in the array will not have a large negative impact on hay yield.

5. annual reporting to the Department and MDAR of the productivity of the crop(s) and herd, including pounds harvested and/or grazed, herd size growth, success of the crop, potential changes, *etc.*, shall be provided after project implementation and throughout the SMART incentive period;

BlueWave or its affiliates/assigns will coordinate with Ridge Road Farm to provide MDAR with the requisite reports throughout the 20-year SMART incentive.

6. other system design information, which shall include, but not be limited to:
   a. dual-use type, *e.g.*, ground mount racking, pole towers, tracking, *etc.*;
   Pile-driven or ground-screw mounted steel posts or A-frame structures, single-axis tracker, 10-foot minimum height
   b. total gross acres of open farmland to be integrated with the project;
   Roughly 20 acres (Update for PB: Roughly 27 acres)
   c. type of crop(s) to be grown, including grazing crops;
   Hay
   d. pounds of crop(s) projected to be grown and harvested, or grazed;
   Roughly 114,000 pounds of hay
   e. animals to be grazed with herd size(s); and
   N/A
   f. design drawing including mounting system type (fixed, tracking), panel tilt, panel row spacing, individual panel spacing, for pole towers tower spacing and mounting height, *etc.*
   Please see Attachments B2, B3 & B4

Guidelines

Please describe compliance with the Guidelines as follows:

b) System Design Parameters

i. Panel Height Requirements:

1. For fixed tilt ASTGUs, the minimum height of the lowest panel point shall be eight (8) feet above ground.

2. For tracking ASTGUs, the minimum height of the panel at its horizontal position shall be 10 feet above ground.

Panels will be mounted on torque tubes which are raised to 10'.

ii. Maximum Direct Sunlight Reduction Requirements:

All ASTGUs must demonstrate that the maximum sunlight reduction from the panel shading on every square foot of land directly beneath, behind and in the areas adjacent to and within the ASTGU's design shall not be more than 50% of baseline field conditions as calculated by the SMART Tool.

As shown in Attachment C1 – Shading Analysis Tool Screenshot, the maximum shade within the array will be 49%, with minimum shade being 31% and average shade being 42%.

iii. Compatible Sunlight Needs:

Per SMART Regulations 225 CMR 20.06(1)(d)(4), applicant shall provide documentation that the project's proposed solar design's sunlight amount and sunlight reduction is based upon the compatibility with the proposed agricultural crops and productivity, utilizing best available information as indicators, such as photosynthetic active radiation (PAR) and light saturation data; and qualitative information, e.g., sun-loving, partial sunlight, shade tolerant.

Please see attachment C1 – Shading Analysis. No square foot within the array shall exceed 50% maximum shade. Many grass species are tolerant of partial shade, particularly orchardgrass.

iv. Growing Season/Time of Day Considerations:

The typical growing season shall be March through October, with sunlight hour conditions with maximum 50% sunlight reduction to be between 10AM and 5PM for March and October, and from 9AM to 6PM from April through September.

Please see Attachment C1 – Shading Analysis. No square foot within the array shall exceed 50% maximum shade.

v. Maximum ASTGU Rated Capacity:

The maximum AC rated capacity of an ASTGU shall be five (5) MW. The maximum DC rating shall be 2:1 DC to AC ratio and shall not exceed 7.5 MW DC.

The maximum AC capacity of this ASTGU is 1.99 MW. The maximum DC rating is 3.67 MW. The DC: AC ratio is 1.84:1. (Update for PB: Maximum AC capacity is 2.0 MW. Maximum DC rating is 3.93. The DC:AC Ratio is 1.96:1.)

Note: Please label and provide the following REQUIRED ATTACHMENTS as part of APPENDIX A: REQUIRED ATTACHMENTS, defined and found at the end of this application.

- Design drawing including mounting system type (fixed, tracking), panel tilt, panel row spacing, individual panel spacing, for pole towers tower spacing and mounting height, *etc.*

J. SIGNATURES AND ATTESTATIONS

Prior to submitting the Pre-Determination Form, please read and sign as directed below.

Landowner

I hereby certify that I have personally examined and am familiar with the information submitted herein, and, based upon my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete.

Timothy J. Sena
Timothy J. Sena (Aug 1, 2024 17:08 EDT)
Signature of Landowner

08/01/2024
Date

Farm Operator and Landowner

I/we hereby certify that the information submitted regarding the current farm conditions and practice and the Agricultural Plan for the Dual-Use Area is accurate and complete to the best of my/our knowledge and intentions, and that I/we have engaged with the University of Massachusetts Amherst Clean Energy Extension and thereby its agricultural extension service to review the Agricultural Plan and its compatibility with the solar array structures and shading. Further, I/we agree, conditional on being provided eligibility to the SMART program as an ASTGU, to submit a report, through a template provided by the University of Massachusetts Clean Energy Extension, annually throughout the duration of the SMART incentive with ASTGU adder, on the operations and productiveness of the solar array and agriculture along with any changes to the Agricultural Plan for the following year. I/we understand that failure to maintain productive agricultural activities and annual reporting may result in the disqualification of the facility as an ASTGU in the SMART program.

Timothy J. Sena
Timothy J. Sena (Aug 1, 2024 17:08 EDT)
Signature of Farm Operator

08/01/2024
Date

Timothy J. Sena
Timothy J. Sena (Aug 1, 2024 17:08 EDT)
Signature of Landowner

08/01/2024
Date

Solar Facility Owner

I hereby certify that the information submitted regarding the Solar Array Description and inputs and outputs of the Shading Analysis is accurate and complete to the best of my/our knowledge and intentions.

Aaron Simms
Signature of Solar Facility Owner

08/01/2024
Date

APPENDIX A - REQUIRED ATTACHMENTS:

Please provide all required attachments referenced in this application under this section, labelled as follows:

A. SITE INFORMATION:

A1 - Property map

A2 - Soils map, if applicable

A3 - Map of APR/FVEP-restricted area, if applicable

A4 - 61A current or previous enrollment documentation

A5 – CEE Letter for DOER.SMART submission

B. SOLAR ARRAY DESIGN

The following system drawings:

B1 - A site plan (as viewed from above) of the impacted farmland with clear depiction of the layout of all array modules, including dimensions of the overall array, each module, and all applicable spacing.

B2 - A design drawing (from the side) of a representative module with dimensions showing panel tilt and elevations from ground.

B3 - A design drawing of the mounting structure with details showing dimensions and all materials of the ground penetrations.

B4 - Panel specification sheet

C. SHADING ANALYSIS

C1 - Shading Tool Screenshot

D. AGRICULUTRAL PLAN FOR DUAL-USE AREA

D1 - Please attach a *Crop or grazing diagram overlay on the shading analysis map.*

D2 - Soils Tests (if applicable)

D3 - Please attach a mapping plan per 4.)b (if applicable)

D4 - Please attach a mapping plan per 4,)c (if applicable)

D5 - Please attach a mapping plan per 5)(1)(a) (if applicable)

D6 - Please attach a mapping plan per 5)(1)(b) (if applicable)

E. Compliance with Requirements of 225 CMR 20.00 and *Guideline Regarding the Definition of Agricultural Solar Tariff Generation Units.*

E1 - design drawing including mounting system type (fixed, tracking), panel tilt, panel row spacing, individual panel spacing, for pole towers tower spacing and mounting height, *etc.*

24-0801 Pre-Determination Application_Worthington Ridge Rd_BWC Wades Stream

Final Audit Report 2024-08-02

Created:	2024-08-01
By:	Gabrielle Hayes (ghayes@bluewave.energy)
Status:	Signed
Transaction ID:	CBJCHBCAABAAlo4KkrhT_tXtH_GHMRiR1de3fXdzsjba

"24-0801 Pre-Determination Application_Worthington Ridge Rd_BWC Wades Stream" History

Document created by Gabrielle Hayes (ghayes@bluewave.energy)
2024-08-01 - 8:48:17 PM GMT

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Agreement completed.
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Appendix E: MA Department of Energy Resources ASTGU Pre-Determination Letter

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF
ENERGY AND ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENERGY RESOURCES
100 CAMBRIDGE ST., 9TH FLOOR
BOSTON, MA 02114
Telephone: 617-626-7300
Facsimile: 617-727-0030

Maura T. Healey
Governor

Kimberley Driscoll
Lt. Governor

Rebecca L. Tepper
Secretary

Elizabeth Mahony
Commissioner

October 10, 2024

Via Electronic Mail

Gabrielle Hayes
BlueWave Energy
d/b/a BWC Wades Stream, LLC
116 Huntington Ave, Suite 601
Boston, MA 02116
Email: ghayes@bluewave.energy

Dear Gabrielle Hayes,

This letter is in response to BlueWave Energy's (Applicant) Pre-Determination Form (Request), submitted August 2, 2024, concerning the potential qualification of a proposed 1.99 MW AC solar photovoltaic installation located at 109 Ridge Road in Worthington, MA (Project) as an Agricultural Solar Tariff Generation Unit (ASTGU) under 225 CMR 20.00. The Department of Energy Resources (Department), acting in consultation with the Massachusetts Department of Agricultural Resources (MDAR), has reviewed the Request.

Special provisions for ASTGUs are detailed in both 225 CMR 20.06(1)(d) and the *Guideline Regarding the Definition of Agricultural Solar Tariff Generation Units* (Guideline).

Special provisions for ASTGUs are detailed in 225 CMR 20.06(1)(d) as follows:

> In order to qualify as an Agricultural Solar Tariff Generation Unit, a Solar Tariff Generation Unit must submit documentation itemized in 225 CMR 20.06(1)(d). All final determinations regarding the eligibility of such facilities will be made by the Department, in consultation with MDAR. An Agricultural Solar Tariff Generation Unit must also submit satisfactory documentation to the Department as detailed in the Department's *Guideline Regarding the Definition of Agricultural Solar Tariff Generation Units*.
>
> 1. the Solar Tariff Generation Unit will not interfere with the continued use of the land beneath the canopy for agricultural purposes;

2. the Solar Tariff Generation Unit is designed to optimize a balance between the generation of electricity and the agricultural productive capacity of the soils beneath;
3. the Solar Tariff Generation Unit is a raised structure allowing for continuous growth of crops underneath the solar photovoltaic modules, with height enough for labor and/or machinery as it relates to tilling, cultivating, soil amendments, harvesting, etc. and grazing animals;
4. crop(s) to be grown to be provided by the farmer or farm agronomist in conjunction with UMass Amherst agricultural extension services, including compatibility with the design of the agricultural solar system for such factors as crop selection, sunlight percentage, etc.;
5. annual reporting to the Department and MDAR of the productivity of the crop(s) and herd, including pounds harvested and/or grazed, herd size growth, success of the crop, potential changes, etc., shall be provided after project implementation and throughout the SMART incentive period; and
6. other system design information, which shall include, but not be limited to:
    a. dual-use type, e.g., ground mount racking, pole towers, tracking, etc.;
    b. total gross acres of open farmland to be integrated with the project;
    c. type of crop(s) to be grown, including grazing crops;
    d. pounds of crop(s) projected to be grown and harvested, or grazed;
    e. animals to be grazed with herd size(s); and
    f. design drawing including mounting system type (fixed, tracking), panel tilt, panel row spacing, individual panel spacing, for pole tower spacing and mounting height, etc.

Additionally, the Guideline sets forth the following System Design Parameters for eligible projects:

i. Panel Height Requirements:
    1. For fixed tilt ASTGUs, the minimum height of the lowest panel point shall be eight (8) feet above ground.
    2. For tracking ASTGUs, the minimum height of the panel at its horizontal position shall be 10 feet above ground.
ii. Maximum Direct Sunlight Reduction Requirements:
    All ASTGUs must demonstrate that the maximum sunlight reduction from the panel shading on every square foot of land directly beneath, behind and in the areas adjacent to and within the ASTGU's design shall not be more than 50% of baseline field conditions as calculated by the SMART Tool.
iii. Compatible Sunlight Needs:
    Per SMART Regulations 225 CMR 20.06(1)(d)(4), applicant shall provide documentation that the project's proposed solar design's sunlight amount and sunlight reduction is based upon the compatibility with the proposed agricultural crops and productivity, utilizing best available information as indicators, such as photosynthetic active radiation (PAR) and light saturation data; and qualitative information, e.g., sun-loving, partial sunlight, shade tolerant.
iv. Growing Season/Time of Day Considerations:

The typical growing season shall be March through October, with sunlight hour conditions with maximum 50% sunlight reduction to be between 10AM and 5PM for March and October, and from 9AM to 6PM from April through September.

v. Maximum ASTGU Rated Capacity:

The maximum AC rated capacity of an ASTGU shall be five (5) MW. The maximum DC rating shall be 2:1 DC to AC ratio and shall not exceed 7.5 MW DC.

Acting in accordance with 225 CMR 20.00 and applicable guidelines, the Department, in consultation with MDAR, hereby determines that the Project, as proposed, has demonstrated that it likely satisfies all criteria set forth in 225 CMR 20.00 to be considered an ASTGU.

Please be advised that this pre-determination of ASTGU eligibility is not a final Department decision, is not binding on the Department or MDAR, and does not give rise to any appeal right under M.G.L. c. 30A, or any other law. The Department, in consultation with MDAR, will make a final determination on the eligibility of the Project's status as an ASTGU at the time it issues a Statement of Qualification under 225 CMR 20.06. Such final determination may be different from the pre-determination contained in this letter if information provided by you in connection with your Pre-Determination Form is materially inaccurate or incomplete. For any material changes to the project design, you will need to submit additional information on the design changes to the Department and MDAR for review. Please contact the Department if you have questions about what constitutes a material change.

If you have any questions regarding this pre-determination of eligibility, please contact Grace Fletcher at grace.fletcher@mass.gov.

Sincerely,

Samantha Meserve
Director, Renewable and Alternative Energy Division

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Appendix F: Rendering of a Typical Warning Sign


14”
DANGER
HIGH
VOLTAGE
KEEP OUT
10”

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Appendix G: Decommissioning Plan and Cost Estimate

DECOMMISSIONING PLAN AND COST ESTIMATE
BWC WADES STREAM, LLC
2.00 MW AC GROUND-MOUNT SOLAR AND BATTERY ENERGY STORAGE SYSTEM (BESS)
RIDGE ROAD, WORTHINGTON, MA

Timeline:

Decommissioning of the system will occur within 150 days following the end of the lease term.

Assumptions:

Key assumptions include the following:
1) Fencing, electrical cabinetry, solar racks, solar panels, wiring and all other equipment are 100% recyclable.
2) The primary cost of decommissioning is the labor to dismantle and load the equipment plus trucking.
3) Concrete pads will be demolished on-site and transported to an ABC recycling facility where it will be accepted at no charge.
4) All other recyclables will be transported to the nearest Transfer Station that accepts the material.
5) Costs are based on the *2025 NYSERDA Solar guidebook for Local Governments* typical decommissioning costs for solar projects in 2024 dollars. The prices have been adjusted to estimate 2025 costs based on the current average inflation rate of 2025 (2.7%).

Decommissioning Tasks:

Task		Cost
1)	**Remove Panels** The panels are bolted in. A laborer needs to unbolt the panel and remove the panel off the rack.	**$6,093**
2)	**Remove Rack Wiring** The panels are plugged together in the same manner as an electrical cord from a light is plugged into a wall socket. A laborer needs only to reach over and pull the plug. The string wires lie in a tray. A laborer needs only to reach into the tray and remove the strands of wire.	**$6,115**
3)	**Dismantle Racks** Racks will be dismantled.	**$32,249**
4)	**Remove Electrical Equipment (Inverters, Transformers, Switchgear)** Equipment will be removed from the equipment pads.	**$4,831**
5)	**Dismantle and Remove BESS (Battery Racks, Storage Containers, Electrical Assembly, Etc.)** BESS cabinet will be removed from the equipment pad.	**$6,000**
6)	**Break Up Concrete Pads** Concrete will be broken up using an excavator and jackhammer.	**$3,917**
7)	**Remove Racks** Racks will be removed and stockpiled.	**$20,368**
8)	**Remove Cable** Cables will be removed and stockpiled.	**$16,973**
9)	**Remove Foundation Posts and Utility Poles** Posts and poles will be removed from the ground using appropriate equipment.	**$36,164**
10)	**Remove Fence** Perimeter fixed knot game fence to remain. Fence fabric and posts will be removed around equipment pads.	**$1,293**
11)	**Grading** Graded areas (e.g., stormwater basins) will be returned to pre-construction conditions.	**$10,445**
12)	**Seed Disturbed Areas** Any graded areas will be seeded to promote revegetation.	**$653**
13)	**Trucking Costs** All stockpiled equipment and materials will be removed from the site and be recycled or disposed of.	**$5,875**
Total Decommissioning Cost Estimate (2025)		**$150,974**
Inflation for next 20 years based on average over last 20 years (2.5%)		$96,415
Total Decommissioning Cost Estimate (2045)		**$247,389**

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Appendix H: BESS FAQ

Battery Energy Storage Systems:

Frequently Asked Questions on Fire Safety and Public Health

BACKGROUND

Battery energy storage systems (BESS) are lowering costs and improving energy reliability across the country. These projects yield significant economic benefits by optimizing electric grid operations, reducing the cost of meeting peak demand, avoiding the need for additional transmission and distribution investments, and balancing the electric grid during times when supply and demand are not aligned. BESS are critical to meeting growing electricity demand cleanly and efficiently and reducing greenhouse gas emissions. BESS absorb and store electricity generated by sources like wind and solar, and then discharge that electricity later to meet customer demand. BESS also improve the resilience of the electric grid by continuing to supply power during emergency situations in many circumstances. All of these attributes help ratepayers and the economy at large by reducing electricity costs and improving reliability.

Due to their many benefits, BESS are becoming increasingly common in Massachusetts and around the country. According to the federal U.S. Energy Information Administration, U.S. battery capacity increased 66% in 2024, and is poised to set new records in 2025. Over 80% of new electric generation capacity is expected to come from battery storage and solar, led by states like Texas. This growth creates opportunities for new job growth, investment in manufacturing, and can be a source of increased local property tax revenues in communities where it is deployed.

Most BESS utilize lithium-ion batteries to store energy. Lithium-ion batteries have high energy density, meaning that they pack a lot of power in comparison to their overall volume. This is why they are used for so many consumer devices, such as laptops, phones, electric bikes, and electric vehicles. When used, charged, and stored properly, lithium-ion batteries are safe. In the rare case of a fire or other incident at a BESS, fires can be very difficult to extinguish and can reignite after suppression. Because of this, the Commonwealth has adopted numerous codes, standards and best practices to mitigate the risk of fire-related incidents at BESS installations.

<u>References</u>

U.S. Energy Information Administration. “U.S. battery capacity increased 66% in 2024.” 2025

Massachusetts Energy Storage Initiative (ESI) Goals & Storage Target. 2024 ES Target Reports

NFPA, Energy Storage Systems (ESS) and Solar Safety, https://www.nfpa.org/education-and-research/electrical/energy-storage-systems

US EPA, Battery Energy Storage Systems: Main Considerations for Safe Installation and Incident Response, https://www.epa.gov/electronics-batteries-management/battery-energy-storage-systems-main-considerations-safe

TYPES OF BATTERY ENERGY STORAGE SYSTEMS

Many types of grid energy storage are commercially available today, each of which have different methods of storing and dispatching energy. Some of these use electrochemical compositions (e.g., lithium-ion, lead-acid, sodium-ion, iron oxide, etc.), while others use thermal (e.g., sensible heat storage, latent heat storage, or thermochemical) or mechanical energy (e.g., pumped hydroelectric, compressed air, gravity-based storage, etc.). Nearly 97% of the energy storage being constructed in Massachusetts today are electrochemical BESS that use lithium-ion batteries. Lithium-ion batteries are a class of energy storage technologies that were first sold starting in the 1990s and have since become ubiquitous in consumer electronics such as mobile phones and laptop computers, electric vehicles, and BESS. Due to the heavy proliferation of lithium-ion batteries, all references to BESS in this document refer to lithium-ion BESS.

References

2024 Energy Storage Target Reports

Nishi, Yoshio. "The Dawn of Lithium-Ion Batteries." The Electrochemical Society Interface, Vol. 25, Iss. 71 (2016).

PURPOSE OF FAQ

This FAQ is intended to help local decision-makers and community members answer common questions about BESS. Specifically, this FAQ addresses some commonly asked questions about grid connected lithium-ion BESS, with a particular focus on questions pertaining to fire safety, environmental impacts, and public health.

1. **How will my community benefit from a BESS?**

   Communities across the state host energy infrastructure like BESS, making up our highly reliable electric grid. BESS, in particular, reduce the cost of meeting peak demand, avoiding the need for additional transmission and distribution investments, reducing wholesale energy supply costs, and improving reliability. BESS are critical to meeting and managing growing electricity demand. Unlike other forms of energy infrastructure, BESS do not emit significant pollution, and will ultimately help replace highly polluting peaker plants across the state. Communities may also benefit from added investment from developers through community benefits plans, tax revenue, and jobs to communities.

2. **What can cause a BESS to catch fire?**

   During normal operation, a battery's lithium-ion cells charge from and discharge electricity to the grid, which generates a small amount of heat that usually safely dissipates. However, if a battery is overcharged, short circuits, is defective or sustains mechanical damage, the heat may not dissipate and can cause the temperature inside the lithium-ion cells to rise uncontrollably beyond operational limits. This causes what's known as a thermal runaway fire. There may also still be energy within the BESS after being involved in a fire and this so-called "stranded energy" may cause reignition of the fire hours, days, or weeks later.

Resources:

Electric Power Research Institute, Insights from EPRI's Battery Energy Storage Systems (BESS) Failure Incident Database: Analysis of Failure Root Cause, May 2024.

Energy Storage Systems Safety Fact Sheet, National Fire Protection Association, Published February 2024.

UL Research Institutes: What Is Thermal Runaway? Published August 24, 2021

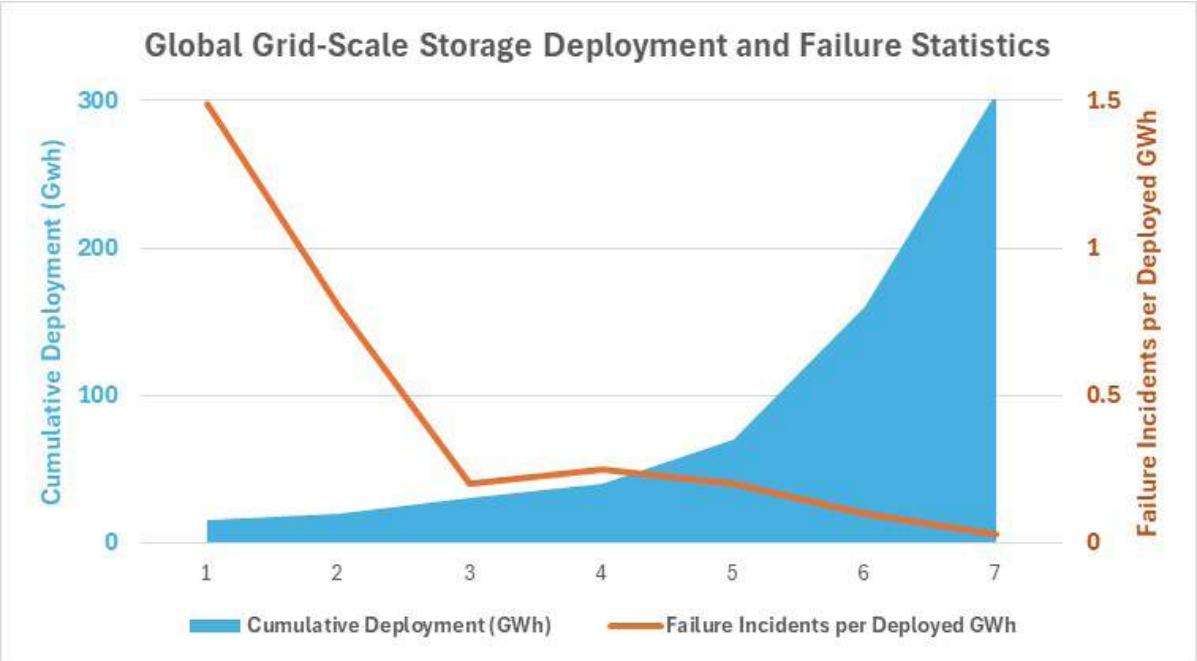
UL Research Institutes: What Causes Thermal Runaway? Published August 20, 2021

3. What is the likelihood that a BESS catches fire?

Many types of infrastructure, including BESS, come with some degree of risk that a fire incident could occur. BESS related fires are rare if designed with sufficient safety protections and are installed, operated, and maintained in a manner that maintains the system safely — as demonstrated by the many systems currently operating safely. In the Commonwealth today, there are over 6,000 grid connected BESS installations, ranging from residential to large-scale installations, with some BESS having first been installed nearly 10 years ago.

Additionally, data shows the safety record of BESS has improved significantly in recent years as the technology has matured, industry practices have improved and regulatory standards and codes incorporate learnings gained from experience. A comprehensive worldwide analysis by the Electric Power Research Institute found that the failure rate of utility-scale BESS decreased by 98% between 2018 and 2024 while the deployment of BESS greatly increased.

Figure 1: Global Grid-Scale BESS Deployment and Failure Statistics



Lessons learned from earlier incidents when the technology was nascent have led to robust requirements and improved industry practices, which today inform the safe siting of BESS and emergency response procedures in the Commonwealth. For example, the Moss Landing facility in California, at which a large indoor BESS fire occurred on January 16, 2025, was designed to be located inside a 1950s era building that previously housed an old power generation facility. The facility was also unique in how it arrayed its battery racks and utilized a less common nickel-manganese cobalt chemistry as opposed to lithium-ion phosphate, which is more common and safer. Such a facility would not be permitted under revised codes and standards that exist today for installations within the Commonwealth.

Resources:

Electric Power Research Institute, BESS Failure Incident Database. Accessed October 20, 2025.

Fire & Risk Alliance, LLC and the American Clean Power Association, Assessment of Potential Impacts of Fires at BESS Facilities, 2025.

4. **Are there any codes or standards in Massachusetts to mitigate the risk of fires at BESS installations?**

Yes. There are robust standards and codes in place today to which all BESS constructed in Massachusetts must adhere. BESS that are installed, operated, and maintained in accordance with these standards should typically be operated without incident.

In Massachusetts, BESS must comply with 527 CMR 1.00: The Massachusetts Comprehensive Fire Safety Code, which is adopted by the Massachusetts Board of Fire Prevention Regulations (BFPR). This code is consistent with the national model fire code developed by the National Fire Protection Association (NFPA) NFPA 1, but contains some additional Commonwealth-specific standards.

The Massachusetts Comprehensive Fire Safety Code is updated every three years to reflect updates to NFPA 1 and NFPA 855. These updates to the fire code incorporate the latest lessons learned and evidence-based practices for new developments in energy systems such as BESS. It sets comprehensive fire protection criteria for BESS and other energy storage installations based on the technology used, the setting where the system is being installed, the size and separation of the containers or installations, and the fire suppression and control systems in place. NFPA 855 also reflects the current best practice for mitigating the risk of explosions and safely containing fires and applies to all lithium-ion BESS with a capacity larger than 20 kilowatt-hours.

In addition, all BESS constructed in Massachusetts must be listed with a Nationally Recognized Testing Laboratory to UL 9450 (Standard for Energy Storage Systems and Equipment) or an approved equivalent.

NFPA 1, Fire Code

NFPA 855, Standard for the Installation of Stationary Energy Storage Systems (2026)

527 CMR 1.00: The Massachusetts Comprehensive Fire Safety Code

5. **Do BESS that catch fire emit toxic chemicals into the air?**

While fire related BESS incidents are rare, the byproducts released during BESS fires have been found to be largely similar to those released during conventional fires (e.g., house and structure fires) with no contaminant concentrations beyond the immediate fire scene that posed a risk to public health.

Between 85-92% of the gas volume produced in BESS fires has been found to consist of hydrogen (H2), carbon dioxide (CO2), and carbon monoxide (CO). BESS may also emit volatile organic compounds (VOCs),or other trace gases depending on the battery chemistry and overall materials used in the construction of the BESS unit. The state of charge (i.e., how charged a battery is) at the time of a fire is a contributing factor in the proportion of different gases emitted, with a lower state of charge leading to higher CO2 and lower CO emissions, and a higher state of charge leading to the reverse. With these factors in mind, it is important to note that in some situations, unignited gases may create potentially hazardous conditions within and around the BESS room or container.

Air sampling from past BESS incidents across the United States found that no incident had contaminant concentrations beyond the immediate fire scene that posed a public health risk. Studies indicate that emissions are mostly confined to the immediate vicinity of the fire because the ignited gases resulting from a BESS fire become rapidly dispersed and diluted in the air to safe levels. However, the smoke emitted from fire incidents always presents a public health risk for the immediate fire scene and the appropriate emergency response measures should always be followed. In the event of a fire at a BESS facility, nearby residents and businesses should follow all instructions from fire officials, which may involve the evacuation of residents depending upon the scale of the fire, similar to emergency responses for other structural or industrial fires.

C. Essl et al., "Comprehensive Hazard Analysis of Failing Automotive Lithium-Ion Batteries in Overtemperature Experiments," Batteries, vol. 6, no. 2, p. 30, May 2020, DOI Foundation: https://doi.org/10.3390/batteries6020030.

Fire & Risk Alliance, LLC and the American Clean Power Association, Assessment of Potential Impacts of Fires at BESS Facilities, 2025.

Energy Storage Systems Safety Fact Sheet, National Fire Protection Association, Published February 2024.

6. **What emergency response steps are in place if there's a BESS fire?**

In the rare case of a fire or other incident at a BESS, there are multiple layers of local, state, and federal emergency response procedures in place to reduce risks to public health, safety, and environment. In the event of a fire or spill at a BESS facility, the local fire department should be called immediately. Depending on the nature of the incident and the capabilities of the local fire department, additional firefighting resources may be required from neighboring communities. The fire response could ultimately require firefighters and apparatus from across the region through the Statewide Fire Mobilization Plan.

After the local fire department has been notified, MassDEP Emergency Response must be notified via the Emergency Response Hot Line (888-304-1133) within 2 hours of a release or spill of hazardous materials that meet MassDEP's 2-hour reporting thresholds requirements. MassDEP

Emergency Response personnel are available 24/7 to respond and help contain and assess spills/releases of oil or hazardous chemicals.

Following a battery fire or other release to the environment, the owner of the BESS is required to hire a Licensed Site Professional/response contractor to implement immediate response actions. As the circumstances require, response actions could include immediate containment or spill cleanup, as well as sampling of nearby soils, surface waters and groundwater for residual contamination.

If contamination is found above regulatory limits, then further cleanup is required. If the owner/potentially responsible party is unwilling or unable to hire a contractor, MassDEP has the ability to activate one, and pursue cost recovery from the potentially responsible party. MassDEP also maintains on its website a list of licensed hazardous waste transporters who can provide transport and disposal services. The regulations governing these environmental response measures are known as the Massachusetts Contingency Plan.

Resources:

Massachusetts Contingency Plan, 310 CMR 40.0000.

MassDEP, Environmental Emergency Response Program.

Massachusetts Statewide Fire Mobilization Plan, https://www.mass.gov/info-details/fire-mobilization.

MassDEP, Licensed Hazardous Waste Transporters.

7. **Can BESS that catch fire lead to chemicals leaching into the ground or groundwater, including aquifers and drinking water sources?**

In past BESS fire incidents where environmental sampling was conducted, water and soil samples did not reveal hazardous contamination levels requiring remediation. Massachusetts regulations will require BESS to be built on pads that allow for the containment of materials preventing them from leaching into the soil below.

Due to the potential of water runoff from firefighting activities in these incidents, the consensus best practice today for response to a BESS fire is to surround the fire with cooling water to prevent the spread of the fire and protect surrounding areas and structures, including trees, brush, and any nearby buildings. In doing so, water is less likely to pick up potential contaminants in any runoff.

Additionally, studies show that the chemical byproducts produced in BESS fires have low water solubility, limiting the potential for groundwater contamination. Across 35 documented large-scale BESS fire incidents in the United States that occurred between 2012 and 2024, there has been no evidence of any air, soil, or water contamination at levels that would pose a public health concern or require further remediation.

Resources:

Fire & Risk Alliance, LLC and the American Clean Power Association, Assessment of Potential Impacts of Fires at BESS Facilities, 2025.

Eurofins Calscience, "Water Quality Report: SDG&E Battery Fire," Sep. 2024. https://www.escondido.gov/DocumentCenter/View/6717/SDGE-Water-Run-Off-ReportPDF?bidId=

New York State Interagency Fire Safety Working Group, "Air, Soil, and Water Data Findings," NYSERDA, Dec. 2023.

Electric Power Research Institute (EPRI), The Evolution of Battery Energy Storage Safety Codes and Standards, EPRI White Paper, November 2023.

8. **What rules and standards exist to ensure that a BESS fire does not lead to environmental contamination or endanger public health?**

All BESS constructed in Massachusetts must adhere to robust standards and codes. Facilities are required to be listed by a Nationally Recognized Testing Laboratory to UL 9450 (Standard for Energy Storage Systems and Equipment) or an approved equivalent. BESS must also meet NFPA standards and the latest edition of the Massachusetts State Fire Code, which includes emergency operations plans, emergency training, smoke detection systems, fire control and suppression systems, explosion control, spill response measures, enclosure of electrical circuitry within weatherproof enclosures, setback requirements, and recommendations on the use of water as the primary fire suppression agent for BESS fires, among other requirements.

Additionally, BESS must already comply with certain state and local requirements that aim to prevent fire related runoff from affecting the public health and the environment. For example, the Massachusetts Department of Environmental Protection's (MassDEP) Stormwater Management Standards require measures to control surface water runoff that may contribute to downstream flooding, and that prevent stormwater discharges from causing or contributing to the pollution of surface water and groundwater. For projects proposed on land held by public water systems for drinking water purposes, BESS must be located in a self-containment area so that in the event of a fire, fire extinguishing chemicals will be contained.

Under new draft rules that have been proposed by the Energy Facilities Siting Board (EFSB) and Department of Energy Resources (DOER), all BESS are proposed to be required to provide emergency response plans that must be provided to permitting authorities prior to filing a permit application. In the case of small BESS facilities subject to DOER's rules, the emergency response plan is proposed to be created in consultation with local fire, police, and emergency management departments.

Resources:

UL 9540, Energy Storage Systems and Equipment

UL 9540A, Test Method for Battery Energy Storage Systems (BESS)

NFPA 1, Fire Code

NFPA 855, Standard for the Installation of Stationary Energy Storage Systems (2026)

527 CMR 1.00: The Massachusetts Comprehensive Fire Safety Code

MassDEP Drinking Water Program Guideline, *Information to be Submitted to MassDEP for Proposed Solar and Wind Energy Projects on Lands Owned or Controlled by Public Water Systems for Drinking Water Purposes*, updated April 18, 2018.

Massachusetts General Law Chapter 131, Section 40 (the Wetlands Protection Act).

980 CMR 1.00 through 17.00 (DRAFT). More information available at: https://www.mass.gov/info-details/efsb-25-10-proposed-rulemaking.

225 CMR 29.00 (DRAFT). More information and materials are available at: https://www.mass.gov/info-details/clean-energy-siting-permitting-regulations.

9. Given the growth of BESS, what more can be done to mitigate the risks of fire, and protect public health and the environment?

The state is adding additional methods of avoiding, minimizing, and mitigating risks associated with fire from BESS, including by updating siting and permitting procedures. Pursuant to Chapter 239 of the Acts of 2024, Massachusetts is currently overhauling its siting and permitting procedures related to clean energy infrastructure, which includes clean energy generation (e.g., solar, wind, and anaerobic digesters), transmission and distribution infrastructure, and BESS. These new rules are currently being established by the Executive Office of Energy and Environmental Affairs (EEA), EFSB, and DOER and must be in place by March 1, 2026. The agencies involved are responsible for developing the following:

- Developing a Site Suitability Methodology and guidance that evaluates the suitability of locations for hosting different types of clean energy infrastructure facilities.

- Establishing regulation that creates procedures for local governments to adhere to when issuing consolidated local permits to Small Clean Energy Infrastructure Facilities, including standard permit conditions for small BESS facilities (i.e., less than 100 MWh).

- Establishing regulations that govern the process of issuing consolidated permits to Large Clean Energy Infrastructure Facilities and some types of Small Clean Energy Infrastructure Facilities, including standard permit conditions for large BESS (i.e., equal to or greater than 100 MWh) facilities.

These new rules will establish additional standards and procedures that help ensure BESS are sited and designed to avoid, minimize, and mitigate any potential public health, environmental, and safety risks. They will also establish standard permit conditions that apply to BESS, which shall be designed to be protective of public health, safety, and the environment.

DOER is also developing a Model Energy Storage Bylaw for municipalities, which will be made publicly available later in 2025.

Through proper project design, siting, and fire management practices, many of which are already largely in place today, the risks to public health and the environment from a BESS fire can be effectively minimized and managed.

Resources:

Fire & Risk Alliance, LLC and the American Clean Power Association, Assessment of Potential Impacts of Fires at BESS Facilities, 2025.

980 CMR 1.00 through 17.00 (DRAFT). More information available at: https://www.mass.gov/info-details/efsb-25-10-proposed-rulemaking.

225 CMR 29.00 (DRAFT). More information and materials are available at: https://www.mass.gov/info-details/clean-energy-siting-permitting-regulations.

EEA Site Suitability Guidance (DRAFT). More information is available at: www.mass.gov/energypermitting.