OVERVIEW OF DEVENS ENTERPRISE COMMISSION PERMITTING PROCESS

Role of the Devens Enterprise Commission (DEC):

The DEC acts as the regulatory and permitting authority for the Devens Regional Enterprise Zone. It functions as a board of health, conservation commission, zoning board of adjustment, and planning board. It carries out these duties in the context of a unique and innovative one-stop, or unified permitting system, which greatly streamlines the local regulatory process. Section 9 of Chapter 498 lists the complete roles and responsibilities of the Commission https://devensec.com/ch498/dec4989.html. There are twelve DEC Commissioners. Six commissioners are nominated by Ayer, Harvard, and Shirley. Six additional regional Commissioners are appointed by the Governor. The Governor appoints the Chairperson.

Meeting Schedule and Application Timelines:

The DEC holds regular monthly meetings on the first Thursday after the first Tuesday of each month. Public hearings are generally held on the last Tuesday of each month. Most development permit applications are acted on within 75 days. No other permitting process can match the project flexibility and approval speed that Devens has to offer.

Application Review Process:

The Devens By-laws and DEC's Development Rules and Regulations provide for Level One and Level Two permit application review processes. Level One actions allow rapid approval at the Administrative level (generally within 14 days) for relatively minor adjustments to site plans, lot lines, and architectural modifications in historic areas, as well as wetland certificates of compliance. Level Two actions require a full public hearing, and generally involve larger scale undertakings such as most new construction, adaptive reuse of existing buildings and any major private and/or public infrastructure improvements. Anything not specifically identified as a Level One action requires Level Two review.

The application review process for Level Two permits typically consists of the following:

1. **Scoping Session:** A preliminary meeting between the Applicant and the Director to determine the components of the Permit, the timing of the Submission and permitting process, and general scope of the project submittal items.
2. **Determination of Zoning Compliance:** An Applicant may seek Determination from the DEC that the proposed uses and activities are permitted within the zoning district in which the development site is located and the proposed uses comply with the development goals of that zoning district. Such determination is made by the Commission at a public meeting. The Applicant must submit a statement indicating how the proposed use and development comply with the applicable zoning district (as per the By-Laws and Reuse Plan).
3. **Pre-Permitting and Final Conferences:** Pre-Permitting Conferences with the Director are required to review which development issues are critical, Submission and Plan Form and Contents requirements, Waivers of Design Standards and preliminary time schedules.
4. **Determination of Completeness (DOC):** Upon completion of the Final Pre-Permitting Conference, the Director shall render a written DOC within 14 calendar days. "Complete" means that a Submission complies with the Plan Form and Contents and Submission requirements of all applicable DEC Rules and Regulations (see 974 CMR 3.02 for requirements). Submissions can be determined conditionally complete, however a schedule for the submission of deficient or additional items shall be attached to the DOC.
5. **Town Comment Period:** The DEC provides surrounding towns (Ayer, Harvard and Shirley) 30 days to render comments to the DEC on the Submission. The public hearing shall not be closed until the thirty-day town comment period is concluded.
6. **Public Hearing Requirement and Abutter Notices:** The DEC provides notice of public hearings to the general public and to abutting property owners.
7. **Public Hearing Continuances:** The DEC may, with the consent of the Applicant, agree to one or more continuances of public hearings of up to 30 days each.
8. **The Voting Process:** All DEC votes are by a majority of a quorum (seven DEC members). Seven votes are required for a Variance and Reconsideration. Eight votes are required to adopt or amend Regulations.

9. **Record of Decision (ROD).** The ROD is issued within 10 days from the date of the DEC's vote. The Applicant shall record the ROD with the Registry of Deeds for both Worcester and Middlesex Counties and provide proof thereof to the DEC prior to the issuance of a building permit.
10. **Endorsement.** After the appeal period has expired (30-days), the Applicant submits plans for endorsement by the DEC. Plans are recorded with the Registry of Deeds for both Worcester and Middlesex Counties and proof of recordation submitted to the DEC prior to the issuance of a building permit.
11. **Permit Duration.** Site Plan approvals are valid for 2 years. Work must commence within 6 months of approval or the approval expires. Extension of these timeframes is possible.

Application Fees:

Unified Permit fees cover all DEC activities from the Pre Permitting Conference through the Building Permit. The fee is based on the total value of all construction and improvements, including site preparation, construction, engineering and site testing, roads, paving, parking lots, landscaping, and other improvements. The cost of the building must be included in the total value of all construction for the purposes of calculating the fee. The fee consists of a base fee and a value increment based on the gross value of the project.

UNIFIED PERMIT FEE

Gross value of project (inclusive of the buildings and all site development work and infrastructure improvements)	Base fee	Plus value increment (if any)
$1,000,000 or less	$1,300	Plus $13 per $1000 of work above $100,000
$1,000,000 and above	$13,000	$11.00 for each additional $1000 in work above $1,000,000

Peer Review Fees. The DEC may seek review and analysis from outside consultants (peer review). Applicants are required to pay 100% of the consultants' fees. Outside consultants employed by the DEC for plan review routinely include civil engineers, landscape architects, wetlands scientists, and attorneys and may include additional specialists, depending on level of complexities of a Submission or "special environmental conditions". Peer review deposits are retained until the project is completed.

The complete Devens Bylaws and Rules and Regulations are available on-line at www.devensec.com

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DEVENS
ENTERPRISE • COMMISSION

DEVENS ENTERPRISE COMMISSION

DEC NO. _____
DATE: _____
FEE: _____

DEVENS REGIONAL ENTERPRISE ZONE
PERMIT APPLICATION **LEVEL 2**

==========

ESTIMATED COST OF CONSTRUCTION / IMPROVEMENTS _____

OWNER _____
ADDRESS _____
TOWN/STATE _____
PHONE _____
FAX _____

_____
SIGNATURE

_____
Type or print name and title

APPLICANT _____
ADDRESS _____
TOWN/STATE _____
PHONE _____
FAX _____

_____
SIGNATURE

_____
Type or print name and title

If appropriate, attach a separate sheet with the name(s), address(es), and telephone/fax numbers for the project engineer, attorney, or other "development team" personnel.

SITE / LOCATION / STREET _____ _____

LOT SIZE / TOTAL PARCEL / ZONING DISTRICT: _____

==========

STATEMENT OF PROPOSED WORK OR ACTIVITY: _____

==========

SCOPE OF WORK (pick the actions that best fit your project or application)

___ Site Plan
___ Wetlands NOI
___ Minor amendment or modification of an approved plan
___ Historic District renovations/addition/alternations
___ Other (Specify) _____

___ Reconsideration
___ Zoning Variance

Explain work to be performed: _____

_____

Comments from Notifying Agencies**:** _____

LEVEL TWO UNIFIED PERMIT –
CHECKLIST FOR DETERMINATION OF COMPLETENESS
[Devens Enterprise Commission Rules and Regulations 2024]

Name of applicant and project: _____

Date of Issuance of this DOC: _____

List Regulatory Components of this Unified Permit: _____

Signature of LUA or Authorized Agent: _____

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1. Submission Requirements

☐ (a) A completed Permit application form.

☐ (b) The required Administrative, Processing, and Peer Review Fee.

☐ (c) One (1) original and three (3) copies* of the application, supporting plans (no larger than 24"x36") and materials and one (1) digital (PDF) copy of the full submission. ***Copies shall not contain any plastic binders or covers.***

☐ (d) A List of Abutters, certified if abutters are not located in Devens and a sketch plan showing the proximity of the abutters to the site.

☐ (e) Drainage calculations prepared by an Engineer complying with 974 CMR 3.04(4).

☐ (f) Request for Determination of Applicability (RFD) or a Notice of Intent (NOI) shall be submitted in accordance with Article XII of the By-Laws and 974 CMR 4.06.

☐ (g) Copies of all existing easements, covenants, restrictions and Institutional Controls applying to the lot.

☐ (h) Soil suitability tests and analysis.

☐ (i) A list of Waivers requested by the applicant, identified as Waivers of Submission and Plan Form and Contents requirements or Design Standards, with the applicable section of the Regulations clearly identified or a statement that no waivers are being requested.

☐ (j) Copy of any variance applying to the land, granted or filed concurrently with the Site Plan.

☐ (k) A narrative demonstrating compliance with the Reuse Plan and By-Laws meeting the specifications of 974 CMR 1.02.

☐ (l) If proposed by the applicant, a plan for the phasing of the construction of the required improvements, including a description, schedule, and plan showing the location of each phase.

☐ (m) A written statement of compliance with the Devens Open Space and Recreation Plan (DOSRP) and the Devens Main Post Trails report dated July 2001, to determine the effects, if any, of proposed development on resource areas, proposed trail rights-of-way, active and passive recreation areas, and other amenities included in the DOSRP.

☐ (n) If an applicant proposes parking lot construction phasing, a written statement demonstrating that the portion to be constructed is sufficient for the needs of the users of the proposed structure, comparing the number of spaces required by the By-Laws to the number the applicant believes are adequate, written certification that no building or permanent accessory structure will be placed on the area reserved for additional parking spaces, and a draft covenant that the parking will be built when the DEC determines it is required.

☐ (o) An estimate of the number of vehicle trips daily and for the morning and evening peak periods (trip generation rates shall be based on the ITE "Trip Generation Manual" most recent edition, and if applicable, data about similar developments in Massachusetts) and a description of traffic mitigation measures proposed including traffic management plans, trip reduction methods, and car/vanpooling preferential parking, etc. Refer to the Devens Transportation Management Initiative Overview for full details and parking/trip reduction guidance.

☐ (p) An erosion and sedimentation plan.

☐ (q) A landscaping maintenance and water management plan.

☐ (r) A narrative demonstrating compliance with the Industrial Performance Standards.

☐ (s) A copy of the LEED Green Building Rating System Project Checklist with the Location and Transportation, Sustainable Sites, and Water Efficiency Categories completed: https://www.usgbc.org/resources/leed-v4-building-design-and-construction-checklist .

☐ (t) Building elevations or perspectives of those portions of the building visible from public ways and residential and open space zoning districts showing the general appearance, massing, building materials, proposed colors, and relationship to abutting premises and, prior to the public hearing, the design review letter from Mass Development.

☐ (u) Building design review materials and if located within the Viewshed District, viewshed impact analysis.

☐ (v) All Slope Resource Areas as identified in 974 CMR 3.06 Appendix B Figures (13) Figure M within the proposed plan area shall be shown on the site plan.

☐ (w) Climate change mitigation, adaptation and greenhouse gas emissions mitigation measures in accordance with the requirements of 974 CMR 4.11.

☐ (x) A completed copy of the Devens Project Checklist for Reducing Embodied Carbon (highlighted rows only) – see Appendix 2. A final copy of this competed checklist (all rows) will be required prior to issuance of a Certificate of Occupancy.

☐ (y) All project submittals subject to DEC review shall require the stamp and signature of a registered Professional Engineer in the Commonwealth of Massachusetts certifying that the project complies with the requirements of 974 CMR 3.04(4), Stormwater Management Design Standards, and 974 CMR 4.08, General: Stormwater Management

2. Surveying and Drafting Plan Requirements

☐ (a) Site plans shall be 24”x36” and at a scale of 1” = 40’ unless alternate size is approved by the Director. All Site Plans must also conform to the Registry of Deeds requirements for recording.

☐ (b) The names and addresses of the record owner of the land and the applicant and the name, seal, and address of the designer, Engineer, Surveyor, and Registered Landscape Architect who made the plan, all of which shall appear in the lower right-hand corner.

☐ (c) The name of the development, scale, date of plan, and legend.

☐ (d) A locus plan indicating the general location of the site in relation to all adjacent and nearby roads, railroads, and waterways.

☐ (e) Ties from the development site to the nearest town and county bounds if within 1000 feet of the site. Bearings and curve data/distances of all lot lines, names of all adjoining property owners as they appear in the most recent tax list, and the location of easements, rights-of-way, and public and private ways.

☐ (f) Devens Lot number of the site, if available.

☐ (g) Topography for the entire site in two-foot intervals with contours and principal elevations of significant existing and proposed features related to the National Geodetic Vertical Datum (NGVD) of 1929. Existing contours shall be shown as dashed lines and, along with all other existing features, shall be screened. Proposed contours are to be shown as solid lines.

☐ (h) A space for the DEC's endorsement of the Site Plan by a majority of the members of the DEC on the front sheet and space for the chairperson or designee to sign all other sheets.

☐ (i) Lines of existing abutting Streets and Roads showing drainage and driveway locations and curb cuts.

☐ (j) Surveyed property lines showing distances and monument locations, all existing and proposed Easements, Rights-of-Way, utilities and other encumbrances, the size of the entire parcel, and the delineation and number of square feet of the land area to be disturbed.

3. Administrative Plan Requirements

☐ (a) Zoning district(s) and any boundary of zoning districts within the site, along any existing or proposed lot line, or within 50 feet.

☐ (b) The location, dimensions (including height), and general use of all existing and proposed buildings and structures to remain, including ground coverage, gross floor area, open area uses, and other facilities and improvements. Location of buildings existing on the site to be developed and on adjacent land under the same ownership within 500 feet of the lot line, indicating whether existing buildings are to be retained, modified or removed. See Appendix 1 for table template.

☐ (c) A statement noting the area of the site, the percentage of the site to be covered by impervious surfaces (such as buildings and parking areas), the area to be devoted to open space, the area to be paved for parking, driveways, loading spaces, and sidewalks, the number of proposed parking spaces and the number required by the By-Laws, the number of employees expected per shift, and the gross floor area of each proposed (commercial, industrial, office, or other) use. This data shall be tabulated to show the relationship of the required versus the proposed quantities. See Appendix 1 table template.

☐ (d) Existing and proposed front, side, and rear setback dimensions.

☐ (e) Parking lots and loading docks, showing driveway entrances and exits designed for safe ingress and egress, curb cuts, layout of parking spaces, aisles, off-street loading facilities, pedestrian walks, bicycle racks or storage facilities, handicap ramps, and representative cross-sections of service and parking areas and driveways.

☐ (f) Existing and proposed landscape features such as fences, walls, planting areas, wooded areas, and walks. Scattered trees to be preserved shall also be shown as well as all "specimen trees" (trees exceeding a minimum caliper of twelve inches) within 100 feet of existing or proposed lot lines have been identified and indicated on the plan. All existing landscape features, especially existing trees and woodland to remain are shown on ALL site plan sheets. Planting details setback, screens, and other landscaped areas including quantities, species, and spacing of plantings, shown at sufficient scale to illustrate clearly the landscaping design. Plans for walks, walls, and fences including dimensions, materials, and finishes. Landscaping Plans, Irrigation Design plans, Planting Plans, Planting Detail sheets, and Planting Specifications shall be prepared by a Landscape Architect registered in the Commonwealth of Massachusetts and shall bear the seal and signature of the Registered Landscape Architect who prepared them.

☐ (g) Planting Plans shall indicate the locations of proposed Street, Road and site lighting, even if site lighting is shown elsewhere on a separate plan and designed by separate consultant. Planting plans shall also include details and locations for walks, walls, and fences including dimensions, materials, and finishes.

☐ (h) Quantities, species, and spacing of plantings in lot setback areas, screens, parking and loading areas, and other landscaped areas shall be shown at a minimum scale of 1"=40'. Detail plans for areas such as landscape treatments adjacent to buildings, tree clusters or shrub beds, landscaped islands in parking areas, or other densely landscaped areas shall be shown at a scale of 1"=20'.

☐ (i) If an irrigation system is proposed, the Submission shall include an irrigation plan complying with 974 CMR 8.09(11) showing the complete layout and of all components, complete schematic diagrams of all systems, a functional and sequential description of all systems, and irrigation details for installation of all components, including but not limited to piping, valves, valve boxes, sprinkler heads, backflow preventers, automatic control systems, pumps, meters, associated cabinets, and all appurtenances as needed.

☐ (j) Proposed means of fire equipment access**.**

☐ (k) Proposed traffic circulation systems, including the volume and proposed direction of traffic flows into, out of, and within the site for both vehicles and pedestrians for an average day and for peak hours.

☐ (l) Location and dimensions (including height) of all storage facilities for equipment, material, and other like items. Location of all underground and aboveground fuel, combustible, and flammable liquid storage tanks greater than 250 gallons.

☐ (m) Location and dimensions (including height) of facilities for garbage, rubbish, recycling, and other waste collection and disposal. Location and dimensions (including height) of facilities for garbage, rubbish, recycling, composting and other waste collection and disposal. **Note: Applicants should be aware of MA waste ban materials and plan for storage/reuse accordingly.** Info. on waste ban items can be found at http://goo.gl/Qrea5

☐ (n) Garage and pedestrian entrances and exits.

☐ (o) Maximum size vehicle, including trailers, expected to use the site after construction, by length, width, height, and American Association of State Highway and Transportation Officials (AASHTO) designation.

☐ (p) Location and dimensions (including height) of existing and/or proposed free-standing signs and the manner of illumination. All proposed signs shall conform with Article XIII of the By-Laws and 974 CMR 6.00: Sign Control as most recently amended.

☐ (q) Existing and proposed public and private utilities, above and below grade, along with their type, size, and class

☐ (r) If the project is to be phased, a plan for the phasing of the construction of the required improvements, including a description, schedule, and plan of affected areas

☐ (s) Any additional details that may be pertinent or required by the Director during the scoping or Pre-Permitting sessions

4. Industrial Performance Standards Plan Requirements.

☐ (a) The site lighting information shall be provided on the Site Plan, including types of fixtures, heights, wattage, foot candle output directly under the light source, foot

candle output at the lot line, and a photometric layout/diagram showing direction and intensity of outdoor lighting.

☐ (b) Notes shall be provided on the Site Plan stating:
(1) Existing or proposed use will not generate electromagnetic interference to any sensitive receptor. Interference with the Harvard-Smithsonian radio telescope (1400-1720 MHz) is specifically prohibited.
(2) Proposed or existing use will not cause pronounced, multiple patterns of noise or vibration nuisance to, or interfere with, any sensitive receptor.
(3) Either "A Massachusetts Department of Environmental Protection (DEP) air quality permit application has been made" or "A DEP air quality permit is not required."

☐ (c) Locations or uses deemed by the Director to be sensitive receptors in any given area of impact may be subject to field identification of the receptor and/or special documentation or field data that helps to clarify the existence or absence of subject impacts. This documentation and data includes existing secondary data and studies, limited field testing by the applicant, or in the worst case scenario, retention of additional professional consultants to conduct further testing. Specifications for any additional information will be identified by the Director during the pre-permitting conference and shall be incorporated in the Site Plan.

☐ (d) A Copy of the completed Industrial Performance Standards Checklist shall be included: http://www.devensec.com/forms/Industrial_Performance_Standards_Checklist.pdf .

5. Wetlands/Water Resources/Flood Plain Plan Requirements.

☐ (a) All Resource Areas as defined by 974 CMR 4.06, including existing natural features (ponds, brooks, wetlands, etc.), Federal Emergency Management Agency (FEMA) flood plain elevations on and/or adjacent to the lot, Flood Insurance Rate Map (FIRM) panel number, zone designation, and base flood elevation.

☐ (b) Erosion, siltation, and dust control measures before and during construction, in accordance with 974 CMR 3.02(3)(e).

☐ (c) Location of all private wells on or within 200 feet of the boundaries of the property, if any

☐ (d) Location of all public and community water supply wells on or within 1,000 feet of the boundaries of the property, if any.

☐ (e) Proposed conservation restrictions and easements.

☐ (f) For any site plan that stores fuel, combustible and flammable liquids, as defined by 42 U.S.C. section 6901-6922i, G.L. c. 148, and 527 CMR 9.00, compliance with 974 CMR 4.09 and an addendum to the DSPCC and the location of on-site materials and equipment for spill response in accordance with its specific DSPCC are required.

6. Schedule:

Transmitted to Nitsch and other consultants
Pre-Permitting conference
Date of Determination of Completeness
Mail to Towns (30-day comment period begins)
Advertisements
Notification of abutters
Public hearing
End of 30-day comment period
Tentative vote

7. Notes/Comments

Appendix 1:

Zoning Conformance Summary

Address:	
Parcel ID:	
Primary Zoning District:	
Overlay District(s):	
Use:	

Dimensional Requirements

Criteria	Required		Existing	Proposed	Change	Zoning Compliance
Lot Area (AC)		(Min.)				
Total Land Area Disturbed (SF)						
Total Impervious Cover (SF)		(Max.)				
Total Impervious Cover (% of Parcel)		(Max.)				
Building Impervious (SF)						
Building Impervious (% of Lot)						
Pervious Pavement/Pavers (SF)						
Total Hardscape (Impervious + Pervious)(SF)						
Percent of Hardscape in Pervious Pavement/Pavers (SF)						
Open Space (SF)						
Lot Frontage (FT)		(Min.)				
Front Yard Setback (FT)	25	(Min.)				
Side Yard Setback (FT)	10	(Min.)				
Rear Yard Setback (FT)	25	(Min.)				
Building Height (FT)		(Max.)				
FAR Coverage		(Max.)				

Parking and Traffic Summary

Criteria	Required		Existing	Proposed	Change	Zoning Compliance
Parking Spaces		(Max.)				
Reserve Parking Spaces (If applicable)						
Total Spaces		(Max.)				
Compact Spaces		(Max.)				
Electric Vehicle/Hybrid Plug-in Spaces	5%	(Min.)				
Electric Vehicle/Hybrid Preferred Spaces	5%	(Min.)				
Ride Share (Car/Vanpool) Spaces	5%	(Min.)				
Handicap Spaces		(Min.)				
ADT						
Total Employee Count						
Number of Employee Shifts						
Employee Count by Shift (###/###/###/etc)						

Building Area and Use

Criteria	Existing	Proposed	Change	FAR by Use	Zoning Compliance
Gross Floor Area:					
Total (SF)					
Commercial (SF)					
Industrial/Light Industrial/ Distribution (SF)					
Office (SF)					
Other (Specify) (SF)					

Devens Project Checklist for Reducing Embodied Carbon

A Worksheet for Project Teams

DEC Version 1
Last Updated: March 20, 2023

Introduction

Embodied carbon refers to the greenhouse gas emissions arising from the manufacturing, transportation, installation, maintenance, and disposal of building materials. There are many ways for project teams to collaborate to reduce embodied carbon on projects using siting, design, construction, or procurement strategies. This worksheet is meant to help design and construction teams learn about strategies and identify the best solutions for reducing embodied carbon on their projects.

To learn more about embodied carbon, measuring embodied carbon, or strategies to reduce embodied carbon, read more here.

Strategies to Reduce Embodied Carbon

This worksheet provides a checklist for project teams to ensure they have considered strategies that may be relevant for their projects. The strategies are organized into types of strategies, beginning with process and tools and also including:

Using the Checklist

On the following sheet, there is a list of embodied carbon reduction strategies with a brief description, followed by two sets of checkboxes with empty rows.

At the Schematic Design phase (prior to submission of Unified Permit), complete the highlighted rows and identify which strategies you intend to use by checking the checkbox in Column E and insert a brief explanation in Column F about how the project may incorporate the strategy into the project and any necessary special considerations. If you feel that a strategy is already included on the project / integral to the project program and requirements, you can select 'Already included' instead of 'Will pursue'.

Upon construction completion (prior to CO), identify which strategies you used by checking the checkbox in Column H and insert a brief explanation in Column I about how the project incorporated this strategy. If the project aimed to use this strategy but was not able to, indicate which challenges prevented implementation.

Questions? Contact
Email the Devens Enterprise Commission (neilangus@devensec.com)

Project Checklist for Reducing Embodied Carbon in Devens

A Worksheet for Project Teams

Embodied Carbon Reduction Strategy	Checklist for Schematic Design			Checklist Based on As-Builts		Get Started on Learning More *(More to be added in v2!)*
0 Process and Tools	*Already included*	*Will pursue?*		*Achieved?*		
0 Identify Embodied Carbon as a Priority Communicate early in the design process that reducing embodied carbon is a design and procurement priority for the whole team (e.g., structural engineer, architect, contractor, sustainability consultants, mechanical engineers, etc.)	SELECT	SELECT	*Add a brief explanation here about how the project may incorporate this strategy into the project and any special considerations necessary*	SELECT	*Add a brief explanation as to whether and how the project incorporated this strategy. If the team intended to pursue this strategy but was not able to, provide insight as to why.*	WGBC Bringing Embodied Carbon Upfront
0 Set a Project Embodied Carbon Reduction Target Align the design and construction team around an embodied carbon reduction target. Consider targets from organizations around the globe (e.g., C40, Architecture 2030, WGBC, LETI) to understand what reductions we need now to reach 2030 and 2050 goals. Use life cycle assessment tools (see Sections 0.3 and 0.4 below) to track progress towards reduction goals. See Section "4.1 Integrate Carbon Intensity Limits into Specifications" for information about setting targets for multiple building products.	SELECT	SELECT		SELECT		C40 Cities Clean Construction Declaration LETI Embodied Carbon Primer: Best Practice Targets Architecture 2030 2030 Challenge for Embodied Carbon
0 Commit to Using Whole Building (Whole Project) Life Cycle Assessment Perform a whole building life cycle assessment (WBLCA) early in design development to identify the largest opportunities ("hot spots") for emissions reductions. Use the results from WBLCA(s) done throughout design to compare design choices and identify which reduction strategies will have the largest impact. WBLCA can be used to analyze the whole building, tenant improvement projects, or portions of a building.	SELECT	SELECT		SELECT		Carbon Leadership Forum LCA Practice Guide AIA-CLF Embodied Carbon Toolkit for Architects (particularly Part 2: Measuring Embodied Carbon)
0 Use Environmental Product Declarations (EPDs) During Procurement Once a product type has been selected, ask manufacturers (via specifications and the bidding and procurement processes) to provide environmental product declarations (EPDs) of their products to help select the lowest-carbon option.	SELECT	SELECT		SELECT		Embodied Carbon in Construction Calculator (EC3) AIA-CLF Embodied Carbon Toolkit for Architects (particularly Part 2: Measuring Embodied Carbon)
0 Discuss Whether to Integrate Carbon into the Bid Process Carbon can be evaluated alongside cost, schedule, and other criteria when selecting bids for materials to be used in construction. Alternatively, performance incentives can be provided to contractors who deliver low-embodied-carbon projects or suppliers that deliver materials below a certain carbon threshold. These strategies all require discussion early in the process between the owner, design team, and contractor.	SELECT	SELECT		SELECT		Steps to Develop a Low Carbon Procurement Policy (Incentives) OwnersCAN Embodied Carbon Action Plan Microsoft Case Study
1 Build Less, Reuse More	*Already included*	*Will pursue?*		*Achieved?*		**Learn More**
1 Reuse/Retrofit Existing Buildings Re-use or retrofit existing buildings instead of constructing a completely new building. Reductions in new square footage or new structure will translate directly to reductions in embodied carbon.	SELECT	SELECT	*Add a brief explanation here about how the project may incorporate this strategy into the project and any special considerations necessary*	SELECT	*Add a brief explanation as to whether and how the project incorporated this strategy. If the team intended to pursue this strategy but was not able to, provide insight as to why.*	
1 Design for Disassembly and Reuse Maximize the reuse potential of building components by detailing connections that can be easily disassembled and reused in future buildings. Avoid lamination and adhesion in assemblies (such as composite decks or hybrid mass timber/concrete assemblies) that prevent deconstruction and reuse. Avoid materials that are difficult to recycle, and avoid coatings that could prevent recycling.	SELECT	SELECT		SELECT		Zero Net Carbon Collaboration Resources AIA's Retrofitting Existing Buildings Guide
1 Select Salvaged or Refurbished Materials Reuse materials, such as those onsite or from other city properties, or purchase salvaged materials rather than new ones. Consider refurbishing items, such as furniture, instead of throwing them out and re-purchasing them.	SELECT	SELECT		SELECT		Where feasible, take advantage of past EC 'investments' by making use of previously-used building materials rather than newly-produced materials. (AIA, 2019; Carbon Leadership Forum Webinar Series, 2018)
2 Design Lighter and Smarter	*Already included*	*Will pursue?*		*Achieved?*		**Learn More**
2 Reduce [New] Floor Area Identify opportunities for design and programmatic flexibility to minimize the amount of new floor area. Similar to material and building reuse, reducing new floor area translates to material savings (as well as cost savings) and reduces embodied carbon.	SELECT	SELECT	*Add a brief explanation here about how the project may incorporate this strategy into the project and any special considerations necessary*	SELECT	*Add a brief explanation as to whether and how the project incorporated this strategy. If the team intended to pursue this strategy but was not able to, provide insight as to why.*	

2	**Reduce Below-Grade Construction** Reduce or eliminate below-grade parking or interior spaces. Subgrade construction requires a large amount of concrete (a carbon-intensive material) and releases soil carbon during excavation.	SELECT	SELECT		SELECT		Canadian Architect, 2021
2	**Select Lighter Materials and Assemblies** When possible, selecting lighter materials and assemblies for the structure and envelope systems can reduce the load on structural components (and therefore their size and embodied carbon). Consider lightening slabs through use of void systems, or using lighter structural materials like timber. In some cases, lighter structural loads may be decreased enough to allow for the preservation of an existing structure, unlocking additional carbon savings from building reuse.	SELECT	SELECT		SELECT		
2	**Design Structure for Material Efficiency** Using less of a material to do the same work results in large carbon and cost savings. Structural design choices -- such as bay sizing, column and beam spacing, and member cross sections, as well as avoiding structural gymnastics (like cantilevers and transfer beams) -- can all reduce carbon.	SELECT	SELECT		SELECT		SE2050 Structural Engineering Commitment case studies Additional strategies may include using braced frames instead of moment-resisting frames, using lighter shapes like joists/trusses, lightening concrete slabs by using void systems, and "right-sizing" each steel member.
3	**Choose Finishes Carefully** The total impact of interior finishes adds up significantly over time. Consider the expected turnover of the space you are designing and whether that matches up with the selected products. Architects and interior designers can collaborate to use salvaged materials and minimize the need for additional finishes where not required for functional performance, particularly in spaces with high occupant turnover and frequent interior fit-outs. These considerations should be included alongside toxicity, cost, and performance requirements when choosing finishes.	SELECT	SELECT		SELECT		Metropolis Magazine's Climate Toolkit for Interior Design CLF LCA of MEP Systems and Tenant Improvement
3	**Minimize Construction and Demolition Waste (Waste Prevention)** Before construction, design in modules to minimize waste. During construction, adopt sorting and waste diversion practices on-site to minimize construction waste.	SELECT	SELECT		SELECT		AIA 10 Steps to Reducing Embodied Carbon

	Use Low-Carbon Alternatives: Substitute Low-Carbon Materials/Systems for High-Carbon Ones	*Already included*	*Will pursue?*		*Achieved?*		**Learn More**
3	**Consider Total Carbon when Selecting Envelope Systems** Use WBLCA (alongside energy modeling) to help assess the trade-offs in embodied and operational carbon for different envelope options. Typically, lightweight envelope systems are likely to have the lowest embodied carbon (in addition to reducing the embodied carbon of the supporting structure).	SELECT	SELECT	*Add a brief explanation here about how the project may incorporate this strategy into the project and any special considerations necessary*	SELECT	*Add a brief explanation as to whether and how the project incorporated this strategy. If the team intended to pursue this strategy but was not able to, provide insight as to why.*	
3	**Select Carbon-Storing Structural, Envelope, and Finish Materials** Bio-based materials typically have lower upfront carbon than non-bio-based products, with the added potential to store carbon over the life of the building. The availability of bio-based alternatives to conventional materials -- such as mass timber, laminated bamboo, wood fiberboard, straw, clay-straw, hempcrete, cork, wool, linoleum, cork, and more -- is increasing. Bio-based materials are also often significantly lighter than their alternatives, reducing the load and size of supporting structural members (and therefore reducing carbon).	SELECT	SELECT		SELECT		Builders for Climate Action's Zero Carbon Resources Buildings as Global Carbon Sinks WoodWorks Carbon Smart Materials Palette
3	**Select Lower-Carbon Refrigerants** Refrigerant leakage is one of the biggest contributors to climate change within the building industry. Architects can collaborate with engineers to use passive design strategies, select systems that use low-carbon refrigerants, and encourage clients to adopt building management practices to mitigate refrigerant leakage and ensure 100% refrigerant recovery.	SELECT	SELECT		SELECT		Integral Group's Refrigerants & Environmental Impacts: A Best Practice Guide
3	**Eliminate HFC-Containing Insulation and Select Lower-Carbon Insulation** Selecting an insulation that balances operational and embodied carbon trade-offs is key to achieving a total carbon balance for building. Generally, plastic- and chemical-based insulation will have a much higher embodied carbon than bio-based materials. In particular, avoid specifying HFC-containing rigid polyurethane spray foam, sealants, and XPS products that are being banned or significantly restricted in Canada and a growing number of states in the US (including California).	SELECT	SELECT		SELECT		HFC bans by region and end-use product (including foams and refrigerants) US EPA Substitutes in Foam Blowing Agents Building Enclosure: "New Climate Regulations Spell Changes for Building Products" (2020)

	Procure Low(er)-Carbon Products: Specify and Source the Lowest Carbon Product Available	*Already included*	*Will pursue?*		*Achieved?*		**Learn More**
4	**Integrate Carbon Intensity Limits into Specifications** At a minimum, architects can use template language to incorporate requests for EPDs into their specifications as a part of bid proposal submittals. For products where EPDs are more widely available, architects can integrate carbon intensity limits into performance requirements, requiring an EPD to document compliance with a global warming potential limit (e.g. XX kg CO2e / unit of material).	SELECT	SELECT	*Add a brief explanation here about how the project may incorporate this strategy into the project and any special considerations necessary*	SELECT	*Add a brief explanation as to whether and how the project incorporated this strategy. If the team intended to pursue this strategy but was not able to, provide insight as to why.*	Carbon Leadership Forum Material Baselines ownersCAN Embodied Carbon Action Plan ownersCAN ECAP Specification Matrix and Language

4	**Use Performance-Based Concrete Specifications** Use performance-based (rather than prescriptive) requirements for concrete design that is appropriate for each component/mix. If CMU is used in construction, use a specified compressive stress method instead of a prescriptive method to proportion grout mix.	SELECT	SELECT	SELECT		
4	**Optimize Concrete Mix Design** Work with structural engineers to optimize concrete design with strategies such as reducing cement volume, allowing for longer cure times by specifying strength at 56 days instead of 28 days to allow more time for strength gain, looking at carbon implications of higher-quality aggregate, or reducing strength requirements where feasible/appropriate. Minimizing portland cement and/or replacing portland cement with other materials -- such as Type 1L Cement or supplemental cementitious materials (fly ash, slag, etc.) -- also reduces embodied carbon.	SELECT	SELECT	SELECT		RMI Concrete Solutions GuideNRMCA Guide to Specifying S
4	**Source from Lower-Carbon Facilities and Products** Manufacturers vary in the sustainability of their facilities and sourcing practices. Two materials with the same performance may differ in their embodied carbon as a result of energy source (fuel type/electricity grid mix), plant energy efficiency, product design and material efficiency, or lower-carbon ingredient sourcing (through using recycled, bio-based, or local ingredients). Due to how products are specificed and selected, EPDs are typically the best or only option for a project team to differentiate the carbon intensity of products from different facilities and manufacturers.	SELECT	SELECT	SELECT		Embodied Carbon in Construction Calculator (EC3) Energy Star Industrial Plant Efficiency Program Carbon Smart Materials Palette
5	**Source Climate-Smart Wood** The full life cycle embodied carbon impacts and benefits of wood are difficult to quantify (and therefore difficult to optimize) because of complex supply chains and differing methods for calculating carbon benefits. Current strategies for optimizing wood sourcing include using reclaimed/salvaged wood, asking for chain-of-custody certificates or other supply chain transparency information, asking for sustainable forest management certifications (such as FSC or SFI), and specifying wood that is locally-harvested or harvested from working (not primary) forests. *(Note: An agreed-upon definition for climate-smart wood that can be used in procurement is still in development and should be included once available).*	SELECT	SELECT	SELECT		Carbon Leadership Forum's Wood Carbon Seminars Climate-Smart Forestry.org
5	**Integrate Carbon into the Bid Process** Evaluate carbon -- in addition to cost, schedule, and other criteria -- as an awarding criteria when selecting bids for materials to be used in construction. If points are used to differentiate bids, award points for low-carbon procurement. When possible, provide performance incentives to contractors who deliver low-embodied-carbon projects.	SELECT	SELECT	SELECT		Steps to Develop a Low Carbon Procurement Policy (Incentives) OwnersCAN Embodied Carbon Action Plan Microsoft Case Study

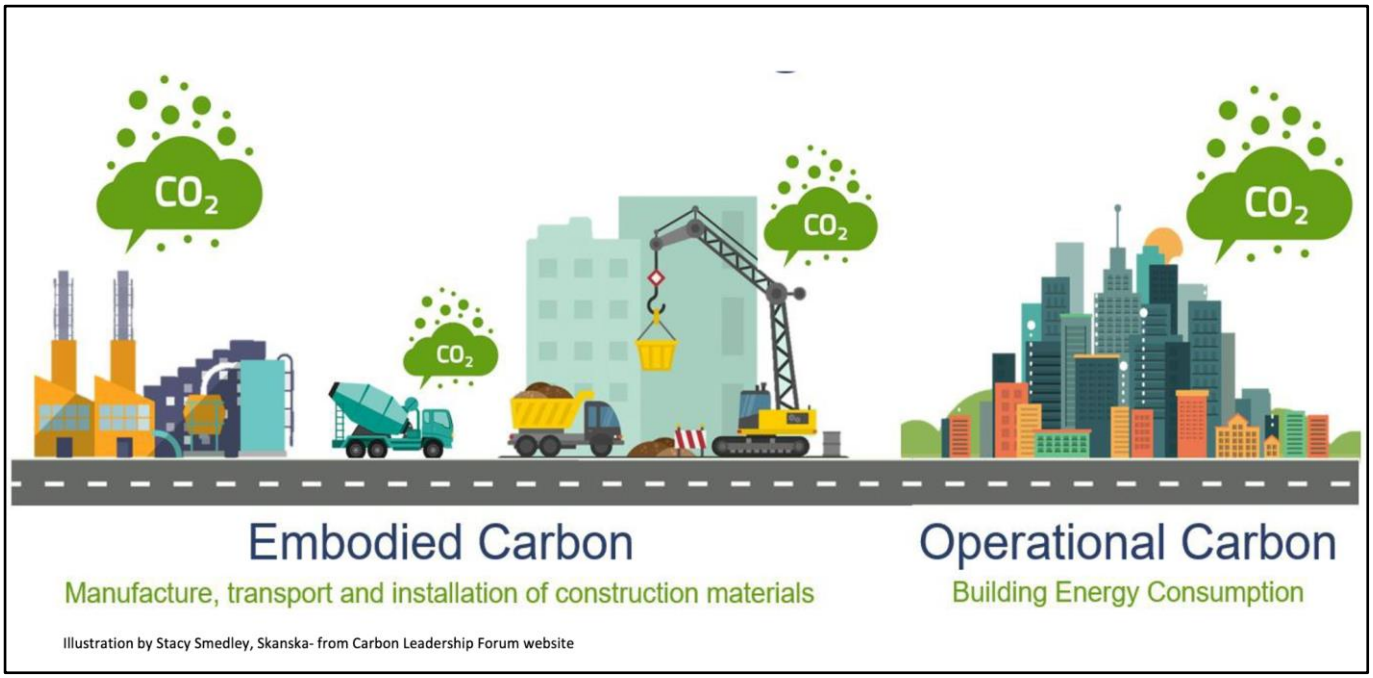
Appendix 2: Devens Project Checklist for Reducing Embodied Carbon

EMBODIED CARBON REDUCTION GUIDELINES

These guidelines are to be used as part of the Devens Enterprise Commission's Unified Permitting Process. ***All Level 2 Unified Permits shall review these guidelines and complete the attached "Embodied Carbon Checklist for Devens Projects****. Any questions can be directed to Devens Enterprise Commission staff at 978.772.8831 or neilangus@devensec.com*

What is Embodied Carbon?

Greenhouse gases are heat-trapping gasses in the atmosphere, such as CO_2, methane, and nitrogen that contribute to global warming. Carbon dioxide (CO_2) makes up roughly 76% of global greenhouse gasses. Building materials are one of the largest sources of industrial greenhouse gas emissions, which means that they are potential drivers to reducing carbon emissions. The top two industrial sectors alone—steel and cement—are each individually responsible for more emissions than all of commercial building energy use each year. Embodied Carbon refers to the carbon dioxide (CO_2) emissions associated with building materials throughout their whole lifecycle - from extraction of raw materials, processing and assembly of those raw materials, manufacturing, transportation, distribution, construction, use and maintenance, demolition, haul-away, and landfill or recycling.



Embodied Carbon is different from Operational Carbon, which is CO_2 generated from the energy used to operate and power buildings. Embodied Carbon + Operational Carbon= Whole Life Carbon:

https://worldgbc.org/advancing-net-zero/whole-life-carbon-vision/

Why Does Embodied Carbon Matter?
In order to avoid the catastrophic impacts of climate change and reach the decarbonization targets set by the Commonwealth of Massachusetts, CO_2 emissions have to decline by 50% from 1990 levels by 2035 and reach net zero by 2050. The good news is that we already have a number of strategies that developers and applicants can use, and Embodied Carbon reduction is a key impactful strategy.

Reducing the embodied carbon of a project involves four aspects:
.

First, you can prioritize selection of the most impactful, low-carbon products like structural materials or high-churn interior products. Second, you can quantify your embodied carbon total, or reductions using analysis tools which are listed below. These tools can be used to inform decisions about which specific products are lowest in embodied carbon, or they can be used to look at your whole building (or whole site). Third, you can challenge your design team to be intentional about unnecessary waste. This can include reusing existing structures whenever feasible, right-sizing rooms and floor to floor heights, using fewer materials overall or specific targets like minimizing the footprint of concrete foundations by cantilevering upper floors, which is frequently done. Finally, you can make decisions about your landscape and planting to choose plants and trees that sequester as much carbon as possible.

1. Top 10 Products
Concrete (footings & slabs):

- Minimize the use of concrete
- Specify 40% minimum SCM content where appropriate
- Use 56 or later day strength wherever possible (rather than conventional 28 day)
- Utilize carbon sequestration (CO2 injection)
- Specify Portland Limestone Cement (PLC) instead of Portland cement
- Use non-fossil fuel-based SCMs
    - Glass Pozzolan
    - Rice Husk Ash Concrete
- Explore potential partnerships with alternative cement/concrete and carbon-storing aggregate and filler manufacturers
- For **perimeter walls** (not foundation/slab), consider using biogenic insulated concrete forms (e.g., IsoSpan, Nexcem IsoSpan)

- Crush, spread, and/or reuse (or give to a reuse facility) at concrete's end of life
- New technologies such as biochar (replacement for sand) are emerging and will be more available in the next couple of years.

Structural Steel:
- Minimize the use of steel
- Use steel that comes from electric arc furnaces (EAFs)
    - Use shapes that come from electric arc furnaces
- Use recycled steel whenever possible
- Redesign the steel structural system to accommodate a glue-laminated (glulam) engineered wood structural system with appropriate fireproofing considerations
- Use braced frames instead of moment-resisting frames
- Use reinforcement only when needed

For structure, consider the use of Mass Timber to replace concrete or steel wherever possible.

Insulation:
- Avoid specifying HFC-containing rigid polyurethane spray foam, sealants, and XPS products
- Recommended products: Cellulose, mineral wool, and other nature/bio-based materials that reduce *both* operational *and* embodied carbon
    - Blanket & Batt insulation:
        - Certainteed Sustainable Insulation
        - Johns Manville Formaldehyde Free
        - Knauf Ecobatt
        - Owens Corning EcoTouch
        - Owens Corning Thermafiber SAFB and UltraBatt
        - Rockwool AFB evo
        - Bonded Logic (recycled cotton)
        - Havelock (wool)
    - Blown insulation:
        - Greenfiber Cellulose Insulation
        - Jet Stream Ultra Blowing Wool
        - Havelock Wool Loose Fill

Refrigerants:
- Select systems that use low-carbon refrigerants, adopt building management practices to mitigate refrigerant leakage and that ensure 100% refrigerant recovery.
- Recommended products:
    - Honeywell Solstice N15 (R-515B), N40 (R-448A), N41 (R-466A), ze (R-1234ze), zd (R-1233zd), L40X (R-455A), 513A (R-513A)
    - COMSTAR RS-51 (R-470B), R-53 (R-470A)
    - CHEMOURS Opteon™ XL20 (R-454C), XL41 (R-454B)
    - AKEMA R-1233zd(E)

Wood:
- Use reclaimed wood or wood from climate-smart forests that was manufactured without fossil fuels
- Mass Timber to substitute for concrete and steel where feasible
- Specify locally harvested and manufactured wood products
- Specify wood from energy-efficient manufacturers
- Specify air-dried lumber
- Specify wood products manufactured with carbon-free renewable energy (TimberHP is a good one for insulation/insulated panels)
- Specify wood that is not harvested from primary forests
- Design for longevity, durability, and end of life

OR

Engineered Wood:
- Specify products with no-added-formaldehyde resins
- Specify wood with FSC-certified content
- Recommended products:
    - Nordic Structures Engineered Wood

- StructurLam Products CrossLam CLT
- Redbuilt Certified Engineered Lumber

Gypsum Board:

- Specify lightweight gypsum board
- Use the thinnest gypsum board necessary
- Consider recycled gypsum board
- Consider lower embodied carbon panel products where appropriate
    - Gypsum board alternatives that utilize compressed agricultural fibers (CAF) may present a low-carbon alternative to standard gypsum board. Where code allows, look for products that utilize agricultural waste, such as wheat, rice, and straw byproduct, which sequester carbon during their growth and store that carbon as a building product
    - Clay and Magnesium Oxide boards can be healthier alternatives
- Recommended products:
    - USG EcoSmart

Carpet:

- Specify carpet tile rather than broadloom or sheet carpet to reduce installation and maintenance waste (especially the carpet tiles that do not need adhesive, which makes it easier to recycle them through take back programs)!
- Specify carpet with high recycled plastic content, especially in nylon face fiber
- Specify carpet with solution-dyed nylon yarn
- Balance embodied carbon with durability
- Recommended products:
    - Shaw EcoWorx / ShawPU
    - Bentley Mills High Performance PC Broadloom
    - Mohawk Unibond Plus Air
    - Tarkett/Tandus (Centiva ethos)

Resilient Flooring:

- Avoid specifying flooring materials that contain or are PVC/vinyl.
- Consider biobased content or natural rubber (not tire-derived) with Greenguard Gold certification
- Meet CDPH Standard Method emissions standards
- Recommended products:
    - Forbo Marmoleum (linoleum)
    - Tarkett Harmonium (linoleum)
    - Liquid Lino (linoleum)
    - Armstrong Migrations BBT
    - Kährs Upofloor Zero
    - Teknoflor CS Sheet and CS Tile
    - Mannington Mills Cirro
    - Artigo rubber flooring (natural rubber)
    - Nora rubber flooring (natural rubber)

Acoustic Wall & Ceiling Panels

- Specify products with FSC certified wood
- Specify products with high recycled content
- Avoid products with PVC, formaldehyde, etc.
- Recommended products:
    - Armstrong Tectum
    - FilzFelt Wool Design Felt
    - Unika Vaev Ecoustic panels and tiles
    - Hunter Douglas Heartfelt
    - WhisperTrack PVC-free
    - FabriTrak approved fabrics mounted on GeoTrak frame

Ceiling Systems:

- Use formaldehyde-free binders (acoustic ceiling tiles) or have third-party testing to verify compliance with CDPH Standard Method

- Are FSC certified (wood products)
- Have high recycled content and transparency documentation (metal ceiling panels)
- Recommended products:
    - Armstrong Cirrus/Cirrus High NRC, Dune, Mesa, Ultima
    - Certainteed Symphony f and m
    - Hunter Douglas Metal Linear
    - 9Wood

2. Tools for Analysis

CARE: *This tool is very specifically for evaluating whether to reuse an existing building, or building new is less embodied carbon - early planning scenarios, architecture 2030*
EC3 *- best used for individual product evaluation and comparing multiple products to see which has lower embodied carbon/GWP*
Tally *- individual product evaluation and whole building life cycle analysis, and Revit plugin*
OneClick *- individual product evaluation*
EPIC *(ehdd's new tool for early phase: https://www.ehdd.com/design/epic)…*
Carbon Conscience*: used for large scale planning, by Sasaki (https://www.sasaki.com/voices/introducing-the-carbon-conscience-app/)*
Cove.tool *launching new EC component soon*
Kaleidoscope: *(Payette's tool) https://www.payette.com/kaleidoscope/*

3. Strategic Design Moves – how to direct design teams:

- Prioritize firms who have some experience, and who set internal, firm-wide targets for embodied carbon.
- Address the materials that have the greatest impact, because of the sheer volume of them like concrete and steel, or because of the highest embodied carbon (if a TI retrofit doesn't include concrete/steel in the scope, then you look at which things have the greatest impact and target those). Steel studs (embossed studs use less steel for same strength), gyp-board and furniture are significant.
    - *"Just three materials – concrete, steel, and aluminum – are responsible for 23% of total global emissions (most of this used in the built environment)."* (Architecture 2030).
- Smaller footprint (whether whole building especially foundation 'footprint' in case of large buildings, room sizes, floor to floor heights)
- Design for deconstruction (this must be discussed very early on – regulations are popping up everywhere and MA DEP is looking at this).
- Reduce overall number of materials and finish materials: design for this from the start!
    - Include interior designers from day one
    - Holistic vision how to achieve design objectives with fewer overall materials
    - According to research conducted by CLF and LMN Architects, interior designers may be responsible for emissions at least equal to those associated with the structure and envelope of a building.

RESOURCES:
AIA-CLF Embodied Carbon Toolkit For Architects: Introduction to Embodied Carbon
AIA-CLF Embodied Carbon Toolkit For Architects: Measuring Embodied Carbon
AIA-CLF Embodied Carbon Toolkit For Architects: Carbon Reduction Strategies
Carbon Smart Materials Palette
CLF Report: Carbon Storing Materials
Why Interior Designers Must Fight Climate Change

Industrial Performance Standards Checklist for Newly Proposed Projects

All projects within the Devens Regional Enterprise Zone (DREZ) must comply with the Devens Enterprise Commission (DEC) Industrial Performance Standards (IPS) under 974 CMR 4.00. This checklist is intended to assist Applicants in determining at the time of submittal, or ideally before submittal, if their project may or may not involve development and/or activities that may impact sound, vibration, air quality, or lighting within the DREZ.

Site layout, building(s) design/orientation, traffic patterns, location of outdoor equipment and numerous other project components can impact sound, vibration, air quality, and lighting within the DREZ. By identifying any potential IPS concerns early on in the review process, Applicants can design their projects to ensure compliance with the IPS at all times and avoid potential future violations of the IPS and costly mitigation after the fact.

Please note, if a project requires an air permit from the Massachusetts Department of Environmental Protection (DEP), the Applicant will need to initiate permitting through the DEP office as well. Even if a project requires a DEP air permit, the proponent still must demonstrate compliance with the DEC IPS.

Please circle the correct answer to each question in this checklist. Please note that by circling "NO", the Applicant is not relieved of demonstrating compliance with the IPS requirements. If "NO" is circled and a potential concern is identified during the review process, it could temporarily suspend the approval process timeline until the concern is adequately addressed. If "YES" is answered, please explain and provide any supporting studies, modelling files, or information to aid the DEC in their evaluation of the project.

Project Name_____

Does the proposed project and associated activities involve any potential increases in sound, vibration, air quality, odor, dust, lighting and/or electromagnetic interference that are covered under the DEC Industrial Performance Standards?	**YES**	**NO**

If you answered yes, will the Applicant demonstrate compliance directly or will the project proponent employ an expert to demonstrate compliance? Please provide pertinent contact information of the responsible official:

_____

_____

_____

_____

Industrial Performance Standards Checklist for Newly Proposed Projects cont…

Noise

Does the proposed project have the ability to increase sound?	**YES**	**NO**
1. Will the increase in sound plus background sound exceed 974 CMR 4.05 (3)a?	**YES**	**NO**
2. Will the total sound plus background sound exceed 974 CMR 4.05 (3)b?	**YES**	**NO**
3. Will the increase in sound create pure tones that will exceed 974 CMR 4.05 (3)c and/or 974 CMR 4.05 (3)d7?	**YES**	**NO**
4. Will the increase in sound create impulsive sounds that will exceed 974 CMR 4.05 (3)d1-6 and/or 974 CMR 4.05 (3)d8?	**YES**	**NO**
5. Are there procedures and controls proposed to reduce sound during earth removal per 974 CMR 4.07(10)?	**YES**	**NO**
Checklist Options to Demonstrate Sound Compliance		
6. Have all of your potential sound sources been identified?	**YES**	**NO**
7. Will spreadsheet calculations of the potential increase in sound be provided?	**YES**	**NO**
8. Will sound modeling of the proposed project be provided?	**YES**	**NO**
9. Will the facility submit a protocol describing the potential sound monitoring, metrics, and modeling as required?	**YES**	**NO**
10. Does the project propose to collect background sound data (typically 7-days worth of valid data is sufficient)?	**YES**	**NO**
11. If the facility intends to collect background sound data will it include other qualifying weather data such as wind speed, wind direction, sky conditions, etc.?	**YES**	**NO**
12. Is mitigation to reduce the overall sound profile proposed?	**YES**	**NO**
13. Is sound mitigation to be assumed when calculations or modeling is performed? (modelling files are required to be submitted to the DEC)	**YES**	**NO**
14. Is compliance monitoring proposed to demonstrate that the project meets the estimated increases in sound?	**YES**	**NO**
15. Have increases in sound with respect to traffic been considered?	**YES**	**NO**

Industrial Performance Standards Checklist for Newly Proposed Projects cont…

Vibration

Does the proposed project have the ability to increase vibration?	**YES**	**NO**
16. Will the increase in vibration exceed 974 CMR 4.05 (4)a??	**YES**	**NO**
Checklist Options to Demonstrate Vibration Compliance		
17. Have all of the potential vibration sources been identified?	**YES**	**NO**
18. Will spreadsheet calculations of the potential increase in vibration be provided?	**YES**	**NO**
19. Will the proponent provide vibration modeling of the proposed project?	**YES**	**NO**
20. Does the project propose to collect background vibration data?	**YES**	**NO**
21. Is mitigation proposed to reduce the overall vibration profile?	**YES**	**NO**
22. Is vibration mitigation to be assumed when the calculations or modeling performed?	**YES**	**NO**
23. Is compliance monitoring proposed to demonstrate that the project meets the estimated increases in vibration as proposed?	**YES**	**NO**

Industrial Performance Standards Checklist for Newly Proposed Projects cont…

Air Quality

Does the proposed project have the ability to create air, visible, and/or odor emissions?	**YES**	**NO**
24. Will the proposed project meet the air quality standards in 974 CMR 4.02(3)	**YES**	**NO**
25. Are there procedures and controls proposed to minimize impacts during earth removal per 974 CMR 4.07(7)?	**YES**	**NO**
26. Will the proposed project require a MassDEP air quality permit per 974 CMR 4.02 (1)	**YES**	**NO**
If the project will require an air permit, then the proponent should set up a meeting with the regional MassDEP office to determine air permitting requirements, and answer the following:		
27. Will the proposed project submit a Limited Plan Approval application?	**YES**	**NO**
28. Will the proposed project submit a Non-Major Comprehensive Plan Approval application?	**YES**	**NO**
29. Will the proposed project submit a Major Comprehensive Plan Approval application?	**YES**	**NO**
30. Will the proposed project be a Title V source?	**YES**	**NO**
31. Will the proposed project be a PSD source?	**YES**	**NO**
Checklist Options to Demonstrate Air Quality Compliance		
32. Have you identified all of your potential air, visible and/or odor sources?	**YES**	**NO**
33. Will there be any visible emissions?	**YES**	**NO**
34. Will there be any dust emissions?	**YES**	**NO**
35. Will there be any odor emissions?	**YES**	**NO**
36. Will there be any potential increases in air, odor or dust emissions within the DREZ that will impact any internal or external receptors?	**YES**	**NO**
37. Will the project proponent provide spreadsheet calculations of the potential increase in air and/or odor emissions within the DREZ to demonstrate how the increase will not impact any internal or external receptors?	**YES**	**NO**

Industrial Performance Standards Checklist for Newly Proposed Projects cont…

Checklist Options to Demonstrate Air Quality Compliance (cont.)

38. Will the project proponent provide air and/or odor modeling of the proposed project within the DEC or into the neighborhood surrounding the DEC??	**YES**	**NO**
39. Is mitigation proposed to reduce the overall air and/or odor profile?	**YES**	**NO**
40. Is air pollution and/or odor control to be assumed when the calculations or modeling is performed?	**YES**	**NO**
41. Is compliance monitoring proposed to demonstrate that the project meets the estimated increases in air and/or odor as proposed?	**YES**	**NO**

Lighting/Illumination

Does the proposed project have the ability to create additional Illumination?	**YES**	**NO**
42. Will lighting meet the illumination standards set forth in 974 CMR 4.04(3)?	**YES**	**NO**
43. Have all of the potential light sources been identified?	**YES**	**NO**
44. Will spreadsheet calculations of the potential increase in light and how it will not affect the Observatory outlined in 974 CMR 4.04(1) or any external or internal receptors be provided?	**YES**	**NO**
45. Is mitigation proposed to reduce the overall light profile?	**YES**	**NO**

Electromagnetic Interference

Does the proposed project have the ability to create electromagnetic interference?	**YES**	**NO**
46. Have you identified all your potential electromagnetic sources?	**YES**	**NO**
47. Are you proposing to provide spreadsheet calculations of the potential increase in electromagnetic interference and how it will not affect any internal or external receptors as per 974 CMR 4.03(3)?	**YES**	**NO**
48. Are you proposing any mitigation to reduce your overall electromagnetic profile?	**YES**	**NO**
49. Will your project comply with all the electromagnetic requirements under 974 CMR 4.03?	**YES**	**NO**

OVERVIEW OF THE DEVENS TRANSPORTATION MANAGEMENT INITIATIVE:

Section 3.02(2)(o) of the Devens Enterprise Commission Rules and Regulations requires all applications that involve site plan review to provide "*an estimate of the number of vehicle trips daily and for the morning and evening peak periods….and a description of traffic mitigation measures proposed including traffic management plans, trip reduction methods, and car/ vanpooling preferential parking*." Further, Section 3.03(2)(n) requires applicants agree to participate in the Devens Transportation Management Initiative.

The Devens Transportation Management Initiative or Transportation Demand Management (TDM) Program, is part of the Final Environmental Impact Report (EIR) for the redevelopment of Devens. The intent of the Final EIR is to assess the potential future impacts of the 1994 Devens Reuse Plan, identify appropriate means of mitigating those impacts, and put in place commitments for implementation of that mitigation. The TDM Program was developed to minimize potential traffic impacts in the region as a result of the redevelopment of Devens. The TDM program includes strategies to reduce peak traffic flows, single-occupancy vehicle trips and increase options for alternative forms of transportation. These strategies will avoid or delay the need for physical improvements that could have environmental consequences (i.e. road widening creating additional stormwater, wetland and open space impacts). The TDM plan, if successfully implemented could result in an overall trip reduction of 15% over the baseline traffic projections for the AM peak hour full build condition. Bicycle and pedestrian trails/ paths are also part of the Reuse Plan for Devens. These will further aid in providing options for alternative modes of transportation to Devens and within Devens.

As a requirement of the EIR, once development at Devens reaches a critical mass, MassDevelopment will be required to establish a Devens Transportation Management Association (TMA). The TMA will provide commuter-related services, assistance and information to all organizations (residents, visitors, businesses, industries, non-profits, etc.) currently located or locating at Devens.

The Final EIR requires all employers at Devens to become members of the TMA and designate an employee to be responsible for participating in the Devens TMA. **By agreeing to participate in the Devens Transportation Management Initiative as per Section 3.03(2)(n) of the Devens Enterprise Commission Rules and Regulations, Devens organizations are agreeing to become members of the TMA once it is established and implement TDM program strategies to reduce single occupancy vehicle trips and promote alternative forms of transportation**, including, but not limited to:

- Guaranteed Ride Home Program (for those who use alternative transportation or participate in ridesharing)
- Employee Relocation Commuter Assistance Program (educating employees on transportation options)
- Ridematching Services (reducing single-occupancy vehicle trips)
- Flexible work hours/compressed work weeks (to reduce AM and PM peak traffic)
- Devens Shuttle Bus Circulator (proving access to Devens services and local commuting options)
- Access to Devens community services (day care, bank, restaurant, dry cleaners, etc..)

As stated previously, MassDevelopment is the entity responsible for initiating this program and assisting participating organizations in implementing TDM program strategies. In anticipation of your organization's participation in the Devens TDM program, applicants will want to take into consideration TDM and TMA initiatives early on in the site design and layout process and incorporate them where possible. Such initiatives that may affect the site design and layout include, but are not limited to:

- Providing a minimum of 5% of total parking spaces as preferred parking for any ridesharing services (car/van vanpools)
- Providing a minimum of 5% of total parking spaces as preferred parking for any hybrid or zero/low-emitting vehicles
- Including bicycle racks and shower/changing facilities
- Providing connections to existing/future multi-purpose trail networks and designing site layout at the pedestrian-scale
- Hybrid/Electrical vehicle plug-in/recharge stations
- Phased parking and/or reduced parking requirements

These initiatives can result in multiple financial and environmental benefits including reduced infrastructure costs, fewer parking spaces required, financial savings on material and maintenance costs, reduced stormwater management, reduced heat-island effect, additional open space and/or smaller lot size requirements.

Complete details on the program are published in Section 4 of the document entitled: "Final Environmental Impact Report – Devens; Ayer, Harvard, Shirley and Lancaster, Massachusetts. Submitted by the Massachusetts Government Land Bank in cooperation with the Joint Boards of Selectmen. Prepared by Earth Tech, 169 Baker Aveenue, Concord, MA 01742. In association with: Vanasse Hangen Brustlin, Inc., Watertown , MA; Garrity & Knisely, Boston, MA; Haley & Aldrich, Inc., Cambridge, MA, H.W. Moore, Boston, MA. Dated July 31, 1995. EOEA#9116." This document is available in the DEC office and MassDevelopment Engineering Library at 33 Andrews Parkway, Devens, MA.

GREEN INFRASTRUCTURE GUIDELINES FOR DEVENS PROJECTS

The redevelopment of the Devens Regional Enterprise Zone (Devens) is guided by the principles of sustainable development – recognizing the long-range consequences of current actions. This approach to redevelopment also recognizes the economic, social and environmental impacts of redevelopment and the interconnectedness of these triple-bottom line aspects of sustainable development. The Devens Enterprise Commission (DEC) Rules and Regulations governing the redevelopment of Devens contain a number of sustainable design standards that promote the conservation and integration of the natural environment with the built environment. In Devens, where and how you build is just as important as what you build. Connectivity of infrastructure services (roads, sewers, utilities, etc…) is important from a development perspective but so is connectivity of the natural environment to support biodiversity and help ensure preservation of important ecosystem services such as wildlife habitat, natural stormwater management and filtration, carbon capture and sequestration. Devens has been redeveloped with sufficient hard infrastructure to support the energy, water, sewer and transportation needs of the built environment, while also connecting to and preserving important components of the natural environment. This approach results in high quality, attractive and functional development patterns that have proven to be more cost effective than traditional development techniques – further enhancing the sustainable redevelopment goals of Devens. This document is intended to provide applicants with a better understanding of what Green Infrastructure is, the local incentives to promote Green Infrastructure, and guidance on how to strategically locate and incorporate Green Infrastructure into projects to meet multiple regulatory requirements within the DEC Rules and Regulations.

What is Green Infrastructure?

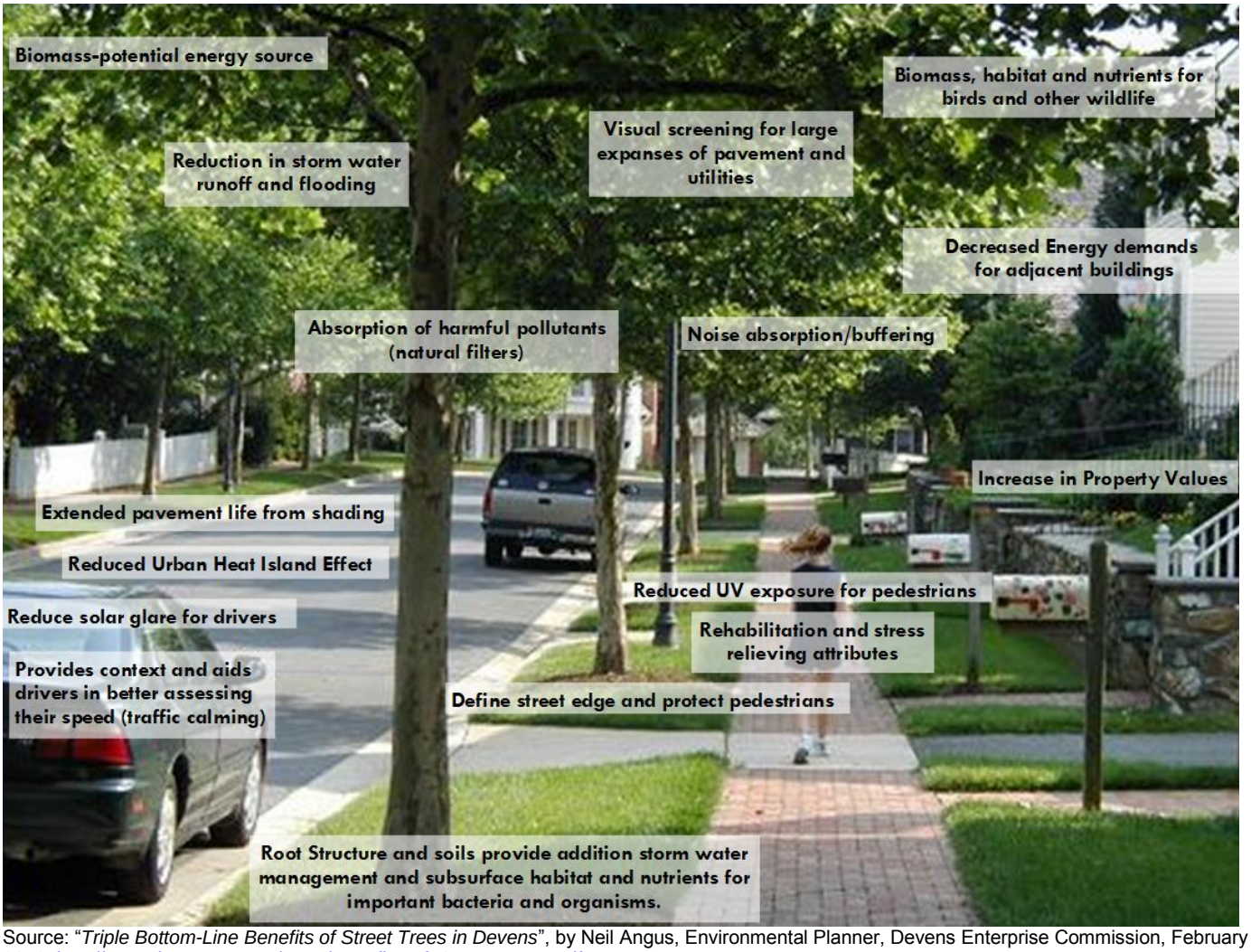
Green Infrastructure refers to natural, constructed, or restored landscape features that support fish, aquatic and terrestrial wildlife habitat and provide natural (and free!) ecosystem services such as water filtration and recharge; temperature moderation; erosion control; carbon capture and pollutant control; nutrient management, and food production. Green Infrastructure features may be natural such as forests, trail systems, floodplains, wetlands and buffer areas, or built/engineered features such as street trees, rain gardens, green roofs, bioretention areas and constructed wetlands (low-impact development or LID) that mimic or restore natural ecological processes. Green Infrastructure elements also help reduce wildlife habitat fragmentation and provide the ability for developments to better adapt to changing weather patterns through more direct and natural methods of stormwater management and infiltration which decrease flooding threats– resulting in less impacts from hazards (improved resiliency). Green Infrastructure in Devens also includes energy efficiency and renewable energy measures that help create a more sustainable network of built and natural systems. Incorporating Green Infrastructure elements into development projects can help meet your corporate sustainability objectives and the DEC regulations, all while saving money and enhancing the natural and built environment within Devens.

The Devens Open Space and Recreation Plan, Devens Main Post Trails Plan, Water Resources Protection Report and Stormwater Pollution Prevention Plan were all drafted as part of the planning and redevelopment for Devens. These plans and reports identify important natural areas and systems within Devens and the surrounding region and recommend certain levels of conservation and protection. Well planned developments can strategically identify these resource areas (i.e., wetlands, watercourses, steep slopes) and preserve and incorporate these elements and associated buffers as green infrastructure components and meet development screening, landscaping, water quality and viewshed protection requirements, while preserving the ecological structure and function of these natural areas at the same time.

Traditional parking lot design(curb, gutter and catch basin)

Low-Impact Development parking lot design (biofiltration)

Green Infrastructure elements are incorporated throughout the current DEC Rules and Regulations. A single Green Infrastructure element such as street trees or parking lot landscaping can be utilized to meet multiple regulatory requirements and sustainability objectives within the DEC Rules and Regulations:



Source: "*Triple Bottom-Line Benefits of Street Trees in Devens*", by Neil Angus, Environmental Planner, Devens Enterprise Commission, February 2012. http://www.devensec.com/news/Benefits_of_Street_Trees.pdf

As the above graphic shows, street tree plantings can replicate many natural ecosystem services and can act as corridors or connections to larger, unfragmented ecological habitats as well as provide many added benefits for people and properties nearby (triple-bottom line attributes of sustainable development). All of these benefits also apply to the vegetative screening that Devens requires for parking lots. A listing of Green Infrastructure elements and the corresponding DEC regulations that these elements address are listed in Appendix A. Graphic examples of commercial and residential Green Infrastructure applications can also be found in Appendix B.

Green Infrastructure Incentives in Devens:

The DEC offers a number of regulatory and financial incentives for projects that incorporate certain sustainable and green infrastructure elements:

Expedited Permitting: To Applicants, time is money. It is often said, the greenest of green buildings is often the adaptive reuse of existing buildings. The DEC recognizes these points and has committed to a maximum 21-day permitting timeframe for projects utilizing existing buildings (where no exterior site improvements are required). This helps reduce the environmental footprint of new development and expands on the DEC's already expedited Unified Permitting Process which commits to Level 2 Unified Permitting of projects within 75 days.

Stormwater Management Credit for Green Roofs: For projects that incorporate vegetated roofs, the area of roof covered by vegetation may be considered pervious and subtracted from the total proposed impervious area [974 CMR 4.08(5)]. This reduces the overall quantity of stormwater that is required to be managed on-site and can reduce the size of associated stormwater management systems, thereby saving land and money.

Relaxed Frontage Requirements for more Energy &Water Efficient Development: Applicants that agree to construct residential projects to a Home Energy Rating System (HERS) of 60 or less and incorporate EPA Water Sense labeled plumbing fixtures in all buildings are eligible for reduced lot frontage requirements. This allows for more

clustered approaches to development which reduces the development footprint and associated infrastructure costs [974 CMR 5.02(2)].

***Additional Street Types**:* The DEC recently revised its Regulations to include additional street types which allow for reduced pavement widths and /infrastructure costs (refer to 974 CMR 2.07).

Renewable Energy Building and Electrical Permit Fee Reductions: to incentivize the integration of Renewable Energy Facilities at Devens and further promote clean energy, greenhouse gas reduction and improved air quality; the DEC has adopted a reduced Unified, Building and Electrical Permit fee schedule for renewable energy installations for both ground-mounted and building mounted/integrated systems.

Financial incentives for LEED projects: The US Green Building Council's Leadership in Energy and Environmental Design (LEED) green building certification program requires a number of green infrastructure components be designed and constructed into a project that is pursuing certification (landscaping, energy efficiency, low-impact stormwater management, reduced development footprint management, etc…). As this program embodies the same sustainable development principles as Devens, completed projects that achieve LEED certification can be reimbursed up to 15% of their unified permit fee (maximum $10,000).

Green Infrastructure in Devens – Low-Impact Development/Bio-Filtration Landscape Island Case Study:
One Jackson Place (27 Jackson Road, Devens, MA)

Total Traditional Project Cost:	**$1,004,000**
LID Reduced site paving	-$32,000
LID Reduced curbing	-$50,000
LID Reduced stormwater piping	-$14,000
LID Reduced stormwater structures	-$68,000
LID Increased landscaping	+$12,000
LID Increased site preparation	+$10,000
LID Increased soil mix	+$18,000
Total Estimated LID Savings:	**-$124,000 (12%)**

Depressed landscape islands with specialized plantings and soil mix to naturally filter and infiltrate stormwater runoff while providing wildlife habitat connections through the site to adjacent larger forested areas.

For additional information or questions, please contact Devens Enterprise Commission staff
neilangus@devensec.com or 978.772.8831.

Resources:

1. UNH Stormwater Center: http://www.unh.edu/unhsc/– Case Studies on economics of LID techniques: http://www.unh.edu/unhsc/sites/unh.edu.unhsc/files/docs/FTL_Resource%20Manual_LR.pdf
2. Devens LID Case Study: www.devensec.com/sustain.htm
3. MA Smart Growth/Smart Energy Toolkit: http://www.mass.gov/envir/smart_growth_toolkit/pages/mod-lid.html
4. MA DEP Stormwater Management Standards Structural Specifications for BMP's: http://www.mass.gov/eea/docs/dep/water/laws/i-thru-z/v2c2.pdf
5. BioMap 2: Conserving the Biodiversity of Massachusetts in a Changing World: http://maps.massgis.state.ma.us/dfg/biomap2.htm

Green Infrastructure Guidelines:

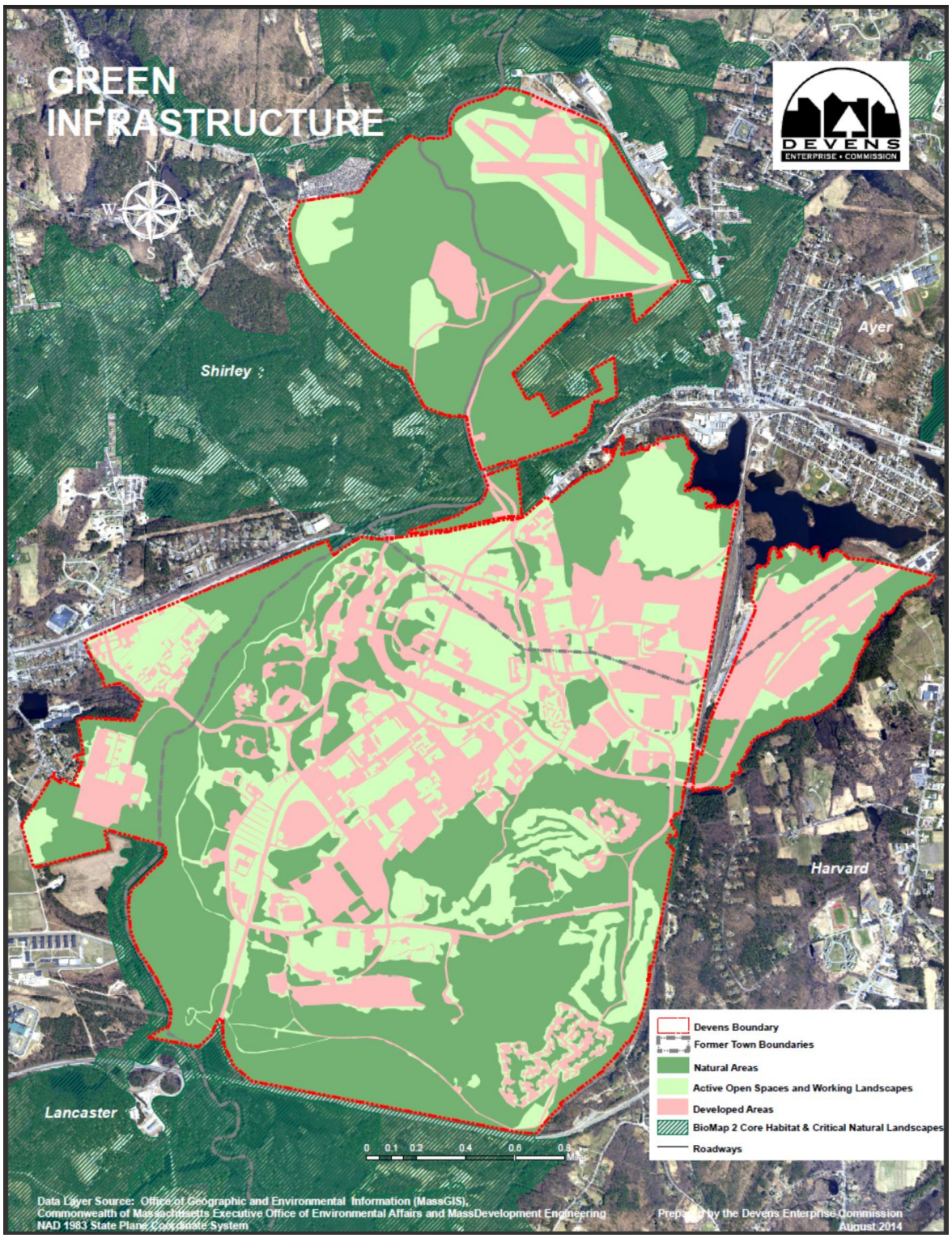
1. **Green Infrastructure Objectives.** All development projects within Devens should be designed to incorporate Green Infrastructure elements that meet one or more of the following objectives:
    a. **Protect and use existing vegetation.** Minimize disruption to existing habitats by incorporating site design that protects existing healthy and native vegetation and minimizes the development footprint (tight construction disturbance zone limits).
    b. **Facilitate connections.** Incorporate landscape design elements into all proposed projects to facilitate green infrastructure connections/linkages to surrounding natural landscapes to the maximum extent feasible. 974 CMR 3.04(8)(d)5. requires areas of previously cleared woodlands that are not utilized on project sites to be re-planted with native woodland species. Edges of previously cleared woodlands on-site are also required to be planted with mix of vegetation types.
    c. **Vegetation types**. Support biodiversity, reduced pesticide use, and water conservation by using native plants species that have adapted to site conditions and local climate zones (see 974 CMR 3.06 Appendix A for a list of native plants). Also prohibit planting of invasive species (a full and updated list is available from the Invasive Plant Atlas of New England – IPANE).
    d. **Energy/Micro-climate.** Reduce building energy consumption by maximizing solar orientation of buildings and incorporating passive energy design features to maximize energy efficiency to the maximum extent practicable. Projects are encouraged to consider the placement of appropriate vegetation or vegetated structures in strategic locations adjacent to buildings. Projects may also be designed to offset additional building energy demands to the maximum extent practicable through added efficiencies such as district energy systems and/or renewable energy systems. Where feasible, projects may also incorporate urban heat island reduction elements such as shade trees, green roofs, or vegetated structures to cover non-vegetated surfaces such as walls, walkways and parking lots.
    e. **LID/Stormwater Management.** Use low-impact development stormwater management techniques to facilitate green infrastructure connections throughout proposed developments.
    f. **Landscape Management.** Develop long-term invasive species monitoring, control and removal program as part of the Long Term Operations and Maintenance Plan for the site. Refer to Appendix B for examples of Commercial/Industrial and Residential Applications.
2. **The Devens Green Infrastructure and Landscape Matrix Map** divide Devens into three (3) landscape areas/classifications. Projects located within one or more of these areas are encouraged to incorporate green infrastructure components that are functional and facilitate connections to or enhance larger contiguous landscape patches. See ***Appendix A*** for a list of Green Infrastructure technologies and ***Appendix B*** for graphic examples of Commercial/Industrial and Residential Applications.

DEVENS GREEN INFRASTRUTURE AND LANDSCAPE MATRIX

Dark Green: **Natural Lands.** All proposed projects within these areas may preserve and incorporate green infrastructure linkages and connections within these areas in accordance with DEC Landscaping requirements 974 CMR 3.04(8).

Light Green: **Active Open Spaces, Working Landscapes and Existing LID**. All proposed projects within these areas may incorporate landscape designs that connect to/expand existing Natural lands within the immediate vicinity in accordance with 974 CMR 3.04(8)(d)5. and 974 CMR 3.04(8) in general.

Red: **Developed Areas.** All proposed projects within these areas may incorporate landscape designs in accordance with 974 CMR 3.04(8) that, where feasible, facilitate connections to surrounding Natural Lands, Active Open Spaces, Working Landscapes and Existing LID as per 974 CMR 3.04(8)(d)5.



**Core Habitat and Critical Natural Landscapes from the BioMap 2 are shown in green hash marks outside of Devens boundaries. These areas are generally contiguous with "Natural Lands" within Devens, further emphasizing the importance of maintaining and facilitating green infrastructure connections to and from these areas.*

APPENDIX A – Devens Green Infrastructure Elements:

Below is a list of green infrastructure elements and technologies that should be considered by all Applicants, along with links to the applicable DEC regulations that such components can satisfy. As this table demonstrates, many individual green infrastructure components can satisfy multiple regulatory requirements. Please note, the DEC supports innovation and recognizes this is not a complete list of Green Infrastructure elements and technologies. New or alternative Green Infrastructure elements and technologies not listed below may be acceptable, provided the Applicant demonstrates to the DEC the appropriateness of such measures in meeting the applicable provisions of the DEC Rules and Regulations.

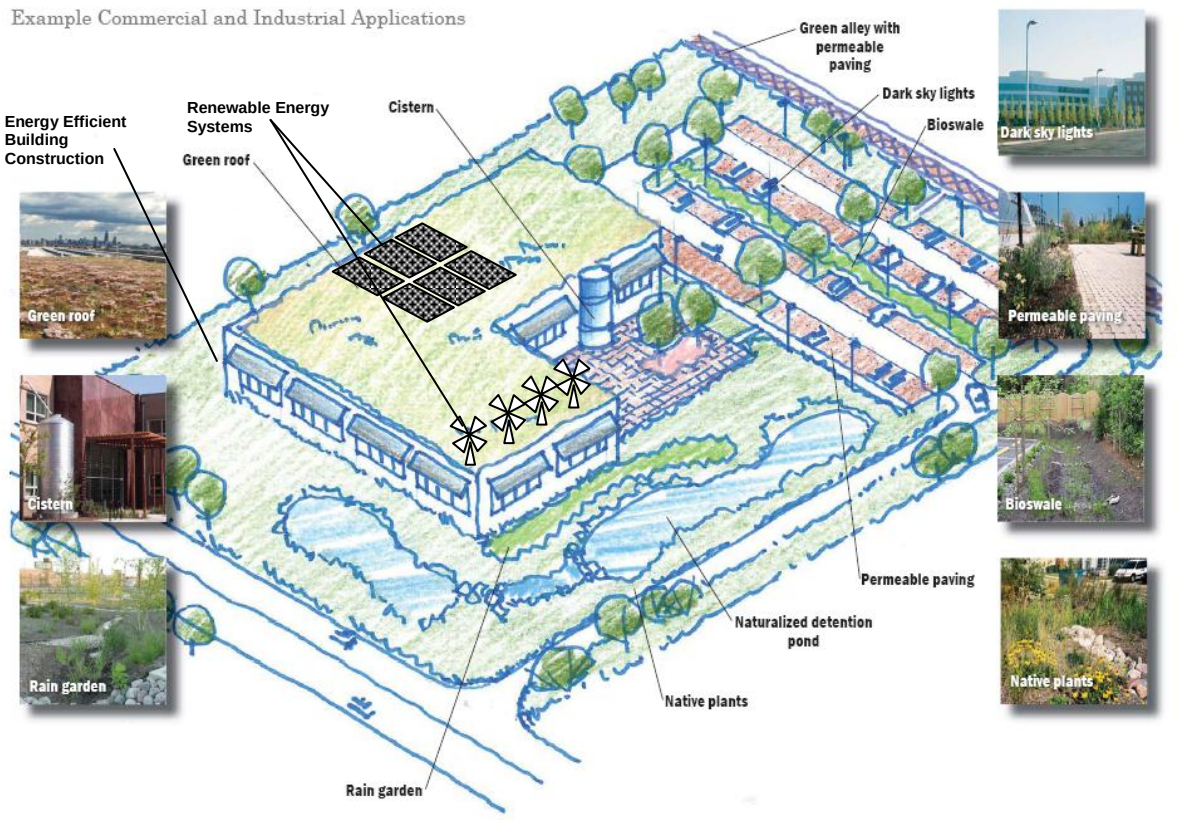
GREEN INFRASTRUCTURE ELEMENTS	EXAMPLES OF DEC REGULATIONS ADDRESSED
General Landscape Design Elements:	
Preservation of tracts/corridors of existing native vegetation, topography and native wildlife habitat.	Stormwater Management - 974 CMR 3.04(4) Topographic Alterations – 974 CMR 3.04(5) Site Improvements - sidewalks/trails 974 CMR 3.04(6)(d) Preservation of existing vegetation - 974 CMR 3.04(8)(d) Restoration of vegetation - 974 CMR 3.04(8)(d)5. Use of native plants - 974 CMR 3.04(8)(c) Minimize lawn areas 974 CMR 3.04(8)(f) Viewshed Overlay Districts - 974 CMR 3.04(8)(i) Steep Slope Protection – 974 CMR 3.06 Industrial performance standards for light and noise - 974 CMR 4.04 &5 Wetland Protection 974 CMR 4.06 Water Resource Protection – 974 CMR 4.09 Greenhouse Gas Mitigation – 974 CMR 4.11 Innovative Residential Development – 974 CMR 5.02(1)(k)
Restoration of habitat	Preservation of existing vegetation - 974 CMR 3.04(8)(d) Topographic Alterations – 974 CMR 3.04(5) Screening - 974 CMR 3.04(8)(g) Wetland Protection 974 CMR 4.06 Water Resource Protection – 974 CMR 4.09 Greenhouse Gas Mitigation – 974 CMR 4.11
Trails and greenway connections	Site Improvements - sidewalks/trails 974 CMR 3.04(6)(d) Stormwater Management - 974 CMR 3.04(4) Greenhouse Gas Mitigation – 974 CMR 4.11 Innovative Residential Development – 974 CMR 5.02(1) and (2)
Landscaping Plantings	Use of native plants - 974 CMR 3.04(8)(c) Screening - 974 CMR 3.04(8)(g) Minimize lawn areas 974 CMR 3.04(8)(f) Parking Landscaping requirements - 974 CMR 3.04(8)(h) Industrial performance standards for light and noise - 974 CMR 4.04 &5 Greenhouse Gas Mitigation – 974 CMR 4.11
Control and management of invasive species	Use of native plants - 974 CMR 3.04(8)(c) Maintenance requirements:- 974 CMR 3.04(8)(n) Wetland Protection 974 CMR 4.06
Impervious surface reductions (urban heat island)	Parking Landscaping requirements - 974 CMR 3.04(8)(h) Industrial performance standards for light and noise - 974 CMR 4.04 &5 Parking maximums - Devens Bylaws Article C Stormwater Management - 974 CMR 3.04(4) Innovative Residential Development – 974 CMR 5.02(1) and (2) Vegetated roofs and walls - 974 CMR 3.04(8)(g)(i)(5)
Reduce/eliminate potable water use for irrigation	Xeriscaping and greywater reuse 974 CMR 3.04(8)(c) Use of native plants - 974 CMR 3.04(8)(c) Minimize lawn areas - 974 CMR 3.04(8)(f) Maintenance requirements - 974 CMR 3.04(8)(n) Stormwater Management - 974 CMR 3.04(4) Water Resource Protection – 974 CMR 4.09 Controls on in-ground irrigation systems - 974 CMR 8.09(11)
Created Wetlands	Screening - 974 CMR 3.04(8)(g) Use of native plants - 974 CMR 3.04(8)(c) Stormwater Management - 974 CMR 3.04(4) Stormwater Management Design Standards – 974 CMR 4.08 Water Resource Protection – 974 CMR 4.09
Preservation of Steep Slopes	Screening - 974 CMR 3.04(8)(g) Slope Resource Areas - 974 CMR 3.06 Innovative Residential Development – 974 CMR 5.02(1) and (2)
Vegetative screening	Screening - 974 CMR 3.04(8)(g) Use of native plants - 974 CMR 3.04(8)(c) Building façade screening requirements:- 974 CMR 3.04(8)(l) Industrial performance standards for light and noise - 974 CMR 4.04 &5 Parking Landscaping requirements - 974 CMR 3.04(8)(h) Viewshed Overlay Districts - 974 CMR 3.04(8)(i) Greenhouse Gas Mitigation – 974 CMR 4.11

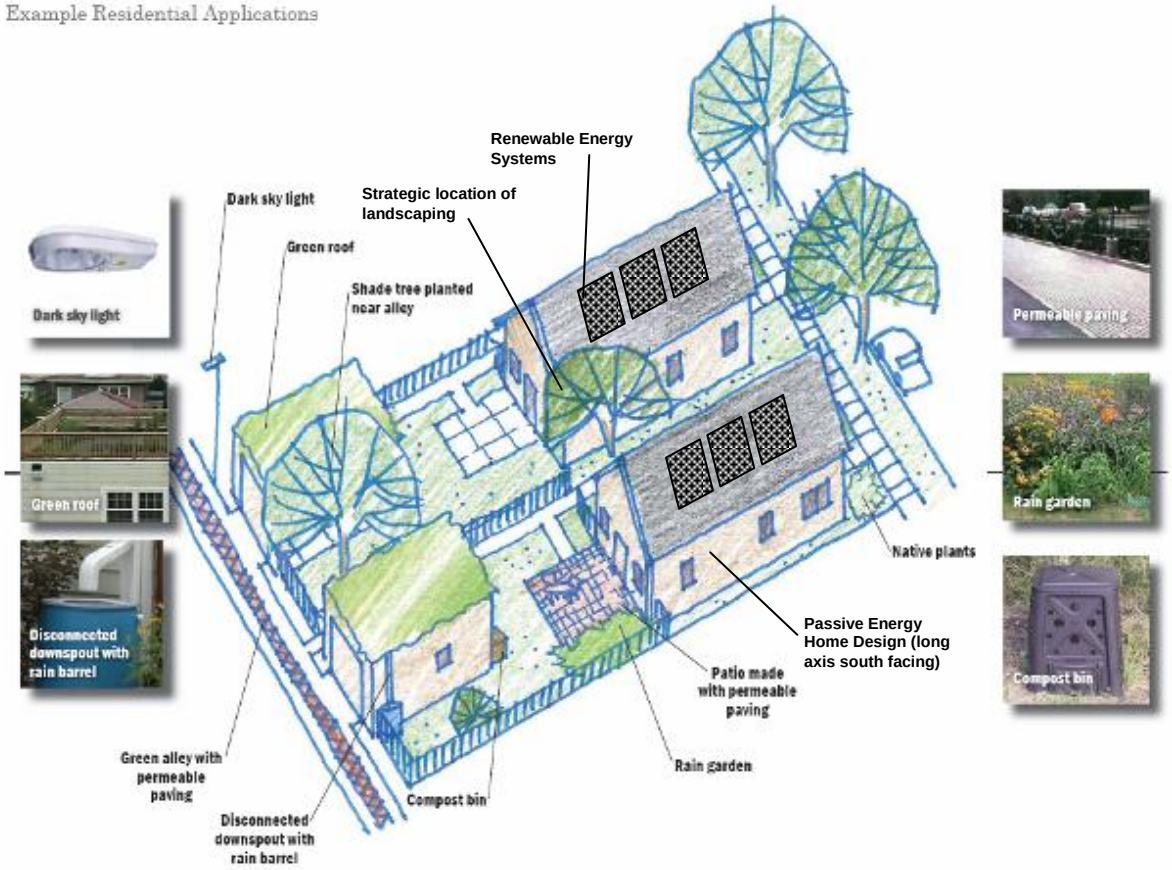
GREEN INFRASTRUCTURE ELEMENTS	EXAMPLES OF DEC REGULATIONS ADDRESSED
General Landscape Design Elements cont…	
Edible landscapes	Plants lists – 974 CMR 3.07(5) Innovative Residential Development – 974 CMR 5.02(1) and (2) Vegetated roofs and walls - 974 CMR 3.04(8)(g)(i)(5)
Building and Site Design Elements:	
Low-Impact Development Stormwater Mgm't - on-site stormwater management requirements	Stormwater Management - 974 CMR 3.04(4) Stormwater Management Design Standards – 974 CMR 4.08 Parking Landscaping requirements - 974 CMR 3.04(8)(h) Water Resource Protection – 974 CMR 4.09 Innovative Residential Development – 974 CMR 5.02(1) and (2) Vegetated roofs and walls - 974 CMR 3.04(8)(g)(i)(5)
Minimizing building heating and cooling requirements with landscaping	Screening - 974 CMR 3.04(8)(g) Building façade screening requirements:- 974 CMR 3.04(8)(l) Vegetated roofs and walls - 974 CMR 3.04(8)(g)(i)(5) Industrial performance standards for light and noise - 974 CMR 4.04 &5 Greenhouse Gas Mitigation – 974 CMR 4.11
Manage, improve, recharge and reuse stormwater on-site to the maximum extent feasible	Screening - 974 CMR 3.04(8)(g) Stormwater Management - 974 CMR 3.04(4) Vegetated roofs and walls - 974 CMR 3.04(8)(g)(i)(5) Stormwater Management Design Standards – 974 CMR 4.08 Water Resource Protection – 974 CMR 4.09 Controls on in-ground irrigation systems - 974 CMR 8.09(11)
Rain gardens	Use of native plants - 974 CMR 3.04(8)(c) Stormwater Management - 974 CMR 3.04(4)\ Stormwater Management Design Standards – 974 CMR 4.08 Water Resource Protection – 974 CMR 4.09
Decentralized infiltration systems	Use of native plants - 974 CMR 3.04(8)(c) Stormwater Management - 974 CMR 3.04(4) Vegetated roofs and walls - 974 CMR 3.04(8)(g)(i)(5) Stormwater Management Design Standards – 974 CMR 4.08 Water Resource Protection – 974 CMR 4.09
Rain barrels/cisterns	Stormwater Management - 974 CMR 3.04(4)\ Maintenance requirements:- 974 CMR 3.04(8)(n) Water Resource Protection – 974 CMR 4.09 Controls on in-ground irrigation systems - 974 CMR 8.09(11)
Green roofs/green walls (refer to DEC Vegetated Roof Policy)	Screening - 974 CMR 3.04(8)(g) Vegetated roofs and walls - 974 CMR 3.04(8)(g)(i)(5) Water Resource Protection – 974 CMR 4.09 Use of native plants - 974 CMR 3.04(8)(c) Building façade screening requirements:- 974 CMR 3.04(8)(l) Stormwater Management - 974 CMR 3.04(4) Stormwater Management Design Standards – 974 CMR 4.08 Greenhouse Gas Mitigation – 974 CMR 4.11
Minimizing cut and fill and development footprint	Topographic Alterations – 974 CMR 3.04(5) Preservation of existing vegetation - 974 CMR 3.04(8)(d) Minimize lawn areas 974 CMR 3.04(8)(f) Industrial performance standards for light and noise - 974 CMR 4.04 &5 Water Resource Protection – 974 CMR 4.09 Innovative Residential Development – 974 CMR 5.02(1) and (2) Greenhouse Gas Mitigation – 974 CMR 4.11
Naturalized Erosion and Sediment Controls	Plan requirements - 974 CMR 3.02(3)(e) Stormwater Management - 974 CMR 3.04(4) Stormwater Management Design Standards – 974 CMR 4.08 Water Resource Protection – 974 CMR 4.09
Infrastructure Elements*:	
Street types/widths, stormwater mgm't and landscape treatments within Road Rights-Of-Ways (ROW)	Landscaping Requirements within ROW - 974 CMR 2.07(2) and (7) Use of native plants - 974 CMR 3.04(8)(c) Industrial performance standards for light and noise - 974 CMR 4.04 &5 Stormwater Management for Streets – 974 CMR 2.07(6) Greenhouse Gas Mitigation – 974 CMR 4.11 Innovative Residential Development – 974 CMR 5.02(1)(e)
Traffic calming measures incorporating landscaping/biofiltration	Traffic calming - 974 CMR 2.07(3) Stormwater Management for Streets – 974 CMR 2.07(6) Use of native plants - 974 CMR 3.04(8)(c) Street tree requirements - 974 CMR 3.04(8)(k) Industrial performance standards for light and noise - 974 CMR 4.04 &5 Greenhouse Gas Mitigation – 974 CMR 4.11 Innovative Residential Development – 974 CMR 5.02(1) and (2)
Permeable and pervious paving systems	Stormwater Management - 974 CMR 3.04(4) Stormwater Management Design Standards – 974 CMR 4.08

GREEN INFRASTRUCTURE ELEMENTS	EXAMPLES OF DEC REGULATIONS ADDRESSED
Infrastructure Elements*cont…:	
Street trees with tighter spacing (30-40' vs. traditional 50')	Street tree requirements - 974 CMR 3.04(8)(k) Industrial performance standards for light and noise - 974 CMR 4.04 &5 Screening - 974 CMR 3.04(8)(g) Use of native plants - 974 CMR 3.04(8)(c) Greenhouse Gas Mitigation – 974 CMR 4.11 Innovative Residential Development – 974 CMR 5.02(1) and (2)
Biofiltration swales	Use of native plants - 974 CMR 3.04(8)(c) Stormwater Management - 974 CMR 3.04(4) Stormwater Management Design Standards – 974 CMR 4.08
Floodplain, stream, wetland, riparian buffer protection and/or restoration	Wetland Protection 974 CMR 4.06 Stormwater Management - 974 CMR 3.04(4) Stormwater Management Design Standards – 974 CMR 4.08 Greenhouse Gas Mitigation – 974 CMR 4.11
Community parks/permanently protected open space	Greenhouse Gas Mitigation – 974 CMR 4.11 Use of native plants - 974 CMR 3.04(8)(c) Stormwater Management - 974 CMR 3.04(4) Preservation of existing vegetation - 974 CMR 3.04(8)(d) Site Improvements - sidewalks/trails 974 CMR 3.04(6)(d) Restoration of vegetation - 974 CMR 3.04(8)(d)5. Innovative Residential Development – 974 CMR 5.02(1)(k)
Community gardens	Innovative Residential Development – 974 CMR 5.02(1) and (2)
Integrated waste management systems	Greenhouse Gas Mitigation – 974 CMR 4.11
Water Conservation and Efficiency	Use of native plants - 974 CMR 3.04(8)(c) Stormwater Management - 974 CMR 3.04(4) Maintenance requirements:- 974 CMR 3.04(8)(n) Greywater reuse - MA DEP regulatory provisions for greywater systems Innovative Residential Development – 974 CMR 5.02(1) and (2) Controls on in-ground irrigation systems - 974 CMR 8.09(11)
Ground source heat pumps, cogeneration and other energy efficiency infrastructure	Greenhouse Gas Mitigation – 974 CMR 4.11 Innovative Residential Development – 974 CMR 5.02(1) and (2)
District energy systems	Innovative Residential Development – 974 CMR 5.02(1) and (2) Greenhouse Gas Mitigation – 974 CMR 4.11
Renewable energy systems (including solar canopies for renewable energy generation and heat-island reduction)	Renewable Energy Facility Requirements – 974 CMR 4.10 Greenhouse Gas Mitigation – 974 CMR 4.11

*Transportation demand management programs that reduce single occupancy vehicle trips and promote alternative modes of transportation also contribute to reduced greenhouse gas emissions and improved public health and therefore qualify as green infrastructure components. For details on TDM in Devens, go to: http://www.devensec.com/development/TMI_Overview.pdf

APPENDIX B - Example Commercial, Industrial and Residential Applications:





Base drawings from the Chicago Green Alley Handbook. This information is being provided for informational purposes to assist applicants as part of the Devens Enterprise Commission expedited Unified Permitting process.

Devens Enterprise Commission
Reuse and Recycling Guidance for Devens Businesses and Residents

This guidance document was developed to assist Devens businesses and residents with meeting the recycling requirements of 974 CMR 8.00 and 310 CMR 19.017. This document also offers additional guidance on how businesses may be able further reduce waste generation with assistance provided by the Devens Eco-Efficiency Center and its Great Exchange reuse program.

Through MassDevelopment and the Devens Eco-Efficiency Center (DEEC), Devens currently offers recycling facilities for all waste ban materials listed by the MA Department of Environmental Protection. The recycling facilities are provided for all residents and small businesses on Devens.

In accordance with 974 CMR 8.00, all residents, businesses, industries and organizations in Devens are required to recycle all Waste Ban materials as defined by the MA Department of Environmental Protection in 310 CMR 19.017, which include:

- **Glass Containers:** glass bottles and jars (soda-lime glass) but excluding light bulbs, Pyrex cookware, plate glass, drinking glasses, windows, windshields and ceramics.
- **Metal Containers:** aluminum, steel or bi-metal beverage and food containers.
- **Single Polymer Plastics:** all plastic containers with recycle symbol.
- **Recyclable Paper:** all paper, cardboard, and paperboard products excluding tissue paper, toweling, paper plates and cups, wax-coated cardboard.
- **Yard Waste:** grass clippings, weeds, garden materials, shrub trimmings, and brush 1" or less in diameter (excluding diseased plants).
- **Leaves:** deciduous and coniferous leaf deposition.
- **Batteries:** lead-acid batteries used in motor vehicles or stationary applications.
- **White Goods:** appliances employing electricity, oil, natural gas or liquefied petroleum gas to preserve or cook food; wash or dry clothing, cooking or kitchen utensils or related items. These typically include refrigerators, freezers, dishwashers, clothes washers, clothes dryers, gas or electric ovens and ranges, and hot water heaters.
- **Whole Tires:** motor vehicle tires of all types. Whole tires may be disposed at combustion facilities. Shredded tires (a tire which has been cut, sliced or ground into four or more pieces such that the circular form of the tire has been eliminated) are not prohibited.
- **Cathode Ray Tubes:** any intact, broken, or processed glass tube used to provide the visual display in televisions, computer monitors and certain scientific instruments such as oscilloscopes.
- **Construction and Demolition Debris:** aggregate, asphalt, brick, carpet, ceiling tiles, concrete, gypsum, metal, paper, rubber, shingles and wood from construction activities and demolition of buildings and similar sources must be disposed of in a Massachusetts licensed construction and demolition debris recycling facility.

Every owner, tenant, occupant, property manager (acting on behalf of an owner, tenant, or occupant), or the person in control of the land at Devens is responsible for the proper disposal of recyclables, including the set up on site of recycling collection areas for owners, tenants, occupants, and property managers and for the proper disposal of recyclable materials and compostable yard waste. **Each occupant of land within Devens should therefore separate all designated recyclable materials and compostable yard waste from other refuse.**

Bundling of solid waste and recyclables service required: All haulers are required to provide bundled solid waste and recyclables collection services for their customers within Devens at a rate that reflects the cost of both services. Haulers are also required to provide quarterly reports to the Devens Department of Public Works (DPW) detailing the amounts and types of solid waste hauled and materials recycled. Exemptions are available provided the generator is using the Devens Recycling drop off or a separate hauler. **Generators (residents and businesses) shall send notice to the Devens DPW upon change of hauler.**

Recycling Services Available at Devens Department of Public Works (DPW)
Plastics, Bottles, Cans, Paper, Cardboard:Those who live or work in Devens can use the containers located in front of the DPW, located at 99 Buena Vista Street, to dispose of these recyclable materials. Containers are accessible at all times; paper and corrugated cardboard is to be disposed in the compactor.

Appliances, Metal Items
The DPW provides a drop-off location for refrigerators, washing machines, air conditioners, bicycles, filing cabinets, etc., for Devens residents at their facility. The DPW will also arrange to pick up these items curb-side. Both the drop-off and pick up services are available to Devens residents for a small fee and by appointment only. Call 978-772-1864 for additional information or to schedule a pick-up/drop-off.

Electronics
The DPW will also accept computer monitors, fax machines, printers, etc., from Devens residents and those who work in the community for a nominal disposal fee, by appointment only.

Compostable Yard Waste
The DPW currently provides free yard waste collection services **for residences only** within Devens. Every residential owner, tenant, occupant, or property manager (acting on behalf of an owner, tenant, or occupant) should place all compostable yard waste in suitable containers/bags and twigs/branches in tied bundles and place them at the curb at designated collection times as per the Devens Department of Public Works.

A detailed list of DPW accepted items, hours of operation and fees can be found at:
http://www.devenscommunity.com/sites/default/files/devens_recycling.pdf

Household Hazardous Waste Disposal:
In accordance with 310 CMR 30.000, all hazardous wastes must be disposed of at licensed disposal facilities. Households, organizations and business/industry within Devens that generate less than 220 pounds or 27 gallons on hazardous waste per month can use the service provided by the Devens Regional Household Hazardous Products Collection Center, located at 9 Cook Street. The Collection Center is open the first Wednesday and following Saturday of each month (March through December), 9:00a-noon. For more information and a list of acceptable materials, visit their website at http://www.devenshhw.com. For a listing of other current disposal permanent and temporary disposal centers in the region, go to:
http://www.northcentralmassrecycles.com/hazard.htm#form

Devens Eco-Efficiency Center Recycling-Reuse Services:
The Devens Eco-Efficiency Center is a non-profit entity based at 33 Andrews Parkway. The Center offers a number of programs and services that help establishments reduce waste generation and disposal costs. Technical assistance, outreach materials and 96-gallon recycle totes are available to help establish, strengthen or expand recycling programs in businesses and not-for-profit facilities.

Great Exchange:
The Center's Great Exchange program creates partnerships that divert a broad range of items and materials to reuse opportunities, including unwanted office furniture, outdated or imperfect inventory, packing materials, and production scraps. For additional information visit www.ecostardevens.com or call 978-772-8831 x3304.

Pallet Recycling Service:
Facilities located in Devens can have their wooden pallets collected free of charge on the morning of the first Thursday of each month. As more businesses participate, frequency may increase to every other week. The pallets will be refurbished for reuse, recycled as wood pellets or used as fuel at a local wood-fired power plant. Cardboard and stretch wrap can also be recycled through this service. For more information and to be included in the collections contact the Devens Eco-Efficiency Center at 978-772-8831 x3304 or donaneely@ecostardevens.com.

Private Recycling Services Available in Devens:
While the DEC does not endorse or promote any of the following private companies, the following recycling services are also situated within Devens:

Devens Recycling Center
Devens Recycling Center, located on Independence Drive, is a construction and demolition debris recycling facility.

For additional information or questions on recycling in Devens, please contact the Devens Enterprise Commission and the Devens Eco-Efficiency Center at: 978-772-8831 or visit their websites at
https://devensecoefficiencycenter.wordpress.com and www.devensec.com

Devens Soil Management Policy

The following represents the policy of the Massachusetts Development Finance Agency ("MassDevelopment" or the "Agency"), with regard to the disturbance, excavation, movement and/or removal of soils located in the Devens Regional Enterprise Zone ("Devens").

MassDevelopment, pursuant to Chapter 498 of the Acts of 1993, has been designated as the public agency responsible for the redevelopment, reuse, and operation of Devens.

Whereas, Devens is a former active military installation, it is possible that unexploded ordnance ("UXO") or Munitions of Explosive Concern ("MEC") and environmental contaminants may exist and/or be encountered at Devens. With this policy, MassDevelopment seeks to reduce any risk to human health and safety and the environment.

Until amended or rescinded, it shall be the policy of the Agency that:

1. Prior to commencing any intrusive earth work within Devens (due diligence, construction or otherwise) all personnel to be on site shall view a UXO/MEC video briefing provided by MassDevelopment. This video is intended to instruct on-site personnel as to how to visually recognize UXO/MEC if found during construction activities and to provide instructions on what to do if potential/suspected UXO/MEC is observed.

2. To the extent reasonably practicable, no soil shall leave any construction site at Devens. Construction sites at Devens should be "balanced", i.e., engineered such that all soils remain on the development site and result in no excess soil.

3. In the event that excess soils must be removed from a development site, the following protocol shall apply:

(a) Excess soils may be transported to another suitable location within Devens, provided however, that:

i. the soils must be restricted for use only at a commercial site;

ii. there is written documentation evidencing the consent and approval of the party agreeing to accept the soils for a specific use and the use, location and disposition of the soils shall be approved in writing by MassDevelopment;

iii. chemical testing of soils to be transported must be performed in conformity with the soil management plan developed by Haley and Aldrich (to be provided by MassDevelopment upon request) and any site specific

requirements imposed by the Massachusetts Department of Environmental Protection ("MA DEP"). The MA DEP must review and approve the results of the soils tests prior to the soils being transported;

iv. upon approval of soil test results by the MA DEP, the owner of the soils shall request that MassDevelopment provide written approval for the soils to be transported; and

v. any relocation of soils shall be compliant with all applicable DEC regulations and bylaws.

(b) If there is no suitable location on Devens to relocate the soils, the soils may be removed to a location outside of Devens, provided however, that:

i. the requirements of paragraphs 3(a)(i-v) shall apply; and

ii. all soils to be relocated outside of Devens shall be passed through a 1" diameter screen under the supervision of qualified personnel;

iii. all tailings (i.e. debris/matter not passing through the screen) shall be utilized on site; and

iv. if UXO/MEC is found in the tailings (or elsewhere), operations in the vicinity of the found item shall immediately cease and MassDevelopment and State Police shall be notified by the contractor.

(State Police phone #:978-772-7200)

4. In the event that areas of suspected environmental contamination (i.e. underground storage tanks, foreign materials, substances, etc.) are found, operations in the area in the vicinity of the suspected contamination shall cease and the contractor shall immediately notify MassDevelopment

(Devens Environmental Manager: phone # 978-784-2917)
or
(Devens EVP: phone # 978-784-2929)

MassDevelopment shall work with its environmental consultants and MA DEP and/or EPA to promptly agree upon a plan to temporarily relocate the foreign materials, if possible, in order to permit work on the site continue while a permanent disposal/remediation plan is established.

Please note that additional soil management policies are in force at certain specific areas in Devens. Contact the Devens Environmental Manager for details.

DEVENS UXO PROTOCOL AND PROCEDURES

A. DEVENS UXO PROTOCOL AND PROCEDURES – Prior to performing any intrusive soil work, all personnel on site must view an instructional video describing the types of unexploded ordnance ("UXO") which could be encountered and providing instruction of the procedures to be followed if a potential UXO item is encountered. The Contractor is responsible for coordinating viewing of the video by all personnel (both contractor and sub-contractors) who will be excavating (either by machine or hand tools), will be working within an excavated area or who will be overseeing or supervising either. Arrangements can be made for viewing of the instructional video by contacting the Devens Fire Department (978-772-4600) located at 182 Jackson Road, Devens, MA. Contact Fire Department to schedule viewing as soon as possible to avoid any delays in Contractor's proposed construction schedule.

1) If ordnance is found or suspected, Contractor shall follow the following procedures:

I. DO NOT TOUCH

II. STOP ALL OPERATIONS IN THE AREA OF THE ITEM

III. SHUT OFF ALL EQUIPMENT IN THE AREA OF THE ITEM

IV. EVACUATE THE AREA

V. CALL DEVENS DISPATCH @ 978-772-7200

2) Dispatch will notify the appropriate emergency and public safety personnel including notification of the Army UXO response coordinator.

3) State Police, in conjunction with the Devens Fire Chief, and the U.S. Army will determine the course of action to be followed regarding the relocating, removing and/or destroying of found UXO upon further investigation of the item.

4) The Contractor will be notified when personnel can return to the area and/or when and where operation of equipment can resume.

5) The following disclosure and notification is provided by Owner in documentation allowing access to and ground related work to be performed at Devens. In this context, the "Licensee" is the party to be performing the work and the "Licensor" Owner as the owner of the property.

"Licensee acknowledges that Devens is the site of a former active military installation, and that there is a possibility that unexploded ordnance (UXO) may be encountered during activities licensed by this Agreement. Specifically, the Deed pursuant to which the United States Army conveyed

Devens to Licensor, states that “The [Army] completed a comprehensive records search and, based on that search, undertook and completed statistical and physical testing of areas on Devens where the existence of unexploded ordnance (“UXO”) was considered to be present. Based upon said search and testing, the Army represents that, to the best of its knowledge, no UXO is currently present on [Devens]. The [Army] and [Licensor] acknowledge that, due to the former use of [Devens] as an active military installation, and notwithstanding the above –referenced records search and testing, UXO may exist on Devens. Upon due notice, the [Army] agrees to remove any such remaining UXO discovered on [Devens], as required under applicable law and regulation, as expeditiously as reasonable and practicable, subject to the availability of funds.” Licensee acknowledges and agrees that: (1) its right of entry is subject to the Army’s disclosure; (2) UXO have in fact been identified at Devens subsequent to the Army’s testing; (3) Licensee will take appropriate precautions as it deems necessary to be alert to the possibility of UXO; (4) neither Licensee nor its employees, agents, or contractors will touch or otherwise disturb UXO or suspected UXO; and (5) Licensee will cooperate with Licensor with respect to issues relating to UXO or suspected UXO. Without limiting the generality of the foregoing, if Licensee identifies an object that it suspects is UXO, it will immediately stop work and alert Licensor. Licensor will promptly alert the Army or other authorities and ask them to take appropriate further actions. Licensee agrees that any UXO is the responsibility of the Army (not Licensor), and Licensee agrees to follow whatever precautions or other actions are recommended by the Army. Licensee understands that activities authorized under this Agreement may be interrupted, impeded, delayed or prohibited by the Army as a result of the presence or suspected presence of UXO. Notwithstanding, the obligations of Licensee and the Army as specified in this Agreement, Licensee also agrees to cooperate with Licensor with respect to actions Licensor determines are necessary with respect to UXO at the Licensed Premises while this Agreement is in effect. Licensee shall not conduct any intrusive soil work on the Licensed Premises without first viewing Licensor’s instructional video on UXO.