

**Global Warming Solutions Act Implementation Advisory Committee
Recommendations for the Executive Office of Energy and Environmental Affairs'
Integrated and Holistic Land Use Plan, Strategy, and Tool
Submitted to EEA July 2024**

PURPOSE

The Executive Office of Energy and Environmental Affairs (EEA) requested that the Global Warming Solutions Act Implementation Advisory Committee (IAC) draft a memo to help inform the development of a holistic and integrated land use plan and strategy. The IAC, which includes leaders from business, energy, environment, building, transportation, local government, and academic communities, advises the Administration's implementation of the Clean Energy and Climate Plans for 2025/30 and 2050 that provide a roadmap to meet the requirements of the Commonwealth's climate change laws to meet greenhouse gas emissions reductions targets and goals. The IAC comprises five working groups, including: Land Use and Nature-Based Solutions, Electricity, Transportation, Buildings, and Climate Justice.

The work group chairs understand that EEA intends the holistic and integrated land use plan and strategy to apply to all types of land uses, not just those related to climate mitigation and the scope of the IAC. Given that broader reach of the plan and strategy, we encourage EEA to foster broad collaboration with its fellow state agencies and on-going initiatives on environmental justice, transportation, and housing, biodiversity and engage their associated stakeholders processes.

EEA has stated the objectives of the holistic and long-term land use plan and strategy include:

- Foster predictable development and growth to ensure equitable provision of services; electricity, transportation, etc.;
- Determine where and how to promote the protection and development of land to achieve objectives, while reducing risks to people and property;
- Reduce human ecological damages footprint and increase natural services; and
- Provide a focal point and tool for interagency coordination of intersecting policy decisions and promote active cross-agency support and alignment of land use goals.

In alignment with EEA's request of the IAC, this memo provides EEA with the following

- Introduction and status of land use
- Principles to guide land use decisions
- Goals and actions of state policies and plans related to land use
- Questions to guide the scope of the land use study and strategy

- Best practices related to principles, process, policies, and implementation
- Strategies and policy recommendations
- Methods, data and tools for developing the land use study, strategy and tool

INTRODUCTION AND STATUS OF LAND USE

The U.S. Environmental Protection Agency defines “Land Use” as “The human use of land. It represents the economic and cultural activities that are practiced at a given place.” The European Environment Agency states “Land use corresponds to the socio-economic description (functional dimension) of areas: areas used for residential, industrial or commercial purposes, for farming or forestry, for recreational or conservation purposes, etc.” Land use decisions in Massachusetts have, and will, determine the health and well being of our people and communities, as well as our natural world, for generations to come.

Massachusetts covers approximately 5.2 million acres. According to Mass Audubon’s “Losing Ground” (2020) “In Massachusetts, about 1.1 million acres are now developed, accounting for approximately 21% of the state’s land area. Over 1.3 million acres are now permanently protected, approximately 27% of the state’s land area. About 2.7 million acres, or 52% of the land in the state, is neither developed nor protected.” The Commonwealth loses 5,000 – 7,000 acres of forest (and other terrestrial habitats) to development each year.^{1,2}

There is a tension between land use for conservation and recreation, biodiversity, housing, transportation, energy infrastructure, and other purposes. The Healey-Driscoll administration has convened stakeholders to develop robust plans and strategies across each of these sectors. In order to help reconcile competing land uses, the administration has committed to developing a holistic and long-term land use strategy to support the implementation of goals, plans, and policies in an equitable way on climate change, energy infrastructure, housing, transportation, and economic development.

GOALS AND ACTIONS OF STATE POLICIES AND PLANS RELATED TO LAND USE

For each IAC Working Group sector, there are existing land use-related goals expressed in agency statutes, regulations, and plans. The Integrated and Holistic Land Use Plan can help ensure that all of these goals are met and coordinated in a complementary way to ensure mutual benefits for people and nature and avoid conflicts and unintended consequences.

Improve Equity and Environmental Justice: Across all state agencies and programs, achieve substantive justice through program outcomes and procedural justice through meaningful public participation and access to information under the Environmental Justice Strategy.

Natural and Working Lands

- **Clean Energy and Climate Plan**
 - **Accelerate Proactive Land Protection:** Increase the pace of public and private land protection to achieve *Clean Energy and Climate Plan* (CECP) goals of 30% of undeveloped lands and waters conserved by 2030 and 40% by 2050.
 - **Tree Planting (Clean Energy and Climate Plan)**
 - 5,400 acres of urban trees planted in developed open space, prioritizing environmental justice communities; and
 - 800-900 miles, covering 10,700 acres, of riparian buffers planted
 - **No Net Loss/Minimize the loss/conversion of natural and working land area and forest land area:** There is currently no target for this metric, but minimizing the loss of NWL is included in the CECP and Resilient Lands Initiative, and a goal for reducing forest loss is an outcome of the *Forests as Climate Solutions* Initiative.
- **Restoration of Natural and Working Lands**
 - **Biodiversity Executive Order goal** Draft goals, as of July 2024, include legal protection of 40% of the Commonwealth by 2050 (in keeping with CECP), restoration of additional lands and waters, coastal and marine goals, and focused engagement with communities across Massachusetts.
- **Natural and working land area and Agriculture and Food Security:**
 - Permanently protect 30% of undeveloped farmland by 2030. Enhance soil sequestration capacity of farms, parks and community ballfields, and other developed areas and those being developed.
 - No net loss of farmland is echoed in stakeholdering in the Department of Fish and Game's implementation of the Biodiversity Executive Order.

Accelerate Clean Energy Infrastructure:

Meet decarbonization goals to transform the buildings and transportation sectors from fossil fuels to renewable energy that will require additional land use to site infrastructure, including:

- Solar: 8.4 GW by 2030 and 27 GW by 2050
- Storage: 1,000 MWh by 2030; 5.* GW by 2050

Accelerate Production of Affordable and Market-Rate Housing, ideally in neighborhoods that are transit-accessible, walkable, and close to amenities and services. Incorporate any numeric goals emerging from the administration's Housing Advisory Council and Commission on Unlocking Housing Production

Accelerate Land Use Improvements for low vehicle miles traveled

- Evaluate suitability of mobility hub siting and/or expansion and complete streets suitability for communities.

Minimize Electric and Transportation Infrastructure Footprint

- Site and permit: 15,000 public charging station ports by 2025, and 75,000 public charging stations ports by 2030
- Develop planning maps for maximum conversion of public and private impermeable parking and roadway areas.
- Minimize roadway and intersection expansion to the degree possible.

QUESTIONS TO GUIDE THE SCOPE OF THE LAND USE STUDY AND STRATEGY

This section provides the IAC working groups' suggestions of questions to guide the scope of the land use study and strategy. Note that we did not place these into subcategories as there is significant overlap among the IAC sectors on climate justice, land use and nature-based solutions, transportation, buildings and electricity.

Key Questions:

- From an equity perspective, how do we look at how historic structural inequities impact current land use patterns around development and disproportionately impacting environmental justice communities?
- Where are current indigenous lands and waters? How would indigenous tribes prefer to engage and be consulted on addressing historic land use and efforts to reclaim and protect their ancestral lands?
- How do we redress historic inequities that have occurred with regard to new development and suitability of land protection and restoration?
- Which urban areas will be prioritized for funding for actions, such as tree-planting grants? How do we provide and ensure everyone has equitable access to open spaces?
- Where are the urban heat islands? How has providing open space and trees made a difference in reducing heat impacts? Where are areas that would benefit

from fostering greening? What will make an urban site suitable for tree planting and creating open space and investment/resources?

- Where are the farmers markets and urban gardens in relation to food deserts? Where are the locations that would benefit from fostering farmers markets and urban gardens?
- What does sustainability and site suitability look like from a holistic land use perspective that provides better outcomes and avoids harms for people and irreversible losses of natural and working lands?
- Where can we enable managed population and job growth; direct growth in a more proactive manner; characterize the types of development that are appropriate/inappropriate in natural and working lands?
- Where are water supplies and availability that can balance the needs of people and nature? Where is water moved/transferred across watersheds and basins?
- Where are the locations that are the most resilient to climate change impacts? And where are the areas most vulnerable to climate change impacts?
- Where is the infrastructure that controls water (dams, seawalls, culverts and bridges)? What is its hazard rating (the combination of location in proximity to people and condition)? What is its rating/benefit if removed would provide benefits for biodiversity? Or the converse, what areas should be restored, or designed as green infrastructure, to prevent flooding?
- Where is the existing infrastructure, such as utilities, transportation and housing? Recommend opportunities to prioritize infrastructure investments to areas that can accommodate more growth? Areas not vulnerable or are less vulnerable to future climate impacts? How do we integrate those into how we think about site suitability and prioritization of areas where we could encourage growth.
- How can the plan/strategy/tool encourage policies that incentivize or cause transportation mode shift?
- How do we limit, avoid, minimize, and mitigate those potential impacts of land use and development, particularly at the community level?
- Where are the highest value natural and working lands for protection, management, and/or restoration due to their ecosystem and climate services, including:
 - carbon storage and sequestration
 - habitat for wildlife
 - globally unique biodiversity
 - soil productivity
 - forestry
 - agriculture
 - aquaculture
 - climate resilience

- ecological restoration potential
- Equitable access to nature
- drinking water provision
- How can we coordinate with the statewide housing planning process as part of the Housing Advisory Council and Commission on Unlocking Housing Production coordinated by the Office of Housing and Liveable Communities?
- How can we balance the need to address the housing shortage and build resilient and low emissions housing, ideally sited near transit and existing infrastructure?
- Which sites are best candidates for new energy and infrastructure development and why? When are these sites needed?
- What are key uncertainties around proposed locations/sites for new clean energy sites (e.g., need for new transmission changes due to investments in neighboring state(s))?
- Where and how much solar can be deployed on existing buildings, parking lots, and already developed lands? What is the potential for deploying solar + energy storage on new commercial and residential buildings?
- What technology changes will have the greatest impact on land demand for energy over next three decades (e.g., long-duration energy storage can reduce total clean energy generation capacity)?

Best Practices: Principles, Process, Policies and Implementation

This section offers suggested best practices in overlapping categories of principles, processes, policies, and implementation. We realize there is overlap between this section and the following section on strategies and policy recommendations. Due to time and capacity issues we did not merge or consolidate these two sections.

- Gather local input to hear and learn from community experience and knowledge to complement spatial mapping tools. This will help ensure that historical marginalized groups are invited to participate and share their thoughts on the land use policy process.
- Ensure that the substantive requirements of existing laws, especially relating to the avoidance or mitigation of harm, are not compromised; and provide for adaptive management to continually update regulations and guidance with newly enacted policies and developments in science and technology.
- Revise site suitability for siting and permitting policies to meet or exceed mandated carbon reduction and removal levels, including:
 - Climate mitigation change goals and actions to reduce the causes of climate change, such as protecting, managing and restoring natural and working lands to maintain storage of and sequester carbon.

- Climate change adaptation plans and policies to address the impacts of climate change, such as nature-based solutions to reduce flooding, heat, and drought.
- Environmental Justice laws and policies that enhance community engagement and address cumulative impacts of development and displacement on neighborhoods.
- Biodiversity goals that aim to protect our natural heritage and keep nature healthy for all living things.
- Utilize best available science, technology, and data with timely analysis and transparent and clear public reporting. Provide estimates of uncertainty and describe limitations of data and results, including guidance for how to interpret and apply analytic results.
- Support partnerships and collaboration in every way possible at scale for impact.
- Ensure consistent and supportive approaches to avoid conflicts and provide better outcomes for people and nature and avoid harms.
- Develop a mitigation program and apply the ‘mitigation hierarchy’ to land use conversions – in the following sequence: avoid impacts to the maximum extent practicable, what cannot be avoided should be minimized, and what cannot be minimized should be mitigated.
- Identify land use policy and regulatory changes and incentives that will require, incentivize, and enable equitable and sustainable land use.
- Ensure land use priorities are included across relevant state agencies and programs to operationalize solutions with agency coordination/collaboration. Prepare an agency toolkit for approving grants and projects that use and incorporate

STRATEGIES AND POLICY RECOMMENDATIONS

This section provides strategies and policies to help achieve goals and lead to outcomes. We encourage that land use study and strategies include the consideration, evaluation and recommendations of policies. This first section is the Natural and Working Lands policies that EEA selected from the Clean Energy and Climate Plans. The second section is a more comprehensive list of Natural and Working Lands policies (and a few Transportation policies) that were included in the CECP and the Resilient Lands Initiative, as well as other recommendations. We acknowledge that policy priorities from the other IAC sectors are not included here, but would like to continue collaborating with EEA to determine which one should be added.

EEA presented the following Natural and Working Lands policy priorities at the March 2024 IAC meeting

Natural & Working Lands (1/2): How do we achieve the needed sequestration & storage?

We follow these strategies:	With these policies & initiatives:	And measure progress against these indicators and goals:
Protect NWL	State actions (land acquisition & stewardship; proactive wetland restoration; infrastructure investment & siting decisions)	28% of MA permanently conserved by 2025, 30% by 2030, 40% by 2050
Manage NWL (incl. Sustainable Wood Use)	Education, Outreach, Technical Assistance (Service Foresters; Wetlands Circuit Riders; Farmer Consultant Program; nutrient management)	Land conversion reduction goal TBD
Restore NWL	Incentives (grants for land acquisition, climate-oriented management, tree planting & retention, wetland restoration, planning assistance; Chapter 61 current use tax rate; tax credits for land conservation and cranberry bog renovation)	20% of private forests & farms adopting climate-smart practices by 2030
Explore Additional Sequestration	Regulations (WPA permits, forest cutting plan reviews, MEPA environmental reviews, mitigation measures/fees, in-lieu fees, plant nutrient management)	5% improvement between 2025-2030 in durable wood product recovery of harvested timber
	Policy mechanism TBD for hybrid/engineered carbon dioxide removal and/or interstate carbon purchase	5,000 acres of new riparian/urban trees by 2025, 16,100 acres by 2030, and 64,400 acres by 2050
	Environmental Justice Overlay	No net loss of carbon storage in wetlands by 2030

How are policy levers being implemented?



Natural & Working Lands (2/2): NWL Program and Policy Landscape

Policy/ Lever	Current	Planned
State Actions	- Land acquisition & stewardship by DCR & DFG - Proactive restoration by DFG/DER - Infrastructure investment & siting decisions - Net Zero emissions accounting framework	Multi-state net zero emissions accounting framework
Education, Outreach, Technical Assistance	- DCR's Working Forest Initiative - Service Forestry Program - MassDEP's Wetlands Circuit Rider Program - MDAR's Coordinated Soil Health Program, Farmer Consultant Program - Nutrient management plans via NRCS & UMass Ag. Ext.	**DCR's Underserved Forest Landowner Program - Online portal connecting forest landowners and businesses to resources
Incentives	*EEA's land acquisition grant programs, planning assistance grant program, and MVP Action grants for nature-based projects **EEA & DCR's grant programs for urban tree planting *EEA & MDAR's healthy soils grant programs - DCR's grant programs for climate forestry - MDAR's grant program for agrivoltaic systems - DFG/DER's grant programs for ecosystem restoration - Chapter 61, 61A, 61B current use tax rate - Tax credit programs for land conservation & cranberry bog renovation	*EEA's riparian tree planting grant program - DFG's blue carbon finance program - DCR's grants for forest soil protection - Incentives for use of native lumber in buildings
Regulations	*MA Environmental Policy Act (MEPA) - Forest Cutting Practices Act - Wetlands Protection Act (WPA) - In Lieu Fee Program - Plant Nutrient Management	- WPA reg. updates requiring organic soils in replicated wetlands - Streamlined permitting for proactive wetland restoration

Here are some topics NOT already included in the EEA slide the IAC recommends adding to EEA priorities:

- Increase funding for conservation and restoration of NWLs. This could include creating a dedicated funding for land conservation and stewardship; increasing

CLTC; and increasing grants to NGOs for land conservation, restoration and stewardship

- Set policies to achieve Net Gain and or No Net Loss of valuable natural resources and ecological functions, carbon storage/sequestration value, and biodiversity
- Advance policies to incentivize local communities to protect trees and forests, farms, healthy soils, and other natural lands
- Increase adoption of policies that meet goals of affordable housing and conservation such as central density zoning – Natural Resources Protection Zoning and MBTA Communities
- Fix state PILOT payments or develop new payment mechanisms to compensate communities for land use that provides public benefits and property tax exemptions
- Develop an *in lieu fee* program for carbon, biodiversity, and other environmental benefits
- Develop tree nurseries (both larger ones in more rural areas, and smaller urban ones) and related workforce development opportunities (growing, planting, and ongoing maintenance)
- Provide support to municipalities for tree retention bylaws
- Identify and foster opportunities to protect and restore salt marsh migration and riverine corridors to facilitate adaptation of blue carbon systems to sea level rise and other flooding
- Advance projects that provide multiple benefits, like a restoration project that provides adaptation benefits and includes trails for recreation
- Incentivize the use of local wood in buildings and account for the embodied carbon in steel and concrete within the building sector
- Weave in the biodiversity goals and policies that emerge from the Biodiversity Executive Order
- Incentivize going a step above to include and restore nature in the work of other sectors (ex. Pollinator habitat in medians; retaining, when possible, and planting trees when housing is developed; using permeable pavement/impervious surface removal when possible; etc.)
- Streamline general use approval for innovative and alternative (I/A) septic systems that reduce nutrient loading and develop programs that facilitate their installation
- Identify, protect, and restore salt marsh migration corridors to facilitate adaptation of blue carbon systems to sea level rise
- Strategically site transit hubs and charging infrastructure to minimize conflicts, as practicable

- Optimize transit oriented development, smart growth, and complete streets policies to minimize land use conflicts and encourage density, where appropriate
- Encourage the use impermeable surfaces, where appropriate

METHODS, DATA AND TOOLS FOR DEVELOPING LAND USE TOOL

EEA asked the IAC to provide data and tools that could be used to inform the land use study, strategy and tool.

We recommend categorizing EEA's wide range of land and water environmental data into four groups, under the heading of "Environment", in order to flesh out concepts and to avoid confusion. Below are the four groups, and the data and mapping tools recommended by TNC for each. This is a preliminary list.

Environment:

Conservation:

1. Biodiversity

BioMap

Project overview, includes interactive mapping tool:

<https://biomap-mass-eoeea.hub.arcgis.com/>

Datasets:

1. Core Habitat and Critical Natural Landscape (CNL). Note: We recommend more clearly defining biodiversity values, functions, and goals. There are multiple components of both Core Habitat and CNL that could be used to target specific biodiversity values.
2. Beyond Core Habitat and CNL, BioMap includes "Local Components", data designed specifically to support municipal-level decisions, augmenting the statewide data.

TNC Resilient and Connected Lands

Resilient Lands Mapping Tool:

<https://www.maps.tnc.org/resilientland/#/explore>

Datasets:

1. Resilient Sites
2. Climate Flow

USEPA Ecosystem Services and Biodiversity

<https://www.epa.gov/enviroatlas/ecosystem-services-enviroatlas-1>

TNC Freshwater Resilient and Connected Network

Resilient Rivers Explorer: <https://crs.tnc.org/pages/freshwater>

Datasets:

1. Freshwater Resilience

2. Freshwater Resilient and Connected Network
 - Aquatic Connectivity

Tools

1. DER's Restoration Potential Model Tool
<https://www.mass.gov/info-details/ders-restoration-potential-model-tool>
2. National Aquatic Barrier Inventory and Prioritization Tool
<https://aquaticbarriers.org/>

2. Natural and Working Lands

- Carbon Storage and Sequestration

Datasets

1. Forest Carbon

2 sources exist: from Harvard Forest and Clark University. The Clark University data is distributed at this link:
https://tnc.app.box.com/folder/155203697669?s=2yvv1ypjl2cln2qjzvl1iy_ejznmwrgmg
 2. Reforestation opportunities for climate mitigation
<https://www.reforestationhub.org/>
- Forest Management

Datasets

1. DCR Forest Reserves
2. Forest Harvest areas. MassGIS has a layer for "Prime Forest Land" but there is likely a better source.
3. TNC Secured Lands by Gap Status
4. Harvard Forest Wildlands

- Agriculture

Datasets

1. Agricultural Preservation Restrictions

APRs are recorded within the Protected and Recreational Open Space Datalayer
<https://www.mass.gov/info-details/massgis-data-protected-and-recreational-openspace>
2. Prime Farmland. MassGIS has a layer of "Prime Farmland Soils" but it is unclear whether this is the best source of data.
3. Recommendations from Healthy Soils Action Plan (these span forests, farmlands, wetlands)
<https://www.mass.gov/doc/healthy-soils-action-plan-2023/download>

3. Open Space and Outdoor Recreation

- Urban green space

- Recreation

Datasets

1. MassGIS Protected and Recreational Open Space
<https://www.mass.gov/info-details/massgis-data-protected-and-recreational-openspace>
2. Fishing and Boating Access Sites
<https://www.mass.gov/info-details/massgis-data-office-of-fishing-and-boating-access-sites>
3. Trails

4. Regulatory Data

- Supporting MESA and Wetland Protections Act
 1. Priority Habitat and Estimated Habitat
<https://www.mass.gov/info-details/massgis-data-nhosp-priority-habitats-of-rare-species>
- Wetlands
- Areas of Critical Environmental Concern
<https://www.mass.gov/info-details/massgis-data-areas-of-critical-environmental-concern>
- Watershed Protections Act Viewer
<https://experience.arcgis.com/experience/6b2d62c1611f48f38c890dc717ff4459>

1. Urban green corridors, parks, raingarden, and preserved floodplain areas.

Key Data Viewers:

- Massachusetts Ocean Resource Information System (MORIS)
<https://www.mass.gov/info-details/massachusetts-ocean-resource-information-system-moris>
- MassMapper
<https://maps.massgis.digital.mass.gov/MassMapper/MassMapper.html>

Clean Energy Infrastructure Energy

USEPA RE-Powering America's Land Initiative interactive Mapper evaluating brownfields, landfills for potential renewable energy redevelopment,
<https://www.epa.gov/re-powering/re-powering-mapper>

- [Technical Potential of Solar Study | Mass.gov](#)
- Offshore Wind Areas Mapping [Mapping Marine Habitats for Better Offshore Energy Siting | TNC \(nature.org\)](#)
- Potential OSW Interconnection Points
- Existing Ground Mounted Solar Map
- Rooftop and parking lot layers (LBNL, Clark University)
- MassAudubon and Harvard Forest's *Growing Solar, Protecting Nature* Study: <https://www.massaudubon.org/our-work/publications-resources/growing-solar-protecting-nature>

Utilities

- Capacity Constraint/ Availability Maps
- Hosting Capacity Maps:
 - Eversource: <https://www.eversource.com/content/residential/about/doing-business-with-us/interconnections/massachusetts/hosting-capacity-map>
 - National Grid: <https://systemdataportal.nationalgrid.com/MA/>
 - Unitil: <https://unitil.com/ways-to-save/solar-private-generation/ma-interconnection-hosting-capacity-map>
- Utility Electricity System Modernization Plan maps
- Utility CIP maps
- ISO-NE analysis on need
- [US DOE National Interest Transmission Corridor Phase II](#)

Transportation

- DOT Road Inventory and Infrastructure Development Map, particularly accurate and granular in LMI and EJ communities.
- EV Charging and Alternative Fuels (hydrogen, CNG, etc.) Maps:
 - DOE Alternative Fuels Data Center: https://afdc.energy.gov/fuels/electricity_locations.html#/find/nearest?fuel=ELEC
 - Charge HubEV Charging Directory: <https://chargehub.com/en/countries/united-states/massachusetts.html>

Climate Resilience

- CZM Sea Level Rise and Coastal Flooding

- Resilient Coasts – using data layers on flooding, erosion & development.
Resilience Districts TBD
- MORIS