Water Resources DRAFT

This guidance is intended to clarify how the Water Resources Goal and Objectives of the Regional Policy Plan (RPP) are to be applied and interpreted in Cape Cod Commission Development of Regional Impact (DRI) project review. This technical bulletin presents specific methods by which a project can meet the goal and objectives.

Water Resources Goal: To maintain a sustainable supply of high quality drinking water and protect, preserve or restore the ecological integrity of Cape Cod's fresh and marine surface water resources.

- **Objective WR1** – *Protect and preserve groundwater quality*
- **Objective WR2** – *Protect, preserve and restore fresh water resources*
- **Objective WR3** – *Protect, preserve and restore marine water resources*
- **Objective WR4** – *Manage and treat stormwater to protect and preserve water quality*
- **Objective WR5** – *Manage groundwater withdrawals and discharges to maintain hydrologic balance and protect surface and groundwater resources*

The applicability and materiality of these goals and objectives to a project will be determined on a case-by-case basis considering a number of factors including the location relative to Water Resource Areas (identified on page WR-5), context (as defined by the Placetype of the project's location), scale, use, and other characteristics of a project.

THE ROLE OF CAPE COD PLACETYPES

The RPP incorporates *a framework for regional land use policies and regulations based on local form and context* as identified through categories of Placetypes found and desired on Cape Cod.

The Placetypes are determined in two ways: some are depicted on a map contained within the RPP Data Viewer located at www.capecodcommission.org/RPPDataViewer adopted by the Commission as part of the Technical Guidance for review of DRIs, which may be amended from time to time as land use patterns and regional land use priorities change. The remainder are determined using the character descriptions set forth in Section 8 of the RPP.

The project context, as defined by the Placetype of the project's location, provides the lens through which the Commission will review the project under the RPP.

TABLE OF CONTENTS

Introduction 4
Definitions 5
Summary of Methods 8
Detailed Discussion of Methods for Meeting Objective WR1 16
Detailed Discussion of Methods for Meeting Objective WR2 25
Detailed Discussion of Methods for Meeting Objective WR3 27
Detailed Discussion of Methods for Meeting Objective WR4 31
Detailed Discussion of Methods for Meeting Objective WR5 35
General Application Requirements 36
Detailed Water Resources Application Requirements 36
References 38
Appendix A: Nitrogen Loading Guidance for Water Resources 39
Appendix B: Estimation Of High Ground-Water Levels 46
Appendix C: Monetary Nitrogen Offset 47

INTRODUCTION

Cape Cod's water resources include fresh and marine waters as well as natural and built systems. The Cape Cod Aquifer, which serves as the primary link between all of the water resources on Cape, is relied upon to provide drinking water and wastewater disposal capacity for the human population, plays an integral role in maintaining plant and animal habitat in marine and freshwater settings, and ultimately underlies many of the scenic and recreational opportunities that serve as the primary economic driver for the region. Consistent with the Cape Cod Area Wide Water Quality Management Plan (the "208 Plan"), maintaining the integrity and health of the aquifer and the various systems connected to it while encouraging provision of water resource infrastructure and growth that is appropriate in form and location is the primary purpose of the Water Resources goal and objectives.

This Technical Guidance provides examples of various methods and strategies that DRI projects may use to satisfy the Water Resources Goal and Objectives of the RPP. Through implementation of these methods and strategies, DRI projects can support the protection of critical water resources through development that is consistent with the vision for the region. Although the majority of methods discussed in this Technical Guidance are intended to be flexible, certain methods will be required of all DRIs where a particular Water Resources objective is applicable.

DEFINITIONS

Best Management Practice (BMP) – structural or procedural control measures implemented to reduce the quantity and velocity of stormwater runoff, and improve water quality.

Contributing Area to Ponds (CAPs) – This designation combines two areas, the Freshwater Recharge Area and the upgradient 300 foot buffer to ponds. It is an area in which land use and land-based activities are presumed to have a deleterious impact on pond water quality and ecology.

Environmentally Sensitive Site Design (ESSD) – is a design that incorporates Low Impact Development techniques or practices to prevent the generation of stormwater and non-point source pollution by reducing impervious surfaces, disconnecting stormwater sheet flow paths and treating stormwater at its source, maximizing open space, minimizing disturbance, protecting natural features and processes, and / or enhancing wildlife habitat.

Fresh Water Recharge Area (FWRA) – Watershed area that contributes to a fresh water pond as defined by the topography of the water table.

Hazardous Material - Hazardous Materials as defined and regulated under the Massachusetts State Sanitary Code (105 CMR 480.00). Examples include petroleum products, petroleum distillates, organic and inorganic solvents, oil-based paints, oil-based stains, insecticides, herbicides, rodenticides, and pesticides.

Hazardous Substance – Any chemical or substance that when released into the environment will pose a significant contaminant threat to groundwater and drinking water supplies. Hazardous substances include Hazardous Materials and Hazardous Wastes.

Hazardous Substances, Household Quantity of – quantities less than the following limits are considered Household Quantities:

- 275 gallons of oil on site at any time to be used for heating of a structure, or to supply an emergency generator
- 25 gallons or equivalent dry weight, total, of Hazardous material(s) on site at any time (excluding oil as classified in part (a))

- 55 gallons of Hazardous Waste generated at the Very Small Quantity Generator level as defined in Massachusetts Hazardous Waste Regulations (310 CMR 30.000) and accumulated or stored on-site at any time.

Hazardous Waste – Any Hazardous Waste, Universal Waste, or Waste as defined in the Massachusetts Hazardous Waste Regulations (310 CMR 30.010), not including Hazardous Materials or biomedical wastes regulated under the Massachusetts State Sanitary Code (105 CMR 480.00).

Impaired Area –Impaired Areas are where groundwater may have been degraded by point and non-point sources of pollution, including but not limited to areas with unsewered residential developments with an average lot size of less than 20,000 square feet; landfills, septage, and wastewater treatment plant discharge sites; and areas of high-density commercial and industrial development and those downgradient areas where groundwater may have been degraded by those sources.

Impervious Area – Land area that is covered by surfaces which do not permit precipitation to naturally recharge. Typically includes paved surfaces, roadways, parking areas, hard-packed gravel, and rooftops.

Infill – Development of new housing, commercial, or other amenities on scattered or discontinuous sites within existing substantially built-up areas.

Low Impact Development (LID) – Innovative stormwater management systems that are modeled after natural hydrologic features. LID manages rainfall at the source using uniformly distributed, decentralized, micro-scale controls. LID uses small, cost-effective landscape features located at the lot level. LID takes the form of techniques (e.g., porous pavement) or practices (e.g., reduced front yard setback).

Marine Water Recharge Area (MWRA) – Watershed area that contributes to a marine embayment as defined by the topography of the water table, and determined by United States Geological Survey (USGS) modeling as part of the Massachusetts Estuaries Project (MEP)

Potential Public Water Supply Area (PPWSA) – Land identified as suitable for the development of public water supplies.

Scientific Evaluation – as defined by MassDEP and set forth in the regulations at 310 CMR 15.002 and 15.214

Stormwater Control Measure (SCM) – structural or non-structural action taken to control the rate, volume, and/or pollution of stormwater.

Wetland Area – For the purposes of the nitrogen loading calculation worksheet, an area that does not infiltrate stormwater runoff because it is “wet.” Including areas such as wet meadows, marshes, swamps, bogs, and areas of flowing or standing water, such as rivers, streams, ponds, and lakes, or a coastal area including beaches, intertidal areas, salt marshes, and land under the ocean.

Wastewater Treatment Facility (WWTF) – Wastewater treatment and collection systems that are designed to treat flows greater than 10,000 gallons per day.

Wellhead Protection Area (WHPA) - Lands receiving precipitation that contribute to the recharge of public drinking water supply wells are considered Wellhead Protection Areas (WHPA). These include MADEP approved Zone IIs, interim wellhead protection areas, and certain town delineated water protection districts that extend beyond the Zone II limits.

SUMMARY OF METHODS

GOAL | WATER RESOURCES

To maintain a sustainable supply of high quality drinking water and protect, preserve or restore the ecological integrity of Cape Cod's fresh and marine surface water resources.

OBJECTIVE WR1 – Protect, preserve and restore groundwater quality

METHODS

All DRIs must:

- Limit site-wide nitrogen loading to a maximum concentration of 5 parts per million (ppm) except as provided below for Impaired Areas and Potential Public Water Supply Areas (PPWSAs),
- Not adversely impact downgradient existing or proposed drinking water wells.
- Site septic systems and other sources of contamination to avoid adversely impacting downgradient existing or proposed drinking water wells.
- Review existing Environmental Site Assessment(s) as available for previously developed properties and incorporate findings into project design

All DRIs should, to the greatest extent feasible:

- Utilize site design and operational best practices to preserve groundwater quality

For projects in an Impaired Area (see RPP Data viewer):

- If proposed site-wide nitrogen loading concentration exceeds 5 ppm, demonstrate no adverse impact on public or private drinking water supply wells, and potential water supply wells.

For projects in areas where mapped Potential Public Water Supply Areas are present:

- Site-wide nitrogen loading concentration must be less than 1 ppm.
- Site development should be minimized and designed to avoid the mapped PPWSA.
- An analysis of the impacts of the proposed site plan on potential future well siting is required.

All projects proposing private wastewater systems designed for flows greater than 2,000 gallons per day (gpd) and requiring greater treatment efficiency than specified by Massachusetts Department of Environmental Protection (MassDEP) permit or approval letter must:

- Enter into an Operation, Monitoring, and Compliance agreement with the Cape Cod Commission and local Board of Health.

All Wastewater Treatment Facility DRIs must:

- Consistently achieve 5 ppm or lower total nitrogen in wastewater effluent or in groundwater at downgradient property boundary.
- Utilize wastewater treatment facilities including private treatment facilities to protect and/or restore ground water quality provided that such facilities will not adversely impact water or other natural resources.

All DRIs within Wellhead Protection Areas (WHPAs) or Potential Public Water Supply Areas (PPWSAs) (see WHPA and PPWSA layers in the RPP Data Viewer) must employ the following methods as applicable to meet Objective WR1:

- All development, construction, clearing, and staging occurs at least 400 feet from identified future well sites.
- Locate site development within the project area to preserve the 400 foot radius around areas suitable for future public supply wells
- Provide secondary containment for 110% of potentially hazardous fluid volume plus an additional volume to include the 100-year storm event over a 24-hour period.
- Projects with elements that carry a high risk of contaminating groundwater, such as fleet storage, vehicle maintenance areas and loading docks, must locate those elements outside of WHPA / PPWSA when possible. When site constraints prevent locating these elements outside WHPA/PPWSA, projects must include a mechanical shut-off valve or other flow-arresting device in stormwater systems between the stormwater capture structures and the leaching structures. Additional requirements for stormwater management are detailed in Objective WR4.
- Do not use, treat, generate, handle, store or dispose of Hazardous Substances, in excess of Household Quantities, except under the following circumstances:

    - Reduce the quantity of hazardous substances on the site of redevelopment projects from the prior use and adequately document that reduction
    - Permanently eliminate the same or greater quantity of Hazardous Substances at another facility, project, or site within the same WHPA or PPWSA and adequately document that reduction
- Do not discharge effluent from private wastewater treatment facilities, unless private wastewater treatment facilities remediate existing water quality problems in the water supply area.
- Employ integrated pest management and/or biorational landscape management practices (per the detailed methods) protective of water quality for non-residential development and redevelopment
- Minimize impervious surfaces of roadway and parking area designs and materials

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OBJECTIVE WR2 – Protect, preserve and restore fresh water resources

METHODS

All DRIs within a Contributing Area to Ponds (CAPs), which includes the recharge area to ponds (Freshwater Recharge Area, where they are delineated) and the 300 foot buffer area upgradient of a pond, as defined by groundwater contours, must employ the following methods as applicable to meet Objective WR2:

- Prevent loading of nutrients and other contaminants to fresh water resources from new development.
- Maintain or reduce loading from nutrients and other contaminants to fresh water resources from redevelopment.
- Maintain, increase, or enhance vegetated buffer zones along shorelines to ponds and lakes. See Cape Cod Freshwater Pond Buffer Guidance for reference.

All projects within a CAP where wastewater disposal is proposed must maintain a 300 foot buffer to the high water level of a freshwater pond unless they demonstrate that phosphorus transported by groundwater does not discharge into the pond or its tributaries.

Discharges of wastewater effluent over 2,000 gallons per day proposed anywhere in the recharge area to a freshwater pond must evaluate the impacts of wastewater discharge on pond water levels, and potential phosphorus transport by groundwater to the pond.

OBJECTIVE WR3 – Protect, preserve and restore marine water resources

METHODS

All DRIs in a Marine Water Recharge Area (MWRA) where a critical nitrogen load has been determined through either a Total Maximum Daily Load, Massachusetts Estuaries Project (MEP) Technical Report, or other Scientific Evaluation (accepted by MassDEP) showing nitrogen impacts or impairment, or as defined by MassDEP's Natural Resource Nitrogen Sensitive Areas (NRNSA) must:

- Not add nitrogen mass (on a kg-N per year basis) to a MWRA unless:
  - There is a MassDEP Watershed Permit or locally adopted nutrient management plan, deemed consistent with the 208 Plan by the Cape Cod Commission, in the sub-watershed in which the project is proposed, and the approved nutrient management plan calls for initiation of nutrient reduction actions or strategies sufficient to offset nutrient contribution(s) from the project within five years of project approval; or
  - The project is in an area with available sewer connections, or is in a Placetype where nitrogen additions may be offset through a monetary contribution to address water quality problems in the affected surface waters.
- Improve on existing conditions by reducing project nitrogen mass loading for a redevelopment project

Projects in areas subject to a MassDEP-approved wastewater or watershed permit must:

- Further the goals of applicable local nitrogen management plan(s)

DRIs in a MWRA not meeting the above conditions must employ one or more of the following methods to meet Objective WR3:

- Not contribute additional nitrogen mass
- Connect project to sewer
- Remove an equivalent amount of nitrogen from the same subwatershed to offset the new nitrogen generated by the project
- Provide a monetary offset if allowed in the applicable Placetype (see list below).

To meet Objective WR3 all DRIs in a MWRA where there are water quality problems that have been documented in a MassDEP-accepted scientific study and a critical load has not been determined must:

- Maintain or reduce nitrogen mass amount relative to existing levels using the best available nitrogen reducing technology, including I/A systems approved by MassDEP for general use, provisional and private use, provided they perform as well as or better than the best performing general use systems.

OBJECTIVE WR3 AREAS OF EMPHASIS BY PLACETYPE

Natural Areas | Development is discouraged in Natural Areas and monetary N-offsets are not permitted.

Rural Development Areas | Nutrient reduction actions are generally not anticipated in rural areas due to low development density, therefore monetary N-offsets are not permitted.

Suburban Development Areas | Monetary N-offsets may be permitted in Suburban Development Areas at Commission's discretion.

Historic Areas | Monetary N-offsets may be permitted in Historic Areas at Commission's discretion.

Maritime Areas | Monetary N-offset are permitted in Maritime Areas where sewer is not yet available.

Community Activity Centers | Monetary N-offsets are permitted in Community Activity Centers where sewer is not yet available.

Industrial Activity Centers | Monetary N-offset are permitted in Industrial Activity Centers where sewer is not yet available.

Military and Transportation Areas | Monetary N-offset are permitted in Military / Transportation Areas where sewer is not yet available.

* The nitrogen offset rate is based on cost efficiencies associated with wastewater collection and municipal treatment as described in Appendix C.

OBJECTIVE WR4 – Manage and treat stormwater to protect and preserve water quality

METHODS

All DRIs must employ the following methods to meet Objective WR4:

- Provide a stormwater management system that prevents adverse impacts to water resources and other natural resources.

- Prevent discharge of untreated stormwater to marine and fresh surface water and natural wetlands by treating runoff from development, including areas located outside the jurisdiction of the Massachusetts Wetlands Protection Act.
- Locate new infiltration to maintain a minimum two foot separation between points of infiltration and the maximum high water table.

All DRIs, with the exception of redevelopment projects as discussed below, must employ the following methods to meet Objective WR4:

- Design stormwater systems according to the Massachusetts Stormwater Handbook to at a minimum: 1) accommodate the 100 year 24-hour storm, 2) remove at least 90% total suspended solids (TSS), 3) remove at least 60% of total phosphorus (TP), and 4) remove at least 44% total suspended solids prior to discharge into subsurface leaching facilities
- Provide storage and water quality treatment capacity for the first inch of stormwater runoff from impervious area using biofiltration, bioretention, or other Environmentally Sensitive Site Design (ESSD) and Low Impact Development (LID) techniques as detailed in the most recent version of the Massachusetts Stormwater Handbook, unless impracticable

Redevelopment projects must:

- Improve site conditions to enhance stormwater retention, water quality treatment, and recharge over existing conditions.
- Remove at least 80% TSS
- Remove at least 50% TP
- Include natural areas in stormwater system design, and utilize LID stormwater controls that add greenspace to project site.

For Projects within WHPA or PPWSA

- Stormwater systems must include a mechanical shut-off valve or other flow-arresting device between the stormwater capture structures and the leaching structures

OBJECTIVE WR4 AREAS OF EMPHASIS BY PLACETYPE

Natural Areas and Rural Development Areas | Prioritize protection of mature trees and wooded areas and utilize natural drainage features to manage stormwater. Minimize construction footprint, land disturbance during and after construction, and impervious area creation to maintain natural filtration and recharge processes. Use

LID features that provide water quality treatment during storm events and provide environmental or recreational function at other times, and optimize SCMs to remove nutrients of interest to applicable water resources For example, target removal of nitrogen if near a saltwater resource, or phosphorus if near a freshwater resource.

Suburban Development Areas | Cluster development to maximize contiguous natural areas. Minimize stormwater runoff by reducing road/driveway widths and using permeable materials or features to break up large impervious areas.

Historic Areas and Maritime Areas | Utilize permeable material choices when designing roadways, parking, and walkways where land area and subsurface access may be limited. Employ rainwater re-use techniques in ways that maintain local character. Explore opportunities for development of off-site shared district or community scale stormwater treatment.

Community Activity Centers | Prioritize inclusion of green space that can provide treatment and infiltration capacity for redevelopment / infill projects. Utilize subsurface storage and infiltration measures where site constraints limit above ground treatment capacity. Where applicable maintain or improve gray infrastructure to support development of shared off-site district or community scale stormwater treatment.

Industrial Activity Centers and Military and Transportation Areas | Prioritize inclusion of green space that can provide treatment and infiltration capacity for redevelopment / infill projects. Utilize permeable material choices when designing lower traffic roadways, parking, and walkways, and subsurface storage and infiltration measures where site constraints limit above ground treatment capacity. Where applicable maintain or improve gray infrastructure to support development of shared off-site district or community scale stormwater treatment. Design sites to minimize exposure of stormwater runoff to hazardous substances and other potential contaminants. Design stormwater systems to treat higher potential pollutant loads and contain runoff via flow arresting device or otherwise in the event of a spill / release.

OBJECTIVE WR5 – Manage groundwater withdrawals and discharges to maintain hydrologic balance in a way that is protective of surface and groundwater resources

METHODS

- All DRIs must meet Objective WR5 by designing water withdrawals and wastewater discharges in a manner that protects surface water and wetland habitat from groundwater pumping and, in the case of effluent disposal, from water table mounding issues (e.g., breakout, flooding, water table separation).
- Projects proposing to discharge >10,000 or withdraw >20,000 gallons of water per day from the site must: provide a groundwater study that demonstrates the project will not have adverse impacts on groundwater levels or adjacent surface waters and wetlands.

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE WR1

Objective WR1 – *Protect and preserve groundwater quality*

NITROGEN LOADING

Protection of Cape Cod's groundwater resources is critical for the protection of human health. The Cape Cod aquifer was designated as a Sole Source Aquifer (47 FR 30282) by the US Environmental Protection Agency (USEPA) in 1982, recognizing the complete dependence of the population on groundwater as its source for drinking water. The aquifer is primarily recharged by precipitation but also receives discharges of wastewater and stormwater, which can introduce contaminants into Cape Cod's primary source of drinking water. Nitrate-nitrogen (NO_3-N) is a primary contaminant of concern due to its potential human health effects, for which USEPA has established a maximum contaminant level (MCL) of 10 parts per million (ppm). In addition, high NO_3 concentrations in groundwater have also been correlated with higher concentrations of drinking water contaminants (e.g., volatile organic compounds and compounds of emerging concern). For these reasons the nitrogen loading requirements must be met by all DRIs, regardless of whether they are located within mapped water resource areas.

Detail on the methods for meeting Objective WR1 is provided below:

For all projects

Under the Safe Drinking Water Act, public supply wells which exceed 5 ppm NO_3-N are subject to additional monitoring requirements, and wells that exceed the MCL (10 ppm NO_3-N) cannot obtain variances or exemptions, thus requiring expensive treatment or being removed from operation. In aerobic subsurface environments like Cape Cod's unconfined aquifers, nitrate is highly persistent with natural chemical reactions providing minimal removal. Consequently, limiting the amount of nitrogen introduced to the aquifer is the most effective way to reduce NO_3-N concentrations in groundwater and protect Cape Cod's drinking water.

5 PPM NITROGEN LOADING STANDARD

The Cape Cod Commission has adopted a loading standard of 5 ppm NO_3-N which, based on a statistical analysis, is designed to keep violations of the USEPA MCL for NO_3-

N to less than 1 in 10 samples, while maintaining an additional margin of safety during times of simultaneous low recharge (i.e., drought conditions) and high loading (summer peak season). This standard is designed to protect human health, as well as current and potential future drinking water resources. A site-wide nitrogen loading concentration calculation takes into account all sources of nitrogen from the project site post-development and divides this cumulative nitrogen input by the water input (recharge) for the entire project site. Instructions on the information required and method for calculating site-wide nitrogen loading concentration are available in Appendix A – Nitrogen Loading Guidance for Water Resources. Applicants seeking to reduce site-wide nitrogen loading concentration may do so by providing advanced treatment of wastewater flows to remove additional nitrogen, reducing the volume of wastewater flows, increasing natural area on-site, decreasing fertilized lawn area, and incorporating Stormwater Control Measures (SCMs) optimized for nitrogen removal.

IMPACTS OF DEVELOPMENT ON LOCAL DRINKING WATER WELLS

The 5 ppm nitrogen loading concentration standard is designed to protect the Cape Cod aquifer as a whole, but localized impacts of a project on the groundwater resources also need to be considered. As nitrogen and other wastewater constituents follow the flow of groundwater, the direction of groundwater flow at the project site will determine where wastewater effluent travels. The location of septic and other wastewater disposal systems, direction of groundwater flow, and proximity of public or private drinking water wells at the site and on neighboring parcels must be examined, as applicable, to verify that a project even when complying with site-wide loading standards is not contaminating nearby drinking water resources. Applicants must identify existing or proposed drinking water wells within 400 feet of project boundaries, when this method is applicable. Groundwater flow direction should be determined using a water table map, which may be generated from groundwater elevation data (possible sources might include the United States Geological Survey, Massachusetts Department of Environmental Protection, or the town). The direction of groundwater flow should be used to locate wastewater treatment systems (including septic) appropriately so that effluent does not flow directly into downstream drinking water sources.

SITE ASSESSMENTS FOR PREVIOUSLY DEVELOPED PROPERTIES

Sites that have been previously developed, particularly those with uses that historically have used/generated hazardous substances (e.g., gas stations, auto repair facilities, dry cleaners, manufacturing facilities) may contain contaminated soil or groundwater even if site assessment and remediation activities have been conducted under the Massachusetts Contingency Plan (MCP). To prevent the unintentional mobilization of contaminants into groundwater, documentation of all Environmental Site Assessments and remedial actions must be provided for Commission review when this method is utilized to ensure the best available information regarding surface and subsurface site conditions is considered when evaluating the project design.

BEST DEVELOPMENT PRACTICES FOR SITE DESIGN

Low impact development is the practice of using innovative stormwater management systems that are modeled after natural hydrologic features. Low impact development techniques manage rainfall at the source using distributed decentralized micro-scale controls, and small cost-effective landscape features located at the lot level. They also facilitate compact, clustered development and minimize impervious surfaces.

Environmentally sensitive site design incorporates low impact development techniques to prevent the generation of stormwater and non-point source pollution by reducing impervious surfaces, disconnecting flow paths, treating stormwater at its source, maximizing open space, minimizing disturbance, protecting natural features and processes, and/or enhancing wildlife habitat.

Additional resources regarding site design best practices are available from the United States Environmental Protection Agency (https://www.epa.gov/sites/production/files/2015-11/documents/region3_factsheet_lid_esd.pdf), the Metropolitan Area Planning Council (https://www.mapc.org/resource-library/low-impact-development-toolkit/), and other State and regional environmental and planning agencies..

USE OF SHARED INFRASTRUCTURE

Shared wastewater treatment utilizes a single system to treat wastewater from multiple units of development. This practice can facilitate higher density development, reduce environmental impacts and treatment costs, and enhance open space preservation as it only requires a single location for wastewater disposal and may require less total area for disposal. In cases where a parcel is subdivided or residential lots are to be sold individually, a covenant will need to be entered into by the homeowners for operation and maintenance of a shared system in order to meet Objective WR1 via this method.

Multi-unit development is also encouraged to include community or public water supplies as alternatives to multiple private wells, in order to avoid potential impacts from wastewater disposal and challenges of siting and associated setback requirements for multiple water supply wells.

For Projects Proposing Private Wastewater Systems

OPERATION, MONITORING, AND COMPLIANCE AGREEMENTS

When a wastewater system of sufficient capacity (greater than 2,000 gallons per day design flow) is proposed to operate with greater removal efficiency than currently certified by MassDEP permit or letter of approval in order to meet Water Resources objectives, an Operation Monitoring and Compliance (OMC) Agreement is required to ensure treatment goals are met. The OMC agreement should be entered into between the applicant, Cape Cod Commission, and the local Board of Health, and generally consists of:

- Treatment specifications
  - Wastewater flow limit
  - Effluent quality limits
- Monitoring requirements
  - Sampling locations
  - Analyses required
  - Sampling frequency
- Reporting requirements
  - Frequency of reporting
  - Enforcement actions
- Operations and maintenance plan and staffing

For Projects Proposing Wastewater Treatment Facilities

WASTEWATER TREATMENT FACILITIES

Wastewater collection and treatment systems that have a design flow of greater than 10,000 gallons per day are considered a wastewater treatment facility (WWTF).

LOCATION OF WASTEWATER TREATMENT FACILITIES

WWTFs are likely to play a role in many towns' nutrient reduction strategies, therefore it is important that public and private facilities are deployed in a coordinated and strategic manner. Nutrient reduction strategies may be laid out in a town's Comprehensive Waste Management Plan (CWMP), a Targeted Watershed Management Plan (TWMP) that may involve several towns, or in other planning documents. When a nutrient reduction strategy has been deemed consistent with the Cape Cod Area Wide Water Quality Management Plan Update (208 Plan Update) by the Cape Cod Commission, private WWTFs that are not owned or operated by a town, municipality or district may be located in areas where a) no public WWTF is proposed within five years of the proposed project construction date under the nutrient reduction strategy, or b) where the nutrient reduction strategy relies upon the proposed private WWTFs to achieve nutrient reduction goals. In areas where an approved nutrient management plan is not yet in place, private WWTFs are an encouraged strategy for maintaining or improving groundwater quality.

5 PPM NITROGEN CONCENTRATION LIMIT IN EFFLUENT OR AT DOWNGRADIENT BOUNDARY

Projects proposing WWTFs are required to maintain nitrogen at 5 ppm or lower when measured at the downgradient property boundary. As it can be assumed that nitrogen discharged to groundwater will flow advectively without natural attenuation to the property boundary, following discharge nitrogen concentrations generally remain constant or decrease slightly due to dilution from recharge. WWTF effluent nitrogen is monitored as part of a MassDEP groundwater discharge permit (GWDP), and projects with 5 ppm nitrogen or less in effluent are deemed to have met this requirement. Projects proposing to discharge nitrogen at concentrations greater than 5 ppm must use a groundwater model or an acceptable calculation using groundwater monitoring data to demonstrate that nitrogen concentration in groundwater at the downgradient property boundary will not exceed 5 ppm and the results must be submitted to the Commission for review and confirmation.

For Projects within Wellhead Protection Areas (WHPAs) and Potential Public Water Supply Areas (PPWSAs)

PROTECTION OF EXISTING AND FUTURE DRINKING WATER WELLS (WHPAS AND PPWSAS)

As additional development on land areas that contribute (or may contribute in the future) to drinking water wells will directly impact drinking water quality, certain additional protections are required to prevent excessive nutrient loading and minimize the risk of contamination.

Lands receiving precipitation that contribute to the recharge of public drinking water supply wells are considered Wellhead Protection Areas (WHPA). These include MADEP approved Zone IIs, interim wellhead protection areas, and certain town delineated water protection districts that extend beyond the Zone II limits.

Potential Public Water Supply Areas (PPWSAs) are locations that may be suitable for future development of drinking water supplies. The process to identify these areas started with creating a GIS layer of only pervious land on Cape Cod, from which surrounding land uses incompatible with wellhead placement were removed (e.g., landfills, hazardous waste sites or contaminant plumes, cemeteries, golf courses, airports). The remaining land was overlain with an 11.5 ac hexagon layer, the approximate size of a wellhead and its protective buffer. The resultant PPWSA layer is therefore hex based, not parcel based, and represents approximate locations where a well could be placed and have natural resource protection.

Discharging effluent from private wastewater treatment facilities in WHPAs or PPWSAs may negatively impact those resources by degrading water quality and/or modifying natural hydrologic processes. Private wastewater treatment facilities may be proposed in a WHPA or PPWSA only when designed to specifically tie-in and treat existing sources of wastewater within that same water supply area.

HAZARDOUS SUBSTANCES LIMITATIONS

Any chemical or substance that when released into the environment will pose a significant contaminant threat to groundwater and drinking water supplies is considered a Hazardous Substance. Examples include petroleum products, petroleum distillates, organic and inorganic solvents, oil-based paints, oil-based stains, insecticides, herbicides, rodenticides, and pesticides. Any substances classified as Hazardous Waste, Universal Waste, or Waste as defined in the Massachusetts Hazardous Waste Regulations (310 CMR 30.010) are considered Hazardous Wastes for the purposes of this technical bulletin. Hazardous Wastes do not include Hazardous Materials or biomedical wastes regulated under the Massachusetts State Sanitary Code (105 CMR 480.00). Hazardous Materials as defined in Massachusetts General Laws, Chapters 21E and 21K, do not include Hazardous Wastes, Articles, Consumer Products, or Cosmetics. This technical bulletin considers and regulates both Hazardous Wastes and Hazardous Materials as Hazardous Substances.

To minimize the potential risk of introducing contamination to existing or future water supplies, the following limits on Hazardous Substances apply in WHPAs and PPWSAs.

(a) 275 gallons of oil on site at any time to be used for heating a structure, or to supply an emergency generator
(b) 25 gallons or equivalent dry weight, total, of Hazardous Material(s) on site at any time (excluding oil as classified in part (a))
(c) 55 gallons of Hazardous Waste generated at the Very Small Quantity Generator level as defined in Massachusetts Hazardous Waste Regulations (310 CMR 30.000) and accumulated or stored on-site at any time.

Applicants should provide the Commission an inventory which includes the identities and quantities of expected and potential Hazardous Substances that will be generated, used, or stored on site for the proposed use. Similar inventories should be provided for the previous use (when applicants propose to reduce the quantity of Hazardous Substances present on site through redevelopment) or for the proposed offset site (when applicants propose to eliminate the same or greater quantity of Hazardous Substances from another project, site, or facility within the same WHPA or PPWSA).

Certain types of development even when remaining within the above limits on Hazardous Substances may present a greater potential for contaminating groundwater. Stormwater systems serving areas used for fleet storage, vehicle maintenance and repair, electrical transmission/generation, loading docks, waste handling, industrial machinery and equipment and railroad equipment maintenance, log storage and sorting yards, aircraft maintenance areas, railroad yards, fueling stations, construction businesses, paving, heavy equipment storage and / or maintenance, the storage of petroleum products, high-intensity-use parking lots, and any other use with greater potential for groundwater contamination must include a means to halt discharge from the stormwater system (flow arresting device) in the event of a spill, accident, or release of any source of contamination.

1 PPM NITROGEN LIMIT

PPWSAs are a finite and increasingly limited resource that requires extra levels of protection to ensure they remain available to provide a stable drinking water system able to meet future water supply needs.

To maintain the suitability of PPWSAs to supply drinking water in the future, projects that disturb areas mapped as PPWSA are limited to a site-wide nitrogen loading concentration of 1 ppm (mg/L).

PRESERVATION OF POTENTIAL FUTURE WELL SITES

Public water supply wells require a 400-foot protective radius around the well, known as a Zone I, to be owned or fully controlled by the public water provider. Where project sites contain mapped PPWSA, development on the site should be minimized or avoided within the mapped PPWSA. If development cannot be located outside mapped PPWSA on a project site, any development should be sited to minimize fragmentation and preserve contiguous mapped PPWSAs. The application for Projects proposing to develop areas mapped as PPWSA should include an analysis of the impacts of proposed site plan on potential future well siting, including any remaining PPWSA on the project site and adjacent sites that still support the 400- foot Zone I radius.

LANDSCAPE MANAGEMENT PRACTICES

Landscaping is an important part of development that may play a role in screening, stormwater management and treatment, and overall visual aesthetics. Proper maintenance of landscaping is necessary to maintain its continued function, and several approaches are encouraged to minimize the environmental impacts presented by chemical fertilizer and pesticide usage during these activities. Additional detail regarding landscaping is provided in the Community Design Technical Bulletin. For additional plant guidance see Cape Cod Freshwater Pond Buffer Guidance, Appendix B, and the Massachusetts Stormwater Handbook Volume 2, Chapter 2 for plants suitable for use in SCMs.

Integrated pest management and biorational landscape management make use of an inspection and monitoring approach, along with a variety of pest control measures to maintain pest populations below levels that can cause significant damage or loss to installed landscaping. Soil nutrient and moisture testing should be employed with fertilization and irrigation methods tailored to the specific site conditions. Accurate identification of pests and monitoring of their populations should be used to determine rate and frequency for applying pest control (which may include chemical, cultural, and biological controls) to maintain pest population levels below identified thresholds. If no effective non-pesticide control measures are available, a key concept of integrated pest management is that selected pesticides should result in the lowest possible risk to health or the environment. The University of Massachusetts Extension provides a more detailed background and ongoing guidance regarding integrated pest management at (https://www.umass.edu/agriculture-food-environment/integrated-pest-management/about).

ROADWAY AND PARKING AREA DESIGN

In WHPAs and PPWSAs, roadways and parking areas should be designed to minimize impervious area, with pervious construction materials used whenever possible to minimize the impact of stormwater on drinking water supplies.

PROJECTS IN IMPAIRED AREAS

Areas where water quality has been degraded by land uses such as high-density residential, commercial, or industrial development; landfills, septage, and wastewater treatment discharges; and areas downgradient of these sources that are similarly impacted are considered Impaired Areas.

Projects located in Impaired Areas that are outside other mapped water resource areas including WHPAs, PPWSAs, MWRAs and CAPs may use existing groundwater quality data, distance from existing natural or built water resources, and position upstream or downstream of those resources relative to groundwater flow direction to demonstrate that nitrogen loading concentration above 5 ppm will not adversely impact those resources.

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE WR2

Objective WR2 – *Protect, preserve and restore freshwater resources*

Prevent loading of phosphorus to freshwater resources

Freshwater bodies of water are a valued natural resource across Cape Cod. They have nitrogen filtering capacity and connect to groundwater, the aquifer, and coastal embayments. Lakes and ponds are an important part of Cape Cod's ecosystems providing habitat for a diversity of aquatic flora and fauna, Ponds are also cherished as recreational resources, and for their cultural and aesthetic values. Freshwater Recharge Areas (FWRA) are defined watershed areas that contribute to a freshwater body as defined by the topography of the water table. For ponds that do not have a delineated recharge area, it is presumed that portions of the 300 foot pond buffer that are upgradient of the pond provide recharge to the freshwater body. These limited areas of the 300-ft buffer are delineated as significant based on groundwater contours and groundwater flow direction. To be more protective of ponds, these two areas, the Freshwater Recharge Area and the 300 foot buffer upgradient of a pond, were effectively combined on the RPP Data Viewer to yield Contributing Areas to Ponds (CAP). Applicants may provide evidence demonstrating that the 300-ft pond buffer areas (see data layer in the RPP Data Viewer) are not significant for pond recharge to overcome this presumption.

Maintaining or enhancing vegetative buffers with native plant species and additional canopies (groundcover, shrubs and/or trees) will be protective of pond and lake water quality. Increasing the width of vegetative buffers that are less than 100 feet will improve habitat and stormwater runoff infiltration thereby improving water quality. To incorporate additional ways to prevent phosphorus loading reference the Cape Cod Freshwater Pond Buffer Guidance (Cape Cod Freshwater Pond Buffer Guidance | Cape Cod Commission).

Phosphorus, unlike nitrogen, is attenuated in the subsurface through sorption to soil minerals or uptake during microbial or plant growth. Studies of phosphorus transport support regionally accepted use of a 300 foot buffer for purposes of protecting freshwater resources from wastewater discharges. Therefore, siting septic systems outside a 300 foot upgradient buffer to fresh surface waters will be protective of water quality.

For projects with sufficiently large flows in pond recharge areas, the phosphorus load may exceed the attenuation rate of the soils and ultimately result in additional phosphorus loading to the pond even when the discharge is located greater than 300 feet upgradient of the pond. In these situations, additional modeling which looks at groundwater flow, soil characteristics, and wastewater characteristics will be required to characterize the site and evaluate the expected extent of phosphorus transport, as appropriate.

Stormwater treatment systems located within Contributing Areas to Ponds are required to be designed to remove 60% of Total Phosphorus (TP) from runoff from all impervious surfaces on the site for new development, and 50% of TP for redevelopment projects.

Projects must prevent loading phosphorus to freshwater resources by not using fertilizer that contains phosphorus outside of the initial plant establishment period. Native plants are ideal for projects near lakes and ponds as they require less irrigation and fertilizer.

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE WR3

Objective WR3 – *Protect, preserve and restore marine water resources*

Prevent and mitigate loading of nutrients and other contaminants to marine water resources

Cape Cod's marine waters provide a variety of complex habitats necessary to support shellfish populations, marine fisheries, migratory birds, and many other plant and wildlife populations. Less than 25% of the Cape Cod land surface drains to open marine waters (e.g., Cape Cod Canal, Cape Cod Bay, Nantucket Sound, Atlantic Ocean). Instead, the majority of land surfaces discharge to estuaries or coastal embayments through groundwater flow in the Cape Cod aquifer. Marine Water Recharge Areas (MWRA) are defined as watershed areas that contribute to a marine embayment as defined by the topography of the water table.

As of 2025, the Massachusetts Estuary Project (MEP) has studied 40 of Cape Cod's 53 coastal embayments. MEP continues to study coastal embayments on Cape Cod to determine the critical nitrogen load for each embayment, which is the maximum amount of nitrogen input that can be assimilated without negatively impacting ecosystem function and provision of habitat. A total maximum daily load (TMDL) is the maximum amount of a pollutant that a waterbody can assimilate on a daily basis and still support a healthy ecosystem, which for Cape Cod's coastal embayments is determined by MassDEP and the U.S. Environmental Protection Agency based on the results of the MEP studies. Six of the embayments studied to date have been found to have assimilative capacity for nitrogen; therefore, no TMDL is necessary at this time. The remaining watersheds that have been studied require nitrogen reduction to achieve healthy ecosystem function.

Additional information about the MEP, embayment reports, and applicable TMDLs is available at the MassDEP website (https://www.mass.gov/guides/the-massachusetts-estuaries-project-and-reports).

The Cape Cod Section 208 Area Wide Water Quality Management Plan (208 Plan Update) was completed in 2015 in response to the need for a new approach to planning for and implementing nitrogen reduction plans and projects to achieve the critical nitrogen loads. The 208 Plan Update expands the available nutrient reduction strategies beyond source reduction to include remediation and restoration approaches. This allows for a range of strategies to be employed, depending on the placetype and context within the watershed of the area where nitrogen reduction is needed (ex. in-embayment strategies, such as the use of aquaculture, may be used in watersheds where low density development causes inefficient source reduction from a cost perspective). The 208 Plan Update provides a framework for applying watershed based solutions to reduce nitrogen in impaired embayments. CWMPs, TWMPs, and other municipal nutrient management plans and projects deemed consistent with the 208 Plan Update and those that are permitted by MassDEP through a watershed permit determine the approach and timing of solutions within an individual watershed or sub-watershed, and development that conforms with the approved nutrient management plan is considered to meet Objective WR3.

Development is generally prohibited from adding nitrogen to areas that contribute to nitrogen-overloaded coastal waters. Embayments which have nitrogen loading greater than or equal to their critical nitrogen loads are considered nitrogen-overloaded and may or may not have a TMDL associated with them. Documented water quality problems may also exist (e.g., shellfish or beach closures, failure to meet Massachusetts Surface Water Quality Standards) in areas where a critical nitrogen load or TMDL has not yet been established, in which case projects are required to mitigate or offset any proposed nitrogen load as described below. Nitrogen additions from the proposed project may be mitigated by connecting existing development to an existing sewer system, by tying-in and providing wastewater treatment to existing development currently served by septic systems, or by other means that result in the overall nitrogen mass amount within the (sub)watershed being maintained or reduced. Applicants proposing to use this form of mitigation should provide a calculation of the expected nitrogen mass amount generated by the project, the existing nitrogen sources (number, type, estimated load) proposed for mitigation, and a detailed description of the means by which treatment of those sources will be implemented (which could include financing of sewer tie-ins, a contract to provide wastewater treatment, installation and operation of I/A systems at existing properties, or other means of demonstrating how the proposed mitigation will ultimately be achieved).

Projects proposed in Placetype areas where development is encouraged and where infrastructure needed to meet nitrogen reduction requirements is lacking, may provide a monetary offset of the project's nitrogen mass amount which can be used to support expansion of municipal wastewater treatment and nutrient management operations.

MONETARY NITROGEN OFFSET

Natural Areas | No monetary nitrogen offset available

Rural Development Areas | No monetary nitrogen offset available

Suburban Development Areas | Monetary nitrogen offset available where appropriate

Historic Areas | Monetary nitrogen offset available where appropriate

Maritime Areas | Monetary nitrogen offset available

Community Activity Center | Monetary nitrogen offset available

Industrial Activity Center | Monetary nitrogen offset available

Military and Transportation Areas | Monetary nitrogen offset available

Certain Placetypes may have existing sewer collection and treatment systems, or have sufficient density of development and other infrastructure to justify future connection to sewer systems. To promote the desired development density and facilitate future sewering, projects in Community Activity Centers, Maritime Areas, Industrial Activity Centers or Military and Transportation Areas Placetypes without available sewer connections may contribute a monetary offset calculated as up to $11,362 per kilogram per year nitrogen mass amount to be offset. The monetary offset is based on the cost of removing one kilogram of nitrogen per year for 20 years using a conventional sewer collection system and municipal wastewater treatment and applies to all project nitrogen sources (e.g. wastewater, stormwater, fertilizer). See Appendix C for further information on the methodology. An alternative analysis of per kilogram nitrogen costs may be submitted so long as it is consistent with a locally approved plan. The Commission may utilize a proposed alternative analysis to determine offset costs, as appropriate.

Patterns of development in Suburban Development Areas are generally too spread out to make centralized wastewater collection financially feasible, while Historic Areas may present special challenges to sewering in terms of access below grade and age of existing infrastructure. For these reasons monetary offsets are allowed in limited circumstances at the discretion of the Commission in those Placetype Areas. Factors that will be considered in determining offsets in these placetypes might include, but are not limited to, existing development, business and community activity, a community's vision for the area as described in their Local Comprehensive Plan or other planning documents, and any plans for construction of wastewater infrastructure or other nutrient management operations that will take place within five years.

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE WR4

Objective WR4 – *Manage and treat stormwater to protect and preserve water quality*

Undisturbed natural areas generally slow the velocity of runoff, allowing natural processes to remove nutrients and contaminants and facilitating recharge so that rain largely stays where it falls. When natural areas are covered by impervious surfaces, the resulting stormwater runoff from rainfall or snow melt travels at higher velocities and in more concentrated flows, making both infiltration and removal of nutrients or contaminants more challenging. As rainfall amounts and patterns continue to change, the increased frequency of high intensity storms present challenges and risks to many forms of infrastructure. Stormwater systems designed to handle increased runoff in a distributed and decentralized manner should be an integral part of community planning for water quality, flood protection, climate resilience, and capital infrastructure. Across the Commonwealth of Massachusetts, untreated stormwater runoff is the single largest source of water body impairment. To maintain and improve the health of Cape Cod's water resources and the communities that depend on them, it is critical to manage both the quantity and quality of stormwater runoff that is generated by development.

STORMWATER SYSTEM DESIGN

To protect existing water resources and maintain safety by preventing flooding/ponding of water on roadways, stormwater systems must be designed to capture, treat, and infiltrate rainfall from roadways, parking lots, and rooftops on the project site. Stormwater runoff collects sediment, bacteria, nutrients, and pollutants from the impervious surfaces it flows over, which negatively impact ground and surface water resources if not adequately treated. Properly designed and maintained treatment SCMs minimize the amount of these pollutants that are ultimately discharged to surface waters and groundwater. The Massachusetts Stormwater Handbook (https://www.mass.gov/guides/massachusetts-stormwater-handbook-and-stormwater-standards) provides guidance for minimizing site disturbance and impervious cover, disconnecting impervious surfaces, and designing stormwater structures to meet the water quality treatment and storage/infiltration aspects of Objective WR4.

To best account for changing patterns in precipitation, updated projections for extreme precipitation events should be used whenever designing new stormwater systems. The Massachusetts Stormwater Handbook currently uses precipitation data from U.S. Weather Service Technical Paper 40, which was published in 1961. Projections from the National Oceanic and Atmospheric Administration (NOAA Atlas 14 Plus, published 2015) and Northeast Regional Climate Center (Extreme Precipitation Analysis, http://precip.eas.cornell.edu/) utilize much more recent data than Technical Paper 40 and are forward-looking. MassDEP currently recommends using the most conservative (largest) rainfall volume from among the three resources.

Applicants should provide a stormwater maintenance and operation plan certified by a licensed Professional Engineer that details a schedule for inspection, monitoring, and maintenance; and identifies the party responsible for implementation. The applicant should also agree to provide a Professional Engineer certified letter that details inspection of the stormwater facilities one year after completion and certifies that the system was installed and continues to function as designed and approved.

REQUIREMENT TO MANAGE STORMWATER THROUGH ENVIRONMENTALLY SENSITIVE SITE DESIGN (ESSD) AND LOW IMPACT DEVELOPMENT (LID) TECHNIQUES AND STORMWATER CONTROLS

Low Impact Development techniques or practices prevent the generation of stormwater and non-point source pollution by reducing Impervious Surfaces, disconnecting stormwater sheet flow paths, and treating stormwater at its source. LID techniques provide additional benefits including maximizing open space, minimizing disturbance, protecting natural features and processes, and/or enhancing wildlife habitat. LID when employed in conjunction with other site design choices for buildings, parking and roadways, and landscaping, can be considered ESSD. All projects are required to meet applicable stormwater standards through LID and ESSD, unless impracticable based solely on physical constraints, and demonstrated through a written alternatives analysis.

SEPARATION FROM HIGH GROUNDWATER

A calculation of the high groundwater level is required to be performed when this method is applicable to ensure that stormwater facilities are designed to maintain the proper 2 foot separation from the water table under all conditions. Appendix B – Estimation of High Groundwater Levels describes a calculation that may be used to adjust water levels measured at discrete Cape Cod locations and estimate high groundwater levels at those same locations. Applicants may utilize the High Groundwater Levels Data Viewer to assist with calculating the proper groundwater adjustment. The high groundwater estimation approach was developed in cooperation with the US Geological Survey and is based on historic long-term groundwater-level measurements at index wells located across Cape Cod.

TOTAL SUSPENDED SOLIDS REMOVAL AND WATER QUALITY TREATMENT VOLUME

For new development, stormwater systems are required to be designed to remove 90% of Total Suspended Solids (TSS) and provide water quality treatment for the first inch of precipitation from all impervious surfaces on the site . For redevelopment, stormwater systems are required to be designed to remove 80% of TSS. An estimate of the TSS removal achieved in the stormwater treatment train(s) can be performed using MassDEP's TSS Removal Calculation Worksheet. (https://www.mass.gov/files/documents/2016/08/nn/tss.xls)

The required water quality treatment volume can be calculated using the following equation.

$$\textit{WQ treatment volume } (ft^3) = \textit{impervious area } (ft^2) * (1 \textit{ inch} / 12 \textit{ inches per foot})$$

Storage/treatment volume provided by most stormwater SCMs can be calculated with a stage-storage table, where the incremental volume of each stage is given by

$$\textit{Incremental volume } (ft^3) = (elevation_2 - elevation_1) * ((area_2 + area_1)/2)$$

Table 1: Example stage-storage volume calculation

ELEVATION (FT)	SURFACE AREA (FT^2)	INCREMENTAL VOLUME (FT^3)	CUMULATIVE VOLUME (FT^3)
72.5	210	0	0
73	660	217.5	217.5
73.5	1,020	420	637.5
74	1,500	630	1267.5

The *Massachusetts Stormwater Handbook* contains detailed explanations, examples, and guidance for additional methods, including the simple dynamic method which may be used to calculate required volume(s) in Volume 3, Chapter 1 – Standard 4. Use of the static method will be conservative and result in larger sized stormwater controls since it does not consider exfiltration during the design storm event. The dynamic method can be used to correctly size smaller stormwater controls that still meet design requirements, reducing land disturbance associated with the stormwater management system.

For redevelopment projects the *New England Stormwater Retrofit Manual* contains guidance for retrofit scenarios.

PHOSPHORUS REMOVAL

Stormwater systems located within CAPs (FWRA and 300-ft buffer upstream of freshwater bodies) are required to be designed to remove 60% of Total Phosphorus (TP) from all impervious surfaces on the site for new development, and 50% of TP for redevelopment.

NITROGEN REMOVAL

Projects within a nitrogen sensitive MWRA or MassDEP Natural Resource Nitrogen Sensitive Area should optimize stormwater control measures for nitrogen removal. Credits for nitrogen removal from SCMs are applied to site-wide nitrogen loading under Objective WR1, and to the project's total nitrogen mass for purposes of Objective WR3.

ADDITIONAL METHODS TO MEET OBJECTIVE WR4:

- Where site constraints limit capacity for water quality treatment, rooftop runoff may be separately managed through direct infiltration unless there is an identified rooftop water quality concern requiring additional treatment or management.
- Refer to EPA's SCM Performance Curve to appropriately size stormwater control measures to meet load reduction requirements (MS4 General Permit, Appendix F).

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE WR5

Objective WR5 – *Manage groundwater withdrawals and discharges to maintain hydrologic balance in a way that is protective of surface and groundwater resources*

Projects that exceed 20,000 gpd withdrawals must provide adequate groundwater characterization to demonstrate that drawdown of the groundwater due to pumping will not negatively impact nearby surface waters and wetlands, which may be connected to and fed by groundwater. The study should include mapping of surface water morphology and comparison of existing and affected water-table fluctuations. In addition, projects utilizing wastewater treatment facilities should provide adequate groundwater characterization to determine the maximum expected height of groundwater mounds and the potential for groundwater with this additional mounding to breakout above the land surface or to impact water levels in surface water resources. Projects should provide a high groundwater estimate consistent with the methodology of Appendix B –Estimation of High Groundwater Levels to incorporate into modeling of potential mounding.

GENERAL APPLICATION REQUIREMENTS

Application materials should provide sufficient detail to demonstrate that the project meets the applicable goals and objectives, but typically include:

A. Project description including site location, applicable Water Resource Areas, and narrative of proposed wastewater, stormwater and drinking water systems
B. Site-wide nitrogen loading calculation
C. Site plan including applicable grading, drainage, and utilities
D. Stormwater treatment and capacity calculations
E. Operations and maintenance plan(s)

These items may not be required for all projects. See guidance below.

The Water Resource Areas, which are defined in the Definitions section beginning on WR-5 can be viewed in the RPP Data Viewer, and include:

- Wellhead Protection Areas (WHPA)
- Contributing Areas to Ponds (CAPs)
- Marine Water Recharge Areas (MWRA)
- Potential Public Water Supply Area (PPWSA)
- Impaired Areas

DETAILED WATER RESOURCES APPLICATION REQUIREMENTS

1. The project narrative should include a description of the site location and any applicable resource areas, existing site conditions, and how the proposed project will change those conditions during and after construction. Areas that should be considered include:
    a. Presence of existing and proposed drinking water wells within 400 feet of project boundaries
    b. Expected wastewater design flow and proposed treatment including system type (manufacturer, model, etc.) and total nitrogen concentration in wastewater effluent for on-site wastewater treatment systems.
    c. Source of drinking water supply
    d. Changes in natural and impervious area cover (tabulated in square feet and/or acres as appropriate)
    e. Stormwater management and treatment

   f. for previously developed sites a description of historical site usage, and if a reportable release under the MCP has occurred at the project site or if a Site Release Tracking Number (RTN) has been assigned for the site by MassDEP, a Chapter 21E site assessment or other Environmental Site Assessment information is required to be submitted for Commission review when method is utilized.

2. A calculation of site-wide nitrogen loading should be performed using the method described in Appendix A.
3. The site design should specify the location of the proposed septic system or wastewater treatment facility and identify downgradient resources as described in WR1 – detailed methods.
4. Sites proposing development in PPWSAs must include an analysis of project impacts on future public well siting.
5. The stormwater report should include a description of the proposed system including the treatment train(s) (for small systems, a description in the project narrative may be sufficient) and the following information as necessary:
   a. Soil survey and / or boring logs
   b. Calculation of high groundwater level (in feet below land surface or elevation above sea level) to ensure that stormwater facilities are designed with proper separation from the water table as described in WR4 – detailed methods.
   c. Estimate of TSS removal achieved in stormwater treatment train(s) using MassDEP's TSS Removal Calculation Worksheet (https://www.mass.gov/files/documents/2016/08/nn/tss.xls)
   d. Calculation of required water quality treatment volume and treatment volume provided as described in WR4 – detailed methods.
   e. Engineering design drawings, standard details, or cut sheets for proposed stormwater system components
6. Operations and maintenance plans for all proposed water systems (drinking water supply, stormwater, and wastewater treatment) should be submitted for Commission review

REFERENCES

Cape Cod Commission, 1992. Estimation of High Groundwater Levels for Construction and Land Development, Technical Bulletin 92-001

Cape Cod Commission, 1999. Priority Land Acquisition Assessment Project – A guide to evaluating the suitability of land for future water supply sites

Cape Cod Commission, 2001. Priority Land Acquisition Assessment Project Phase II

Massachusetts Estuaries Project and Reports https://www.mass.gov/guides/the-massachusetts-estuaries-project-and-reports

The Massachusetts Stormwater Handbook and Stormwater Standards (https://www.mass.gov/guides/massachusetts-stormwater-handbook-and-stormwater-standards)

National Weather Service, 1961. Technical Paper 40: Rainfall Frequency Atlas of the United States

National Oceanic and Atmospheric Administration, 2015. Atlas 14 Precipitation Frequency Data Server https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html

Northeast Regional Climate Center, 2011. Extreme Precipitation Analysis. http://precip.eas.cornell.edu/

USGS, 1986. Ground-Water Resources of Cape Cod, Massachusetts Hydrologic Investigations Atlas-692

United States Environmental Protection Agency, 2009. Incorporating Environmentally Sensitive Development into Municipal Stormwater Programs https://www.epa.gov/sites/production/files/2015-11/documents/region3_factsheet_lid_esd.pdf

Metropolitan Area Planning Council, 2014. Low Impact Development Toolkit https://www.mapc.org/resource-library/low-impact-development-toolkit/

Grow Smart Maine, 2015. Building "Smart": Environmentally Sensitive Design Resources for Your Community - GrowSmart Maine

University of Massachusetts Extension, 2018. Integrated Pest Management Program http://ag.umass.edu/integrated-pest-management

APPENDIX A: NITROGEN LOADING GUIDANCE FOR WATER RESOURCES

The Water Resource Goal of the Cape Cod Commission's Regional Policy Plan is "to maintain a sustainable supply of high quality drinking water and protect, preserve or restore the ecological integrity of fresh and marine surface waters." The Water Resources Technical Bulletin contains five (5) Objectives that are distinguished by Water Resource Area and Placetype. The Water Resource Areas are: Wellhead Protection Areas, Fresh Water Recharge Areas, Marine Water Recharge Areas, and Potential Water Supply Areas. The Water Resources Technical Bulletin also recognizes Impaired Areas where water quality may have been impaired from existing development.

The applicant will need to know specific project information to complete a nitrogen loading calculation

A methodology has been adopted by the Commission for calculating groundwater nitrogen loading concentrations. The methodology is based on information and parameters describing wastewater flows; stormwater runoff volumes; lawn sizes, fertilization and leaching rates; respective nitrogen masses and concentrations attributable to these nitrogen sources, and precipitation dilution factors as described below and shown in the example calculations.

WORKSHEET INSTRUCTIONS

The applicant will need to know the information listed below to complete a Nitrogen Loading calculation:

Identify the Water Resource Area the project is located in, if any (RPP Data Viewer);

1. Upland area of site (square feet);
2. Wastewater flow rate (calculated pursuant to 310 CMR 15.203);
3. Actual Flow rate determined by occupancy rate;
4. Average residential flow rate, calculated from the Title 5 design + the Actual Flow rate;
5. Type of septic system proposed (e.g. alternative design pursuant to 310 CMR 15.280);
6. Paved and roof areas (assumed 2,500 square feet for residential projects);
7. Proposed lawn area (assumed 5,000 square feet for residential projects);

A summary of Nitrogen Loading conversion factors and sample calculations are shown on the following pages.

A Nitrogen Loading and Mitigation Worksheet is available at www.capecodcommission.org/NitrogenWorksheet.

SUMMARY OF NITROGEN LOADING VALUES

TARGET CONCENTRATION: 5 ppm (milligram/liter) NO3-N

WASTEWATER

Residential Concentration: 35 ppm NO3-N
Flow: Title 5 (310 CMR 15.02)
Non-residential Concentration: 35 ppm NO3-N
Flow: Title 5 Design or actual documented flows

OCCUPANCY: Range (Actual town rate of 2 people per bedroom)

LAWNS

Area: 5,000 ft2
Fertilizer: 3 lbs/1,000 ft2 of lawn
Leaching: 25%

RECHARGE

From impervious surfaces: 40 inches per year

<u>Concentrations</u>
Road runoff: 1.5 ppm NO3-N
Roof runoff: 0.75 ppm NO3-N

<u>Natural areas</u>
Barnstable: 18 inches per year
Bourne: 21 in/yr
Brewster: 17 in/yr
Chatham: 16 in/yr
Dennis: 18 in/yr
Eastham: 16 in/yr
Falmouth: 21 in/yr
Harwich: 17 in/yr
Mashpee: 19 in/yr
Orleans: 16 in/yr
Provincetown: 16 in/yr
Sandwich: 19 in/yr
Truro: 16 in/yr
Wellfleet: 16 in/yr
Yarmouth: 18 in/yr

EXAMPLE RESIDENTIAL LOADING CALCULATIONS

Home (3 bedrooms)

Lot Size: 1 acre (43,560 ft^2)
Impervious Surfaces: Roof Area: 2,000 ft^2; Paving Area: 500 ft^2
Natural Area: 41,060 ft^2; Lawn Area: 5,000 ft^2
Title V Flow: 110 gallons/day per bedroom

WASTEWATER

Title V (2 people per bedroom)

3 bedrooms $\left[\frac{110\text{ gpd}}{\text{bedroom}}\right]\left[\frac{3.785\text{ L}}{\text{gal}}\right] = 1{,}249.0\ \text{L/d}\quad \left[\frac{35\text{ mg}}{\text{L}}\right] = 43{,}716.8\ \text{mg/d}$

Actual (assume 2.5 people/unit average occupancy within the town)

3 bedrooms $\left[\frac{110\text{ gpd}}{\text{bedroom}}\right]\left[\frac{3{,}785\text{ L}}{\text{gal}}\right]\left[\frac{2.5}{6}\right] = 520.4\ \text{L/d}\quad \left[\frac{35\text{ mg}}{\text{L}}\right] = 18{,}214.6\ \text{mg/d}$

IMPERVIOUS SURFACES

2,000 ft^2 $\left[\frac{40\text{ in}}{\text{yr}}\right]\left[\frac{\text{ft}}{12\text{ in}}\right]\left[\frac{28.32\text{ L}}{\text{ft}^3}\right]\left[\frac{1\text{ yr}}{365\text{ d}}\right] = 517.3\ \text{L/d}\quad \left[\frac{0.75\text{ mg}}{\text{L}}\right] = 387.9\ \text{mg/d}$

500 ft^2 $\left[\frac{40\text{ in}}{\text{yr}}\right]\left[\frac{\text{ft}}{12\text{ in}}\right]\left[\frac{28.32\text{ L}}{\text{ft}^3}\right]\left[\frac{1\text{ yr}}{365\text{ d}}\right] = 129.3\ \text{L/d}\quad \left[\frac{1.5\text{ mg}}{\text{L}}\right] = 194.0\ \text{mg/d}$

LAWN

5,000 ft^2 $\left[\frac{3\text{ lbs}}{1{,}000\text{ ft}^2\text{*yr}}\right]\left[\frac{1\text{ yr}}{365\text{ d}}\right]\left[\frac{454{,}000\text{ mg}}{\text{lb}}\right]\left[0.25\right] = 4{,}664.4\ \text{mg/d}$

NATURAL

43,560 ft^2 - 2,500 ft^2 = 41,060 ft^2

41,060 ft^2 $\left[\frac{1.5\text{ ft}}{\text{yr}}\right]\left[\frac{28.32\text{ L}}{\text{ft}^3}\right]\left[\frac{1\text{ yr}}{365\text{ d}}\right] = 4{,}778.7\ \text{L/d}$

SUMMARY

Title V Flow $\frac{43{,}716.8 + 387.9 + 194.0 + 4{,}664.4\text{ mg}}{1{,}249.0 + 517.3 + 129.3 + 4{,}778.7\text{ liters}} = \frac{48{,}963.1\text{ mg}}{6{,}674.3\text{ liters}} = 7.34\text{ ppm}$

Actual $\frac{18{,}214.6 + 387.9 + 194.0 + 4{,}664.4\text{ mg}}{520.4 + 517.3 + 129.3 + 4{,}778.7\text{ liters}} = \frac{23{,}460.9\text{ mg}}{5{,}945.7\text{ liters}} = 3.95\text{ ppm}$

Final Calculation $(7.34 + 3.95)/2 = \boxed{5.65\text{ ppm}}$

EXAMPLE NONRESIDENTIAL LOADING CALCULATIONS

Office Building:

Lot Size: 5 acres (217,800 ft^2)
Impervious Surfaces: Roof Area: 15,000 ft^2; Paving Area: 30,000 ft^2
Natural Area: 172,800 ft^2; Lawn Area: 10,000 ft^2
Title V Flow: 75 gallons/day per 1,000 ft^2

WASTEWATER

$$15{,}000\ ft^2 \left[\frac{75\ gpd}{1{,}000\ ft^2}\right]\left[\frac{3.785\ L}{gal}\right] = 4{,}258.1\ L/d \qquad \left[\frac{35\ mg}{L}\right] = 149{,}034.4\ mg/d$$

IMPERVIOUS SURFACES

$$15{,}000\ ft^2 \left[\frac{40\ in}{yr}\right]\left[\frac{ft}{12\ in}\right]\left[\frac{28.32\ L}{ft^3}\right]\left[\frac{1\ yr}{365\ d}\right] = 3{,}879.5\ L/d \qquad \left[\frac{0.75\ mg}{L}\right] = 2{,}909.6\ mg/d$$

$$30{,}000\ ft^2 \left[\frac{40\ in}{yr}\right]\left[\frac{ft}{12\ in}\right]\left[\frac{28.32\ L}{ft^3}\right]\left[\frac{1\ yr}{365\ d}\right] = 7{,}758.9\ L/d \qquad \left[\frac{1.5\ mg}{L}\right] = 11{,}638.4\ mg/d$$

LAWN

$$10{,}000\ ft^2 \left[\frac{3\ lbs}{1{,}000\ ft^2 * yr}\right]\left[\frac{1\ yr}{365\ d}\right]\left[\frac{454{,}000\ mg}{lb}\right]\left[0.25\right] = 9{,}328.8\ mg/d$$

NATURAL

$$5\ acres \left[\frac{43{,}560\ ft^2}{acre}\right] = 217{,}800\ ft^2; \quad 217{,}800\ ft^2 - 45{,}000\ ft^2 = 172{,}800\ ft^2$$

$$172{,}800\ ft^2 \left[\frac{1.5\ ft}{yr}\right]\left[\frac{28.32\ L}{ft^3}\right]\left[\frac{1\ yr}{365\ d}\right] = 20{,}111.1\ L/d$$

SUMMARY

$$\frac{149{,}304.4 + 2{,}909.6 + 11{,}638.4 + 9{,}328.8\ mg}{4{,}258.1 + 3{,}879.5 + 7{,}758.9 + 20{,}111.1\ liters} = \frac{172{,}911.2\ mg}{36{,}007.6\ liters} = \boxed{4.80\ ppm}$$

DRAFT

Water Resources Nitrogen Loading and Mitigation Worksheet

See Technical Bulletin 91-001 for further details: http://www.capecodcommission.org/regulatory/NitrogenLoadTechbulletin.pdf

Project Nitrogen Load — ***Wastewater*** — ***Proposed development***

1.
Enter value — Project Title-5 wastewater flows: [ ] gpd **(a)**
Enter value — Actual wastewater flows: [ ] * **(b)**
Calculated value — Average wastewater flows: [ ] gpd **(a)+(b) ÷2=** **(A)**
* Title-5 flows prescribed by TB91-001 for commercial uses

Place √ in applicable box:

Yes **No**
[ ] [ ] Will the project be connected to sewer ?
[ ] [ ] Is project Title-5 wastewater flow 10,000 gpd or greater ?
(If 'Yes', then the project must be reviewed for consistency with MPS WR6)

Place √ in applicable box and multiply unsewered wastewater flow by applicable conversion factor:

[ ]	Standard Title-5 System (35-ppm-N)	x	0.048359
[ ]	DEP-approved I/A System (25-ppm-N)	x	0.034542
[ ]	DEP-approved I/A System (19-ppm-N)	x	0.026252
[ ]	Groundwater Discharge (10-ppm-N)	x	0.013817

} Type of system: ______________

Calculated value — Wastewater nitrogen load (**Title-5 flows**) = [ ] kg-N/yr **(B)**
Calculated value — Wastewater nitrogen load (**Actual flows**) = [ ] kg-N/yr **(C)**

Stormwater Runoff

Town: _________________ Recharge rate for town (inches; for natural areas from Technical Bulletin 91-001): : [ ] **(RECH)**
Enter value

Enter value	Project site area:	[ ]	acres	**(D)**
Enter value	Project site wetland area:	[ ]	acres	**(E)**
Calculated value	Project site upland area:	[ ]	acres	**(F)**
Calculated value	Pervious unpaved upland:	[ ]	acres	**(G)**
Enter values [ ] % using LID	Paved area:	[ ]	s.f.	**(H)**
Factor may be adjusted for employment of LID →	x	1.4158E-04		
Calculated value	=	[ ]	kg-N/yr	**(I)**
Enter value	Roof area:	[ ]	s.f.	**(J)**
	x	7.0792E-05		
Calculated value	=	[ ]	kg-N/yr	**(K)**

Fertilizer

Enter value	Managed turf:	[ ]	s.f.	
	x	3.4019E-04		
Calculated value	=	[ ]	kg-N/yr	**(L)**

Total Nitrogen Load

Calculated value	Total project nitrogen load (**Title-5 flows**):	[ ]	kg-N/yr	**(M)=**	**(B)+(I)+(K)+(L)**
Calculated value	Total project nitrogen load (**Actual flows**):	[ ]	kg-N/yr	**(N)=**	**(C)+(I)+(K)+(L)**
Calculated value	Nitrogen load per acre (**Average**):	[ ]	kg-N/yr/acre	**(O)=**	**(M)+(N) ÷2 ÷(F)**

Nitrogen Loading Concentration

Calculated value	Project nitrogen loading concentration (**Title-5 flows**):	[ ]	ppm-N	**(P)=**	$\frac{\textbf{(M)}}{\textbf{(a)÷723.76 + (G)x(RECH)÷9.7286 + (H)÷10,594 + (K)÷0.75}}$
Calculated value	Project nitrogen loading concentration (**Actual flows**):	[ ]	ppm-N	**(Q)=**	$\frac{\textbf{(N)}}{\textbf{(b)÷723.76 + (G)x(RECH)÷9.7286 + (H)÷10,594 + (K)÷0.75}}$
Calculated value	Project nitrogen loading concentration (**Average**):	[ ]	ppm-N	**(R)=**	**(P)+(Q) ÷2**

next page -->

Existing (if redevelopment)

Calculate (A') through (P') as w/ (A) through (P):

Title-5 wastewater flows: [ ] gpd
Actual wastewater flows: [ ] *
Ave. wastewater flows: [ ] gpd **(A')**

Place √ in applicable box:

Yes **No**
[ ] [ ] Is existing development on sewer ?
(If 'Yes', then go to line 2.)

[ ] Standard Title-5 System
[ ] DEP-approved I/A System (commercial)
[ ] DEP-approved I/A System (residential)
[ ] Wastewater Treatment Facility (GWDP)

[ ] kg-N/yr **(B')**
[ ] kg-N/yr **(C')**
wastewater offsets

Project site area:	[ ]	acres	**(D)**
Project site wetland area:	[ ]	acres	**(E)**
Project site upland area:	[ ]	acres	**(F)**
Pervious unpaved upland:	[ ]	acres	**(G')**
Paved area:	[ ]	s.f.	**(H')**
Paving runoff offset:	[ ]	kg-N/yr	**(I')**
Roof area:	[ ]	s.f.	**(J')**
Roof runoff offset:	[ ]	kg-N/yr	**(K')**
Managed turf:	[ ]	s.f.	
Fertilizer offset:	[ ]	kg-N/yr	**(L')**
Existing nitrogen load (Title-5 flows):	[ ]	kg-N/yr	**(M')**
Existing nitrogen load (Actual flows):	[ ]	kg-N/yr	**(N')**
Nitrogen offset per acre:	[ ]	kg-N/yr/acre	**(O')**

Existing nitrogen loading concentrations:

Title-5 flows	[ ]	ppm-N	**(P')**
Actual flows	[ ]	ppm-N	**(Q')**
Average	[ ]	ppm-N	**(R')**

Resource/ Impact Based Criteria

Marine Water Recharge Areas

Yes No

2. ☐ ☐ Is the project in Marine Water Recharge Area (MWRA, Map WR3) with a nitrogen-loading limit OR in a MWRA that discharges to coastal waters with documented impaired water quality** ?
(If 'No', then go to line 3.)

Name of Marine Water Recharge Area sub-embayment
(*from RPP Water Resource Classification Map II*):

Enter value Fair Share nitrogen-loading limit** : ☐ kg-N/year/acre **(S)**

☐ ☐ Does project's nitrogen load **(O)** exceed the existing load **(O')** AND the critical nitrogen load **(S)** ?
(If 'No', then go to line 3.)

Calculated value Excess project nitrogen load to be mitigated: ☐ kg-N/yr **(T)=** LESSER OF **(O)-(S) x(F)** AND **(O)-(O') x(F)**

x 1,550

Calculated value = $ ☐ **(U)**

☐ Place √ in box if applicant intends to make this payment **(S)**
(If not checked, then the project must provide an alternative strategy for meeting its Fair Share nitrogen load pursuant to MPS WR3.4)

*** Fair Share nitrogen-loading limit is determined through either a Total Maximum Daily Load (TMDL), a Massachusetts Estuaries Project-accepted technical report, or specified by a Commission-approved comprehensive wastewater management plan pursuant to MPS WR3.1 & WR3.3. If a nitrogen-loading limit is unavailable and impaired water quality has been documented for the receiving coastal waters, the nitrogen loading limit shall be 0 kg-N/yr per acre pursuant to MPS WR3.2.*

Groundwater Quality

Yes No

3. ☐ ☐ Does the project's nitrogen loading concentration in groundwater **(R)** exceed the greater of **5 ppm** *or* the existing concentration **(R')** ?
(If 'Yes' and the project is located in a Water Quality Improvement Area (Map WR5), the project may need to provide an alternative strategy for meeting MPS WR1.1 and WR5.4)

Potential Public Water Supply Areas

Yes No

4. ☐ ☐ Is project in a Potential Public Water Supply Area (PPWSA, Map WR2) ?
(If 'No', then go to line 5.)

☐ ☐ Has the Town or local water district documented the release of the site from consideration as a PPWSA ?
(If 'Yes', then go to line 5.)

☐ ☐ Does the project's nitrogen loading concentration **(R)** exceed the greater of **1 ppm** *or* the existing concentration **(R')** ?
(If 'Yes', the project must provide an alternative strategy for meeting MPS WR2.6)

☐ ☐ Does the project use, treat, generate, store or dispose of hazardous materials in excess of the greater of a) household quantities or b) existing quantities ?
(If 'Yes', the project must provide an alternative strategy for meeting MPS WR2.2)

Wellhead ProtectionAreas

Yes No

5. ☐ ☐ Is project in a Wellhead Protection Area (WHPA, Map WR2) ?
(If 'No', then go to line 6.)

☐ ☐ Does the project's nitrogen loading concentration **(R)** exceed the greater of **5 ppm** *or* the existing concentration **(R')** ?
(If 'Yes' and the project is located in a Water Quality Improvement Area (Map WR5), the project must provide an alternative strategy for meeting MPS WR2.1)

☐ ☐ Does the project use, treat, generate, store or dispose of hazardous materials in excess of the greater of a) household quantities or b) existing quantities ?
(If 'Yes', the project must provide an alternative strategy for meeting MPS WR2.2)

Fresh Water Recharge Areas

Yes No

6. ☐ ☐ Is project wastewater disposed of within 300 feet of a stream or fresh surface water body (Map WR4)?
(If 'No', then go to line 7.)

☐ ☐ Is the project located hydraulically upgradient of a stream or fresh surface water body ?
(If 'Yes', the project must provide an alternative strategy for meeting MPS WR4.1)

Other Potential Impacts

Yes No

7. ☐ ☐ Will the project withdraw more than 20,000 gallons of water per day ?
(If 'Yes', then the project must provide documentation demonstrating that there will not be significant impacts to water levels, surface waters and wetlands)

8. ***The project must demonstrate compliance with MPS WR1 and MPS WR7, including use of Low Impact Development to mitigate impacts of stormwater runoff and O & M plans for maintaining stormwater infrastructure and landscaping.***

APPENDIX B: ESTIMATION OF HIGH GROUND-WATER LEVELS

The Water Resources Technical Bulletin Appendix B - Estimation of High GW is available at:

https://www.capecodcommission.org/resource-library/file/?url=/dept/commission/team/Website_Resources/regulatory/HighGroundH20TechBulletin.pdf

Current groundwater levels and adjustments are available from the High Groundwater Levels Data Viewer: https://cccommission.maps.arcgis.com/apps/webappviewer/index.html?id=f1d0ad5a1b5d44c7976ed6a9749d2d4a

Historical monthly groundwater levels, adjustment tables, and other resources are available at: https://capecodcommission.org/our-work/estimating-high-groundwater-levels/

APPENDIX C: MONETARY NITROGEN OFFSET

For projects that will not connect to sewer, monetary nitrogen offsets may be allowed in certain circumstances. The appropriate Placetypes and methods for providing a monetary nitrogen offset are generally set forth in the 2025 Water Resource Technical Bulletin.

Nitrogen Management Policy

The 2025 RPP encourages growth in certain areas, such as Community Activity Centers, and discourages growth in other areas, such as in Natural Areas. For that reason, the per kilogram nitrogen monetary offset may be applied up to the maximum amount of $11,362; however, a lesser dollar amount per kilogram of nitrogen ($0 to less than $11,362) may be applied in areas where growth is encouraged as evidenced by:

- The presence of existing development, business and community activity, or
- The Local Comprehensive Plan or other planning documents identify a vision of growth and infill for the area, or
- Plans have been approved for construction of wastewater infrastructure or nitrogen management actions to be implemented within five years of a Commission Decision.

The maximum dollar per kilogram amount of $8,290 for nitrogen offsets was based on Capital and 20-year O&M costs for nitrogen removal by conventional sewering as derived from the Comparison of Costs for Wastewater Management Systems Applicable to Cape Cod, updated in 2014. To adjust this amount to present day costs, the cumulative inflation factor of 1.3706 (~ 37%) was applied to the infrastructure and operational costs in the 2014 report to 2025 costs: $8,290 x 1.3706 = 11,362 .

Calculation of Monetary Nitrogen Offset

The monetary nitrogen offset represents the calculated cost to remove a project's nitrogen with a typical municipal-scale wastewater treatment facility:

The per kilogram nitrogen offset cost calculation combines the capital cost for a treatment plant with assumed design flow of 1.5 million gallons per day and a collection system requiring 100 linear feet of piping per parcel connected, with the present value of the cost to operate and maintain that system for 20 years, to get the total present worth. Dividing the total present worth by the nitrogen load removed in kg-N per year

(20-yr planning period) results in the cost per kilogram of nitrogen removed in ($/ kg N / yr).

A project's monetary nitrogen offset is calculated by multiplying the project's total Nitrogen mass (in kg/yr) by the per kilogram nitrogen offset cost ($11,362 / kg N / yr).

EXAMPLE OFFSET

- 30-unit residential sub-division (mix of 2- and 3-bedroom)
- Actual flow: 125 gpd per unit; 3,760 gpd total
- Wastewater load to be offset: 136 kg-N/yr
- Calculation of monetary offset

$1.5 million = $289 million x 136 kg-N/yr / 24,800 kg-N/yr

Likewise $11,362 / kg-N per year x 136 kg-N/yr = $1.5 million

Ocean Resources DRAFT

This guidance is intended to clarify how the Ocean Resources Goal and Objectives of the Regional Policy Plan (RPP) are to be applied and interpreted in Cape Cod Commission Development of Regional Impact (DRI) project review. This technical bulletin presents specific methods by which a project can meet the goal and objectives.

Ocean Resources Goal: To protect, preserve, or restore the quality and natural values and functions of ocean resources

- **Objective OR1** – *Locate development away from sensitive resource areas and habitats*
- **Objective OR2** – *Preserve and protect ocean habitat and the species it supports*
- **Objective OR3** – *Protect significant human use areas and vistas*

The applicability and materiality of these goals and objectives to a project will be determined on a case-by-case basis considering a number of factors including the location, context (as defined by the Placetype of the project's location), scale, use, and other characteristics of a project.

THE ROLE OF CAPE COD PLACETYPES

The RPP incorporates *a framework for regional land use policies and regulations based on local form and context* as identified through categories of Placetypes found and desired on Cape Cod.

The Placetypes are determined in two ways: some are depicted on a map contained within the RPP Data Viewer located at www.capecodcommission.org/RPPDataViewer adopted by the Commission as part of the Technical Guidance for review of DRIs, which may be amended from time to time as land use patterns and regional land use priorities change, and the remainder are determined using the character descriptions set forth in Section 8 of the RPP.

The project context, as defined by the Placetype of the project's location, provides the lens through which the Commission will review the project under the RPP.

TABLE OF CONTENTS

Introduction 4

Definitions 5

Summary of Methods 6

Detailed Discussion of Methods for Meeting Objective OR1 8

Detailed Discussion of Methods for Meeting Objective OR2 9

Detailed Discussion of Methods for Meeting Objective OR3 16

General Application Requirements 18

References and Resources 28

INTRODUCTION

In 2008 the State enacted legislation (the “Oceans Act”, St. 2008, c. 114) enabling limited types of development activity within the State’s ocean waters, including renewable energy facilities, sand mining, and cable and pipeline installation. In response to the Oceans Act the Executive Office of Energy and Environmental Affairs (EEA) issued a Massachusetts Ocean Management Plan in 2009. The Oceans Act requires EEA to review the ocean plan at least once every five years.

In 2009 the Cape Cod Commission worked with Cape communities to develop the Cape Cod Ocean Management Plan (CCOMP), a plan that identified priorities for the protection of ocean based resources and uses. The RPP establishes those recommendations and priorities as goals and objectives. The guidance in this technical bulletin is intended to assist the proponent of offshore development projects in preparing an application for Development of Regional Impact (DRI) review. While the CCOMP considered projects in jurisdictional ocean waters offshore of Cape Cod, starting 0.3 nautical miles seaward of mean high water (MHW), and extending to 3 nautical miles from MHW, or the state jurisdictional boundary, whichever is farther from the shore, this technical bulletin applies to all ocean waters seaward of MHW up to the state jurisdictional boundary.

The Cape Cod Commission Act requires DRI review for projects where an Environmental Impact Report is required under the Massachusetts Environmental Policy Act (MEPA). Where possible, the methods within this bulletin have been designed to be consistent with state regulations to streamline the permitting process. Although the majority of methods discussed in this Technical Guidance are intended to be flexible, certain methods will be required of all DRIs where a particular Ocean Resources objective is applicable.

DEFINITIONS

Adverse Visual Impact: Where the degree of change in the scenic quality resulting from an activity is expected to unreasonably alter the public's enjoyment or appreciation of a scenic resource or otherwise unreasonably alter the character, setting or quality of a scenic resource.

Beach Nourishment: The placement of clean sediment, of a grain size compatible with existing beach nourishment, on a beach to increase its width and volume for purposes of storm damage prevention, flood control, habitat, or public recreation. The seaward edge of the nourished beach shall not be confined by any structure.

Improvement Dredging: Any dredging in an area which has not been previously dredged or which extends the original dredged width, depth, length, or otherwise alters the original boundaries of a previously dredged area for the purposes of improving navigation or flushing of an embayment or harbor.

Maintenance Dredging: Dredging in accordance with a license or permit in any previously authorized dredged area which does not extend the originally dredged depth, width, or length.

Sand Mining: Activities involving the removal of material from the ocean floor for the purposes of Beach Nourishment, but not including Maintenance Dredging activities that include a Beach Nourishment proposal.

SUMMARY OF METHODS

GOAL | OCEAN RESOURCES

To protect, preserve, or restore the quality and natural values and functions of ocean resources

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OBJECTIVE OR1 – Locate development away from sensitive resource areas and habitats

METHODS

All DRIs must:

- Locate development away from designated rare species habitat
- Locate development away from designated prohibited areas for ocean species as identified in Cape Cod Ocean Management Plan
- Locate development away from designated exclusionary areas as identified in the Cape Cod Ocean Management Plan

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OBJECTIVE OR2 – Preserve and protect ocean habitat and the species it supports

METHODS

All DRIs must:

- Protect whales and their habitats
- Protect rare species and their habitats
- Protect eelgrass from impacts unless there is no feasible alternative, there is a public purpose, and the impacts are minimized and appropriately mitigated
- Design the project, and time construction and operations to protect benthic habitats from direct and indirect impacts, including construction impacts
- Design the project, and time construction and operations to protect significant fish resources and habitats
- Design the project, and time construction and operations to protect sea turtles from impacts
- Design the project, and time construction and operations to protect coastal waterbirds and sea ducks, and their habitats

- Design the project, and time construction and operations to protect marine mammals and their habitats
- Manage construction-related noise
- Coordinate project siting with existing conduit routes in order to minimize damage to the environment
- Demonstrate public purpose
- Evaluate the cumulative impacts of the project together with existing development activities and design the project to avoid or minimize impacts to ocean habitats and human use areas

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OBJECTIVE OR3 – Protect significant human use areas and scenic resources

METHODS

All DRIs should:

- Provide buffers to navigation
- Protect aquaculture and commercial fishing from impacts
- Minimize impacts to ocean-based recreational activities
- Site project to protect sensitive archaeological sites
- Locate and design project to avoid adverse visual impacts to the Cape's cultural, historic, and scenic resources

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DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE OR1

Objective OR1 – *Locate development away from sensitive resource areas and habitats*

All DRIs must:

Locate development away from rare species habitat

Applicants proposing development in the ocean should refer to mapped rare species habitat in project planning and siting. As a general practice, development should avoid mapped state or federal rare species habitat in order to protect these species from the adverse effects of development. Comments from the Massachusetts Natural Heritage and Endangered Species Program (NHESP) and/or National Marine Fisheries Service (NMFS) may be used to demonstrate that the project will not adversely impact rare species or their habitats (see also OR2 below, and WPH3).

Locate development away from mapped prohibited areas

Projects proposed in the ocean should utilize the Cape Cod Ocean Management Plan (CCOMP), as well as state data resources found in MORIS (Massachusetts Ocean Resources Information System) and the Massachusetts Ocean Management Plan (MOMP) (see Resources) to help select suitable locations for development. The CCOMP identified prohibited areas for certain development activities. Sand Mining projects are not allowed within the CCOMP Map of Sand and Gravel Mining Prohibited Areas, and cable and pipeline installations are not allowed within CCOMP Cable and Pipeline Prohibited Areas. Maps of these prohibited areas are available through the Regional Policy Plan Data Viewer and should be consulted when developing project proposals. (Applicants should be aware that state mapping and criteria established through the MOMP will also apply through the state permitting process.)

Locate development away from mapped exclusionary areas

The CCOMP also established exclusionary areas where ocean-based development activities are strongly discouraged. Allowable development activities (i.e., those limited development activities allowed through the Oceans Act, including renewable energy installations, sand and gravel mining, and cable and pipeline installations) may be permitted within these exclusionary areas if the applicant can demonstrate there is no feasible alternative location, and all applicable methods for meeting the objectives OR1, OR2, and OR3 are met.

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE OR2

Objective OR2 – *Preserve and protect ocean habitat and the species it supports*

All DRIs must:

Protect whales and their habitats

Sand Mining operations and cable/pipeline installations are not permitted from January to May in North Atlantic Right Whale Critical Habitat (comprising all of Cape Cod Bay due north and east of the Cape Cod Canal, as designated by National Marine Fisheries Service (NMFS)). At other times of year, Sand Mining operations and cable/pipeline installations anywhere in Barnstable County must immediately cease if North Atlantic Right Whale(s) are observed within two (2) miles of such activities. The sighting must be reported to NMFS immediately. Activities may not recommence until such time that NMFS or a NMFS-approved environmental monitor provides written notification of their determination that operations may resume.

Sand Mining operations and cable/pipeline installations are not permitted from January to May in the Exclusionary Areas that comprise expanded North Atlantic Right Whale habitat (see Cape Cod Ocean Management Plan Map of Exclusionary Areas). Sand Mining operations and cable/pipeline installations may be permitted in these Exclusionary Areas at other times of year provided the applicant can provide clear and convincing evidence that the activity will not cause direct or indirect impacts to North Atlantic Right Whales, or other whale species.

To reduce the potential for vessel harassments or collisions with listed whales and sea turtles, all vessel and aircraft captains and project managers associated with the development activity should be familiar with the NOAA Fisheries Northeast Regional Viewing Guidelines, as updated, and –Bureau of Ocean Energy Management Vessel Strike Avoidance and Injured/Dead Protected Species Reporting guidelines.

The Commission will require the Applicant to verify it has incorporated these guidelines into the project manuals for operating and managing the development activity.

Protect Rare Species and their Habitats

Where a project is located within mapped state or federal rare species habitat, the proponent must submit the development proposal to the Massachusetts Natural Heritage and Endangered Species Program (NHESP), and, in the case of marine mammals, to the National Marine Fisheries Service (NMFS) for review and comment. As a matter of practice, development that would adversely affect habitat of local populations of rare wildlife is not permitted. However, development in mapped rare species habitat may be allowed if the NHESP and/or NMFS provides written comment that the work will not adversely affect rare species (including through the development of a NHESP approved conservation and management permit, or that NHESP determines that the project will not result in a "take"). Comments from the NHESP and/or NMFS may be used to demonstrate that the project does not adversely impact rare species or their habitats (see also Wildlife and Plant Habitat Objective WPH3).

Protect eelgrass from impacts unless there is no feasible alternative, there is a public purpose, and the impacts are minimized and appropriately mitigated

The general presumption is that work in the ocean must not have direct or indirect adverse effects on eelgrass beds, unless an applicant can demonstrate that there is no feasible alternative location or design for the project and the project is necessary to accomplish an overriding public purpose subject to a mitigation requirement. Sand Mining operations and cable/pipeline installation should avoid impacts to areas of historic eelgrass beds to the maximum extent feasible, regardless of whether eelgrass is found in the historic eelgrass bed at the time of application. If a project adversely affecting eelgrass is permitted, appropriate mitigation, including eelgrass restoration, is required. Mitigation includes replanting eelgrass following disturbance and/or planting eelgrass in a suitable off-site location. The Commission may require a planting and monitoring plan to ensure that restoration of the disturbed eelgrass bed is successful. In cases where a cable or pipeline route is permitted through an eelgrass bed, directional drilling must be used to avoid any direct impacts on eelgrass (see also WET1).

Design the project and time construction and operations to protect benthic habitats from direct and indirect impacts, including construction impacts

All DRIs:

Development activities must not have any direct impacts on areas of biologically productive benthic habitats (e.g., Hard/Complex Seafloor as defined in the CCOMP). The applicant must demonstrate through field surveys that the resources are not present, and/or will not be impacted adversely.

Applicants for projects located within 500 feet of eelgrass beds or other biologically productive benthic habitats (e.g., Hard/Complex Seafloor) must provide an analysis of anticipated sediment dispersion resulting from the development activities. The results of the sediment dispersion modeling will be used to ensure that the design and siting of development activities avoid indirect impacts (e.g., turbidity) to eelgrass and other biologically productive benthic habitats (e.g. Hard/Complex Seafloor). Best construction practices (e.g., directional drilling) should be used to the extent feasible to minimize impacts.

The applicant must consult with Massachusetts Division of Marine Fisheries to determine whether restrictions should be placed on the timing or methods of construction for development activities to avoid temporary or permanent impacts to critical life history stages (e.g., spawning, and egg, embryo, and juvenile development) of marine species. Best management practices must be employed during development activities to minimize turbidity and sedimentation impacts to sensitive benthic habitats, including eelgrass and other biologically productive benthic habitats such as Hard/Complex Seafloor as identified in the Massachusetts Ocean Management Plan.

Applicants must provide a site monitoring plan for Commission review and approval. In order to evaluate project impacts, including any changes in the areal extent and health of sensitive marine resources, the plan should identify (a) sensitive marine resources in the vicinity of the construction site, (b) protocols to monitor turbidity, light penetration, dissolved oxygen and nutrient conditions in the proposed construction area, as well as within a buffer zone that extends to the furthest boundary of the potentially affected adjacent area (as determined by current/wave modeling), (c) monitoring schedules, and (d) contingency plans if turbidity conditions exceed identified thresholds.

Cable and Pipeline projects:

Cable and pipeline installations must demonstrate that the project will not result in adverse impacts to benthic communities and their ecology, specifically, impacts to finfish, shellfish, and migratory species resulting from sedimentation, erosion, scour, or barriers to migration.

Sand Mining Projects:

Sand Mining projects must be designed to minimize impacts to benthic resources and encourage recolonization. Projects must be designed to retain substrate in order to minimize impacts and promote recolonization of mined areas. Design practices that will facilitate recolonization include, but are not limited to, retaining refuge patches or strips through a sand mining site to promote recolonization of the postmining site to pre-mined benthic communities and related or dependent marine life.

Sand Mining operations must demonstrate that the project will not change ocean currents or wave conditions in a way that results in adverse effects on existing coastal landforms (e.g., coastal bank erosion), infrastructure, navigation, and public/private property, including saltwater intrusion on landward freshwater resources.

Applicants for Sand Mining operations must provide a post-construction monitoring plan for Commission review and approval. The post-project monitoring plan must include provisions for monitoring the physical, chemical and/or biological conditions at the borrow site for a minimum of three years following development closure to evaluate recovery of the site to productive benthic habitat conditions. Where the intent of a development is to establish a long-term borrow site, the elements of a post-development monitoring plan may be modified at the Commission's discretion.

Design the project and time construction and operations to protect significant fish resources and habitats

Projects must protect important fish resources and habitat as classified by the Division of Marine Fisheries (DMF). Sand Mining operations and cable/pipeline installation may be permitted in Exclusionary or Provisional (as designated on CCOMP map) areas, provided that the presumption of a site's importance to fish resources and habitat is overcome where the applicant can demonstrate to the satisfaction of the Commission through a site assessment that the resources do not exist, or the site is not significant to important fish resources and habitat. In addition, projects should avoid construction in licensed commercial fishing or aquaculture installations (e.g., fish weirs, aquaculture pens, rafts, floats, etc.).

Design the project and time construction and operations to protect sea turtles from impacts

Projects must protect sea turtles during construction or operations. The applicant must provide a species protection plan to the Commission for its review and approval that addresses and mitigates development activity that is proposed within sea turtle habitat or during times of year when turtles are present. The Commission may consult with the NMFS or DMF in review and approval of a species protection plan.

Design the project and time construction and operations to protect coastal waterbirds and sea ducks, and their habitats

Projects must be designed to protect coastal waterbirds from the adverse impacts of Sand Mining or cable and pipeline installation and operations where these activities would adversely impact the core habitats of Long-tailed Duck, Roseate Tern, Special Concern Tern species (Arctic, Least, and Common Terns), and important nesting habitats of colonial waterbirds and Leach's Storm Petrel (core habitat delineations as identified by the Massachusetts Ocean Management Plan). Development may be permitted where the proponent can demonstrate that the development will not adversely affect the habitat of these species. A species protection plan may be required as a condition of approval when development is permitted in these habitat areas.

Sand Mining operations should avoid directly or indirectly impacting important feeding, resting, staging, or overwintering habitat for sea ducks in waters less than 65 ft (20 meters) deep. Determination of whether an area supports sea duck habitat will be based on factors including but not limited to pre-construction site surveys, areas known to support large congregations of sea ducks, and/or seafloor mapping that confirms the presence of important benthic feeding habitat (MOMP mapping may be used to help make the determination of important sea duck habitat).

Design the project and time construction and operations to protect marine mammals and their habitats

In addition to requirements to protect marine mammals which are protected under state and federal law, projects should be designed and construction and operations are timed to protect all marine mammals from adverse impacts of development and construction. The Commission may consult with NMFS or DMF to determine whether projects are anticipated to have adverse impacts on marine mammals. A species protection plan may be required as a condition of approval.

Manage construction-related noise

Applicants must provide a Construction Noise Mitigation Plan to the Commission for review and approval. The plan must address issues to avoid or minimize construction noise impacts on marine mammals and sea turtles, including but not limited to an assessment of the construction noise impacts on marine life, a monitoring plan for tracking marine mammals and sea turtles entering the construction zone, and a mitigation plan, including time-of-year (TOY) restrictions on construction, to avoid or minimize construction noise impacts on marine mammals and sea turtles.

Coordinate project siting with existing conduit routes in order to minimize damage to the environment

Applicants should locate conduit installations with existing cable or pipeline routes to the maximum extent feasible in order to minimize impact to the environment.

Demonstrate public purpose

Ocean resources are public resources. Applicants for ocean-based projects must demonstrate that the development furthers a substantial public purpose with respect to these coastal or ocean resources, including but not limited to, protection against storm damage, protection against sea level rise, flood control, protection of recreational beaches, restoration or improvement of habitat, utility-related reliability or necessary capacity or technology improvements, or water quality improvement. The areal extent of these anticipated effects should be quantified, where possible, and the time period over which the public purpose is expected to persist.

Consistent with this purpose and the priorities established through the CCOMP, sediments derived from an offshore borrow site must be utilized within Barnstable County.

Evaluate the cumulative impacts of the project together with existing development activities and design the project to avoid or minimize impacts to ocean habitats and human use areas

As part of an application for offshore development, the applicant must provide for consideration an assessment of cumulative impacts of any existing or permitted offshore renewable energy facilities, sand mining operations, and cables and pipelines within Barnstable County. The intent of this standard is for the Commission to determine whether the incremental addition of impacts from the project, when added to the impacts from existing and permitted development, will cumulatively adversely affect resources protected under the Act. Applicants should identify on a map all of the existing or permitted offshore renewable energy facilities, ongoing or prior sand mining operations, or cable or pipeline installations within Barnstable County. The Commission will determine whether the incremental addition of the proposed project will unduly degrade ocean habitats or resources, or will conflict with human use activities to such an extent that those resources or activities are threatened.

The cumulative impact assessment should:

a. Define the boundary of the area that will be affected by the project (project impact zone).
b. List the resources that could be affected by the project. Establish baseline conditions for resources: are resources presently degraded, and to what extent?
c. Determine the geographic areas occupied by those resources outside of the project impact zone – (for example, if the project impacts whale habitat, the extent of critical whale habitat within the region).
d. Establish the timeframe of potential impacts.
e. Identify existing and proposed activities which may impact significant resources protected by the Act and the RPP. Significant resources for the purposes of this analysis should include any wildlife or supporting habitat resource, but may also include cultural, archaeological or historic resources.
f. Characterize the significant resources in terms of their response to the proposed change and their capacity to withstand the potential stress, i.e., will the activity fragment habitat or create barriers to normal life cycle activities for wildlife resources?
g. Identify and describe cause and effect relationships between stresses and resources and/or ecosystems. Describe magnitude of effect, e.g., degradation of water quality, removal of benthic habitat, etc. and the temporal and spatial parameters of the impact
h. Identify modifications to reduce potential impacts.

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE OR3

Objective OR3 – *Protect significant human use areas and vistas*

Provide buffers to navigation

Development activities should provide buffers to established ferry routes, navigational channels and commercial shipping lanes with adequate width to prevent accidents or irreconcilable conflict between different uses. Cable and pipeline installations may be sited coincident with established navigational routes provided an applicant can provide evidence that the proposed installation will not adversely impact established navigational uses.

Protect aquaculture and commercial fishing

Applicants should avoid siting projects in areas of active or significant fishing use. The applicant and the Commission should refer to mapped data available through the MOMP (mapped data is available in MORIS, see Resources) and the CCOMP regarding areas used for recreational and commercial fishing and/or aquaculture.

Minimize impacts to ocean-based recreational activities

Projects should be sited and construction windows should be timed to minimize impacts to areas of high-use ocean-based recreation. The applicant should provide a current survey of activities in the project vicinity and should reference human use activity areas mapped in the MOMP as provided in MORIS (see Resources).

Locate and design project to avoid adverse visual impacts to the Cape's cultural, historic, and Scenic Resources

Development activities should be sited and designed to avoid adverse visual impacts to the Cape's cultural/historic and scenic resources, including structures listed or eligible for listing on the National or State Register of Historic Places and Historic or Cultural Landscapes. Sand mining operations less than 12 months in duration are presumed to have no adverse visual impact. Any development that is planned or designed to exceed 12 months in duration must provide an assessment to demonstrate that the project will not have adverse impacts on cultural/historic or scenic resources (see also Community Design Technical Bulletin Objective CD3).

Site project to protect sensitive archaeological sites

Applicants should configure projects to avoid known archaeological sites or sites with high archaeological sensitivity as identified by the Massachusetts Board of Underwater Archaeological Resources, the Massachusetts Historical Commission and/or the Mashpee Wampanoag Tribe.

GENERAL APPLICATION REQUIREMENTS

This Technical Bulletin identifies required reports and analyses to characterize the existing environment, analyze the potential impacts, describe the anticipated public purposes and cumulative impacts, and address the protection of sensitive resources.

The requested information must be submitted in a narrative report, on plans of an appropriate scale, and where indicated, as data files compatible with GIS. Plan preparation, data collection and analysis, and natural resource evaluations must be conducted by individuals qualified through academic credentials and experience. The Commission or its designee may waive application requirements where the required study or plan is deemed unnecessary to the review process or duplicative of requirements under state and/or federal authority.

I. List of Required Permits and Authorizations

Applicants proposing work in offshore ocean waters must provide a list of all permits and authorizations (not limited to the following) required by local, state, and federal regulatory agencies for the proposed activity in a format similar to the following example:

AGENCY	PERMIT/APPROVAL	INTENT/FOCUS
US Environmental Protection Agency	See 401 Water Quality Certification, below	
US Army Corps of Engineers	Programmatic General Permit (PGP), Category 2 pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899. Included in this review is coordination with Federal agencies (National Marine Fisheries Service, US Fish and Wildlife, EPA), Massachusetts CZM, Massachusetts Historical Commission, and the Tribal Historic Preservation Office	To protect navigable waters of the U.S. from being obstructed or altered without government review
US Coast Guard	Notification for Notice to Mariners and information to be shared with the National Ocean Survey for updates to nautical charts.	

AGENCY	PERMIT/APPROVAL	INTENT/FOCUS
Federal Energy Regulatory Commission		
National Oceanic and Atmospheric Administration	Federal Consistency Review	
National Marine Fisheries Service	"Take" authorization under Marine Mammal Protection Act Biological Opinion under Endangered Species Act	To protect marine mammals from harassment, capture, killing
US Fish and Wildlife Service		
Massachusetts Coastal Zone Management	Federal Consistency Certification	To ensure coordination among state agencies of the protection of resources within the coastal zone
Mass. Department of Environmental Protection	Water Quality Certification pursuant to Section 401 of the Clean Water Act Chapter 91 Waterways License	To protect public health from discharges of dredged materials into waters of the commonwealth To protect public rights to fish, fowl, and navigate
Mass. Environmental Policy Act	Environmental Review	To ensure adequate analysis of project impacts has been collected for permitting by state regulatory agencies
Mass. Historical Commission Mass. Board of Underwater Archaeological Resources Tribal Historic Preservation Office	Determination of No Adverse Effect	
Local Conservation Commissions	Order of Conditions	To protect wetland resources
Local Planning Board, Board of Appeals, Building Inspector	Special Permit, Building Permit	Interests are individualized by town
Others? DPW	Road opening permit	

II. Characterization of Existing Environment

An application for DRI review must include a narrative description and map of environmental resources and human use areas potentially affected by the project. Site characterization should encompass sufficient data for establishing natural variability and a baseline from which to assess whether or not a resource is being affected by project activities. Site characterization should:

a. Define the project site
   The application should include engineered plans at an appropriate scale showing all areas that may be physically affected by the proposed action. In the case of sand mining or cable/pipeline installation, the project site plans should include the area that incorporates the estimated full extent of disturbance, and for a wind turbine facility should include an area within an envelope that encloses all footings/foundations out to at least 200 meters[1].

b. Describe the existing physical environment including:
   i. Meteorology (seasonal patterns of temperature, wind direction and speeds, frequency and magnitude of storm events, precipitation, air quality)
   ii. Geology (bathymetry, seafloor and subsurface sediment types, geologic features and hazards)
   iii. Physical oceanography (temperature, salinity, density, tides and wave energy)
   iv. Chemical oceanography (nutrients, dissolved organic matter, chemical pollutants)

c. Describe the biological environment within the project site including:
   i. Pelagic, demersal and benthic organisms
   ii. Avifauna including ducks, seabirds and migrants
   iii. Endangered and threatened species
   iv. Fishery resources and habitat (including spawning, feeding and nursery habitat)

d. Characterize the socioeconomic marine environment, in both narrative form and on a plan, including:
   i. Employment, existing offshore and coastal infrastructure, commercial and recreational fisheries, including typical seasons, location and type

[1] (McCann, 2012)

        ii. Cultural resources including subsistence resources and harvest practices
        iii. Archaeological resources
        iv. Vessel traffic, including recreational boating and commercial shipping, military activities
        v. Other space/use conflicts

e. Context Map identifying resource areas and important seascape/landscape features within and surrounding the project location(s).

III. Analyses of Site Assessment, Construction, and Operational Impacts

DRI applications must include a narrative analysis of the anticipated impacts from a project during different phases of project implementation. The discussion should reflect completion of analyses designed to assess impacts to different types of resources, as indicated below. Supporting evidence should be provided, as appropriate, including:

a. Physical resources

    i. Anticipated changes in bathymetry, seafloor topography, sediment grain size characteristics, impacts of sediment suspension and turbidity on physical and biological resources through modeling. Evaluate impacts to a distance of at least 200 meters from project boundaries.
    ii. Analysis of wave and tidal currents patterns and impacts in dredging footprint, affected nearshore/shorelines, etc.
    iii. For Sand Mining operations only:
    1) Analyses of the movement and quantity of sediment at both the extraction and nourishment sites,
    2) An analysis of the potential effects of the borrow pit on wave heights and the direction of wave propagation,
    3) An analysis of the potential impact of the proposed project on regional sediment transport,
    4) An analysis of the potential impacts to the form of ridge and shoal features, including alterations to the biological communities,
    5) Analysis of alternative sediment removal design scenarios, e.g., removal in strips or patches, with the goal of encouraging recolonization of benthic resources,
    6) Identification and mapping of sensitive natural and cultural resources potentially affected by the project (dredging and placement sites), including benthic habitats, shellfish beds, eelgrass beds, fish spawning and nursery areas and archaeological sites,
    7) Identification of potential impacts to shore erosion or shoaling,

navigation channels or marinas, landward freshwater resources,
8) Estimates of sand infill rates in borrow pit,
9) Utilization of sediment dispersion models to characterize sediment re-suspension and dispersion during mining operations. The result of this modeling should be used to design mining operations, including "at sea" processing, to limit impacts of suspended sediment and turbidity on fishery resources and minimize the area affected.

iv. For Cable or Pipeline installations only:
1) Site reconnaissance plan of proposed cable/pipeline route extending 100 meters on each side of the installation route to include bathymetry, substrate characteristics (grain size, sediment thickness), fisheries/benthic habitat classification, sensitive marine resources, potential/documented archaeological sites, high resolution scanning of seafloor using sidescan sonar, multi-beam bathymetry to acquire continuous data. Post-installation surveys should also be conducted,
2) Description of cable/pipeline installation methodology,
3) Pre- and Post-construction impacts to benthic wildlife, including habitat structure and function, specific focus on migratory and/or mobile species (e.g. horseshoe crabs) that may be affected by cable/pipeline.

b. Biological and ecological resources

   i. Analysis of impacts to marine organisms, including fish, crustaceans, mollusks and benthic infaunal communities (consult with Division of Marine Fisheries (DMF))
   ii. Analysis of impacts to habitat for marine organisms, including fish, crustaceans, mollusks, etc. (consult with DMF)
   iii. Analysis of impacts to other biologically productive habitats (hard bottom, eelgrass, etc.)
   iv. Analysis of impacts to rare species (listed by the Mass. Div. of Fisheries and Wildlife, as published in the Code of Massachusetts Regulations) or their habitat,
   v. Analysis of impacts to marine mammals and sea turtles, ducks, pelagic and sea birds
   vi. For Wind Turbines only: Analysis of impacts to both resident and transient/migratory birds and bats and potential impacts to migration corridors.

c. Recreational and commercial fisheries, including aquaculture

   i. Analysis of displacement, competition for space and impacts from vessel traffic volume and transit routes
   ii. Analysis of impacts of activity on inshore and offshore bottom and off-bottom aquaculture operations

d. Cultural resources and public viewsheds (historic districts, native American sites, parks, public beaches, coastal vistas)
    e. Identify historic and cultural resources and public viewsheds within the project vicinity and within the project's viewshed. (contact MHC, Tribal Preservation Officer, and town staff; review town Local Comprehensive and Open Space plans.)

f. Archeological resources (shipwrecks, other)
    i. Identify onshore and underwater archaeological resources within the vicinity of the project area (contact MHC and MBUAR)

IV. Resource Protection Plans, required as may be determined necessary

Where the Commission finds that a proposed activity is consistent with the goals and objectives, conditional approval of the project will likely require the approval of resource protection plans. The applicant must prepare narrative and spatial plans to address mitigation and monitoring consistent with the following requirements.

a. Rare Species Protection Plan required where development is allowed in rare species habitat (e.g., terns, colonial water birds) but is demonstrated not to adversely affect such habitat. The applicant should consult with the National Marine Fisheries Service (NMFS), the Natural Heritage and Endangered Species Program (NHESP) and the Division of Marine Fisheries (DMF) in the preparation of this plan. Plans should include:
    i. Assessment of habitat characteristics, rare species population status (locally and within the region),
    ii. Maps showing location of rare species habitat within and adjacent to project site, as well as transportation routes to and from project site, and other potential conflicts,
    iii. Mitigation measures to avoid or minimize impacts to rare species and their habitat (i.e., time- of -year (TOY) restrictions; exclusion zones; training of vessel operators and key project personnel),
    iv. Contingency plan if project impacts rare species,
    v. Post-construction monitoring and reporting protocols

b. Marine Mammal and Sea Turtle Protection Plan, required when development is proposed within habitat for whales, sea turtles, and other listed species, or during times of year when these species are present. The applicant should consult with DMF, NMFS and NHESP in the preparation of this plan. Plans should include:

i. Sampling and reporting protocols and information sources to determine presence/absence, seasonal variability and habitat utilization of marine mammals and sea turtles,
ii. Mitigation measures to avoid or minimize impacts to species (e.g., exclusion zones, TOY restrictions; training of vessel crew and other key project personnel; use of marine mammal observers),
iii. Methods for monitoring exclusion zone, monitoring schedule and contingency for poor viewing conditions,
iv. Contingency plan if whales, sea turtles or other listed species enter the exclusion zone, including waiting times, reporting protocol, etc.,
v. Best management practices to avoid, minimize or mitigate impacts to marine wildlife; (e.g., compliance with NOAA noise limits for marine mammals and turtles, use of noise control devices, etc.),
vi. Post-construction monitoring and reporting protocols

c. Fishery Resource and Habitat Protection Plan, required to determine the presence/absence of the resource, and if resource is present, to address potential impacts from the development. The applicant should consult with DMF on the significance of the habitat, development of the plan, and sampling protocols. Plan should include:
    i. Sampling protocol and information sources to identify and quantify spawning/feeding/nursery habitat for fish (including anadromous and catadromous species), shellfish and crustaceans,
    ii. Assessment methodology to determine species/habitat composition and distribution, habitat quality and key focus species/habitat types in and adjacent to the development activities,
    iii. Mitigation measures to avoid, minimize or mitigate impacts,
    iv. Post-construction monitoring and reporting protocols
d. Sea Duck Habitat Surveys for projects within 20m water depth or less[2] to determine whether site provides breeding, resting, staging, migration, overwintering habitat for sea ducks. A plan should include:
    i. Sampling protocol and information sources to identify presence, habitat utilization of area in and adjacent to proposed development activities,
    ii. Mitigation measures to avoid, minimize or mitigate impacts to sea ducks and their habitats
e. Protection Plan for Eelgrass and other biologically productive benthic habitats. Plan should demonstrate presence/absence and quality of

[2] The USFWS sea duck survey found that 75% of sea ducks observed were in less than 20 meters of water, within 4 nautical miles of shore and over bottom slopes of less than 1%.

eelgrass, or other productive benthic habitats such as hard/complex bottom. If resources are present, explain how they will be protected during development activities. Plan should include:

i. Sampling protocol and information sources to determine presence/absence of the resource, including historic presence/absence of eelgrass, as well as habitat quality (sediment type, wind and wave energy, plant density and height, percent cover and eelgrass depth limit)
ii. Sediment dispersion modeling and pre-construction analysis if project is within 150 m. of eelgrass or other productive benthic habitat to ensure that design and siting of project avoids indirect impacts (e.g., turbidity) to eelgrass and other biologically productive benthic habitats
iii. Best management practices employed during development activities to avoid, minimize or mitigate for turbidity and sedimentation impacts to eelgrass habitat (e.g., TOY restrictions, installation methods, buffer zones)
iv. Short- and long-term monitoring plan for turbidity, suspended particulates, light penetration, dissolved oxygen and nutrient conditions near eelgrass before, during and after development activities, as recommended by DMF
v. Reporting protocol for monitoring and research activities
vi. Contingency plan if turbidity exceeds identified thresholds during development activities

f. Noise Mitigation and Monitoring Plan for Marine Wildlife
All project proposals should include a noise mitigation plan that includes:
i. An assessment of construction noise (dredging, boat traffic, tower installation, hydroplow, etc.) on marine wildlife, and a determination of the zone of influence by species
ii. A plan to monitor sound levels in the water column during construction operations
iii. A monitoring plan for tracking marine wildlife entering the construction zone (e.g., acoustic buoy array; trained observers onsite)
iv. A monitoring and contingency plan to avoid or minimize construction noise on marine wildlife, e.g. TOY restrictions, soft start, suspension of operations when endangered species are within zone of influence
v. Post-construction monitoring and reporting protocol.

g. Marine Archaeological Reconnaissance Survey and Protection Plan. All project proposals should include a survey of underwater archeological resources and protection plan, to be developed in consultation with MBUAR.

h. For Wind Energy Facilities only: The individual phases of wind energy facility development are characterized by different noise sources during the different phases. The noise mitigation plan for wind energy facilities should address the following development-specific activities:
    i. Initial surveys will increase small boat traffic in an area, adding to background noise.
    ii. Construction of the facilities includes larger and more sustained ship traffic, turbine installation, dredging and other activities.
    iii. Turbine operation introduces sound and vibration over prolonged periods while the facility is in use.
    iv. Decommissioning of the facilities increases background noise from large vessel traffic, and noise sources from any removal of equipment.
    v. A monitoring program should be in operation during pre- and post-construction as well as during decommissioning activities.

i. Avian and Bat Monitoring and Mitigation Plan, for Wind Energy Facilities only, to demonstrate that a WEF can be operated to ensure bird and bat safety during significant migratory events. Plan should include:
    i. Type, duration and frequency of pre-construction and post-construction monitoring
        1. Monitoring systems to gauge the presence/absence of birds and bats (e.g., acoustic bat detector surveys, avian acoustic monitoring, video monitoring, thermal animal detection systems (TADS) or other)
        2. Number of detectors, location, monitoring schedule, frequency/duration of observations, TADS design
        3. Telemetry tracking
        4. Avian surveys monitoring protocol: # of transects, survey timing (breeding, staging and migration seasons), etc.
    ii. Type of deterrents used to minimize avian presence in WEF area (e.g., anti-perching devices)
    iii. Reporting protocol
        1. Frequency of reporting (near-term, long-term), summary of previous results relative to monitoring objectives, effectiveness of monitoring techniques
        2. Reporting protocol to document collisions, mortality of listed and non-listed bird, bat species

j. Habitat Recovery Monitoring Plan, for Sand Mining only:
A monitoring plan should be initiated prior to mining and nourishment activities, continue through the project, and continue afterwards for a period

to be determined in consultation with DMF. The key objective of monitoring is to determine whether environmental conditions at both the mining and nourishment sites have recovered.

The monitoring plan should include sampling design and protocols for:

i. Biological resources, including the benthic community and fishery resources
ii. Wave monitoring and modeling
iii. Bathymetric and sediment surveys
iv. Shoreline monitoring and modeling
v. Reporting protocol for monitoring activities

Recovery is defined as return to within the 95% confidence interval for mean values of the pre-dredging condition.

REFERENCES AND RESOURCES

Cape Cod Ocean Management Plan (http://capecodcommission.org/CCOMP)

Massachusetts Ocean Management Plan (https://www.mass.gov/service-details/massachusetts-ocean-management-plan)

The Massachusetts Ocean Resource Information System (MORIS) has GIS data on a number of resources and uses of Massachusetts waters, including fishing grounds, special sensitive and unique resources, cultural resources, ferry routes and vessel traffic (http://www.mass.gov/czm/mapping/)

Designing site assessment and monitoring programs: J. McCann (2012). *Developing Environmental Protocols and Modeling Tools to Support Ocean Renewable Energy and Stewardship.* U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs, Herndon, VA., OCS Study BOEM 2012-082, 626 pp. (https://repository.library.noaa.gov/view/noaa/43408)

Applicants should review the BOEMRE Guidelines for Providing Geological and Geophysical Hazards, and Archaeological Information Pursuant to 30 CFR Part 285 (http://www.boem.gov/Renewable-Energy-Program/Regulatory-Information/Index.aspx) in the preparation of the application.

Applicants should consult with the Massachusetts Board of Underwater Archeological Resources (MBUAR) (http://www.mass.gov/czm/buar/) to determine whether marine archaeological surveys should be conducted, and if so, the appropriate survey protocol to follow.

Dibajnia, M. and R. B. Nairn. Investigation of Dredging Guidelines to Maintain and Protect the Geomorphic Integrity of Offshore Ridge and Shoal Regimes, U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Regulation and Enforcement, Herndon, VA., OCS Study MMS 2011-025. 150 pp. + appendices at: http://www.boem.gov/Non-Energy-Minerals/Marine-Mineral-Studies.aspx

CSA International, Inc., Applied Coastal Research and Engineering, Inc., Barry A. Vittor & Associates, Inc., C.F. Bean, L.L.C., and Florida Institute of Technology. 2009. Analysis of

Potential Biological and Physical Impacts of Dredging on Offshore Ridge and Shoal Features. Prepared by CSA International, Inc. in cooperation with Applied Coastal Research and Engineering, Inc., Barry A. Vittor & Associates, Inc., C.F. Bean, L.L.C., and the Florida Institute of Technology for the U.S. Department of the Interior, Minerals Management Service, Leasing Division, Marine Minerals Branch, Herndon, VA. OCS Study MMS 2010-010. 160 pp. + apps at: http://www.boem.gov/Non-Energy-Minerals/Marine-Mineral-Studies.aspx

Applicants should review the Massachusetts Department of Environmental Protection Guide to Best Management Practices for Beach Nourishment Projects with Technical Attachments, for information on recommended site surveys and general monitoring guidelines (https://www.mass.gov/doc/beach-nourishment-massdeps-guide-to-best-management-practices-for-projects-in-ma/download)

Applicants should consult with the Natural Heritage and Endangered Species Program, the Massachusetts Division of Marine Fisheries and with the National Marine Fisheries Service prior to design development. Proponents should ensure that projects are 1) not located in areas known to support endangered marine life, and 2) where project siting unavoidably conflicts with state or federally listed endangered species habitat, the project should be designed to minimize impacts to these species.

Applicants are encouraged to review the Mass. Division of Marine Fisheries eelgrass monitoring page https://www.mass.gov/info-details/dmfs-eelgrass-restoration-and-monitoring or the 2010 publication, Technical Guidelines for the Delineation, Restoration and Monitoring of Eelgrass (*Zostera marina*) in Massachusetts Coastal Waters (https://www.mass.gov/doc/eelgrass-survey-guidelines-2010-tr-43/download) in developing a plan for delineating and monitoring eelgrass habitat.

For information on Essential Fish Habitat (EFH), designated under the federal fishery management plan development process, applicants should consult with the New England Fishery Management Council (http://www.nefmc.org/) and the National Marine Fisheries Service (http://www.habitat.noaa.gov/protection/efh/index.html)

Information regarding NMFS biological opinions for endangered marine mammals and sea turtles can be found at: https://www.fisheries.noaa.gov/national/endangered-species-conservation/biological-opinions-noaa-fisheries-office-protected

Applicants are encouraged to view the Department of the Interior's Bureau of Ocean Energy Management (BOEM) guidelines for providing environmental information for offshore renewable energy projects (https://www.boem.gov/renewable-energy/regulatory-framework-and-guidelines), particularly those associated with benthic habitat surveys and avian resource surveys.

Applicants can obtain information on sea ducks in this region in the 2012 USFWS Atlantic Coast Wintering Sea Duck Survey athttps://seaduckjv.org/atlantic-coast-wintering-sea-duck-survey/ .

Applicants are encouraged to review OCS Report MMS 2001-089: Development and Design of Biological and Physical Monitoring Protocols to Evaluate the Long-Term Impacts of Offshore Dredging Operations on the Marine Environment https://www.boem.gov/sites/default/files/mm-research/2022-03/2001-089.pdf

ADDITIONAL MAPPING RESOURCES

The MarineCadastre.gov is an integrated marine information system that provides ocean data, offshore planning tools, and technical support to the offshore renewable energy community. It has three primary focus areas: Web map viewers and ocean planning tools; spatial data registry; and technical support and regional capacity building: www.marinecadastre.gov

The National Oceanic and Atmospheric Administration (NOAA) Coastal and Marine Spatial Planning (CMSP) Data Registry is a collection of web-accessible NOAA geospatial data deemed essential for local, regional, or national-level CMSP processes: https://coastalscience.noaa.gov/

The OBIS–USA (Ocean Biogeographic Information System) is a program of the United States Geological Survey (USGS) Core Science Analytics and Synthesis (CSAS). It is the U.S. national node of the Ocean Biogeographic Information System (OBIS). Meant to serve research and natural resource management needs, OBIS-USA brings together marine biological occurrence data in a standard format, with metadata, web-based discovery and download, and web service access for users and applications.

The Northeast Regional Ocean Council (NROC) Northeast Ocean Data: http://northeastoceandata.org/

Wetlands Resources DRAFT

This guidance is intended to clarify how the Wetlands Resources Goal and Objectives of the Regional Policy Plan (RPP) are to be applied and interpreted in Cape Cod Commission Development of Regional Impact (DRI) project review. This Technical Bulletin presents specific methods by which a project can meet the goal and objectives.

Wetlands Resources Goal: To protect, preserve, or restore the quality and natural values and functions of inland and coastal wetlands and their buffers.

- **Objective WET1** – *Protect wetlands and their buffers from vegetation and grade changes.*
- **Objective WET2** – *Protect wetlands from changes in hydrology, including those associated with stormwater discharges.*
- **Objective WET3** – *Promote the restoration of degraded wetland resource areas.*

The applicability and materiality of these goals and objectives to a project will be determined on a case-by-case basis considering a number of factors including the location, context (as defined by the Placetype of the project's location), scale, use, and other characteristics of a project.

THE ROLE OF CAPE COD PLACETYPES

The RPP incorporates *a framework for regional land use policies and regulations based on local form and context* as identified through categories of Placetypes found and desired on Cape Cod.

The Placetypes are determined in two ways: some are depicted on a map contained within the RPP Data Viewer located at www.capecodcommission.org/RPPDataViewer adopted by the Commission as part of the Technical Guidance for review of DRIs, which may be amended from time to time as land use patterns and regional land use priorities change, and the remainder are determined using the character descriptions set forth in Section 8 of the RPP.

The project context, as defined by the Placetype of the project's location, provides the lens through which the Commission will review the project under the RPP.

TABLE OF CONTENTS

Introduction 4
Definitions 4
Summary of Methods 6
Detailed Discussion of Methods for Meeting Objective WET1 9
Detailed Discussion of Methods for Meeting Objective WET2 17
Detailed Discussion of Methods for Meeting Objective WET3 19
General Application Requirements 21
References 23

INTRODUCTION

One out of every four acres on Cape Cod is wetland. Freshwater wetlands include red maple swamps, Atlantic white cedar swamps, bogs, marshes, and wet meadows. Coastal wetlands include salt marshes, beaches, dunes, banks, and intertidal areas. All of the foregoing wetland resources are important to both the environment and economy of Cape Cod. Wetlands serve important natural functions including groundwater recharge and attenuation of pollutants. They protect water quality for shellfishing and provide wildlife and fisheries habitat. They serve as an attraction for residents and visitors seeking opportunities for outdoor recreational activities, including beach recreation, bird watching, and fishing. In addition, wetlands and their buffers often contain archaeological resources.

Wetland buffers serve important functions including stormwater recharge and filtration, sedimentation and erosion control, nutrient removal, and groundwater recharge. Buffer areas also provide critical habitat for wildlife species that depend on wetlands and their buffers for foraging, breeding, and nesting. Studies indicate that buffers 100- to 300-feet wide are needed to protect surface water bodies from sedimentation and to maintain wildlife habitat, and buffer widths of 300 feet or greater are needed to remove 90 percent of man-made nutrients.[1], [2]

The wetland goal and objectives recognize the irreplaceable value of natural wetlands, prohibit any further wetland degradation, and promote the restoration of previously degraded wetlands as a means to improving overall wetland performance. Most Cape communities have passed local wetlands bylaws that regulate activities within wetlands or require setbacks for construction activities. Although these bylaws are generally stricter than the state Wetlands Protection Act, many still do not provide adequate protections, such as a minimum 100-foot undisturbed buffer.

DEFINITIONS

Beach Nourishment: The placement of clean sediment, of a grain size compatible with existing beach nourishment, on a beach to increase its width and volume for purposes

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[1] Environmental Law Institute, with funding from USEPA: *Planner's Guide to Wetland Buffers for Local Governments*, March 2008.

[2] Washington State Department of Ecology: *Wetland Buffers: Use and Effectiveness*, February 1992.

of storm damage prevention, flood control, habitat, or public recreation. The seaward edge of the nourished beach shall not be confined by any structure.

Improvement Dredging: Any dredging in an area which has not been previously dredged or which extends the original dredged width, depth, length, or otherwise alters the original boundaries of a previously dredged area for the purposes of improving navigation or flushing of an embayment or harbor.

Invasive species – List of species determined by Massachusetts Department of Agricultural Resources to be noxious weeds. https://www.mass.gov/massachusetts-prohibited-plant-list

Maintenance Dredging: Dredging in accordance with a license or permit in any previously authorized dredged area which does not extend the originally dredged depth, width, or length.

Riverfront Area - Riverfront Area is the area of land between a river's mean annual high water line and a parallel line measured horizontally. The riverfront area may include or overlap other resource areas or their buffer zones. Riverfront Area is described in the Wetlands Protection Act and in 310 CMR 10.58.

Vista Pruning – trimming or removal of selected branches from trees to provide a view to the water, a wetland, or other vista. Vista pruning which may be allowed within wetland buffers will not necessarily provide an unobstructed view.

Wetland – An inland area of 500 square feet or greater including wet meadows, marshes, swamps, bogs, and areas of flowing or standing water, such as rivers, streams, ponds, and lakes, or a coastal area including beaches, dunes, barrier beaches, coastal banks, intertidal areas, salt marshes, and land under the ocean. Wetlands may border water bodies or may be isolated. Wetlands are generally described in the Wetlands Protection Act and delineated in accordance with the boundary delineation methods set forth in the relevant sections of 310 CMR 10.00. These include 310 CMR 10.25(2), 10.27(2), 10.28(2), 10.29(2), 10.30(2), 10.31 (2), 10.32(2), 10.33(2), 10.34(2), 10.35(2), 10.55(2) with the exception of the —bordering requirement, and 10.56(2).

SUMMARY OF METHODS

GOAL | WETLANDS RESOURCES

To protect, preserve, or restore the quality and natural values and functions of inland and coastal wetlands and their buffers.

OBJECTIVE WET1 – Protect wetlands and their buffers from vegetation and grade changes

METHODS FOR ALL WETLANDS:

- Wetlands and their buffers must not be altered except in the limited circumstances identified in this Technical Bulletin and where the applicant can show that there is a public benefit, there is no feasible alternative to alteration, and that the impacts from the alteration are minimized and mitigated. Upon the required showing, the Commission may permit alterations to wetlands and buffers and approve mitigation for the following purposes:
  - Where development currently exists, provided that such proposed additional alterations either reduce impacts to or improve the functions of the wetland resources;
  - Installation of new utility lines;
  - Water-dependent structures and uses;
  - Vista pruning and pedestrian access paths;
  - Wetland restoration (see Objective WET3).
- Provide vegetated, undisturbed buffer areas of at least 100 feet in width from the edge of coastal and inland wetlands including isolated wetlands, to protect their natural functions.
- Development activity in the Riverfront Area does not adversely impact wetlands
- Fertilizer and Pesticide use is minimized within 300 ft of wetlands
- Mitigation is required for any new alteration to wetlands and must include the permanent protection of wetlands and buffers on- or off-site of equal or greater ecological value to the area impacted in a proportion of at least 2:1 mitigation to impact.

METHODS FOR COASTAL WETLANDS:

- Protect beaches, barrier beaches, dunes, coastal banks, salt marshes, and land under water bodies from alteration.
- Redevelopment or water-dependent development in proximity to coastal wetlands accommodates their natural migration.
- Projects must not impact eelgrass unless no feasible alternative, there is a public benefit, and the impacts are minimized and appropriately mitigated.
- For beach nourishment projects, the design must prioritize the natural functions of coastal resources and minimize impacts.
- For maintenance dredging projects, maintain footprint and depth of existing navigation channels and basins.
- Improvement dredging is not permitted except where it accomplishes a substantial public benefit and there is no feasible alternative.
- For water-dependent projects, including aquaculture, avoid and minimize impacts to fish, shellfish, and crustaceans.
- Restoration projects – see Objective WET3 below.

Permittable development activities within wetlands and buffer areas do not vary by Placetype.

OBJECTIVE WET2 – Protect wetlands from changes in hydrology, including those associated with stormwater discharges

METHODS

- Projects should direct stormwater discharges away from wetlands and their 100 foot buffers.
- Development activities do not alter wetland hydrology

For projects proposing water withdrawals greater than 20,000 gallons per day:

- Projects involving water withdrawals in proximity to wetlands do not adversely impact wetlands.

OBJECTIVE WET3 – Promote the restoration of degraded wetland resource areas

METHODS

- Restore wetlands where wetland is shown to be degraded and the proposed restoration will improve the natural wetland functions, restore native vegetation, and/or improve habitat for native species.
- For coastal resource restoration, enhance natural coastal processes, functions, and sediment movement.
- Remove structures from wetland resource areas wherever possible.
- Remove invasive species from wetland resource areas where it will improve the natural functions of the wetland.

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE WET1

Objective WET1 – *Protect wetlands and their buffers from vegetation and grade changes.*

Methods Applicable to All Wetland Areas

General Prohibition on Alteration of Wetlands and their 100-foot buffers

Due to the regional importance of protecting wetland resources, subject to the narrow exceptions discussed below, DRIs will not be permitted to alter the vegetation, grade, or hydrology of wetland resources and 100-foot buffer areas. In practice, meeting this objective means not proposing or conducting work within wetland resource or buffer areas. Wetlands are defined according to the Massachusetts Wetlands Protection Act (see definitions at top of bulletin, and reference to 310 CMR 10.00). Prior to filing an application for DRI review, applicants proposing work on sites with wetlands present must seek a determination of the resources present and their boundaries from the local conservation commission through the appropriate process under the Wetlands Protection Act regulations and any applicable local wetlands bylaw and regulations.

APPLICANTS MUST PROVIDE VEGETATED, UNDISTURBED BUFFER AREAS OF AT LEAST 100 FEET IN WIDTH FROM THE EDGE OF COASTAL AND INLAND WETLANDS INCLUDING ISOLATED WETLANDS, TO PROTECT THEIR NATURAL FUNCTIONS.

To protect the important functions that wetland buffers serve, a vegetated buffer of at least 100-feet must be maintained or restored. A functioning vegetated buffer contains dense layers of native plants and contributes to the resilience and ecological health of the adjacent wetland. Where a healthy wetland buffer exists, it must be protected from development impacts. Where a wetland buffer has been altered or degraded, it should be restored.

Exceptions to Prohibition on Wetlands Alteration

Under the limited circumstances described below, the Commission may permit a DRI that results in otherwise prohibited alteration of wetlands and/or buffer areas.

EXISTING DEVELOPMENT IN WETLANDS AND BUFFERS

In some cases, a DRI may propose changes to an existing development that is located within wetland and buffer areas. In these circumstances, the Commission may allow alteration of the wetland resources if the applicant can establish that the proposed changes reduce impacts to, or improve the functions of, the wetland resources.

Applicants seeking to alter wetlands at preexisting development sites must submit to the Commission a narrative discussing technically feasible alternatives to the proposed alteration that were considered and rejected, and why. Applicants must also submit existing and proposed conditions civil engineering plans identifying that portion of the wetland and buffer area affected by the new work, with an accompanying narrative describing how the proposed project will reduce impacts to or improve function of the wetland and buffer, or, at a minimum, demonstrating that the proposed alteration will not increase adverse impacts to that portion of the wetland resource areas. Any proposed work on preexisting development sites within wetland and buffer areas must be accompanied by a plan for restoration, including grading, hydrology, and native plant species (types, quantities, sizes).

In determining whether a DRI proposing work on an existing development located within wetland and buffer areas will reduce impacts to or improve functions of wetland resources, Commission staff will consider the following factors: whether the extent of proposed impact exceeds the existing area of impact, whether there is an increase in impervious area, assessment in the Natural Resources Inventory (NRI) of current conditions as compared to an assessment by the consulting professional biologist preparing the NRI of proposed conditions, and whether (in coastal resource areas) the project is designed to accommodate the migration of coastal resources.

UTILITIES

Disturbance of wetlands and buffer areas for installation of new utility services may occur where the Commission finds no feasible alternative to the proposed route for such utilities. Applicants should demonstrate that alternatives to work within the wetland area have been fully considered. In the event that utility installation in wetland areas must proceed, disturbance of wetland and buffer areas should be minimized, and surface vegetation, topography, and water flow should be restored substantially to the original condition.

WATER-DEPENDENT STRUCTURES AND USES

Certain traditional uses of wetland resource areas, (especially coastal resources) may generate impacts to these resources. Recreational access, shellfishing, boating, or the Massachusetts public trust rights to fishing, fowling, and navigation all require activity which may directly or indirectly affect wetland resources. While the goal under this RPP is to protect all wetland resources from alteration, access to the water and water-dependent structures and uses are recognized as important and often necessary, and may result in impacts to wetland resources. Wherever possible, alterations for water-dependent structures should be avoided. Where alterations cannot be avoided, a public benefit should be demonstrated, development impacts should be minimized, and applicant must show there is no feasible alternative.

VISTA PRUNING AND PEDESTRIAN ACCESS PATHS

Vista pruning and pedestrian access paths may be permitted within wetland buffer areas where there is no other feasible alternative location. Pruning of branches from trees may be allowed to achieve a view to open water or wetlands, but may not always result in an unobstructed view. Removal of dead or diseased trees, which can provide important wildlife habitat, is discouraged unless they pose a threat to human health or safety. Pedestrian access paths may be established or maintained in wetland buffers provided the siting and design minimizes impacts on habitat and natural functions of the resource area.

WETLAND RESTORATION

The restoration of degraded wetland resource areas is strongly encouraged. Applicants may be allowed to alter wetlands if they submit an appropriate restoration plan. See Objective WET3 for methods to demonstrate compliance with the wetland restoration objective.

Development activity in the Riverfront Area does not adversely impact wetlands

Where the local conservation commission has determined that Riverfront Area as defined by the Wetlands Protection Act is present on a project site, applicants must locate development activity outside the Riverfront Area. Applicants can overcome the presumption of significance of those portions of the Riverfront Area outside of wetlands and the 100 ft buffers to wetlands upon a showing that the impacts proposed are no greater than existing impacts or that development activity will have no adverse impact on the functions of the river, including its water quality or volume of flow.

Fertilizer and Pesticide use is minimized within 300 ft of wetlands

Septic systems must be located in excess of a 300 ft upgradient buffer from freshwater wetlands and ponds in order to protect water quality (see Water Resource Technical Bulletin Objective WR2). Existing septic systems within the 300 ft buffer may be replaced provided there is no increase in impacts to wetland resources or their buffers.

Fertilizer and pesticide use proximate to wetlands is known to contribute to water quality degradation. Studies have demonstrated that buffers in excess of 300 feet are needed to attenuate 90% of manmade nutrients, and buffers of greater widths are significant for the protection of wildlife.[3] [4] Fertilizer and pesticide application within 300 ft of wetland resource areas should not occur unless a naturally vegetated buffer of at least 100 ft is maintained between the wetland resource and the development site. Larger buffers and no fertilizer or pesticide application is preferred and encouraged.

Mitigation for Wetland or Buffer Impacts

As detailed in this Technical Bulletin, wetland and buffer alteration is generally not permitted, with the limited exceptions noted herein for redevelopment, utility installation, water-dependent projects, or wetland restoration. In rare instances the Commission may allow wetland and buffer alteration, but only where wetland resource values are not degraded, there is an overriding public benefit, and the impacts are minimized and mitigated. Mitigation must be provided where new wetland or buffer alteration is proposed, though not for restoration projects. For wetland restoration, see Objective WET3.

Where the Commission may allow new alteration to wetlands or wetland buffers for non-water-dependent projects, mitigation provided should be at least 2:1 mitigation to impact. Mitigation may include the permanent protection of wetlands and/or buffers, which could be on-site or off-site. Wetlands offered as mitigation should be of equal or greater habitat value to those being impacted, i.e., they should be of high quality, free of invasive species, not serving as stormwater management structures. Similarly, wetland

[3] Environmental Law Institute: *Planner's Guide to Wetland Buffers for Local Governments*, March 2008. Funded by USEPA.
[4] Washington State Department of Ecology: *Wetland Buffers: Use and Effectiveness*, February 1992.

buffers offered as mitigation should be naturally vegetated, free of invasive species (or will be incorporated into an invasive species management plan) and are not serving some other development-related purpose.

To allow the Commission to consider potential impacts to wetlands or wetland buffers, the Applicant must provide:

- Narrative discussing technically feasible alternatives to the proposed alteration that were considered and rejected, and why,
- Plan identifying that portion of the wetland and buffer area affected by the new work,
- Narrative discussing how the proposed alteration minimizes impacts to or improves the functions of wetlands, buffers, and the beneficial functions that they provide
- Restoration plan including grading, hydrology, and the types, quantities, and sizes of native plant species to be used in the restoration.
- Narrative discussing the public benefits that derive from the project
- Proposed mitigation identifying preserved wetlands, 100 ft buffers, located on- or off-site, and in an amount equal to or greater than twice the area of impact. Wetland mitigation areas must include wetland habitat of equal or greater ecological value to the wetlands impacted. May be waived for most water dependent projects, except where eelgrass or salt marsh may be impacted.
- For wetland buffers, mitigation may also include protection of habitat areas that have an equal or greater habitat value than the wetland buffer affected. Examples of high value habitats include areas identified by the NHESP BioMap Core Habitats, Critical Natural Landscapes, or Local or Regional Components, mapped rare species habitat, vernal pools, Important Bird Areas, habitats or Key sites identified in the State Wildlife Action Plan.

Taken together, the analysis must demonstrate that, with the proposed mitigation, the project will not degrade wetland resource values.

METHODS FOR COASTAL WETLANDS

Like inland, freshwater wetlands, beaches, barrier beaches, dunes, coastal banks, salt marshes, and land under water bodies must be protected from alteration. Specific considerations and methods to address necessary alterations within coastal wetland resource areas follow.

Most projects located in proximity to coastal resource areas are also located within the floodplain or future floodplain. Where this is the case, projects should also address the requirements of the Coastal Resiliency goal, objectives, and Technical Bulletin. The RPP discourages, limits, or prohibits new development, and further regulates redevelopment in the floodplain, depending on which type of coastal hazard area is present within the coastal zone subject to flood inundation.

Accommodating Coastal Resource Migration

Water-dependent development activity in coastal resource areas has the potential to adversely impact the natural shifting of form and location of these resources. Wherever possible, alterations to beach, dune, coastal bank, salt marsh, and land under water bodies should be avoided. Recognizing that these resources are dynamic and change form naturally and continually, development in proximity to these resources should accommodate their natural migration through open foundations, piers, breakaway walls, and the like.

Eelgrass

The general presumption is that work in coastal resource areas will not have direct or indirect adverse effects on eelgrass beds, including mapped historic eelgrass beds, unless an applicant can demonstrate that there is no feasible alternative location or design for the project and the project is necessary to accomplish an overriding public benefit subject to a mitigation requirement. If a project adversely affecting eelgrass is permitted, appropriate mitigation, including eelgrass restoration, will be required. Mitigation may include replanting of eelgrass following disturbance and/or planting eelgrass in a suitable off-site location. The Commission may require a planting and monitoring plan to ensure that restoration of the disturbed eelgrass bed is successful. In cases where work is permitted proximate to eelgrass beds, directional drilling should be used to avoid any direct impacts on eelgrass.

Beach Nourishment

As sea levels rise and coastal properties experience increased erosion, Cape Cod communities may seek to permit, or see more private requests to permit beach nourishment projects designed to provide protection from coastal hazards.

Applicants for any beach nourishment project, whether for hazard mitigation or beneficial reuse of sediments retrieved from dredging, should characterize the profile and sediment of the beach to be nourished, and demonstrate the compatibility of the grain size of the sediment source material and that of the receiving beach.

DRI application materials should demonstrate that site-specific wave climate and erosion rate conditions support the goal of the project.

Applicants also should provide a site monitoring plan that includes the following elements:

- A commitment to conduct seasonal beach profile surveys along the length of the project area during the first year, followed by annual beach profile surveys,
- Annual evaluation of survey data to determine whether the project is performing as designed (e.g., to re-introduce sediment to the littoral system, or to provide storm damage protection benefits, and is not resulting in down-stream adverse impacts to coastal resources), and
- Consistency with the guidelines in Beach Nourishment - MassDEP's Guide to Best Management Practices for Projects in Massachusetts (March 2007).

The Commission may require submission of monitoring reports after the first year of data collection, and up to two years thereafter.

Dredging

Maintenance dredging is generally considered dredging within previously permitted channels at the permitted widths and depths to allow for safe passage of current users. Applicants seeking permits for maintenance dredging should provide prior permitting documentation, including permit numbers, dates of issuance and re-issuance, and documentation that clearly demonstrates the location, width, depth and length of the previously permitted project. Maintenance dredging projects should maintain the existing footprint and depth of existing navigation channels and basins. Clean sediments retrieved from dredging activities should be beneficially reused to nourish area beaches, provided there are not other resource protection conflicts.

Improvement dredging is generally considered dredging new channels that have not been dredged previously or expanding the depth, width, or length of existing permitted channels. Improvement dredging is prohibited except when necessary to accomplish a substantial public benefit and no feasible alternative exists. Improvement dredging proposed for water quality improvement should provide hydrologic/hydraulic analyses demonstrating that the proposed dredging activity will improve water quality, and may be approved where the applicant can demonstrate that there will not be adverse impacts to sensitive resources, including shellfish, finfish, and endangered species habitat.

Fish, Shellfish, Crustaceans

Development and redevelopment should be designed and constructed to minimize direct and indirect adverse impacts to fish, shellfish, crustaceans and their habitat. The construction or expansion of docks and piers is strongly discouraged in significant shellfish habitat areas, as identified and documented by the Division of Marine Fisheries and/or local shellfish officials. Previously licensed private docks and piers more than 50 percent damaged or destroyed by storms may be replaced in accordance with federal, state and local regulations. In areas identified and documented as significant shellfish habitat, replacement structures should be designed to minimize adverse impacts to these resources. As a general practice, in order to reduce cumulative adverse impacts to coastal ecosystems, community docks and piers should be constructed in lieu of individual docks on private property.

Aquaculture

Coastal aquaculture should be designed to have no significant adverse impacts to water quality or marine habitat. Temporary structures may be allowed provided that they are:

- Permitted by MassDEP and all other appropriate regulatory agencies,
- Designed to increase the productivity of land containing shellfish or to enhance marine fisheries and supported by the Division of Marine Fisheries, and
- Determined by the Army Corps of Engineers and local Harbor master to create no significant impact to public trust rights and navigation safety.

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE WET2

Objective WET2 – *Protect wetlands from changes in hydrology, including those associated with stormwater discharges.*

Projects should direct stormwater discharges away from wetlands and their 100 foot buffers

Precipitation contributes to the natural hydrology of wetlands, flowing over land or entering wetlands from streams and rivers. Stormwater runoff from the built environment typically contains nutrients and pollutants which may have adverse impacts on wetlands. Thus, stormwater management should not result in discharge of stormwater to wetland resource areas or within 100 feet of wetlands in order to protect the natural hydrology and water quality within the wetland resource area. More detail on meeting stormwater management objectives may be found in the Water Resources Technical Bulletin, Objective WR4.

Development activities do not alter wetland hydrology

Development activities may indirectly impact wetlands through changes in hydrogeology. Disposal of large volumes of water, as in treated wastewater disposal fields or injection wells could have adverse effects on nearby wetland resources. Excavation for mineral resources, sand, and gravel, or extensive drilling for geothermal projects could alter groundwater flow volumes or direction, possibly impacting nearby wetland resources. Applicants proposing projects that introduce changes that could impact the behavior of the aquifer must provide hydrogeological analyses that demonstrate the project will not adversely impact wetland resource hydrology. More detail on managing water discharges to maintain hydrologic balance may be found in the Water Resources Technical Bulletin, Objective WR5.

Projects involving water withdrawals in proximity to wetlands do not adversely impact wetlands

In situations where a project proposes new groundwater withdrawals exceeding 20,000 gallons/day in proximity to wetlands, the applicant must demonstrate that the withdrawal will have no adverse effect on surface water levels and wetland habitat. The applicant must provide hydrogeologic characterizations in sufficient detail to demonstrate that wetland and vernal pool resources are sufficiently separated from the drawdown cone around the well, or are protected by a confining layer of sediment such that the impacts of water level drawdown on the wetland are non-existent or negligible. Water withdrawals should have no impact on water levels in wetlands or surface water bodies which may be connected to and fed by groundwater. More detail on managing water withdrawals to maintain hydrologic balance may be found in the Water Resources Technical Bulletin, Objective WR5.

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE WET3

Objective WET3 – *Promote the restoration of degraded wetland resource areas.*

The RPP encourages restoration of degraded natural habitats and natural communities. Centuries of development activity have adversely impacted many of our coastal and inland wetlands. Development activity has encroached on wetlands or their buffers, streams have been restricted or impounded, coastal erosion management has altered the natural flow of sediment along beaches and across salt marshes.

Restore wetlands where wetland is shown to be degraded and the proposed restoration will improve the natural wetland functions, restore native vegetation, and/or improve habitat for native species

Measures to restore altered or degraded inland wetlands, including non-structural bank stabilization, revegetation, and restoration of natural hydrology are encouraged. Cranberry bogs where cultivation has ceased are excellent opportunities for wetland restoration.

Restoration projects should demonstrate that the proposed work will improve the natural functions of the wetland or buffer area and improve habitat for native plant and wildlife species.

In agricultural areas where full restoration of wetlands and buffer areas may not be practical, management practices that improve water quality and conserve water are encouraged. The Natural Resources Conservation Service has recommendations for farmers that address these interests (see reference below).

For coastal resource restoration, enhance natural coastal processes, functions, and sediment movement

Measures to restore altered or degraded coastal wetlands, including revegetation and restoration of tidal flushing are encouraged. Salt marsh restoration techniques including thin layer sediment placement, ditch remediation, runnels, and marsh habitat mounds may be allowed on salt marshes where there is evidence of restoration success.

Remove structures from wetland resource areas wherever possible

Removing development within sensitive or significant habitats, including mapped estimated or priority habitat or BioMap habitats and landscapes as identified by the Natural Heritage and Endangered Species Program, is encouraged. Removing development from wetlands and their buffers should help restore essential functions of wetlands including recharging groundwater, flood control, pollutant filtration, and wildlife habitat.

Remove invasive species from wetland resource areas where it will improve the natural functions of the wetland

Invasive species pose a threat to the health and function of Cape Cod's wetlands. A current listing of invasive species can be found on the web at https://www.mass.gov/info-details/massachusetts-prohibited-plant-list. Additional information on invasive plants in Massachusetts can be found on the Massachusetts Invasive Plant Advisory Group's webpage here: www.massnrc.org/mipag/invasive.htm.

The Commission may allow the alteration of wetlands in order to address invasive species invasions where the unwanted plants can be removed without adversely impacting native species and natural wetland functions. Applicants seeking to restore wetlands or buffers impacted by invasive species should provide a management plan as detailed in the Wildlife and Plant Habitat Technical Bulletin, a detailed site plan and narrative describing the proposed restoration, including species to be removed, methods for removal, and a plan for restoration, including grading, hydrology, and native plant species (types, quantities, sizes). The chemical treatment of invasive species in wetlands is discouraged but may be permitted only where an alternate method would result in adverse impacts to wetland resources. Where chemical treatment is proposed, the applicant should address the available best practice methods for controlling the invasive species present on the site, and discuss the merits and drawbacks of the different methods with regard to impacts to wetlands, aquatic species, and water quality.

GENERAL APPLICATION REQUIREMENTS

Application materials should provide sufficient detail to demonstrate that the project meets the applicable Objectives, but will typically include an assessment of wetland resources on the project site and in the project vicinity as detailed below.

Definitions of key terms, including Wetland Resources, are presented on page WET-5. For the purposes of this Technical Bulletin, wetlands are defined in accordance with the Massachusetts Wetland Protection Act and include both inland and coastal wetlands.

Applicants should provide the following materials to address consistency with the Wetland Resources Goal and Objectives.

- Site plan showing delineation of all wetland resources and the 100 ft buffer to those delineations and determination of the resources present and their boundaries from the local conservation commission through the appropriate process under the wetland regulations.
- Applications for Developments of Regional Impact that propose to alter undeveloped areas should include a natural resources inventory (NRI) as detailed in the Wildlife and Plant Habitat Technical Bulletin. The NRI should identify the presence and location of wetlands and their buffers, and serve as a guide for the layout of the development.

If development is proposed within wetland resource areas or buffers:

- Provide a narrative discussing technically feasible alternatives to the proposed alteration that were considered and rejected, and why,
- Plan identifying that portion of the wetland and buffer area affected by the new work,
- Narrative discussing how the proposed alteration minimizes impacts to or improves the functions of wetlands, buffers, and the beneficial functions that they provide
- Restoration plan including grading, hydrology, and the types, quantities, and sizes of native plant species to be used in the restoration.
- Narrative discussing the public benefits that derive from the project
- Proposed mitigation identifying preserved wetlands and 100 ft buffers, located on- or off-site, in an amount equal to or greater than twice the area of impact, and of equal or greater ecological value. Where beach nourishment or other coastal

alterations are proposed, cross sections of proposed beach or dune profiles should be provided.

REFERENCES

The Protecting Wetlands in Massachusetts webpage has many resources, accessed July 2025. Protecting Wetlands in Massachusetts | Mass.gov

The DEP Wetlands Information webpage has many resources, accessed July 2025. Wetlands Information | Mass.gov

See also the Regional Policy Plan Data Viewer.

Wildlife and Plant Habitat DRAFT

This guidance is intended to clarify how the Wildlife and Plant Habitat Goal and Objectives of the Regional Policy Plan (RPP) are to be applied and interpreted in Cape Cod Commission Development of Regional Impact (DRI) project review. This technical bulletin presents specific methods by which a project can meet the goal and objectives.

Wildlife and Plant Habitat Goal: To protect, preserve, or restore wildlife and plant habitat to maintain the region's natural diversity.

- **Objective WPH1** – *Maintain existing plant and wildlife populations and species diversity*
- **Objective WPH 2** – *Restore degraded habitats through use of native plant communities*
- **Objective WPH 3** – *Protect and preserve rare species habitat, vernal pools, 350-foot buffers to vernal pools*
- **Objective WPH 4** – *Manage invasive species*
- **Objective WPH5** – *Promote best management practices to protect wildlife and plant habitat from the adverse impacts of development*

The applicability and materiality of these goals and objectives to a project will be determined on a case-by-case basis considering a number of factors including the location, context (as defined by the Placetype of the project's location), scale, use, and other characteristics of a project.

THE ROLE OF CAPE COD PLACETYPES

The RPP incorporates *a framework for regional land use policies and regulations based on local form and context* as identified through categories of Placetypes found and desired on Cape Cod.

The Placetypes are determined in two ways: some are depicted on a map contained within the RPP Data Viewer located at www.capecodcommission.org/RPPDataViewer adopted by the Commission as part of the Technical Guidance for review of DRIs, which may be amended from time to time as land use patterns and regional land use priorities change, and the remainder are determined using the character descriptions set forth in Section 8 of the RPP.

The project context, as defined by the Placetype of the project's location, provides the lens through which the Commission will review the project under the RPP.

TABLE OF CONTENTS

Introduction 5
Definitions 9
Summary of Methods 11
Detailed Discussion of Methods for Meeting Objective WPH1 14
Detailed Discussion of Methods for Meeting Objective WPH2 17
Detailed Discussion of Methods for Meeting Objective WPH3 18
Detailed Discussion of Methods for Meeting Objective WPH4 20
Detailed Discussion of Methods for Meeting Objective WPH5 21
General Application Requirements 23
References 28

INTRODUCTION

Cape Cod is located within the southern Massachusetts Pine Barrens eco-region. Pine barrens are a globally rare habitat comprised of a unique assemblage of plants and animals that thrive in the nutrient poor soils and variable climate found on Cape Cod. Pine Barrens are comprised of an open canopy of pitch pines and a dense understory of scrub oak and huckleberry. There are many natural communities associated with the Pine Barrens, which together populate the matrix of habitats that define the eco-region, including thickets, shrub barrens, heathlands and grasslands, and various pond and wetland habitats. Though the entire natural landscape on Cape Cod was altered following European settlement, there remain pockets of mature woodlands within the Pine Barrens matrix containing beech, hickory, red maple, and birch. These woodlands have supported, and continue to support native species and traditional uses, providing important habitat diversity and value to the region.

Many of the plant and animal species found on Cape Cod are rare or declining in number. Of the 453 species of plants and wildlife listed by the Massachusetts Natural Heritage and Endangered Species Program as endangered, threatened, or special concern, 148 occur on Cape Cod. Additional species are on a watch list and could become listed in the future based on further review. Threatened and endangered species that are also on the federal list of threatened and endangered species include the little brown bat, northern long-eared bat, North Atlantic right whale, Kemp's Ridley Sea Turtle, red knot, piping plover, roseate tern, and sandplain gerardia.

These species depend on undisturbed and healthy habitats for their survival. The Cape's woodlands provide important upland wildlife and plant habitat. Poorly planned development can harm species by fragmenting large tracts of forest and severing wildlife corridors and other ecological connections. The Cape's wetlands, vernal pools, and ponds also provide vital habitat for diverse rare and endangered species. These areas can be damaged not only by adverse impacts such as pollution and disturbance but also by groundwater withdrawals that can reduce water levels needed to support aquatic and shoreline species.

Accurate information about the nature, location, and extent of sensitive resources can result in improved project site selection and site design. Applicants are encouraged to review available mapped information about sensitive resource areas and areas that are priorities for protection prior to selecting a development location. To identify these areas, the RPP relies on several sources of mapped data based on existing natural resources and protected open space presently providing a network of wildlife habitats and corridors across the Cape. A compilation of many of these important resource areas is found in the Regional Policy Plan Data Viewer. In addition, several other resources, including the State's Wildlife Action Plan (SWAP), may provide guidance in selecting preferred locations for development. A list of mapped resources available for planning and regulatory review is available at the end of this technical bulletin.

Growth management approaches are needed to reduce the amount of land converted to development and to improve the design and performance of new development to ensure protection of valuable habitat. A renewed commitment to protect the most ecologically sensitive undeveloped lands through land acquisition and other permanent conservation measures is also warranted. Maintaining wildlife corridors and large patches of existing heterogeneous habitat types is a critical element toward maintaining the viability of wildlife habitat on Cape Cod. Restoration and better land stewardship are needed to improve areas that have already been developed.

HABITATS FOUND ON CAPE COD

According to the SWAP, Cape Cod is defined by many upland, wetland, and aquatic habitats, such as: coastal beaches and dunes, grasslands and heathlands, woodlands and barrens, maritime forests and shrublands, coastal plain pondshores, marshes and wet meadows, vernal pools, tidal wetlands, and marine nearshore and offshore, among others. The SWAP further subdivides habitats into distinct natural communities that are finer-scale groups of plants and animals that co-occur in distinct environmental settings. For example, the woodlands and barrens habitat includes the pitch pine-scrub oak and pitch pine-oak forest/woodland communities that typify the southern Massachusetts Pine Barrens eco-region.

Several areas on Cape Cod have been designated as significant for comprehensive resource protection interests. The Wildlife and Plant Habitat goal, objectives, and methods are structured to discourage, limit, or prohibit development in these significant habitat areas. Applicants should review the mapped boundaries (viewable through the RPP Data Viewer or elsewhere, as noted) of these areas when planning a development activity, and take appropriate steps to address the resource protection interests of each, if applicable:

- Natural Heritage and Endangered Species Program (NHESP) Rare and Endangered Species Habitat: NHESP is responsible for the conservation of hundreds of species in Massachusetts that are not hunted, trapped, fished or commercially harvested in the state, as well as the protection of the natural communities that make up their habitats. NHESP also administers the Massachusetts Endangered Species Act through the review of projects located in Priority Habitat of Rare Species, a mapped data layer available through MassMapper and the RPP Data Viewer.
- BioMap is a map and guide developed and maintained by MassWildlife for protecting and stewarding lands and waters that are most important for conserving biological diversity in Massachusetts. BioMap includes Core Habitats and Critical Natural Landscapes as well as Local and Regional Components. BioMap can be explored here: https://biomap-mass-eoeea.hub.arcgis.com/
- Key Sites are identified by the SWAP as the highest priority sites for biodiversity protection and habitat management. Key Sites have a concentration of co-occurring rare species, the best-quality occurrences of high-priority species or natural communities, and/or multiple, co-occurring, landscape-level resources, as identified by BioMap. Key Sites identified in the 2015 SWAP can be found in Chapter 4, starting on page 351. Key Sites are being updated with the 2025 SWAP.
- Important Bird Areas (IBA) are important sites for the conservation of bird species, identified by a set of internationally-accepted, standardized criteria. The sites are small enough to be conserved in their entirety, often form part of a protected-area network, and typically are different in character or habitat or ornithological importance from the surrounding area. Cape Cod hosts several IBAs. Mass Audubon maintains a list of IBAs in Massachusetts here: https://www.massaudubon.org/our-work/birds-wildlife/bird-conservation-research/massachusetts-important-bird-areas/iba-sites. The National Audubon Society also has information on IBAs and a map here: https://www.audubon.org/important-bird-areas
- Areas of Critical Environmental Concern (ACEC) are defined areas which contain concentrations of highly significant environmental resources and which have been formally designated by the state through a public nomination and review process. Following designation, state agencies, communities, and public and private organizations work to protect, preserve and restore the significant resources in these areas. Regulatory agencies are expected to apply stricter standards of review

to development activities within ACECs. Cape Cod hosts eight ACECs from Wellfleet to Bourne. Designation documentation on the eight ACECs is available on the state's ACEC Program Overview webpage ACEC Program Overview | Mass.gov.

- Districts of Critical Planning Concern (DCPC) are areas designated by ordinance by Barnstable County following review and recommendation by the Cape Cod Commission. DCPCs may be established for many purposes under the Cape Cod Commission Act, but many of those in place today were designated to protect natural resource interests.

STRESSORS TO HABITATS ON CAPE COD

Habitats on Cape Cod may be adversely impacted or threatened by numerous stressors, including residential and commercial development, agriculture and aquaculture, energy production and mining, transportation and service corridors, biological resource use, human intrusions and disturbance, natural system modifications, invasive and other problematic species, pollution, as well as other stressors that are beyond the control of the typical applicant (i.e. geological events, climate change and severe weather - from a list adopted by the International Union for the Conservation of Nature, and incorporated into the SWAP). In order to protect the remaining habitat areas on Cape Cod, development introducing or expanding these stressors is discouraged, and is not permitted in certain significant habitats such as vernal pools and their buffers, and rare species habitat. The SWAP, through BioMap, contains detailed information on the nature of the impacts these stressors may be expected to exert on each of the habitats on Cape Cod.

NATURAL RESOURCES INVENTORY

Applications for Developments of Regional Impact that propose to alter undeveloped areas are required to provide a natural resources inventory (NRI) as detailed in the application materials. The NRI should identify the presence and location of wildlife and plant habitat, including wetlands and vernal pools, and serve as a guide for the layout of the development and any open space requirement (see Open Space Technical Bulletin).

DEFINITIONS

Key Sites, as defined in the 2015 Massachusetts State Wildlife Action Plan (SWAP), are identified as the highest priority sites for biodiversity protection and habitat management. Key Sites were identified based on meeting one or more of the following thresholds:

1. Sites with a concentration of co-occurring rare species listed under the Massachusetts Endangered Species Act,
2. Sites with the best-quality occurrences of high-priority species or natural communities (e.g., globally rare species),
3. Multiple, co-occurring, landscape-level resources, as identified by BioMap. Key Sites identified in the 2015 SWAP can be found in Chapter 4, starting on page 351.

Key Sites are being updated with the 2025 SWAP.

Rare Species are those plant and animal species listed as endangered, threatened, or special concern under the Massachusetts Endangered Species Act. These species are tracked in the NHESP database. These species are either at risk, or may become at risk, of extinction. Rarity in the state, population trend, and overall threat are the main criteria used to determine extinction risk. Rare species in Massachusetts are threatened primarily due to habitat loss or degradation.

Significant Habitat Areas are those natural resources identified as important for protection and include Natural Heritage and Endangered Species Program BioMap areas, State Wildlife Action Plan Key Sites, Important Bird Areas, Areas of Critical Environmental Concern, and Districts of Critical Planning Concern where wildlife and plant habitat are identified as a concern.

"Take" is defined under the Massachusetts Endangered Species Act as the following:

In reference to animals, it means to harass, harm, pursue, hunt, shoot, hound, kill, trap, capture, collect, process, disrupt the nesting, breeding, feeding or migratory activity or attempt to engage in any such conduct, or to assist such conduct,

And in reference to plants, take means to collect, pick, kill, transplant, cut or process or attempt to engage or to assist in any such conduct. Disruption of nesting, breeding, feeding or migratory activity may result from, but is not limited to, the modification, degradation or destruction of habitat.

Vernal Pools – a vernal pool is a wildlife habitat that supports standing water for a period of time from spring into summer and which provides habitat for vernal pool species. For the purposes of DRI review, vernal pools include both those sites which have been certified by the NHESP, and those sites which have the characteristics that make them certifiable by the NHESP. Maps of certified vernal pools and potential vernal pools are available on the RPP Data Viewer link.

SUMMARY OF METHODS

GOAL | WILDLIFE AND PLANT HABITAT

To protect, preserve, or restore wildlife and plant habitat to maintain the region's natural diversity.

OBJECTIVE WPH1 – Maintain existing plant and wildlife populations and species diversity

METHODS

All DRIs must:

- Minimize clearing of vegetation and alteration of natural topography.
- Minimize fragmentation of wildlife and plant habitat and maintain or establish greenways/wildlife corridors to protect edge species and species that inhabit the interior forest.
- Maximize the protection of large, contiguous unfragmented areas, and cluster development away from the most sensitive areas of a site.
- Protect standing specimen trees; if protecting standing specimen trees is not possible, appropriate mitigation must be provided

DRIs should, to the maximum extent feasible:

- Avoid constructing development, including fencing, that interferes with identified wildlife migration corridors.
- Avoid development in Significant Habitat Areas.

OBJECTIVE WPH1 AREAS OF EMPHASIS BY PLACETYPE

Natural Areas | New clearing is strongly discouraged
Rural Development Areas | New clearing is minimized, does not conflict with rural character, preserves habitat connections
Suburban Development Areas | New clearing is minimized, preserves habitat connections
Historic Areas | New clearing is minimized, does not conflict with character defining landscape
Maritime Areas, Community Activity Centers, Industrial Activity Centers, and Military

and Transportation Areas | New clearing is minimized, preserves habitat connections

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OBJECTIVE WPH2 – Restore degraded habitats through use of native plant communities

METHODS

- Plant native vegetation as needed to enhance or restore wildlife habitat.
- Restore altered or degraded habitat areas where ecologically appropriate (for example, sandplain grasslands, pine barrens, etc.).

OBJECTIVE WPH3 – Protect and preserve rare species habitat, vernal pools, 350-foot buffers to vernal pools

METHODS

- Locate development outside of rare species habitat.
- Where a project is located within mapped rare species habitat, demonstrate that impacts to rare species have been avoided or mitigated. Comments from the Natural Heritage and Endangered Species Program may be used to support demonstration that the project does not adversely impact rare species or their habitats.

For projects adjacent to a vernal pool:

- Locate development outside of certified or certifiable vernal pools.
- Provide a 350-foot undisturbed buffer to vernal pools.
- Locate new stormwater discharges a minimum of 100 feet from vernal pools.

OBJECTIVE WPH4 – Manage invasive species

METHODS

- Where invasive species have been identified on a project site, provide an invasive species management plan that helps to prevent the spread of invasive species on the site.
- Use Best Management Practices during construction to avoid introduction of invasive species.

OBJECTIVE WPH5 – Promote best management practices to protect wildlife and plant habitat from the adverse impacts of development

METHODS

All DRIs must:

- Limit the extent of site alteration and disturbance to the minimum areas needed for the project.
- Use erosion control barriers during construction to prevent gullying.
- Use fencing to protect plants and wildlife from harm during construction.

All DRIs should, to the maximum extent feasible:

- Avoid use of pesticides (including herbicides, fungicides, insecticides, and rodenticides)
- Respect time of year restrictions to avoid or minimize impacts to wildlife from construction activities.
- Incorporate bird-friendly practices into building design to reduce the threat of bird collisions with glass.
- Ensure lighting is dark-sky compliant to minimize impacts to nocturnal species.

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE WPH1

Objective WPH1 – *Maintain existing plant and wildlife species populations and habitat diversity.*

All DRIs must:

Minimize clearing of vegetation and alteration of natural topography

Applicants must design development in a way that minimizes new land clearing and alteration of topography to minimize impacts to wildlife and plant habitat. Minimizing impacts includes designing the project to minimize the total cleared and disturbed area on a site, clustering buildings, locating infrastructure under, on, or adjacent to buildings and paved areas, and utilizing existing disturbed areas. Reuse of existing buildings, parking, and other infrastructure is strongly encouraged. Locating structured parking under buildings or in a multi-level garage is encouraged. Minimize fragmentation of wildlife and plant habitat and maintain or establish greenways/wildlife corridors to protect edge species and species that inhabit the interior forest.

Projects must be designed to minimize fragmentation of wildlife and plant habitat. Development on parcels that may provide connections to a larger habitat network should be laid out to protect large unfragmented areas, and make connections to undeveloped areas offsite. Where appropriate, greenways and wildlife corridors of sufficient width to benefit edge species and those that inhabit the interior forest should be provided. Wildlife should be provided with opportunities for passage under or across roads and safely through developments where such opportunities will maintain the integrity of wildlife corridors. Where development is proposed adjacent to rare species habitat or Significant Habitat Areas, the Commission may require designation of a limit of work (for structures, driveways, lawns, etc.), where appropriate, to limit removal of vegetation. Fencing should not be constructed so as to interfere with identified wildlife migration corridors. See references below for additional guidance on site and subdivision design layout.

Maximize the protection of large, contiguous unfragmented areas, and cluster development away from the most sensitive areas of a site

Development sites may include or be adjacent to off-site resources that are highly sensitive to the impacts of development. Applicants must cluster development activity away from these sensitive resources such as wetlands and their buffers, rare species habitat, vernal pools and their buffers, potential public water supply areas, specimen trees, etc. (which are also addressed in WPH2, WET1, and WR1 objectives), and should strive to cluster development away from Significant Habitat Areas, with the objective of preserving large, contiguous unfragmented areas of intact woodlands or other existing naturally vegetated plant communities. Clustering of development is an objective that also meets Community Design interests (see Objective CD2), and will aid in reducing mitigation requirements.

Protect standing Specimen Trees; if protecting standing specimen trees is not possible, appropriate mitigation must be provided

The preservation of the tree canopy and planting of replacement trees if necessary helps to conserve habitat as well as the character and aesthetics of the region. The number and species of specimen trees on a project site should be identified in the Natural Resources Inventory (NRI – see application requirements). Defining a specimen tree on Cape Cod will vary depending on the species of tree, but typically softwoods greater than 18” diameter-breast-height (dbh) and hardwoods greater than 12” dbh are considered specimens. Protecting specimen trees means not disturbing an area equivalent to 10 feet greater than the canopy perimeter, at a minimum, and ideally protecting a larger area around them, including trees which provide buffering to the specimen tree from storms. Applicants should protect standing specimen trees to the extent feasible, especially native species. Where specimen tree removal cannot be avoided, removed trees should be replaced on- or off-site according to the following: for each inch of dbh of the specimen tree(s) removed, no less than one- half inch of caliper of new tree(s) shall be replanted with each new tree having a minimum caliper of two inches, , or, where feasible, large (greater than 3” dbh) same-species trees should be moved from areas to be cleared to areas to be protected. Any tree transplantation should be done in consultation with a certified arborist. Specimen tree mitigation may also be achieved through the permanent protection of specimen trees through the provision of off-site open space mitigation.

DRIs should, to the maximum extent feasible:

Avoid constructing development, including fencing, that interferes with identified wildlife migration corridors.

Fencing should not be constructed so as to interfere with wildlife migration corridors identified through a NRI. Fencing design, material, and installation should allow for safe passage for wildlife through developments. Other site design considerations such as building configurations and site drives and parking should reflect consideration for preservation of daily or seasonal wildlife movement, as may be indicated by the NRI. See references below for additional guidance on site and subdivision design layout.

Avoid development in Significant Habitat Areas

Development within Significant Habitat Areas is strongly discouraged. These areas may serve the community better as protected open space and should be considered for that purpose. Where development is proposed within Important Bird Areas, Key Sites for Species of Greatest Conservation Need as identified in the SWAP, BioMap areas as defined by NHESP, Areas of Critical Environmental Concern, or Districts of Critical Planning Concern, the applicant must submit with its application a narrative describing how the project has been designed to avoid or minimize impacts to the natural resource interests identified.

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE WPH2

Objective WPH2 – *Restore degraded habitats through use of native plant communities*

Plant native vegetation as needed to enhance or restore wildlife habitat

To enhance or restore wildlife habitats, landscape plans must include plants that are characteristic of the region (see the Cape Cod Commission plant list). Use plant materials that are predominantly native species and suitable to the site. In general, no less than 80% of the total landscaped and/or restored area should be comprised of native species. The Applicant must provide justification for any proposed plants that are not on the Commission's plant list. Incorporate pollinator species and other species that provide nesting, food, and cover for wildlife. Provide diversity in plant material selection and select species that minimize use of irrigation, pesticides, and fertilizer. Soil tests are recommended to help inform planting plans. Further information about recommended plant species can be found on the Cape Cod Commission website.

Restore altered or degraded habitat areas where ecologically appropriate

Opportunities to restore native habitat communities such as sandplain grasslands and pine barrens that are found within the southern Massachusetts pine barrens eco-region are encouraged. Restoration projects or development projects, including "undevelopment," with a habitat restoration component should provide in their application a plan detailing the nature of the restoration, including grading changes, a description of native species to be planted (including types, sizes, quantities), discussion of approach to ensure establishment (irrigation and/or invasive species management), and a narrative discussing the purpose and objectives of the restoration, and monitoring as needed.

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE WPH3

Objective WPH3 – *Protect and preserve rare species habitat, vernal pools, 350-foot buffers to vernal pools*

Locate development outside of Rare Species habitat

Where development is proposed within mapped state or federal rare species habitat areas, the proponent must submit the development proposal to the Massachusetts Natural Heritage and Endangered Species Program (NHESP) for review and comment. Development that adversely affects habitat of local populations of rare wildlife and plants is not permitted. However, development in mapped Priority Habitat for Rare Species may be allowed if the NHESP provides written comment that the work will not adversely affect rare species (including through the development of a NHESP approved conservation and management permit, or that NHESP determines that the project will not result in a "take").

Where a project is located within mapped Rare Species habitat, demonstrate that impacts to rare species have been avoided or mitigated.

Development which NHESP determines may result in a "take" of state listed species may be permitted where the proponent can demonstrate that such development will not adversely affect rare species habitat. An applicant may be able to address a determination of take or likely take through redesign of the project, utilizing best management practices during construction, timing of construction activities, or occasionally through mitigation, including a conservation and management permit. Only through a determination by NHESP will mitigation be allowed to address impacts to rare species. In those cases, a wildlife and plant habitat management plan may be required as a condition of approval when development or redevelopment is permitted in rare species habitat areas.

Projects adjacent to or that contain a Vernal Pool within the site must:

Locate development outside of certified or certifiable Vernal Pools

Vernal pools are ephemeral pools of water that typically appear in the spring with winter snowmelt and spring rains, and often (but not always) disappear by summer's end. Only those vernal pools meeting the state Wetlands Protection Act definition of "wetlands" are protected under that Act, but all vernal pools are recognized as a significant habitat and are protected under the RPP. Studies have demonstrated that vernal pool species, which spend most of their yearly lifecycles in upland vegetated buffers outside of the pool, may migrate up to 1,000 feet to breed in the temporary pools. NRIs should identify vernal pools that may be present on a site according to the criteria established by the Natural Heritage and Endangered Species Program (see reference below and details in NRI). Vernal pools and their 350-foot buffer should be delineated on a site plan included in application materials.

Provide a 350-foot undisturbed buffer to vernal pools

If a vernal pool, including pools that meet the criteria for certification, is located on or adjacent to a project site, development must be located outside of a 350-foot undisturbed buffer around these resources in order to protect both the pool habitat as well as the important upland habitat around them .

The Commission may permit alterations to vernal pool buffers where:

- Development currently exists,
- There is no feasible alternative to alteration,
- Proposed additional alterations either reduce impacts to or improve the function of the vernal pool buffer,
- The applicant can show that the project will provide a public benefit, and
- The impacts from the alteration are minimized and mitigated.

Locate new stormwater discharges a minimum of 100 feet from vernal pools

New stormwater discharges points or infrastructure should be located a minimum of 100 feet from vernal pools in order to protect these resources from the adverse effects of sedimentation, nutrient inputs, or significant changes in water level or water period.

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE WPH4

Objective WPH4 – *Manage invasive species*

Provide an Invasive Species management plan

Development on sites where a NRI identifies the presence of invasive plant species should provide and implement a management and restoration plan detailing the management of, and where possible, the eradication of the invasive species present, and the proposed revegetation of the site with native species. Where significant or sensitive wildlife or plant habitat is threatened, the invasive species management plan should strive to eradicate or reduce the threat to those sensitive species. A current listing of invasive species can be found on the web at https://www.mass.gov/info-details/massachusetts-prohibited-plant-list. Additional information on invasive plants in Massachusetts can be found on the Massachusetts Invasive Plant Advisory Group's webpage here: www.massnrc.org/mipag/invasive.htm.

Use best management practices

Development activities should also take steps to avoid introducing invasive species to a development site during construction through use of best management practices, such as educating contractors regarding invasive species, using weed-free construction and landscaping materials, properly handling and disposing of soils, seeds, and plants from infested areas, washing construction vehicles and equipment prior to initiating work on the project site and inspecting and/or washing vehicles and equipment periodically during construction.

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE WPH5

Objective WPH5 – *Promote best management practices to protect wildlife and plant habitat from the adverse impacts of development*

All DRIs must:

Limit the extent of site alterations

In general, development projects on Cape Cod are strongly encouraged to retain as much of the natural vegetation as possible. As discussed elsewhere (above, and in the Community Design technical guidance), development should be clustered on a site to use land as efficiently as possible, minimize impervious surfaces and minimize impacts to native vegetation and habitats. Construction fencing and/or limits of work may be employed to limit disturbance to existing trees, shrubs, and groundcovers. Setting limits of work will typically reduce restoration and other mitigation costs, and help retain native forested and other vegetative covers to protect the services these natural materials provide in filtering nutrients and stormwater, improving air quality, and providing shade and wildlife habitat. Limits of work established in a property deed can ensure that impacts from development are not expanded and that these natural services are protected over the long term. The Commission may require the use of limits of work where sensitive habitats or resources are present.

Use erosion control barriers

Erosion control barriers should be used in areas with slopes, areas proximate to wetlands, or anywhere other sensitive resources are present to ensure that the impacts from construction are managed within the construction site. In longer-term construction projects where unvegetated soils may be present through several seasons, seeding and/or erosion control blankets should be employed to manage loss of soils off-site and prevent gullying. Import and export of soils should be avoided, and a soils management plan should be developed to ensure appropriate management of soils during construction.

Use fencing to protect plants and wildlife

Construction activities can pose direct threats to wildlife. Where turtles or other slow moving or sensitive wildlife species may be present (such as vernal pool species or amphibians), construction fencing should be employed to redirect wildlife away from the construction site.

All DRIs should, to the maximum extent feasible:

Avoid use of pesticides

After construction and throughout the life of the project, the use of pesticides should be avoided (including herbicides, fungicides, insecticides, and rodenticides) as these may have adverse impacts on non-target wildlife.

Respect time of year restrictions

Time-of-year restrictions help protect wildlife from the adverse impacts of construction. For example, it is best practice to avoid tree and other vegetation removal during the spring/summer breeding bird season, or clearing activities that could impact amphibian or reptile migration. Applicants should comply with time of year restrictions for sensitive species on the project site or provide a rationale for why compliance is infeasible.

Incorporate bird-friendly practices into building design

Incorporating bird-friendly practices into building design helps reduce collision threats to birds. If glass areas over 24 square feet are proposed, applicants should incorporate muntins (grilles) or other features to limit bird collisions. Bird-friendly design ideas can be found here: https://abcbirds.org/wp-content/uploads/2015/05/Bird-friendly-Building-Guide_2015.pdf

Ensure lighting is dark-sky compliant

Outdoor lighting should be avoided as much as possible. Where outdoor lighting is proposed, following responsible outdoor lighting principles minimizes disruption to nocturnal species. More information is available through Dark Sky International: https://darksky.org/what-we-do/advancing-responsible-outdoor-lighting/.

GENERAL APPLICATION REQUIREMENTS

Applicants should provide the following materials to address consistency with the Wildlife and Plant Habitat Goal and Objectives:

- Prepare a Natural Resources Inventory (NRI) (see guidance below)
- Where a project is located within mapped rare species habitat, provide documentation indicating review by the Massachusetts Natural Heritage and Endangered Species Program.
- Where a NRI indicates the presence of invasive species, provide an Invasive Species Management Plan (see guidance below).

Natural Resources Inventory

Once a site has been selected, applicants for DRI review must prepare a natural resources inventory (NRI) to evaluate the site in more detail. NRIs should be prepared by a wildlife or plant biologist, and contents of a should include:

SOILS

- Describe soils underlying the development site. Where the Barnstable County Soil Survey indicates the presence of prime agricultural soils, the development site should be surveyed and mapped based on results of field testing.

VEGETATION

- Describe the major upland vegetational communities located on the site, include canopy/trees, shrub layer, low ground cover, herbaceous vegetation. Note approximate depth of leaf litter, and size and height of mature trees. Note species and locations of specimen trees. If several different zones of vegetation or natural/vegetational communities are present on the site, note the location of these areas on a site plan (suggested scale: 1"=40').
- Identify and delineate wetlands, waterbodies, banks, dunes, flats, and floodplain areas located on the site. Describe the major vegetational communities located in these areas as above. Note whether wetland delineations have been verified by the town conservation commission.
- Note the relative abundance or scarcity of vegetational community(ies) identified on the site in areas immediately surrounding the development site. In particular, note

nearby areas of similar unfragmented habitat. Identify vegetational communities that are unique to the development site.

- Identify and delineate the presence of any state-listed invasive species.

WILDLIFE

- Identify wildlife species and evidence of wildlife observed in each vegetational community. Search for amphibians and reptiles under rocks and fallen logs. Identification/observations may include sightings of animal species, identification of species from calls/sounds, tracks, scat, burrows, browse marks, nests, feathers, bone fragments, etc. At least two field visits for the purpose of wildlife identification should be made. Such field visits should occur within one hour of sunrise and within one hour of sunset during good weather.
- Identify presence of wildlife migration areas and corridors, denning, nesting and breeding areas, and deer yards and travel corridors.
- Note presence of snags and significant dead vegetation that may serve as nesting sites for bird species.
- Note presence of fish, amphibians and other species associated with wetlands and waterbodies located on the site.

VERNAL POOLS

- Note presence of kettle hole depressions and other areas that may function as vernal pools (regardless of association with other wetland area or state certification). If such areas exist, note presence/evidence of vernal pool species. Refer to the state vernal pool certification guidelines for identification of vernal pools. When possible, vernal pool surveys should be conducted during April, May and June.

NATURAL RESOURCE INVENTORY NARRATIVE

The results of the inventory should be provided in a report format and on plans, as appropriate, and should include a discussion of the short and long-term impacts to existing habitats and natural communities that will result from the development activity. The narrative should discuss how the project's design has minimized impacts to the habitats present, including habitat fragmentation. If impacts to wetlands or their buffers are proposed, discuss how proposed conditions will compare to existing conditions relative to changes in wetland functions, hydrology, and habitat. The narrative should also include a description of any proposed mitigation measures that are specifically intended to reduce the impact of the proposed project upon plant and wildlife habitat and/or populations. Include any measures designed to enhance existing plant and wildlife habitat that would provide an overall benefit to the area. Include details on best management practices to be employed during construction to avoid gullying and other effects of erosion, and to avoid the introduction of invasive species (see Detailed Methods for Meeting Objectives WPH4 and WPH5). Where appropriate, describe any revegetation and restoration that is planned after development and associated monitoring. Revegetation should emphasize plant species indigenous to Cape Cod.

In addition to the maps referenced (above/below) several resources may be useful in preparing the NRI. These may include:

- RPP Data Viewer
- Mapping of rare species habitat and vernal pools by the Natural Heritage and Endangered Species Program (NHESP),
- BioMap Core Habitat, Critical Natural Landscape, and Local and Regional Components by NHESP
- NHESP Natural Communities
- Massachusetts State Wildlife Action Plan (SWAP), 2025
- Barnstable County Soil Survey, Prime Agricultural soils mapping
- Aerial photography
- DEP Wetlands layer
- FEMA and Massachusetts Coast Flood Risk Model flood zones
- Areas of Critical Environmental Concern (ACEC), maps and designation narrative
- Districts of Critical Planning Concern (DCPC), maps and designation narrative
- Coastal Zone Management Shoreline Change maps
- Important Bird Area maps

Invasive Species Inventory and Management Plan

Projects proposing to alter undeveloped areas should provide an inventory of invasive species on the proposed site. These inventories should include the percent cover of each species and should delineate each species on a site map. Invasive plants should be identified by genus and species names. Where identified state-listed rare or endangered species are present on a project site, a detailed narrative discussing potential threats to the endangered species from the more aggressive and/or successful invasive species should be provided. This narrative should also address potential problems associated with managing invasive species in proximity to endangered species or in ecologically sensitive areas.

POTENTIAL IMPACT OF INVASIVE PLANT SPECIES

The management plan should describe:

- how the invasive plants could be expected to spread if left unmanaged in an undeveloped area and the impacts (if any) to the surrounding plant and wildlife community.
- how the invasive plants could be expected to spread if left unmanaged after the proposed development was constructed.
- alternative management options for the invasive plants on site. These options should include examples of mechanical, chemical, and biological control with a full explanation of any potential adverse effects from control measures.

DEVELOPMENT OF A PREFERRED MANAGEMENT PLAN

A preferred management plan should use a strategy that best manages the invasive species on site with the minimum adverse impacts from control measures. Wherever possible, the goal of the management plan should be to eradicate the species from the site. Mechanical control, such as cutting or pulling, generally has the least adverse impacts, however, it is not effective on some deciduous woody plant species. Chemical control methods are discouraged, except in situations where chemical management would reduce adverse impacts on the environment. When chemical control is the only viable option, modest applications to cut stems or frill cuts are recommended. Foliar spraying is strongly discouraged because of the negative impact to non-target plant and animal species. Biological control, or use of living organisms as a control agent, has been proven effective on some species. However, only well tested, scientifically documented biological control agents should be considered. The goal of biological control strategies should not be to eradicate the species, because if the target species is eradicated, the biological control agent often moves to a non-target species. Where plant removal is proposed, an alternative planting plan, using plants native to the region, should be provided.

Staff is available to consult with applicants to determine the best management plan for invasive species. A variety of information which may assist in developing management plans is available on-line. Suggested websites include:

- https://massnrc.org/mipag/publications.htm
- https://www.massaudubon.org/nature-wildlife/invasive-plants-in-massachusetts
- The Massachusetts Invasive Plant List may be found at: https://www.mass.gov/service-details/invasive-plants

REFERENCES

See also the Wetlands, Open Space, and Community Design Technical Bulletins

REGIONAL POLICY PLAN DATA VIEWER

Updated link to be added

VERNAL POOL INFORMATION

The Natural Heritage and Endangered Species Program certifies vernal pools and has established criteria for their certification. Information may be found here: https://www.mass.gov/service-details/vernal-pool-certification

RARE SPECIES

Information on rare species, including current list of state listed species, forms requesting state review and comment, and other pertinent resources may be found at the Natural Heritage and Endangered Species Program website https://www.mass.gov/orgs/masswildlifes-natural-heritage-endangered-species-program

BIOMAP

MassWildlife maintains BioMap, a guide for protecting and stewarding lands and waters that are most important for conserving biological diversity in Massachusetts. BioMap includes Core Habitats and Critical Natural Landscapes as well as Local and Regional Components. BioMap can be explored here: https://biomap-mass-eoeea.hub.arcgis.com/

STATE WILDLIFE ACTION PLAN

The 2025 draft update to the Massachusetts State Wildlife Action Plan (SWAP) can be found at this link: https://www.mass.gov/service-details/state-wildlife-action-plan-swap

SITE AND SUBDIVISION DESIGN

See the Community Design Technical Bulletin.

Rural by Design, or Conservation Subdivision Design, both by Randall Arendt, provide detailed guidance about layout of new development in greenfield sites, designed to minimize impacts to habitat and views of significant landscapes.

HEALTHY SOILS ACTION PLAN

The Massachusetts Executive Office of Energy and Environmental Affairs developed the Healthy Soils Action Plan to protect, restore, and better steward soils across the Commonwealth: https://www.mass.gov/doc/healthy-soils-action-plan-2023/download

BIRD-FRIENDLY DESIGN GUIDELINES

The American Bird Conservancy developed a Bird-Friendly Building Design Guide that provides an overview of the threats glass poses to birds and solutions.

RESPONSIBLE OUTDOOR LIGHTING

DarkSky International's five principles for responsible outdoor lighting can be found here: https://darksky.org/resources/guides-and-how-tos/lighting-principles/

CAPE COD FRESHWATER POND BUFFER GUIDANCE

This comprehensive document is designed to help homeowners and municipalities preserve and protect ponds through responsible landscape management: https://capecodcommission.org/our-work/cape-cod-freshwater-pond-buffer-guidance

Open Space DRAFT

This guidance is intended to clarify how the Open Space Goal and Objectives of the Regional Policy Plan (RPP) are to be applied and interpreted in Cape Cod Commission Development of Regional Impact (DRI) project review. This technical bulletin presents specific methods by which a project can meet the goal and objectives.

Open Space Goal: To conserve, preserve, or enhance a network of open space that contributes to the region's natural and community resources and systems.

- **Objective OS1** – *Protect and preserve natural, cultural, agricultural, and passive recreational resources*
- **Objective OS2** – *Maintain or increase the connectivity of open space*
- **Objective OS3** – *Protect or provide open space appropriate to context*

The applicability and materiality of these goals and objectives to a project will be determined on a case-by-case basis considering a number of factors including the location, context (as defined by the Placetype of the project's location), scale, use, and other characteristics of a project.

THE ROLE OF CAPE COD PLACETYPES

The RPP incorporates *a framework for regional land use policies and regulations based on local form and context* as identified through categories of Placetypes found and desired on Cape Cod.

The Placetypes are determined in two ways: some are depicted on a map contained within the RPP Data Viewer located at www.capecodcommission.org/RPPDataViewer adopted by the Commission as part of the Technical Guidance for review of DRIs, which may be amended from time to time as land use patterns and regional land use priorities change, and the remainder are determined using the character descriptions set forth in Section 8 of the RPP.

The project context, as defined by the Placetype of the project's location, provides the lens through which the Commission will review the project under the RPP.

TABLE OF CONTENTS

Introduction 4
Definitions 6
Summary of Methods 8
Detailed Discussion of Methods for Meeting Objective OS1 10
Detailed Discussion of Methods for Meeting Objective OS2 14
Detailed Discussion of Methods for Meeting Objective OS3 16
General Application Requirements 29
Additional Resources 30

INTRODUCTION

The vision for the future of Cape Cod is a region of vibrant, sustainable, and healthy communities, and protected natural and cultural resources. Open space is a critical element of achieving this vision.

The open space goal of the RPP is "to conserve, preserve, or enhance a network of open space that contributes to the region's natural and community resources and systems." Open space in all its forms provides a wide range of ecosystem services – direct and indirect contributions to human well-being – throughout Cape Cod, and helps manage the impacts associated with growth and development. Open space preservation will ensure that the values and characteristics that make this place special will be sustained and stewarded for future generations.

Cape Cod is located within the southeastern Massachusetts pine barrens ecoregion, a globally rare habitat type comprised of a unique assemblage of plants and animals that thrive on the region's nutrient-poor soils and variable climate. Within this ecoregion, a diverse matrix of habitat types — from salt marshes to sandplain grasslands to freshwater wetlands to estuaries — supports 148 state-listed rare plant and animal species and hundreds of additional species that rely on Cape Cod's habitats year-round, during seasonal migrations, or for breeding. Priorities for protection include high value natural resources, significant wildlife habitat, and areas that protect current and potential future drinking water supply sites.

Preserving Cape Cod's cultural heritage, including traditional maritime and agricultural activities, as well as scenic views, natural landscapes, and community character is important to the region. Similarly, providing and preserving public access to beaches, parks, lands of community significance, walking and bicycling paths, woodland trails, and community gathering spaces throughout Cape Cod will sustain community health and well-being, as well as contribute to tourism-dependent economic activities. Connections between the natural and built environment in more densely developed areas will enhance quality of life and provide additional transportation and recreation options for residents and visitors alike.

With these priorities in mind, the provision of open space is a requirement of DRIs where new development is proposed. The methods, quantity, and form of open space provided will vary from site to site, reflective of Placetype, sensitive resources that may be present, connections to natural and community systems, extent of development proposed, and context. The open space objectives may be met through the implementation of methods such as, but not limited to, those described on the following pages. This flexible approach to DRI review will allow for a strong correlation between the form and function of open space and Cape Cod's varied natural and community resources and systems.

DEFINITIONS

Agricultural Resources: Agricultural lands include lands in active agricultural production or that could support agriculture based on their soils. To help identify agricultural lands, soils data from the U.S. Department of Agriculture Natural Resources Conservation Service's Web Soil Survey and MassGIS' Prime Farmland Soils should be reviewed. Another indicator of the presence of agricultural lands is local agricultural zoning.

Area of Development Impact: The total undeveloped area on a project site anticipated to be impacted by a proposed development.

Cultural Resources: Cultural resources include cultural landscapes and scenic resources. A cultural landscape is a geographic area associated with an historic event, activity, or person, or exhibiting other cultural or aesthetic values. There are four general types of cultural landscapes, not mutually exclusive: historic sites, historic designed landscapes, historic vernacular landscapes, and ethnographic landscapes. Scenic resources are locations or areas that are recognized, utilized, and enjoyed by the public for their visual and scenic qualities and whose features, views, patterns, and characteristics contribute to a distinct sense of appreciation of the natural and cultural environment.

Development: Any of the following undertaken as a part of a Development of Regional Impact pursuant to Section 2 of the *Cape Cod Commission Enabling Regulations Governing Review of Developments of Regional Impact*, Barnstable County Ordinance 90-12: any building, construction, renovation, mining, extraction, dredging, filling, excavation, or drilling activity or operation; any material change in the use or appearance of any structure or in the land itself; the division of land into parcels; any change in the intensity of use of land, such as an increase in the number of dwelling units in a structure or a change to a commercial or industrial use from a less intensive use; any activity which alters a shore, beach, seacoast, river, stream, lake, pond, canal, marsh, dune area, woodland, wetland, endangered species habitat, aquifer, or other resource area, including coastal construction or other activity within the jurisdictional limits of Barnstable County; demolition of a structure; the clearing of land as an adjunct of construction; or the deposit of refuse, solid or liquid waste, or fill on a parcel of land or in any water area.

Open Space: The term open space in the context of this Technical Bulletin is used to refer to lands with natural, cultural, agricultural, and passive recreational resource values. These lands include protected open spaces owned and managed by a town or land trust and dedicated to conservation or recreation, as well as undeveloped lands with potential for protection for their open space resource values. Open space can be used to provide buffers to development, protect sensitive resources, and/or for passive recreation – outdoor activities that occur in a natural setting with minimum disturbance of natural and cultural resources and that are consistent with quiet enjoyment of the land.

SUMMARY OF METHODS

GOAL | OPEN SPACE

To conserve, preserve, or enhance a network of open space that contributes to the region's natural and community resources and systems.

OBJECTIVE OS1 – Protect and preserve natural, cultural, agricultural, and passive recreational resources

METHODS

- Minimize development footprint and impacts
- Protect and preserve high value resources

Where the following resources are present on the project site, implementing the following method(s) support consistency with OS1:

- Protect existing Wellhead Protection Areas and lands suitable for future water supply sites
- Preserve wildlife habitat and unfragmented blocks of open space
- Preserve the region's agricultural lands and scenic vistas
- Preserve open space that benefits cultural heritage and community character
- Provide and enhance public passive recreational opportunities and access to open space

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OBJECTIVE OS2 – Maintain or increase the connectivity of open space

METHODS

- Protect open space contiguous to undeveloped lands or protected open space

Where wildlife corridors, greenways or trails are present on or abutting the project site, implementing the following method(s) support consistency with OS2:

- Preserve wildlife corridors and opportunities for the movement of wildlife
- Establish, enhance, and connect greenways and recreational trails

OBJECTIVE OS3 –Provide protected open space appropriate to context

METHODS

- Projects must provide protected open space according to Placetype context in the ratio and via the mechanism indicated in the Summary of Open Space Mechanisms and Ratios Specific to Placetype below.
- Preserve open space that benefits natural and community systems

SUMMARY OF OPEN SPACE MECHANISMS AND RATIOS SPECIFIC TO PLACETYPE:

The ratios below represent the relative amount of Protected Open Space to Area of Development Impact. The available mechanisms for meeting the Open Space requirement are set forth below.

Natural Areas | 3:1 – provide high-quality open space onsite, or in areas of higher or equal ecological value offsite
Rural Development Areas | 2:1 – provide high-quality open space onsite, or in areas of higher or equal ecological value offsite
Suburban Development Areas | 1:1 – provide high-quality open space, adequate buffers and pedestrian amenities onsite, offsite, or by cash contribution
Historic Areas | 1:1 – provide streetscape improvements and/or pocket park appropriate to context onsite, offsite, or by cash contribution
Maritime Areas | 1:1 – provide streetscape improvements and/or pocket park appropriate to context onsite, offsite, or by cash contribution
Community Activity Centers | 1:2 –provide public pocket parks, streetscape improvements and/or public sitting areas onsite, offsite, or by cash contribution
Industrial Activity Centers | 1:1 – provide substantial buffers to development and protect sensitive resources onsite, offsite, or by cash contribution
Military and Transportation Areas | 1:1 – provide substantial buffers to development and protect sensitive resources onsite, offsite, or by cash contribution

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE OS1

Objective OS1 – *Protect and preserve natural, cultural, agricultural, and passive recreational resources*

The applicability and materiality of Objective OS1 to a project will be determined on a case-by-case basis considering a number of factors including the location, context (as defined by the Placetype of the location), scale, use, and other characteristics of a project. OS1 will generally be applicable to projects proposed on lands containing natural, cultural, agricultural, or passive recreational resources. The following methods may be implemented to demonstrate consistency with this Objective:

Minimize Development Footprint and Impacts

Projects within all Placetypes should be designed to protect and/or preserve those areas with the highest natural resource value and to ensure that the most sensitive elements of a site are not impacted by development. Applications for Developments of Regional Impact that propose to alter undeveloped areas must include a Natural Resources Inventory (see Wildlife and Plant Habitat Technical Bulletin) to provide guidance on significant natural resources and characteristics that should be given consideration during site design, including identifying lands that are a high priority for conservation. Applicants should also inventory significant cultural or recreational resources present.

On sites where high value natural resources, important wildlife habitat, or other significant resources are not present or do not create site design constraints, development should be sited close to existing development, roadways, and infrastructure to limit the area of site disturbance.

By limiting impervious surfaces, more land will be left in its natural state, which will provide ecological benefits. Approaches for minimizing impervious surfaces include reducing paved areas by reducing parking or using asphalt alternatives or providing some or all of a development's parking facilities under buildings or in multi-level parking structures. Removal of existing impervious surfaces on a site and replacing these with pervious alternatives or restoring these areas with native vegetation is also encouraged.

Locating a project outside of Natural and Rural Development Placetype Areas will lessen the open space requirement and may also allow for more flexibility in how open space is provided. To the extent feasible, for redevelopment projects in Natural and Rural Development Placetype Areas, designers should strive to lay out site features to remove existing development from sensitive resource areas and restore or enhance natural and community system functions.

Protect and Preserve High Value Resources

REGIONAL PROTECTION PRIORITIES

The permanent protection of land and resources within Significant Habitat Areas and sensitive natural resource areas is a regional priority. Natural resources that are the highest priorities for protection on Cape Cod include: BioMap Core Habitats, Critical Natural Landscapes, habitat for rare species, vernal pools and their buffers, Wellhead Protection Areas, Potential Public Water Supply Areas, lands adjacent to water resources such as lakes, rivers, shoreline, and wetlands, areas that provide a critical function in preserving the integrity and viability of Cape Cod's significant and diverse ecosystems, and large unfragmented blocks of undeveloped land and wildlife corridors.

Additional priorities for protection or preservation include: historic, cultural, and archaeological resources; regionally significant scenic vistas and roads; agricultural and forested lands; BioMap Local and Regional Components; the region's working waterfronts and maritime heritage; unique landforms; and public passive recreational resources.

Protect Existing Wellhead Protection Areas and Lands Suitable for Future Water Supply Sites

The protection of the Cape's existing and potential water supply sites is a regional priority as these areas protect the region's current and future drinking water sources. Wellhead protection areas are important for protecting the recharge area around public water supply groundwater sources from contamination. The protection of future water supply sites is important to ensure access to additional sources of drinking water in the future. Keeping these areas as natural as possible is critical to take advantage of the water filtering services of native trees and soils.

Much of Cape Cod is located within the Wellhead Protection Areas of public water supply wells (also known as Zone 2s). Ideally these areas should have no or minimal development in order to protect water supply and facilitate recharge of the sole source aquifer, though in practice, large areas within Zone 2s are already developed. The goal moving forward is to protect remaining undeveloped land within Zone 2s, and where development cannot be avoided, projects proposing new development within Zone 2s must minimize the size and impact of development within these areas. Where possible, configuring development outside of these areas will help to reduce impacts and minimize mitigation requirements. Development in Zone 2s must meet the open space requirements for the defining Placetype where they are located.

Similarly, lands identified as future water supply sites are generally undeveloped and a priority for protection. Accordingly, these lands are subject to higher standards of review. Ideally, development should not be in these areas. Where development cannot be avoided, projects proposing new development within potential public water supply areas (PPWSA – see RPP Data Viewer) must minimize the size and impact of development within these areas. Where possible, configuring development outside of these areas will help to reduce impacts and minimize mitigation requirements. Development in PPWSA must meet the open space requirements for Natural Area Placetype. The Water Resources Technical Bulletin provides additional strategies and resources for protecting the region's drinking water supply.

Preserve Wildlife Habitat and Unfragmented Blocks of Open Space

Clustering development will reduce fragmentation of open lands and habitat, which supports healthy ecosystem function, and preserves interior wildlife habitat. For residential subdivisions and commercial subdivisions of land, clustering development is strongly encouraged unless it is inconsistent with local bylaws. The design of cluster residential and commercial developments should preserve natural and community resources, maximize contiguous open space, respect the natural topography and character of the site, and employ wastewater treatment alternatives to allow for more compact development.

Preserve the Region's Agricultural Lands, Scenic Vistas, Cultural Heritage, and Community Character

Preservation of the region's rich cultural heritage and community character is supported through flexibility in open space requirements within Maritime Areas and

Historic Areas. Provision of public access to community greenspaces within Historic Areas and Maritime Areas may be proposed as methods for meeting Objective OS1.

The viability and sustainability of working landscapes, including lands in agricultural production and working waterfronts, should be preserved to the greatest extent possible, to support the local economy, preserve Cape Cod's cultural heritage, and provide opportunities to meet some of region's food production needs locally and sustainably.

Scenic resources are locations or areas that are recognized, utilized, and enjoyed by the public for their visual and scenic qualities and whose features, views, patterns, and characteristics contribute to a distinct sense of appreciation of the natural and cultural environment. If there are regionally significant views within, towards, or across a site, development should be designed to allow for continued access to those viewscapes to the greatest extent possible. The preservation or reestablishment of historic views to water or landscape vistas is encouraged (see also the Community Design Technical Bulletin).

Provide and Enhance Passive Recreational Opportunities and Access

The provision of public access to on-site open space is encouraged. If the site is adjacent to publicly accessible open space, a designated greenway within the property to the off-site open space should be provided.

The preservation of public access to resource-dependent passive recreational activities, including but not limited to hiking, foraging, swimming, and fishing, is a high regional priority

The provision of public access that benefits people of all ages and abilities through the establishment of ADA compliant pathways is also encouraged.

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE OS2

Objective OS2 – *Maintain or increase the connectivity of open space*

The following methods may be implemented to demonstrate consistency with Objective OS2 for projects adjacent to lands containing natural, cultural, agricultural, or passive recreational resources.

Protect Open Space Contiguous to Undeveloped Lands or Protected Open Space

In cases where the project site abuts land that has been permanently restricted for conservation or preservation purposes, or abuts unprotected undeveloped lands of natural or cultural value, or where it is adjacent to working landscapes such as lands in active agricultural production, site design should protect contiguous open space. This will expand unfragmented wildlife habitat, buffer development, and support healthy ecosystem function.

Protection of open space that is contiguous to undeveloped land that is not restricted provides for future expansion of the block of unfragmented open space, should the opportunity arise.

The protected open space layer visible in the RPP Data Viewer and the MassMapper are useful resources for identifying contiguous open space that should be taken into consideration during site design.

Preserve Wildlife Corridors and Opportunities for the Movement of Wildlife

By reviewing the habitat types present on and adjacent to the property, as described in the Natural Resources Inventory and the RPP Data Viewer, significant blocks of wildlife habitat and corridors of connected open space for the movement of wildlife across the landscape can be identified and protected. Topography, existing and proposed land use, and species requirements should be considered when determining the necessary wildlife corridor width. Preservation of wildlife corridors must be factored into the placement of fencing on-site when this method is applicable.

Establish, Enhance, and Connect Greenways and Recreational Trails

The RPP Data Viewer is a useful tool for identifying existing pathways to water, trails, and/or multi-modal greenways – a linear open space along either a natural corridor or a right-of-way converted to recreational use – on the project site itself and/or on neighboring properties. When designing the site, any existing greenway connections on the property should be preserved to the greatest extent possible. The establishment of a new multi-modal greenway section across the property, connected to an existing off-site multi-modal greenway is encouraged.

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE OS3

Objective OS3 – *Protect or provide open space appropriate to context*

The following methods may be implemented to demonstrate consistency with Objective OS3.

DRIs are required to provide open space appropriate to context. The following section addresses identification of open space required, including how to calculate the Area of Development Impact; identifying and incorporating open space appropriate to the Placetype; ensuring that the site design protects lands of high natural resource value and that it benefits natural and community systems; and alternate methods for meeting the open space requirement on an off-site parcel or through a cash contribution.

In determining a DRI's Open Space mitigation requirement, the Commission will assess both the extent and present conditions of the Area of Development Impact ("ADI"). The Natural Resources Inventory ("NRI") will guide the Commission in determining the quality and quantity of Open Space mitigation appropriate to the project, in alignment with Placetype designation.

Calculate Area of Development Impact

The Area of Development Impact is the total undeveloped area on the site anticipated to be impacted by the proposed development (see Definitions for *Development*). The project's civil engineer should calculate the square footage of areas disturbed by development activity, calculated for each Placetype if multiple Placetypes are present, and provide this on the proposed conditions plan. Depending on the size and location of the project, the ADI may encompass multiple Placetypes. The applicant must calculate the Open Space mitigation requirement for each applicable Placetype separately, then combine them to determine the total Protected Open Space requirement. For example, if a project's ADI is 2 acres with 1 acre located in the Natural Areas Placetype and 1 acre located within a Suburban Development Area Placetype, the Open Space requirement would be calculated as follows: Natural Area (1 acre at 3:1 = 3 acres mitigation) + Suburban Development Area (1 acre at 1:1 = 1 acre mitigation) = 4 acres total Open Space required.

In redevelopment projects, the Area of Development Impact will be determined on a case-by-case basis, with consideration of existing and recent historical conditions. Managed landscaped areas adjacent to existing buildings or parking (for example, landscaped islands within parking lots and lawn and landscaped areas next to buildings and between buildings and parking lots) will be considered disturbed and excluded from the Area of Development Impact. Other managed, landscaped, or disturbed areas may also be excluded depending on the site context and existing conditions of the area as documented in an existing conditions plan or resource inventory.

Where land is being subdivided for the purpose of residential, commercial, or other lot development, the Area of Development Impact includes the total undeveloped area proposed to be subdivided and/or developed. This provision encourages efficient use of land and clustering to reduce overall impacts.

Any open space lot/area preserved in perpetuity as part of the project can be excluded from the Area of Development Impact and may be counted towards the open space protection requirement.

To incentivize reducing impervious surfaces due to parking, provision of some or all of a development's parking under buildings or in multi-level parking structures reduces the Area of Development Impact on a site, which in turn reduces the open space requirement. On sites with structured parking, reduce the Area of Development Impact by twice the area of the structured parking.

If the following criteria are met, the amount of required open space may be reduced by up to 20%:

- If no sensitive resource areas are present, including BioMap Core Habitats, Critical Natural Landscapes, rare species habitat, Wellhead Protection Areas and Potential Public Water Supply Areas, wetlands, waterbodies, vernal pools, floodplain, cultural or historic resources, agricultural lands or soils; and,
- If higher quality open space is provided than what is impacted by the project, as determined by the number, value, and/or significance of the resources to be protected.

Additional flexibility in addressing the open space requirement may be allowed, including further reductions in the ratio or method of meeting this requirement, depending on the size and condition of the Area of Development Impact and the surrounding context. Where flexibility is allowed, the method identified should not result in substantial detriment to or derogation from the purposes and values intended to be protected or promoted by the open space goal and objectives.

Protect Open Space Appropriate to Context

How a project meets the open space requirement varies by Placetype, but may include the protection of land onsite (preferred in Natural and Rural Development Placetype Areas), protection of land on an offsite parcel (may be the preferred method if the land protected has higher resource-protection value), or provision of a cash contribution to the town's open space acquisition fund. A combination of these methods may also be permitted. Applicants should consult with the town (including but not limited to planning departments, conservation committees, and open space committees), and land trusts early in their project planning process to help identify appropriate open space protection methods.

Natural Areas – The permanent protection of high value resources within Natural Areas is a regional priority. Development is discouraged in Natural Areas due to the sensitivity of resources present. The only way a DRI proposed in a Natural Area Placetype can meet open space objectives is to permanently restrict land from development in the same or higher ecological value Natural Areas, in a minimum ratio of three parts open space to one part development. In Natural Areas, permanently protected open space which is of equal or higher ecological value to the Area of Development Impact may be provided on-site. Projects located in Natural Areas may provide permanently protected open space offsite if the Commission finds that the interests of resource protection would be better met than providing protected open space on the project site.

Rural Development Areas – Methods such as clustering development to allow for the permanent protection of a larger unfragmented block of open space are encouraged. The only way a DRI can meet open space objectives in Rural Development Areas is to permanently restrict land from development, in a ratio of two parts open space to one part development. In Rural Development Areas, permanently protected open space which is of equal or higher ecological value to the Area of Development Impact may be provided on-site. Projects located in Rural Development Areas may provide permanently protected open space offsite in Natural or Rural Development Areas if the Commission finds that the interests of resource protection would be better met than providing protected open space on the project site. An Agricultural Preservation

Restriction may be an appropriate approach for preserving farmland on the project site or on a suitable parcel offsite.

Suburban Development Areas – Required open space in an amount equal to the total Area of Development Impact may include: on-site protection of significant natural and/or community resources; permanent protection of offsite land in Natural or Rural Development Areas; or provision of greenspace within the Suburban Development Area community system the project is a part of, such as a pocket park, multi-modal greenway, or public recreation area. A cash contribution may also be used to meet the open space requirement.

Historic Areas – Protecting character of historic areas, including viewsheds and cultural landscapes, is a priority within this Placetype. Impacts may be mitigated by providing public access to historic features, structures, and/or vistas in order to preserve the community's connection to its historic and cultural heritage. Streetscape improvements appropriate to historic context, pocket parks, or sitting areas, may be considered onsite open space in this Placetype. Permanent protection of offsite open space in a Natural Area or Rural Development Area, or a cash contribution may also be used to meet the open space requirement.

Maritime Areas – Protecting maritime character and coastal access are priorities in this Placetype. Projects should be designed to minimize development impacts on maritime activities and to preserve community character, including providing public pathways to scenic shoreline vistas or working waterfronts. Streetscape improvements appropriate to maritime context, pocket parks, or sitting areas may be appropriate. Permanent protection of offsite open space in a Natural Area or Rural Development Area, or a cash contribution may also be used to meet the open space requirement.

Community Activity Centers – Development with context sensitive design (see Community Design) in Community Activity Centers is strongly encouraged. Parks, multi-modal greenways, streetscape improvements appropriate to context, stormwater management systems that provide significant natural or community benefits, or outdoor community gathering spaces within the associated Community Activity Centers may be considered open space. If high value natural resource areas are impacted, open space onsite, or open space of equal or higher ecological value offsite should be permanently conserved. Community access to open space and recreational resources should be considered and prioritized to meet this objective. A cash contribution may also be used to meet the open space requirement.

Industrial Activity Centers – Development in Industrial Activity Centers is strongly encouraged. Multi-modal greenways, streetscape improvements appropriate to context, stormwater management systems that provide significant natural or community benefits, or restoration of degraded lands may meet open space requirements within the associated Industrial Activity Centers. If high value natural resource areas are impacted, open space onsite, or open space of equal or higher ecological value offsite should be permanently conserved. A cash contribution may also be used to meet the open space requirement.

Military and Transportation Areas – If high value natural resource areas are impacted, open space onsite, or open space of equal or higher ecological value offsite should be permanently conserved. Maintaining adequate buffers between incompatible uses is a priority in designing industrial sites, and quality buffers may be used to meet the open space requirement. Permanent protection of offsite open space in a Natural Area or Rural Development Area, or a cash contribution may also be used to meet the open space requirement.

Protect Open Space of High Natural Resource Value

The protection of open space of high natural, cultural, and/or recreational resource value, including current public water supply (Zone 2s) and potential future drinking water supply sites (PPWSAs) and areas that contribute to preserving the integrity and viability of Cape Cod's diverse ecosystems is a priority. The presence of rare species habitat, wetlands, and other sensitive resources on-site will affect site design, project review, and open space requirements. Areas of high natural resource value include BioMap Core Habitats, Critical Natural Landscapes, habitat for rare species, vernal pools and their buffers, lands adjacent to water resources such as lakes, rivers, shoreline, and wetlands, Wellhead Protection Areas, and Potential Public Water Supply Areas. The methods outlined in the previous sections provide guidance on preserving unfragmented blocks of undeveloped land, connections with contiguous open space, scenic vistas, landscapes that contribute to community character, working landscapes, wildlife corridors, and habitat for Cape Cod's native flora and fauna.

Preserve Open Space that Benefits Natural and Community Systems

In determining how to incorporate open space into a project, form and function consistent with the natural and community systems context should be taken into consideration. The proposed project must demonstrate how natural and community systems have been factored into site design and proposed open space.

The project site should be designed to support and sustain natural and community systems, irrespective of property boundaries. This will allow for a holistic, systems-based approach to open space protection, as ecosystems, watersheds, wildlife habitat, multi-modal greenways, and other resources extend beyond property boundaries. Applicants should strive to take advantage of opportunities to link on-site and off-site open space to expand the contiguity of open space.

Protection or restoration of key areas which contribute to coastal resiliency support natural and community systems long-term. On-site or off-site provision of open space to improve coastal resiliency is encouraged. The "Coastal Resiliency" Technical Bulletin provides additional strategies and resources for meeting additional Coastal Resiliency objectives.

Based on the characteristics of a specific project and the resources present, the Commission may consider allowing stormwater management systems which incorporate Low Impact Development (LID) principles, protect floodplain function, provide significant flood reduction benefits, or support coastal resiliency to meet open space requirements (see Water Resources and Community Design Technical Bulletins.)

While there is flexibility in how and where open space is provided based on Placetype, as discussed above, open space should benefit natural or community resources and systems to meet the open space requirements. For example, landscaped islands within parking lots, narrow buffers between developed areas, and drainage structures/detention basins that do not provide significant natural or community benefits may not be counted towards open space requirements.

OFF-SITE OPEN SPACE

As detailed in the Summary of Open Space Mechanisms and Ratios Specific to Placetype, open space may be provided by one of three methods, based on Placetype. In Natural Areas and Rural Development Areas, onsite open space or off-site open space in a Natural Area or Rural Development Area with the same or higher ecological value is required, but in other Placetypes open space may be met by one or a combination of onsite, offsite, or cash contribution methods. Offsite open space may be suitable for project sites with low natural resource values, or dependent on the type of development being proposed. The determination of the appropriateness of off-site protection of open space will be made by Commission staff in consultation with the town in which the DRI is located (including but not limited to planning departments, conservation committees, open space committees, and land trusts), based upon the size and type of development that will be mitigated with open space protection, and the resource values of the proposed off-site location. Applicants should work with the town and local land trust to identify appropriate off-site open space protection methods. Commission staff is also available to work with the applicant, town and local land trusts to help identify appropriate off-site parcels. Open space proposed for off-site protection should be of equal or higher natural resource value as the land being impacted by development, or provide a significant cultural resource value (such as public access to open space or to the water, preservation of farmlands, cultural landscapes, or passive recreational lands).

Off-site open space within the town where a development is proposed is preferred; however, where the town and the local land trust agree, and where there is land of higher ecological value available within the region, off-site open space may be provided in other towns, starting with adjacent towns.

In the case of off-site open space protection, development rights on the property must be permanently extinguished and the land may not be used toward the calculation of densities for future development on the subject parcel or any other parcels.

CONTRIBUTE FUNDS FOR OPEN SPACE PROTECTION OR RESTORATION

In appropriate cases, the Commission may allow a DRI to meet the open space requirement through a cash contribution to a town or land trust's open space acquisition fund. This provision allows a community to protect higher value or priority open space off-site and for more concentrated development in certain locations. The availability of this option is limited by Placetype (see Summary of Open Space Mechanisms and Ratios Specific to Placetype) and based on whether sensitive resources are present.

While use of cash contributions within the town where a development is proposed is preferred, where the town and the local land trust agree, and where funds are contributed to acquire land of higher ecological value within the region, funds may be used in other towns, starting with adjacent towns.

Using funds for open space acquisition is preferred; however, if the town or local land trust has a restoration project that will restore high ecological value, the cash contribution may be used for restoration, including undevelopment, of existing open space, provided the request for funds is associated with a well-vetted plan.

The cash contribution provided must be no less than 110 per cent of the fair market value or value in use of the land to be developed, whichever is higher, as determined by Commission Staff after an independent appraisal. The funding provided will be held by the County and dedicated solely for the acquisition or restoration of permanently protected open space. The funds shall be used to acquire replacement land in a comparable location.

Incorporate Greenspace into the Built Environment

All people on Cape Cod should have access to greenspace in their communities. Projects in more densely developed Placetypes, such as Suburban Development Areas, Historic Areas, Maritime Areas, Military and Transportation Areas, and Community and Industrial Activity Centers, should support the natural and community systems they are a part of by designing sites and providing greenspace in a manner that integrates the built environment through landscape improvements, provides access to outdoor spaces, and enriches community connections. In Community Activity Centers, for example, pocket parks, passive recreational areas, multi-modal greenways, walking paths shaded by native trees, and community gathering spaces may be incorporated into the built environment to sustain community health and well-being. (see also the Community Design Technical Bulletin).

Restore Degraded Areas to a Natural State

The restoration of degraded areas on-site to provide significant natural, scenic, and/or recreational benefits may meet some or all of the open space requirement, depending on the specific natural or community systems the site is a part of. The removal of existing structures on-site to reestablish scenic vistas, restore resource functions, improve the region’s resilience to the effects of severe storms and climate change, reduce the amount of fragmented habitat, or enable wildlife corridor connections are all encouraged. Any site revegetation should be consistent with the natural and community systems the site is a part of and should utilize native species. Where projects located on severely degraded areas such as gravel pits and landfill sites are revegetated, at the Commission's discretion, the revegetated areas may be counted toward meeting the open space requirement; these areas should be regraded consistent with the surrounding topography in a manner that reduces or eliminates potential erosion.

GUIDANCE ON THE PERMANENT PROTECTION OF ONSITE AND OFFSITE OPEN SPACE

In order for onsite and offsite open space to meet any permanent protection requirements as a condition of DRI approval, it must be restricted in perpetuity for conservation, agriculture, and/or passive recreation purposes.

For those DRIs that elect to meet OS3 by the restriction of open space on or offsite, the following methods may be implemented:

- Land donated to the town in which the DRI is located for conservation purposes
- Land donated to a nonprofit (501(c)(3)) conservation organization or land trust
- Conservation Restriction placed on land, held by town or land trust
- Land held by homeowner's or condominium association with permanent Deed Restrictions in place

Donation in Fee to a Town, Conservation Organization, or Land Trust

To meet any open space protection requirements, an Applicant should consider donating the property outright to the town the property is located within, a nonprofit conservation organization, or a land trust. Donating a property in fee for conservation purposes may be the most efficient means for meeting the open space requirement, providing the property has characteristics that make it conducive to a donation and that a partner has been identified who is willing to accept the donation and stewardship of the property in perpetuity.

Donations made to a town should be placed under the care, custody, and control of a Conservation Commission pursuant to MGL, c. 40, ş. 8C.

Conservation Restriction

Where ownership is retained by an individual, corporation, or association, a perpetual Conservation Restriction (CR) must be placed on the open space to ensure its permanent protection. Conservation Restrictions are authorized by MGL, c. 184, Sections 31-33. In appropriate instances an Agricultural Preservation Restriction or Preservation Restriction may also be acceptable.

CRs must be approved by the holder of the restriction (Grantee), as well as locally (by the Board of Selectmen/Town Council and Conservation Commission). The Applicant should provide evidence of having located a willing Grantee to accept the CR prior to a decision on the project. CRs must also be approved by the Secretary of Energy and Environmental Affairs (Secretary) and recorded at the Registry of Deeds or Land Court. If there is a mortgage on the property, the lender must subordinate the mortgage to the CR or provide a partial release for the land under CR. These requirements must be met before a Certificate of Compliance will be issued by the Cape Cod Commission and may be required earlier in the process for some types of projects as a result of permit conditions. It is advisable to submit a draft of the CR for state review prior to proceeding with local approvals of the CR.

Applicants are advised that the approval process for a CR may take several months, and consequently are advised to begin drafting the CR well in advance of seeking compliance with this requirement.

A CR should confer a public benefit in order for the Secretary to make a finding of "public interest" in approving the CR. Such public benefits include: the protection of archeological or historic resources or sites; minimization of "damage to the environment" as defined in M.G.L. Ch. 30 Sec. 61; the protection of beautiful scenery visible from a public road or waterway; the protection of public drinking water sources; the preservation of the historic rural or cultural character of the municipality; the maintenance of critical wildlife habitat, wetlands, or other important ecosystems; the preservation and conservation of farm, forest, or grazing lands; and/or public use and public access to the restricted site. It should also be noted that the Secretary will generally not accept landscaped yards, driveways, roads, private tennis courts, pools, etc. for inclusion in lands subject to a CR. However, there are some uses such as recreation fields that may be included when a public benefit can be demonstrated. The public benefit provided by the CR must be specified in the restriction.

CRs are considered permanent. Once a CR is placed on a parcel it can only be released after a public hearing and vote by the Selectmen or Town Council, and with approval by the holder (Conservation Commission, land trust, etc.), the town through Town Meeting, the Secretary, and the Massachusetts Legislature.

Activities Allowed within Protected Open Space

The types of activities allowed within protected open space will be based on the resources present on the site and the Placetype context. Applicants should work closely with the intended owner of the open space and/or holder of the CR when designating and determining the use(s) of the open space.

Protection of Significant Ecological Resources — Within sensitive ecological and/or wildlife habitat areas (such as rare species habitat, dunes, or other high value resource areas), it may be necessary to restrict public access and use of the open space.

Passive Recreation — Passive recreation involves the use of existing natural resources and does not require any development or alteration of existing topography or the use of motorized vehicles. Certain kinds of passive recreation may necessitate minimal alteration of existing vegetation for trail creation, maintenance, and other management activities. Depending on the site and the Placetype, active recreational areas such as playing fields may be an allowed use on land set aside as open space, if the Town agrees to accept the land for this purpose in fee simple.

Cultural Respect Easements – A Cultural Respect Easement is a legal agreement that guarantees Indigenous people cultural access to land in perpetuity. Cultural Respect Easements provide Indigenous people with safe areas to practice their traditional and spiritual lifeways, such as ceremonies, seasonal celebrations, camping, and more.

Agricultural Activities — In appropriate circumstances, agriculture may be an allowed use on land set aside for open space. Instances where agriculture will not adversely impact rare species or their habitats, or adversely impact wetlands or water quality, may be included as allowed uses in a CR. Possible language within the reserved rights section of a CR may include allowances for agricultural activities such as pasture lands, crop lands, and lands accessory to agriculture. Where land is being donated to meet the open space requirement, land in active agricultural or planned for that use may be accepted. These lands typically should not contain structures. However, small structures that are integral to the agricultural operation (e.g. small sheep shelter within a field, pump house for cranberry bogs, fencing around pastures) may be considered by the Commission as allowable within the open space.

Other Forms of Restriction in Special Circumstances

In general, covenants, deed restrictions, and special permits do not satisfy a requirement for permanent protection of open space. In limited situations, such as when LID stormwater systems are incorporated into site design and provide natural/community benefits or in some development/redevelopment projects that incorporate greenspace into site design in the Community Activity Centers or Industrial Activity Centers Placetypes, covenants, deed restrictions, and special permits may be an appropriate tool to meet the open space requirement.

GENERAL APPLICATION REQUIREMENTS

Applicants are strongly encouraged to consult with Commission staff in the early phases of project development in order to help identify low impact sites and site layouts that will minimize impacts on the environment and reduce related mitigation requirements. For a pre-filing review of proposed projects, applicants should submit maps or addresses of potential development locations and conceptual development footprint. For projects where the applicant has secured a site, civil plans of existing conditions, including existing vegetation and, where wetlands are present, a resource area delineation from the local conservation commission, is needed to assist in more detailed review and guidance about what mitigation may be required through the regulatory review process. For projects in later phases of project development, proposed civil plans and a Natural Resources Inventory on greenfield sites will allow for more detailed feedback in advance of a formal application filing.

Applicants are required to submit the following as part of their DRI application:

- Natural Resources Inventory (required when project is located on a greenfield site, or is located within a Natural Area – see Wildlife and Plant Habitat Technical Bulletin)
- Calculation of Area of Development Impact (see p. OS-14)
- Open Space Narrative discussing proposal based on Placetype ratio and area of disturbance
- Proposed Method of Permanent Open Space Protection and Conservation Partner, as appropriate

ADDITIONAL RESOURCES

Map Data Layers:

- Cape Cod Commission RPP Data Viewer (www.capecodcommission.org/RPPDataViewer)

Town Open Space and Recreation Plan

Open Space and Recreation Plans (OSRPs) are a tool through which a community plans for the future of its conservation and recreation resources. Many towns on Cape Cod have recently updated their OSRPs, providing current information on their open space and recreation priorities.

Guidance on Open Space Conservation:

Additional information about conservation restrictions, including model language for developing conservation restrictions is contained in the Model Conservation Restriction, available through the Executive Office of Energy and Environmental Affairs, Division of Conservation Services https://www.mass.gov/service-details/conservation-restriction-review-program

Names of municipal and land trust open space contacts are available from the Cape Cod Commission.

Community Design DRAFT

This guidance is intended to clarify how the Community Design Goal and Objectives of the Regional Policy Plan (RPP) are to be applied and interpreted in Cape Cod Commission project review. This technical bulletin presents specific methods by which a project can meet the goal and objectives.

Community Design Goal: To protect and enhance the unique character of the region's built and natural environment based on the local context.

- **Objective CD1** – *Promote context-sensitive building and site design*
- **Objective CD2** – *Minimize the amount of newly disturbed land and impervious surfaces*
- **Objective CD3** – *Avoid adverse visual impacts from infrastructure to scenic resources*

The applicability and materiality of these goals and objectives to a project will be determined on a case-by-case basis considering a number of factors including the location, context (as defined by the Placetype of the project's location), scale, use, and other characteristics of a project.

THE ROLE OF CAPE COD PLACETYPES

The RPP incorporates *a framework for regional land use policies and regulations based on local form and context* as identified through categories of Placetypes found and desired on Cape Cod.

The Placetypes are determined in two ways: some are depicted on a map contained within the RPP Data Viewer located at www.capecodcommission.org/RPPDataViewer adopted by the Commission as part of the Technical Guidance for review of DRIs, which may be amended from time to time as land use patterns and regional land use priorities change, and the remainder are determined using the character descriptions set forth in Section 8 of the RPP.

The project context, as defined by the Placetype of the project's location, provides the lens through which the Commission will review the project under the RPP.

TABLE OF CONTENTS

Introduction 4
Definitions 6
Summary of Methods 8
Detailed Discussion of Methods for Meeting Objective CD1 11
Detailed Discussion of Methods for Meeting Objective CD2 31
Detailed Discussion of Methods for Meeting Objective CD3 37
General Application Requirements 39
Additional Application Requirements for Infrastructure Projects 40
References 41
Resources 41

INTRODUCTION

Cape Cod is a unique and special place in terms of both its natural and built environments. The diverse landscape includes historic villages and distinctive architecture that combine traditional forms and materials in a variety of different styles. The region's history and natural environment have shaped development into a recognizable local aesthetic and a regional pattern of dense village centers surrounded by less-developed outlying areas.

Maintaining Cape Cod's unique character is essential to the region's continued economic health and to the quality of life of its residents. Yet, as the Cape continues to grow in population and popularity, new development poses challenges brought by land-consumptive development patterns and incompatible designs. In order to protect the region's distinctive character, new development needs to respect old and established patterns in both building and site design and project siting. This is the essence of context-sensitive design: design that responds to and respects its surroundings, promoting continued vitality for the region and reinforcing the Cape's strong 'sense of place.'

Context-sensitive design relates to its surrounding neighborhood, environment and regional traditions. In its design, it meets not only the project goals, but also those related to preserving scenic, aesthetic, historic, environmental and other community values. Context-sensitive design recognizes the scale and placement of existing surrounding buildings and follows established patterns, whether they are tall buildings sited close to the street, low buildings clustered in a tight neighborhood, or structures set well back from the road and screened by vegetation. It recognizes regional traditions in building materials and building forms, which on Cape Cod includes small attached massings, sloped roofs, and wood siding materials. It also follows more compact land use patterns to help preserve Cape Cod's natural resources and distinctive character. The Cape Cod Commission's publication "Contextual Design on Cape Cod," explains the principles of context-sensitive design through guidelines and illustrations. It is the basis for many of the methods explored in this Technical Bulletin. See the full document at: capecodcommission.org/resource-library/file/?url=/dept/commission/team/Website_Resources/design/ContextualDesignCapeCod.pdf

Cape Cod Placetypes are one way of describing and asserting the various contexts that exist in the region, and they are helpful in identifying appropriate designs based on a project's location.

While there is room for modern design and contemporary interpretation, new buildings should incorporate traditional design elements to support the region's existing character. By guiding development to follow compact land use patterns and limiting building footprints and paved areas, we will better maintain natural lands and preserve the distinction among different Placetypes while working to re-establish regional patterns in areas that have existing highway-oriented development.

Cape Cod has a wide variety of scenic resources that contribute to the region's unique sense of place. The character of scenic resources results from the interplay of geology, landform, soils, vegetation, land use and settlement patterns and is made up of a wide variety of features, patterns, and characteristics. Open ocean waters, natural areas, cliffs, dunes, historic resources, open fields, wooded road edges, views to water or historic villages, and scenic roadways may all be considered scenic resources.

The Cape's scenic resources vary in their quality, value, and ability to absorb changes. New infrastructure and large-scale developments must be sited carefully to limit impacts to these resources, especially in areas with a distinctive built or natural character. Visual and scenic resources play a direct role in people's enjoyment of Cape Cod, and their preservation has a direct impact on the region's continued economic vitality.

DEFINITIONS

Adverse Visual Impact: Where the degree of change in the scenic quality resulting from Development is expected to unreasonably impact or interfere with a scenic resource or otherwise unreasonably alter the character, setting, or quality of a scenic resource.

Scenic Resources: Locations or areas that are recognized, utilized, and enjoyed by the public for their visual and scenic qualities and whose features, views, patterns, and characteristics contribute to a distinct sense of appreciation of the natural and cultural environment.

Scenic resources on Cape Cod include, but are not limited to:

- National, State and Regional Parks, marine sanctuaries and wildlife refuges from the U.S. Geological Survey, U.S. Fish and Wildlife, Massachusetts Department of Environmental Management, and Massachusetts GIS.
- Historic Districts listed by the Massachusetts Historical Commission in the State Register of Historic Places, Old King's Highway and other Historic Districts, as well as other individually listed properties. Information about individual properties, both within and outside of historic districts is also compiled on MACRIS (Massachusetts Cultural Resources Inventory System) [see also the Cultural Heritage Technical Bulletin].
- Municipally designated scenic roads.
- Scenic vistas or viewpoints, e.g., scenic canal overlooks in Bourne; Nobska Light in Falmouth; and Scargo Tower in Dennis.

Scenic Road: A public road that has one or more of the following characteristics:

- Passes through an area of outstanding natural environmental features providing views of scenic elements such as salt marshes, rivers, bays, dunes, and the ocean;
- Provides outstanding views of rural, agricultural landscapes including scenic elements such as panoramic or distant views, cropland, pastures, fields, streams, ponds, hedgerows, stone or wooden fences, farm buildings, and farmsteads;
- Follows historic road alignments and provides views of historic resources;

- A large proportion of the road provides frontage for properties that are in a historic district or subject to perpetual or long-term agricultural, environmental or historic easements; or,
- Is designated by a municipality as a scenic road.

Visual Impact: The degree of change in scenic quality resulting from Development.

Visual Impact Assessment (VIA): The process for determining the degree of change in scenic quality resulting from Development, including but not limited to establishing the zone of visual influence, identifying Visual and Scenic Resources, preparing visual simulations, and assessing the magnitude of the proposed change.

SUMMARY OF METHODS

GOAL | COMMUNITY DESIGN

To protect and enhance the unique character of the region's built environment based on the local context.

OBJECTIVE CD1 – Promote context-sensitive building and site design

METHODS

- Relate siting of development to existing building and streetscape patterns
- Follow regional and local scale of development
  - New building footprints must be under 6,000 square feet in Historic, Maritime, Rural, and Natural Areas, and under 15,000 square feet in Community Activity Centers and Suburban Development Areas.
  - For every 50 feet of façade length, at least 10 feet of projection or setback must be included.
- Use regionally appropriate forms and materials
- Locate parking where it does not adversely impact visual character of the area
  - Landscaped islands in parking areas should be at least 10-12 feet wide with trees planted 25-40 feet apart. Trees should be a minimum of 3 inches in diameter when planted.
  - Landscaped islands should comprise 20% of the parking field.
- Provide appropriate landscaping and pedestrian amenities
- Ensure lighting protects dark skies and signage fits with community character

OBJECTIVE CD1 AREAS OF EMPHASIS BY PLACETYPE

Natural Areas | New development is discouraged. Redevelopment should be limited to small scale buildings and clustered in small areas that are mostly screened from view.

Rural Development Areas | Limit development to small scale buildings and cluster in small areas that can be screened from view.

Suburban Development Areas | Re-establish traditional patterns with buildings close to the street and parking to the side or rear.

Historic Areas and Maritime Areas | New development should conform with established patterns and should be consistent with traditional structures and uses.

Community Activity Centers | New and redevelopment encouraged in these areas. Build in traditional patterns with buildings close to the roadway and focus on providing pedestrian amenities and defining the streetscape.

Industrial Activity Centers and Military and Transportation Areas| Design flexibility is allowed in these areas as long as there is limited visibility from areas outside these Placetypes.

OBJECTIVE CD2 – Minimize the amount of newly disturbed land and impervious surfaces

METHODS

- Reuse and redevelop existing buildings, structures and sites
- Cluster development
- Minimize total parking spaces to no more than what is required by zoning
- Develop multi-story buildings where appropriate
- Provide parking under or within buildings or in structures
- Use permeable or pervious materials
- Maintain existing native vegetation and revegetate disturbed sites

OBJECTIVE CD2 AREAS OF EMPHASIS BY PLACETYPE

Natural Areas | New development strongly discouraged. Reuse and redevelopment should minimize or reduce existing development footprints.

Rural Development Areas | Reuse and redevelopment encouraged. All development should be clustered, respect the surrounding landscape, and protect scenic resources.

Suburban Development Areas | Concentrate development into nodes; minimize and reduce parking area footprints.

Historic Areas | Reuse historic structures; infill development should reflect historic context.

Maritime Areas | Reuse historic structures; infill development should reflect context.

Community Activity Centers | Reuse, redevelopment, mixed use, and multi-story development encouraged; minimize parking through design or shared parking.

Industrial Activity Centers & Military and Transportation Areas | Reuse and redevelop when possible; minimize impervious areas.

OBJECTIVE CD3 – Avoid adverse visual impacts from infrastructure on scenic resources

METHODS

- Site infrastructure away from scenic resources
- Design and scale infrastructure appropriate to context
- Collocate infrastructure with other existing infrastructure and/or within buildings
- Utilize previously developed and/or impervious areas
- Locate infrastructure underground where feasible
- Screen infrastructure with vegetative buffers, buildings, or other structures

OBJECTIVE CD3 AREAS OF EMPHASIS BY PLACETYPE

Natural Areas | Avoid siting in these areas except where necessary to protect public health and safety.

Rural Development Areas | Avoid siting in open landscapes; minimize height to that of existing tree canopy.

Suburban Development Areas | Avoid visual impacts to surrounding neighborhood through buffering and/or siting.

Historic Areas | Avoid siting in these areas or ensure no visual impacts on historic resources.

Maritime Areas & Community Activity Centers | Ensure infrastructure is similar in scale to surrounding development.

Industrial Activity Centers & Military and Transportation Areas | Generally appropriate; buffer from residential areas.

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE CD1

Objective CD1 – *Promote context-sensitive building and site design*

The following methods may be implemented to demonstrate consistency with Objective CD1.

Relate siting of development to building and streetscape patterns

Historically, the pattern of development within the Cape's village centers consisted of buildings that were close to the road and oriented with their narrower façade facing the street. This pattern of development produced a strong sense of enclosure to the street and established a setback pattern that continues to help define the region's character.

In many locations on the Cape, the edge of the street is very well defined by either buildings, walls, fences, or trees. Twentieth century zoning regulations have encouraged development in other areas that conflicts with historic and traditional settlement patterns. Linear commercial areas are often oriented to the automobile and typically characterized as having poorly defined road edges with parking close to the street and buildings far from the street edge. This is in stark contrast to the traditional village pattern of development seen in the region. Following is a discussion of ways to site new development in the Cape Cod landscape, following traditional streetscape patterns.

FOR ALL PROJECTS

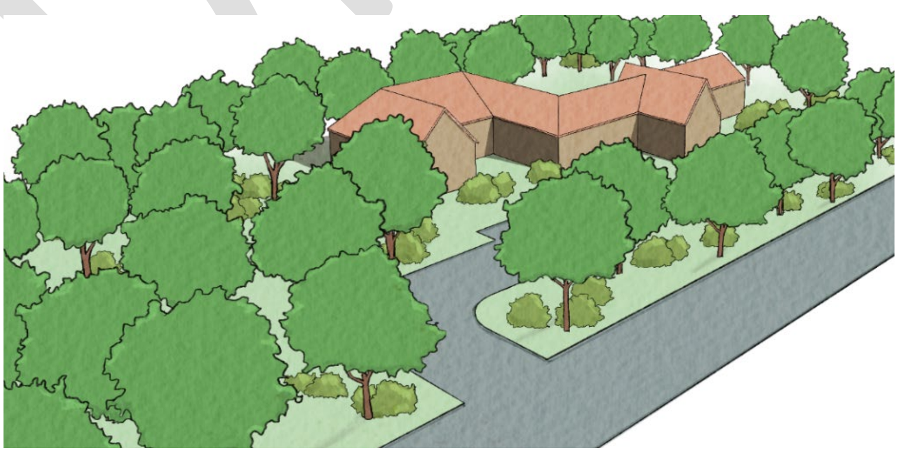
- **Follow traditional setbacks**: New development should follow traditional setback patterns, whether close to the road edge or set behind small front yard areas. Site new buildings to reinforce the existing building setbacks which help define the streetscape edge. If new construction must be placed farther back than existing structures, use low walls and vegetation to continue the established street edge.
- **Locate new construction behind existing frontage buildings or vegetation**: As an alternative to siting a large building on the street, place structures with more modest forms at the street edge to match existing street patterns and to shield the larger building behind. Placing larger buildings behind existing structures or newly constructed, traditionally scaled buildings will screen the

larger buildings and associated parking areas to the rear and also assure that the traditional streetscape pattern is continued.

- **Maintain the distinction between developed and outlying areas**: Locate new development within Community Activity Centers and existing village centers whenever possible. If locating outside these areas, site new development behind existing vegetated areas to maintain open landscapes and wooded roadway character.
- **Design streets and roadways in scale with the surrounding context**: If an area has a distinctive roadway design or scenic character, any new roadways should be designed consistent with the existing character. Narrower roadways are generally preferred to slow traffic and provide comfort for pedestrians and bicyclists. On-street parking in appropriate areas can also create streets that are better-suited to accommodate all users.

FOR PROJECTS IN NATURAL AREAS AND RURAL DEVELOPMENT AREAS

- **Maintain established roadway character**: Preserve the landscape character of existing roadways, whether wooded or open landscapes with few structures. Site buildings outside key view areas and sensitive natural resources. Maintain the existing road width and layout and avoid more urban details such as granite curbing.
- **Design meandering entrance roads**: Entrance roads or site accesses should meander through a vegetated buffer to limit views into the site. Trees are especially important along access roads to limit broad views of new development and to provide enclosure in context with outlying areas.



A meandering site access road limits views into the site.

- **Site outside open landscapes**: New development in these areas should locate at the periphery of open landscapes and away from scenic vistas or further reduce visual prominence by siting behind or near woodland edges. Any new development should be designed consistent with existing development density and should follow established relationships between existing buildings and the roadway.

FOR PROJECTS IN SUBURBAN DEVELOPMENT AREAS

- **Create focal points of denser commercial development**: In strip commercial areas, focus on re-establishing traditional streetscape elements with dense clusters of buildings surrounded by less densely developed areas.
- **Bring buildings closer to the street**: Site new buildings near the roadway to re-establish the street edge and relate the building to the street, or to shield larger elements of the development to the rear.
- **Move parking to less visible areas**: Re-locate parking to the side or rear of the development to reduce its prominence. In some cases, parking can be successfully incorporated into a parking structure that occupies the lower level or rear portion of a building. Where re-locating parking is not possible in the short term, add landscape walls and buffer plantings to effectively screen paved areas.
- **Improve pedestrian amenities**: Add sidewalks and pathways that bring pedestrians along the front facades of buildings. Add shade trees, gardens, seating areas and other pedestrian amenities along the road frontage of new development.
- **Use cluster to reduce residential development footprints**: Residential subdivisions of the 1960's and 1970's are land-consumptive and do not mirror traditional development patterns. New development in these areas should be clustered to respect existing topography, protect sensitive natural resources, and preserve high-quality open space. Cluster development should also minimize the length of new roadways and utilities and create amenities on site for use by residents of the neighborhood.

FOR PROJECTS IN MARITIME AREAS

- **Set buildings back from eroding shorelines**: In areas where the shoreline is eroding, the setback for all new buildings and septic systems should be at least

30 times the average annual erosion rate of the dune or eroding bank and projects are encouraged to consider up to 70 times the average annual rate. Shoreline change maps, developed by the Massachusetts Coastal Zone Management Office, and historic photos can help to evaluate long term erosion trends.

- **Maintain facilities that support water dependent uses**: Docking and unloading facilities for commercial fishermen, marinas for public and private vessel use, ferry terminals, and areas for charter boats and whale watching are all water-dependent facilities that should be maintained. Loss of these waterfront facilities results in a loss of traditional economic activity in the community. Maintenance of these facilities, coupled with access for the public, such as walkways, observation areas and boat launch facilities generate public interest and activity on the waterfront.
- **Maintain and enhance physical and visual access to the coast**: Public access to the shoreline should be provided in waterfront locations. New walkways are encouraged if they enhance shoreline access for the public, including people with disabilities, but they should not be pursued if they degrade undisturbed resources or create adverse impacts to habitat, aesthetics, or storm damage prevention. Where physical access is not appropriate or feasible, visual access should be provided. This can be done by siting multiple buildings to provide views between them, or by providing an arch or walkway to allow views between buildings. Visual impact from the water should be considered when designing the structure, to maintain maritime character and the natural beauty of the shore.

FOR PROJECTS IN HISTORIC AREAS AND COMMUNITY ACTIVITY CENTERS

- **Maintain setback patterns and building scale along the road frontage**: Design new buildings to front on the street and to maintain established setback patterns, consistent with traditional village design. If appropriate, orient the narrower facade to the street to be consistent with existing facade widths.
- **Activate the street-facing facade**: Include a street-oriented entrance and principal windows on the street-facing facade to reinforce the building's primary relationship to the street and encourage pedestrian activity. In commercial

areas, consider incorporating porches or other pedestrian amenities in the design.

- **Site infill development to the rear to preserve desirable existing streetscape patterns**: Consider infill development on the rear portion of lots to allow additional activity in already developed areas while maintaining existing streetscape patterns.

FOR PROJECTS IN INDUSTRIAL ACTIVITY CENTERS AND MILITARY AND TRANSPORTATION AREAS

- Design flexibility is allowed in these areas as long as there is limited visibility of the development from areas outside these Placetypes.

Follow regional and local scale of development

Cape Cod's buildings are traditionally modest in scale and comprised of a series of small massings that reflect their gradual growth and expansion over time. While some larger buildings and estates began to be constructed in the region in the late 1800s, the majority of structures remained small in size. To maintain this traditional and predominantly residential scale that defines most of the Cape's villages, new buildings should appear similar in size to historic structures or they should be sited behind smaller buildings or vegetation that can screen their bulk from public view. This is especially important in Natural and Rural Development Areas where wooded or open landscapes should be dominant, and in Historic or Maritime Areas where traditional building styles should be most prominent. Where existing local development is clearly defined and guided by historic traditions, that scale should inform any new development. In all other locations, new development should reflect regional building scale and traditions. The following narrative presents a variety of ways to fit a new building into the Cape landscape, focusing on how to reduce the apparent building size to make it consistent with the local development scale.

FOR ALL PROJECTS

- **Break down large building masses**: Separate the building mass into various structures that more closely approximate the size of traditional buildings in the region. Building masses should be consistent with the established pattern in the area but should generally not exceed a footprint of 6,000 square feet in Historic, Maritime, Rural, and Natural Area Placetypes, and should generally not exceed a footprint of 15,000 square feet in Community Activity Centers and Suburban Development Area Placetypes. Several smaller building masses may be grouped around a central courtyard or arranged as a primary building with several attached ells to mimic traditional regional patterns.

  - Along roadways, orient the short axis of the building parallel to the street to maintain a building profile that is more consistent with the region's traditional scale.

- **Vary the roof form**: Vary the height of the roof line at both the roof peak and the eaves to break large roof masses into smaller elements and to vary their relationship to the ground. Incorporate several different roof forms on different parts of a large building, following historical examples. Gable, shed, and hip roofs are compatible with regional styles and can be effectively combined on a single building.
  - Flat roofs are discouraged but not prohibited, as they may be appropriate in some areas where existing development includes flat-roofed, row-house style structures, or on some portions of a building. Roof forms should be designed to read as a functional roof over the building, not as a decorative feature added to the facade.
- **Vary the façade line with setbacks and projections**: New development should incorporate pronounced changes in the wall planes and building mass to mirror the pattern of individual facades in a village streetscape. For every 50 feet of façade length, at least 10 feet of projection or setback should be included. Though the façade changes can be split into several components, changes in the façade line of 10 feet or more are most likely to read as distinct areas and reduce the visual impact of a larger building mass.
  - A varied rhythm of elements, rather than a strict repetition of the same feature, is most effective for breaking down the building mass into smaller components and providing visual interest to a design. Adjacent wall sections should be varied in length, setback, and height.

Vary the facade line with changes in wall length, setback, and height

- **Vary the wall height**: Provide changes in the building wall height to reduce the overall bulk of the structure and to increase variety along the facades. Portions of the building above 20 feet in height should be roof forms unless the established development pattern in the area includes higher building walls. If a third floor is created, it should be set back or within a roof form to maintain a traditional scale to the building. Designing a second story for a portion of the building is an effective way of varying both the building design and the wall height consistent with traditional development patterns in the region.
- **Bring down the building edges**: Bring the edges of the building down with smaller attached masses such as porches, entrances, or lower additions. The use of arcades (a series of arches supported by columns) that are not physically attached to the building but are stepped forward and essentially act as a frontage building can be particularly effective in breaking up the apparent massing of a large building.
    - While visually identifying the entrance of a building is essential to any good design, the mass of the entry should generally be subordinate to the primary building mass. For example, the ridge of an entry should be at or below the primary roof height. The design should provide a visual distinction between primary and secondary entrances, which also helps to incorporate asymmetry into the building facade.

Bring down a building's edges with lower roof forms adjacent to the street.

- **Provide transition areas between commercial and residential developments**: Buildings should step down in scale and size where commercial developments abut residential neighborhoods to avoid jarring transitions in street and neighborhood character.

FOR PROJECTS IN NATURAL AREAS AND RURAL DEVELOPMENT AREAS

- **Limit development footprints**: Development should be avoided in Natural Areas and Rural Development Areas where environmental resources and open landscapes are prominent characteristics. To preserve the open landscape character, wooded nature, and sparse development pattern of these areas, only small scale and clustered developments are appropriate. Building masses should generally not exceed a footprint of 6,000 square feet in Natural and Rural Development Areas.

FOR PROJECTS IN SUBURBAN DEVELOPMENT AREAS

- **Create frontage buildings**: Incorporate small frontage buildings to re-establish traditional building scale and relationships to the street. Frontage buildings can also effectively screen larger development and parking areas to the rear. Building masses should generally not exceed a footprint of 15,000 square feet in Suburban Development Areas without screening from smaller frontage buildings.

- **Reinforce the building setback line**: In areas where existing buildings are set well back from the street and large parking areas are in front, use low walls and dense planting areas to continue the traditional building setback along the street edge.

FOR PROJECTS IN HISTORIC AREAS, MARITIME AREAS, AND COMMUNITY ACTIVITY CENTERS

- **Mirror existing character**: These areas have a distinctive and established character that new development must conform to. Traditionally, buildings in these areas present a pedestrian-scaled facade of one or two stories, with floors over the second story incorporated within a traditional roof form. Village streetscapes have a consistent range of facade lengths and spacing between buildings. This variation should be mirrored in new development by incorporating recesses or projections in the building footprint to mimic the length of traditional building facades. The form and scale of the buildings should be consistent with their surroundings, continuing existing character and streetscape patterns, and should incorporate pedestrian-scaled amenities (such as porches and stoops) and doors and windows on all street-facing elevations. Building masses should generally not exceed a footprint of 6,000 square feet in Historic or Maritime Areas and should generally not exceed a footprint of 15,000 square feet in Community Activity Centers.
- **Avoid long building facades**: For long front facades, vary the setback, height, and roof form of the building within the range provided by existing buildings to continue the established rhythm of facades on the street. In most cases, long facades should be avoided, extending no more than 50 feet without a change in the wall plane. In cases where it is difficult to fit a large building into existing patterns, use smaller frontage buildings to screen large buildings in the rear.

FOR PROJECTS IN INDUSTRIAL ACTIVITY CENTERS AND MILITARY AND TRANSPORTATION AREAS

- Flexibility in the scale of individual buildings is allowed in these areas as long as there is limited visibility of the development from areas outside these Placetypes.

Use regionally appropriate forms and materials

The Cape has always been a region of vernacular architecture – architecture which reveals an area's unique local traditions and characteristics. Cape Cod's earliest architecture took the form of Native Wampanoag wetus built of bent wood poles and bark coverings. Early colonial forms were simple wood structures based on English styles and oriented toward the region's agricultural focus. By the 18th century, a new form had evolved to meet the early settlers' needs and protect them from the harsh environment. This form has become known as the "Cape Cod House" and its simplicity, its gable roofs, and weathered shingle or clapboard exterior define the basis of vernacular architecture in this region.

The growth of maritime industries in the early 19th century introduced architectural diversity to the Cape. The region's new wealth was reflected in larger homes designed in Greek Revival and other Neoclassical styles and in the expansion and alteration of many existing buildings. Though the new structures were generally larger, they reinforced the local building traditions by maintaining the simplicity of the earlier forms and continuing the use of local materials. The late 19th and early 20th century saw construction of a variety of Victorian styles, built primarily to accommodate Cape Cod's growth as a resort area. Although these structures incorporated new forms, their general scale and wooden construction were compatible with the region's traditions. Throughout the Cape, small-shingled structures continued to be built in simple forms reminiscent of earlier styles.

FOR ALL PROJECTS

- **Complement surrounding architecture in areas with distinctive architectural styles**: Use similar architectural scale, massing, and materials to relate new buildings to their surroundings. Reflect the predominant rhythm of the existing buildings in new construction. When developing in areas without distinctive architecture, new buildings should be designed to complement the region's traditional vernacular styles. Modern elements may be included but should reference regional traditions in either form or materials.
- **Use pitched roofs**: Roofs play a major role in a building's character because they are a dominant visual element. Roof types such as gable, shed, gambrel, and hip are all seen on the Cape, although gable and shed roofs are most common. The pitch of gabled roofs generally is not more than 12 inches in height for 12 inches in length or less than 7 inches in height for 12 inches in

length. When pitched roofs are used, sub-masses should be attached to the main mass at right angles, with either parallel roof lines or intersecting cross gables.

- **Use traditional building materials**: One distinctive feature of the region is the preponderance of naturally weathered wood on building exteriors. The Cape's traditional building materials are wood shingle and wood clapboard, though brick and stone were also used. In prominent areas, use high quality, traditional materials that weather naturally on the exterior of the building to reflect regional building traditions. Non-traditional materials may be used if they accomplish the overall goal of adding interest and depth to the facade. In areas that should receive less attention, such as service areas and unbroken expanses of wall, use less-formal materials and simpler detailing to make those parts of the façade recede into the background. High-intensity, reflective, and metallic colors and materials are strongly discouraged. Glass facades or large expanses of glass should generally be limited to non-historic areas, but may be appropriate if they help meet energy-efficiency goals or respond to local modern architecture traditions.
- **Avoid false fronts**: Raised parapets and false-fronted gable ends are strongly discouraged and should be avoided. Non-functioning dormer windows, cupolas, and similar details are also strongly discouraged as they do not serve to break down the building mass, but instead give the impression of unrealistic appendages that detract from, rather than improve, the design.
- **Conceal heating, ventilation, air conditioning (HVAC) and other mechanical equipment**: Place roof mounted equipment behind sloped roofs, parapets, or in the central portion of flat roofs beyond site lines as seen from ground level. Conceal flues and vents in chimneys or cupolas. Screen other utility equipment, loading docks and service areas with vegetation, walls and fences.

FOR PROJECTS IN HISTORIC AREAS AND COMMUNITY ACTIVITY CENTERS

- **Be sensitive to forms in historic areas**: Historic Areas are the most sensitive to change and require careful design to avoid negative impacts to significant structures and landscapes. When adding to or altering existing historic structures, maintain the quality of materials and workmanship found in the original structure. If a comparable quality of natural materials is not available, synthetic surface materials may be considered as long as they are similar in appearance and durability. For more details, refer to the Cultural Heritage technical bulletin.

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FOR PROJECTS IN INDUSTRIAL ACTIVITY CENTERS AND MILITARY AND TRANSPORTATION AREAS

- These areas are typically less visible and not adjacent to highly visually sensitive areas, so have more flexibility in terms of design and layout. With large building facades, the design should take a cue from the surrounding traditional forms. Vary the detailing, materials, and colors in adjacent sub-masses to resemble the traditional variety found in the region's village centers.
- Industrial and warehouse buildings are typically designed to create large volume spaces with open floor plans to accommodate their manufacturing, assembly, and storage functions and are generally not designed with pedestrian use in mind. Consequently, industrial and warehouse buildings are typically large, have little or no architectural detail, and are built at a scale that is in sharp contrast to the regional development forms of the Cape. Screening and appropriate siting are the best solutions for fitting them into the Cape landscape.
- **Screen buildings with wide landscape buffers**: Establish a wide landscaped buffer between the street and the building by retaining existing wooded areas and supplementing with a variety of evergreen and deciduous trees and shrubs as appropriate to the site and design a meandering entrance drive to limit views into the site. In cases where a site does not have an existing wooded buffer, provide a landscaped buffer that consists of a mix of evergreen and deciduous trees and shrubs that provide adequate year-round screening.
- **Design a portion of the building with traditional form and materials**: Design a small portion of the facility, such as the office or a small retail/showcase area, using traditional architectural forms and materials. Locate this portion of the facility in the most-visible portion of the site, where it can function as a frontage building that provides a more-traditional facade to the public and partially screens other parts of the facility from view. Alternatively, combine the warehouse with other uses and shield the warehouse behind the other structures on the site. Using traditional wood siding on a visible façade can help it blend more easily into the landscape.

Locate parking where it does not adversely impact visual character of the area

Parking is a significant part of any development. To preserve the traditional character of the region and to promote pedestrian-friendly development, parking should be located to the side or rear of a development so that it does not have a strong impact on the character of the streetscape. Building facades and landscaped areas should always be the prominent visual elements. If frontage buildings are used, parking can be located behind them but in front of rear structures. Landscape berms and deep landscape buffers (both along the street and within large lots) can be used to lessen the visibility of existing parking lots, but no new parking should be placed in front where it is visible from the street. If berms are needed to screen development, they may need to be designed in concert with areas of low topography to capture stormwater runoff. Most sensitive are historic and rural/natural areas but preserving character in Community Activity Centers is key to their success.

FOR ALL PROJECTS

- **Locate parking to the side or rear of development**: Parking should be located further back on a lot than any adjacent buildings. Parking located in front of buildings and next to the street is inconsistent with the region's traditional patterns. It diminishes the sense of enclosure of the roadway and is not compatible with pedestrian activity.
- **Screen parking from view**: Locate new parking lots behind or to the side of buildings to effectively screen them and maintain the character of the streetscape. Parking lots may also be screened from the street by the use of a low wall, fence, hedge, or landscaping. Provide view corridors, informational signage, and walkways to provide visibility and access to parking areas.

Locate parking lots behind effective landscape buffers to screen them from view.

- **Design smaller parking lots with more landscaping**: Design smaller parking lots separated by landscaping rather than constructing a single large lot. Use large landscaped islands, at least 10-12 feet wide with trees planted 25-40 feet apart, depending on the tree species selected. Trees should generally be a minimum of 3 inches in diameter when planted. Landscaped islands should comprise 20% of the parking field.

FOR PROJECTS IN NATURAL AREAS AND RURAL DEVELOPMENT AREAS

- **Limit new parking lots**: Use existing lots and shared parking whenever possible. Many land uses require parking at different times of the day and different days of the week, making it convenient to share parking and minimize construction of new parking areas. Use alternative surface materials like gravel or shell or others to blend in with their surroundings.

FOR PROJECTS IN HISTORIC AREAS, MARITIME AREAS, AND COMMUNITY ACTIVITY CENTERS

- **Use existing on-street parking and shared parking lots**: In these areas it's most important to keep parking secondary and not a prominent element of the streetscape. Use existing on-street parking and parking lots that can be shared in village centers and developed areas. Churches, offices, restaurants, and other uses that operate at different times may be willing to enter into agreements to share parking areas, reducing costs as well as the amount of land devoted to impervious parking.

FOR PROJECTS IN SUBURBAN DEVELOPMENT AREAS

- **Remove existing parking from front yard areas**: Where parking exists in front yard areas, reduce the amount of parking provided or relocate it to the side or rear of the lot. Replace those areas with improved landscaping.

- **Seek shared parking between adjacent uses**: Where appropriate, seek opportunities to reduce the amount of parking provided on-site by sharing parking with adjacent uses, particularly in commercial- or industrial-use Suburban Development Areas.

- **Provide for reserve parking on-site to reduce impervious surfaces**: Design overflow parking to be retained in a natural state or use pervious or permeable pavers to reduce the amount of impervious surface in these areas.

Provide appropriate landscaping and pedestrian amenities

Consideration of appropriate landscaping and buffering for development is an integral part of contextual design on Cape Cod. Landscaping can be used to screen parts of development and to enhance its relationship to the site. The development's location and the character of the surrounding landscape context should guide the development of a landscape plan for a project site. While natural vegetation defines the character of some Placetypes, others are more developed and require a different landscape treatment such as street tree planting or pocket parks. Development should implement a landscape plan that addresses the functional aspects of landscaping, such as stormwater treatment, erosion prevention, screening and buffering, and provision for shade and energy conservation. Retaining or restoring visual access to natural resources is also an important component of the region's historic pattern of development identified in the Cape Cod Placetypes.

FOR ALL PROJECTS

- **Preserve the natural landscape**: Minimize removal of existing vegetation. Preserve massings of plants in their characteristic natural associations. Maintain forest floor conditions and as many mature trees on site as possible and design the project around existing vegetation so that the existing landscape provides a setting for the project. Transplant and re-use on-site vegetation where feasible.
- **Restore natural edge conditions**: Blend the development into the existing landscape. Species characteristic of the region require less maintenance, provide an appropriate habitat for local wildlife, and integrate the new development more successfully into the existing landscape. Existing wooded areas adjacent to the site may be used as reference in determining appropriate species for new buffer planting.
- **Use a variety of species to assemble new landscaping masses**: Create visual depth in plant massings by layering plants of various textures, sizes, and colors. Include flowering or fruiting species for color, interest, and wildlife habitat where appropriate. Layered plantings soften edges and corners and reduce the scale of buildings in the landscape. Masses of trees and vegetation near buildings

reduce the perceived scale of buildings and set them into the landscape. Trees should generally be a minimum of 3 inches in diameter at the time of planting. Consider plant massing along with architectural massing during the design process. Balance the mass, proportion, and rhythm of landscape and building elements.

- **Create pedestrian-oriented landscape areas**: Create landscaped areas adjacent to the building to add variety and depth to a large building facade. Arbors or pergolas can be combined with landscaping to effectively break up a large flat facade, adding different materials, depth, and vegetation. Within large projections or setbacks in the facade, incorporate landscaped areas to provide relief and provide interest while also softening the building exterior and mass.
- **Use plants that are characteristic of the region**: Use plant materials that are predominantly native species and suitable to the site. Incorporate pollinator species and other species that provide nesting, food, and cover for wildlife. Provide diversity in plant material selection and select species that minimize use of irrigation, pesticides, and fertilizer. Further information about recommended plant species can be found on the Cape Cod Commission website.
- **Minimize lawn area**: Provide alternatives to lawn area including native grasses and forbs to reduce mowing and fertilizer application. Where lawn is necessary, favor fescues and other drought-tolerant species.
- **Provide pedestrian amenities within the development site**: Incorporate benches, bike racks, and trash receptacles within the development site as appropriate to the use and scale of the project. Pedestrian walkways should be provided within parking areas to allow for safe pedestrian travel, with crosswalk pavement highlighted either by a change in the pavement texture or color so that pedestrian circulation is clearly defined

FOR PROJECTS IN NATURAL AREAS AND RURAL DEVELOPMENT AREAS

- **Use low-lying plantings to preserve views of the horizon**: Especially along the coastline, make use of mat-forming plants or low shrub massings and/or native grasses and forbs that are wind-and salt-tolerant. In wooded areas, preserve existing vegetation.
- **Use substantial landscape buffers to screen new development**: The predominant woodlands found on Cape Cod consist of oak and pitch pine, with a low deciduous understory. These woodlands tend to lack lower branching, and

pitch pines, in particular, do not provide effective screening due to their irregular form. This type of natural buffer is an ineffective visual barrier for a proposed development unless it is of substantial depth. Therefore, natural, undisturbed vegetated buffers should be supplemented by additional plantings when necessary to adequately screen development.

- **Preserve the feeling of enclosure**: Wooded roadways provide enclosure through overhead tree canopy. Retain existing wooded road edges and retain a buffer of natural vegetation between new development and the road edge where possible to preserve the character of scenic wooded roadways. When replanting along the road edge, leave an appropriate distance between the edge of the pavement and any new trees.
- **Provide footpaths along roadways**: Where appropriate, provide footpaths along roadways where they enhance compatible access to natural, scenic, and cultural resources and do not adversely impact these resources.

FOR PROJECTS IN SUBURBAN DEVELOPMENT AREAS

- **Improve landscaping and buffering of development**: Improve the appearance and function of Suburban Development Areas by providing adequate buffers and/or berms where appropriate between the street and development to screen parking and shield loading areas. If berms are used to screen development, they may need to be combined with low landscaped areas to address stormwater on site. Substantial buffers should be provided for side and rear property boundaries where commercial development abuts residential properties.
- **Provide pedestrian amenities:** Provide pedestrian amenities within the site including tables, seating, bus shelters, trash receptacles, bike racks, drinking fountains, shelters, and public restrooms where appropriate. Use plantings and public art to enhance these outdoor spaces.

FOR PROJECTS IN HISTORIC AREAS, MARITIME AREAS, AND COMMUNITY ACTIVITY CENTERS

- **Provide sidewalks along roadways, consistent with the character of the area**: While hard curbs may be appropriate in village/activity centers, grass strip and less formal designs are appropriate in other areas. Sidewalks should be accessible when conditions allow.

- **Enhance the streetscape with landscaping**: Provide street trees to define the street edge, provide shade, and contribute to a comforting sense of enclosure. Where appropriate, establish planting strips, road islands and small parks within the public right-of-way, especially where it can make pedestrian crossings more comfortable and safe.
- **Incorporate pedestrian amenities in Community Activity Centers**: Provide public seating, pocket parks, outdoor commercial seating and other amenities along the streetscape to encourage greater activity in front of the building.
- **Use building setbacks for greenspace/hardscape**: Use courtyard areas or setback areas in front and between buildings to accommodate a pocket park, pedestrian plaza, or alleyway to parking behind buildings if appropriate. These areas provide relief, soften the street edge, and provide an opportunity for gathering and interaction that contributes to the vitality of centers.

FOR PROJECTS IN INDUSTRIAL ACTIVITY CENTERS AND MILITARY AND TRANSPORTATION AREAS

- **Provide substantial buffers**: Natural, undisturbed vegetated buffers should be provided by development, particularly in cases where the building form is non-traditional, such as industrial and warehouse buildings.
- **Provide open space adjacent to residential areas**: Where Industrial Activity Centers and/or Military and Transportation Areas are adjacent to residential uses, open space in addition to vegetated buffers should serve to separate incompatible uses.

Ensure lighting protects dark skies and signage fits with community character

Lighting and signage can add to the character of an area or can become a significant visual distraction. Lighting should be kept to a minimum safe level and should not spill onto adjacent lots or up into the sky. The appropriateness of outdoor lighting might also relate to the use for which the lighting is proposed, e.g., outdoor lighting proposed for a hospital may require special considerations for public safety, emergency, and security not generally applicable to other uses.

FOR ALL PROJECTS

- **Design outdoor lighting at moderate levels**: Provide a uniform distribution of light without compromising safety and security. Areas of high pedestrian and vehicle use should maintain a minimum footcandle of 1.0, measured four feet above the ground surface at the point of least illumination, and a maximum footcandle of 7.0. measured four feet above the ground surface directly beneath the light source.
- **Provide total cutoff of light at property lines**: Light should not spill from a development onto adjacent properties. Parking areas should have light fixtures that have a total cutoff of all light at less than 90 degrees and a beam cutoff of less than 75 degrees. Attached building or wall pack lighting should be screened by the building's architectural features or contain a 45-degree cutoff shield.
- **Select light poles that are in scale with proposed or surrounding buildings**: The maximum light fixture height for properties that are visible from regional roadways, abut residential areas or regional vistas, should be 20 feet. Properties that do not abut residential areas and/or have no regional views may have a maximum light pole height of 25 feet. For pedestrian walkways and plazas, consider using lights in bollards (3 to 4-foot high posts) where appropriate.
- **Lighting should not conflict with shade trees within landscaped islands**: Select lower mounting heights, below the canopy of trees, rather than high mounted fixtures which may create shadows or dark spots. Spacing of light poles in parking areas should be staggered rather than aligned, to maintain a uniform distribution of light. In all cases, light poles should be located within landscaped islands for safety and aesthetic reasons.
- **No internally illuminated signs**: Internally illuminated or flashing signs are not appropriate on Cape Cod, though channel-lit letters may be appropriate in non-historic areas. For externally illuminated signs, lighting should be aimed downward to avoid impacts on the night sky.
- **Limit height of signage**: Building signs should be located either flush or perpendicular to the building wall. Do not place signs on roofs or above eaves and parapets. If site signs are used, they should be kept as low as possible without impacting safe sight distance at vehicle entrances.

Use the smallest size and least number of signs: A small, simple, well-located sign is generally more effective than an improperly located large sign with excessive information. Sign materials, style and shape should be compatible with surrounding building materials, colors and textures. Sign size and lighting should be modest to keep the focus on the surrounding traditional architecture and other cultural features.

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE CD2

Objective CD2 – *Minimize the amount of newly disturbed land and impervious surfaces*

The natural resources and open spaces of the region are key to maintaining the culture and character of Cape Cod, as well as its economy. As development replaces the region's natural areas and forest cover, both natural functions and regional character are degraded. To preserve the Cape's distinctive character and minimize impacts to natural processes as the region continues to grow, new development must follow more compact land use patterns and use land more efficiently.

Cape Cod's traditional development patterns are defined by compact land uses with buildings in more densely developed centers or villages, surrounded by open, natural, and less developed lands. However, much modern development in the region follows a more spread out development pattern that requires large swaths of impervious surface and relies on automobiles as a primary means of transportation, necessitating large and often excessive paved parking areas and roadways. More sustainable design builds in tighter patterns and reuses existing buildings.

These large areas of impervious surface not only fragment the natural habitat and resources of the land, but also negatively impact water quality due to increasing runoff while decreasing the capacity of natural systems to recharge and filter stormwater. Reducing the natural and vegetated areas also diminishes the ability of an area to absorb floodwaters and replacing these areas with pavement or dark roofs can lead to increased heat retention, necessitating greater use of air-conditioning and energy. Minimizing the amount of newly disturbed land and impervious surfaces will help maintain and restore the natural areas of the region and the vital functions they serve, while also reinforcing the unique characteristics of the different Placetypes found throughout Cape Cod.

Reuse and redevelop existing structures and sites

Reuse of existing developed sites takes advantage of existing infrastructure, minimizes the amount of newly disturbed land and impervious surfaces, and reinforces regional development patterns. Reuse also avoids unnecessary new construction, conserves energy, and maintains those buildings that are considered architecturally and historically valuable. Existing buildings hold 'embodied energy' from the effort required to harvest their building materials, process, and construct them. Reusing existing buildings reduces construction and demolition waste, saves energy by decreasing extraction and processing of raw materials, and reduces air pollution from transporting materials.

Reusing existing buildings also supports the necessary broad spectrum of housing types including affordable housing and a viable mix of uses within an expanding community. Given recent growth on Cape Cod, it is essential to preserve and continue the traditional pattern of adaptive reuse if the Cape is to retain its special character. This housing diversity facilitates growth while preserving community character and a sense of place.

Redevelopment can be an important component of new retail and office developments, improving the viability and character of an existing property through rehabilitated facades, additions, frontage buildings, and enhanced landscaping. It can also provide a good opportunity to encourage mixed-use development in locations where it does not currently exist.

FOR ALL PROJECTS

- **Reuse existing buildings**: To avoid unnecessary new construction and to conserve energy, new uses should be found for existing structures, particularly if they have architectural or cultural significance. Reusing buildings provides the potential for increased economic benefit while limiting new development impacts on natural resources.
- **Reuse developed sites**: In addition to reusing existing buildings, existing developed sites should be redeveloped to avoid newly disturbed lands and impervious surfaces. Redevelopment of these sites may involve partial or complete demolition of buildings (provided they are not culturally significant) and new construction in previously developed areas.
- **Infill development**: Constructing new buildings or additions within areas that are already largely or densely developed is another way of adding development consistent with regional traditions. Infill development in Historic and Maritime Placetypes must be carefully designed to be consistent with existing patterns by adding structures where there are breaks in the streetscape pattern or where there is available land to the rear of a site. This type of infill development can facilitate efficient use of existing infrastructure.

FOR PROJECTS IN SUBURBAN DEVELOPMENT AREAS

- **Encourage infill construction in areas of existing strip development**: Along the strip, new buildings should be constructed along the road frontage in order to define the roadway edge. Developing buildings along the road frontage will also screen large existing parking areas and help to make the area more pedestrian friendly.

FOR PROJECTS IN HISTORIC AREAS

- **Reuse historic buildings**: Older structures often exhibit architectural styles and a level of craftsmanship that is historically valuable and often too expensive to replicate today. They also represent significant periods and events in a community's history which should not be lost to future generations. New users of historic buildings should limit the alterations they make to historic exteriors in order to avoid losing resources that are important to the community. Refer to the Cultural Heritage Technical Bulletin for guidance and methods to reuse historic buildings.

Cluster development

Cluster development is a form of development that uses smaller lots, and reduced frontage and lot setbacks to focus development on the most appropriate portions of a site while preserving common open space on the more sensitive portions of a site. By concentrating development on one portion of a site, larger and more contiguous undisturbed or undeveloped areas or open spaces may be preserved. Frequently, cluster development permits a reduction in lot area requirements, frontage, and setbacks, allowing reduced construction costs for shorter roadways and other infrastructure. Permanently protected open space is often required as part of the development design and serves as an amenity for the immediate neighborhood and for the larger community.

FOR ALL PROJECTS

- **Cluster development on a portion of the site**: Rather than distributing development uniformly across a site, cluster development close together in areas that are least sensitive in terms of natural resources and where development can most efficiently share infrastructure and other resources. Lay out buildings, roads, and parking lots after sensitive areas and buffers for these areas have been established. Multistory buildings, mixed use development, and shared parking are features that can help support a smaller development footprint desired in cluster developments.

- **Reduce cut and fill to minimize disturbance to existing topography and vegetation**: Clear only where needed for construction and protect all disturbed areas from erosion and sedimentation. Develop only those areas of the site where the existing slopes are suitable for the proposed use. One benefit of constructing only on suitable slopes is reduced construction costs.
- **Follow existing topography and landscape**: Reflect the form of the land in new road layouts to minimize environmental and visual impact to the landscape. Generally follow existing contours so that roads integrate into the landforms with a minimum of cutting and filling.

FOR PROJECTS IN NATURAL AREAS

- **Reduce development footprints**: New development should be avoided in Natural Areas. Redevelopment or reuse of existing sites within or adjacent to Natural Areas should be clustered to reduce the overall development footprint. Any changes in this Placetype should involve reduced lots, shortened roadways, and protecting additional land from development. This is particularly true for coastal hazard areas where concerns about safety continue to increase and landforms have reduced ability to respond to natural forces.

Minimize total parking spaces to no more than what is required by zoning

In many cases, zoning for commercial uses requires large setbacks from roadways and excessive parking requirements. These requirements make it difficult for development to respect the Cape's traditional development patterns and can lead to unnecessarily large amounts of impervious surface on a site.

FOR ALL PROJECTS

- **Divide up large parking lots**: Divide large parking lots and buildings into smaller components as an alternative to extensive grading and paving. Landscaping can be used to divide the larger parking areas into discrete smaller parking areas. Landscaped islands should be at least 10-12 feet wide with trees planted 25-40 feet apart, depending on the tree species selected. Trees should generally be a minimum of 3 inches in diameter when planted. Landscaped islands should comprise 20% of the parking field.

- **Design parking lots to accommodate average, not peak, volume**: To reduce the amount of paved area, design parking lots to accommodate average, not peak, volume. The required number of parking spaces should be based on average use over a twelve-month period rather than peak holiday and summer months. Consider sharing parking areas with compatible uses, on-street parking, and town-owned parking lots, as well as school and church parking lots for shuttle service during peak use periods. For new developments, consider reserving an area for additional parking that will be paved in the future if a need is demonstrated, but which will otherwise remain as open space.
- **Use permeable or pervious pavement**: Permeable or pervious construction materials should be used whenever possible. Gridblocks with grass, crushed stone, or shells are possible solutions which can improve the appearance of lightly used or seasonal parking areas while reducing stormwater runoff. This is particularly appropriate in Historic Areas and areas adjacent to Natural Areas.
- **Provide facilities for other modes of transportation**: Provide bicycle racks and storage facilities, and/or bus stops, as appropriate to promote use of modes of transportation other than vehicular and reduce demand for vehicle parking.

Develop multi-story buildings where appropriate

Past development in the region often included multi-story buildings with usable second and third floors. Incorporating multiple stories in new development can reduce both the building footprint and development footprint without reducing the usable square footage.

FOR ALL PROJECTS

- **Add a second or third story to reduce building footprints**: New development should be designed with a usable second or third story, consistent with the region's traditional building forms. Building a second story, rather than placing the entire floor area on the ground level, can reduce the overall footprint of the proposed use and result in a building that more closely matches the local scale. A second story can also accommodate different uses, such as residential or office space above retail, creating a mixed-use development and allowing for more varied architectural features. Alternatively, a second story may be designed without added floor area, but simply to allow natural light to pass more freely into the interior of the building through an atrium space.

Provide parking under or within buildings or in structures

In some situations, incorporating a parking structure into the design of proposed buildings may be desirable to limit the amount of land area devoted to parking.

FOR ALL PROJECTS

- **Locate parking within or under buildings**: Locating a portion or all of a development's parking within the first floor of a building or underneath it in a parking garage reduces the need for impervious surface in excess of the building footprint.
- **Locate parking in parking structures**: Parking structures can minimize the amount of impervious surface by using multiple stories to create parking areas with a smaller footprint. Multi-story parking structures are preferably located to the rear of a building because it is difficult to design them in ways that are compatible with traditional building forms. If parking structures will be visible from the street or public ways, they should be incorporated into the design of the building, with a similar level of architectural detail.

Maintain existing vegetation and revegetate disturbed sites

Whenever possible, existing vegetation should be maintained on a site. When vegetation is disturbed, the site should be revegetated with appropriate native species. Refer to the Wildlife and Plant Habitat Technical Bulletin for additional information about appropriate species to plant and about preserving significant plant habitat.

FOR ALL PROJECTS

- **Integrate existing vegetation into the landscape plan**: Integrate existing mature trees and vegetation into the landscape plan. Preserve the function of existing vegetation, such as groves of trees that separate land uses or provide a natural backdrop for development.

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE CD3

Objective CD3 – *Avoid adverse visual impacts from infrastructure on scenic resources*

Large scale infrastructure projects such as telecommunication towers, solar fields, utility corridors and substations can have significant impacts on the region's community character because of their substantial height and land coverage. It is important to site these projects where they will not dominate sensitive neighborhoods or Placetypes. Smaller scale infrastructure projects, such as road and sidewalk improvements, expansion of public parking areas, and wastewater treatment facilities, are more likely to have impacts on their immediate surroundings. These infrastructure projects should be sited and designed to fit the natural or built character of the surrounding area, considering the scale of buildings as well as nearby cultural resources.

FOR ALL PROJECTS

Site infrastructure away from scenic resources

There are numerous locations or areas on Cape Cod that contain Scenic Resources. Siting infrastructure so that it is not visible from these locations is the preferred method for meeting Objective CD3. Avoid siting infrastructure in Natural Areas, open landscapes in Rural Development Areas, and Historic Areas.

Collocate infrastructure with other existing infrastructure and/or within buildings

Minimize visual impact of infrastructure by collocating or sharing space/poles with other existing infrastructure where possible and/or by locating infrastructure within existing buildings or other structures.

Utilize previously developed and/or impervious areas

For some types of infrastructure such as solar panels and utility infrastructure, the use of previously developed areas such as parking lots or where other infrastructure may already be located is strongly encouraged to reduce natural resource impacts.

Locate infrastructure underground where feasible

Another preferred method for infrastructure unless cultural or natural resources are present is to locate infrastructure underground where it is not visible.

Design and scale infrastructure appropriate to context

Where possible, infrastructure such as roads, sidewalks, traffic signals and other appurtenances as well as wireless facilities, should be designed to be compatible with the corresponding Placetype.

- **Minimize the height of infrastructure**. In visually sensitive areas, minimize the height of infrastructure to the minimum height necessary and/or locate at or below the height of surrounding vegetation.

- **Minimize lighting impacts to surrounding neighborhoods and visually sensitive areas**. Avoid flashing lights, strobe lighting, or brightly illuminated infrastructure unless required by the FAA for safety reasons.

- **Camouflage infrastructure to reduce its visibility**. Camouflage infrastructure through designs that reduce the visibility through techniques such as a reduced profile, color, or by disguising the infrastructure to resemble other structures in the built environment where appropriate. Use colors that mimic the predominant background setting and choose colors or materials that are less reflective.

- **Minimize the silhouette of infrastructure through design**. The outline or profile of infrastructure can be minimized through designs that are sleeker or slimmer.

Screen infrastructure with vegetative buffers, buildings, or other structures

In some cases, dense vegetative buffers may be effective in screening infrastructure from roadways or other public viewpoints. Additional guidance on screening methods is available under Objective CD1.

GENERAL APPLICATION REQUIREMENTS

Written Design Narrative. All applicants should provide a narrative that addresses both the project design and the building design. The narrative should present the Applicant's analysis of the project's Placetype and clearly explain the design concept, alternatives considered, and how the proposed project's siting and building design responds to surrounding context. Include information regarding appropriateness of project siting, building siting, and building materials.

Context Map. All applicants should provide a map identifying resource areas, existing landscape features, development patterns, open space networks, and other important features surrounding the project site.

Context Renderings. All applicants should provide project renderings that illustrate how the proposed development appears in relation to its surroundings. Based on the size, scale, and/or location of the project, Commission staff will identify the extent of the surrounding area that should be included in the renderings.

Required Project Plans

- Site Plans, with functional scale
- Building Elevations, with exterior building materials noted
- Roof Plans
- Landscaping plan and landscape maintenance protocol
- Lighting/Photometric plans and specifications
- Signage Plan and specifications (including signage lighting)

ADDITIONAL APPLICATION REQUIREMENTS FOR INFRASTRUCTURE PROJECTS

Applicants for infrastructure projects may be required to provide the following additional information as part of their DRI application. Based on the size, scale, and/or location of the project, Commission staff will determine if this additional information will be required at a pre-application meeting.

Visual Impact Map. Map of surrounding scenic resources showing areas from which the project may be visible. Based on the size, scale, and/or location of the project, Commission staff will make a determination on the extent of the map. For proposed offshore infrastructure that will affect broad ocean views, please see the Visual Impact Assessment Methodology for Offshore Developments (available from Commission Staff) for detailed methodology on assessing the project's visual impacts.

Visualizations and Simulations. Prepare photo-simulations as determined in the pre-application meeting to describe the anticipated effect of the proposed project on the region's scenic resources. The number of simulations required will depend on the anticipated impact and the sensitivity of the resources. The Visual Impact Assessment (VIA) should include consideration of all parts of the project, including all associated infrastructure both in the ocean or on land. In the event that more than one alternative is being considered, the visual impact of all alternatives should be evaluated by the applicant.

Additional Design Narrative Content. Provide a description of how the infrastructure project has been configured or located and how it avoids or minimizes visual impacts. The narrative should provide details concerning alternative configurations or sites that were evaluated in the design process and the design or mitigation strategies employed to reduce any visual impacts.

REFERENCES

Contextual Design on Cape Cod: Design Guidelines for Large Scale Development. Cape Cod Commission, October 2009. https://www.capecodcommission.org/resource-library/file/?url=/dept/commission/team/Website_Resources/regulatory/DesignManual.pdf

RESOURCES

Design Guidelines for Multifamily Housing. Cape Cod Commission, 2023. https://www.capecodcommission.org/our-work/mf-design-guidelines/

Flood Area Design Guidelines for Cape Cod. Cape Cod Commission, 2023. https://www.capecodcommission.org/our-work/flood-area-design-guidelines/

Coastal Resiliency DRAFT

This guidance is intended to clarify how the Coastal Resiliency Goal and Objectives of the Regional Policy Plan (RPP) are to be applied and interpreted in Cape Cod Commission Development of Regional Impact (DRI) project review. This technical bulletin presents specific methods by which a project can meet the goal and objectives.

Coastal Resiliency Goal: To prevent or minimize human suffering and loss of life and property or environmental damage resulting from storms, flooding, erosion, and relative sea level rise, including but not limited to that associated with climate change.

- **Objective CR1** – *Minimize development and risk within areas vulnerable to flooding*
- **Objective CR2** – *Plan for erosion*
- **Objective CR3** – *Restore coastal resource areas to promote their natural beneficial functions*

The applicability and materiality of these goals and objectives to a project will be determined on a case-by-case basis considering a number of factors including the location, context (as defined by the Placetype of the project's location), scale, use, and other characteristics of a project.

THE ROLE OF CAPE COD PLACETYPES

The RPP incorporates *a framework for regional land use policies and regulations based on local form and context* as identified through categories of Placetypes found and desired on Cape Cod.

The Placetypes are determined in two ways: some are depicted on a map contained within the RPP Data Viewer located at www.capecodcommission.org/RPPDataViewer adopted by the Commission as part of the Technical Guidance for review of DRIs, which may be amended from time to time as land use patterns and regional land use priorities change, and the remainder are determined using the character descriptions set forth in Section 8 of the RPP.

The project context, as defined by the Placetype of the project's location, provides the lens through which the Commission will review the project under the RPP.

TABLE OF CONTENTS

Introduction 4
Definitions 6
Summary of Methods 8
Detailed Discussion of Methods for Meeting Objective CR1 10
Detailed Discussion of Methods for Meeting Objective CR2 15
Detailed Discussion of Methods for Meeting Objective CR3 17
General Application Requirements 18
References 19

INTRODUCTION

Over the last several decades Cape Cod has seen considerable growth and development, much of it in the coastal zone. With 586 miles of coastline, one of the most significant risks to the region is the destructive impacts of increasingly intense coastal storms, extreme precipitation, and associated flooding, with both flooding and erosion exacerbated by rising sea levels. This means that some of the most scenic and desirable development sites are located in areas that are vulnerable to some kind of coastal hazard: storm surge, erosion, flooding, and sea-level rise.

Development within the floodplain places thousands of properties at risk. The Cape Cod Commission's Climate Action Plan estimated that adapting the coast to sea level rise and storm surge could avoid a potential $50 billion in losses resulting from damaged roads, residential real estate and economic assets, lost tax revenue, reduced beach tourism, and decreased land value through 2100. Cape Cod's coastlines are active with nonwater dependent development. Since the vast majority of the coastline is privately owned, decisions about how to prepare for and respond to coastal threats have fallen on the property owner. The Regional Policy Plan encourages a shift to more coordinated preparation and planning for coastal threats, and toward reducing hazards within the coastal zone.

Flood hazard areas are those areas defined and delineated by the Federal Emergency Management Agency (FEMA) as V and A Zones – areas impacted by storm driven wave action and/or inundated by flood waters, respectively. The V and A Zone maps (FEMA Flood Maps) are delineated by FEMA, and adopted by communities who participate in the National Flood Insurance Program (NFIP). FEMA uses these areas for participation in the NFIP, but they are more broadly employed as delineations of flood hazard areas.

FEMA Flood Maps are developed based on observed prior flood conditions. These maps do not consider expected changes that will occur with sea level rise and increasingly intense storm events. As sea level continues to rise and storm frequency and intensity increase, the FEMA Flood Maps no longer reflect the full extent of flood risk. There is a need to manage development activity within flood hazard areas today and into the future to reduce the impacts of storm-related damage to both the natural and built environment. Flood models, such as the Massachusetts Coast Flood Risk Model (MC-FRM), provide a more accurate representation of future flood risk. Both

FEMA Flood Maps and the best available coastal flooding model are used to evaluate DRIs.

Every effort should be made to avoid new development within the Present (FEMA) and Future Floodplain. Development within the floodplain is vulnerable to coastal storms, and increasingly will be vulnerable to the effects of sea level rise. Damage from coastal threats impacts property owners, neighbors, emergency responders, and the ability of the environment to provide important ecosystem services upon which the community relies.

Structures in the floodplain can redirect or channelize flooding and increase flood volume and velocity, exacerbating flood damage, erosion and damage to wetlands resources, buildings, roads and other structures. Debris, building materials and hazardous materials washed into the flooded area damage and pollute sensitive wetland resources.

For all development within the floodplain, applicants are encouraged to develop storm-preparedness and response plans to be prepared for coastal storms and floods and for post-disaster response to ensure the development is safe during storm events and any debris from the development is handled expeditiously and appropriately in coordination with local authorities.

DEFINITIONS

Areas Vulnerable to Flooding: Any land which is subject to inundation caused by coastal storms and sea level rise, including V and A Zones as defined by FEMA, and that predicted to be caused by the 1% annual storm for 2070, as defined by the Massachusetts Coast Flood Risk Model. A Zones include the Coastal A (MoWA) and A Zone (MiWA) identified in the draft DEP Floodplain regulations.

Base Flood Elevation: the elevation to which floodwater is anticipated to rise during the base flood. Base flood elevations (BFEs) are shown on Flood Insurance Rate Maps (FIRMs). The BFE is the regulatory requirement for the elevation or floodproofing of structures. The relationship between the BFE and a structure's elevation determines the flood insurance premium.

Coastal Banks: the seaward face or side of any elevated landform, other than a coastal dune, which lies at the landward edge of a coastal beach, land subject to tidal action, or other wetland, as defined in the Massachusetts Wetlands Protection Act Regulations (310 CMR 10.30).

Design Flood Elevation: The elevation of surface water resulting from inundation caused by sea level rise and coastal storms up to and including that predicted to be caused by the 1% annual storm in 2070, as defined by the Massachusetts Coast Flood Risk Model, or the State Building Code, whichever is higher. Reference the Flood Data Viewer https://cccommission.maps.arcgis.com/apps/instant/portfolio/index.html?appid=7010cb5c13c44f3ab3a239a614ae9e84

Future Floodplain: The future floodplain is that area encompassed by the additional area landward of the FEMA floodplain to the MC-FRM 2070 1% annual storm extent (identified as "2070 Coastal Flood Exceedance Probabilities (MC-FRM)" data layer on MORIS), and includes flood depths for the MC-FRM 2070 1% annual storm (identified as "2070 Flood Depths for the 1% ACFEP (MC-FRM) data layer on MORIS)".

Minimal Wave Action Area (MiWA): A subarea of the A Zone, as identified on the FIRM and defined in the draft DEP Regulations at 310 CMR 10.36(2). The MiWA is the area where base flood wave heights are less than 1.5 feet.

Moderate Wave Action Area (MoWA): A subarea of the A Zone, also known as Coastal A Zone, as identified on the FIRM and defined in the draft DEP Regulations at 310 CMR

10.36(2). The MoWA is the area where base flood heights are equal to or greater than 1.5 but less than 3 feet.

Non-Water-Dependent Use: Non-water-dependent uses are those which may be located on waterfront property, but do not rely on their close proximity to the water. Examples of non-water-dependent uses include retail and commercial outlets, hotels, offices, restaurants, gas stations and residences.

Predicted Path of Wetland Migration: Areas adjacent to existing salt marsh, coastal beach, barrier beach, coastal dune, coastal bank or rocky intertidal shore where the wetland resource is predicted to migrate due to rising sea-levels. Applicants should consult the Massachusetts Sea Levels Affecting Marsh Migration (SLAMM) model (intermediate high SLR scenario), or other best available model recognized by the Commonwealth, to identify the predicted path of wetland migration. At a minimum, the predicted path of wetlands migration shall be presumed to include the adjacent 100 ft buffer zone of the wetland resource, unless topography or other factors predict a differing pattern of wetland migration.

Present Floodplain: The floodplain as defined and delineated by the Federal Emergency Management Agency (FEMA) as V and A Zones – areas impacted by storm driven wave action and/or inundated by flood waters, respectively. The V and A zone maps (FEMA Flood Maps) are delineated by FEMA, and adopted by communities who participate in the National Flood Insurance Program (NFIP).

Water-Dependent Use: In general, water-dependent uses are those that require direct access to or location in tidal or inland waters. Examples of water-dependent uses include piers, wharves, marinas, boathouses, shoreline protection, jetties, revetments, seawalls, ripraps and floats.

SUMMARY OF METHODS

GOAL | COASTAL RESILIENCY

To prevent or minimize human suffering and loss of life and property or environmental damage resulting from storms, flooding, erosion, and relative sea level rise, including but not limited to that associated with climate change.

OBJECTIVE CR1 – Minimize development and risk within areas vulnerable to flooding

METHODS

All DRIs in the Present (FEMA) and Future Floodplain must:

- Limit new development in V zones to water-dependent uses and only where the applicant can show that there is no feasible alternative and that development impacts are minimized and mitigated.
- Limit new nonwater-dependent development in the Coastal A-zone (Moderate Wave Action area, or MoWA) to only development where the applicant can show that there is no feasible alternative and that impacts are minimized and mitigated and can demonstrate an overriding public purpose. Non-water-dependent redevelopment may occur if the applicant can show that there is no feasible alternative, gross floor area is reduced or remains the same, and that impacts are minimized and mitigated. Water-dependent uses are allowed but impacts must be minimized and mitigated.
- Avoid development or redevelopment in the A-zone (Minimal Wave Action area, or MiWA) and Future Floodplain unless the applicant demonstrates that there is no feasible alternative, and minimize and mitigate impacts to coastal resources in order to protect their natural beneficial functions (including but not limited to hazard mitigation and habitat).
- Avoid exacerbating flood conditions.
- Accommodate the Predicted Path of Wetland Migration.
- Use NADV88 datum.
- Use construction best practices to prevent damage to the site or dislodging of material into flood waters.

OBJECTIVE CR2 – Plan for erosion

All DRIs on or near coastal banks must:

- Limit new development on or within 100 ft of a coastal bank to water-dependent uses and only if the applicant can show that there is no feasible alternative and that impacts are minimized and mitigated.
- Provide an adequate setback from the top of the coastal bank to reflect long-term erosion rates.
- Redevelopment Projects: Demonstrate that there is no feasible alternative to redevelopment on or within 100 ft of a coastal bank and minimize and mitigate impacts.

OBJECTIVE CR3 – Restore coastal resource areas to promote their natural beneficial functions

METHODS

- Remove existing development in coastal resource areas.
- Restore or rehabilitate salt marsh, beach, dune or floodplains, or restore the ability for coastal resources to migrate naturally.

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE CR1

Objective CR1 – *Minimize development and risk within areas vulnerable to flooding*

All DRIs in the Present (FEMA) and Future Floodplain must:

V ZONES: LIMIT NEW DEVELOPMENT IN V ZONES TO WATER-DEPENDENT USES AND ONLY WHERE THE APPLICANT CAN SHOW THAT THERE IS NO FEASIBLE ALTERNATIVE AND THAT DEVELOPMENT IMPACTS ARE MINIMIZED AND MITIGATED.

New development in V zones, (also known as high-hazard areas), is not allowed except for water-dependent uses where there are no feasible alternatives and the impacts have been minimized and mitigated. A showing of no feasible alternatives should include an evaluation of alternative locations for the water dependent use that could achieve the goals of the project.

COASTAL A ZONES: LIMIT NEW NONWATER-DEPENDENT DEVELOPMENT IN THE COASTAL A-ZONE (MODERATE WAVE ACTION AREA, OR MOWA) TO ONLY DEVELOPMENT WHERE THE APPLICANT CAN SHOW THAT THERE IS NO FEASIBLE ALTERNATIVE AND THAT IMPACTS ARE MINIMIZED AND MITIGATED AND CAN DEMONSTRATE AN OVERRIDING PUBLIC PURPOSE. NON-WATER-DEPENDENT REDEVELOPMENT MAY OCCUR IF THE APPLICANT CAN SHOW THAT THERE IS NO FEASIBLE ALTERNATIVE, GROSS FLOOR AREA IS REDUCED OR REMAINS THE SAME, AND THAT IMPACTS ARE MINIMIZED AND MITIGATED. WATER-DEPENDENT USES ARE ALLOWED BUT IMPACTS MUST BE MINIMIZED AND MITIGATED.

New development within Coastal A zones (Moderate Wave Action area or MoWA) is not allowed, except for the following circumstances: 1) New development may be permitted where the applicant can demonstrate that there is no feasible alternative and that the impacts have been minimized and mitigated, and can demonstrate an overriding public purpose, or 2) New development in Community Activity Centers and Maritime Areas Placetypes proposed in Coastal A zones may be permitted provided impacts have been minimized.

Redevelopment may occur in Coastal A zones if the applicant demonstrates that removing development or relocating it on the site to reduce hazard exposure is infeasible. Where relocating development to reduce hazard exposure (including reducing project footprint or intensity of use in the Coastal A zone) is not possible, reconstruction on the existing development footprint may be permitted provided there is no increase in impervious footprint or intensity of use from the prior use or structure. Intensity of use may include, but is not limited to, increases in wastewater flow, gross floor area, impervious area, or parking spaces, or conversion from seasonal to year-round use. Redevelopment projects that increase intensity of use or impervious footprint will be evaluated as new development.

Maintenance of existing public infrastructure and water-dependent structures is permitted in Coastal A Zones.

Non-water-dependent public infrastructure should not be constructed within Coastal A Zones unless there is an overriding public purpose in doing so. Where public infrastructure is proposed to remedy an existing problem or need within the floodplain, it should not result in the promotion of additional development within the floodplain.

New seawalls or other hard coastal engineered structures designed to control erosion are not permitted in Coastal A Zones; nor is new structural fill, or fill for mounding septic systems permitted. Stairs and access features must be removable for storm damage prevention. Fences must have open slats to allow for flood water movement.

Green infrastructure (also known as nature-based solutions) and restoration projects within the floodplain are supported, provided the applicant can demonstrate that impacts associated with the project have been minimized, and mitigated as may be necessary, recognizing that restoration projects typically serve to mitigate impacts associated with the restoration.

AVOID DEVELOPMENT OR REDEVELOPMENT IN THE A-ZONE (MINIMAL WAVE ACTION AREA, OR MIWA) AND FUTURE FLOODPLAIN UNLESS THE APPLICANT DEMONSTRATES THAT THERE IS NO FEASIBLE ALTERNATIVE, AND MINIMIZE AND MITIGATE IMPACTS TO COASTAL RESOURCES IN ORDER TO PROTECT THEIR NATURAL BENEFICIAL FUNCTIONS (INCLUDING BUT NOT LIMITED TO HAZARD MITIGATION AND HABITAT).

New development within A zones (Minimal Wave Action Area or MiWA) and the Future Floodplain may be permitted if the applicant can demonstrate that there is no feasible alternative and that the impacts have been minimized. If new development proposed in Community Activity Centers and Maritime Areas Placetypes is located in A Zones or the

Future Floodplain, it may be permitted provided the applicant can demonstrate that impacts have been minimized.

Where redevelopment is proposed in the A Zone or Future Floodplain, redevelopment may be permitted provided there is no increase in impervious footprint or intensity of use from the prior use or structure. Intensity of use may include, but is not limited to, increases in wastewater flow, gross floor area, impervious area, or parking spaces, or conversion from seasonal to year-round use. Redevelopment projects that increase intensity of use or impervious footprint will be evaluated as new development.

All redevelopment must comply with current applicable regulations, including building code.

Maintenance of existing public infrastructure and water-dependent structures is permitted in A Zones and Future Floodplains.

Non-water-dependent public infrastructure should not be constructed within the A Zone or Future Floodplain unless there is an overriding public purpose in doing so. Where public infrastructure is proposed to remedy an existing problem or need within the floodplain, it should not result in the promotion of additional development within the floodplain.

Fill is allowed only if the applicant can demonstrate that it will not result in adverse redirection or channelization of flood waters.

Green infrastructure (also known as nature based solutions) and restoration projects within the A Zone and Future Floodplain are supported, provided the applicant can demonstrate that impacts have been minimized and mitigated.

AVOID EXACERBATING FLOOD CONDITIONS.

Development and redevelopment must be designed to address anticipated sea level rise and floodwaters. The applicant must demonstrate that 1) the project will not redirect, channelize or exacerbate flood conditions or ponding in wetlands or on other properties through provision of a flood risk analysis, and 2) that structures are elevated to the Design Flood Elevation (DFE). Structures should be designed and built well to weather the elements and avoid short-term obsolescence (which also results in waste of resources). Where development activity may be allowed on beaches, dunes, and salt marshes, structures should be built on open pilings to allow for storm flowage, wave action, and resource migration.

FEMA recognizes that certain historic properties may not be suitable for elevation where the setting for the building is important in defining its historic character. The Commission may also apply flexibility in requiring elevation of a historic structure where doing so would significantly alter the building's historic qualities.

ACCOMMODATE THE PREDICTED PATH OF WETLAND MIGRATION

Development or redevelopment within the predicted path of wetland migration must preserve vegetated areas, and limit new or expanded impervious surfaces. Applicants are advised to consult Massachusetts EEA's Sea Level Affecting Marshes Model (SLAMM) resources, including maps, to understand resources that are anticipated to migrate and possible migration direction. Projects proposing work in or near areas of wetland migration will be evaluated based on current and proposed conditions on the site. Applicants proposing work within areas of likely wetland migration should provide an assessment of impacts prepared by a coastal engineer or wetland scientist, and should consider conditions based on the Intermediate High Scenario and the 2070 time horizon, unless a case can be made for considering a shorter time horizon. At a minimum, the predicted path of wetland migration shall be presumed to include the adjacent 100 ft buffer zone of the wetland resource, unless topography or other factors predict a differing pattern of wetland migration. New septic systems are prohibited within the predicted path of wetland migration. Unavoidable development must be mitigated consistent with provisions in the Wetland Technical Bulletin, ideally within the area of the predicted path of wetland migration.

USE NAVD88 DATUM

The most recent Mean Sea Level datum available for a site must be used to determine base flood elevation and inform all coastal construction activities. When determining Mean Sea Level, applicants must use the 1988 datum of NAVD88.

USE CONSTRUCTION BEST PRACTICES TO PREVENT DAMAGE TO THE SITE OR DISLODGING OF MATERIAL INTO FLOOD WATERS.

During new construction or redevelopment, construction materials must be stored and secured to prevent damage from flood waters or dislodging into flood waters. Hazardous materials should not be stored in the floodplain unless in limited quantities required for construction operations and secured in a flood protected location. Fences and gates must be installed with the posts anchored in the ground and the fence or gate panels must be placed above the ground and constructed with open slats or other openings so as to allow water to pass under and through the fence or gate. Use anchoring and wet- and dry-floodproofing measures, as appropriate.

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE CR2

Objective CR2 – Plan for erosion

All DRIs in or near coastal banks must:

LIMIT NEW DEVELOPMENT ON OR WITHIN 100 FT OF A COASTAL BANK TO WATER-DEPENDENT USES AND ONLY IF THE APPLICANT CAN SHOW THAT THERE IS NO FEASIBLE ALTERNATIVE AND THAT IMPACTS ARE MINIMIZED AND MITIGATED.

The Wetlands Protection Act Regulations (310 CMR 10.30) define coastal banks as "the seaward face or side of any elevated landform, other than a coastal dune, which lies at the landward edge of a coastal beach, land subject to tidal action, or other wetland." Eroding coastal banks are a principal source of sediment for beaches, dunes, and barrier beaches. Coastal banks also serve as vertical buffers to storm and flood waters.

New development is not permitted on or within the 100-foot buffer to a coastal bank except for : water-dependent development provided the applicant shows that there is no feasible alternative, that the impacts to the natural functions of coastal resources are both minimized and mitigated, and that the development is designed to address anticipated sea level rise. Exceptions may also be made for the following activities provided the applicant demonstrates that best available measures are utilized to minimize adverse impacts on all critical coastal resources::

- Bank nourishment and non-structural restoration projects that do not impair the natural beneficial functions of the resource, including temporary fencing and other devices composed of natural material intended to facilitate the resources' natural beneficial function. Monitoring and maintenance plans may be required.
- Appropriately designed and sited pedestrian walkways and elevated decks with appropriate orientation, height, and spacing between planks to allow sufficient sunlight penetration to maintain underlying vegetation and resource migration.
- Maintenance and use of existing public boat launching facilities.
- Maintenance of existing public infrastructure.
- Maintenance required to preserve the aesthetics or structural integrity of existing marine infrastructure.
- Underground utility crossings that do not disturb protected resources.

PROVIDE AN ADEQUATE SETBACK FROM THE TOP OF THE COASTAL BANK TO REFLECT LONG-TERM EROSION RATES

All nonwater dependent development proximate to a coastal bank must be set back from the top of the coastal bank at least 30 times the average annual erosion rate of the shoreline or 100 feet, whichever is greater. Development should be located as far landward of the coastal bank as is feasible within a site.

The average annual rate of shoreline erosion is determined by averaging the erosion over the previous 30-year period, at a minimum, or other time frame determined by the Commission, to appropriately reflect current and future shoreline conditions.

Calculating a setback from the top of the coastal bank of at least 70 times the average annual erosion rate of the bank is encouraged. Doing so reflects the typical 70-year lifetime of a residential building, based on a study conducted for the Federal Insurance Administration to establish reliable estimates for the life of residential coastal structures.

REDEVELOPMENT PROJECTS: DEMONSTRATE THAT THERE IS NO FEASIBLE ALTERNATIVE TO REDEVELOPMENT ON OR WITHIN 100 FT OF A COASTAL BANK AND MINIMIZE AND MITIGATE IMPACTS

Redevelopment, where there is no increase of intensity of use, may be permitted on or within 100 feet of a coastal bank provided the applicant shows there is no feasible alternative, that there is no increase in impacts to the natural functions of coastal resources, and that the project is designed to address the effects of anticipated sea level rise on proposed structures. The applicant must evaluate relocating development on the site to reduce hazard exposure and impacts to natural functions of coastal resources. Redevelopment should be designed to have no adverse impact on the function of the bank as a natural sediment source to the coastal system.

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE CR3

Objective CR3 – *Restore coastal resource areas to promote their natural beneficial functions*

Remove existing development in coastal resource areas.

In coastal resource areas, prior to considering redevelopment, the applicant should evaluate the potential for removing or reducing development from coastal hazard areas, or moving development landward to reduce risk. Removal of development from sensitive coastal resource areas is encouraged. Where redevelopment is allowed, existing development should be removed from the most sensitive areas of the site to allow for restoration and resource migration.

Coastal Resource Restoration

Coastal resources provide multiple beneficial functions, including protecting coastlines and landward properties from storms and flooding. Consistent with objectives CR1 and CR2, activities intended to restore the natural beneficial functions of coastal resource areas are permitted. Natural and/or non-structural methods for coastal restoration are encouraged. Activities might include, but are not limited to, beach, dune and bank nourishment; salt marsh, , fish run, or shellfish bed restoration; revegetation with native plant species; temporary fencing and other approaches employing natural materials designed to re-establish or create natural forms and functions. Development and redevelopment consistent with CR1 and CR2 should incorporate coastal restoration and use of native plants into landscape and revegetation plans to address disturbed areas of the site.

GENERAL APPLICATION REQUIREMENTS

Applicants are required to submit the following as part of their DRI application:

- Site plan showing delineation of all coastal resources and the 100 ft buffer to those delineations.
- If development is proposed within coastal resource areas or buffers, plans detailing the development proposed should be provided, including site plans of existing and proposed conditions, and planting plan for restoration of the site. A geotechnical report should also be provided to substantiate the safety and stability of any coastal structures.
- Narrative discussing the alternatives considered, and plans of the alternatives, as appropriate.
- To help demonstrate development in the floodplain will not exacerbate flood conditions consistent with CR1, a flood risk analysis must be provided. A flood risk analysis is a hydrodynamic modeling analysis performed to assess any potential flooding changes (flood depth and extent), and velocity changes (redirection and concentration of flood flows) associated with the proposed development. The analysis should evaluate flooding under current and future flood conditions and indicate the potential for adverse effects to the site, adjacent properties, and infrastructure for the useful life of the development. The analysis should account for the effects of wave action and show modeled depths, velocities, and pathways of present and future floodwaters.

REFERENCES

Regional Policy Plan Data Viewer

Flood Area Design Guidelines for Cape Cod. These guidelines were developed to review the main strategies available for reducing or eliminating hazards from sea level rise and storm surge to life and the built environment while also protecting the region's distinctive character and historic resources, both in the short term and the long term.

Floodplain Data Viewer. This GIS-based data viewer provides a visual representation to illustrate the potential effects of historic and future floods. The floodplain data viewer provides existing FEMA flood extents and future flood extents projected by the Massachusetts Coast Flood Risk Model (MC-FRM).

Low Lying Roads Viewer. Low lying roads are areas prone to flooding from the combined effects of hazards such as sea level rise, storm surge, and erosion. The viewer displays inundation probability, and criticality scores, to determine the top vulnerable roads for each town.

The Massachusetts Office of Coastal Zone Management (CZM) maintains several maps and viewers that should be consulted when proposing a coastal project, including:

- Massachusetts Sea Level Rise and Coastal Flooding Viewer (https://www.mass.gov/info-details/massachusetts-sea-level-rise-and-coastal-flooding-viewer)
- Shoreline Change Project and Coastal Erosion Viewer (https://www.mass.gov/info-details/massachusetts-shoreline-change-project)
- Sea Level Affecting Marshes Model (SLAMM) (https://www.mass.gov/info-details/sea-level-affecting-marshes-model-slamm)

Capital Facilities and Infrastructure DRAFT

This guidance is intended to clarify how the Capital Facilities and Infrastructure Goal and Objectives of the Regional Policy Plan (RPP) are to be applied and interpreted in Cape Cod Commission Development of Regional Impact (DRI) project review. This technical bulletin presents specific methods by which a project can meet the goal and objectives.

Capital Facilities and Infrastructure Goal: *To guide the development of capital facilities and infrastructure necessary to meet the region's current and demonstrated future needs*

- **Objective CAP1 –** *Ensure capital facilities and infrastructure promote efficiency, sustainability, and resiliency*
- **Objective CAP2 –***Enhance the coordinated provision of services and facilities that respond to the needs of the region*

The applicability and materiality of these goals and objectives to a project will be determined on a case-by-case basis considering a number of factors including the location, context (as defined by the Placetype of the project's location), scale, use, and other characteristics of a project.

THE ROLE OF CAPE COD PLACETYPES

The RPP incorporates *a framework for regional land use policies and regulations based on local form and context* as identified through categories of Placetypes found and desired on Cape Cod.

The Placetypes are determined in two ways: some are depicted on a map contained within the RPP Data Viewer located at www.capecodcommission.org/RPPDataViewer adopted by the Commission as part of the Technical Guidance for review of DRIs, which may be amended from time to time as land use patterns and regional land use priorities change, and the remainder are determined using the character descriptions set forth in Section 8 of the RPP.

The project context, as defined by the Placetype of the location, provides the lens through which the Commission will review the project under the RPP.

TABLE OF CONTENTS

Introduction 4
Definitions 4
Applicability 4
Summary of Methods 5
Detailed Discussion of Methods for Meeting Objective CAP1 7
Detailed Discussion of Methods for Meeting Objective CAP2 9
General Application Requirements 10

INTRODUCTION

The Cape Cod Commission Act requires the Commission to "anticipate, guide and coordinate the rate and location of development with the capital facilities necessary to support such development, in order to protect the region's natural and historic resources and advance a more balanced economy, housing mix, and social diversity." In order to meet this charge, the Regional Policy Plan includes a specific capital facilities and infrastructure goal and objectives to guide planning initiatives and set the measures by which the regulatory review process takes place.

DEFINITIONS

Areas Vulnerable to Flooding: Any land which is subject to inundation caused by coastal storms and sea level rise, including V and A Zones as defined by FEMA, and that predicted to be caused by the 1% annual storm for 2070, as defined by the Massachusetts Coast Flood Risk Model. A Zones include the Coastal A (MoWA) and A Zone (MiWA) identified in the draft DEP Floodplain regulations.

APPLICABILITY

This Capital Facilities and Infrastructure goal and related objectives apply to projects whose primary purpose is constructing or modifying capital facilities or infrastructure. For the purposes of this guidance document, capital facilities and infrastructure include but are not limited to roads and non-auto transportation structures, drinking water and wastewater distribution and treatment systems, waste disposal and management facilities, telecommunications lines and equipment, energy distribution and generation facilities, and coastal structures and improvements.

SUMMARY OF METHODS

GOAL | CAPITAL FACILITIES AND INFRASTRUCTURE

To guide the development of capital facilities and infrastructure necessary to meet the region's current and demonstrated future needs.

OBJECTIVE CAP1 – Ensure capital facilities and infrastructure promote efficiency, sustainability, and resiliency

METHODS

Where feasible and appropriate, the following methods should be implemented to meet Objective CAP1:

- Locate capital facilities and infrastructure outside of areas vulnerable to flooding
- Use existing structures, utility easements, and/or rights-of-way
- Locate infrastructure underground
- Support compact development patterns
- Design capital facilities for resilience to current and future risks

AREAS OF EMPHASIS BY PLACETYPE

Natural Areas | Avoid locating capital facilities and infrastructure in these areas unless the project can demonstrate overriding public purpose

Rural Development Areas | Minimize impacts to scenic or cultural resources through siting and design of capital facilities and infrastructure

Suburban Development Areas, Historic Areas, Maritime Areas, and Community Activity Centers | Design and site capital facilities and infrastructure to support compact land use patterns and economic development while protecting historic and scenic resources

Industrial Activity Centers and Military and Transportation Areas | Larger capital facilities and infrastructure may be appropriate in these areas; should support industrial development and diversity and vitality of the regional economy

OBJECTIVE CAP2 – Enhance the coordinated provision of services and facilities that respond to the needs of the region

METHODS

Where feasible and appropriate, the following methods should be implemented to meet Objective CAP2:

- Improve the quality or availability of service
- Provide site sharing or space for other providers or types of infrastructure
- Coordinate project construction with other planned or needed infrastructure projects

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE CAP1

Objective CAP1 - *Ensure capital facilities and infrastructure promote efficiency, sustainability, and resiliency*

The intent of Objective CAP1 is that capital facilities and infrastructure projects should promote sustainability of the region by supporting compact land use patterns to the greatest extent possible, by supporting transition to carbon-free infrastructure, and by being located and designed to avoid impacts to natural, historic and cultural resources. Capital facilities and infrastructure should also be designed to be resilient to extreme weather events and the effects of climate change or other natural or man-made risks and be responsive to the context in which they are located.

Where feasible and appropriate, the following methods should be implemented to meet Objective CAP1:

Locate capital facilities and infrastructure outside of Areas Vulnerable to Flooding

The location of capital facilities and infrastructure could have a significant impact on a community's resilience to natural disasters. When feasible, capital facilities and infrastructure should be located outside of Areas Vulnerable to Flooding to ensure that services and access to facilities are available in the event of a natural disaster and protected from damage or loss due to severe coastal storms.

Use existing structures, utility easements, and/or rights-of-way

Capital facilities and infrastructure should utilize existing structures, utility easements and rights-of-way wherever feasible to reduce costs, minimize waste, minimize private property impacts, and limit impacts on the natural environment.

Locate infrastructure underground

When feasible, locate infrastructure underground where it will not be subject to wind, ice, tree falls or other above ground hazard to reduce vulnerability to severe storms or other natural or human-made risks.

Support compact development patterns

The location of capital facilities and infrastructure shapes future development patterns in the region. Capital facilities and infrastructure that support compact land use patterns, including development and redevelopment in Community and Industrial Activity Centers, are strongly encouraged to reduce the cost of providing infrastructure and encourage efficient use of land and resources. Infrastructure should be co-located with other public utilities wherever feasible to reduce the impact of utility installation on the landscape.

Design capital facilities for resilience to current and future risks

Capital facilities and infrastructure should be designed and sited to be resilient to extreme weather events and the effects of climate change, such as wildfire, extreme heat, drought, and rising ground water or salt water intrusion due to sea level rise, or other natural or human-made risks. Structures should be designed and sited with the following principles in mind:

- Consideration of site selection to reduce exposure to hazards
- Structural design to withstand anticipated wind or floodwater forces, temperatures, or corroding effects
- System redundancy to ensure continued service during disruptions
- Adaptability and flexibility to allow for future modifications
- Utilizing natural ventilation and passive cooling to reduce reliance on energy during power outages
- Adequate stormwater design to accommodate anticipated changes in precipitation

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE CAP2

Objective CAP2 - *Enhance the coordinated provision of services and facilities that respond to the needs of the region*

Where feasible and appropriate, the following methods should be implemented to meet Objective CAP2:

Improve the quality or availability of service

Capital facilities and infrastructure should provide safe, reliable, affordable, accessible, equitable, high-quality services. Services, including but not limited to the provision of drinking water, wastewater treatment, waste disposal, telecommunications, and energy are critical to the built and community systems of Cape Cod. Capital facilities and infrastructure investment can help to open new markets, encourage the growth of industries that diversify the regional economy, encourage fossil fuel-free energy, and enhance educational opportunities, thereby improving lives and supporting the advancement of the region's civic and business communities.

Provide site sharing or space for other providers or types of infrastructure

When appropriate, capital facilities and infrastructure should provide space on-site for other planned or future infrastructure or through collocation to reduce the cost of providing infrastructure and minimize impacts on the region's character and environment.

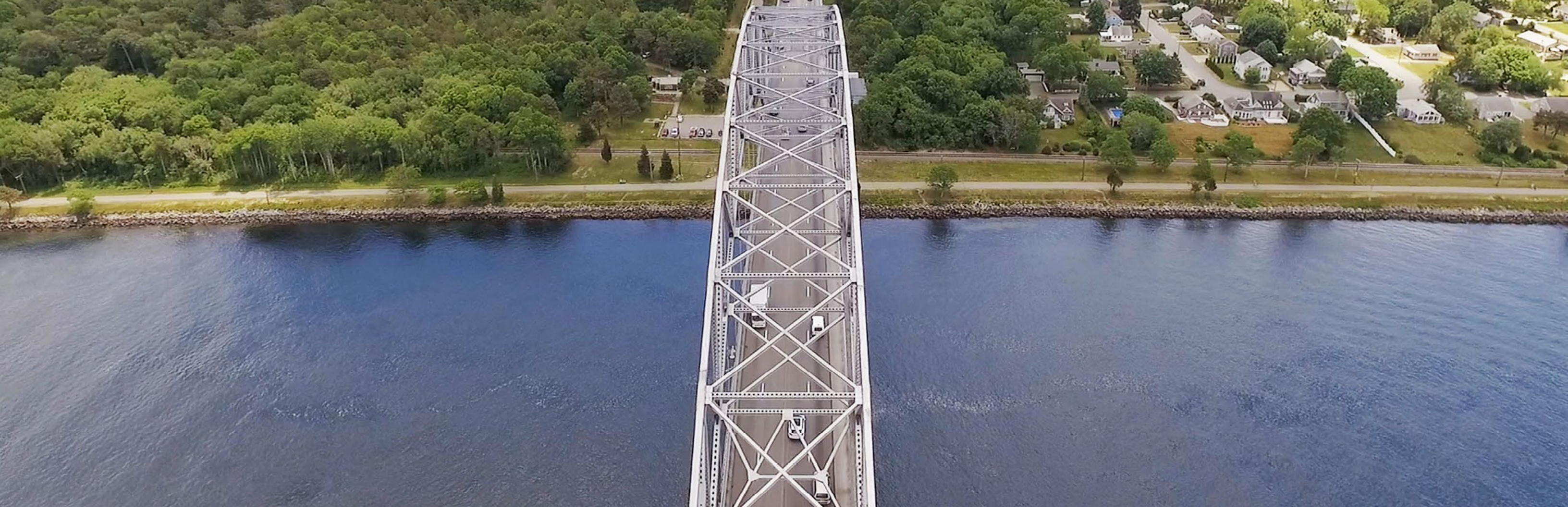
Coordinate project construction with other planned or needed infrastructure projects

Capital facilities and infrastructure should be coordinated with other existing or planned capital facilities and infrastructure to reduce the cost of providing infrastructure, limit land clearing and impacts to natural and other resources, and to protect the region's historic and community character.

GENERAL APPLICATION REQUIREMENTS

Applicants should provide the following materials to address consistency with the Capital Facilities and Infrastructure Goal and Objectives.

- Project plans detailing the location(s) of the proposed project
- Narrative discussing the alternatives considered, as appropriate.
- Statement of need that provides the information necessary to determine whether:
    - The project addresses existing needs of Cape Cod without unnecessarily duplicating existing services or facilities; and/or,
- The project addresses demonstrated future needs.
- Narrative describing how the project is resilient to current and future natural and human-made risks and will advance overall resiliency.



Transportation DRAFT

This guidance is intended to clarify how the Transportation Goal and Objectives of the Regional Policy Plan (RPP) are to be applied and interpreted in Cape Cod Commission Development of Regional Impact (DRI) project review. This technical bulletin presents specific methods by which a project can meet the goal and objectives.

Transportation Goal: To provide and promote a safe, reliable, and multi-modal transportation system.

- **Objective TR1** – *Improve safety and eliminate hazards for all users of Cape Cod's transportation system*
- **Objective TR2** – *Provide and promote healthy transportation options and appropriate connections for all users*
- **Objective TR3** – *Implement and promote vehicle trip reduction strategies*
- **Objective TR4** – *Provide and promote an efficient and reliable transportation system by reducing congestion*

The applicability and materiality of these goals and objectives to a project will be determined on a case-by-case basis considering a number of factors including the location, context (as defined by the Placetype of the project's location), scale, use, and other characteristics of a project.

THE ROLE OF CAPE COD PLACETYPES

The RPP incorporates *a framework for regional land use policies and regulations based on local form and context* as identified through categories of Placetypes found and desired on Cape Cod.

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TABLE OF CONTENTS

Introduction 4
Summary of Methods 5
Detailed Discussion of Methods for Meeting Objective TR1 8
Detailed Discussion of Methods for Meeting Objective TR2 12
Detailed Discussion of Methods for Meeting Objective TR3 14
Detailed Discussion of Methods for Meeting Objective TR4 16
Application Requirements (Transportation Impact Assessment Elements) 22
References and Resources 31
- References 31
- Mapping Resources 31

INTRODUCTION

Numerous subsystems make up Cape Cod's transportation network including vehicular roadways, railways, public transportation, air travel, marine transportation, and pedestrian and bicyclist accommodations and networks. These systems are responsible for safely and effectively moving the people of the region and the goods they rely on. Additionally, these systems must serve not only the year-round population but must also effectively handle the movements of the more than doubled seasonal population, which requires building and maintaining a transportation system that functions under the strain of the peak season, without negatively impacting the character that defines this unique place.

Section 7 of the RPP – Coordinated Regional and Local Planning – outlines the vision of the Cape Cod Regional Transportation Plan (RTP) and identifies the important connection between transportation and land use planning. If the region is to achieve the RTP vision for "a transportation system that supports the environmental and economic vitality of the region through infrastructure investment that focuses on livability, sustainability, equity, and preservation of the character that makes our special place special," smart transportation investment and land use planning decisions need to be made at all levels.

This Technical Bulletin provides examples of various methods and strategies that DRI projects may use to satisfy the Transportation Goal and Objectives of the RPP. Through implementation of these methods and strategies, DRI projects can support the advancement of a transportation system consistent with the vision of the region.

This Technical Bulletin also presents guidance on elements of a Transportation Impact Assessment (TIA) necessary to demonstrate that the project meets the applicable goals and objectives (see page TR-22). Applicants are encouraged to reach out to Cape Cod Commission staff early in the application process to discuss preparation of a TIA.

SUMMARY OF METHODS

GOAL | TRANSPORTATION

To provide and promote a safe, reliable, and multi-modal transportation system.

OBJECTIVE TR1 – Improve safety and eliminate hazards for all users of Cape Cod's transportation system

METHODS

All DRIs must employ the following methods to meet Objective TR1:

- Prepare an appropriate Transportation Impact Assessment (TIA).
- Apply good access management principles in site and driveway design. (Locate driveways to provide acceptable sight distance and locate signs, vegetation, lighting, and other fixed objects in manner that avoid creating sight distance obstructions.
- For projects anticipated to generate 50 or more peak hour trips, present a detailed analysis of off-site safety impacts of the development at Study Area locations and implement appropriate safety improvements.

OBJECTIVE TR2 – Provide and promote healthy transportation options and appropriate connections for all users

METHODS

All DRIs must employ the following methods to meet Objective TR2:

- Provide safe pedestrian connections throughout the site and, where practical, to adjacent sites.

Where feasible:

- Provide appropriate rights-of-way along the street frontage and/or across the property to accommodate current and future pedestrian, bicycle, and transit needs.

Where feasible and appropriate:

- Construct sidewalks, multi-use paths, and/or bicycle/pedestrian connections along or across the site with connections out to the existing pedestrian and bicycling network.

OBJECTIVE TR3 – Implement and promote vehicle trip reduction strategies

METHODS

All DRIs must employ the following methods to meet Objective TR3:

- Housing and employment sites should implement Transportation Demand Management (TDM) best practices.
- For employment sites with 25 or more employees develop and implement a site-specific TDM Plan.

OBJECTIVE TR4 – Provide and promote an efficient and reliable transportation system by reducing congestion

METHODS

All DRIs must employ the following methods to meet Objective TR4:

- Provide for full mitigation of congestion impacts on the transportation system through a combination of trip reduction measures, physical congestion mitigation, and, as appropriate, congestion mitigation payments commensurate with the development's congestion impact.
- For projects anticipated to generate 100 or more peak hour trips, provide a detailed analysis of off-site congestion impacts and of any proposed physical congestion mitigation.

OBJECTIVE TR4 AREAS OF EMPHASIS BY PLACETYPE

Natural Areas and Rural Development Areas | Implement trip reduction measures and mitigate remaining congestion impacts through congestion mitigation payments. Physical improvements may be appropriate where they enhance compatible access to natural, scenic, and cultural resources and do not adversely impact these resources.

Suburban Development Areas | Implement trip reduction measures and address congestion impacts within the study area through compatible physical improvements. Impacts beyond the study area may be mitigated through congestion mitigation payments.

Historic Areas and Maritime Areas | Implement trip reduction measures and mitigate remaining congestion impacts through congestion mitigation payments. Physical improvements may be appropriate where they enhance compatible access to natural, scenic, and cultural resources and do not adversely impact these resources.

Community Activity Centers, Industrial Activity Centers, and Military and Transportation Areas | Implement trip reduction measures and address congestion impacts within the study area through physical improvements. Impacts beyond the study area may be mitigated through congestion mitigation payments.

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE TR1

Objective TR1 – *To improve safety and eliminate hazards for all users of Cape Cod's transportation system*

Prepare an appropriate Transportation Impact Assessment

A description and outline of the requirements of an appropriate Transportation Impact Assessment are described in the Application Requirements on page TR-22.

Access management

Access management is the coordinated planning, regulation, and design of access between roadways and land development. It involves the systematic control of the location, spacing, design, and operation of driveways, median openings, interchanges, and street connections to a roadway, as well as roadway design applications that affect access, such as median treatments and auxiliary lanes, and the appropriate separation of traffic signals. (See most recent edition of the *Access Management Manual* published by the Transportation Research Board (TRB), National Academies of Sciences, Engineering, and Medicine.) Good access management principles balance land access and traffic mobility needs based on the type of roadway, specifically the functional classification of the roadway.

The design and location of driveways directly affects traffic operations on the mainline roadway. The spacing of adjacent and opposing driveways, and the spacing of driveways relative to road intersections, influences crash potential.

Good access management principles should be applied to the greatest extent feasible given site constraints. Where feasible, this would include:

- Prohibiting turn-movements that present a hazard through physical means (ex. median installation, channelizing islands in the driveway, right-in/right-out driveway to eliminate turns);
- Appropriately site driveways to meet minimum spacing recommendation as presented in the latest edition of the *Access Management Manual* published by the Transportation Research Board;
- Limiting the total number of driveways;
- Sharing access with existing driveways instead of creating a new driveway;

- Limiting access and egress to the lower volume roadway when the site has frontage on more than one roadway; and
- Allowing for and, where feasible, constructing interconnections with adjacent properties.

The applicant should seek early coordination with Cape Cod Commission staff to ensure that good access management practices are being followed in the proposed project.

Driveway location and design

The location and design of site driveways impact the safety of those accessing the site as well as of users of the adjacent transportation network.

The site driveway should be located to avoid the creation or intensification of a hazard. Acceptable sight distance, as defined by the latest edition of the *American Association of State Highway and Transportation Officials (AASHTO) A Policy on Geometric Design of Highways and Streets*, should be met and maintained at all driveways. Furthermore, human-made sight-distance obstructions such as signage, utility poles and boxes, vegetation, and lighting must be located to avoid visual obstructions as to not negatively impact motorist or non-motorist safety.

Excessively wide curb cuts present a hazard to pedestrians by extending the pedestrian crossing distance thereby increasing exposure. Excessive driveway corner radii also present a hazard to pedestrians by allowing for higher vehicle turning speeds. Driveway width and driveway corner radii should be no larger than needed to accommodate vehicles anticipated to use the site. The *National Association of City Transportation Officials (NACTO) Urban Streets Design Guide* presents a discussion of appropriate corner radii for a variety of conditions.

Driveway travel lanes should not exceed 11 feet per travel lane unless required by local or state design standards. Driveways with a throat width exceeding 22 feet should include a center pedestrian refuge island, where appropriate.

Off-site safety impacts and mitigation

A project may impact transportation safety beyond the site driveway. Regardless of the size or nature of the development, developments should not degrade safety for pedestrians, bicyclists, or motor vehicle operators or passengers.

The applicant should identify safety impacts of the development and implement appropriate safety improvements at all Study Area locations. Study Area locations should include, at a minimum, all regional road segments, all intersections of regional roads, and all local road intersections with regional roads that are used by a project for access to the regional road network, where the project is expected to increase traffic by 25 or more trips during the project's peak hour. Additional Study Area locations, identified in consultation with Cape Cod Commission staff, town officials, and, as appropriate, the Massachusetts Department of Transportation (MassDOT), may be required.

A Study Area location is considered a high crash location if, over the most recent five (5) years of data available within the MassDOT Crash Data Portal, the location averaged three (3) or more crashes per year or exhibited a crash rate higher than regional average crash rate. The regional average crash rate should be based on Massachusetts Department of Transportation District 5 average crash rates for signalized intersections, unsignalized intersections, and roadway segments (by functional classification).

To allow the Commission to consider potential safety impacts and appropriate safety mitigation, the Applicant must provide:

- A table and map with number of crashes occurring at each Study Area location (roadway segment and intersection) over the most recent five (5) years on record with the Massachusetts Department of Transportation Registry of Motor Vehicles.
- A collision diagram and crash data summary table for each high crash location (roadway segment and intersection) based on crash reports obtained from the local police department and, as appropriate, the Massachusetts State Police.
- Completed MassDOT Crash Rate Worksheets
- Identification of whether the study area intersections or roadway segments are identified as a MassDOT Highway Safety Improvement Program (HSIP) crash cluster, a Cape Cod Crash Top 50 location, or Cape Cod Vision Zero High-Injury or High-Risk location.
- Crash analysis for all high crash locations (roadway segment and intersection) identifying potential safety issues at each location and any potential safety impacts attributable to the proposed project.
- A summary of proposed safety mitigation.

Overall, this analysis must demonstrate that, with the proposed safety mitigation, the development will not degrade safety for pedestrians, bicyclists, or motor vehicle operators or passengers.

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE TR2

Objective TR2 – *Provide and promote healthy transportation options and appropriate connections for all users*

Healthy transportation: Site design

Good site design accommodates all roadway users including pedestrians, bicyclists, and motorists in a safe manner. Conflicts between motorists and non-motorists should be minimized and, where possible, eliminated, through the provision of appropriate sidewalks, crosswalks, curb ramps, and bicycle accommodation. Safe pedestrian connections should be provided throughout the site.

To the extent feasible, the following site design features and amenities should be included in all projects:

- Sidewalk connections to all buildings
- Safe crossing treatments at all driveway and parking lot crossings
- Conveniently located bicycle racks

Pedestrian and bicyclist facilities should be safe, convenient, and attractive to encourage frequent use. Federal and state law require that all facilities that allow for use by the public must be compliant with all applicable Americans with Disabilities Act (ADA), Public Right-of-Way (PROWAG), and Massachusetts Architectural Access Board (AAB) requirements. Amenities such as bicycle racks, benches, and bus shelters should be incorporated where appropriate.

A more detailed discussion of site design can be found within the Community Design section of the RPP Technical Bulletin.

Healthy transportation: Off-site accommodations and connections

Supporting healthy transportation options also involves supporting and providing connections to the region's pedestrian, bicycle, and transit networks.

The region's sidewalk network on Cape Cod has been built out over time. Further development of this network will require a cooperative, coordinated approach with both public and private partners.

In support of further development of the region's sidewalk network, the applicant should provide appropriate rights-of-way along the street frontage and/or across the site to accommodate expected needs for pedestrian, bicycle, and transit accommodation.

Furthermore, where deemed appropriate by the Commission, the applicant should construct sidewalks, multi-use paths, and/or bicycle/pedestrian connections along or across the site.

Where gaps between on-site pedestrian accommodations and the region's sidewalk network exist, extending sidewalks beyond the site may be required to ensure safe pedestrian access. In determining whether to require construction of sidewalks, multi-use paths and/or bicycle/pedestrian connections along or across the site with connections out to the existing pedestrian and bicycling network, the Cape Cod Commission will consider the extent to which the improvement is necessary to meet Objective TR2 and consider the following factors:

- The location of the project and surrounding context;
- The nature and scale of the project;
- Any constraints to project implementation;
- The anticipated cost of the potential improvement; and
- The anticipated benefit of the potential improvement.

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE TR3

Objective TR3 –*Implement and promote vehicle trip reduction strategies*

Transportation Demand Management (TDM): Best practices

Transportation Demand Management (TDM) is a combination of strategies employed to reduce single-occupancy vehicle trips to and from a site. The effectiveness of any strategy, or combination of strategies, depends on the type of land use proposed, proximity to existing transit corridors, walking and bicycling characteristics of the area, and other factors. In all cases, applicants are encouraged to identify and evaluate strategies that are appropriate for the project. Sources of data should be identified, and methods used should be justified.

Sites with fewer than 25 employees or sites that include residential units may consider adopting industry standard TDM Best Practices rather than developing a site-specific TDM plan. Cape Cod Commission staff can provide these TDM best practices. Typical TDM Best Practices measures include:

- Posting of carpool brochures on-site and online
- Enroll in the MassRideMatch or Bay State Commute program
- Posting of transit schedules on-site in a high visibility location and online
- Designated carpool / vanpool parking spaces monitored to ensure proper use
- Outdoor bicycle racks / secured bicycle storage
- On-site services such as an employee lunchroom
- Utilization of hybrid schedule (e.g., working both remotely and in the office)

Site-specific TDM plans

Projects with more than 25 employees are strongly encouraged to develop a site-specific TDM plan. This TDM plan would build on the TDM Best Practices with additional strategies appropriate for larger employers such as:

- On-site Transportation coordinator
- Trip reduction monitoring program
- Showers and changing facilities for pedestrians and bicyclists
- Arrange employee work hours to match transit schedules
- Compressed work weeks

- Flexible work hours for ridesharers
- Delivery services
- Provide/subsidize vans for vanpoolers
- "Guaranteed ride home" program (company car, rental car, cab, designated driver)
- Subsidize transit passes
- Incentives and allowances for using modes of transportation other than a single-occupancy vehicle
- Provide covered transit shelters with lighting
- E-bike charging station
- Collaborate with other employers for shared services (i.e. vanpool)

Cape Cod Commission staff are available as resources when considering elements of an appropriate TDM plan.

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE TR4

Objective TR4 – *Provide and promote an efficient and reliable transportation system by reducing congestion*

Congestion mitigation approaches

DRIs are required to provide for full mitigation of congestion impacts on the transportation system through a combination of:

- Trip reduction measures (including TDM implementation and/or land conservation),
- Physical congestion mitigation, and/or,
- As appropriate, congestion mitigation payments commensurate with the development's congestion impact as calculated through a fair share payment and/or Vehicle-Miles-Traveled (VMT) approach.

The Cape Cod Commission will consider the following factors in determining if the congestion mitigation approach proposed for a DRI meets Objective TR4:

- The location of the project;
- The nature and scale of the congestion impacts of the project;
- The anticipated effectiveness of any trip reduction measures that are being proposed;
- The anticipated cost and congestion benefit of any physical off-site improvements that are being proposed; and
- Whether a congestion mitigation payment can be effectively utilized to offset the anticipated congestion impacts of the project.

Congestion mitigation through trip reduction measures

Reducing the number of vehicle trips to and from the site reduces the congestion impacts of the project. This can be achieved through means such as, appropriate siting of developments, providing a mix of uses on the site, the promotion of healthy transportation options, and the implementation of Transportation Demand Management measures. The anticipated success of these trip reduction measures should be based on standard industry practice and any sources should be clearly cited.

Congestion mitigation through land conservation

Net congestion impacts can be further reduced by the donation and protection, through a development restriction pursuant to MGL, Chapter 184, of land in excess of open space mitigation otherwise required by the RPP. Where credit for the donation and protection of land is proposed by the Applicant and deemed appropriate by the Commission, at a minimum, the land proposed for credit must:

- Be permanently protected through fee simple donation to a conservation entity such as a town conservation commission or an appropriate non-profit land trust, or through the grant and imposition of a development restriction pursuant to MGL, Chapter 184. The method of protection must extinguish future development potential on the land proposed for credit;
    - For developed land:
        - The trip reduction credit should be based on traffic counts at the existing site, ITE trip generation data for the existing land use, or, at the discretion of Cape Cod Commission staff, ITE trip generation data for the same land use and trip generation values/formulas as the proposed DRI project.
    - For vacant land:
        - The land must include the entirety of individual, buildable lot(s);
        - The land must be buildable, having the minimum lot area and minimum (actual and legal) lot frontage required under local zoning and subdivision law;
        - The land should meet the zoning requirements in effect including allowed use and bulk/dimensional requirements such as minimum yard setbacks, maximum building/lot coverage, and maximum building height;
        - The trip reduction credit should be based on trip generation data for the same land use and trip generation values/formulas as the proposed DRI project; and,
        - A preliminary sketch of the potential site development on the credit land, supporting the credit requested, shall be included with the DRI application materials.

Physical congestion mitigation

Where physical congestion mitigation is proposed by the Applicant for congestion mitigation purposes and deemed appropriate by the Commission, the mitigation must:

- Safely accommodate all road users;
- Result in a Build Condition operation that must be no worse than the No-Build Condition operation (as measured by LOS, delay, and queue length);
- Be in accordance with the access requirements, standards, and policies of the applicable state, regional, and/or local jurisdiction; and
- Not degrade historic resources, historic character, community character, scenic resources, and/or natural resources.

The improvement should not significantly change a roadway layout in a way that detracts from its character. Furthermore, the physical improvement should not increase the access or roadway capacity to a level that the resource cannot reasonably accommodate. Improvements that are considered compatible access may increase the ability of the public to access natural, scenic, and cultural resources through lower impact approaches such as transit or remote parking where appropriate and not in excess.

If a new signal is proposed, a roundabout feasibility analysis should also be evaluated. The most appropriate form of traffic control should be implemented.

The cost for improvements that benefit only vehicles accessing the proposed project site should not be considered congestion mitigation. Examples include acceleration and deceleration lanes for new site access points, new left turn lanes which only provide access to the site, and new traffic signals located at the applicant's driveway(s). Where benefits of the improvement are utilized by vehicles accessing the proposed project site and other roadways users, a fair share proportion of the improvements benefiting other roadway users may be included as congestion mitigation.

The total cost of proposed physical mitigation should be clearly set out in the DRI application material.

Fair Share congestion mitigation payment

At the discretion of the Commission, an Applicant may mitigate congestion impacts at specific Study Area locations using a Fair Share Payment as a substitute for physical mitigation.

FAIR SHARE PAYMENT CALCULATIONS

Where a Fair Share Congestion Mitigation Payment is proposed by the Applicant and deemed appropriate by the Commission for a Study Area location, it must be calculated based on the estimated costs of a capacity increase in traffic generation apportioned to and occasioned by the project as follows:

1. Determine the *Capacity With Mitigation* and the *Capacity Without Mitigation.* In this context, capacity is defined as the maximum traffic volume possible with LOS E. When more than one measure of LOS is possible at a location, such as the various movements at an unsignalized intersection, then the most sensitive measure, i.e., any one movement operating at LOS E/F, is the movement used to determine the capacity. Traffic volumes for all movements should be factored by a constant so that all movements will remain a fixed percentage of the total volume at the location. The sum of the volumes of all movements is the Capacity for that scenario. *Capacity Without Mitigation* will be that of the given Location's existing geometric configuration under prevailing traffic conditions (such as peak hour factor, vehicle mix, and other assumptions consistent with the pattern of existing traffic and projected traffic growth) combined with DRI traffic (and then factored to meet the LOS E maximum volumes). *Capacity With Mitigation* will be that of the given Location's proposed (mitigated) configuration under prevailing traffic conditions, given the pattern of existing traffic and projected traffic growth combined with DRI traffic (and then factored to meet the LOS E maximum volumes).
2. Calculate the *Capacity Addition* by subtracting *Capacity Without Mitigation* from the *Capacity With Mitigation*, as reflected in the following formula:

   Capacity Addition = Capacity With Mitigation - Capacity Without Mitigation

3. Calculate the *Fair Share Proportion* as the *DRI Traffic* divided by the *Capacity Addition,* as reflected in the following formula:

   Fair Share Proportion = DRI Traffic / Capacity Addition

4. Calculate *Mitigation Cost* to public agency(ies) that would be implementing transportation improvement. This cost should be based on costs of similar projects

constructed within the MassDOT District 5 or from current estimated unit costs provided by MassDOT.

5. Calculate the *Fair Share* as the *Fair Share Proportion* times the *Mitigation Cost*, as reflected in the following formula:

Fair Share = Fair Share Proportion × Mitigation Cost

6. Calculate the *Fair Share Contribution* at each location as the *Fair Share* at each location less the estimated value of Physical Mitigation performed at the expense of the Applicant. The Fair Share Contribution should likewise be reduced by the amount, if any, which is assessed in other agencies' transportation impact fees and the transportation portion of municipalities' local impact fees which are directly related to the specific location.

Fair Share Contribution = Fair Share - (Value of Physical Mitigation + Transportation Impact Fees assessed by other agencies)

The total *Fair Share Congestion Mitigation Payment* is equal to the sum of the applicant's *Fair Share Contributions* at all locations as reflected in the following formula:

Fair Share Congestion Mitigation Payment = Sum of all Locations' Fair Share Contribution

Fair share mitigation payments may not be used to address safety impacts.

VEHICLE MILES TRAVELED (VMT) CONGESTION MITIGATION PAYMENT

At the discretion of the Commission, an applicant may propose to mitigate some or all congestion impacts of a DRI project using a location-based, Vehicle-Miles-Traveled (VMT) Congestion Mitigation approach. The VMT Congestion Mitigation payment analysis varies based on the location of the proposed project. Projects located in a way that minimizes the burden on the existing transportation network will have a lower calculated VMT Congestion Mitigation payment.

Where a Vehicle Miles Traveled (VMT) Congestion Mitigation Payment is proposed by the Applicant and deemed appropriate by the Commission, the Payment should be based on workbooks for calculating VMT Congestion Mitigation payments available on the Cape Cod Commission's website www.capecodcommission.org or another method deemed acceptable by the Commission. This Workbook will be updated by Cape Cod

Commission staff periodically as new cost data and analysis parameters become available.

If the impact area extends beyond the boundaries of the town in which the development is being proposed, the applicant should present an analysis of the relative impacts in each town to allow such funds to be divided between towns based on the development's impact area.

GENERAL APPLICATION REQUIREMENTS (TRANSPORTATION IMPACT ASSESSMENT ELEMENTS)

Applicants are encouraged to reach out to Cape Cod Commission staff early in the application preparation process to discuss application materials necessary to demonstrate that the project meets the applicable goals and objectives. The application materials are generally presented in the form of a Transportation Impact Assessment (TIA). The scope of a TIA is largely informed by the scale of the potential impact to the transportation system as approximated by the anticipated peak hour trips generated by the project. It is recommended that Applicants submit, in the form of a letter to Cape Cod Commission staff, a draft TIA scope, including the identification of the Study Area, prior to formal application submission. Cape Cod Commission staff will respond to such a letter with recommendations on the appropriateness of the proposed scope. TIA scoping recommendations will be determined on a case-by-case basis based on the location, context (as defined by the Placetype of the location), nature, and other characteristics of a project. Typical TIA elements recommended for inclusion based on the scale of the project are presented below.

Transportation Impact Assessment (TIA) Framework	**< = 50 Anticipated Peak Hour Trips***	**> 50 Anticipated Peak Hour Trips***	**> 100 Anticipated Peak Hour Trips***
A. Project description	x	x	x
B. Trip generation analysis	x	x	x
C. Description of Multi-Modal Accommodation and Connectivity	x	x	x
D. Driveway safety analysis	x	x	x
E. Off-site safety analysis**		x	x
F. Trip reduction analysis***			x
G. Off-site congestion analysis			x
Appendices	As needed	As needed	As needed

*Proposed trips minus existing trips[24]

**Required for Study Area locations where the project is expected to increase traffic by 25 or more trips during the project's peak hour. This criterion is typically only met for projects anticipated to generate 50 or more peak hour trip.

***Required if credits for trip reduction measures are proposed.

The TIA elements are described in more detail in the following section.

A. Project Description

1. Locus Map – Provide a map including regional roadways and town boundaries to provide a regional context. This map should also any driveway interconnects to other properties and the approximate size of nearby developments.
2. Study Area Map – Provide a map identifying all Study Area locations (roadway segments and intersections) to be analyzed in the TIA. Study Area locations should include, at a minimum, all regional road segments, all intersections of regional roads, and all local road intersections with regional roads that are used by a project for access to the regional road network, where the project is expected to increase traffic by 25 or more trips during the project's peak hour. Additional Study Area locations, identified in consultation with Cape Cod Commission staff, town officials, and, as appropriate, the Massachusetts Department of Transportation (MassDOT), may be required.
3. Site Plan – Site plan should include site access and all properties and their driveways within 500 feet of the project site, property lines, and roadway layouts.
4. Roadway and Multi-modal Network – Describe and provide a map of all the Study Area roadways and intersections, and all pedestrian, bicycle, and transit accommodations, indicating jurisdictional responsibilities of each roadway link within the study area.
5. Traffic Volumes – Provide a table and map with Existing Conditions Peak Season and Average Season average weekday daily, AM peak hour, and PM peak hour volumes at all Study Area locations. Saturday daily and peak conditions should also be included for retail developments or other high weekend traffic generators.

   The base year of Existing Conditions Analysis is the year in which the project has been referred for DRI review or filed a Development Agreement application. Actual count volumes that are factored to base year levels should be no greater than two (2) calendar years old prior to the base year unless, based on consultation with Commission staff, appropriate justification on the suitability of using the older count data is included in the TIA.

   Non-peak season traffic counts should be adjusted using Seasonal adjustment factors from the most recent edition of the Cape Cod Commission’s Traffic Counting Report for Cape Cod or, as approved by Cape Cod Commission staff, adjustment factors based on local traffic data. Any adjustment factors or growth rates used should be cited and referenced.

B. Trip Generation Analysis

1. Trip Generation – When available, local trip generation data should be used. If a Local Trip Generation Study is conducted it should meet, at a minimum, the ITE guidelines for local trip generation studies as detailed in the most recent edition of the ITE Trip Generation Handbook. This includes the provision that data from at least (3) three facilities similar to the project be included in the analysis.

   When local trip generation data is not available, Trip generation calculations should be based on the unadjusted rates for the particular land use code(s) applicable to the project from the most recent edition of the *Trip Generation Manual,* using methodologies described in the *Trip Generation Handbook*, both published by Institute of Transportation Engineers (ITE). Trip generation calculations should be developed using the "fitted curve" equations when statistically appropriate as determined by the methodologies in the Manual and Handbook. Trip generation calculations should be based on square footage in the case of most commercial development and on the number of dwelling units in the case of most residential development. For peak hour analyses, the AM and PM peak hour of adjacent street is generally appropriate unless unique land use(s) being proposed are anticipated to result in a peak hour outside of the AM and PM peak hour of adjacent street traffic.

2. Credits for Existing Development – Credits for existing development should be based on the estimated annual average daily and peak-hour trip generation of the immediate prior use on the site based on the standard trip generation approach, a Local Trip Generation Study, or actual counts from the site as determined in consultation with Cape Cod Commission staff. Outside of Community Activity Centers and Industrial Activity Centers credits for existing development shall not be allowed if the previous use has been discontinued or vacated for five or more consecutive years. The difference in trip generation between existing and proposed development on site will serve as the basis for TIA analysis.

3. Multi-Use Developments – In some multi-use developments, land use interactions may reduce overall trip generation. All trip generation reductions suggested by the applicant resulting from multi-use development should be clearly documented, based on the methods outlined in the most recent version of the *ITE Trip Generation Handbook*, or other best practices as may be approved by Commission staff.

4. Heavy Vehicle Traffic – A description of anticipated heavy vehicle traffic to the site should be provided when applicable based on the proposed land use, an estimate of heavy vehicle traffic to/from the site under Build conditions should be included.
5. Trip Generation Adjustments – The order in which the various adjustments to trip generation are to be computed is as follows:
   a. Unadjusted trip generation (Weekday, AM peak hour of adjacent street traffic, PM peak hour of adjacent street traffic, Saturday, Saturday peak hour of generator, Sunday, Sunday peak hour of generator, as applicable);
   b. Interconnection reduction credit may be applied for DRIs that allow for site traffic to travel conveniently and safely to adjacent properties without traveling on or crossing a public way or that allow for mixed-use development that minimizes dependence on automobile travel. The credit should be a 10-percent reduction apportioned between the two properties or, if greater, a traffic credit as outlined in the latest edition of the Institute of Transportation Engineers Trip Generation Handbook, or another acceptable methodology subject to Commission approval;
   c. Trip reduction credits; and
   d. Pass-by reduction (if applicable) based on the most recent data from ITE.
6. Trip Distribution Analysis – All generated vehicle trips to/from the site through all access points are to be documented, including the following trip types:
   a. Primary – type of trip in which the purpose of the trip is travel exclusively to the proposed development site.
   b. Pass-By – type of trip directly from the traffic stream passing the proposed development site on the adjacent street system, not requiring a diversion from the primary route.

   Certain projects may be eligible to reduce their anticipated trip generation through pass-by trip reductions. The amount of pass-by trips associated with the applicable land uses should be based on the most recent data from ITE. Notwithstanding ITE guidance, Cape Cod Commission staff may make further determinations as to the applicability/eligibility and amount of pass-by trip reductions to particular land uses as the nature of a project warrants.

7. Trip Generation and Distribution Summary – A graphical or tabular summary of trip distribution and trip generation outlining trips to and from the project site should be submitted.

C. Description of Multi-Modal Accommodation and Connectivity

1. Vehicle, Pedestrian, Bicycle, and Transit Users Accommodation – A narrative description of how site and driveway design will accommodate all potential users including motorists, bicyclists, pedestrians, and other non-motorists should reference plans included in the DRI application materials.
2. Connections to the Regional Systems – A narrative description of how site and driveway design connect to the region's pedestrian and bicyclist network. As appropriate, this should identify planned or desired improvements in the Study Area as represented in municipal Complete Streets Prioritization Plans.

D. Driveway Safety Analysis

1. Access Management Discussion– A narrative description of the access management approach employed in site design and how it meets current industry best practices to the greatest extent feasible given any unavoidable site constraints.
2. Sight Distance Analysis – Measurements of available sight distance should be taken at all existing and proposed project site access/egress locations. Sight distance requirements should be determined according to the most recent *A Policy on Geometric Design of Highways and Streets* published by the American Association of State Highway and Transportation Officials (AASHTO).

E. Off-Site Safety Analysis

1. Crash History and Analysis – Identify existing crash history and existing safety issues at each Study Area location.
   a. Provide a table and map with number of crashes occurring at each Study Area roadway segment and intersection over the most recent five (5) years available in the MassDOT Crash Data Portal. The table should include the calculation of intersection and segment crash rates and comparison to the MassDOT District and Statewide averages.
   b. A collision diagram and crash data summary table should be prepared for the high crash locations (three or more crashes/year) based on crash reports obtained from the local police department and, as appropriate, the Massachusetts State Police.
   c. Crash analysis for all high crash locations should include identification of trends, probable causes and potential safety issues at the location. Crash

analysis should also identify any potential safety impacts attributable to a proposed project as they must be mitigated as required by the RPP.

d. Locations that are listed as a MassDOT Highway Safety Improvement Program (HSIP) cluster, a Barnstable County High Crash Location or as a Cape Cod Vision Zero High-Injury or High-Risk location_should be identified in the analysis.
e. If previous a Road Safety Audit was conducted at the high crash locations, the analysis and recommendation from the Audit should be referenced.

2. Safety Impacts – Identify the anticipated safety impacts of the proposed development at each Study Area location. Consider the identified crash trends in relationship to the estimate number of site-generated trips at each high crash location.
3. Safety Mitigation Analysis and Summary – Provide a summary of the safety analysis and proposed safety mitigation measures.

F. Trip Reduction Analysis

1. Proposed Trip Reduction Measures – Identify proposed trip reduction measures.

2. Trip Reduction Credit Estimation – The anticipated success of these trip reduction measures should be clearly documented and based on standard industry practice.

G. Off-Site Congestion Analysis

1. Current and Future Traffic Volumes – The Future No-Build and Future Build conditions should be graphically shown for the AM peak hour of adjacent street traffic, PM peak hour of adjacent street traffic, and if applicable, Saturday and Sunday peak hour of generator for the peak season and average season. Future conditions should cover a seven-year time horizon as a minimum. This seven-year horizon should be from the Base Year as previously defined.

    a. A graphical summary should be submitted showing the seven-year Future No-Build traffic volumes. Background baseline traffic growth should be included in future year background volumes. The traffic assignment for all other anticipated developments with the potential to impact Study Area locations should be combined with future year background volumes to develop the Future No-Build traffic volumes. Other anticipated developments are those permitted, licensed or approved; those having applied for permits, licenses or approvals; or those pending permits, licenses or approvals from state agencies, the Commission, and/or municipal governments within, at a minimum, the most recent prior seven-year period.

   b. A graphical summary of project-generated trips on regional roadway segments and intersections after adjustments should be submitted.
   c. The traffic assignment for the project should then be added to the Future No-Build volumes to generate Future Build volumes.

2. Current and Future Conditions Level of Service (LOS) Analysis – Existing Conditions LOS should be computed for the roadway network including site driveways and study area intersections. LOS analysis should include: delay, volume to capacity (v/c) ratio, queue length. These analyses should be performed using the most recent Highway Capacity Manual and any updates published by the Transportation Research Board. Computer software programs used for LOS analysis should be approved in the most recent version of *A Guide on Traffic Analysis Tools* published by the MassDOT, or superseding publication. Software printouts for any traffic analysis results referenced should be provided and should include assumptions, inputs, and results.

   LOS analysis should be provided for both Peak Season conditions as well as Average Season conditions. The Cape Cod Commission may also request examining a specific peak hour depending on the type of development and location. Performance indicators such as volume to capacity ratio (v/c ratio) and delay should be reported regardless of value (e.g., v/c ratios greater than as well as less than 1.0, and seconds of delay greater than as well as less than 80 should be presented).

   LOS should be computed under Future No-Build and Build conditions, without and with proposed mitigation measures in place, for the peak and average season.

3. Congestion Mitigation Analysis and Summary –
   a. Mitigation Actions – These should be clearly identified along with the anticipated future year performance under Future Build conditions, as evidenced by performance indicators such as delay, v/c ratios, and queue lengths. Mitigation improvements should address safety-related impacts at high crash locations as identified during the DRI review process.
   b. Mitigation Analysis – Analyses of all mitigation measures should be computed. A roundabout analysis should be conducted at any intersection where a new traffic signal is proposed. Impacts on wetlands, archaeological resources, right-of-way availability, historic resources, scenic resources, community character, or other issue areas in the RPP should be identified and quantified.

c. Proposed Mitigation – The analysis should clearly identify the total cost and timing of the proposed mitigation improvements, including costs and timing associated with any specific phase or part thereof. Cape Cod Commission staff should be consulted to develop an estimate of operations and maintenance costs for signals that will be given over to town jurisdiction. Cape Cod Commission staff should be consulted to develop estimates of costs for the purchase, installation, operations, and maintenance of automated traffic counting equipment. Conceptual improvement plans should be developed showing the recommended proposed improvements. The proposed improvements should be clearly shown in relation to the existing right-of-way, including:

   i. Scaled plan showing existing and proposed right-of-way layout lines;

   ii. Proposed roadway geometric changes and widening (storage lanes, acceleration/deceleration lanes); and

   iii. Proposed intersection improvements, signalization, and/or signal improvements including conceptual phasing and timing.

d. Mitigation Payments – Congestion Mitigation methodology using a Fair Share or Vehicle Miles Traveled Congestion mitigation approach.

Appendices

1. Traffic Counts
   a. Recorded turning movement counts, including heavy vehicles and Peak Hour Factors by approach
   b. Recorded Automated Traffic Recorded (ATR) counts including Peak Hour Factors by approach
   c. Calculated future year peak hour traffic volumes
   d. Adjustment factors and sources
2. Crash Analysis Supplements
   a. Tabular crash data summary for all study area segments and intersections
   b. Collision diagram and corresponding crash data table for all high crash segments and intersections (if not included elsewhere in the TIA)
   c. Supplemental analysis or references to support the effectiveness of proposed safety mitigation countermeasures as appropriate
3. Capacity Analysis Supporting Materials

   a. Lane geometry
   b. Assumed signal phasing and timing
   c. Assumed saturation flow rates
   d. All worksheets or computer outputs
4. ITE Land Use Code Sheets – or other summary sheets showing trip generation calculations
5. ITE Multi-use Development, or other approved Trip Reduction Estimate Sheets
6. Signal Warrant Analysis Sheets

REFERENCES AND RESOURCES

References

1. American Association of State Highway and Transportation Officials (AASHTO). *A Policy on Geometric Design of Highways and Streets*. Most recent edition.
2. Architectural and Transportation Barriers Compliance Board. *Accessibility guidelines for pedestrian facilities in the public right-of-way (PROWAG Final Rule).* (2023, August 8).
3. Cape Cod Commission. *Cape Cod Regional Policy Plan*. Most recent edition.
4. Cape Cod Commission. *Complete Streets/Living Streets: A Design Manual for Cape Cod*. Most recent edition.
5. Cape Cod Commission. *Traffic Counting Report for Cape Cod*. Most recent edition.
6. Cape Cod Commission. *Cape Cod Vision Zero Action Plan*. Most recent edition.
7. Cape Cod Commission, Barnstable County High Crash Locations, Most recent edition.
8. Federal Highway Administration. *Manual on Uniform Traffic Control Devices Handbook* (MUTCD including the Massachusetts Amendments). Most recent edition.
9. Institute of Transportation Engineers (ITE). *Parking Generation*. Most recent edition.
10. Institute of Transportation Engineers (ITE). *Trip Generation*. Most recent edition.
11. Institute of Transportation Engineers (ITE). *Trip Generation Handbook*. Most recent edition.
12. Massachusetts Department of Transportation (MassDOT, formerly Massachusetts Highway Department) *Massachusetts Highway Department Project Development & Design Guide*. Most recent edition or superseding publication.
13. Massachusetts Department of Transportation (MassDOT), Crash Rate Worksheet and Network Screening Tool.
14. National Association of City Transportation Officials (NACTO). *Urban Street Deign Guide*. Most recent edition.
15. Transportation Research Board (TRB), National Academies of Sciences, Engineering, and Medicine. *Access Management Manual*. Most recent edition.
16. Transportation Research Board (TRB), National Academies of Sciences, Engineering, and Medicine. *Highway Capacity Manual*. Most recent edition.

Mapping Resources

1. Regional Policy Plan Data Viewer
2. Massachusetts Department of Transportation (MassDOT) Crash Portal available at: https://apps.crashdata.dot.mass.gov/cdp/home
3. MassDOT Roadway Functional Classification Map available at: https://gis.massdot.state.ma.us/roadinventory/
4. Cape Cod Commission Crash Dashboard

www.capecodcommission.org/safety

5. Cape Cod Vision Zero High Injury and Hish Risk Network Maps
www.capecodcommission.org/visionzero

Energy DRAFT

This guidance is intended to clarify how the Energy Goal and Objectives of the Regional Policy Plan (RPP) are to be applied and interpreted in Cape Cod Commission Development of Regional Impact (DRI) project review. This technical bulletin presents specific methods by which a project can meet the goal and objectives.

Energy Goal: To provide an adequate, reliable, and diverse supply of energy to serve the communities and economies of Cape Cod.

- **Objective EN1** – *Support renewable energy development that is context-sensitive*
- **Objective EN2** – *Increase resiliency of energy generation and delivery*
- **Objective EN3** – *Promote energy efficiency and conservation measures by minimizing energy consumption through planning and design*

The applicability and materiality of these goals and objectives to a project will be determined on a case-by-case basis considering a number of factors including the location, context (as defined by the Placetype of the project's location), scale, use, and other characteristics of a project.

THE ROLE OF CAPE COD PLACETYPES

The RPP incorporates *a framework for regional land use policies and regulations based on local form and context* as identified through categories of Placetypes found and desired on Cape Cod.

The Placetypes are determined in two ways: some are depicted on a map contained within the RPP Data Viewer located at www.capecodcommission.org/RPPDataViewer adopted by the Commission as part of the Technical Guidance for review of DRIs, which may be amended from time to time as land use patterns and regional land use priorities change, and the remainder are determined using the character descriptions set forth in Section 8 of the RPP.

The project context, as defined by the Placetype of the project's location, provides the lens through which the Commission will review the project under the RPP.

TABLE OF CONTENTS

Introduction 4
Summary of Methods 6
Detailed Discussion of Methods for Meeting Objective EN1 8
Detailed Discussion of Methods for Meeting Objective EN2 10
Detailed Discussion of Methods for Meeting Objective EN3 12
General Application Requirements 17
References and Resources 19
Appendix A - Energy Technical Bulletin 20
WECF Guidelines and Protocols 20

INTRODUCTION

Energy policy and regulation in Massachusetts originates and is largely administered and implemented at the state level. Closely aligned with its general energy policy and regulation, Massachusetts has adopted climate change policy, which promotes renewable energy sources, storage and greenhouse gas emissions reduction. State law also sets an energy storage target for electric distribution companies and the delivery of clean energy during seasonal peak hours. Massachusetts' Global Warming Solutions Act (St. 2008, c. 298) sets targets on greenhouse gas emissions reduction and contains directives to certain state agencies regarding renewable energy development and greenhouse gas emissions reduction. The Massachusetts Green Communities Act (St. 2008, c. 169) is companion legislation directed to municipalities in Massachusetts, which supports the state's overall climate change and clean energy approach. This legislation creates incentives for municipalities to adopt energy efficiency and conservation measures, promote renewable energy development and pursue greenhouse gas emissions reduction strategies. In November 2024, Massachusetts adopted an Act Promoting a Clean Energy Grid, Advancing Equity and Protecting Ratepayers ("2024 Climate Act", St. 2024, c. 239). The 2024 Climate Act supports development of renewable energy generation and storage facilities, and directs state agencies to promulgate new regulations for siting and permitting such facilities.

The Commission plays a distinct role in a complex network of energy policy and regulation. Regional energy policy under the RPP is intended to support and fit within the Commonwealth's established policy and regulatory framework; it is not intended to be independent of the Commonwealth's approach, and the Commission cannot and does not implement state energy policy and regulation directly.

Building energy codes and technologies have made the prospect of "Net Zero" building increasingly attainable. Zero energy certifications have been developed by organizations such as the US Green Building Council (USGBC), Passive House Institute US (PHIUS), US Department of Energy (DOE), and Residential Energy Services Network (RESNET). Many definitions of net zero buildings have been developed, but all incorporate the basic concept that a building maximizes energy efficiency to reduce energy demand and consumption, promote building systems electrification, and generates as much energy as it uses.

The primary purpose of the Energy Goal and Objectives in the RPP is to ensure an adequate, reliable, and diverse supply of energy to serve the communities and economies of Cape Cod. Energy efficient design, conservation measures, and diverse energy sources, including renewable and alternative energies, support the availability and adequacy of supply.

This Technical Guidance provides examples of various methods and strategies that DRI projects may use to satisfy the RPP's Energy Goal and Objectives. These methods and strategies deal generally with building and operational energy efficiency and conservation, renewable energy and energy storage, and the general provision of adequate and reliable energy infrastructure. The Energy Goal, Objectives, and methods apply over a wide array of development, according to the type of development or use proposed: from utility-scale energy infrastructure as a principal use, to building and other development projects where energy use is an ancillary design and operational consideration.

SUMMARY OF METHODS

GOAL | ENERGY

To provide an adequate, reliable, and diverse supply of energy to serve the communities and economies of Cape Cod.

OBJECTIVE EN1 – Support renewable energy development that is context-sensitive

METHODS

All DRIs must:

- Enter into a "Green" power purchase agreement; and/or,
- Incorporate on-site renewable energy generation or alternative energy use, including but not limited to: solar photovoltaic (PV), wind, solar thermal, geothermal, solar carport, fuel cells, the use of biofuels

Projects with energy generation, distribution or storage as a primary purpose:

- Describe how the project incorporates renewable energy generation or supports Massachusetts' overall approach to a Clean Energy future
- Transmission infrastructure should utilize existing rights-of-way and new systems should connect to existing substations when feasible
- New substations to support these systems should be sited in areas of compatible development and be sized to accommodate future connections
- For guidance on appropriate design and protocols related to proposed Wind Energy Conversion Facility projects, see Appendix "A."

OBJECTIVE EN2 – Increase resiliency of energy generation and delivery

METHODS

- Protect infrastructure by locating utilities underground;
- Manage for peak demand and power outages by:
  - Incorporating energy storage technology, including but not limited to storage batteries or technology, and/or emergency backup generators;
  - Enrolling in the ConnectedSolutions, or similar program; or
  - Installing 'smart meter' technology to monitor building energy use.

OBJECTIVE EN3 – Promote energy efficiency and conservation measures by minimizing energy consumption through planning and design

METHODS

- Design buildings to be LEED certifiable
- Design buildings to be Energy Star certifiable
- Design buildings to be Passive House certifiable
- Design buildings in compliance with the Municipal Opt-in Specialized energy code (Specialized Code)
- Perform a pre-development or redevelopment energy audit, incorporate recommendations to the maximum extent practicable
- Incorporate building design elements, including but not limited to:
  - Combined Heating and Power (CHP) system
  - Energy efficient lighting and appliances
  - Water efficient appliances
  - Building envelope conservation measures
  - Incorporate green or cool roof
  - Sub-metering per building unit
  - Incorporate site design elements such as passive heating/cooling/lighting, including building orientation/solar exposure
- Incorporate operational elements, including but not limited to:
  - 'Smart thermostats' for heating and cooling
  - Smart automation technology for building system management, such as lighting and/or water use based on occupancy and/or time of day

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE EN1

Objective EN1 – *Support renewable energy development that is context-sensitive*

The intent of Objective EN1 is to support an adequate and diverse supply of energy for and to Cape Cod. Local energy generation can increase energy independence and support existing development. DRI applicants must purchase renewable or alternative ("Green") power from energy suppliers, generate their own renewable power or incorporate alternative energy use., or implement a combination of these methods to demonstrate consistency with Objective EN1.

Green power purchase

Under the Massachusetts Renewable Energy Portfolio Standard (RPS), for every megawatt hour (MWh) of electricity added to the New England electric grid from a renewable energy generator, a Renewable Energy Certificate (REC) is generated. These RECs are available for purchase, supporting the Commonwealth's goal to increase renewable energy generation. The Alternative Energy Portfolio Standard (APS) is a similar approach that focuses on the sale and purchase of renewable energy generated from alternative methods, such as biofuels, geothermal technology, or food waste, as examples. The sales and purchase of RECs claim a portion of the renewable energy generated regionally and added to the regional electric grid for use. Options for the purchase of renewable energy power may include a Power Purchase Agreement (PPA) or Net Metering Credit Purchase Agreement (NMA) with an electric utility provider or a third-party energy provider.

Applicants contracting with a renewable energy generator should provide documentation that the generator has the energy capacity to provide for such purchase.

More information about purchasing Green power can be found through the Cape Light Compact, Green Energy Consumers Alliance, or by contacting your utility provider. Projects proposing to meet Objective EN1 by purchasing Green power should provide documentation of the commitment and identify the renewable energy generator, utility, or other entity that is a party to the agreement.

On-site renewable energy generation

On-site renewable energy generation can promote a diverse supply of energy to serve an individual development or the community more broadly. Renewable energy generation facilities should be located on sites with existing disturbance and avoid new greenfield development to the extent practicable.

For solar renewable energy generation, the Commission encourages on-site generation to support discrete building development, and utility scale generation that is sensitive to the Cape Cod regional context while supporting Massachusetts' goals for renewable energy generation. Applicants proposing utility scale solar energy generation facilities should consult the Commission's solar screening tool and companion document "Siting Large-Scale Solar Photovoltaic Projects on Cape Cod" (see References and Resources) when locating their project and should plan for safety and decommissioning.

Where feasible, battery storage facilities should be co-located with renewable energy generation systems or where electricity consumption is high and reliability is essential (e.g., emergency shelters, hospitals, long-term care facilities, schools, large businesses). Battery storage facilities should be contained within a structure with the following features: a temperature and humidity-maintained environment; an impervious floor with a containment system for potential leaks of hazardous substances; a smoke/fire detection, fire alarm, and fire suppression system; a thermal runaway system; and a local disconnect point or emergency shutdown feature. The structure and systems must be designed and installed in accordance with all applicable State codes and safety requirements as well as safety measures recommended by the National Fire Protection Association's Standard for the Installation of Stationary Energy Storage Systems. See the Water Resources Technical Bulletin for guidance on secondary containment systems and Hazardous Substances.

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE EN2

Objective EN2 – *Increase resiliency of energy generation and delivery*

The purpose of Objective EN2 is to support the reliability of the energy supply for and to Cape Cod. By increasing the energy resiliency of development, long-term energy savings, reduced impact on the environment, and less strain on the energy grid may be realized. Applicants are encouraged to propose alternate methods not listed below based on best practices for the type of project proposed, or as new technologies are developed and available.

The following are methods that may be implemented to meet Objective EN2:

Underground utilities

Locating utilities underground can reduce the risk of damage from storms and other events that overhead power wires and electric lines may face. DRI projects may locate on-site utilities for development underground, except where the presence of natural features such as wetlands or archaeological resources prevent such placement.

Manage for peak demand and power outages

Managing energy use for "peak demand" (times during the day when overall energy use is the highest), known as demand response, can reduce strain on energy generators which can cause power outages and decrease end user costs by reducing energy use when demand is highest, and often most costly. For energy consumers, this is known as Demand-side Management (DSM), where managing energy use for peak demand may not decrease total energy consumption but may reduce the need for energy infrastructure needed to meet the highest periods of energy use. For energy generators, Supply-side Management (SSM) focuses on providing customers with an adequate supply of energy during peak demand by incorporating energy infrastructure to support generation, distribution, and transmission.

INCORPORATE ENERGY STORAGE TECHNOLOGY

One example of managing energy use for peak demand is through energy storage technology that can store energy off peak hours for use during peak hours, including but not limited to storage batteries, fuel cells, or emergency backup generators.

ENROLL IN THE CONNECTEDSOLUTIONS PROGRAM (OR SIMILAR)

Enrolling in programs such as the ConnectedSolutions program allows a utility provider to manage project energy use during times of high demand. These programs often provide financial incentives to enrollees.

INSTALL 'SMART METER' TECHNOLOGY

Managing for peak demand can also include the installation of 'smart meter' technology to monitor building energy use during high demand times. Such technology can provide information on building systems energy use and allow energy managers to identify times of high energy use, where energy consumption levels can then be managed through energy efficiency or reduction measures.

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE EN3

Objective EN3 – *Promote energy efficiency and conservation measures by minimizing energy consumption through planning and design*

The purpose of Objective EN3 is to promote energy use reduction and conservation. By increasing the energy efficiency of development, long-term energy savings, reduced impact on the environment, and less strain on the energy grid may be realized.

The following methods may be implemented to meet Objective EN3:

Design buildings to be LEED certifiable

Leadership in Energy and Environmental Design (LEED) is a green certification program of the US Green Building Council (USGBC) for building design, construction, operations, and maintenance. Green Business Certification Inc. (GBCI) administers LEED certification.

The LEED program uses a rating system of methods incorporated into a project to achieve credits towards a certification level: Certified (40-49 points), Silver (50-59 points), Gold (60-79 points), Platinum (80+ points). Methods to achieve LEED credits vary by the project type.

The categories of LEED rating systems are:

- Building Design and Construction (BD+C)
- Interior Design and Construction (ID+C)
- Building Operations and Maintenance (O+M)
- Neighborhood Development (ND)
- Homes
- Cities and Communities

Applicants who choose this method should use the most recent, applicable LEED checklist and have a project designed to achieve at minimum the LEED certification level “Certified” (40-49 points). *Applicants are not required to seek certification through Green Business Certification Inc*. but must provide information that the project is certifiable.

Design buildings to be Energy Star® certifiable

Energy Star® is a joint program of the US Environmental Protection Agency (EPA) and US Department of Energy (DOE) that certifies energy efficient products and building development. Energy Star® building certification compares a building's energy use, design, and operations to similar buildings around the country, on a scale of 1-100 where a score of 50 represents median energy performance and a score of 75 or higher means the proposed building performs better than at least 75% of similar buildings nationwide. For a building to be eligible for Energy Star® certification a building must earn an Energy Star® score of 75 or higher.

Applicants utilizing this method should have a project designed to achieve an Energy Star® score of 75 or higher. *Applicants are not required to seek certification through Energy Star®* but must provide information that the project is certifiable.

Design buildings to be Passive House certifiable or in compliance with the municipal Opt-in Specialized Energy Code

To support state targets for GHG reductions from the building sector, the 2021 "An Act Creating a Next-Generation Roadmap for Massachusetts Climate Policy" (M.G.L. c. 25A, § 6) mandated the creation of a municipal opt-in specialized stretch energy code where compliance pathways are consistent with a net-zero economy in 2050. Compliance pathways include all-electric and Passive House building standards.

Passive House design and the opt-in specialized energy code support energy efficiency and decreased energy use.

Information on Massachusetts energy codes can be found at Building Energy Code and more detailed information on Passive House design can be found at PassiveHouse.com.

See Climate Change Technical Bulletin Detailed Description and Resources. *Applicants are not required to seek certification through the Passive House Institute (PHIUS)* but must provide information that the project is certifiable.

Perform a pre-development or redevelopment energy audit

An energy audit can assess building energy use based on existing or proposed building systems and design. An audit can help identify opportunities to reduce energy use or increase energy efficiency and may include recommendations for building design or systems adjustments to decrease energy use and maximize energy efficiency.

Incorporate building design elements

The aim of this method is to minimize energy consumption and maximize energy efficiency and conservation through building design and the use of energy efficient building systems. Below are example methods consistent with Objective EN3. Applicants are encouraged to propose alternate methods to meet Objective EN3 based on best practices for the type of project proposed, or as new technologies are developed and available.

COMBINED HEATING AND POWER (CHP) SYSTEM

A combined heating and power system is a suite of technologies that can use a variety of fuels to produce electricity and decreasing the amount of fuel needed by using the heat created from the power generation process to provide heating and/or cooling.

More information on combined heat and power can be found through the Department of Energy.

ENERGY EFFICIENT LIGHTING OR APPLIANCES

Energy efficient lighting and appliances can decrease the amount of energy needed to operate lighting or appliances.

WATER EFFICIENT APPLIANCES

Water efficient appliances can decrease the amount of energy needed to operate such appliances.

BUILDING ENVELOPE CONSERVATION MEASURES

Building envelope conservation measures such as insulation and air sealing can improve a building's energy use and efficiency, decreasing the amount of energy needed for heating and cooling systems.

GREEN OR COOL ROOF DESIGN

Green roofs utilize plants to absorb rainwater and cool structures, providing benefits through stormwater management, reducing energy costs for building cooling, and reducing the heat island effect in the surrounding environment. Green roofs may be extensive or intensive, and may be proposed over the entire roof or a portion thereof. Extensive roofs tend to have lower additional structural requirements, use low growing plants with a shallower medium, and require less maintenance. Intensive green roofs have deeper soil beds to support larger plants, including shrubs and trees, and require greater structural support. Intensive roofs may also serve to help manage stormwater and can serve as a building amenity when designed as a rooftop garden or exterior space. Because there are structural considerations for buildings incorporating green roofs, their applicability is best for new construction[1]. Applicants proposing larger structures in Community Activity Centers and other densely developed areas are encouraged to consider a green roof design to help reduce ambient summer air temperatures.

Cool roofs are designed to reflect, as opposed to absorb, sunlight by applying a light-colored paint, coating or material to the surface of a roof exposed to the sun. A cool roof surface could be as much as 50 degrees cooler than a standard or dark colored roof, thereby reducing the amount of energy needed to cool a building. Cool roofs can decrease building air conditioning needs, lower peak electricity demand, and reduce the local air temperature. Cool roofs can be used in new construction and in certain roof retrofits depending on other building conditions, and can be used on sloped or flat roofs. For certain buildings where a flat roof is incorporated into the design, making the roof reflective, or a "cool roof" is encouraged.

More information about cool roofs can be found through the Department of Energy.

SUB-METERING PER BUILDING UNIT

Submetering is the installation of separate utility meters for multi-tenant buildings or properties, which allows for the measurement and tracking of energy usage by individual users. These systems can give energy users information on the energy use of individual tenants, departments, buildings, specific industrial processes and other loads and encourage energy conservation by providing real-time information on energy usage. Sub-metering is appropriate for commercial, residential, and mixed-use buildings and projects.

[1] https://www.epa.gov/heatislands/using-green-roofs-reduce-heat-islands accessed August 2025

PASSIVE HEATING, COOLING, AND LIGHTING

The location of a building on a site can promote passive heating and lighting, which takes advantage of the sun's orientation to provide additional heating and light to the building. Similarly, a building can be located to avoid excess sunlight and reduce the need for building cooling.

Incorporate Operational Elements

The aim of this method is to minimize energy consumption and maximize energy efficiency and conservation through operational elements. Below are example methods consistent with Objective EN3. Applicants are encouraged to propose alternate methods to meet Objective EN3 based on best practices for the type of project proposed, or as new technologies are developed and available.

SMART THERMOSTATS FOR HEATING AND COOLING

Smart thermostats can be programmed to set temperature controls based on the time of day or building occupancy, heating and cooling spaces as needed for the comfort of building users and decreasing the need for heating and cooling when building spaces are not in use.

PROJECT INCORPORATES SMART AUTOMATION TECHNOLOGY

Similar to smart thermostats, other building systems such as lighting and water use can be programmed to set controls based on the time of day or building occupancy, decreasing the need for lighting or limiting the amount of water use when building spaces are not in use.

GENERAL APPLICATION REQUIREMENTS

Applicants should provide the following materials to address consistency with the Energy Goal and Objectives.

- Documentation showing what percentage of project energy use will be purchased through a green power purchase agreement.
- Documentation and specifications regarding the type of renewable or alternative energy proposed to be used and the system size in kilowatts (kW), and a projection of the annual kilowatt hours (kWh) of energy this will provide.
- Site Plan showing utility locations and appropriate specifications for locating those utilities underground.
- A systems safety plan and decommissioning plan for projects whose primary purpose is renewable energy generation.
- Documentation and specifications for any proposed energy storage technology system, a narrative describing how the system is incorporated into the building design and operations, a Site Plan showing the proposed energy storage location with appropriate specifications.
- Letter from a LEED Accredited Professional describing which certification level the project has been designed to achieve and LEED checklist for appropriate project category.
- Statement of Energy Design Intent (SEDI) signed by a licensed professional engineer or architect.
- An energy audit of proposed building design and systems for proposed and/or existing conditions, performed by a qualified auditor, which includes recommendations for increased energy efficiency, and a narrative detailing how recommendations from the energy audit will be incorporated into the project design to the maximum extent practicable. Qualified auditors include but are not limited to licensed Professional Engineers, Certified Energy Managers, LEED Accredited Professionals, and Building Performance Institute Analysts.
- A narrative description of selected features relative to building design, site design, or operations.
- When proposing a CHP system, Applicants should provide documentation and design specifications regarding the type of system.

- A description of the green or cool roof, as applicable, should be included in the project narrative, including a description of the type of system to be installed, vegetation cover types if applicable, and maintenance requirements.

REFERENCES AND RESOURCES

Green Energy Consumers Alliance – https://www.greenenergyconsumers.org/

Massachusetts Department of Energy Resources (DOER) – https://www.mass.gov/orgs/massachusetts-department-of-energy-resources

Cape Light Compact – https://www.capelightcompact.org

Massachusetts Clean Energy Center – http://www.masscec.com/

MassSave – https://www.masssave.com/

US Green Building Council – https://new.usgbc.org/

Energy Star – https://www.energystar.gov/

Passive House Institute US (PHIUS) - https://www.phius.org/

ConnectedSolution information through MassSave - https://www.nationalgridus.com/media/pdfs/bus-ways-to-save/connectedsolutions-ciprogrammaterials.pdf

Department of Energy Combined Heat and Power Basics - https://www.energy.gov/eere/iedo/combined-heat-and-power-basics

Department of Energy Cool Roofs - https://www.energy.gov/energysaver/cool-roofs

APPENDIX A - ENERGY TECHNICAL BULLETIN

WECF Guidelines and Protocols

To the extent a wind energy conversion facility, wholly located within the jurisdictional limits of Barnstable County, comes to the Commission for DRI review, the following will be considered the minimum siting and design guidelines and operational protocols for such facilities in order to be considered appropriate to context, pursuant to Energy Objective EN1. Renewable energy projects, like wind and solar, are ways to meet the 2025 RPP Energy goal; however, such projects are required to be appropriate to context.

These guidelines and protocols were originally developed with significant public input and review and adopted as revisions to the 2009 Regional Policy Plan Energy Minimum Performance Standards.

The Commission may vary the application of such guidelines and protocols under the particular circumstances of a project, including but not limited to greater setbacks and distances from such facilities.

A wind energy conversion facility (WECF) is equipment, machinery, and structures utilized in connection with the conversion of wind to electricity. This includes, but is not limited to, all transmission, storage, collection and supply equipment, substations, transformers, site access, service roads, and machinery associated with the use. A wind energy conversion facility may consist of one or more wind turbines, and does not include meteorological (or “met”) towers.

As used herein, ‘receptor’ shall mean an occupied property or building.

Because of the unique procedural, legal, and political safeguards applicable to town appropriations and the use of town-owned land, these methods shall not apply to a municipal project proposing a single WECF 250 KW or less on municipally owned land.

- Clear Area: All WECFs shall maintain a Clear Area, free of any structure designed for human occupancy, surrounding the base of the turbine equal to at least 1.5 times the height of the WECF, or the WECF manufacturer’s fall zone, setback, or clear area specification, whichever is greater. The Clear Area setback shall be measured from the base of the turbine.

- Noise: An applicant for a WECF greater than 660 KW shall submit a noise study with its DRI application; fund a peer review of the noise study by a consultant of the Cape Cod Commission choosing; and such WECF shall adhere to a setback of 10 times the rotor diameter of the proposed turbine from the nearest receptor, or residentially zoned parcel, unless the applicant can demonstrate through the noise study that the projected sound levels, including both ambient and infrasound, would result in minimal impacts to occupants within a reduced setback. Such applicant shall also provide a plan which specifies reduced operating procedures to address and mitigate noise complaints that may arise during operation of the WECF; this plan shall be consistent with and incorporate recommendations from the Commission's noise consultant.
- Shadow Flicker: An applicant shall submit in its DRI application an impact study of shadow flicker on receptors which will be affected by the proposed WECF. WECFs with anticipated shadow flicker effects on receptors shall require the applicant to provide a mitigation plan to the Commission which specifies operational controls, landscaping, or other means that mitigate shadow flicker events to fewer than 10 hours per year.
- Avoid Adverse Visual Impacts: WECFs shall be sited and designed to avoid adverse visual impacts to scenic resources. A WECF applicant shall provide in its DRI application a Visual Impact Assessment (VIA); guidance on VIAs can be found in Commission Technical Bulletin 12-001.
- Decommissioning: An applicant shall in its DRI application provide a decommissioning plan, which also addresses removal of the meteorological (or "met") tower. Such plan shall include that any WECF that has not been operational for more than 120 consecutive days shall be dismantled and removed and legally disposed of by the owner, operator, or other authorized parties designated in the decommissioning plan. The applicant shall also provide security in a form and amount satisfactory to the Cape Cod Commission to cover the cost of and ensure decommissioning and removal of any abandoned or damaged WECF.

Waste Management DRAFT

This guidance is intended to clarify how the Waste Management Goal and Objectives of the Regional Policy Plan (RPP) are to be applied and interpreted in Cape Cod Commission Development of Regional Impact (DRI) project review. This technical bulletin presents specific methods by which a project can meet the goal and objectives.

Waste Management Goal: To promote a sustainable solid waste management system for the region that prioritizes reuse and diversion and protects public health, safety, and the environment.

- **Objective WM1** – *To reduce waste and waste disposal by promoting waste diversion, reuse, beneficial reuse, deconstruction and other Zero Waste initiatives*
- **Objective WM2** – *Support an integrated solid waste management system*

The applicability and materiality of these goals and objectives to a project will be determined on a case-by-case basis considering a number of factors including the location, context (as defined by the Placetype of the location), scale, use, and other characteristics of a project.

THE ROLE OF CAPE COD PLACETYPES

The RPP incorporates *a framework for regional land use policies and regulations based on local form and context* as identified through categories of Placetypes found and desired on Cape Cod.

The Placetypes are determined in two ways: some are depicted on a map contained within the RPP Data Viewer located at www.capecodcommission.org/RPPDataViewer adopted by the Commission as part of the Technical Guidance for review of DRIs, which may be amended from time to time as land use patterns and regional land use priorities change, and the remainder are determined using the character descriptions set forth in Section 8 of the RPP.

The project context, as defined by the Placetype of the project's location, provides the lens through which the Commission will review the project under the RPP.

TABLE OF CONTENTS

Introduction 4
Applicability 4
Summary of Methods 5
Detailed Discussion of Methods for Meeting Objective WM1 7
Detailed Discussion of Methods for Meeting Objective WM2 9
General Application Requirements 11
References and Resources 12

INTRODUCTION

Solid waste management has improved greatly in the Commonwealth since 1990 when MassDEP issued the Commonwealth's first Solid Waste Master Plan. Today, Massachusetts has a modern solid waste management system that promotes waste reduction and recycling and ensures that facilities that handle and dispose of waste are properly designed and operated to protect public health and the environment.

There are increasingly fewer landfills and less landfill capacity in the Commonwealth, and for environmental, economic and other reasons, siting of new landfill facilities to maintain current disposal rates is unlikely or undesirable. In fact, a good deal of solid waste and recycling is shipped outside the Commonwealth for disposal or handling. The necessary alternative is to reduce reliance on landfilling and disposal.

The 2030 Massachusetts Solid Waste Master Plan states that in-state landfills will be closing soon, with no plan to create more in-state landfill disposal capacity. Similarly, the 2030 Solid Waste Master Plan does not anticipate increases in incineration capacity and notes that future regulation of incinerators may result in a decrease in that capacity. The Master Plan anticipates that the Commonwealth will address its solid waste management needs through diversion, recycling and other zero waste strategies.

The RPP's Waste Management Goal and Objectives are intended to support and further the Commonwealth's current Solid Waste Master Plan (2020-2030) and recognize Barnstable County's relationship and role with the Commonwealth (and beyond) in advancing a sustainable approach to waste management; and alternately, that it is neither feasible nor desirable for Barnstable County to have a waste management system and approach that is entirely independent from the Commonwealth's.

APPLICABILITY

WM1 applies to DRIs where the proposed development involves or is likely to involve solid waste generation, or if solid waste handling or management is a principal purpose, use, or component of the development.

Waste Management Objective WM2 applies to projects whose primary purpose is waste management, disposal, or reduction.

SUMMARY OF METHODS

GOAL | WASTE MANAGEMENT

To promote a sustainable solid waste management system for the region that prioritizes reuse and diversion and protects public health, safety, and the environment.

OBJECTIVE WM1 – Reduce waste and waste disposal by promoting waste diversion, reuse, beneficial reuse, deconstruction and other Zero Waste initiatives.

The following are methods a project may use to achieve consistency with Objective WM1. Applicants are encouraged to propose alternate methods to meet Objective WM1 based on best practices for the type of project proposed, or as new technologies are developed and available.

Massachusetts has a waste ban which prohibits the disposal of certain recyclable and reusable construction and demolition (C&D) materials. Applicants for projects where WM1 is found applicable and material must provide a C&D materials management plan for the construction phase of the project. See *General Application Requirements*.

METHODS

- Incorporate alternatives to disposal, such as:
  - the beneficial re-use of materials and resource recovery of useful materials
  - provide spaces and facilities for recycling
  - create or expand opportunities to compost organic materials
- Provide opportunities for reuse, such as:
  - Bottle refill stations
  - Reuse buildings and structures
  - Reuse building materials and/or provide building materials for reuse through building deconstruction
  - Provide spaces and facilities for reuse, such as textile donation
- Incorporate clean waste-to-energy initiatives such as anaerobic digestion.
- Improve collection and disposal of marine debris.
- Properly manage construction and demolition waste and recycling.

OBJECTIVE WM2 – Support an integrated solid waste management system

WM2 is applicable to those projects whose primary purpose is waste management, disposal, or reduction. Implementation of one or more of the methods below can be used to support the finding that the project meets this objective. The following are methods a project may use to achieve consistency with Objective WM2. Applicants are encouraged to propose alternate methods to meet Objective WM2 based on best practices for the type of project proposed.

METHODS

- Incorporate waste diversion methods, facilities, and/or initiatives to preserve existing disposal capacity to serve regional needs.
- Provide alternative methods to trucking to transport waste and recycling materials from Barnstable County, including rail and ship.
- Promote regional solid waste management:
  - Support existing municipal waste facilities and encourage regional coordination between municipal facilities.
  - Private waste facilities and markets provide support for and supplement municipal waste facilities and operations
  - Strengthen waste management collaboration between the Cape and Islands to increase efficiencies and opportunities
  - Advance opportunities for multi-town and public/private and public/military collaboration on diversion and disposal options
- Create integrated facility partnerships – including between municipalities and businesses – to support integrated solid waste management systems.
- Support local and regional resilience and disaster debris management
- Develop or support local markets, infrastructure, technologies, jobs and firms in recycling, re-use, resource recovery and related material management efforts.

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE WM1

Objective WM1 – *To reduce waste and waste disposal by promoting waste diversion, reuse, beneficial reuse, deconstruction and other Zero Waste initiatives*

The intent of objective WM1 is to reduce the amount of waste generated and to provide for the recycling or reuse of waste.

Since the 1990's, Massachusetts has imposed state-wide waste bans that increase recycling, support the recycling economy, and are a key tool available in Massachusetts to reduce disposal and increase recycling and composting.

However, the disposal of materials that have significant value – in both monetary and natural-resource terms – continues and whose environmental impacts could be avoided if those materials were reused. Solid waste management represents a significant cost to taxpayers and businesses, and disposal of materials causes environmental impacts and is a waste of resources and a lost economic opportunity. The more consumers can reduce the amount of waste that has to be disposed of by reducing generation and increasing reuse, recycling, and composting, the better for the economy, public health and the natural environment. There have also been dramatic changes in the recycling markets at the state, national and international level over the past few years, suggesting that less reliance on recycling alone and the promotion of other forms of waste diversion are prudent approaches for future solid waste planning.

Incorporate alternatives to disposal

Projects should provide alternatives to waste disposal through resource recovery and beneficial reuse of materials, including the composting of organic waste, and may provide facilities for waste diversion such as recycling.

"Zero Waste" is an alternative vision to the traditional concept of waste disposal, involving the overall reduction in waste generation and the amount of wastes requiring disposal; and less overall reliance on disposal in landfill facilities by diverting materials from the waste stream. Waste diversion approaches include increasing reuse of materials; increasing recycling of materials that have served their useful purpose; resource recovery of useful materials that would otherwise be placed in the waste stream; and composting food and other organic materials. Resource recovery is using wastes as an input material to create valuable products as new outputs. Plastic, paper, aluminum, glass and metal are examples of where value can be found in waste as input material.

Incorporate opportunities for reuse

Projects should incorporate opportunities for reuse, furthering alternatives to disposal and preserving already available resources, such as reusing buildings and building materials or provide for the reuse of items such as building materials or textiles. Water bottle refilling stations also promote the reuse of vessels for liquids and support waste diversion from the use of single-use plastic water bottles.

Diverting material from the waste stream saves money, promotes the more efficient use of materials, captures valuable resources, protects the environment, and supports the economy. Disposal of potentially useful and valuable materials is a waste of resources and lost economic opportunity.

Incorporate clean waste-to-energy initiatives

The project includes waste-to-energy technology, such as anaerobic digestion, which can reduce the amount of waste sent to landfills and provide an energy source for local or regional use.

Improve collection and disposal of marine debris

The project includes collection and/or reuse of marine debris (waste found along the shoreline or within the ocean). Increased collection and proper reuse or recycling of marine debris can promote waste diversion, recycling, or reuse of materials such as derelict fishing gear.

Properly manage construction and demolition waste

Massachusetts has a waste ban which prohibits the disposal of certain recyclable and reusable construction and demolition (C&D) materials. Applicants must provide a C&D materials management plan for the construction and/or demolition phase of the project.

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE WM2

Objective WM2 – *Support an integrated solid waste management system*

The intent of objective WM2 is to promote an integrated system of solid waste management. Waste Management Objective WM2 applies to projects whose primary purpose is waste management, disposal, or reduction.

Integrated Solid Waste Management (ISWM) is a holistic waste reduction, diversion, collection, composting, recycling system that still relies on disposal to some degree, and is a step along the way to try to achieve a "Zero Waste" future. Preserving the scarce, remaining solid waste disposal capacity that is part of such an integrated system is a critical infrastructure consideration for the social and public health of the Cape Cod community and the environment.

ISWM systems rely on a network of individual facilities, with the backbone being municipal transfer stations/solid waste facilities. An ISWM system would include private solid waste or material management businesses to supplement municipal facilities and public markets, which partnerships help in preserving disposal capacity and managing costs. Such local public/ private partnerships, markets and networks can also benefit local economies and support existing or new local and regional businesses and industries. An integrated solid waste management facility (ISWMF) includes components such as:

- a comprehensive recycling drop-off center,
- a materials recovery facility,
- regular hazardous product collections,
- a reuse swap shop,
- grass and leaf waste composting,
- food composting,
- a C&D handling facility.

Incorporate Waste Diversion Methods

Waste disposal facilities should include waste diversion components to support reuse and recycling and the preservation of existing disposal capacity for material that cannot be reused or recycled.

Provide alternative methods to trucking

Alternative methods to trucking, such as rail and ship, are used in waste management, disposal, and diversion operations to support an integrated network of materials handling and processing.

Transportation options, including rail, should be maintained and/or improved to support the management of solid waste and diverted material within and outside of Barnstable County. Any modifications to rail lines or rail heads should maintain or improve the capacity for efficient movement of solid waste and diverted materials.

In 2021, Barnstable County commissioned an Out-of-State MSW Disposal study that identified the most economic and environmentally beneficial MSW disposal option is to rail haul municipal MSW to one of several out-of-state disposal facilities. The existing rail line, and the two existing rail heads on the Cape (one in Yarmouth and one on Joint Base Cape Cod) provide the region with the transportation infrastructure to accomplish this method of disposal.

Promote regional solid waste management

Projects support existing municipal and private waste operations and promote regional coordination for materials management. such as projects that advance opportunities for multi-town, public-private, or public-private-military collaboration. This could include agreements, programs, land dedication, facility construction and/or operation to improve environmental and/or economic outcomes.

Support disaster debris management

Projects provide for the management and/or processing of disaster debris following major disasters such as hurricanes, wildfire, tornadoes, or severe storms.

Develop or support local markets, infrastructure, technologies

Projects support existing or new local markets, infrastructure, or technologies related to materials management and may provide opportunities to bolster the local workforce.

GENERAL APPLICATION REQUIREMENTS

As applicable:

- Narrative describing how the project supports the Objectives.
- Site Plan showing how waste will be managed and/or waste management facility design.
- Construction and Demolition (C&D) waste management plan
- Post- Construction/ operational solid waste and recycling management plan
- Education and outreach plan to encourage participation in recycling efforts
- Toxic waste management plan
- Food waste or other composting plan
- Waste material re-use/ resource recovery plan
- Corporate/ business sustainability plan, including operational best practices and employee training

Construction and Demolition Waste Management Plan Components

The purpose of a construction and demolition waste management plan is to plan for minimizing waste generation and the disposal of such materials prior to construction. A construction or demolition waste management plan does not need to be lengthy or complicated to be effective. Preparing a plan consists of identifying the types of debris that will be generated by the project and identifying how all waste streams will be handled. A successful waste management plan will contain the following information:

- Identify potential waste haulers, contractors, and facilities where materials will be handled
- Estimated types and quantities of materials or waste generated from the project site
- Proposed and intended disposal methods for these materials
- Intended procedures for handling the materials or waste
- Plans for reuse and salvage of materials, such as how those will be collected and separated and how those materials are intended to be reused
- Detailed instructions for the subcontractors and laborers on how to separate or collect the materials at the job site

REFERENCES AND RESOURCES

MassDEP Recycle Smart Initiative (Recyclopedia) - https://recyclesmartma.org/

MassDEP Managing Construction and Demolition Wastes - https://www.mass.gov/lists/managing-construction-demolition-cd-wastes

RecyclingWorks Massachusetts - https://recyclingworksma.com/

RecyclingWorks Massachusetts Construction and Demolition Materials Guidance - https://recyclingworksma.com/construction-demolition-materials-guidance/

Information on Massachusetts Recycling and Waste - https://www.mass.gov/topics/recycling-waste-management

Massachusetts Solid Waste Master Plan - https://www.mass.gov/guides/solid-waste-master-plan

Zero Waste Boston Deconstruction Initiative – Deconstruction in Boston

Massachusetts Solid Waste Bans - state-wide waste bans

Climate Change DRAFT

This guidance is intended to clarify how the Climate Change Goal and Objectives of the Regional Policy Plan (RPP) are to be applied and interpreted in Cape Cod Commission Development of Regional Impact (DRI) project review. This technical bulletin presents non-exhaustive, non-exclusive methods by which a project can meet the goal and objectives.

Climate Change Goal: To increase the region's resiliency to climate change impacts and mitigate climate change by supporting and contributing as a region to the Commonwealth's greenhouse gas reduction goals and initiatives, including a state-wide net zero carbon target by 2050.

- **Objective CC1** – *Promote low or no carbon transportation alternatives and technologies*
- **Objective CC2** – *Promote electrification and low or no carbon technologies for building energy use, including appliances, lighting, and heating, ventilation and cooling (HVAC) systems*
- **Objective CC3** – *Promote carbon sequestration and other emissions removal practices as appropriate to context*
- **Objective CC4** – *Promote low or no carbon energy generation as appropriate to context*
- **Objective CC5** - *Promote strategies to address climate change induced impacts such as wildfire and extreme temperatures and changes in precipitation*

The applicability and materiality of the RPP goals and objectives to a project will be determined on a case-by-case basis considering a number of factors including the location, context (as defined by the Placetype of the project's location), scale, use, and other characteristics of a project.

THE ROLE OF CAPE COD PLACETYPES

The RPP incorporates *a framework for regional land use policies and regulations based on local form and context* as identified through categories of Placetypes found and desired on Cape Cod.

The Placetypes are determined in two ways: some are depicted on a map contained within the RPP Data Viewer located at www.capecodcommission.org/RPPDataViewer adopted by the Commission as part of the Technical Guidance for review of DRIs, which may be amended from time to time as land use patterns and regional land use priorities change, and the remainder are determined using the character descriptions set forth in Section 8 of the RPP.

The project context, as defined by the Placetype of the project's location, provides the lens through which the Commission will review the project under the RPP.

NATURAL AREAS | RURAL DEVELOPMENT AREAS | SUBURBAN DEVELOPMENT AREAS | HISTORIC AREAS | MARITIME AREAS | COMMUNITY ACTIVITY CENTERS | INDUSTRIAL ACTIVITY CENTERS | MILITARY AND TRANSPORTATION AREAS

TABLE OF CONTENTS

Introduction 4
Definitions 5
Summary of Methods 7
Detailed Discussion of Methods for Meeting Objective CC1 10
Detailed Discussion of Methods for Meeting Objective CC2 16
Detailed Discussion of Methods for Meeting Objective CC3 18
Detailed Discussion of Methods for Meeting Objective CC4 20
Detailed Discussion of Methods for Meeting Objective CC5 23
Application Requirements 27
References and Resources 29

INTRODUCTION

Climate change is one of the most pressing global problems, and also presents localized impacts especially pronounced in coastal communities like Cape Cod. However, there are actions that communities can take to address this global issue and its more localized effects.

The Climate Change goal and objectives focus on lowering greenhouse gas (GHG) emissions and promoting strategies to address the impacts of greenhouse gas emissions on the region. This goal ties directly into the Commonwealth of Massachusetts' well-structured legal, policy and regulatory regime, originating with the Global Warming Solutions Act (St. 2008, c. 298) and Green Communities Act (St. 2008, c. 169), which seeks to lower GHG emissions economy-wide from 1990 levels to net zero by 2050.

A critical piece in lowering emissions and meeting state carbon reduction targets is reducing the economy's reliance on fossil fuel use and transitioning to clean, renewable energy sources. This transition will require infrastructure investment in renewable energy generation, transmission, and storage. As shown by the Cape Cod Greenhouse Gas Emissions Inventory, the transportation and stationary energy sectors are the primary contributors to regional GHG emissions, similar to the rest of Massachusetts. The Climate Change objectives support and advance progress in these sectors through the reduction or elimination of project specific and regional greenhouse gas emissions.

At the same time as we decrease our contributions to the causes of climate change, the effects of climate change are already being felt on Cape Cod. As presented in the Cape Cod Climate Action Plan, sea level, drought, and marine heat waves, for example, are expected to continue to increase in the coming decades and beyond. The Climate Change objectives increase project and regional resilience to current and future hazards.

Methods primarily intended to satisfy other RPP goals and objectives may contribute to satisfying the Climate Change goal and objectives, and vice versa.

DEFINITIONS

Direct Current (DC) Fast Charging EVSE: DCFC EVSE delivers high voltage (typically 200-450V) DC power directly into the EV's battery system, enabling rapid charging. An 80% charge can be provided in 30 minutes or less for many all-electric vehicles, compared to several hours for Level 2 charging.

Electric Vehicle (EV): An automotive-type vehicle for on-road use, such as passenger automobiles, buses, trucks, vans, neighborhood electric vehicles, electric motorcycles, and the like, primarily powered by an electric motor that draws current from a rechargeable storage battery, fuel cell, photovoltaic array, or other source of electric current. Informational Note: defined as in 527 CMR 12.00: Massachusetts Electrical Code (Amendments) section 625.2.

Electric Vehicle Capable Space (EV Capable Space): A vehicle space with electrical panel space and load capacity to support a branch circuit and necessary raceways, both underground and/or surface mounted, to support EV charging.

Electric Vehicle Charging Port (EV Charging Port): The EVSE component which connects to vehicle charging inlets. One EVSE unit may contain multiple charging ports, which are also referred to as "plug connectors" or "heads". Level 1 ports include connectors supplied by level 1 EVSE as well as any standard 120V outlets able to supply 15 or more amps of current to be used with the level 1 EVSE supplied by vehicle manufacturers.

Electric Vehicle Charging Station: The public or private parking space(s) served by EVSE, including all signs, information, pavement surfaces, surface markings, fee collection systems, and protective equipment, in which a vehicle is recharged.

Electric Vehicle Ready Parking Space (EV Ready Space): A designated parking space which is provided with wiring and electrical service sufficient to provide AC Level 2 or equivalent EV charging, as defined by Standard SAE J1772 for EVSE servicing light duty Electric Vehicles.

Electric Vehicle Supply Equipment (EVSE): The conductors, including the ungrounded, grounded, and equipment grounding conductors, and the Electric Vehicle connectors, attachment plugs, and all other fittings, devices, power outlets, or apparatus installed specifically for the purpose of transferring energy between the premises wiring and the Electric Vehicle. Informational Note: defined as in 527 CMR 12.00: Massachusetts Electrical Code (Amendments) section 625.2.

Electric Vehicle Supply Equipment Parking Space (EVSE Space): A designated parking space which is provided with a dedicated EVSE connection.

Level 1 EVSE: EVSE which uses a 120V AC connection to a standard residential/commercial electrical outlet typically supplying 15 amps of current, for a power draw around 1.4 – 1.8 kW when charging. All EVs come equipped with Level 1 chargers from auto manufacturers.

Level 2 EVSE: EVSE which uses a 208/240V AC connection to supply increased power to EVs, reducing the amount of time required to charge the EV battery. Level 2 EVSE can provide up to 80 amps of current and 19.2 kW of power, although most current EVs can only accept 3.3 to 10 kW as determined by the vehicle's onboard charger. Current Level 2 EVSE equipment typically uses 208/240V 40-50 amp supply circuits.

Low Power Level 2 EVSE: A 208/240-volt 20-ampere minimum branch circuit and a receptacle for use by an EV driver to charge their electric vehicle or hybrid electric vehicle.

Low Power Level 2 EV Ready Space: A designated parking space which is provided with wiring and electrical service sufficient to serve a Low Power Lever 2 EVSE.

SUMMARY OF METHODS

GOAL | CLIMATE CHANGE

To increase the region's resiliency to climate change impacts and mitigate climate change by supporting and contributing as a region to the Commonwealth's greenhouse gas reduction goals and initiatives, including a state-wide net zero carbon target by 2050.

OBJECTIVE CC1 – Promote low or no carbon transportation alternatives and technologies

METHODS

- Employ and quantify the GHG-reduction benefit of strategies to reduce vehicle miles traveled
- Include EV or hybrid vehicles for fleet vehicles, business use, or car sharing
- Incorporate EV charging infrastructure within parking facilities
- Support the expansion of a regional EV charging network
- Prepare for medium- and heavy-duty charging infrastructure needs

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OBJECTIVE CC2 – Promote electrification and low or no carbon technologies for building energy use, including appliances, lighting, and heating, ventilation and cooling (HVAC) systems

METHODS

- Design buildings to be all electric
- Design buildings to be Passive House certifiable
- Design buildings in compliance with the Municipal Opt-in Specialized energy code (Specialized Code)
- Include in development ground or air source electric heat pumps, in place of fossil fuel HVAC systems
- Include in projects site scale battery storage paired with renewable energy generation or emergency generators that use renewable fuels
- Include in project electric appliances such as induction stoves or water heaters
- Include as project element non-fossil fuel energy use

OBJECTIVE CC3 – Promote carbon sequestration and other emissions removal practices as appropriate to context

METHODS

- Reuse buildings, incorporate reuse of building materials, use recycled building materials, or include building materials certified as low carbon
- Plant new and replacement trees (see Community Design Technical Bulletin Objective CD1 Methods: Provide appropriate landscaping and pedestrian amenities)
- Project proposes on- or off-site planting or restoration with native vegetation, including trees in appropriate habitat settings (see Wildlife and Plant Habitat Technical Bulletin)
- Permanently protect forest or other naturally vegetated areas which sequester carbon (see Open Space Technical Bulletin Objective OS3 Methods)
- Incorporate methane gas capture and conversion technology in capped landfill projects

OBJECTIVE CC4 – Promote low or no carbon energy generation as appropriate to context

METHODS

- Employs and quantify the GHG-reduction benefit of the strategies used to incorporate low or no carbon energy generation
- Include in new buildings and redevelopment installed green energy systems (solar or other renewable energy generation) on roofs, as solar car-ports, or on disturbed sites (see Energy Technical Bulletin Objective EN1 Method: Incorporate on-site renewable energy)
- On-site renewable energy generation (energy generation, distribution, or storage) (see Energy Technical Bulletin Objective EN1 Method: Incorporate on-site renewable energy)
- Commit to purchase renewable energy (see Energy Technical Bulletin Objective EN1 Method: Green Power Purchase)
- Incorporate alternative renewable energy sources for onsite building development such as geothermal heating and cooling
- Propose, contribute to, or tie into a Microgrid

OBJECTIVE CC5 – Promote strategies to address climate change induced impacts such as wildfire and extreme temperatures and changes in precipitation

The following are methods a project may use to achieve consistency with Objective CC5. *Applicants are encouraged to propose alternate methods to meet Objective CC5 based on best practices for the type of project proposed, or as new strategies or technologies are developed and available.*

METHODS

- In Rural and Natural Areas Placetypes, project site selection or layout demonstrate consideration of firebreaks
- Use fire resistant building materials
- In rural and natural areas Placetypes, project site selection or layout demonstrate consideration of firebreaks
- Incorporate green or cool roof design
- Size stormwater management infrastructure to accommodate the 100-year, 24-hour size storm

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE CC1

Objective CC1 – *Promote low- or no-carbon transportation alternatives and technologies*

The purpose of Objective CC1 is to support and advance low- or no-carbon transportation alternatives and technologies to support a regional transition away from fossil fuels in the transportation system. The following is a discussion of the methods that may be implemented to meet Objective CC1.

Employ and quantify the GHG-reduction benefit of strategies to reduce vehicle miles traveled

Reducing vehicle miles traveled can be accomplished through a combination of strategies including implementation of Transportation Demand Management (TDM) strategies and provision of healthy transportation options. Details on these methods are presented in the Transportation Technical Bulletin. Using industry best practices, the Applicant should quantify GHG reductions anticipated though these measures. For example, if the implementation of a TDM plan is anticipated to reduce site-generated traffic by 25%, the avoided GHG emissions should be quantified.

Include EV or hybrid vehicles for fleet vehicles, business use, or car sharing

Many industries are beginning to use EVs, including both Battery Electric Vehicles (BEVs, also referred to as all-electric vehicles) and Plug-in Hybrid Electric Vehicles (PHEVs) for fleet vehicles or they are making EVs available for business use on a reservation basis. Where practical, EVs are preferred for these applications.

Fleet operators should consider electrifying their fleets and installing EV chargers. Fleets that consist of light-duty vehicles (LDVs) which travel on fixed routes and return to the same facility after each route may be well positioned to cost-effectively electrify. Medium- and heavy-duty fleets, where electrification may not currently be cost-effective or where electric alternatives may be limited, should consider installing EV Capable Spaces and/or EV Ready Spaces for future installation of EV chargers as fleet-suitable EV availability improves. Where EVs are currently impractical for these applications, PHEV vehicles may be considered.

A car share, defined as a vehicle that is available by reservation for a business or non-business use, are often used in combination with TDM strategies that promote transportation to the site without use of a personal automobile. Where practical, EVs are preferred for this application.
A charger is generally needed to support the EVs being proposed for fleet vehicles, for business use, or for ride sharing.

Incorporate EV charging infrastructure within parking facilities

To promote EV adoption, projects which include buildings where residents or visitors will dwell for periods of time should, where feasible, install EV chargers and include the appropriate number of EV-Ready and EV-Capable spaces. Guidance varies for different types of buildings and may include one or more of the following types of parking spaces:

a) EV Capable Spaces have electrical capacity and raceways to support future EV charging installation.
b) EV Ready Spaces add wiring capable of providing EV charging.
c) Electric Vehicle Supply Equipment (EVSE) spaces have an EVSE installed on occupancy to provide charging services.

To meet anticipated future demand for EV charging, installed parking spaces should follow guidelines outlined in Table 1. The Applicant should provide justification if the proposal for EV charging infrastructure and spaces does not meet the guidelines in Table 1.

Calculations for spaces should be rounded up to the nearest whole number but should always be a value of at least one EV Charging Port to be available at the time of development occupancy. Installed EVSE Spaces that exceed the minimum recommend number of EVSE Space may be ducted from the number of recommended EV Ready Spaces. EV Ready Spaces that exceed the minimum recommended number of EV Ready Space may be ducted from the number of recommended EV Capable Spaces.

TABLE 1: EV CHARGING GUIDELINES

Occupancy Classification[1] / Building Type	*Requirement*
Multifamily dwellings with less than 20 dwelling units	A minimum of 10% EV Capable Spaces, 25% Low Power L2 EV Ready Spaces
Multifamily dwellings with greater than 20 dwelling units	A minimum of 10% EV Capable Spaces, and 25% Low Power L2 EV Ready Spaces, and 5% EVSE Spaces
Hotels and motels (transient) with less than 20 sleeping units or guest rooms	A minimum of 10% EV Capable Spaces, and 25% EV Ready Spaces
Hotels and motels (transient) with greater than 20 sleeping units or guest rooms	A minimum of 10% EV Capable Spaces, 25% EV Ready Spaces, and 5% EVSE Spaces
All other R-use and Group B (Businesses)	A minimum of 10% EV Capable Spaces, 25% EV Ready Spaces, and 5% EVSE Spaces
All other occupancies	A minimum of 10% EV Capable Spaces, and 25% EV Ready Spaces

Per Massachusetts' Commercial Stretch code and Specialized Opt-in code,[2] EV charging can be met with either dedicated electric branch circuits, or with an automatic load management service (ALMS) that allows multiple spaces to be served by a higher amperage circuit, thus improving overall charging capacity at a lower installed cost.

EV chargers should be installed at businesses, multifamily dwellings, and hotels and motels with greater than 20 guest rooms. Projects at all other sites should consider installing EV-Capable and EV-Ready parking spaces during initial construction, which would allow the cost-effective installation of EV chargers in the future, as EV adoption increases.

Consideration of the appropriateness, type, and number of EVSE to meet Objective CC1 is based on the following factors:

- The type of use(s) on the site;

[1] 2015 International Building Code (IBC), Chapter 3, Use and Occupancy Classification: https://codes.iccsafe.org/content/IBC2015P4/chapter-3-use-and-occupancy-classification

[2] Massachusetts 2023 Commercial Stretch code and Specialized Opt-in code DOER Final Draft 9-19-22 Redline: https://www.mass.gov/doc/commercial-and-other-stretch-energy-code-and-specialized-opt-in-code-language-redline/download

- The location of the project, including proximity to other on- or off-site EVSE;
- The nature and scale of the project;
- Any constraints to EVSE implementation;
- The anticipated cost of the potential improvement; and
- The anticipated benefit of the potential improvement.

Where an applicant proposes the provision of EVSE, best practices in terms of implementation should be followed. While best practices will continue to evolve, the following should be considered:

- Level 2 EVSE or higher should be considered for most land uses. Level 1 EVSE may be appropriate in limited applications.[3]
- To allow for the widest user base, connectors that allow for use by a variety of vehicle makes is encouraged.
- Broad public access to EVSE is desirable, though some locations may restrict use to residents, employees, patrons, and/or other particular site users as needs dictate.
- Appropriate signage and pavement markings should be provided. Charging equipment should be labeled with information on power levels, safety requirements, contact information for reporting when the equipment is not operating or other problems, and, as applicable, any use limitation on use (i.e. patrons only), hour of operations, time limits, and usage fees.
- All EVSE placed and proposed shall be compliant with the Americans with Disabilities Act and with applicable Massachusetts Architectural Access Board rules and regulations.
- Where EVSE is provided or proposed within an adjacent pedestrian circulation area, such as a sidewalk or accessible route to the building entrance, the charging equipment must be located to not interfere with accessibility requirements.

Additional information on Electric Vehicle Infrastructure best practices is available at www.capecodcommission.org/EVguidance

Support the expansion of a regional EV charging network

The EV charging network on Cape Cod will be built out over time. Further development of this network will require a cooperative, coordinated approach with both public and

[3] The terms Level 1 (often referred to as slow charging), Level 2 (often referred to as medium charging), and Direct Current Fast Charging are the most common charging levels used to refer to the electrical power and voltage of the EVSE.

private partners. The pace of EV adoption in the region will rely on investments in regional EV charging infrastructure at various levels. To the extent feasible and appropriate, a project should support the build-out of the regional EV charging network by installing publicly available Level 2 and Direct Current Fast Charging as sites that would be desirable to the general public.

The provision of ESVE is desirable not just for residential and office settings but also sites that serve the general public where visitors dwell for longer periods of time. Given the nascency of the electric vehicle and charging market, it is difficult to forecast the potential demand for EV charging. Typical best practices for EVSE forecasting relate the number of EV chargers to locally registered EVs, but this approach does not work as well in areas like the Cape with an influx of summer residents and visitors. Ideally, publicly available EV charging infrastructure will be installed at slightly faster rate than EV adoption, which will allow the charging ecosystem to stay one step ahead in supporting EV drivers' charging needs. Public EV charging infrastructure should first be installed where drivers most often dwell and should be encouraged in the following Placetypes: Community Activity Centers, Industrial Activity Centers and Military and Transportation Centers For reference, the Cape Cod Commission Electric Vehicle Charging Station Siting Analysis Tool maps the following site characteristics:

- Within Community Activity Centers;
- Proximate to a high concentration of community and/or business activity sites;
- Includes large parking lots; and
- Located in areas that currently lack publicly available charging stations.

Prepare for medium- and heavy-duty charging infrastructure needs

As appropriate, to avoid future demolition when adding EV supply and distribution equipment, space raceway(s) or busway(s) and adequate capacity for transformer(s), service panel(s) and/or subpanel(s) should be installed at the time of construction for future medium and heavy duty (M/HDEV) charging in accordance with MA Electrical code. Requirements can be targeted to building use types which may involve fleet and delivery operations well positioned for electrification such as grocery stores, warehouses, and retail establishments. Requirements can be designed to encourage the installation of additional raceway, busway, and electrical panel capacity during new construction or alternations, and can be tailored based upon building size and/or the number of off-street parking spaces.

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE CC2

Objective CC2 – *Promote low or no carbon technologies for building energy use, including appliances, lighting, and heating, ventilation and cooling (HVAC) systems*

The purpose of Objective CC2 is to advance the use of energy efficient appliances and building heating and cooling systems that use alternatives to transition from fossil fuels, preferably powered by renewable energy sources. The following is a discussion of the methods that may be implemented to meet Objective CC2.

Design buildings to be all electric, Passive House certifiable, or in compliance with the Municipal Opt-in Specialized energy code

To support state targets for GHG reductions from the building sector, the 2021 "An Act Creating a Next-Generation Roadmap for Massachusetts Climate Policy" (M.G.L. c. 25A, § 6) mandated the creation of a municipal opt-in specialized stretch energy code where compliance pathways are consistent with a net-zero economy in 2050. Compliance pathways include all-electric and Passive House building standards.

Passive House design and the opt-in specialized energy code support low or no-carbon energy use technologies for buildings.

Information on Massachusetts energy codes can be found at Building Energy Code and more detailed information on Passive House design can be found at PassiveHouse.com.

See Energy Technical Bulletin Detailed Description and Resources. *Applicants are not required to seek certification through the Passive House Institute (PHIUS)* but must provide information that the project is certifiable.

Include ground or air source electric heat pumps, in place of fossil fuel HVAC systems

Fossil-fuel based heating and cooling systems can be replaced with efficient air or ground-source heat pumps in new development and redevelopment to reduce a building's reliance on fossil fuels. These systems use electricity for power, and when paired with an on-site renewable energy generation system, an older building can greatly reduce its fuel use. An HVAC retrofit should typically be paired with energy efficiency upgrades to reduce heating and cooling leakage through an older structure's building envelope.

Include site scale battery storage paired with renewable energy generation or emergency generators that use renewable fuels

Applicants are encouraged to include on-site renewable energy paired with site scale battery storage to enhance the reliability and extend the usefulness of renewable energy generation. Where a generator is needed on-site, renewable fuel sources should be used, whenever possible. Coupling generators with on-site battery storage will also extend the usefulness of the generator to times when the grid may be down or for other emergency needs. On-site or fleet EVs may also be connected to the building's energy system, providing back-up energy during times when renewable energy sources are unavailable (poor weather or at night).

Include electric appliances such as induction stoves or water heaters

Similar to an all-electric building, electric appliances and systems can contribute to promoting electrification and low or no carbon technologies. Energy efficient lighting and appliances can decrease the amount of energy needed to operate lighting or appliances.

Include non-fossil fuel energy use

Projects may incorporate on-site renewable energy generation or alternative energy use, other than solar photovoltaic (PV) panels, including but not limited to: wind, solar thermal, geothermal, solar carport, fuel cells, the use of biofuels. These fuels and technologies use alternatives to fossil fuels and can be renewable forms of energy generation, promoting electrification and low or no carbon technologies.

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE CC3

Objective CC3 – *Promote carbon sequestration and other emissions removal practices as appropriate to context*

The purpose of Objective CC3 is to advance the capture and storage of carbon to balance the impacts of development on the causes of climate change (greenhouse gases). The gases that contribute to climate change move through natural cycles from solid to gaseous states. On Cape Cod, the region's emissions of carbon dioxide from daily activities like driving and heating buildings far exceed the region's contributions of other climate-harming gases.

Fortunately, the carbon cycle can be harnessed to mitigate some of the impacts associated with human activities. Plants absorb carbon dioxide through photosynthesis and incorporate carbon into plant structures. Trees and other plants, as long as they are alive, store – or sequester – carbon in this way. Once plants are cut, decomposition releases carbon back into the atmosphere.

The following is a discussion of the methods that may be implemented to meet Objective CC3.

Reuse buildings, incorporate reuse of building materials, use recycled building materials, or include building materials certified as low carbon

Carbon emissions can be created during all life-cycle stages of building material product development, from mining and sourcing of raw materials to their manufacture and transport to their disposal. Known as "embodied carbon" these emissions contribute to climate change. Reusing existing building materials or using recycled building materials that reduce or eliminate the greenhouse gases associated with creating new building materials can reduce a project's greenhouse gas emissions. Additionally, using recycled building materials that are certified as low carbon can also reduce the greenhouse gas emissions associated with building construction.

More information on embodied carbon can be found through the Rocky Mountain Institute. Examples of low embodied carbon materials can be found through The New School Healthy Materials Lab. Designers should check with materials manufacturers and suppliers for availability and certification of recycled and/or low carbon building materials and provide materials certifications.

Plant new and replacement trees

As noted above, trees and other vegetation store carbon within their structures, and will continue to absorb and store carbon as long as they are alive. Thus, tree planting, and plantings with other native vegetation can contribute to carbon sequestration.

Trees are especially good at sequestering carbon due to their size, and tree planting is encouraged wherever suitable and appropriate to context. More urbanized areas, within Community Activity Centers or villages, and within commercial developments, are appropriate areas to focus tree planting, especially where mature trees can enhance cooling, streetscape appearance, or buffering between land uses.

See Wildlife and Plant Habitat Technical Bulletin Objective WPH2 Methods for specific guidance on tree planting, and Community Design Technical Bulletin Objective CD1 Methods: Provide appropriate landscaping and pedestrian amenities.

Capped landfill methane gas capture

Capped landfills generate the most potent type of harmful greenhouse gas, methane; however, landfill gases can be captured and converted to carbon dioxide (CO_2), generating energy in the process. While CO_2 is a climate-harming GHG, it is less powerful in affecting climate change processes than the methane that is emitted from capped landfills. Conversion of methane gas to CO_2 through specialized technology can reduce the GHG emissions from landfills while also generating energy.

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE CC4

Objective CC4 – *Promote low or no carbon energy generation as appropriate to context*

The purpose of Objective CC4 is to encourage the generation of renewable energy on Cape Cod. The following is a discussion of the methods that may be implemented to meet Objective CC4.

Employ and quantify the GHG-reduction benefit of the strategies to incorporate low or no carbon energy generation

All projects incorporating low or no carbon energy generation should quantify the GHG-reduction benefits of such method(s). See Energy Technical Bulletin Objective EN1 Method: Incorporate on-site renewable energy and application requirements related to quantifying GHG emissions below.

Install green energy systems in new buildings and redevelopment

Solar or other renewable energy generation on roofs, as solar car-ports, or on disturbed sites can provide low or no carbon energy generation for new buildings and redevelopment.

On-site renewable energy generation

Renewable energy generation, distribution, and storage can support low and no carbon energy use. Utility scale renewable energy facilities should be designed and sited in a manner sensitive to the Cape Cod regional context while supporting Massachusetts goals for renewable energy generation. Applicants proposing utility scale solar energy generation facilities should consult the Commission's solar screening tool and companion document “Siting Large-Scale Solar Photovoltaic Projects on Cape Cod” (see References and Resources) when locating their project and should plan for safety and decommissioning.

Where feasible, battery storage facilities should be co-located with renewable energy generation systems or where electricity consumption is high and reliability is essential (e.g., emergency shelters, hospitals, long-term care facilities, schools, large businesses). Battery storage facilities should be contained within a structure with the following features: a temperature and humidity-maintained environment; an impervious floor with a containment system for potential leaks of hazardous substances; a smoke/fire detection, fire alarm, and fire suppression system; a thermal runaway system; and a local disconnect point or emergency shutdown feature. The structure and systems must be designed and installed in accordance with all applicable State codes and safety requirements as well as safety measures recommended by the National Fire Protection Association's Standard for the Installation of Stationary Energy Storage Systems. See the Water Resources Technical Bulletin for guidance on secondary containment systems and Hazardous Substances.

Commit to purchase renewable energy

Under the Massachusetts Renewable Energy Portfolio Standard (RPS), for every megawatt hour (MWh) of electricity added to the New England electric grid from a renewable energy generator, a Renewable Energy Certificate (REC) is generated. These RECs are available for purchase, supporting the Commonwealth's goal to increase renewable energy generation. The Alternative Energy Portfolio Standard (APS) is a similar approach that focuses on the sale and purchase of renewable energy generated from alternative methods, such as biofuels, geothermal technology, or food waste, as examples. The sales and purchase of RECs claim a portion of the renewable energy generated regionally and added to the regional electric grid for use. Options for the purchase of renewable energy power may include a Power Purchase Agreement (PPA) or Net Metering Credit Purchase Agreement (NMA) with an electric utility provider or a third-party energy provider.

Applicants contracting with a renewable energy generator should provide documentation that the generator has the energy capacity to provide for such purchase.

More information about purchasing Green power can be found through the Cape Light Compact, Green Energy Consumers Alliance, or by contacting your utility provider. Projects proposing to meet Objective CC4 by purchasing Green power should provide documentation of the commitment and identify the renewable energy generator, utility, or other entity that is a party to the agreement. See Energy Technical Bulletin Objective EN1 Method: Green Power Purchase.

Incorporate alternative renewable energy sources for onsite building development such as geothermal heating and cooling

A project may include an alternative renewable energy source such as biomass or biofuels, geothermal technology, or hydrogen fuel cell technology. Biofuels are predominantly transportation fuels derived from plants or plant material such as agricultural crops and byproducts. Geothermal technology uses heat below the Earth's surface in the form of steam or hot water for use in electricity generation, direct usage applications, or in heat pumps for building heating and cooling. Hydrogen fuel cells generate electricity that can be used in buildings, for backup power supply such as an emergency generator, or in transportation. There are many alternative energy sources and an applicant may propose an alternative energy source other than those listed here.

Propose, contribute to, or tie into a Microgrid

The United States Department of Energy Microgrid Exchange Group defines a microgrid as a group of interconnected loads and distributed energy resources (DERs) within clearly defined electrical boundaries that acts as a single controllable entity with respect to the grid. A microgrid can connect and disconnect from the grid to enable it to operate in both connected or island-mode.

Projects proposing to meet Objective CC4 by developing or connecting to a microgrid should provide information on how the microgrid will serve a specific area or documentation on how connection to a microgrid will be incorporated into the project.

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE CC5

Objective CC5 – *Promote strategies to address climate change induced impacts such as wildfire and extreme temperatures and changes in precipitation*

The purpose of Objective CC5 is to help address and mitigate the impacts of climate change on wildfire risk, increases in extreme temperatures, and increases in precipitation events and patterns. The following is a discussion of the methods that may be implemented to meet Objective CC5. Applicants are encouraged to propose alternate methods to meet Objective CC5 based on best practices for the type of project proposed, or as new strategies or technologies are developed and available.

In Rural and Natural Areas Placetypes, project site selection or layout demonstrate consideration of firebreaks

Cape Cod is vulnerable to wildfire. Cape fire departments are responding to an increasing number of wildfire events annually, and that number could further increase with increased temperatures and drought. There are many resources available to help residential and commercial property owners take steps to reduce their exposure to wildfire, including Firewise USA.

From the regional perspective, there are actions that will help improve the community's resiliency to wildfire risk. These actions are particularly relevant and applicable in Natural Area and Rural Area Placetypes, where applicants may demonstrate consistency with this method by identifying and maintaining firebreaks – typically linear areas including roads, fireroads, and transmission easements, but which can also include walkways, parking lots and maintained lawn. Where new development is proposed within Natural Area and Rural Area Placetypes, applicants should demonstrate that the project will not exacerbate the risk of wildfire and that following consultation with the local fire department, if indicated, wildfire breaks are incorporated into project layout or design. Consideration for consistency with this method may include noting the location of existing firebreaks within the vicinity of the project site.

USE FIRE RESISTANT BUILDING MATERIALS

Using roof and siding materials that are fire resistant will reduce a building's vulnerability to wildfire. Roof materials rated Class A offer the greatest fire resistance and include concrete or clay roof tiles as well as some metal roof systems. Fiber cement and other engineered wood products like synthetic wood shakes, available as roof shingles and in various forms of shingle or clapboard siding, can also provide high levels of fire resistance. Class B rated roof materials are most commonly pressure-impregnated fire-retardant treated shakes or shingles. A non-fire-retardant-treated wood shake or shingle roof covering is unrated and is not desirable, though in some cases an underlayment may be added to a roof system to provide Class A protection. In addition to selecting appropriate roof materials, it is important to consider how roof edges can be designed to limit vulnerability to fire. Removing accumulated vegetative debris from roof valleys and replacing combustible siding at roof edges with 6 inches of non-combustible siding such as fiber cement or flashing materials can reduce vulnerability to fire.

Use Firescaping to reduce fire risk

Applicants may also demonstrate consistency with this objective through the use of suitable landscaping, or "Firescaping." Firescaping is the use of plants or maintenance of landscaping that will reduce the flammability of a property. Not all sites will require firescaping, but sites within Natural Area or Rural Area Placetypes, or within heavily wooded Suburban Placetype settings, may demonstrate consistency with this method through the following best practices:

- Use less flammable materials: Certain plants containing volatile oils and resins, dense growth habits, and thin leaves or needles (evergreens) are typically more flammable than plants without oils or resins, more open growth habits, and broader leaves. Similarly, certain mulches, typically those which have been composted, are less flammable than woodchips or straw.
- Modify plant materials (potential fuels): Pruning, thinning, and placement and spacing of plantings relative to buildings will help reduce the ability of fire to spread horizontally along the ground or through the tree canopy. Pruning "ladder fuels" from the ground to 10 ft height along tree trunks will help reduce the ability of ground fires to climb into the canopy. Including firebreaks as a component of landscape design will also help control the spread of wildfire; and
- Maintain the firescape. Ongoing maintenance consistent with these principles will help lessen the risk of wildfire spread.

Information on firescaping may be found in these resources:

University of Georgia Warnell School of Forestry and Natural Resources, Firescaping: Wildfire Resistant Landscaping in Georgia https://resources.ipmcenters.org/resource.cfm?rid=24029

National Wildfire Coordinating Group NWCG Wildland Urban Interface Mitigation Field Guide https://co-co.org/wp-content/uploads/2025/04/NWCG-Wildland-Urban-Interface-Mitigation-Field-Guide.pdf

Incorporate green or cool roof design

Green roofs utilize plants to absorb rainwater and cool structures, providing benefits through stormwater management, reducing energy costs for building cooling, and reducing the heat island effect in the surrounding environment. Green roofs may be extensive or intensive, and may be proposed over the entire roof or a portion thereof. Extensive roofs tend to have lower additional structural requirements, use low growing plants with a shallower medium, and require less maintenance. Intensive green roofs have deeper soil beds to support larger plants, including shrubs and trees, and require greater structural support. Intensive roofs may also serve to help manage stormwater and can serve as a building amenity when designed as a rooftop garden or exterior space. Because there are structural considerations for buildings incorporating green roofs, their applicability is best for new construction[4]. Applicants proposing larger structures in Community Activity Centers and other densely developed areas are encouraged to consider a green roof design to help reduce ambient summer air temperatures.
Cool roofs are designed to reflect, as opposed to absorb, sunlight by applying a light colored paint, coating or material to the surface of a roof exposed to the sun. A cool roof surface could be as much as 50 degrees cooler than a standard or dark colored roof, thereby reducing the amount of energy needed to cool a building. Cool roofs can decrease building air conditioning needs, lower peak electricity demand, and reduce the local air temperature. Cool roofs can be used in new construction and in certain roof retrofits depending on other building conditions, and can be used on sloped or flat roofs. For certain buildings where a flat roof is incorporated into the design, making the roof reflective, or a "cool roof" is encouraged.

More information about cool roofs can be found through the Department of Energy.

[4] https://www.epa.gov/heatislands/using-green-roofs-reduce-heat-islands accessed August 2025

Size stormwater management infrastructure to accommodate the 100-year, 24-hour size storm

Our changing climate is impacting precipitation patterns that the region experiences today and are anticipated to experience in the future. To best account for changing patterns in precipitation, updated projections for extreme precipitation events should be used whenever designing new stormwater systems as detailed in Objective WR4 (manage and treat stormwater to protect and preserve water quality) in the Water Resources Technical Bulletin.

APPLICATION REQUIREMENTS

GHG IMPACT ANALYSIS AND MITIGATION PLAN

An applicant shall provide a narrative analysis describing its anticipated contributions and impacts with respect to regional greenhouse gas (GHG) emissions from its proposed development, based on the categories of sources, as project-relevant, set out in the Barnstable County GHG Inventory (e.g., transportation, stationary energy, etc.). The applicant will lay out in the narrative methods by which it proposes to mitigate, minimize or avoid GHG emissions from its proposed development.

Note that the Barnstable County GHG Inventory deals primarily with the most prevalent type of GHG, carbon dioxide (CO_2), which should similarly be the focus of the applicant's GHG Impact Analysis and Mitigation Plan. (Other GHG emissions may be significant in certain types of projects, and should be addressed in the analysis, as the case may be). There should be sufficient detail in plans and other information submitted with the DRI application to support the analysis and proposed mitigation approaches (e.g., construction plans/notes describing the building size, envelope attributes, operation schedule, building systems, occupancy, and other information necessary to describe the building relative to estimating energy consumption and calculating GHG emissions; transportation documents like TIAS, TDM plans, etc.)

In order to better frame a project's impacts and evidence the effectiveness of its proposed mitigation approaches, an applicant should submit a quantitative estimate of its GHG emissions under existing and proposed conditions, including different scenarios with or without proposed mitigation factored into the calculations. An applicant who proposes to submit estimated GHG emissions calculations for DRI review can reference the MEPA GHG policy (which includes guidance on calculating emissions from development for purposes of MEPA review) as well as the Barnstable County GHG Inventory. For DRI projects that were also subject to MEPA (and which prepared GHG calculations for MEPA review), an applicant can submit these calculations for the Commission to consider under DRI review. As part of this quantification, an applicant could estimate the anticipated building energy use of the building/s for the proposed project using energy modeling software, including all fuels proposed to be used on-site.

RESOURCES FOR GHG IMPACT ANALYSIS AND MITIGATION PLAN

World Resources Institute/World Business Council for Sustainable Development Greenhouse Gas Protocol Initiative (www.ghgprotocol.org)

Calculation Tool for Direct Emissions from Stationary Combustion Sources: "GHG Tool for Stationary Combustion" (https://ghgprotocol.org/calculation-tools#sector_specific_tools_id)

Emissions Factors and GWPs: MassDEP Emissions Factor Calculations "GWPs & EFs" tab, located at Massachusetts Greenhouse Gas (GHG) Reporting Program Data (https://www.mass.gov/lists/massachusetts-greenhouse-gas-ghg-reporting-program-data)

ISO New England Electric Generator Air Emissions Reports (https://www.iso-ne.com/system-planning/system-plans-studies/emissions)

U.S. Energy Information Administration Energy Conversion Calculators (https://www.eia.gov/energyexplained/units-and-calculators/energy-conversion-calculators.php)

U.S. Energy Information Administration Carbon Dioxide Emissions Coefficients (https://www.eia.gov/environment/emissions/co2_vol_mass.php)

U.S. Department of Energy Building Energy Modeling (https://www.energy.gov/eere/buildings/building-energy-modeling)

"Revised MEPA Greenhouse Gas Emissions Policy and Protocol", effective date May 5, 2010 http://www.env.state.ma.us/mepa/downloads/GHG%20Policy%20FINAL.pdf .

REFERENCES AND RESOURCES

Massachusetts energy codes (Building Energy Code)

Passive House Institute US (PHIUS) (https://www.phius.org/home-page)

"Siting Electric Vehicle Charging Stations on Cape Cod" (https://capecodcommission.org/ev-siting-analysis)

Cape Cod Greenhouse Gas Emissions Inventory (https://capecodcommission.org/our-work/greenhouse-gas-emissions-inventory/)

Solar Screening Tool (https://www.capecodcommission.org/our-work/solar-screening-tool/)

U.S. Department of Energy National Renewable Energy Lab Solar Ready Planning (https://www.nrel.gov/solar/market-research-analysis/blog/posts/solar-ready-building-design-a-summary-of-technical-considerations) and "Solar Ready Buildings Planning Guide", December 2009 (https://www.nrel.gov/docs/fy10osti/46078.pdf)

Information on embodied carbon (Rocky Mountain Institute and The New School Healthy Materials Lab).

Cape Light Compact (https://www.capelightcompact.org/)

Green Energy Consumers Alliance (https://www.greenenergyconsumers.org/)

Department of Energy Cool Roofs (https://www.energy.gov/energysaver/cool-roofs)

Cultural Heritage DRAFT

This guidance is intended to clarify how the Cultural Heritage Goal and Objectives of the Regional Policy Plan (RPP) are to be applied and interpreted in Cape Cod Commission Development of Regional Impact (DRI) project review. This technical bulletin presents specific methods by which a project can meet the goal and objectives.

Cultural Heritage Goal: To protect and preserve the significant cultural, historic, and archaeological values and resources of Cape Cod.

- **Objective CH1 –** *Protect and preserve forms, layouts, scale, massing, and key character defining features of historic resources, including traditional development patterns of villages and neighborhoods*
- **Objective CH2** – *Protect and preserve archaeological resources and assets from alteration or relocation*
- **Objective CH3** – *Preserve and enhance public access and rights to and along the shore*
- **Objective CH4** – *Protect and preserve traditional agricultural and maritime development and uses*

The applicability and materiality of these goals and objectives to a project will be determined on a case-by-case basis considering a number of factors including the location, context (as defined by the Placetype of the project's location), scale, use, and other characteristics of a project.

THE ROLE OF CAPE COD PLACETYPES

The RPP incorporates *a framework for regional land use policies and regulations based on local form and context* as identified through categories of Placetypes found and desired on Cape Cod.

The Placetypes are determined in two ways: some are depicted on a map contained within the RPP Data Viewer located at www.capecodcommission.org/RPPDataViewer adopted by the Commission as part of the Technical Guidance for review of DRIs, which may be amended from time to time as land use patterns and regional land use priorities change, and the remainder are determined using the character descriptions set forth in Section 8 of the RPP.

The project context, as defined by the Placetype of the project's location, provides the lens through which the Commission will review the project under the RPP.

TABLE OF CONTENTS

Introduction 4

Definitions 5

Summary of Methods 6

Detailed Methods for Meeting Objective CH1 10

Detailed Methods for Meeting Objective CH2 15

Detailed Methods for Meeting Objective CH3 17

Detailed Methods for Meeting Objective CH4 18

General Application Requirements 20

INTRODUCTION

The Cape Cod Commission Act identifies the preservation of historical, cultural and archaeological resources as one of the purposes of the Cape Cod Commission. Historic and archaeological sites reflect the evolution and growth of a property over long periods of time, providing glimpses into many different eras in the region's history. Preserving these properties protects an important educational and cultural resource.

Preservation of historic and archaeological sites does not necessarily mean that change cannot continue in the region. Change in buildings and neighborhoods is inevitable and may be accommodated while still protecting the most historically significant aspects of a property or district. Preserving historic buildings and appending new additions carries forward regional traditions in which buildings were typically added to incrementally, without destroying the work of previous generations.

Protecting public access to the shore and facilitating agricultural and maritime uses that are linked to the region's historic development and traditional occupations also preserves an important legacy. Reinforcing public trust rights for fishing, fowling and navigation along the shore ensures continued recreational opportunities and visual access in the face of ever-increasing development pressures. Similarly, maintaining key agricultural lands and sheltered harbors for traditional uses acknowledges the potential for these and similar uses to become more prominent again and preserves these resources for future generations.

DEFINITIONS

Historic Resource – any building, structure or site that has historic significance due to its age; association with events that are historically significant; association with persons significant in our past; embodiment of distinctive characteristics of a type, period, or method of construction; or likelihood of yielding information significant in history or pre-history. This includes resources listed on the State or National Registers of Historic Places, resources of significance based on the above criteria that have not yet been inventoried or designated, and may include resources inventoried on the Massachusetts Cultural Resource Inventory System (MACRIS).

Historic District – a collection of historic structures and/or sites within a defined area designated either as a Local Historic District under Chapter 40C of MGL, as a Local or Regional District created by Special Legislation under MGL, or an area listed on the National Register of Historic Places as a District or Multiple Resource Area.

Cultural Landscape – a geographic area associated with an historic event, activity, or person, or exhibiting other cultural or aesthetic values. There are four general types of cultural landscapes, not mutually exclusive: historic sites, historic designed landscapes, historic vernacular landscapes, and ethnographic landscapes. See "Defining Cultural Landscapes" on the National Park Service's website for more information: https://www.nps.gov/subjects/culturallandscapes/understand-cl.htm.

Substantial Alteration – an alteration that jeopardizes an historic resource's continuing individual eligibility for listing in the National Register of Historic Places, or its continuing status as a contributing structure in a National Register Historic District.

SUMMARY OF METHODS

GOAL | CULTURAL HERITAGE

To protect and preserve the significant cultural, historic, and archaeological values and resources of Cape Cod.

OBJECTIVE CH1 – Protect and preserve forms, layouts, scale, massing, and key character defining features of historic resources, including traditional development patterns of villages and neighborhoods.

METHODS

All DRIs must:

- Identify the Historic Resources and Cultural Landscapes that are on or adjacent to the project site and may be impacted by the project
- Where Historic Resources are identified on a project site:
    - Renovate, re-use, and incorporate historic structures into new development proposals in a way that retains their original building materials
    - Design changes or alterations to historic structures to be reversible (as discussed in the Secretary of the Interior's Standards), so that they can be undone in the future without loss of significant historic materials and original architectural features
    - Locate additions to historic structures on secondary facades and stepped back from the original structure to limit demolition of original materials and to ensure additions are secondary to the original building
- Where Cultural Landscapes are identified on a project site:
    - Site new development outside of Cultural Landscapes; or
    - Locate at their periphery or in the least culturally sensitive areas to preserve their historic features and materials.

OBJECTIVE CH1 AREAS OF EMPHASIS BY PLACETYPE

Natural Areas and Rural Development Areas | Limit new development footprints and maintain rural character. Protect entirety of cultural landscapes to maintain rural development pattern.

Historic Areas and Maritime Areas | Allow alteration or expansion to the extent it preserves key character-defining features and is consistent with the scale and character of the surrounding area.

Suburban Development Areas and Community Activity Centers | Allow appropriate alteration or expansion that is consistent with the character of the historic resource.

Industrial Activity Centers and Military and Transportation Areas | Relocation of historic resources may be appropriate if jeopardized by incompatible development.

OBJECTIVE CH2 – Protect and preserve archaeological resources and assets from alteration or relocation.

METHODS

All DRIs must:

- Site new development away from significant archaeological sites so they are not disturbed.
- Place permanent Preservation Restrictions (PR) or Conservation Restrictions (CR) on significant archaeological sites to protect them in situ for the future.

OBJECTIVE CH2 AREAS OF EMPHASIS BY PLACETYPE

Natural Areas and Rural Development Areas | Preserve significant archaeological sites in their entirety and protect them with permanent restrictions from development.

OBJECTIVE CH3 – Preserve and enhance public access and rights to and along the shore.

METHODS

All DRIs should, to the maximum extent feasible:

- Provide public access to the shoreline for any new coastal development without impairing the natural beneficial functions of natural resources.
- Where feasible, maintain, broaden, or restore historic or existing physical and/or visual access to the coast.

- Protect existing public access to the coast with permanent Conservation Restrictions or Easements.

OBJECTIVE CH4 – Protect and preserve traditional agricultural and maritime development and uses.

METHODS

All DRIs with access to the water must:

- Set aside land area for and maintain public access to the water for traditional maritime industries or water-dependent uses

All DRIs should, to the maximum extent feasible:

- Maintain or restore traditional agricultural and maritime industries that contribute to economic diversity and preserve historical traditions
- If present, retain or improve existing maritime industrial structures and allow for continued maritime industrial or water-dependent use
- Place Preservation Restrictions (PR) or Conservation Restrictions (CR) on farmlands that are noted in historic or cultural landscape inventories or listed on the National Register of Historic Places

OBJECTIVE CH4 AREAS OF EMPHASIS BY PLACETYPE

Natural Areas and Rural Development Areas | Retain existing agricultural uses and maritime industries that are compatible with natural resource protection; consider using Preservation Restrictions and Conservation Restrictions to permanently protect their open landscapes.

Suburban Development Areas | Require any new development to be designed to cluster away from existing agricultural or maritime industrial uses.

Historic Areas and Maritime Areas | Preserve traditional agricultural and maritime uses; consider Preservation Restrictions or Conservation Restrictions on historic agricultural landscapes and maritime areas to permanently protect them.

Community Activity Centers | Require any new coastal development to preserve existing maritime industries and to reserve land area for traditional maritime industries or water-dependent uses and public views to the water.

Industrial Activity Centers | Require any new development to limit impacts on existing agricultural or maritime industrial uses.

DETAILED METHODS FOR MEETING OBJECTIVE CH1

Objective CH1 – *Protect and preserve forms, layouts, scale, massing, and key character defining features of historic resources, including traditional development patterns of villages and neighborhoods.*

Identify the historic resources and cultural landscapes on the project site

Historic Resources

To protect Historic Resources that may be impacted by a proposed project, applicants must first identify Historic Resources, as defined in this Technical Bulletin. Identifying Historic Resources on a project site requires reviewing existing cultural resource inventories and completing an inspection of the project site. Many Historic Resources have been inventoried in MACRIS, the Massachusetts Cultural Resource Inventory System, which includes information on properties described on historic inventory forms as well as those listed on the National Register of Historic Places or protected by Local Historic Districts and Preservation Restrictions. Town historical commissions and local historical societies are another potential source of information about existing structures.

Some significant Historic Resources have never been inventoried or given a special designation. To ensure that important properties are not overlooked, any existing building on site should be inspected and researched to determine if it meets the definition of an Historic Resource. Commission staff will provide assistance to the Applicant to determine if an Historic Resource is present on a project site.

Cultural Landscapes

Cultural Landscapes combine both cultural and natural resources, revealing aspects of our region's origins and development as well as our revolving relationship with the natural world. These landscapes are important to understanding our culture and they help to define the character of our region.

Identifying Cultural Landscapes is the first step in protecting them. Cultural Landscapes can take several forms – historic sites, designed landscapes, vernacular landscapes, and ethnographic landscapes – and they may overlap. As defined by the Secretary of the Interior, an historic site is a landscape significant for its association with an historic event, activity or person, such as a presidential homestead or battlefield. Historic designed landscapes are those laid out by a landscape architect or other designer, and include formal parks, campuses, and estates. Historic vernacular landscapes are lands that have evolved through use by the people whose activities or occupancy shaped them, such as a farmstead, an industrial complex, a cranberry bog trail system, or a rural village along a river valley. Ethnographic landscapes contain a variety of natural and cultural resources that the associated people define as heritage resources and often include unique natural landforms or sacred religious sites.

Many Cape towns have a partial inventory of their cultural landscapes. While some cultural landscapes are included in MACRIS, many have not yet been inventoried. To identify Cultural Landscapes, applicants should review the relevant town inventory of Cultural Landscapes (if available) and inventories available through MACRIS. Commission staff will assist the Applicant to determine whether a particular geographic area or site is a Cultural Landscape.

Renovate, re-use, and incorporate historic structures into new development proposals in a way that retains their original building materials

Historic properties reveal information about a community's history and character that cannot be duplicated. They are a non-renewable resource. As such, significant historic structures must be preserved and incorporated into new development proposals in a way that preserves the character-defining features of the resource. Historic structures may be renovated to become part of the primary new use, or they may be retained as a separate use on the property. Demolition should be considered only if the historic resource is no longer found to be significant. There is a presumption that all properties on the National Register of Historic Places, whether individually listed or "contributing" members of a district, are significant. Any demolition request based upon structural instability or deterioration will require a technical report prepared by a registered architect or engineer approved by the Commission.

The original site and setting of the historic structure should also be retained as it is part of the historic record, but in some cases it may be appropriate to allow a historic building to be relocated elsewhere on the project property or elsewhere in the community. Issues to consider in whether relocation may be appropriate include whether the building has been moved in the past (and thus may be tied less strongly to its existing site), whether the building has a unique and special relationship to features on its site (which relationships would be hard to duplicate on another site), and whether the building stands alone or is part of a distinctive neighborhood of related structures (a group of related structures should be kept together to preserve their collective story). If the Commission finds that an historic structure is threatened by erosion or coastal flooding, relocation may be appropriate, preferably in a similar setting within the same community.

Design changes or alterations to historic properties to be reversible as discussed in *The Secretary of the Interior's Standards for Rehabilitation - Historic Preservation Tax Incentives (U.S. National Park Service)*, so that they can be undone in the future without loss of significant historic materials and original architectural features

There are many facets of an historic building or property that contribute to its historic qualities or significance, including its materials, construction type, architectural style, and association with important events or people. A complete understanding of any property may require research about its style, construction, and function; knowledge about the original building, owner, and later occupants; and information about the evolutionary history of the building.

For all historic properties, as much of the historic structure (its framing materials, sheathing, and architectural detailing) as possible should be preserved to retain existing evidence about the building's construction and history. There is intrinsic value in the original historic materials used because they reveal not only the builders' choice of materials but also the engineering and construction methods available.

Many historic buildings have evolved and changed over time, whether to accommodate a new profession, a growing family, or new technologies. It is possible for historic structures to continue to evolve to meet modern needs, but that evolution should occur without destroying historically significant elements contained in the existing structure. This is the concept of "reversibility" that is used by preservationists in evaluating whether proposed changes can be undone at some time in the future without the loss of many significant materials. It is also consistent with traditional regional patterns of adding incrementally to buildings.

Locate additions to historic structures on secondary facades and stepped back from the original structure to limit demolition of original materials and to ensure additions are secondary to the original building

The most recognized standards for evaluating acceptable changes to historic structures are the Secretary of the Interior's Standards for Treatment of Historic Properties (https://www.nps.gov/tps/standards.htm), developed by the National Park Service and used by preservation professionals across the country. For properties where re-use and renovation is expected, the Secretary's Standards for Rehabilitation are used (https://www.nps.gov/tps/standards/rehabilitation.htm).

Consistent with the Secretary's Standards, the Commission will focus on these elements in reviewing proposed additions or alterations to historic buildings:

1. Preserve significant historic materials and original features. New additions should be designed to require little removal of original historic materials. Additions are preferably attached to secondary or less prominent facades of the building and placed so as to limit the removal of distinctive architectural features and trim. If the proposed addition is large, a smaller connecting mass to link the old and new construction will require less removal of historic material. Original architectural details such as window and door surrounds, corner boards, and moldings should be retained and repaired where possible, rather than removed and replaced with entirely new features.
2. Preserve the building's historic character. A new addition or alteration should aim to complement and be compatible with the character of the historic building, not overwhelm it, using similar size, scale, massings, and proportions. To avoid changing the primary historic form too much, follow the region's traditional means of expanding buildings through the use of side or rear additions under separate rooflines, or the use of dormers within the roof slope to expand usable top floor space. There are several ways to design an addition without overwhelming the original building – by stepping back from the historic façade, or by incorporating a recessed area between the old and new portions of the building so that the original building form remains distinct and prominent.
3. Make a visual distinction between old and new. New additions/alterations to historic buildings should be distinguishable from the original structure to avoid a false sense of history. Plan the new addition in a manner that provides some

differentiation in material, color and detailing so that the new work does not appear to be part of the historic building mass. The addition of porches, decks, or other exterior features should be designed without removing significant historic building material so that they can be later removed without harming the building's historic integrity.

Site new development outside of cultural landscapes or locate at their periphery to preserve their unique character

As with other historic resources, the character-defining features of a cultural landscape should be preserved to maintain the integrity of the resource. It can be challenging to accommodate new development on a cultural landscape and new development will only be acceptable if it preserves significant existing cultural and natural features. If existing cultural landscapes are defined by open fields and broad expansive views, new development should be carefully sited to the periphery or clustered in small, less-prominent portions of the landscape to avoid interrupting primary open spaces.

DETAILED METHODS FOR MEETING OBJECTIVE CH2

Objective CH2 – *Protect and preserve archaeological resources and assets from alteration or relocation.*

Site new development away from significant archaeological sites so they are not disturbed

Any work on undeveloped properties, or on land that has not been disturbed in the last century, requires consideration of archaeological resources to determine whether significant resources are present. All archaeological investigations and site work requires a permit from the State Archaeologist at Massachusetts Historical Commission (MHC). MHC maintains an inventory of known archaeological sites and uses that information to build a predictive model to estimate where other archaeological sites are likely to be found. If a property is thought to be archaeologically sensitive, or likely to contain archaeological resources, an archaeological survey will be required as part of the DRI application.

The Commission will use the following process to determine whether sites are archaeologically sensitive and require survey:

- Applicant files a Project Notification Form (PNF) with MHC to determine if the project area is known to be archaeologically sensitive. MHC may determine the area is archaeologically sensitive and require an archaeological survey to determine if there are archaeological resources on the project site. Alternatively, MHC may determine the project is unlikely to affect archaeological resources and no archaeological survey is required. If MHC does not issue a response but the property includes undisturbed areas that may be significant due to their proximity to wetland and water resources or their historical associations with Native American tribes, the Commission will require an archaeological survey to determine if there are archaeological resources on the project site.
- If MHC or the Commission requires an archaeological survey to assess the project site for archaeological resources, the applicant must retain a qualified archaeological consultant, and the consultant must receive a State Archaeologist's Field Investigation Permit to conduct the survey. The State Archaeologist's permit regulations are published in 950 CMR 70.
- If significant archaeological resources are identified during the survey, the applicant shall design the project to avoid ground disturbance in those areas.

- Any significant sites or resources identified by an archaeological survey must be protected from development impacts by conservation restrictions or by locating them within protected open space areas.

Place permanent Preservation Restrictions (PR) or Conservation Restrictions (CR) on significant archaeological sites to protect them in situ for the future

Archaeological sites and archaeological resources hold clues to the past that are best understood when the resources are seen in their original arrangement and setting. As such, resource recovery or the removal of archaeological resources should be considered only as a last resort. Some archaeological sites that are subject to coastal erosion or other natural processes may need to be recovered and documented now, but the same is not true of sites located on higher ground. It is generally understood that archaeological resources are best protected by keeping them in place as long as possible, with the expectation that future societies will have even greater ability to fully document and analyze their significance.

Underwater archaeological resources are addressed in the Ocean Resources section of the RPP and are surveyed and protected in concert with the Massachusetts Board of Underwater Archaeological Resources (MBUAR).

Applicants should work with the State Archaeologist at Massachusetts Historical Commission and with professional archaeological resource consultants to develop appropriate boundaries and restriction language to protect significant archaeological sites.

DETAILED METHODS FOR MEETING OBJECTIVE CH3

Objective CH3 – *Preserve and enhance public access and rights to and along the shore*

Maintain, broaden, or restore historic or existing physical and/or visual access to the coast wherever possible

Much of the Massachusetts coast and tidelands are privately owned, though under Massachusetts law, rights of public use for fishing, fowling, and navigation are reserved in private tidelands. Public access to many coastal areas is already limited and this continues to be a problem as development increases along the coast and erosion impacts some access points. The Commission strives to preserve any existing public access points, to restore historic public rights of way, and to expand public access to the shore, especially in areas where there are few existing public access points.

Provide public access to the shoreline for any new coastal development without impairing the natural beneficial functions of natural resources

Existing and new public access to the shore may take many forms, including pathways, parks, or view corridors, but must also consider potential impacts on natural and historic or archaeological resources. New walkways are encouraged if they enhance shoreline access for the public, including people with disabilities, but they should not be pursued if they degrade undisturbed resources or create adverse impacts to habitat, aesthetics, or storm damage prevention. Coastal engineering structures, such as revetments and flood walls, should be designed to allow the public to pass along the shore (either above or below the structures) in the exercise of its public trust rights to fishing, fowling, and navigation. In development or redevelopment of water-dependent facilities, public access to the shore should be included through means such as viewing areas, pedestrian pathways, seating areas, and boat launches.

Protect existing public access to the coast with permanent Conservation Restrictions or Easements

Some forms of public access may contribute to meeting open space goals of the RPP. Reference the Open Space section for a discussion of open space requirements. Reference the Coastal Resiliency and Wetlands sections for a discussion of natural processes and the beneficial function of natural resources which could be impacted by expanding public access.

DETAILED METHODS FOR MEETING OBJECTIVE CH4

Objective CH4 – *Protect and preserve traditional agricultural and maritime development and uses*

Maintain or restore traditional industries that contribute to economic diversity and preserve historical traditions

The Cape's traditional industries include the agricultural and maritime industries that are responsible for much of the region's historic growth. A combination of agriculture and maritime pursuits has sustained the Cape's residents from its earliest inhabitants to today. Agricultural lands became more significant and began to produce crops for a larger region in the 19th century, but many of these lands were gradually replaced by tourist and second home development as the Cape grew in popularity. Maritime industries in the region reached their peak during the early 1800s, with shipbuilding, fishing and all their related industries bringing new development to the region's harbors and waterways. The prominence of these industries and the area devoted to them has been greatly reduced in more recent history, but the region maintains both working agricultural lands and working harbors. Shell and fin fishing, boat building industries, and agricultural pursuits preserve a traditional way of life in the region and help to maintain some of the Cape's character-defining elements.

If present, retain or improve existing maritime industrial structures and allow for continued maritime industrial or water-dependent use on the project site

Other water-dependent uses such as scientific study of the oceans, commercial and recreational boating have also become traditions in the region. Access for these and the traditional water-dependent industries needs to be maintained. Unless there is an overriding public benefit provided, water-dependent uses should not be changed to non-water dependent uses. Encroachment from other forms of development should be limited, and historic maritime buildings should be preserved and reused whenever possible. FEMA regulations acknowledge the value of protecting certain historic structures in flood hazard areas and include special provisions to encourage their preservation.

Place Preservation Restrictions (PR) or Conservation Restrictions (CR) on farmlands that are noted in historic or cultural landscape inventories or listed on the National Register of Historic Places

Historic agricultural lands and other working agricultural lands should be retained to prevent further loss of these dwindling resources that speak to the Cape's agricultural past. With the growing popularity of farm stands and the local food movement, regional interest in agricultural pursuits has increased. Preserving these traditional uses helps to protect both the region's economic diversity and flexibility to adapt to future needs and continue local agriculture. One way to protect traditional industries is to permanently restrict land for those uses. Conservation Restrictions, Preservation Restrictions, and Agricultural Preservation Restrictions are all tools allowed under Massachusetts General Law that can protect land or building features in perpetuity. They can be particularly useful in maintaining open natural areas that were once part of traditional land-based industries, and preserving historic barns and fields for continued agricultural production. Protection efforts should also focus on limiting new development to a small portion of an agricultural property, clustering it in an area that is least suited for agricultural uses, and protecting the remaining land area for continued traditional use.

GENERAL APPLICATION REQUIREMENTS

Applicants are encouraged to reach out to Cape Cod Commission staff early in the application preparation process to discuss application materials necessary to demonstrate that the project meets the applicable goal and objectives. In almost all cases, application materials will include an assessment of cultural resources on the project site and in the project vicinity, as follows:

- Identify historic resources on the project site and on nearby properties that might be impacted by the proposed development
- Evaluate all properties for archaeological sensitivity by filing a Project Notification Form (PNF) with Massachusetts Historical Commission (MHC) and determining whether intensive survey work is necessary
- Identify existing public access to the shore on the subject property and adjacent properties
- Identify agricultural lands and/or maritime industrial uses on the project site

Economy DRAFT

This guidance is intended to clarify how the Economy Goal and Objectives of the Regional Policy Plan (RPP) are to be applied and interpreted in Cape Cod Commission Development of Regional Impact (DRI) project review. This technical bulletin presents specific methods by which a project can meet the goal and objectives.

Economy Goal: To promote a resilient, inclusive, and diverse regional economy that protects and builds on the Cape's competitive advantages.

- **Objective EC1** – *Support traditional and emerging businesses and industries*
- **Objective EC2** – *Support local workforce, economic activity, and entrepreneurship*

The applicability and materiality of these goals and objectives to a project will be determined on a case-by-case basis considering a number of factors including the location, context (as defined by the Placetype of the project's location), scale, use, and other characteristics of a project.

THE ROLE OF CAPE COD PLACETYPES

The RPP incorporates *a framework for regional land use policies and regulations based on local form and context* as identified through categories of Placetypes found and desired on Cape Cod.

The Placetypes are determined in two ways: some are depicted on a map contained within the RPP Data Viewer located at www.capecodcommission.org/RPPDataViewer adopted by the Commission as part of the Technical Guidance for review of DRIs, which may be amended from time to time as land use patterns and regional land use priorities change, and the remainder are determined using the character descriptions set forth in Section 8 of the RPP.

The project context, as defined by the Placetype of the project's location, provides the lens through which the Commission will review the project under the RPP.

TABLE OF CONTENTS

Introduction 4
Applicability 4
Summary of Methods 5
Detailed Discussion of Methods for Meeting Objective EC1 6
Detailed Discussion of Methods for Meeting Objective EC2 8
General Application Requirements 11
Additional Resources 14

INTRODUCTION

The stated purposes of the Cape Cod Commission Act ("the Act") acknowledge that the regional economy is inextricably linked to the health and appeal of our natural and built environment by calling for the Commission to "maintain and enhance sound local and regional economies, and to ensure balanced economic development" while protecting the unique values of the region. To achieve these purposes set forth in the Act, the Commission is charged with "promot[ing] the expansion of employment opportunities" and "implement[ing] a balanced and sustainable economic development strategy for Cape Cod capable of absorbing the effects of seasonal fluctuations in economic activity."

This technical bulletin serves to clarify the goals and objectives of the Regional Policy Plan (RPP) that pertain to the Cape Cod economy. Its purpose is to help applicants for development projects interpret and apply the basic economic principles contained in the RPP Economy Goal and Objectives. This guidance presents a variety of methods by which a project can meet this Goal and related Objectives.

APPLICABILITY

The economy goal and objectives apply to DRIs with a non-residential component and 10 or more employees (full- or part-time).

SUMMARY OF METHODS

GOAL | ECONOMY

To promote a resilient, inclusive, and diverse regional economy that protects and builds on the Cape's competitive advantages.

OBJECTIVE EC1 – Support traditional and emerging businesses and industries

METHODS

The following are methods that may be used to achieve consistency with Objective EC1:

- Provide business opportunities in emerging industries
- Sustain or support traditional and core industries and businesses
- Support the development of new businesses, technologies, and/or products
- Support artist and other creative occupations
- Protect and support shell/fin fishing industries
- Support or enhance research and development activities

OBJECTIVE EC2 – Support local workforce, economic activity, and entrepreneurship

METHODS

The following are methods that may be used to achieve consistency with Objective EC2:

- Provide year-round jobs
- Provide jobs that pay above-average wages relative to similar occupations and industries in the region and relative to the region as a whole
- Provide employees with training for career advancement
- Provide employees with paid sick, vacation, medical and disability benefits
- Provide housing assistance or affordable housing for employees (year-round and/or seasonal)
- Provide services necessary to allow residents to enter or remain in the workforce (e.g., childcare, transportation)
- Provide space for local businesses
- Support businesses selling locally grown or produced products
- Support businesses that export goods

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE EC1

Objective EC1 – Support traditional and emerging businesses and industries

The intent of objective EC1 is to support the core industries that have and will continue to be crucial to the region's economy, while also fostering new and emerging industries that leverage the attributes and characteristics that make Cape Cod unique and economically viable. Development or redevelopment that fortifies existing core businesses and industries or helps diversify the region's economic mix and is responsive to changes in markets will best serve Cape residents over the long term. Following are methods that may be used to achieve consistency with Objective EC1.

Provide business opportunities in emerging industries

The region will benefit from greater opportunities in new, innovative, and emerging industries that leverage the region's unique characteristics and/or contribute to addressing local and regional priorities. This includes but is not limited to businesses and industries that utilize Cape Cod's coastline and marine and freshwater resources, such as marine science and technology businesses, and those that advance resilience of the natural and built environment to climate change and other challenges. Projects that provide space for, or jobs in, new and emerging industries, such as marine science and technology and other blue economy industries, will help to diversify the region's economy and support those new industries.

Sustain or support traditional and core industries and businesses

While the region should expand and diversify its industries and business opportunities, it is important to also continue to support the existing and traditional industries and businesses currently core to the region's economy. These include the healthcare, hospitality, and retail sectors. Additionally, while comprising a smaller share of the current economic activity, the region needs to continue to support its traditional industries and their needs, such as fishing, aquaculture, and agriculture, which are important to the economy and regional identity. A project may support traditional and core industries in the region by providing jobs in those sectors or providing space for those types of businesses or activity.

Support the development of new businesses, technologies, and/or products

Expanding businesses, technologies and products can bolster the region's economy. A project may propose to create a new business in the region or develop new technologies or products to expand regional wealth and economic activity.

Support artist and other creative occupations

As stated in the 2024 Comprehensive Economic Development Strategy ("CEDS"), "the region's arts and culture sector is a critical component of Cape Cod's identity and economy…and it is a characteristic element of what draws people to the region." Continuing to support and foster artists and creative occupations will help support a key element of the region's economy. A project may support artists or other creative occupations by providing space for such businesses, integrating public art into its design, partnering with artists or other creative organizations in the region, or employing or providing other support for artists and creative occupations.

Protect and support shell/fin fishing industries

The commercial fishing and aquaculture industries are key for the region, both economically and culturally, and can provide critical year-round employment opportunities. A project may help sustain these industries by preserving access to the fishing grounds, protecting or providing needed infrastructure to ensure the continued viability of these industries, or working directly with commercial fishing and aquaculture businesses in the region.

Support or enhance research and development activities

Capitalizing on research and development activities and industries can provide higher-wage year-round employment opportunities and can attract a more diverse industry mix to the region in the future. A project could support or enhance research and development activities by providing jobs or space for such endeavors or through supportive partnerships with institutions and organizations already carrying out this work.

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE EC2

Objective EC2 – Support local workforce, economic activity, and entrepreneurship

The cost of living and demand for leisure-related services and housing limit both workforce and business diversity in the region. Current employers have difficulty retaining and attracting labor as the cost of living far outstrips the average wage in the top industries. While these challenges are systemic and individual development projects cannot fix them, it is essential that wages, job benefits, and opportunities for employment and workforce development contribute to providing a more resilient, inclusive, and diverse economy. Following are methods a project may use to demonstrate consistency with Objective EC2.

Provide year-round jobs

The region's economy is highly seasonal with employment fluctuating between winter and summer months. This can result in lower wage jobs and high unemployment in the winter months, forcing workers to leave the region permanently or during the off-season. Providing year-round jobs is critical to stabilizing and strengthening the economy and allowing residents to live and work in the region year-round. A project can support local workforce by providing year-round jobs.

Provide jobs that pay above-average wages relative to similar occupations and industries in the region and relative to the region as a whole

Many of the jobs in the region are concentrated in lower paying industries, such as retail, food services, and other tourism-related industries. Projects providing jobs that pay higher wages relative to other jobs in the region help enable local workforce participation by compensating for the high cost of living, attracting and retaining more local workers.

Provide employees with training for career advancement

Continuing to provide training so local workers can advance in their careers and provide the labor necessary for changing industry needs is important for the longevity of the region's workforce and economy. Projects can provide employees with regular training opportunities for career advancement, partner with local workforce training and educational institutions to identify workforce training needs and develop programs, and support employees in continuously aligning their skills with the needs of local businesses.

Provide employees with paid sick, vacation, medical and disability benefits

To maintain and attract workers in the region, businesses should offer competitive benefits, which can also help with the cost of living. Projects should provide employees with paid sick, vacation, medical and disability benefits.

Provide housing assistance or affordable housing for employees (year-round and/or seasonal)

Housing in the region is unaffordable for most residents and for average wages in most industries. To help offset the high cost of living and provide opportunities for employees to live and work in the region, a project or development can provide housing assistance for its employees. This may be done through vouchers, providing actual housing for the employees (which may be particularly necessary for seasonal workers), or developing and/or contributing to development of housing in appropriate locations to increase the year-round and seasonal workforce housing supply in the region.

Provide services necessary to allow residents to enter or remain in the workforce (e.g., childcare, transportation)

Housing is not the only factor in cost of living and workforce participation. Access to affordable childcare can be a pivotal factor in whether a parent may be able to participate in the workforce. Additionally, having transportation to a job can be another critical hurdle. Providing support or services, such as affordable and accessible childcare and efficient and affordable transportation, are ways a project can help support local workforce participation. This could include providing free or discounted childcare or eldercare, subsidies for transportation, and/or coordinated transportation or transit services to and from the business.

Provide space for local businesses

The size of the economy is impacted by business ownership; locally owned businesses retain and circulate money within the regional economy to a greater degree than non-local businesses. Securing a location for a business to operate can be a challenge generally and financially. A project can provide space for local businesses, either permanently or as pop-ups, to help local businesses test their concepts and gain exposure to customers in the region. If employing this method, project plans should show a space specifically available to local businesses and details on planned programming for it. This can help support the establishment and continued operations of local businesses, which are vital for local economic activity and entrepreneurship.

Support businesses selling locally grown or produced products

Supporting locally grown or produced products or businesses that add value to local raw materials helps support local economic activity and local businesses. A project can partner with businesses that sell local goods, utilize or sell local raw materials, or contract directly with local suppliers to help support local businesses, growers and producers. Supporting these local businesses can also be a way to stimulate and support the local economy and local entrepreneurship.

Support businesses that export goods

The regional economy expands when products made locally are sold (or exported) to non-residents, or when goods previously imported are made and sold locally (known as import substitution). Businesses that export goods can expand and improve local economic activity. Partnering with or providing resources for businesses that export goods from the region is one way a project can support these businesses and local economic activity.

GENERAL APPLICATION REQUIREMENTS

All applicants must provide an Economic Narrative with their initial DRI application. The narrative should include a brief description of the project and describe the methods by which the applicant will meet the Economy Goal and Objectives. DRI projects being reviewed for consistency with the Economy Goal with 25 or more employees (full- or part-time) are required to complete a full Economic Impact Assessment (EIA). Depending on various factors such as project location, geographic context (as defined by the Placetypes), scale, and proposed use, the Commission may request a full EIA from the applicant for projects with less than 25 employees, in addition to the Economic Narrative. The required elements of these documents are outlined below.

ECONOMIC NARRATIVE

An Economic Narrative should include the following:

- Brief description of the proposed development project, including a description of the products or services that the project will provide and the customers this project will primarily serve (for example, residents of the region, summer residents/second homeowners, tourists, or customers located outside the region);
- Description of the basic elements of the development project, how much it will cost to construct (i.e., total investment including all design and permitting costs), how many jobs will be created, and expected wages and salaries;
- Narrative and documentation describing the methods used to meet the Economy Goal and related Objectives.

ECONOMIC IMPACT ASSESSMENT (EIA)

An EIA should provide detailed information and data on the project, the employment opportunities related to the project, and the expected fiscal impact of the project on the community and the region as a whole.

In addition to the data and information requested below, applicants are welcome to provide economic analyses commonly used to show how the proposed project is favorable to the regional economy. This could include simple location quotient and shift-share analyses or more complex impact assessments using in-put/out-put multipliers, econometric models, and/or fiscal impact models.

An EIA must include the following information:

1. Locus Map(s): Provide a map or maps showing the location of the project relative to:
    a. Community Activity Centers
    b. Direct competitors
    c. Suppliers
    d. Customers

2. Market Niche: Detailed description of the products or services that the project will provide and the customers this project will primarily serve

3. Corporate and/or Ownership Information: Provide documentation of the following as appropriate:
    a. Incorporation type for tax purposes
    b. State of incorporation
    c. Location of corporate headquarters

4. Estimated Cost of the Project: Provide the following information on the estimated investment required to complete the proposed project:
    a. Total investment required to complete the building of the project including construction materials, labor costs, and related development services
    b. Total investment required to acquire the land and any existing buildings located on the property being developed

5. Employment Information: Employment information for the last three years (if applicable) and estimated employment for three years following completion of the project. Actual company data should be provided when available rather than general industry norms.
    a. Short-term, Construction-phase Employment:
        i. Total work hours estimated to complete the project
        ii. Total labor costs for construction
        iii. Average wage(s)/salary(ies) anticipated
    b. Workforce Data:
        i. Total number of individuals to be employed at the site after construction has been completed and specify how many will be full-time, part-time, temporary, and/or seasonal.
        ii. Full-time Equivalent Employment: Provide the total number of full-time equivalents (FTEs) to be employed at the site after

construction has been completed based on a standard work week (40 hours).

For each category, please specify if these employees will be working on a full or part-time basis.

6. Wage Data:
    a. Total Payroll: Provide the total wages to be paid annually to all employees.
    b. Net New Payroll: Provide a three-year average of the total payroll and payroll per FTE generated at the site by the applicant.
    c. Wages: Provide the average wage, median wage, and maximum and minimum wage to be paid to employees working at the site after construction has been completed. For salaried employees, provide the annual salary and the standard number of hours worked per week for full-time employees. Unless otherwise noted, 40 hours will be used as the standard week.

7. Employee Benefits Data: Provide official company documentation regarding the following:
    a. Types of benefits: Provide a list of all the benefits offered to employees (i.e., medical, dental, vision, retirement, disability, childcare, eldercare, transportation.)
    b. Eligibility for Benefits: Provide the policies regarding the eligibility of employees for benefits as determined by hours worked, employment classifications, or other qualifying factors. Provide the number and percent of employees meeting these eligibility requirements.
    c. Cost of benefits: Provide the total cost of the benefit package provided to employees including the percent paid by the employer and the percent paid by the employee
    d. Career Advancement & Training Data: Provide documentation outlining programs and funding allocated to the following:
        - On-site or In-service Training
        - Apprentice Programs
        - Tuition Reimbursement

RESOURCES

General Economic Data Resource links:

- Data Cape Cod: https://datacapecod.org
- American Fact Finder: https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml
- STATS America: http://www.statsamerica.org/

Housing DRAFT

This guidance is intended to clarify how the Housing Goal and Objectives of the Regional Policy Plan (RPP) are to be applied and interpreted in Cape Cod Commission Development of Regional Impact (DRI) project review. This technical bulletin presents specific methods by which a project can meet the goal and objectives.

Housing Goal: To promote the production of an adequate supply of ownership and rental housing that is safe, healthy, and attainable for people with different income levels and diverse needs.

- **Objective HOU1** – *Promote an increase in housing diversity and choice*
- **Objective HOU2** – *Promote an increase in year-round housing supply*
- **Objective HOU3** – *Protect and improve existing housing stock*
- **Objective HOU4** – *Increase affordable and attainable housing*

The applicability and materiality of these goals and objectives to a project will be determined on a case-by-case basis considering a number of factors including the location, context (as defined by the Placetype of the project's location), scale, use, and other characteristics of a project.

THE ROLE OF CAPE COD PLACETYPES

The RPP incorporates *a framework for regional land use policies and regulations based on local form and context* as identified through categories of Placetypes found and desired on Cape Cod.

The Placetypes are determined in two ways: some are depicted on a map contained within the RPP Data Viewer located at www.capecodcommission.org/RPPDataViewer adopted by the Commission as part of the Technical Guidance for review of DRIs, which may be amended from time to time as land use patterns and regional land use priorities change, and the remainder are determined using the character descriptions set forth in Section 8 of the RPP.

The project context, as defined by the Placetype of the project's location, provides the lens through which the Commission will review the project under the RPP.

TABLE OF CONTENTS

Introduction 4
Definitions 5
Applicability 6
Summary of Methods 7
Detailed Discussion of Methods for Meeting Objective HOU1 11
Detailed Discussion of Methods for Meeting Objective HOU2 14
Detailed Discussion of Methods for Meeting Objective HOU3 15
Detailed Discussion of Methods for Meeting Objective HOU4 17
General Application Requirements 22
Resources 22

INTRODUCTION

Housing affordability and diversity are among Cape Cod's most critical challenges. The Housing Goal is intended to promote more compact housing units in a variety of formats, affordable to a range of incomes, and in densities appropriate to the Placetype context, especially focusing more housing in existing centers of activity with adequate infrastructure to support it. There is a particular emphasis on the development or redevelopment of existing housing for year-round rental and ownership units.

Development of new housing, and preservation of existing units are necessary to alleviate current and future housing challenges across Cape Cod. New development should be directed to Community Activity Centers and add variety to the region's housing typology. In particular, the RPP emphasizes the production of multi-unit "infill" housing within Community Activity Centers. This housing type could greatly increase choice and is largely missing from the region. Infill development and redevelopment for housing is generally encouraged.

In the Winter of 2023, the Commission released a Regional Housing Needs Assessment completed by the Donahue Institute at UMass Amherst. The report identified current and potential future gaps in the region's housing market for resident households (both owners and renters) within various sets of income cohorts and provides baseline demographic and economic information. It also provided population and housing supply and demand projections through 2050 and captures additional detail about housing needs particularly as they relate to the region's workforce and year-round residents. The 2025 Regional Policy Plan affirms the need to plan for and stimulate housing supply in appropriate areas, to promote housing diversity, and to expand housing options to meet year-round resident needs and improve housing attainability and affordability in the region.

The following methods are established to support an adequate supply of year-round ownership and rental housing in the region that is safe, healthy, and attainable for people with different income levels and diverse needs, taking into account the location of the proposed housing. This technical bulletin also establishes how and under what circumstances affordable housing mitigation is to be provided for residential development projects under Cape Cod Commission DRI review.

DEFINITIONS

Accessible Housing – existing and new housing units that meet the Massachusetts Architectural Accessibility regulations (521 CMR).

Affordable Housing – housing that is affordable (monthly housing costs do not exceed 30% of a household's gross monthly income) to households earning at or below 80% of Area Median Income (AMI).

Area Median Income (AMI) – determined by the U.S. Department of Housing and Urban Development (HUD).

Attainable Housing – housing that is affordable (monthly housing costs do not exceed 30% of a household's gross monthly income) to households earning 81% AMI to 120% AMI for whom current year-round market-rate housing is unaffordable. The Commission will take into consideration if there is a demonstrated need in a town for Attainable housing to include housing for households earning more than 120% AMI.

Extremely Low-Income Housing – housing that is affordable (monthly housing costs do not exceed 30% of a household's gross monthly income) to households earning up to 30% of AMI.

Low-Income Housing – housing that is affordable (monthly housing costs do not exceed 30% of a household's gross monthly income) to households earning 51% - 80% of AMI.

Seasonal Workforce Housing – housing intended for temporary, seasonal employees who support the region's tourism-driven economy, particularly in industries such as hospitality, recreation, and food service. Seasonal workforce housing typically has leases no shorter than 3 months and no longer than 6 months, and may include shared, dormitory-style, or modular accommodations provided or sponsored by employers or institutions.

Senior Housing – an independent housing unit designed for persons aged 55 or over with the requirement that each dwelling unit in a senior housing development shall be occupied by at least one person 55 years of age or older.

Short-term Rental – housing that is rented for periods of 31 consecutive days or less and subject to Rooms Excise Tax, as defined in the Code of Massachusetts Regulations (830 CMR 64G.1.1).

Very Low-Income Housing – housing that is affordable (monthly housing costs do not exceed 30% of a household's gross monthly income) to households earning 31% - 50% of AMI.

Visitable Housing – housing units with at least one entrance with zero steps, 32-inch clear passage through all interior main floor doors, and at least one half-bath on the main floor.

Year-Round Housing – housing that is not classified as seasonal, recreational, or for occasional use. Year-round owner-occupied units must be occupied by the owner for at least 11 months per year and may not be used as short-term rentals for more than 14 days annually. Year-round tenant-occupied units must have a lease term of at least 12 months, and at least one member of the household must live there for at least 11 months per year. Year-round tenant-occupied units may not be used as short-term rentals (rented for a period of 31 consecutive days or less) for any period of time.

APPLICABILITY

The Housing Goal and Objectives apply to the following DRI projects:

- Residential and mixed-use residential projects will be reviewed for consistency with the Housing Goal and Housing Objectives HOU1, HOU2 and HOU3.
- Projects on sites with existing dwelling units will be reviewed for consistency with the Housing Goal and Objective HOU3.
- Projects proposing the creation of ten (10) or more dwelling units or ten (10) or more residential building lots will be reviewed for consistency with the Housing Goal and Objective HOU4.

SUMMARY OF METHODS

GOAL | HOUSING

To promote the production of an adequate supply of ownership and rental housing that is safe, healthy, and attainable for people with different income levels and diverse needs.

OBJECTIVE HOU1 – Promote an increase in housing diversity and choice

METHODS

The following are methods a project may use to achieve consistency with Objective HOU1:

- Create a variety of year-round housing types meeting a range of life stages and other social needs
- Create small-scale housing units (900 sq. ft. or less)
- Create small lot residential development (.25 acres or less)
- Redevelop existing buildings for residential development
- Create mixed-use (residential and non-residential) development
- Pursue infill development for housing, i.e., development of vacant or under-used parcels within already built areas
- Provide Accessible and Visitable dwelling units
- Create Seasonal Workforce Housing

OBJECTIVE HOU2 – Promote an increase in year-round housing supply

METHODS

The following are methods a project may use to achieve consistency with Objective HOU2:

- Create new year-round rental and/or ownership units
- Convert existing short-term rentals or second homes to year-round housing

OBJECTIVE HOU1 & OBJECTIVE HOU2 AREAS OF EMPHASIS BY PLACETYPE

Natural Areas | New development is discouraged in these areas. If housing is proposed, only low-density small lot cluster development with minimal impacts on open space should be considered.

Rural Development Areas | Reuse and redevelopment are encouraged. All development should be clustered, respect the surrounding landscape, and protect scenic resources.

Suburban Development Areas | All housing types are considered appropriate, so long as adequate infrastructure exists or is proposed to support the housing type and density. Infill development and redevelopment for housing that improves building and development form, including providing a more traditional form is particularly encouraged.

Historic Areas | All housing types are considered appropriate, so long as adequate infrastructure exists or is proposed to support the housing type and density, and the proposed housing is consistent with historic development patterns, does not displace, substantially alter, nor interfere with historic structures, buildings, and sites, and is consistent with existing historic uses. Infill housing may be appropriate subject to layout and design.

Maritime Areas | All housing types are considered appropriate, so long as adequate infrastructure exists or is proposed to support the housing type and density, and the proposed housing is consistent with maritime development, and does not displace, substantially alter, nor interfere with maritime structures and uses. Infill housing may be appropriate subject to layout, design and consideration of the existing site and surrounding uses.

Community Activity Centers | Housing is encouraged in general. Infill and higher density housing is encouraged so long as the proposed housing type, density, form and design is consistent with the context of surrounding development forms and patterns. Smaller unit sizes less than 900 sq. ft. are preferred.

Industrial Activity Centers | Housing is not encouraged, with the exception of on-site caretaker or security housing.

Military and Transportation Areas | Housing will be considered on a case-by-case basis. Master planned projects, including transit-oriented development planned in coordination with transportation assets or developments planned in coordination with infrastructure identified through a capital improvement plan, are encouraged and may be evaluated similarly to projects proposed in Community Activity Centers.

OBJECTIVE HOU3 – Protect and improve existing housing stock

METHODS

All DRIs on sites with existing dwelling units must:

- Preserve or increase the number of housing units in the region

DRIs on sites with existing dwelling units should, to the maximum extent feasible:

- Improve the condition and habitability of existing dwelling units
- Improve the safety of existing dwelling units
- Improve the accessibility or visitability of existing dwelling units

OBJECTIVE HOU4 – Increase Affordable and Attainable Housing

METHODS

All DRIs proposing the creation of ten (10) or more dwelling units or ten (10) or more residential building lots must:

- Provide Affordable and/or Attainable Housing
  - Developments proposing ten (10) to twenty-nine (29) residential units or lots must provide at least 10% of the units or lots restricted as Affordable and/or Attainable Housing.
  - Developments proposing thirty (30) or more residential units or lots must provide at least 20% of the units or lots restricted as Affordable and/or Attainable Housing.
  - The Commission may, in its discretion, allow an applicant to provide the required units or lots off-site, or make a monetary contribution equal to or greater in value than the on-site mitigation otherwise required.

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE HOU1

Objective HOU1 – *Promote an increase in housing diversity and choice*

Housing diversity involves both housing type and housing affordability. The region needs a variety of housing types at various densities to meet housing demand and the needs of a range of Cape Cod residents, from single young people to retirees looking to downsize while remaining in their communities. The region's need for supported or subsidized year-round ownership and rental housing has expanded beyond those at Extremely Low-Income, Very Low-Income, and Low-Income levels. In some towns households earning up to 200% AMI may require assistance to afford housing. As the population ages, there is a continued need for Senior and Accessible Housing and housing seasonal workers must also be addressed. Following are methods a project may use to meet Objective HOU1.

Create a variety of year-round housing types meeting a range of life stages and other social needs

Housing types generally range from single-family homes and Accessory Dwelling Units (ADUs) which are subordinate to a single-family home, duplexes, multi-family homes, town houses, to large multifamily development. In addition, housing may be created by the adaptive re-use of vacant or underutilized commercial properties for residential use. Much of the region's housing stock is detached single-family homes. Projects can provide a variety of housing types within the project or create housing other than detached single-family homes to increase the housing diversity and choice in the region.

Projects should also consider differing needs of residents and aim to support a variety of residents, including families, first-time homeowners, seasonal workers, singles, seniors, disabled residents, residents requiring memory care, and other vulnerable populations.

Create small-scale housing units

Smaller housing units are generally naturally more affordable than larger housing units. Additionally, as the region's current household size is small and likely to decline, smaller housing units will better align with the region's needs. For this reason, projects are encouraged to create units that are 900 sq. ft. or smaller.

Create small lot residential development

In appropriate contexts and Placetypes, small lot and/or cluster subdivisions for smaller scale housing units such as cottage courts and other compact residential development types are preferred to add to the diversity and mix of housing in the region. Any small lot or subdivision design should protect sensitive resources and promote the efficient deployment of required infrastructure.

The Massachusetts Affordable Homes Act (St. 2024, c. 150) allows and encourages the development of homes on lots that common ownership rules previously restricted. These homes must include at least three bedrooms and should serve as year-round residences; the Affordable Homes Act legally restricts owners from using these homes for seasonal housing or short-term rentals.

Redevelop existing buildings for residential development

The preservation and reuse of existing housing stock and other buildings is important for the region. Redevelopment can protect community character, reinforce traditional development patterns, and can be more environmentally sustainable than new development. Units are encouraged in existing and historic structures and outbuildings, such as carriage buildings, where appropriate. Developing new or additional units in existing buildings can generate income for property owners to reinvest in their buildings. A project may propose to redevelop existing buildings for residential uses or a mix of residential and other types of uses.

Create mixed-use (residential and non-residential) development

Mixed-use residential development can promote walkability and reinforce traditional development patterns. This type of residential development also broadens the housing choices for residents who do not own a vehicle or do not drive, including seniors and those with disabilities.

Pursue infill development for housing, i.e., development of vacant or under-used parcels within already built areas

Infill housing development can be created on vacant, under-used, or already developed parcels within existing substantially built-up areas. Infill development provides a potential means to protect community character and reinforce traditional development patterns while increasing housing supply and housing type options. Projects are encouraged to pursue infill development whenever feasible to minimize newly disturbed land and environmental impacts, use existing or anticipated infrastructure, and to revitalize existing areas.

Provide Accessible and/or Visitable dwelling units

DRIs should create and/or maintain existing Accessible and/or Visitable housing units. A floor plan and verification from an appropriately qualified professional that the units meet Accessibility and/or Visitability standards should be provided to the Commission to evidence compliance.

Create Seasonal Workforce Housing

A project proposing Seasonal Workforce Housing can help relieve some of the pressures year-round residents face due to the need for seasonal housing in the region. Seasonal Workforce Housing should be prioritized in locations served by transit or within walking or bicycling distance to seasonal work opportunities. Accommodations for Seasonal Workforce Housing may include redeveloping existing buildings such as altering motels and hotels, providing infill development, or creating other forms of dormitory style housing.

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE HOU2

Objective HOU2 – *Promote an increase in year-round housing supply*

Following are methods a project may use to meet Objective HOU2.

Create new year-round rental and/or ownership units

Based on the most recent American Community Survey estimates, roughly one-third of housing in the region is used seasonally and according to the 2023 Regional Housing Needs Assessment, the percentage of homes used seasonally is likely to increase if past trends continue. The proportion of seasonal homes is more pronounced in the Outer and Lower Cape towns than the Mid and Upper Cape; however, it impacts the housing needs of the entire region. To address this challenge, residential projects are strongly encouraged to create new year-round rental units in the region.

The Commission may require that an affidavit, covenant, or deed restriction be provided to the town in which the development is located, as holder or beneficiary, to ensure that housing is limited to year-round occupancy. In addition, limitations on short-term rentals through lease terms, a homeowners association, or condominium association may also be utilized to demonstrate year-round occupancy.

Convert existing short-term rentals or second homes to year-round housing

A project can propose to convert existing short-term or seasonal housing units into year-round housing units as a means for increasing the year-round housing supply on Cape Cod. Converting short-term rentals to year-round housing units also directly addresses the market imbalance where financial incentives heavily favor short-term rentals over long-term occupancy, which can contribute to displacement and housing inaccessibility for full-time residents.

As with new units, the Commission may require that an affidavit, covenant, or deed restriction be provided to the town in which the development is located, as holder or beneficiary, to ensure that housing is limited to year-round occupancy. In addition, limitations on short-term rentals may also be utilized to demonstrate year-round occupancy.

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE HOU3

Objective HOU3 – *Protect and improve existing housing stock*

As the housing stock in the region ages, with most of the housing supply now more than 40 years old, a focus on sustaining or improving the life-safety, maintenance, and energy efficiency of the existing housing supply is important to the housing market. Opportunities to upgrade housing stock to improve substandard living conditions, such as inadequate cooking facilities, are a regional priority. It is also critical that the region not lose existing housing units, so efforts should be made to protect and preserve existing homes.

All DRIs on sites with existing dwelling units must:

Preserve or increase the number of housing units in the region

The proposed development must preserve existing housing units on the site or demonstrate that any potential loss in housing units will be offset by replacement on or off-site with an equivalent or greater number of new housing units.

DRIs on sites with existing dwelling units should, to the maximum extent feasible:

Improve the condition and habitability of existing dwelling units

Applicants may propose improvements to existing dwelling units which may include but should not be limited to: exterior and interior maintenance, utility and system upgrades, weatherproofing and energy efficiency. Before and after photographic images and evidence of energy ratings for appliances and utilities should be submitted to evidence compliance with HOU3.

Improve the safety of existing dwelling units

Improvements to the safety of existing dwelling units may include but should not be limited to: access and egress improvements, life safety improvements, and systemic improvements to drinking water quality and availability and improvements to wastewater disposal or other systems that improve conditions and lower operating costs. Before and after photographic images or public utility final inspection reports should be submitted to evidence compliance with HOU3.

Improve the accessibility or visitability of existing dwelling units

DRIs should create and maintain existing Accessible and Visitable Housing. A floor plan and verification from an appropriately qualified professional that the improvements meet accessibility and/or visitability standards should be provided to the Commission to evidence compliance.

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE HOU4

Objective HOU4 – *Increase Affordable and Attainable housing*

Provide Affordable and/or Attainable Housing

The need for affordable housing on Cape Cod is sufficiently acute that Affordable or Attainable housing mitigation is required for all proposed residential or mixed-use residential projects of ten (10) or more lots or units.

AFFORDABLE OR ATTAINABLE HOUSING UNITS REQUIRED

Projects with ten (10) to twenty-nine (29) housing units or lots must provide at least 10% of housing units or lots restricted as Affordable and/or Attainable.

Projects with thirty (30) or more housing units or lots must provide 20% of units or lots restricted as Affordable and/or Attainable.

The Commission will take into consideration if there is a demonstrated need in a town for Attainable Housing to include housing for households earning more than 120% of AMI.

Calculating Affordable and Attainable Housing Contributions

For the purposes of calculating the Affordable and/or Attainable housing contributions, all numbers are rounded to the highest whole figure (i.e., if 10% yields 4.4 units, 5 units are required).

Residential Construction

For residential projects that are required to provide Affordable and/or Attainable units, units may be provided within the proposed project or the applicant may provide the requisite number of units through purchase of existing units, redevelopment, or construction of new units off site, subject to approval by the Commission.

An applicant may also contribute land that can support as of right the required number of Affordable and/or Attainable units or a cash contribution dedicated to creating Affordable and/or Attainable units, subject to approval by the Commission. A contribution of land should be accompanied by a development plan acceptable to the Commission, demonstrating that the requisite number of units may be developed by right under zoning and are reasonably expected to be approved under applicable municipal regulations.

Residential Subdivisions

Residential subdivisions or land divisions of ten (10) to twenty-nine (29) lots must provide at least ten percent (10%) of the proposed lots as Affordable and/or Attainable housing sites. Residential subdivisions or land divisions of thirty (30) lots or more must provide 20% of the proposed lots as Affordable and/or Attainable housing sites.

Off-site and In-lieu Options

In lieu of providing such lots on site, the applicant may develop or contribute comparable off-site lot(s) that can support as of right the required number of Affordable and/or Attainable units, subject to approval by the Commission. An applicant may also make a cash contribution dedicated to creating Affordable and/or Attainable units, subject to approval by the Commission. A contribution of land should be accompanied by a development plan acceptable to the Commission, demonstrating that the requisite number of units may be developed by right under zoning and reasonably expected to be approved under applicable municipal regulations.

CASH-CONTRIBUTION OPTION

An applicant may satisfy HOU4 by providing a cash contribution of equivalent value for the funding or purchase of Affordable and/or Attainable housing, provided that:

(a) the applicant submits a plan acceptable to the Commission to expend those funds within the same time frame as the applicant's development, and

(b) such proposal will result in an equal or greater number of units or lots than had they been created on site.

Equivalent value should be determined through one of the following methods:

(a) for lot subdivisions, current appraised value of the Affordable and/or Attainable lots;

(b) for ownership projects, the difference between the Affordable and/or Attainable sales price(s) and the market sales price(s) of similar bedroom units within the project;

(c) for rental projects, the difference in appraised value between the value of the project with and without the Affordable and/or Attainable units. The applicant shall pay for all appraisals, and the Commission must approve the applicant's chosen appraiser.

OFF-SITE OPTION

Allowing off-site provision of Affordable and/or Attainable units gives flexibility to both the applicant and the town, and may result in better locations for such housing. For example, encouraging the provision of Affordable and/or Attainable units near municipal services or access to public transportation may be preferable to providing 'on-site' affordable housing further from such services.

The applicant may offer, and the Commission or its designee may accept, when appropriate, off-site donations of land or existing units in fee simple that the Commission determines are suitable for the construction or establishment of Affordable and/or Attainable housing units. The Commission may require that the applicant submit appraisals of the off-site land or existing units or existing buildings for re-use and mixed-use, as well as other data relevant to the determination of equivalent value of providing for Affordable and/or Attainable housing onsite.

Timing and Mix of Affordable and/or Attainable Units

Regardless of whether Affordable/Attainable units are provided on-site or off-site, development of those units should take place at the same rate and within the same time frame as the development of the market-rate units. The mix of unit/bedroom sizes and/or housing types (e.g., ownership, rental) should be proportional across Affordable/Attainable units and market-rate units.

Integration and Size of Affordable and Attainable Units

Affordable and Attainable housing units should be integrated with the rest of the development in terms of location and should be compatible in exterior design, appearance, construction, and quality of materials with other units. All unit owners and tenants must have equal access to all residential amenities within the project. To ensure that Affordable units qualify for the state's Subsidized Housing Inventory (SHI), both on-site and off-site Affordable housing units should meet the Commonwealth of Massachusetts' Executive Office of Housing and Livable Communities (EOHLC) Local Initiative Program (LIP) unit size guidelines.

Pricing and Rents of Affordable and Attainable Units

For ownership units, the Affordable and Attainable sales prices should be calculated using the Barnstable County HOME Consortium methodology and guidelines. For rental units, the Affordable rents should be the high HOME rents, as published annually by the US Department of Housing and Urban Development (HUD). Attainable rents should be calculated from the income limits published by HUD. For ownership units, condominium fees and home-owners association fees should be limited to affordable levels in the appropriate recorded document(s) for Affordable and/or Attainable units. If comprehensive services are included in the monthly rent (for example, continuing-care retirement communities (CCRC), assisted living, and/or skilled nursing facility projects), and the monthly rent exceeds the limits set forth by the HOME Program, the Commission will utilize existing state and federal housing program guidelines (for example, Massachusetts EOHLC Guidelines M.G.L. c. 40B Comprehensive Permit Projects; 24 CFR 5.609; and HUD Handbook 4350.3, Chapter 5) to determine the amount of household income that must be devoted to rent and services. Prior to the occupancy of the Affordable and Attainable units, the applicant should demonstrate that the occupants are income-eligible in accordance with HUD and/or HOME Consortium guidelines.

The applicant shall identify in its DRI application a qualified monitoring agent for which the monitoring of affordable housing is a primary function of their operation. For age-restricted senior care retirement, assisted living, and skilled nursing facilities, proposed monitoring agents shall demonstrate that monitoring of these types of facilities is a prime function of their operation.

Term of Affordability/Permanent Affordability

As a condition of DRI approval, Affordable and Attainable Housing units shall be subject to affordable housing restrictions (consistent with M.G.L. c. 184, §§ 26—33) that are recorded against title to the subject properties at the Barnstable County Registry of Deeds and which require the units to remain affordable in perpetuity, or for such periods as the grantee may otherwise require. All Affordable units must be eligible for listing on the Commonwealth of Massachusetts Subsidized Housing Inventory (SHI). Affordable and Attainable units must provide year-round housing. It is the Commission's preference that Affordable and Attainable housing restrictions be held by the host community or a qualified housing entity. The form and content of such housing restrictions shall be acceptable to both the Commission and the grantee. The applicant should provide draft proposed restrictions with the DRI application.

Affirmative Marketing and Selection of Buyers/Tenants/Monitoring of Affordability

As a condition of a DRI approval, the Commission will require that an applicant submit to the Commission for its consideration and approval a marketing plan that describes how affordable units will be affirmatively and fairly marketed to potential home buyers and/or renters. The plan should include a description of the lottery process to be utilized for selecting the home buyers and/or renters. The lottery should have either one pool for all applicants or two pools: a local preference pool for up to 70 percent of the units; and all applicants in the second pool. The marketing and selection plan should be consistent with the state's LIP guidelines so that the Affordable Units will qualify for the state's Subsidized Housing Inventory (SHI).

Similarly, as a condition of DRI approval, a monitoring agreement between the applicant and a third-party entity (with experience in affordable housing income verification) acceptable to the Commission will be required for all Affordable and Attainable housing units. For rental DRIs, the monitoring agent should be responsible for certifying initial tenant income eligibility, rents, and compliance with the affirmative marketing and tenant-selection plan; thereafter, the agent should annually certify income eligibility and rents. For ownership DRIs, the monitoring agent should be responsible for certifying initial buyer income eligibility and compliance with the affirmative marketing and buyer selection plan.

GENERAL APPLICATION REQUIREMENTS

Application materials should provide sufficient detail to demonstrate that the project meets the applicable goals and objectives, and typically include a project description, a detailed narrative of how the project will meet the housing goal and applicable objectives, and project plans including site plans, floor plans and elevations. The project description should include a discussion of the Placetype and context in which the development is proposed, and how the proposal is appropriate to its Placetype and context.

The application should include a detailed description of all proposed housing unit(s) including the location, number and size of units, number of bedrooms, proposed cost of rental and ownership units, and how year-round restrictions will be achieved for rental and ownership units. If Affordable and/or Attainable housing units are required to be provided or are otherwise proposed in a DRI, an applicant should submit a marketing plan, draft monitoring agreement including the proposed qualified monitoring agent, and a draft affordability restriction in a form acceptable to the proposed grantee. For condominiums, the application should include proposed master deed language limiting condominium fees for Affordable and/or Attainable units and ensuring equal access to all residential amenities. Appraisals may be required to evaluate offsite or other alternative housing mitigation proposals. Terms and conditions of draft Affordable and/or Attainable housing unit restrictions, monitoring agreements and marketing plans should be discussed and agreed upon in principle between applicants and proposed holders, beneficiaries, grantees or counterparties under these documents prior to or during the DRI permitting process.

RESOURCES

- Cape Cod Regional Housing Strategy: https://www.capecodcommission.org/our-work/regional-housing-strategy
- 2023 Regional Housing Needs Assessment Final Report: www.capecodcommission.org/housing
- Barnstable County HOME Program: https://www.capecod.gov/departments/human-services/initiatives/housing-homelessness/home-program/