

Agricultural Structures

Purpose and Need

The City Charter allows for structures and other improvements on Open Space lands for permitted uses, as long as they are necessary for *open agricultural use*. The types of agricultural structures permitted, especially greenhouses and hoophouses, have come into question with more frequency as there has been an increased desire to diversify the types of agricultural operations on OSMP lands to include more diversified vegetable farming. In 2010 City Council directed staff to explore whether City Charter provisions related to structures on Open Space should be amended to allow for infrastructure to increase the length of the growing season.

This analysis is intended to provide clarity surrounding the agricultural structures permitted on city Open Space, including answering the question of the appropriateness of greenhouses and hoophouses on OMSP lands. This analysis also provides a framework for evaluating proposed new or replacement agricultural structures.

Existing Policy Guidance

The Boulder City Charter (Charter) Section 176 prohibits the improvement of open space land after it has been acquired by the city unless the improvements are necessary to protect or maintain the land or to provide for passive recreational, open agricultural, or wildlife habitat use of the land.

The City Council approved 1995 Open Space and Mountain Parks Long Range Management Policies (LRMP) also address agricultural facilities through the following policies:

- Facilities can be constructed on OSMP land if necessary to support approved activities as specified in an Open Space management plan (and in accordance with the Charter Section 176).
- Structures should be consistent with Open Space purposes, be compatible with natural processes, functional, energy efficient and cost-effective.
- Existing buildings will be considered before new construction is contemplated.
- All facility costs including initial construction, refurbishment, or restoration, ongoing maintenance and operational costs should be considered.
- Facilities will be integrated into the Open Space environment so as to result in minimum impact.
- Facilities will be designed and developed to avoid competing with or dominating Open Space features.

Definitions

Greenhouses (aka Glass Houses)

Greenhouses are used to extend the growing season earlier in the spring and later in the fall. They are permanent structures. The frames are made of aluminum, galvanized steel, or wood. Glazings are glass, rigid clear plastic, or polyethylene. Greenhouses have heat, mechanical ventilation, artificial light, and irrigation systems. Greenhouses offer a controlled environment and plants are not typically grown directly in the ground.



Hoop Houses (aka High Tunnels)

Like greenhouses, hoop houses are used to extend the growing season. They are typically tall enough to allow walk-in access. The frame is PVC, aluminum, or galvanized steel, with wood for hip and baseboards. The frames are then covered in plastic. Plants are typically grown directly in the ground. Hoop houses lack the precision of an environmentally-controlled greenhouse, as they rely on passive heating and cooling.



Analysis

Open Agriculture

While there is not a standard definition for open agriculture, OSMP staff interprets it to mean: ***Agricultural production where the products are grown (or raised) in a manner in which they can interact with the environment.***

Staff considers hoop houses and the crops grown in them as open agriculture because the crops are grown in the ground and while the covering moderates temperatures it is not a tightly controlled environment. Using the same criteria, greenhouses do not meet the standard for open agriculture. However, the issue becomes more complex if crops are only started in a greenhouse and then transplanted to an open space field. The City Attorney's Office issued an opinion that crops started in a greenhouse and then transplanted to Open Space could classify as open agriculture. In response, staff has included both types of structures in the evaluation.

Necessary for Open Agriculture

Under the most strict or narrow interpretation, neither hoopouses or greenhouses are *necessary* for an open agricultural operation. There are multiple types of agricultural operations such as livestock, hay or other perennial production that do not require hoopouses or greenhouses. Annual vegetable farms do not *require* hoopouses or greenhouses. The growing season is generally long enough in the Boulder Valley to produce a limited selection of vegetables. However, structures to extend the growing season are necessary for vegetable farms to be economically viable and competitive. The primary factors that contribute to the viability are the longer season of production and the broader diversity of crops. The value of these structures for agricultural production predates the current and increasing interest in local foods as the Charter seems to anticipate the need for improvements to support agricultural operations. In that regard and acknowledging the city's interest in increasing vegetable and local food production, staff considers hoopouses and under certain limited circumstances greenhouses consistent with the relevant sections of the Charter.

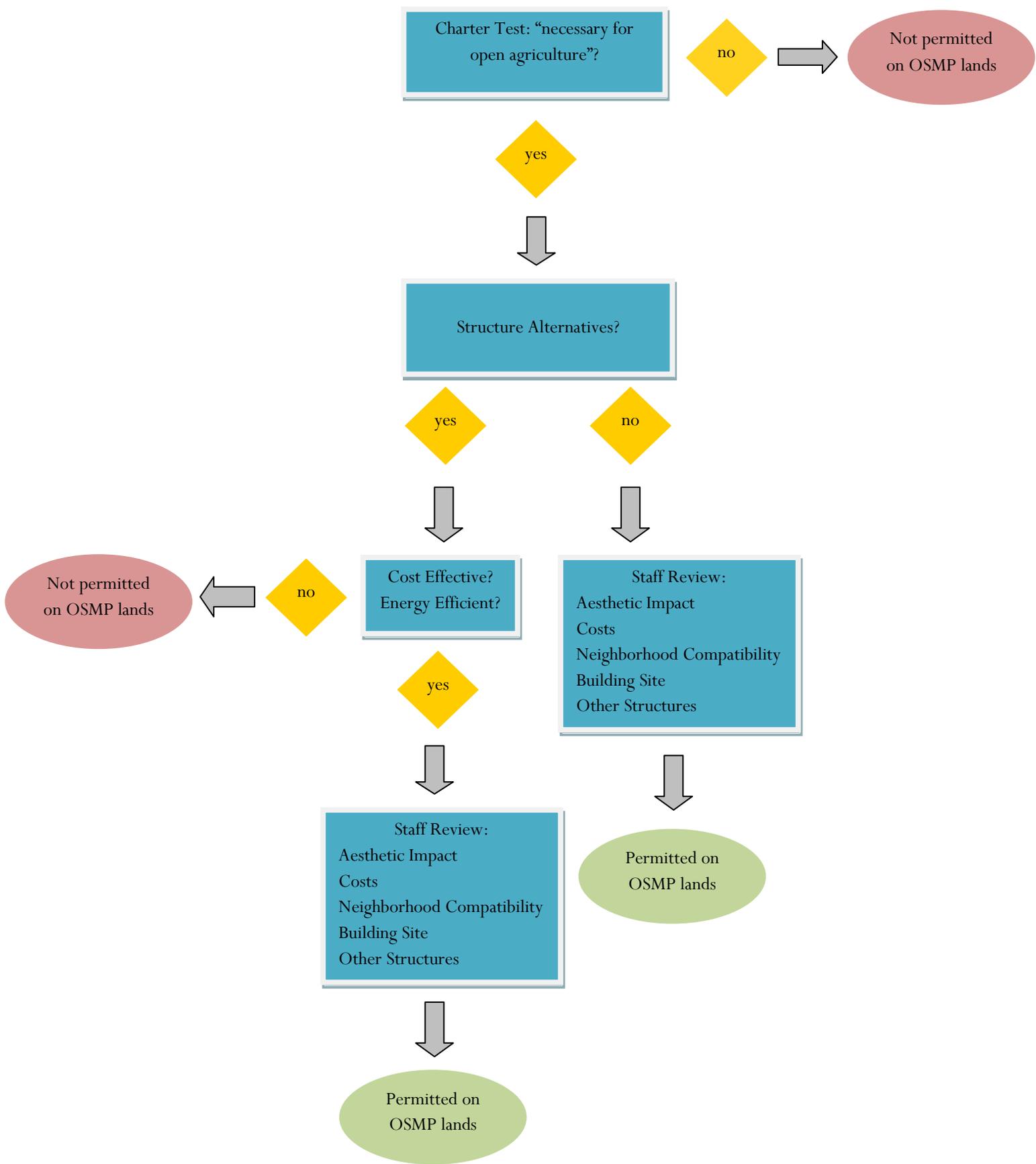
Alternatives Comparison

Recognizing the necessity of hoopouses or greenhouses for successful vegetable farms, staff focused next on selecting the most appropriate type of structure to meet the need. When choosing between alternative structure types, staff looked to the guidance provided by the Open Space LRMP, and determined that energy efficiency and cost effectiveness were the key criteria for comparing alternatives. In regards to hoopouses and greenhouses there are significant differences in both energy efficiency and cost effectiveness. Traditional greenhouses are notorious energy hogs,¹ both for heating and supplemental lighting, while passive solar and net zero greenhouses lack the production capacity of traditional greenhouses and cost 13 times more per square foot to construct.² The construction costs and energy used per unit area are much higher for greenhouses. One study estimated glass-panel greenhouse construction at over \$30.00 per square foot. Given the suitability of hoopouses to extend the growing season at much lower initial and ongoing costs including less energy, staff is recommending hoopouses be permitted on OSMP lands with staff approval and greenhouses be prohibited on OSMP lands.

The following flowchart illustrates the process for determining if a type of structure is appropriate for OSMP lands.

¹ Kinney, L., Hutson, J., Stiles, M., and Glute, G. Energy Efficient Greenhouse Breakthrough: 2012 Summer Study on Energy Efficiency in Building, and Ladd, C. "Giant Greenhouses Mean Flavorful Tomatoes All Year." *New York Times*. 30 March 2010. <http://www.nytimes.com/2010/03/31/dining/31tomoato.html?pagewanted=all&r=0>

² Pena, JG. Greenhouse Vegetable Production Economic Consideration, Marketing and Financing. <http://aggie-horticulture.tamu.edu/greenhouse/hydroponics/economics.html>



Agricultural Structures Policy

The types of structures permitted on OSMP agricultural lands must be consistent with Open Space purposes, necessary for open agriculture, and a cost effective and energy efficient way to meet the agricultural need.

The following types of structures are permitted on OSMP lands

- Barns
- Corrals
- Loafing sheds
- Livestock shelter
- Hoophouses
- Outbuildings
- Storage sheds
- Irrigation water distribution structures

The following types of structures are not permitted on OSMP lands:

- New residences (residences on Open Space are limited to those existing on the properties at the time of acquisition)
- Greenhouses

Replacement or new structures/facilities on agricultural properties may be allowed, but first require OSMP staff approval and be allowed per the Boulder County Land Use Code. OSMP staff will consider the following when making a determination on a case-by-case basis:

- Structures/facilities shall not remove land from agricultural production.
- Structures/facilities will be integrated into the Open Space environment so as to result in minimum impact. Facilities will be designed and developed to avoid competing with or dominating Open Space features.
- All structure/facility costs including initial construction, refurbishment, or restoration, ongoing maintenance and operational costs.
- Neighborhood compatibility.
- Proximity to building sites.
- Number of and uses of existing structures.