MEMO: City of Moab Water Efficient Landscaping Standards Draft Recommendations
TO: Moab City Council & Planning Commission
FROM: Lindsay Rogers & John Berggren, Western Resource Advocates & Victoria Arling, WaterNow Alliance
DATE: February 16, 2022

Executive Summary

In August 2021, WaterNow Alliance (WaterNow) and Western Resource Advocates (WRA) launched a Project Accelerator with the City of Moab to provide pro-bono support in updating the City's zoning code to include water wise landscaping and irrigation efficient standards. This memo presents 11 potential recommendations for updating Moab's landscaping standards in the City's zoning code that we feel would be reasonable for developers and landscapers to undertake and feasible for City staff to implement. These proposed recommendations would apply to some (or all) types of new development and redevelopment.

The recommendations are based on research conducted by WaterNow and WRA on water wise landscaping standards implemented in 10 communities throughout the West. This research – which included a number of options for updating landscaping standards to prioritize water efficiency - was vetted through a variety of avenues, including a presentation and discussion with Moab's Water Conservation & Drought Management Board, conversations with City staff, and interviews with key local stakeholders. Local stakeholders included: Jeffrey Adams with Terra Sophia; Eric Floor and Tara Stoner with EcoLogic; Kara Dohrenwend with Wildland Scapes; Roslynn Brain McCann with Utah State University Extension; Rikki Epperson with Community Rebuilds; and Orion Rogers with Southeast Utah Health Department. Stakeholders were asked to consider, in particular, any financial, capacity, material availability, or other barriers that could arise from a given recommendation.

Based on this feedback, and additional research into other western community's landscape regulations, these 11 potential recommendations were drafted. Each recommendation outlined below includes a justification (with stakeholder feedback), current City standards, recommended code update, supporting code language/examples of potential modifications, and any related supporting resources. In addition, there are 3 recommendations for educational or best management practices the City could pursue. The 11 recommendations include:

1. *Living Plant Material*: Require 25% living plant material at maturity in the landscaped area for all development types and require 50% living plant material in high-visibility, commercial development
2. *Non-Living Permeable Groundcover:* Allow up to 75% of landscaped area to be non-living, permeable materials (e.g., organic mulches, gravel, decorative pavement); for high visibility, commercial areas, allow up to 50% of landscaped areas to be non-living permeable groundcover.
3. *Turf Limits*: For all residential development, require that turf areas shall: (a) be limited to areas with suitable shade; (b) not be allowed in spaces narrower than 10 feet wide; (c) not be used in more than 10% of total landscaped area or a maximum of 200 square feet of turf; (d) not be

allowed on slopes greater than 33%; and HOAs may not mandate the installation of turf on residential properties. For commercial properties, retain current standards.

4. *Plant List:* All plant materials must be selected from the City's approved Plant List, which is organized by non-irrigated/very low, low, medium and high water use plants.
5. *WaterWise Plants Requirement:* A minimum of 50% of living plant material must be selected from the non-irrigated/very low or low water use category of the City's Approved Plant List.
6. *Hydrozones:* Plants are to be hydrozoned with plants of a similar hydrozone. Plants with a very low hydrozone are not to be planted in a moderate to high hydrozone. Irrigation shall be hydrozoned, grouping similar water demands by irrigation zone.
7. *Landscape Water Budget:* The total irrigation water need for all hydrozones cannot exceed a Maximum Applied Water Budget of 15 gallons/season/sq-ft (24in/season) of irrigated landscape area unless special features are included. Special features include: protected native vegetation areas, ecological restoration areas, bioretention areas, non-irrigated permeable areas, stormwater conveyance infrastructure, and graywater systems.
8. *Mulch:* Organic mulch must be applied at a depth of 4 inches, 1 cubic yard per 80 sq ft; inorganic mulch including gravel, river rock, and crushed rock must be applied at a depth of 2 inches. Because mulching can limit the successful propagation of some native plants, native plants are exempt from these mulching requirements.
9. *Irrigation System Criteria:* For commercial and large-scale developments: (a) smart irrigation controllers are required; (b) dedicated landscape water meters/submeters must be installed for all non-residential landscapes greater than 5,000 sq-ft; (c) the irrigation system must be designed to prevent runoff, low head drainage, overspray and other similar conditions; (d) minimum pop-up height for sprinklers in turf grass shall be 6 inches; (e) check valves or anti-drain valves are required on all sprinkler heads; (f) operating pressure at each emission device must be within the manufacturer's recommended pressure range; (g) sprinklers within a zone must have matched precipitation rates; (h) a pressure regulation valve shall be installed and maintained by the consumers; (i) overhead irrigation shall not be permitted within 24 inches of any non-permeable surface.
10. *Fire Wise Landscaping:* For all developments in the wildland urban interface: Avoid fire prone plant materials and highly flammable mulches; plant widely-spaced, low growing, non-resinous shrubs 2-3 feet away from the house; if planting new trees, plant small maturing ones at least 15 feet away from structures.
11. *Maintenance:* All irrigation systems must be maintained including backflow assembly testing, leak repair, head adjustment, etc.; all replacement plants shall conform to the city's plant list and landscaping standards; recommended turf mowing height is 3 ½ inches.

It is important to note that this list of 11 potential recommendations is not intended to be adopted in whole; that is, this is a menu of options from which the City could select certain recommendations to explore. Most notably, there are two broad categories to consider when making those selections, driven primarily by the selection of a water budget allowance approach or not. If the #7: Water Budget Allowance approach is selected, that would impact which of the other recommendations are still applicable. A water budget approach would NOT include #5: Low Water Plant Requirements or #3: Turf Limits residential limitation of 10% or 200 square feet. If a water budget approach were not selected, those recommendations could still be considered.

Finally, Attachment A is a Landscape Water Budget Allowance Worksheet, which presents how the #7: Water Budget Allowance recommendation (Maximum Applied Water Budget of 15 gallons/season/sq-ft (24in/season) of irrigated landscape area) was developed.

Draft Recommendations for Updating Landscape Standards

1. Living Plant Material
    a. Justification
        i. While requiring living plants doesn't necessarily help reduce landscape water demand, a living plant material minimum standard can be important for landscaping aesthetics, reduced heat island effect, and pollinator habitat, among other benefits. Stakeholders expressed support for a living plant minimum, though they noted the example code language from other communities (50% or 75%) was likely too high for Moab's desert landscaping aesthetic.
    b. Current Standards
        i. *Residential:* No living plant material requirement. At least seventy percent of the area contained within a required front or side yard adjacent to a street in any residential or residential-agricultural zone shall be landscaped.
        ii. *Developments over 30,000 sq ft:* At least 5% living plant material other than groundcover or natural vegetation; no more than 80% living ground cover.
    c. Recommended Code Update
        i. Require 25% minimum living plant material at maturity in the landscaped area including shrubs, perennials, ornamental grasses, groundcover plants, and turf grasses in all development types.
        ii. Require 50% minimum living plant material at maturity in the landscaped area for high-visibility, commercial areas including - but not limited to - street frontage landscapes, buffers, and parking lot perimeter landscapes.
        iii. Artificial trees, shrubs, plants, and artificial turf are prohibited.
    d. Supporting Code Language
        i. 50% minimum living materials including shrubs, perennials, ornamental grasses, groundcover plants, and turf grasses. *(Aurora, CO)*
        ii. For Street frontage landscapes, buffers, and parking lot perimeter landscapes – 75% of the area must be live vegetation. *(Grand Junction, CO)*

2. Non-living Permeable Groundcover
    a. Justification
        i. It's important to strike a balance between non-living groundcover and living plant material. Allowing for a greater percentage of non-living ground cover could have the effect of reducing landscape water demand. Stakeholders were generally supportive of this recommendation and wanted to see the living and non-living percentages add up to 100% for clarity.
    b. Current Standards
        i. *Residential:* None

ii. *Developments over 30,000 sq ft*: Permeable non-living ground cover shall have a maximum coverage of 20%.

c. Recommended Code Update
   i. For all development types except high visibility, commercial areas: Allow up to 75% of landscaped area to be non-living, permeable materials including river rock, crushed rock, organic mulches such as shredded bark, gravel, cobbles, walks, decorative pavement, or other non-living materials for all development types.
   ii. For high visibility, commercial areas: Allow up to 50% of landscaped areas to be non-living permeable groundcover.

d. Supporting Code Language
   i. Allows up to 50% non-living materials including river rock, crushed rock, organic mulches such as shredded bark, gravel, cobbles, walks, decorative pavement, and artificial turf or other non-living materials. *(Aurora, CO)*
   ii. Allows up to 25 percent of the area required to be landscaped may be covered with mulch, pavers, decorative concrete *(Thornton, CO)*

3. Turf Limits
   a. Justification
      i. High water use, non-essential turf limitations are potentially the most important standard we can implement to reduce landscape water demand. Given Moab's desert climate, the irrigation demands for turf are significant, so any reductions in the amount of new turf being installed will have large water savings. Currently, there are no limits on turf for residential development. Some form of turf limits were strongly supported by all stakeholders interviewed for this project.
   b. Current Standards
      i. *Residential:* None
      ii. *Developments over 30,000 sq ft:*
         - Turf areas shall be limited to areas with suitable shade and shall not be allowed in spaces narrower than ten feet wide.
         - Turf shall not be used in more than ten percent of total landscape area, and should be located in places where people will use it.
         - Areas with a slope greater than thirty-three percent shall be landscaped with deep rooting, water conserving plants for erosion control and soil stabilization. (Ch. 17.80.070)
   c. Recommended Code Update
      i. Retain existing standards for large developments
      ii. For all residential development, adopt the standards below:
         - Turf areas shall be limited to areas with suitable shade from buildings or trees and shrubs at maturity.
         - Shall not be allowed in spaces narrower than ten feet wide.

- Shall not be used in more than 10% of total landscaped area or a maximum of 200 square feet of turf, whichever is greater. *(Note: this requirement could be removed if water budget approach is adopted)*
- Turf is not allowed on slopes greater than 33%.
- Homeowners Associations may not mandate the installation of turf on residential properties.

d. Supporting Code Language
   i. Lawn or turf area shall not exceed 10 percent of the overall landscape area of a project site *(Sedona, AZ)*
   ii. The installation of new turf in residential front yards is prohibited; Turf is not an allowable plant material within public or private common open space unless it meets the definition of "usable". (For example, they're defined as non-usable as medians, streetscapes, parking lots, entryways, and perimeter landscaping). *(Henderson, NV)*
   iii. Turf is not allowed on slopes greater than 25% when oriented towards hardscape *(Sacramento, CA)*
   iv. Any HOA governing documents… are void and unenforceable if they: Require the use of turf in landscape areas less than 8 feet wide or require turf in other areas that exceed 35% of the landscaped area; or prohibit the use of water-conserving plants as a group. *(Jordan Valley WCD, UT)*

e. Supporting Resources
   i. Utah State University Cooperative Extension "Water-Wise Landscaping: Practical Turfgrass Areas"
   ii. Jordan Valley Water Conservancy District, Flip Your Strip-Park Strip Designs

4. Plant List
   a. Justification
      i. There is an increasingly critical need to conserve water in the arid west, provide habitat for local animals within the urban environment, and create a more sustainable landscape system through the use of adapted plant materials. A plant list can be used to address these environmental concerns by encouraging or requiring certain low water, native plant species and to categorize plant species by their water use. The stakeholders interviewed expressed general interest and support of the City of Moab developing and maintaining a comprehensive plant list, as it would include plants appropriate to Moab's unique climate and would give landscapers the flexibility to select a variety of plants based on what is available in the list.
   b. Current Standards
      i. *Residential:* None
      ii. *Large Scale Developments over 30,000 sq ft*: None.
      iii. *RC Resort Commercial Zone:* Screening Plant List: Plants used to satisfy any required screening standards shall be limited plants with a mature height of between six and fifteen feet and foliage. For reference to appropriate plants and

trees see the publication Urban & Community Forest: A Guide for interior Western United States, Department of Agriculture, 1990. (Ch. 17.31.050)

c. Recommended Code Update
    i. For All Development Types: All plant material must be selected from the City's Approved Plant List. The plant list is categorized by non-irrigated/very-low, low, medium, and high water use plants.
    ii. Installation of plants that are not on the approved list must be pre-approved by the City and are up to the discretion of the Planning Director.
    iii. Pursuant to the Utah Noxious Weed Act, Section 7, no plants shall be planted from the Grand County Noxious Weeds List (Available here: https://www.grandcountyutah.net/168/Noxious-Weeds)
    iv. Note: The City could either adopt and maintain its own plant list *or* borrow from other communities or potentially a state-maintained list.
d. Examples of Potential Modifications
    i. The required plant list features plants that are considered water-wise or low water use plants, unless listed as riparian; includes three categories: native, adaptive, and riparian plants. *(Sedona, AZ)*
    ii. Plant material must be selected from Town's approved plant list; plant materials meet or exceed the plant quality and species standards of the American Standard for Nursery Stock. *(Castle Rock, CO)*
e. Supporting Resources
    i. Native Plants for the Intermountain West: https://cwelwnp.usu.edu/westernnativeplants/index.php
    ii. USU - Waterwise plants for Utah Landscapes: https://extension.usu.edu/cwel/water-wise-plants
    iii. Wildland Scapes, LLC
        - Native: https://www.revegmoab.com/native-plants
        - Pollinator: https://www.revegmoab.com/pollinator-plantings-and-moab-big
        - Shade trees, fruit trees, evergreens: https://www.revegmoab.com/general-plant-lists
        - Shrubs and herbaceous perennials: https://www.revegmoab.com/shrubs-and-herbaceous-perennials

5. Water Wise Plants Requirements
    a. Justification
        i. Water wise and native plants typically have significantly lower water demand than turfgrass and other high water use plants. There are also many associated benefits to using water wise and native plants such as providing pollinator habitat, being fire resistant, being lower maintenance, and providing functional, attractive landscapes. Stakeholders interviewed generally agree that landscaping code updates should include requirements for water wise plants and not native plants. It would be disadvantageous to require a standard for native plants as many plants native to Moab (i.e., cottonwood trees) are not low

water use. Additionally, there are many non-native, low water use plants that are well suited to Moab's climate that would otherwise be restricted in this native plant requirement.

b. Current Standards
    i. *Residential:* None
    ii. *Large Scale Developments over 30,000 sqft:* Plant Materials and Landscape Design Standards. 1. Plants selected for landscape areas shall consist of plants that are well suited to the microclimate and soil conditions at the project site. (Ch 17.80.070)
    iii. *RC Resort Commercial Zone*: i. Use of locally appropriate shrubs, trees and grasses or plants with low-water demand characteristics is encouraged, but not required, in all cases in order to minimize the consumption of water. (Ch 17.31.050)

c. Recommended Code Update
    i. For All Development Types: A minimum of 50% of living plant material must be selected from the non-irrigated/very low or low water use category of the City's Approved Plant List.
    ii. Remove RC Resort language above from code as it would be contradictory to the recommended code update.

d. Supporting Code Language
    i. Adopt current standards for all development types in WUI
    ii. A minimum of 50 percent of the plants on a development site shall be native species identified in the Administrative Manual *(Sedona, AZ)*
    iii. Minimum three tree varieties and five shrub varieties shall be provided for each project selected from the plant list. *(Henderson, NV)*
    iv. Water-wise landscaping is required on all development, private or public, in recognition of our semi-arid climate and limited amount of water available for outdoor uses. *(Thornton, CO)*

6. Hydrozones
    a. Justification
        i. Hydrozones allow for proper, efficient irrigation. Hydrozones means grouping plants in the landscape according to categories based on their water usage (ex. non-irrigated, water-conserving, and non-water conserving); and these plants are served by a valve or set of valves with the same irrigation schedule. Stakeholders interviewed were generally interested and supportive of integrating hydrozone standards into the landscape code in conjunction with the water budget approach and plant list. Local nurseries in Moab already categorize plants by very low, low, medium, and high water use and which complements this code requirement.
    b. Current Standards
        i. *Residential:* None

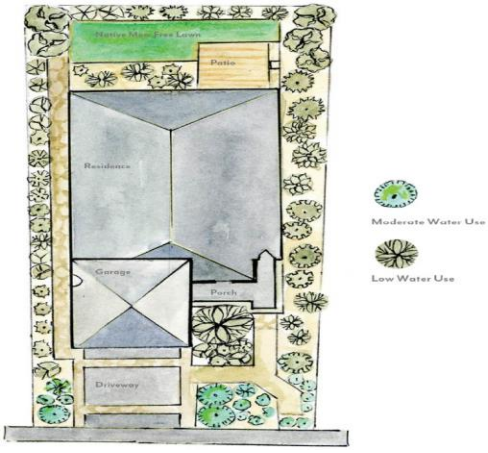
ii. *Large Developments Over 30,000 sqft*: Plant Materials and Landscape Design Standards. Plants with similar water needs shall be grouped together as much as possible. (Ch 17.80.070)

c. Recommended Code Update
   i. For All Development Types: Plants are to be hydrozoned with plants of a similar hydrozone (for example, low with low; very low with very low). Plants with a very low hydrozone are not to be planted in a moderate to high hydrozone.
   ii. Irrigation shall be hydrozoned, grouping similar water demands by irrigation zone.

d. Supporting Code Language
   i. Plants are to be hydrozoned with plants of a similar hydrozone (for example, low with low; very low with very low). Plants of a very low hydrozone are not to be planted in a moderate to high hydrozone. *(Castle Rock, CO)*
   ii. All non-single-family landscapes must be divided into water conserving (non-turf), non-water conserving (turf), and non-irrigated areas (e.g., pavement). A separate hydrozone plan is required for submittal with the landscape plan. *(Aurora, CO)*
   iii. Each valve shall irrigate a landscape with similar site, slope and soil conditions and plant materials with similar watering needs. Turf and non-turf areas shall be irrigated on separate valves. Drip emitters and sprinklers shall be placed on separate valves. *(JVWCD, UT)*

e. Supporting Resources
   i. Definitions:
      - Hydrozone: A group of plants with the same water use classification and microclimate assigned to a single irrigation valve. Plants should be grouped and planted in separate hydrozones due to factors such as: Plant water use classification; root depth; microclimate (sun, shade, wind, heat); slope and elevation; soil type; irrigation emission devices with different application rates; summer-dry adapted plants should be on a different hydrozone to those that require more summer moisture (QWEL Reference Manual).

Hydrozone example / design template *Qualified Water Efficient Landscaper Reference Manual)*



7. Landscape Water Budget
    a. Justification:
        i. A landscape water budget limits the overall amount of water that can be applied to a given landscape during the irrigation season. Stakeholders have been overwhelmingly supportive of this recommendation as a way to reduce landscape water demand while allowing for flexibility in what can be installed in the landscape.
    b. Current Standards: None
    c. Recommended Code Update
        i. All irrigated landscaped areas must be included in the water budget calculation. See Appendix for details regarding the Maximum Applied Water Budget calculation.
        ii. The total irrigation water need for all hydrozones cannot exceed a Maximum Applied Water Budget of 15 gallons/season/sq-ft (24in/season) of irrigated landscape area unless special features are included.
        iii. Special features include:
            - Non-irrigated protected native vegetation areas
            - Ecological restoration projects
            - Bioretention areas
            - Non-irrigated permeable areas
            - Stormwater conveyance infrastructure (vegetated swales)
            - Graywater applied to the landscape (% based on % living plant material primarily watered with graywater)
        iv. If any combination of the special feature areas totals to at least 5% of the total irrigated hydrozone area, then the Maximum Applied Water Budget increases to 16 gallons/season/sq-ft. If any combination of the special feature areas totals to at least 10% of the total irrigated hydrozone area, then the Maximum Applied Water Budget increases to 17 gallons/season/sqft.
        v. Active rainwater catchment systems, including rain barrels or cisterns, are also incentivized in the calculation through a reduced overall irrigation water need.
    d. Examples of Potential Modifications
        i. Require all proposals to calculate water demand of all landscapable areas according to a water usage table; no water budget limit (*Aurora, CO*)
        ii. Require water budget calculations that include an estimated total water use that does not exceed the calculation for the site's maximum applied water allowance *(Sacramento, CA)*
        iii. The total irrigation water need for all hydrozones cannot exceed a Maximum Applied Water Budget of 7.5 gallons/season/sq-ft of irrigated landscape area unless special features are included (e.g. green stormwater infrastructure, graywater) *(Aspen, CO)*

    e. Supporting Resources
        i. EPA Water Budget Calculation Tool: https://www.epa.gov/watersense/water-budget-tool

ii. USBR Agrimet Castle Valley Station: https://www.usbr.gov/pn/agrimet/etsummary.html?station=csvu&year=2021
iii. City of Moab Precipitation Date: https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?ut5733

8. Mulch
    a. Justification:
        i. Proper mulching provides many benefits to landscapes, including reducing soil evaporation and moisture loss, moderating soil temperatures, providing weed control, and improving landscape aesthetics. Some of the stakeholders interviewed expressed concern about the availability of organic mulch in Moab, but also noted that any requirements would create market demand. One stakeholder described organic mulch from arborists as relatively easy to acquire.
    b. Current standards: None
    c. Recommended Code Update
        i. For all development types, require organic mulch be applied at a depth of 4 inches, 1 cubic yard per 80 sq ft; inorganic mulch including gravel, river rock, and crushed rock must be applied at a depth of 2 inches.
        ii. Because mulching can limit the successful propagation of some native plants, it is recommended that native plants be exempt from these mulching requirements.
    d. Examples of Potential Modifications
        i. Rock mulch shall be installed and maintained at a minimum depth of 2 inches and a maximum depth of 4 inches on all planted areas except where groundcover plants are fully established. *(Henderson, NV)*
        ii. Organic mulch applied at depth of 4 inches, 1 cubic yard per 80 sq ft; inorganic mulch applied at a depth of 2 inches. *(Castle Rock, CO)*
    e. Supporting Resources
        i. Utah State University Cooperative Extension, Using Mulches in Utah Landscapes and Gardens
        ii. Utah State University Cooperative Extension, Water-Wise Landscaping: Mulch

9. Irrigation System Criteria
    a. Justification
        i. Irrigation system design and installation is critical because even the most water wise landscaping won't save water if it's not being irrigated efficiently and effectively. For example, MP rotator nozzle heads are significantly more efficient in applying water to the landscape compared to more traditional spray nozzles, especially in windy areas like Moab. The stakeholders interviewed expressed interest in irrigation system criteria requirements, but were concerned about having requirements for residential properties.
    b. Current standards:
        i. *Residential:* None
        ii. Large developments over 30,000 sq-ft:
            - A detailed irrigation plan shall be drawn to the same scale as the landscape plan and shall contain the following information:

a. Layout of irrigation system and summary legend outlining the type and size of all components of the system, including manufacture name and model number with approved equals; and
b. Flow rate in gallons per minute and design operating pressure in pounds per square inch for each valve and precipitation rate in inches per hour for each valve with sprinklers. (Ch. 17.80.070)

iii. RC Resort Commercial Zone:

- Irrigation. All required landscaped areas shall include a permanent, underground irrigation system as defined herein to insure the long-term health and growth of the landscape. Where possible, irrigation systems shall utilize untreated, irrigation water instead of treated water. Irrigation system design shall take into consideration the xeriscape characteristics of plant materials used. (Ch. 17.31.050)

iv. Recommended Code Update:

- *For residential developments*: All requirements below are recommendations.
- *For commercial and large-scale developments:*
- Smart irrigation controllers labeled by U.S. Environmental Protection Agency's WaterSense Program or with published reports posted on the Smart Water Application Technologies website are required.
- Dedicated landscape water meters/sub-meters shall be installed for all non-residential irrigated landscapes of 5,000 sq-ft or more.
- The irrigation system shall be designed to prevent runoff, low head drainage, overspray, or other similar conditions where irrigation water flows onto non-targeted areas, such as adjacent property, non-irrigated areas, hardscapes, roadways, or structures.
- Minimum pop-up height for sprinklers in turfgrass areas shall be six inches (6").
- Check valves or anti-drain valves are required on all sprinkler heads.
- The irrigation system shall be designed to ensure that the operating pressure at each emission device is within the manufacturer's recommended pressure range for optimal performance.
- Sprinklers within a zone shall have matched precipitation rates, unless otherwise directed by the manufacturer's recommendations. Sprinkler spacing shall be designed to achieve the highest possible distribution uniformity using the manufacturer's recommendations. Spacing must achieve head-to-head coverage.
- A pressure regulating valve shall be installed and maintained by the consumer if the static service pressure exceeds 80 pounds per square inch (psi). The pressure-regulating valve shall be located between the meter and the first point of water use, or first point of division in the pipe, and shall be set at the manufacturer's recommended pressure for the sprinklers.

- Overhead irrigation shall not be permitted within 24 inches of any non-permeable surface. Allowable irrigation within the setback from non-permeable surfaces may include drip, drip line, or other low flow non-spray technology. The setback area may be planted or unplanted. The surfacing of the setback may be mulch, gravel, or other porous material.

c. Examples of Potential Modifications
   i. An irrigation construction plan shall graphically depict, and describe through appropriate notes, an efficient irrigation design; each irrigation zone on the irrigation construction plan should be designed to water plants with similar water and environmental requirements. *(Thornton, CO)*
   ii. Specific requirements for irrigation systems including backflow prevention, pressure regulators, highest possible distribution uniformity, and not permitting overhead irrigation within 24 inches of non-permeable surfaces. *(Sacramento, CA)*
   iii. Landscaped areas shall be provided with a WaterSense labeled smart irrigation controller which automatically adjusts … in response to changing weather conditions. *(JVWCD, UT)*

d. Supporting Resources
   i. Washington County Water Conservancy District, Installation and Maintenance
   ii. EPA WaterSense, Water Efficiency Management Guide: Landscaping and Irrigation
   iii. South Metro Water Supply Authority, Model Regional Water Efficient Landscape and Irrigation Ordinance

10. FireWise Landscaping Standards
    a. Justification:
       i. Wildfires present a serious and growing threat to Western communities, particularly properties at the interface between urban areas and natural open space. In conversation with stakeholder, it was recommended that Moab expand firewise landscape regulation for properties in the WUI.
    b. Current Standards:
       i. *Residential*: None
       ii. *Developments over 30,000 sq ft:* For projects located at the interface between urban areas and natural open space non-irrigated, highly drought tolerant plants shall be selected that will blend with the native vegetation and are fire resistant or retardant. Plants with low level fuel volume or high moisture content shall be emphasized. Plants which tend to accumulate excessive amounts of dead wood or debris shall be avoided.
    c. Recommended Code Update:
       i. Expand current large development standards to all development types at the interface between urban areas and natural open space.
       ii. For all development in the WUI:
           - Avoid fire-prone plant materials and highly flammable mulches. See appendix for a recommended list of plants.

- Plant widely-spaced, low-growing, non-resinous shrubs, 2-3 feet away from the house. Do not plant directly under windows, vents, or decks. Do not plant under tree crowns, or use shrubs to screen propane tanks or firewood piles.
- If planting new trees, plant small-maturing ones, at least 15 feet away from structures.

d. Supporting Resources
   i. Utah State University Forestry FireWise Plants List (for appendix): https://forestry.usu.edu/news/utah-forest-facts/firewise-plants-for-utah-landscapes
   ii. Utah State University Forestry Firewise Landscaping Guide: https://forestry.usu.edu/files/firewise-landscaping-updated-2018.pdf

11. Maintenance
   a. Justification: Effectively maintaining landscapes and irrigation systems is critical to plant health and water demand management.
   b. Current Standards:
      i. *For residential developments:* Required landscaped areas shall be maintained in a neat, clean, orderly and healthful condition. This is meant to include proper pruning, mowing lawns, weeding, removal of litter, fertilizing, replacement of dead plants and the regular watering of all plantings. (Prior code § 27-3-24(B))
      ii. *For commercial developments:* Maintenance Requirements. Landscaped areas shall be reasonably maintained by the owner or the lessee of the property, including pruning, trimming, watering, and other requirements necessary to create an attractive appearance for the development. Lack of maintenance of required landscaping material shall constitute a violation of this code.
   c. Recommended Code Update:
      i. Include the replacement and maintenance of irrigation systems including backflow assembly testing, leak repair, head adjustment, etc.
      ii. Include language to specify that all replacement plants shall conform to the city's current plant list and landscaping standards.
      iii. Include a recommended turf mowing height of 3 ½ inches.
   d. Supporting Code Language
      i. Required maintenance shall include regular watering, pruning, mowing, fertilizing, clearing of debris and weeds, removal and replacement of dead plants and repair and replacement of irrigation systems and architectural features. *(Sedona, AZ)*
      ii. All replacement plants shall conform to the city's current landscaping standards. *(Aurora, CO)*
      iii. Maintenance requirements must be noted in landscape and irrigation plans. Irrigation system maintenance includes back flow assembly testing, leak repair, head adjustment, etc. Turf preferred mowing height is 3 ½ inches. *(Castle Rock, CO)*

Educational, Best Management Practice Opportunities

1. Soil Amendment
    a. Justification
        i. Incorporating compost and other soil amendments into a landscape has important benefits including: up to 20% water savings, improved plant growth and increased stormwater retention for the soil, pest suppression and reduced need for fertilizers. However, stakeholders agreed that a requirement for soil amendment – which can be difficult to come by in Moab – would present a financial burden and an enforcement challenge for the City at this time.
    b. Current standards: None
    c. Examples of Potential Modifications
        i. Min. 4 cubic yards of organic matter soil amendment required for turf, trees, shrubs, perennials and annuals; Soil amendment tilled to min. depth of 6 inches (Thornton, CO)
        ii. Develop exception for native seeds/plants to use 2 cubic yards per 1,000 square feet (based on research from City of Centennial, CO)

2. Graywater Reuse
    a. Justification: Graywater reduces potable water demand by reusing water from showerheads or washing machines or bathroom sinks in the landscape. While graywater systems have been incentivized through the water budget allowance, stakeholders shared that requirements for installing graywater stub-outs would likely be ineffective since most homeowners would not then install the full system and graywater stubouts are challenging from a regulatory perspective for Grand County Public Health. Fully installed graywater systems were considered potentially overly prescriptive as a mandate.
    b. Current standard: No requirements, graywater systems allowed in Grand County per state statute (R317)
    c. Examples of Potential Modifications
        i. Incentivize or require graywater in all/some types of new development:
            - Graywater included in a landscape water budget allowance
            - Graywater stub-out requirement
            - Fully installed graywater system required

        ii. Landscape Standards Best Practices

            - Soil characteristics
            - Subsurface irrigation system design
            - Mulch basin design

3. Rainwater Capture
    a. Justification: Rainwater can also be used to reduce potable water demand by capturing, holding and releasing collected water to the landscape. While active and passive rainwater capture is incentivized through the water budget, some stakeholders shared

that mandating rainwater capture could be financially burdensome and would potentially not make a significant difference given Moab's arid climate.

b. Current standards: No local standards, state statute (73-3-1.5) allows for rain catchment storage up to 2,500 gallons or up to 100 gallons without registering.
c. Examples of Potential Modifications
    i. Incentivize and/or require passive or active rainwater harvesting
        - Landscape water budget allowance
        - Requiring specific forms of rainwater harvesting on some properties
    ii. Landscape Standards Best Practices
        - Rain garden / bioswale design
        - Rain barrel installation

ATTACHMENT A: Maximum Allowed Landscape Water Budget

Effective Precipitation:

Effective Precipitation (25 – 75% total rainfall) = **1.6 – 4.7 gal/sf/season**

- Precipitation during irrigation season = **6.27 in** (Mar – Oct)
  - Per Desert Research Institute[1]

Reference Evapotranspiration:

- ETo = **57.38** inches/season (Mar – Oct)
  - Per AgriMet Castle Valley UT station[2]

Irrigated Area

- Irrigated Area = hydrozone area in sq-ft

Water Use Category	**Plant Factor[3]**
High (including Cool Season Turf & Water Features)	0.8
Medium	0.5
Low	0.2
Very Low / Non-Irrigated	0

Irrigation Method	**Default Efficiency**
Overhead	**70%**
Drip	**90%**
Water Feature	**75%**

Special Features to Incentivize Healthy Landscapes (% of irrigated landscape)	**Maximum Applied Water Budget (gal/sf/season)**
At least 15%	+3 gal / sf / season
At least 10%	+2 gal / sf / season
At least 5%	+ 1 gal / sf / season

[1] Annual rainfall during irrigation season from Moab, Desert Research Institute https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?ut5733); Effective precipitation ranges from 25 – 75% based on local climate factors.

[2] Average tall reference ETo from 2015 – 2021; https://www.usbr.gov/pn/agrimet/etsummary.html?station=csvu&year=2021. Additional supporting information: Peak monthly ETo for Moab in June is 9.55 (EPA WaterSense Water Budget); Fruita, Colorado – CoAgMet station captured an ETo of 59.55 for irrigation season.

[3] This table is based on EPA WaterSense Water Budget tool designations, plus an additional VL/Non-Irrigated category to incentivize VL hydrozone plants.

Special Features include:

- Non-irrigated protected native vegetation areas
- Ecological restoration projects
- Bioretention areas
- Non-irrigated permeable areas
- stormwater conveyance infrastructure (vegetated swales)
- Graywater applied to the landscape (% based on % living plant material primarily watered with graywater)

Active Rainwater Catchment

Amount of Rainwater Catchment Capacity	Reduction in Calculated Irrigation Water Need (gallons)
1 x 50 gallon rain barrel	100
2 x 50 gallon rain barrel (100 gal)	200
101 - 500 gallon-cistern	1,000
501 - 1000 gallon-cistern	2,000
1,001 – 1,500-gallon cistern	3,000
1,501 – 2,000 gallon cistern	3,750
2,001 – 2,500 gallon cistern	4,500

Sample Hydrozone Tables

Irrigation Water Budget = [(ETo × Plant Factor) – Re] × Irrigated Area ÷ Irrigation Efficiency × 0.623

Example 1: 1/3 of each High, Medium and Low Water Hydrozones (w/ 75% Effective Precip)

Hydrozone	ETo	Plant Water Use Category	Plant Factor	Re (in/season)	Irrigation Method	Irrigation Efficiency	Hydrozone Area (sq ft)	Irrigation Water Need (gal/season)
Zone 1	57.4	H	0.8	4.7	Overhead	0.7	1,000	36,685[4]
Zone 2	57.4	M	0.5	4.7	Drip	0.9	1,000	16,613
Zone 3	57.4	L	0.2	4.7	Drip	0.9	1,000	4,693
TOTAL							(c) 3,000	(d) 57,991

Avg. irrigation water need all zones = (d / c) = **19.33 gal/sf/season**

Example 1B: 1/3 of H,M, L Hydrozones (w/ 25% Effective Precip)

Hydrozone	ETo	Plant Water	Plant Factor	Re (in/season)	Irrigation Method	Irrigation Efficiency	Hydrozone Area (sq ft)	Irrigation Water Need (gal/season)

[4] Note: If the entire area was high water use (turf), landscape water use per square foot would be 36.6 gal/sf/season

		Use Category						
Zone 1	57.4	H	0.8	1.6	Overhead	0.7	1,000	39,445
Zone 2	57.4	M	0.5	1.6	Drip	0.9	1,000	18,759
Zone 3	57.4	L	0.2	1.6	Drip	0.9	1,000	6,839
TOTAL							(c) 3,000	(d) 65,043

Avg. irrigation water need all zones = (d / c) = **21.7 gal/sf/season**

Example 2: 1/4 H and M, 1/2 Low Water Hydrozones

Hydrozone	ETo	Plant Water Use Category	Plant Factor	Re (in/season)	Irrigation Method	Irrigation Efficiency	Hydrozone Area (sq ft)	Irrigation Water Need (gal/season)
Zone 1	57.4	H	0.8	4.7	Overhead	0.7	1,500	55,029
Zone 2	57.4	M	0.5	4.7	Drip	0.9	1,500	24,920
Zone 3	57.4	L	0.2	4.7	Drip	0.9	3,000	14,080
TOTAL							(c) 6,000	(d) 93,729

Average irrigation water needs = **15.62 gal/sf/season**

Example 2: 1/4 H, M, L, VL/Non-irrigated

Hydrozone	ETo	Plant Water Use Category	Plant Factor	Re (in/season)	Irrigation Method	Irrigation Efficiency	Hydrozone Area (sq ft)	Irrigation Water Need (gal/season)
Zone 1	57.4	H	0.8	4.7	Overhead	0.7	1,000	36,685
Zone 2	57.4	M	0.5	4.7	Drip	0.9	1,000	16,613
Zone 3	57.4	L	0.2	4.7	Drip	0.9	1,000	4,693
Zone 4		VL	0				1,000	
TOTAL							(c) 4,000	(d) 57,991

Average irrigation water needs **= 14.5 gal/sf/season**

Example 4: 10% H and, 1/4 M, 1/2 L, 15% VL w/ a 2,500 gallon cistern

Hydrozone	ETo	Plant Water Use Category	Plant Factor	Re (in/season)	Irrigation Method	Irrigation Efficiency	Hydrozone Area (sq ft)	Irrigation Water Need (gal/season)
Zone 1	57.4	H	0.8	4.7	Overhead	0.7	600	22,011
Zone 2	57.4	M	0.5	4.7	Drip	0.9	1,500	24,920
Zone 3	57.4	L	0.2	4.7	Drip	0.9	3,000	14,080
Zone 4		VL	0				900	0
Subtotal							(c) 6,000	**(d) 61,011**

Rainwater Capture								- 4,500
TOTAL							6,000	**56,511**

Average irrigation water needs w/out cistern = **10.16 gal/sf/season**

Average irrigation water needs w/ cistern **= 9.42 gal/sf/season**

Special Features

Special Feature	Special Feature Response
Total area of Special Features (sq-ft)	600
Total percent of Special Features	10%
Maximum Applied Water Budget (gal/sf/seaon)	+ 2 gal/sf/season

Recommended water budget allowance **= 15 gal/sf/season**