

Channel Migration Zone Regulatory Guidance Report

Final as of May 2, 2019

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Introduction and Process Overview

Oregon Solutions and the State of Oregon Silverjackets group coauthored this regulatory guidance to synthesize and reflect discussions, input and research from federal and state agencies on how to characterize and regulate habitat and hazard information unique to channel migration zones (CMZ's). Information was collected from October 2018-May 2019 and is intended to be a resource for counties to share best practices as well as flag additional considerations to work through at the local level in consultation with DLCD.

Two Channel Migration Zone Policy Assessment Workshops and interim focus groups began formally meeting in response to a letter sent October 5, 2018 by the Clackamas County Board of Commissioners. In the letter, Clackamas County requested information on how to establish land use regulations to prevent development in areas prominently known and at risk for frequent flooding and severe erosion. To respond, Oregon Solutions and Oregon Silverjackets partnered to research best practices in addressing Channel Migration Zones (CMZ's) from relevant federal and state agencies (see below participant list) as well as pulling in information from other states as guidance. Funding from DLCD's land use mediation grant program covered costs of meetings. Below find the timeline of meetings where information was collected for this document:

- November 5, 2018 Channel Migration Zone Policy Assessment Workshop # 1
- February 6, 2019 Focus Group # 1
- February 20, 2019 Focus Group # 2
- May 2, 2019 Channel Migration Zone Policy Assessment Workshop #2
- Additionally, October 3, 2018-April 7, 2019 bi-weekly meetings were held by USACE, Oregon Solutions and Clackamas County to discuss research and information gathering relevant to channel migration zone policy

All meeting materials are accessible in the google drive document library here:

<https://drive.google.com/drive/folders/1CwDcVMY54r-qQMkilDImqsUhx7gV4Mhx?usp=sharing>

In summary, the workshops and focus groups identified 13 major areas in need of policy development in regard to CMZ's in Oregon. The working groups discussed and developed recommendations on the 12 major areas of CMZ policy. This document represents a summary of those deliberations.

Following this report, Clackamas County can now initiate their review and adoption of a CMZ ordinance with technical support from the participating state agencies. Additionally, this regulatory guidance report has established the foundation for a statewide effort to adopt a model CMZ ordinance for communities within the State of Oregon; and/or the value of creating a broader statewide act to categorize marine and riverine shoreline hazards and natural resource values for Oregon (similar to Washington's [Shoreline Management Act](#) which was adopted in 1971).

Characterize Hazard/Risk

Motivation for research into channel migration zone (CMZ) policy is based on hazards associated with channels that erode gradually across a floodplain or avulse from one channel alignment into other historic channel patterns. Property or infrastructure within channel migration zones are particularly at risk of being undermined and damaged. While the National Flood Insurance Program (NFIP) addresses risks associated with river flooding, it does not adequately address

hazards associated with erosion or channel migration. To propose a policy that more adequately incorporates river hazards in general; special flood hazard areas (SFHA's), channel migration zones (CMZ's), and bank erosion must all be included in a framework for developing policy standards.

Policy around SFHA is well established and currently being implemented in the form of 1% annual chance exceedance floodplain boundaries (100-year flood) and floodway boundaries. Where CMZ's do exist, they typically fall outside these boundaries and therefore need a separate set of policy considerations. Since channel migration ultimately undermines foundations, policy must be implemented that relies less on elevation of structures as a standard and more on prevention or mitigation of placing structure and people at risk. For existing or non-conforming structures already within channel migration zones, policy must be in place to limit expansion of risks and to communicate risks associated with channel migration. Mapped channel migration zones should be considered before allowing new development.

Bank erosion is designated as the part of channel migration hazards represented by the gradual retreat of a river bank landward into floodplain area. Traditionally, mitigating bank erosion meant using hardscaping such as rip-rap to resist erosion. It has been shown that non-vegetated rip-rap slopes are hydraulically smoother and will accelerate flows more than vegetated banks. As a result, hydraulic energy tends to increase in the immediate vicinity of the protected bank. This increase in hydraulic energy affects the area of the bank protection and adjacent properties as well. Therefore, there has been increasing interest in the hydraulic engineering community to protect banks from erosion using bioengineering techniques which serve to simultaneously increase stability and dissipate energy near river banks that are at risk of erosion. Policy directing this preferred activity must first distinguish the unique hazard bank erosion plays both for the affected area and on adjacent properties.

Mapping

For the past 50 years, FEMA has supported approaches to determining and mapping floodplain and floodway boundaries for publication on NFIP's Flood Insurance Rate Map. Computation and mapping of the 10%, 2%, 1%, and 0.2% annual chance exceedance probability water surface profiles and floodway encroachments are generally understood and consistently applied to Oregon Rivers. CMZ's have been identified for only a handful of Oregon Rivers and a consistent method for identifying what constitutes a CMZ has not been fully developed for Oregon.

In 2011, DOGAMI applied detailed channel migration zone mapping techniques to several pilot study areas, including the Coos River, Coquille River, Sandy River, and Hood River. The mapping followed techniques developed by the Washington Department of Ecology in 2003. The approach identifies CMZ's as a combination of (1) existing and documented historical channel locations, (2) locations where channels are likely to avulse and create new or re-occupy historical channels, and (3) projected rates of erosion to establish a "channel migration zone" (CMZ).

In 2017, DOGAMI published its Statewide Subbasin-Level Channel Migration Screening for Oregon. In this document DOGAMI adapted approaches developed by the Washington Department of Ecology to determine high-level susceptibility for Oregon's major rivers. The purpose of the screening effort was to prioritize future detailed channel migration zone mapping.

Recently, DOGAMI used the screening effort to prioritize detailed channel migration zone mapping in Benton, Washington, Morrow, and Marion counties. This four-county mapping project was proposed to FEMA and funded in FY18 through the Risk MAP program. DOGAMI is currently reviewing advances in mapping techniques; in addition to new academic research, since 2003 several other states have established detailed mapping protocols. The skills needed to identify CMZ's using DOGAMI's approach require a degree of specialization not typically found in small communities' departments or even at most county governments. Therefore, either training needs to be provided for the mapping of these zones or mapping of CMZ's needs to be conducted at a State or Federal level.

Bank erosion, while a part of the processes in a CMZ, do represent a distinct mapping challenge. Rates of erosion are not typically identified by field monitoring equipment. And while bank erosion can be identified using successive years

of aerial photography, this information is not always readily available. Bank erosion hazards will be developed on a site specific basis. Thus, the burden for identification of the hazard will be based on local resources and would be part of the local permitting application.

Notification/Disclosures

Notification or disclosing channel migration zones is fundamentally an issue of risk communication. Because CMZ's can extend beyond floodplain boundaries and occupy areas of historic channel patterns, their hazard may not be well perceived by potential property buyers, property owners, real estate agents, or developers. Further, because they typically occur in riverine environments outside FEMA's 1% inundation boundary, they are not well understood by the general public. Within the Upper Sandy River, where many of the properties adjacent to the river are developed with vacation homes, or there is a high degree of turnover in property ownership, knowledge of historic channel migration is not carried forward. It is important that there be some mechanism to inform the public of this hazard that has a frequency that is directly tied to regular flooding and consequences that could represent catastrophic failure of structures and infrastructure.

[HB2312](#) passed during the 2019 legislative session to require sellers of property to disclose whether property is identified by FEMA as Special Flood Hazard Area or whether flood insurance is required by local ordinance or in order to obtain federally regulated loan.

New Development

Allowing new construction in the Channel Migration Zone ultimately puts people and property at risk on multiple levels. First, the damage to structures can have high monetary costs that is often shared by the public. Infrastructure necessary to accommodate structures or development, if damaged, also becomes a financial burden that is shared by the public. Based on the nature of CMZs, if the structure or a portion of the structure is undermined and falls into the river, then point source pollution impacts the water quality and habitat of the river. Allowing such development to occur in areas that experience flooding and erosion on a frequent basis should be restricted. Therefore, the recommendation is to not allow any new development in the CMZ.

Existing Development

Based on similar arguments as with new development, redevelopment should be restricted to show that there is no increase of impacts to the riparian hazard area. Existing structures should not be enlarged, remodeled, or redeveloped to encroach further toward the river, increases in impervious area should not be allowed, and the existing riparian vegetation should be maintained. Avoidance should be the primary method of compliance; however, if impacts are unavoidable, then minimizing and mitigating the impacts becomes necessary. Onsite mitigation is preferred in these cases due to the direct impact of expanding structural footprints into the hazard areas. Certain exceptions to these requirements may be necessary especially as it pertains to historic structures and routine maintenance; however, development of these exceptions will be explored further in policy development for CMZ's. For existing development, communities should encourage some of the same requirements as flooding hazards (e.g., elevation standards and flow through foundations.)

Infrastructure and Public Assets

Land development, whether commercial, industrial, or residential, needs infrastructure to provide basic services and support functions. This includes water, sewer, gas, power, and roadways. Because housing in particular depends on this infrastructure, once damaged, the habitability of the development or structure is compromised. Thus, the costs associated with maintaining the viability of residential development in channel migration zones, which are often outside of urban areas, are higher than in other more urban areas of the jurisdiction. Many times however, these costs are absorbed into a large tax base. Costs of maintaining infrastructure can be significant and can reduce a jurisdiction's resiliency. Consideration needs to be given to the viability of providing a full suite of services for residential and potentially other types of development in CMZs.

Regulation

Recommended policies for the identified components of the Riparian Hazard Zone (SFHA, CMZ, and Bank Erosion) should be implemented through a holistic approach to local development regulations and permitting procedures, perhaps including a new permit (e.g., titled Riparian Corridor Permit (RCP)). Such a permit should be for all structures, including manufactured dwellings, and for all development, including fill and other activities in these areas, and should include criteria for submission of a RCP and permit approval. This permit could be similar to the traditional Floodplain Development Permit and where CMZ's or bank erosion are not identified, the requirements of the RCP would default to be essentially only the requirements for developing within the regulatory floodplain. In addition to the specific requirements of the RCP, access should be required for the purpose of inspection during any proposal review, restoration, emergency action or monitoring period.

NFIP Alignment

While the past 50 years of implementation of the National Flood Insurance Program (NFIP) has seen a continued refinement of policy for the program, major changes are possible in the future as the program is currently undergoing legislative review at the Federal level. The concept of the Riparian Hazard Policy is not to compete with or nullify the existing or any new aspects of the NFIP; instead, the framework for the Riparian Hazard Policy is intended to provide a place for NFIP policy and floodplain development regulations to be incorporated into a holistic approach to riparian management within Oregon. NFIP requirements for SFHA's will still need to be included into the overall set of policy requirements and adhered to by local communities that participate in the NFIP program; however, CMZs (which when defined are typically outside the SFHA) provide an additional set of requirements that support Oregon's Statewide Planning Goals and Guidelines. The CMZ's may warrant more rigorous requirements than the NFIP's due to the different kinds of risks associated with CMZ's.

Bank Protection

By definition, CMZ's consist of channels that move laterally across floodplains through a process of either bank erosion or channel avulsion. In terms of bank erosion, the process of erosion of a channel landward into a bank is a process of energy dissipation. When this occurs on undeveloped land, the localized energy dissipation has beneficial effects to upstream and downstream properties as well as to the habitat at the point of erosion. As the bank erodes, the channel leaves behind a nutrient rich deposit of sediment that can foster a healthy ecosystem.

Where bank erosion encroaches into the human environment, structures could be damaged and life could be put at risk. Traditional attempts to hardscape, or rip-rap, locations of bank erosion have had unintended consequences both downstream and upstream of the point of protection. Energy that isn't dissipated is transferred to these adjacent areas. Further, because the hardscape offers a relative smooth surface for the river (relative to an established and robust vegetative cover), velocities and shear forces are increased in the vicinity of the rip-rapped bank.

As an alternative, bioengineering approaches are designed to create a roughened bank through a natural vegetative treatment. This bioengineering approach also is designed to stabilize the bank through an integrated root structure in the soils making up the bank. By a combination of stabilization and energy dissipation, impacts to both downstream and upstream areas can be minimized. Bioengineering also has the advantage of supporting diverse habitat types. Many guidelines can be drawn from design recommendations and the science on this approach is continuing to advance. (ASFPM, No Adverse How-To Guide for Infrastructure, 2016) (SLOPES IV Restoration). Also, Clean Water Services has developed a manual for Washington County entitled the [*Erosion Prevention and Sediment Planning and Design Manual*](#).

Code Enforcement

In states that implement riparian corridor or channel migration zone policies through development regulations, enforcement has been difficult to establish. For Oregon, existing local enforcement language for floodplain development could be borrowed and used as enforcement language for CMZ and bank erosion areas. Taking the lead

from existing local ordinances for NFIP floodplain development regulation in Oregon, violations of the local flood ordinance will result in the violator incurring a penalty. The typical penalty assigned to a violator consists of a misdemeanor, and upon conviction thereof is punishable as prescribed as such; although there is some variation between local communities regarding the type of penalty assigned. The violator is responsible for rectifying the violation. Financial penalties could be included in enforcement language for CMZs and any financial penalties could be put into a riparian area restoration fund. Accrued monies in the riparian area restoration fund could then be used to protect and restore critical areas within riparian areas in that jurisdiction. Specific enforcement policy is the subject of future development; however, it is recommended that consideration be given to consequences of violating CMZ regulations. In our discussions, we heard that enforcement is key to success but often underfunded (or not funded at all) so thus it is not implemented consistently (or at all).

Habitat Protection

The intent of the channel migration policy is not to regulate to habitat standards already included in various state and federal laws, but to recognize the relationship between channel migration and habitat protection. Currently the Statewide Planning Goal 5 provides riparian area protections and the presence of Locally Significant Wetlands adjacent to riparian areas further widens the protected area. These are typically smaller areas than the CMZ. CMZs offer a productive ecosystem of diverse habitat types that many species depend on. When affected through human activities, the benefits of these habitat areas can diminish. Human activities and development within the CMZ can cause both foreseen and unforeseen impacts to overall floodplain function. Here floodplain function involves the combination of floodplain storage, and riparian vegetation cover acts to slow flow velocity, together these functions can increase soil infiltration and decrease potential damage to the built environment. Therefore, any activity within the channel migration zone should consist of preservation of elements of riparian function. If impacts to these functional elements cannot be avoided, then minimization and mitigation are last resorts. If channel stabilization must be undertaken then guidance is available to “soften” the project design by using bioengineering or other practices. Some deleterious channel hardening techniques such as cabling and the use of “gripper systems” can cause additional damage beyond the negative effects of channel hardening and should be avoided.

Legal/Liability

Legal questions regarding policy around CMZs have been based on the fear of the reaction from further restrictions on private property. What has been termed “government overreach” is based on the idea that regulations put in place could reduce property values, limit development potential of property, or restrict individuals from improving property. In legal terms, the concern is that the regulations could render a taking of private property.

Floodplain regulations that serve to protect public health, safety, and general welfare of the community’s constituents have been generally upheld through litigation. A 2007 report put out by the ASFPM¹ has indicated that the “taking” concern is not a serious challenge to performance-oriented hazard regulations. This document suggests that courts are very likely to uphold community regulations which adopt a “no adverse impact” performance standard against claims of unreasonableness or “taking” of private property.

In a 2007 technical memorandum written by DLCD², certain requirements for avoiding a takings is outlined. The policy restrictions for the property use must:

- not prevent all beneficial use of the property;
- make a clear relationship or nexus between the restrictions on action and the intended result or the avoidance of the problem; and
- be in rough proportionality between the amount of impact and regulatory requirements of a developer.

¹ https://www.floods.org/PDF/ASFPM_NAI_Legal_Paper_1107.pdf

² https://www.oregon.gov/LCD/NH/Documents/regulatory_takings_tec_memo_3_%2028_17.pdf

The policy that the focus group has suggested attempts to incorporate this guidance. However, further refinement and vetting of the suggested policy will need to be legally tested for these issues. A local community perspective regarding the liability issues was also considered in the development of the suggested policy. Mapping hazards, flood, erosion or otherwise, identifies a certain risk to the public welfare. When the public is put at risk because of land use policy or outdated maps or data, a certain amount of liability could be assigned to the community. The 2007 ASFPM article suggests that issuance of policy is discretionary and cites cases where governments are not held liable for development that results in flood damage. Still, communities do have some responsibility to avoid exposing the public to unnecessary hazards when the hazards are known. In addition, individual rights of a property owner to modify hazard areas where those modifications can infringe on another's property or safety can provide a basis for adopting appropriate policy.

Incentives

The focus group discussed incentive programs to assist communities to come into compliance over time in collaboration with private property owners. Below are incentives the NFIP program provides for CMZ mapping and regulatory standards as well as Montana's voluntary easement program. There was also discussion about transfer of development right opportunities which would require a more localized study of buildable lands on a county by county basis.

National Flood Insurance Program (<https://www.floodsciencecenter.org/products/crs-community-resilience/element-profiles/432-l-special-flood-related-hazard-regulations/>)

CMZ mapping can overlap with FEMA regulatory floodplain mapping. The NFIP recognizes this potential for overlap and the additional risks that CMZs represent. In reflection of this potential for overlap and additional risk within the regulatory floodplain, the NFIP provides incentives to communities that assess their regulatory floodplains for the presence of CMZ areas, and if CMZ's are identified, then local communities are rewarded for adopting standards to protect their residents from the additional risks associated with CMZs. Specifically, FEMA's Community Rating System provides credit in the NFIP for CMZ standards as follows. Credit is granted for implementing one of the three following regulatory standards (More information here: <https://www.floodsciencecenter.org/products/crs-community-resilience/element-profiles/432-l-special-flood-related-hazard-regulations/>):

- 80 points are awarded if a community completes and maps a detailed study of migration potential, and prohibits development within this mapped area;
- 65 points are awarded if all developments are required to be located a safe distance away from a channel that could potentially migrate and are designed to be safe from channel migration; or
- 40 points are awarded if a channel setback is mapped and development within that area is prohibited until a detailed channel migration study has been completed.

Develop Channel Migration Easement Program (modeled from Montana's [voluntary easement program](#))

Purpose: The Channel Migration Easement (CME) program offers landowners an opportunity to sell the right to reinforce riverbanks that are within the river's 100-year channel migration zone. A CME is a special form of conservation easement where a landowner continues to use their land while allowing the river to erode and move across the floodplain within the easement boundaries.

- Step 1 – Interested landowners meet with County staff to discuss the program and the floodplain property being considered.
- Step 2 – An analysis of past river migration patterns is conducted and the results are discussed with the landowner to identify potential easement boundaries and benefits.
- Step 3 – Specific easement and financial terms are discussed with all involved parties in an open process that acknowledges the needs of the landowner, County staff, and easement holder.
- Step 4 – The channel migration easement is finalized, payment made to the landowner, and papers are filed at the County Courthouse. The easement is monitored over the long-term as prescribed by the agreed-upon terms.

Other incentives do exist for the management of channel migration zones. For communities that proactively manage CMZs, preferential consideration can be applied for grant applications. Or for awarded grant applications, a sliding scale of cost share match requirements can be given based on the strictness of CMZ policy within the jurisdiction. In short, options exist for incentivizing CMZ policy. Ways to entice communities to adopt these requirements should be considered in future policy development.

List of Channel Migration Zone Policy Assessment Workshop Participants

Organization	Name
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