Groundwater Flooding In Falls City

Neighborhoods in South Falls City, OR battle heavy stormwater discharge during wet Coast Range winters. Most mitigation efforts have focused on individual surface runoff diversions leading to disagreements between upstream and downstream landowners. This study aims to investigate the contribution of groundwater to the surface flooding in South Falls City and to determine the feasibility of various dewatering schemes to mitigate stormwater flooding.

RESEARCH QUESTIONS:
1. Is groundwater a primary driver of surface flooding in high precipitation alluvial basins?
2. What combination of engineering solutions for flood mitigation is most feasible for small rural communities?

Groundwater Flooding
- Occurs when water table intersects ground surface.
- Long seasonal onset as water table rises from dry to wet season.
- Often accompanies and exacerbates surface/fluxial flooding.
- Longer subsidence time than surface flooding.
- Recently recognized as source of surface ponding in many locations; Lincoln, ND, Denver, CO, Twin Cities, MN, Alberta, Canada, Karst regions of UK.
- Geologic characterization of setting: mapping, geotechnical boring, seismic refraction survey.
- Characterization of hydraulic properties of subsurface: pump and slug testing.
- Gathering local knowledge about watershed change and hydrology.
- Conduct interviews with landowners in South Falls City to characterize flooding variation across flooding zone.

Methods

Community Collaboration

In addition to aquifer characterization and mitigation evaluation, this study also aims to facilitate collaboration between stakeholders. Historically, landowners have constructed simple drainage measures individually without consulting neighbors, which increases discharge to downstream stakeholders. Beginning in 2013, NWWS has sponsored Community Watershed Forum meetings that bring stakeholders together to explore solutions. This study’s dewatering analysis will aim to supplement stakeholder generated solutions in future meetings to arrive at consensus on a mitigation plan. Lastly, the study aims to put in place an adaptive framework for stakeholders to maneuver through future disputes.

Dewatering Methods

Next Steps
- Seismic refraction to determine depth of alluvium for entire flooding zone.
- Measurement of volumetric flow in ditches at various groundwater levels.
- Infiltration data from region’s septic tanks to evaluate subsurface heterogeneity.
- tracer test to evaluate connectivity of subsurface to ditches.
- LiDAR data to determine possible drainage diversion and paleo-channel.
- Pre-engineering, modeling and pricing of proposed mitigation measures.
- Continue sponsoring stakeholder meetings to coordinate solutions.

References

Acknowledgements

Todd Janish, the Institute for Water and Watersheds, the City of Falls City, Bill Mann of In Situ, Inc. Jake Howell of West Coast Well Drilling, Marvin and Scott Van Horn, Tracy Young, Vicki Avery and all of the citizens of Falls City.