

Addressing Climate Change

and

Natural Hazards

**Facility Planning and Design Considerations**

**January 2015**

**Stop 1: Natural Hazard Checklist**

Excerpt: Level 3 Handbook

**STOP 1. Natural Hazard Checklist**

The checklist below is a screening tool to be used at the earliest stages of facility planning to determine the most likely natural hazards a project may confront. This general information may help project teams assess which natural hazards may be applicable for a particular project early in the facility planning and design process. As the effort continues site specific information may be required to make a determination for any of the hazards.

The checklist should be completed with input from appropriate Park personnel and specialists. If considerable questions remain about the applicability of specific hazard, contact the appropriate Region or WASO specialist.

For each of the natural hazards listed below, the person(s) completing the checklist should indicate whether the hazard:

1. Is applicable and could pose a risk to the project and/or needs more information for a determination.
2. Is not applicable to the project for the following reason(s)
3. Hazard does not occur due to geologic setting (e.g., no volcanoes or permafrost are present in Florida).
4. A previous hazard assessment concluded this hazard was not applicable at this location.

The project’s checklist can be updated at various project milestones as more information is developed. By the time a team completes the schematic design phase the natural hazards applicable to the project should be identified and the checklist should no longer reflect uncertainty associated with any of the hazards listed. To achieve this level of understanding natural hazard assessment(s) may be needed for the project site.

Future versions of this handbook may address additional hazards.

| **Natural Hazard Checklist** | | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| Potential Natural Hazard | Risk or secondary hazard | Sources of General Non-site specific Data | Sources for Site Specific Data | | Best Professional Judgment | |
| Earthquake | * Falling objects. * Collapsing structures. * Inoperability of major building systems e.g. power, sewer, water. * Liquefaction; loss of strength to foundations, silt deposition, standing water. * Trigger to other hazards e.g. landslides, debris flows. | [Thumbnail image of United States Earthquake Probability Mapping by United States Geological Survey (USGS). Click thumbnail to view larger image.](https://www.nps.gov/dscw/upload/NaturalHazardChecklist-Images_AF_120417.pdf#page=1)  [Thumbnail image of United States peak ground acceleration. Click thumbnail to view larger image.](https://www.nps.gov/dscw/upload/NaturalHazardChecklist-Images_AF_120417.pdf#page=2)  [Thumbnail image of Hawaii peak ground acceleration. Click thumbnail for to view larger image.](https://www.nps.gov/dscw/upload/NaturalHazardChecklist-Images_AF_120417.pdf#page=3)  [Thumbnail image of Alaska peak ground acceleration. Click thumbnail for to view larger image.](https://www.nps.gov/dscw/upload/NaturalHazardChecklist-Images_AF_120417.pdf#page=4) | * International Building Code * [USGS: 2009 Earthquake Probability Mapping](http://geohazards.usgs.gov/eqprob/2009/) * State based mapping e.g. [WA liquefaction susceptibility and site class maps.](http://www.dnr.wa.gov/ResearchScience/Topics/GeologyPublicationsLibrary/Pages/pub_ofr04-20.aspx) * [NPS Technical Support](http://www.nature.nps.gov/geology/hazards/index.cfm) | | Potential Hazard  🞎  Not applicable  🞎 | |
| Landslide/  Avalanche | * Rockfall. * Mud or debris slides or flows onto structures. * Mud or debris slides or flows from under structures. * Snow avalanche. | [Thumbnail image of landslide hazard of the conterminous United States. Click thumbnail to view larger image.](https://www.nps.gov/dscw/upload/NaturalHazardChecklist-Images_AF_120417.pdf#page=5) | * State geological surveys e.g. [CA landslide mapping](http://www.conservation.ca.gov/cgs/geologic_hazards/landslides/Pages/Index.aspx). * [NPS Technical Support](http://www.nature.nps.gov/geology/hazards/index.cfm) | | Potential Hazard  🞎  Not applicable  🞎 | |
| Permafrost | * Melting. * Surface collapse. * Increased landslide susceptibility. | [Thumbnail image of Alaska climate monitoring.](http://data.usgs.gov/climateMonitoring/region/show?region=alaska)  [Thumbnail image of Earth circumarctic.](http://nsidc.org/data/docs/fgdc/ggd318_map_circumarctic/) | * [Global Permafrost Zonation Index Map](http://www.geo.uzh.ch/microsite/cryodata/pf_global/) * [NPS Technical Support](http://www.nature.nps.gov/geology/hazards/index.cfm) | | Potential Hazard  🞎  Not applicable  🞎 | |
| Cave/Karst (sinkholes) | * Surface collapse * Contamination * Abandoned Mineral Lands (AML) features | [Thumbnail image of karst and potential karst areas in soluable rocks in the contiguous United States. Click thumbnail to view larger image.](https://www.nps.gov/dscw/upload/NaturalHazardChecklist-Images_AF_120417.pdf#page=6)  [Thumbnail image of Alaska, Hawaii, and Puerto Rico showing humid climate karst. Click thumbnail to view larger image.](https://www.nps.gov/dscw/upload/NaturalHazardChecklist-Images_AF_120417.pdf#page=7) | * State geological hazards maps. * AML features * NPS Technical Support – [Cave and Karst](http://www.nature.nps.gov/geology/caves/index.cfm); [Abandoned Mineral Lands](http://www.nature.nps.gov/geology/aml/index.cfm) | | Potential Hazard  🞎  Not applicable  🞎 | |
| Shrink/ Swell soils | * Damage to structure * “heaving” of ground beneath structure * Increased landslide susceptibility | [Thumbnail image of United States soil resources inventory.](http://science.nature.nps.gov/im/inventory/soils/index.cfm) | * State geological survey site-specific information * [NPS Soil Resources Inventory](http://science.nature.nps.gov/im/inventory/soils/index.cfm) * [NPS Technical Support](http://www.nature.nps.gov/geology/soils/index.cfm) | | Potential Hazard  🞎  Not applicable  🞎 | |
| Coastal Storm Surge | * Rising Sea Levels * Rising Water – Wind Driven (i.e. hurricane, nor’easter) | [Thumbnail image of presidential distaster declarations related to flooding shown by county from 1965 to 2003 in the United States.](https://msc.fema.gov/webapp/wcs/stores/servlet/FemaWelcomeView?storeId=10001&catalogId=10001&langId=-1) | * [FEMA Map Service Center](https://msc.fema.gov/portal) * [NPS Technical Support](http://www.nature.nps.gov/geology/coastal/index.cfm) | | Potential Hazard  🞎  Not applicable  🞎 | |
| Tsunami | * Coastal area inundation associated with earthquakes or undersea landslides. | [Thumbnail image of North America tsunami warning.](http://ntwc.arh.noaa.gov/) | * State Tsunami Inundation Mapping e.g. [OR Tsunami Clearinghouse](http://www.oregongeology.org/tsuclearinghouse/) * National Tsunami Watch Center * [NPS Technical Support](http://www.nature.nps.gov/geology/coastal/index.cfm) | | Potential Hazard  🞎  Not applicable  🞎 | |
| Riverine Flood | * Flooding (i.e. snowmelt, rainfall, etc.) * Destruction of infrastructure. * Stream channel migration. * Stream bank erosion. | [Thumbnail image of presidential distaster declarations related to flooding shown by county from 1965 to 2003 in the United States.](https://msc.fema.gov/webapp/wcs/stores/servlet/FemaWelcomeView?storeId=10001&catalogId=10001&langId=-1) | * [FEMA Map Service Center](https://msc.fema.gov/portal) * [NPS Technical Support](http://www.nature.nps.gov/water/) | | Potential Hazard  🞎  Not applicable  🞎 | |
| Flash Flood | * Sudden rising water (i.e. dry wash) * Loss of life due to unexpected flooding. | [Thumbnail image of presidential distaster declarations related to flooding shown by county from 1965 to 2003 in the United States.](https://msc.fema.gov/webapp/wcs/stores/servlet/FemaWelcomeView?storeId=10001&catalogId=10001&langId=-1) | * May require a special flood study * NPS Technical Support | | Potential Hazard  🞎  Not applicable  🞎 | |
| Hurricane | * High wind speed. * Flying debris. * Storm Surge. | [Thumbnail image of United States showing hurricane return period. Click on thumbnail to view larger image.](https://www.nps.gov/dscw/upload/NaturalHazardChecklist-Images_AF_120417.pdf#page=8) | * Wind Speed data – from local codes * International Building Code * [FEMA Map Service Center](https://msc.fema.gov/portal) * [NPS Technical Support](http://www.nature.nps.gov/geology/coastal/index.cfm) | | Potential Hazard  🞎  Not applicable  🞎 | |
| Tornado | * Extreme wind speed * Flying debris | [Thumbnail image of United States showing average number of tornadoes per year. Click on thumbnail to view larger image.](https://www.nps.gov/dscw/upload/NaturalHazardChecklist-Images_AF_120417.pdf#page=9) | * International Building Code * Limited Data for Local Application * NPS Technical Support | | Potential Hazard  🞎  Not applicable  🞎 | |
| Wildfire | * Fire and Heat. * Smoke. | [Thumbnail image of United States and Puerto Rico showing wildfires. Click on thumbnail to view larger image.](https://www.nps.gov/dscw/upload/NaturalHazardChecklist-Images_AF_120417.pdf#page=10) | | * International Wildland-Urban Interface Code * Limited Data for Local Application * [NPS Technical Support](http://inside.nps.gov/waso/waso.cfm?prg=777&lv=3) *Note: This link routes to an NPS intranet site which is only accessible within the NPS network.* | Potential Hazard  🞎  Not applicable  🞎 | |
| Volcanic Eruption | * [Lava Flows](http://volcanoes.usgs.gov/hazards/lava/index.php) * Fire * [Volcanic Secondary Hazards](http://share.inside.nps.gov/sites/WASO/PPFL/CPM/CPMD-CC/_layouts/WordViewer.aspx?id=/sites/WASO/PPFL/CPM/CPMD-CC/Shared%20Documents/Doc%20Links/Volcanic%20Flow%20Types.docx&Source=http%3A%2F%2Fshare%2Einside%2Enps%2Egov%2Fsites%2FWASO%2FPPFL%2FCPM%2FCPMD%2DCC%2FSitePages%2FHome%2Easpx%3FPaged%3DTRUE%26p%5FSortBehavior%3D0%26p%5FFileLeafRef%3DNatural%2520Disaster%252ebmp%26p%5FID%3D12%26RootFolder%3D%252Fsites%252FWASO%252FPPFL%252FCPM%252FCPMD%252DCC%252FShared%2520Documents%252FDoc%2520Links%26PageFirstRow%3D16%26%26View%3D%7B7D0656C2%2DE011%2D4820%2D8688%2D0C5CAEF3792C%7D&DefaultItemOpen=1&DefaultItemOpen=1) *Note: This link routes to an NPS intranet site which is only accessible within the NPS network.* * [Toxic gas releases](http://volcanoes.usgs.gov/hazards/gas/index.php) | [Thumbnail image of United States showing volcano hazard based on activity in the last 15,000 years. Click on thumbnail to view larger image.](https://www.nps.gov/dscw/upload/NaturalHazardChecklist-Images_AF_120417.pdf#page=11) | | * [USGS Volcano Hazards Program](http://volcanoes.usgs.gov/) * [NPS Technical Support](http://www.nature.nps.gov/geology/hazards/index.cfm) | Potential Hazard  🞎  Not applicable  🞎 | |
| Hydro-thermal Activity (e.g., geysers | * Toxic gas release. * Explosion. * Boiling water * Steam. * Surface collapse into void. | TBD | | * [Air quality issues and monitoring, including real-time for select locations.](http://nature.nps.gov/air/) * [NPS Technical support](http://www.nature.nps.gov/geology/hazards/index.cfm) | Potential Hazard 🞎  Not applicable  🞎 | |
| Pest Infestation | * Historic/ Facility Fabric Loss * Vegetation Loss * Fauna Impacts * Infection * Injury | TBD | | * Integrated Pest Management * [NPS Technical Support](http://www.nature.nps.gov/biology/ipm/index.cfm) | Potential Hazard  🞎  Not applicable  🞎 |