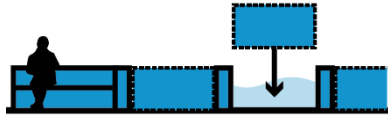


# Sand Bags

## Flood Adaptation Measure

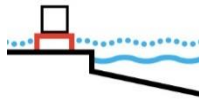


### PHYSICAL INFRASTRUCTURE



Sand bags line on street protected from floodwaters - Bangkok, Thailand  
©Shinji Makoto/Alamy Stock Photo

### SHORELINE LOCATION:



Asset Specific

#### DESIGN LIFE

One-time Use

#### ADAPTABILITY

Low

#### IMPACT ON THE WATERFRONT

Living with Water

#### CONSTRUCTION COST

Low

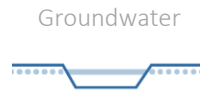
### COASTAL FLOOD HAZARDS MITIGATED:



Sea Level Rise



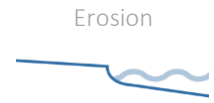
Storm Surge



Groundwater



Waves



Erosion

### MEASURES COMPATIBILITY:

Flood

Seismic

All

All

### ECOSYSTEM SERVICES: Measure may affect these shoreline values

Aquatic Habitat

Terrestrial Habitat

Water Quality

Carbon Storage



### DESCRIPTION:

Sandbags can be used alone and to supplement other flood protection systems. When used alone, are stacked to provide a barrier to floodwater and are most effective with polyethylene sheeting. Properly filled and placed sandbags can act as a barrier to divert water. They do not guarantee a water-tight seal but are satisfactory in many situations.

### CONSIDERATIONS:

- Requires event-specific deployment.
- Does not provide long-term sea level rise protection.

### ADVANTAGES:

- Inexpensive and low-tech (easy to employ).

### DISADVANTAGES:

- Provide limited level of protection, up to 2' of flooding.
- Can be time-consuming and labor intensive to fill, carry, and stack sandbags.

# Sand Bags

## Flood Adaptation Measure



		<ul style="list-style-type: none"> <li>• Not useful as a standalone measure for anything but small volume flows.</li> <li>• Can disrupt overland flow to Bay at certain locations.</li> </ul>
<b>CONSTRUCTION IMPACTS TO THE PUBLIC:</b> <ul style="list-style-type: none"> <li>• Temporary impacts during deployment and clean-up operations</li> </ul>	<b>SEA LEVEL RISE ADAPTATION OPPORTUNITIES:</b> <ul style="list-style-type: none"> <li>• Not adaptable</li> </ul>	<b>CASE STUDIES:</b> <ul style="list-style-type: none"> <li>• Although used around the world to protect against flooding, no particular case studies are selected</li> </ul>
<b>DESIGN OPPORTUNITIES:</b>		
<b>Ecological Enhancements</b> <ul style="list-style-type: none"> <li>• N/A</li> </ul>	<b>Urban Design</b> <ul style="list-style-type: none"> <li>• N/A</li> </ul>	<b>Form</b> <ul style="list-style-type: none"> <li>• N/A</li> </ul>

### DESIGN CONSIDERATIONS:

- Sandbags can be used to fill gaps in a permanent system.
- Untied sandbags are recommended for most situations in order to effectively fill; tied are only recommended for special situations when pre-filling or stockpiling may be required, or for specific purposes (holding objects in place or filling holes).

### SITE-SPECIFIC CONSIDERATIONS:

- Foundation conditions (i.e. to be placed on concrete, pavement or soft soils).

### URBAN DESIGN CONSIDERATIONS:

- Sandbags would impede pedestrian, cycling, and possibly automobile circulation.

### INSTALLATION AND CONSTRUCTABILITY CONSIDERATIONS:

- Need to be filled and installed prior to a flood event - if placed too late may not be effective.

### ARCHITECTURAL CONSIDERATIONS:

- No impact, due to intermittent deployment.

### HISTORICAL RESOURCE CONSIDERATIONS:

- No impact, due to intermittent deployment.

### OPERATION AND MAINTENANCE CONSIDERATIONS:

- Not a permanent measure so operationally intensive at time of deployment, but no continual maintenance.
- Will require clean up following flood event.