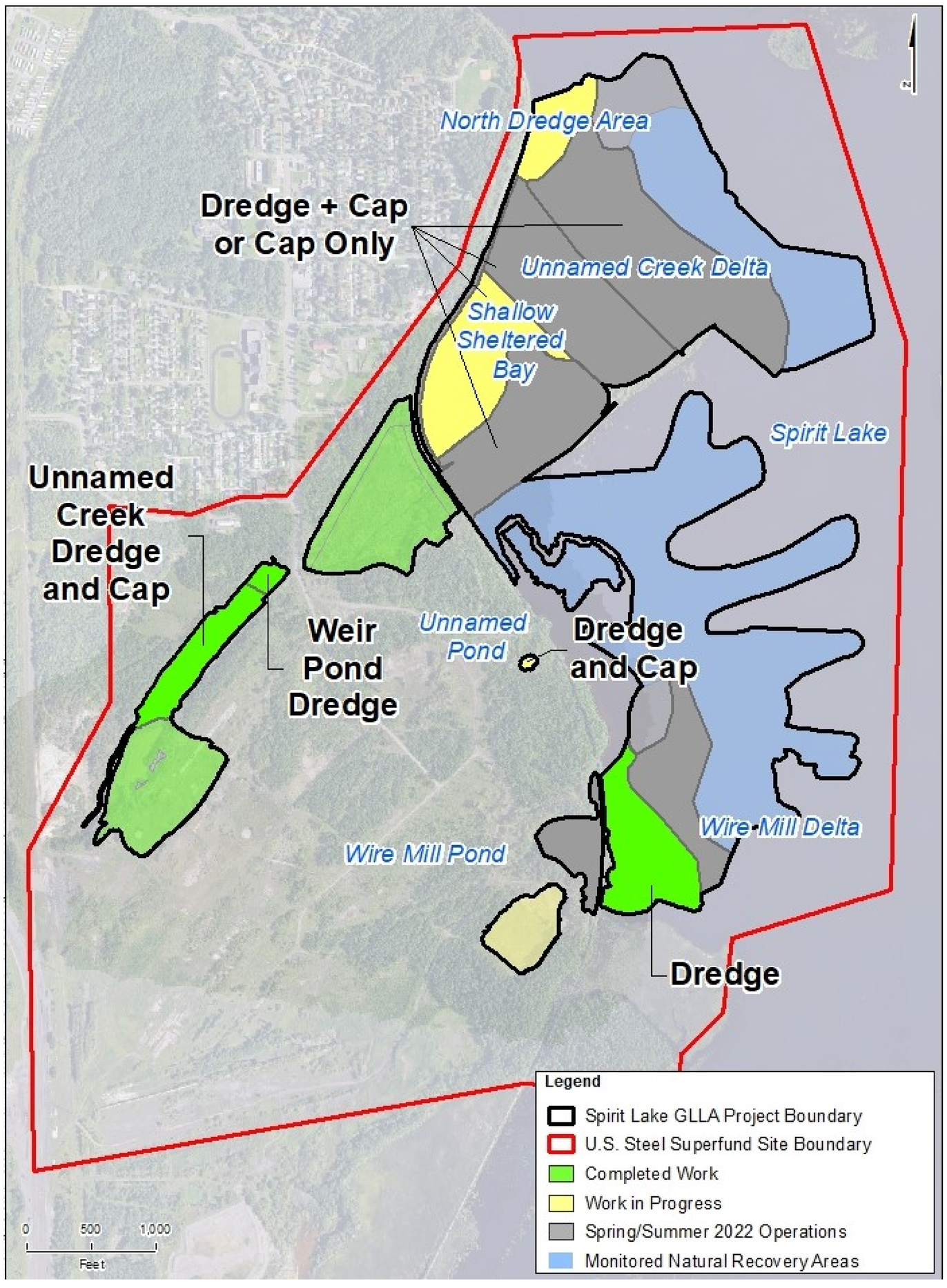
Spirit Lake Great Lakes Legacy Act Project

Environmental Dredging



Dredging Areas

- The project uses a combination of mechanical and hydraulic dredging to remove impacted sediment.
- Mechanical methods have been used in upland/upstream areas.
- Hydraulic methods are used in Spirit Lake.

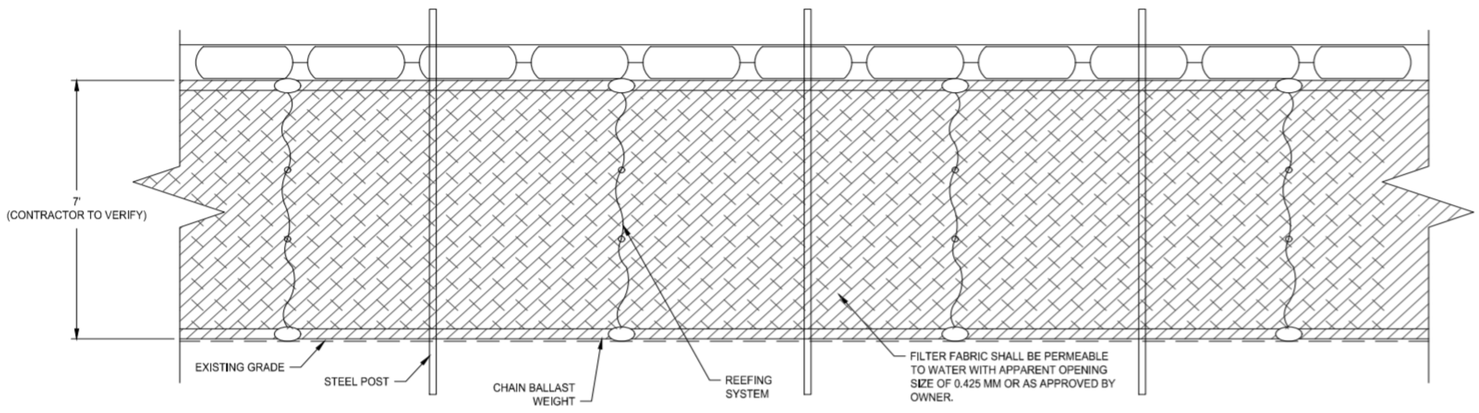
Dredging is conducted with a mechanical dredge in the Shallow Sheltered Bay.

Dredging is conducted with a hydraulic cutterhead dredge in the Wire Mill Delta.

Environmental Controls and Monitoring

Conceptual example of a typical silt curtain.

Turbidity curtains deployed during hydraulic dredging in Wire Mill Delta.

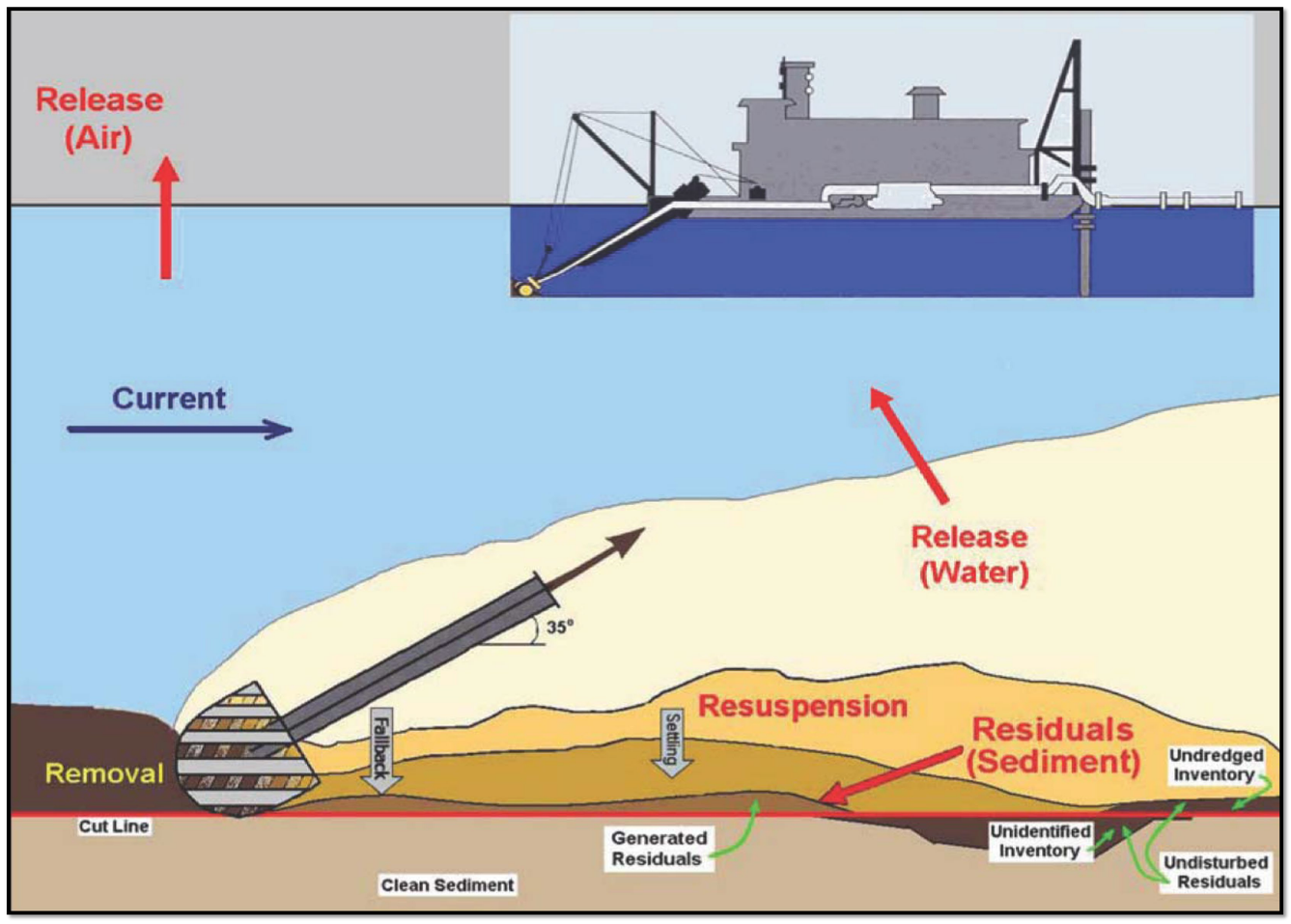


Conceptual example of a silt curtain drawing.

Water quality monitoring is conducted at specific locations outside of the curtains.

Environmental Dredging

Hydraulic Dredging



Environmental hydraulic dredging process with key considerations.

How hydraulic dredging works:

- Hydraulic dredging utilizes suction to remove sediments and pressurized pipes to transfer material
- Removal is performed with a vessel-mounted suction pipe.
  - When sediments are dense or cohesive, a rotating cutterhead is attached to the end of the suction pipe to loosen the sediment.
  - As material is cut from the sediment surface it mixes with water and pulled into the dredge pipe.
  - Booster pumps on barges or at pump stations help maintain pressure in the pipe so the slurry is carried to the placement site.
  - Requires mobilization and maintenance of temporary infrastructure including installation of floating or submerged dredge pipe.
- Hydraulic dredging produces a greater volume of material placed due to the addition of water but can accelerate workflow by reducing the need for material transfers and rehandling.

What does hydraulic dredging look like?

Hydraulic dredge at Spirit Lake.

Cutterhead attached to dredge pipe.