

# Indiana Department of Natural Resources

## Division of Reclamation, Abandoned Mine Lands Section

# Site 2083, Sugar Ridge Fish & Wildlife Area 2

### Significant Safety Problems

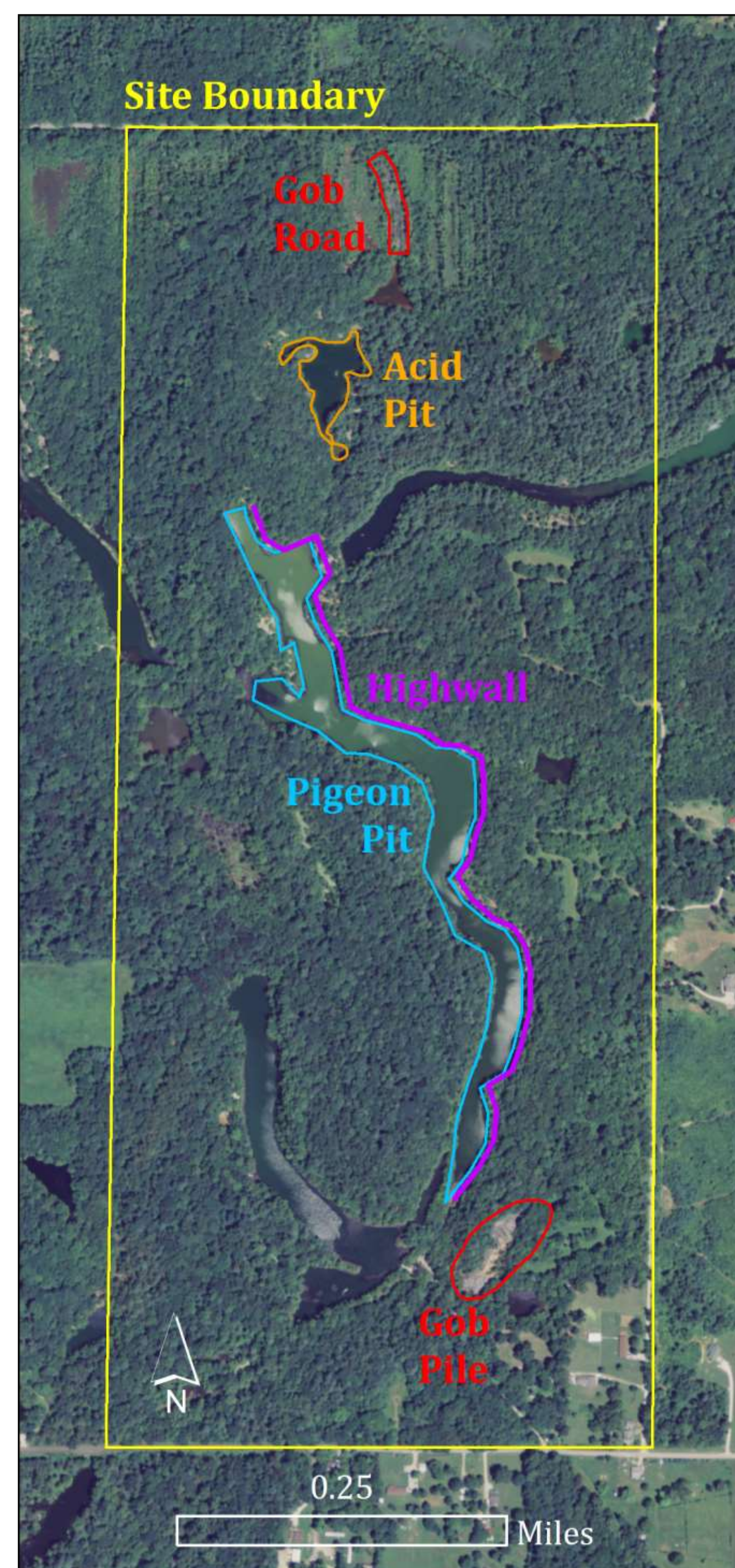
A dangerous highwall 3,500 feet in length was located along the eastern edge of Pigeon Pit in Sugar Ridge Fish & Wildlife Area 2. The highwall was 25-35 feet tall with a slope of more than 50 degrees along most of its length. There was evidence of frequent visitation on top of the highwall, including trails and campsites.



*The highwall along Pigeon Pit was steep and unstable.*

A pile of coarse refuse was located at the south end of the highwall. Some of the gob was exposed near a channel that drained into the pit, causing iron staining after heavy rains dissolved acid salts originating from the refuse. At the north end of the project site, there were 500 feet of gob road through a wetland and an acid pit.

Adjacent private lands were underground mined, and the flow of water between surface mine pits through the underground workings contributed to severe mine subsidence problems.



*The eroding gob pile (below) is on the south end of the project area (above).*



### Effective Geomorphic Design

The highwall was backfilled to eliminate the safety hazard. Geomorphic landform grading techniques were used to tie the backfill material into the natural landscape behind the highwall, which had been covered in overburden that was restricting drainage. The gob pile was buried in the bottom of the pit to isolate the acid-forming material from exposure to oxygen. The area where the coarse refuse was removed and the existing drainage channel were regraded using geomorphic ridges and valleys.

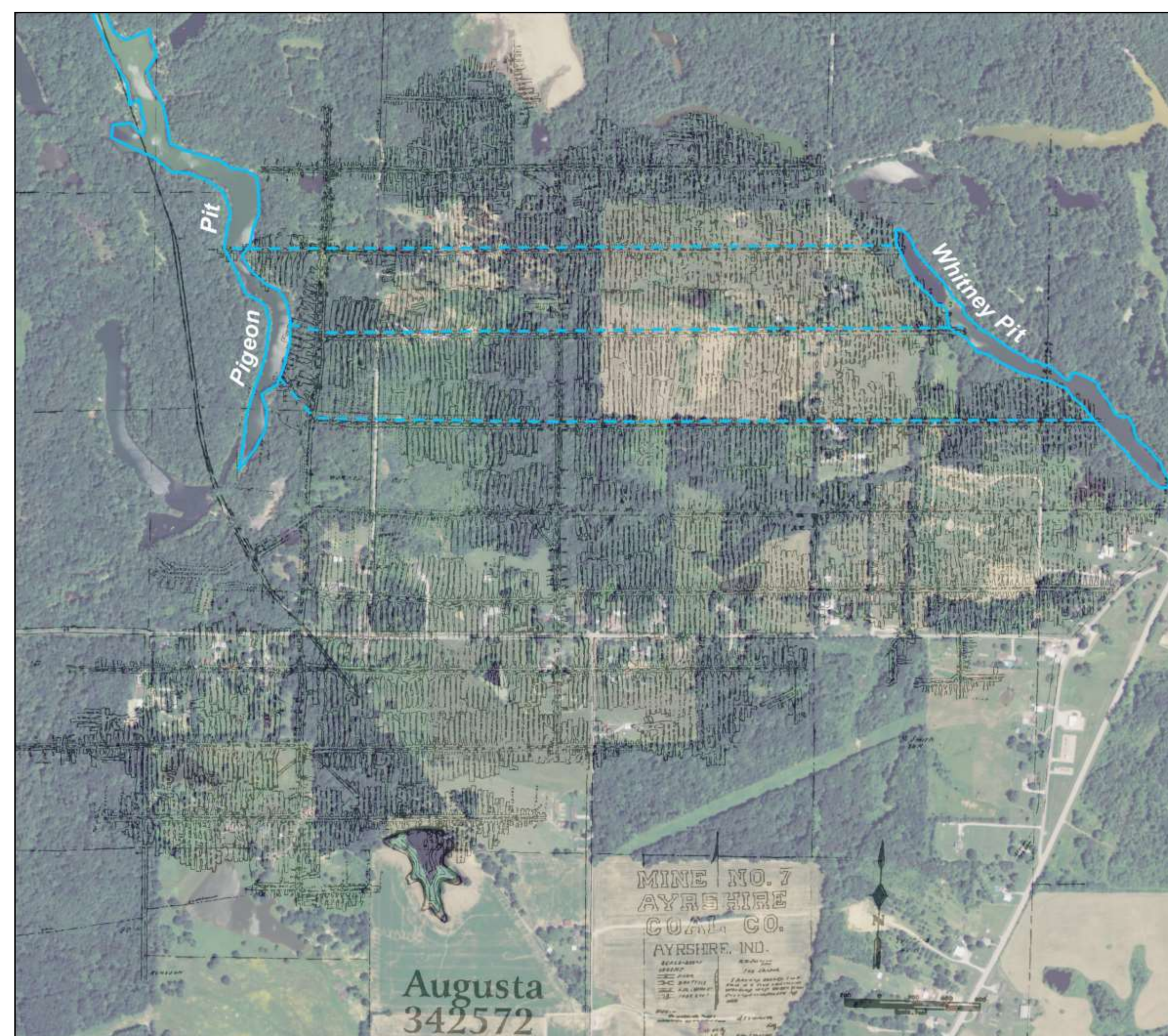
The gob road was removed to 4 feet below the water level and replaced with a riprap access road. The design involved burying the coarse refuse in the acid pit, eliminating the acid pit, and using geomorphic landform grading techniques for the area including a sinusoidal drainage channel. Native wetland species were planted along the edges of water bodies for wetland enhancement.

### On-Site Difficulty

The disposal of the coarse refuse material at the bottom of Pigeon Pit presented quite a challenge. Due to the adjacent underground mine, Pigeon Pit was connected to another water body named Whitney Pit. Three mains acted like culverts and pulled water from Whitney Pit, causing blowouts into the gob disposal area at the bottom of Pigeon Pit.



*Dewatering efforts caused blowouts due to the volume of the mine pool.*



*This georeferenced mine map shows how the underground workings formed direct conduits between Pigeon Pit and Whitney Pit.*

An outlet was quickly placed at Whitney Pit to prevent a storm water surge from overtaking the temporary dams in Pigeon Pit. Failure of these dams would have resulted in a sudden drop in Whitney Pit and endangered boaters. Project Management worked with the contractor to install a series of temporary dams and plugs to stabilize the blowouts. Finally, cells could be created for the placement of the coarse refuse material.

Subsidence problems in the area between Whitney Pit and Pigeon Pit could be at least partially attributed to the constant flow of water from Whitney Pit through the underground works to its outlet at Pigeon Pit. Now, the outlets of the two pits have been matched in order to stagnate the mine pool both for the stability of the highwall and in an effort to prevent future subsidence.

### Benefits to the Community

While this project primarily took place on a state Fish & Wildlife Area, part of the gob pile and most of the acid pit were on private land. The landowner plans to graze cattle on an area formerly covered by coal refuse, and the acid pit has been replaced with upland game habitat planted in warm season grasses and forbs.

The project enhances recreational opportunities for local citizens and visitors to the region. Some great fishing is now more accessible due to improved access trails



*This privately-owned part of the site will be used as pasture land in the future.*

and a lakeside bench that can be mowed. The project increased meadow openings and forest edge, which are in limited supply at Sugar Ridge, as is upland game habitat. Major sources of acid mine drainage have been eliminated, improving water quality in Pigeon Pit and reducing impacts to neighboring wetlands.



*A young woman fishes from the new lakeside bench.*