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Dr. Charles Perino
Bureau of Design and Environment
Illinois Department of Transportation
2300 S. Dirksen Parkway
Springfield, Illinois 62764

Dear Charles:

This letter is an update on our hydrogeologic studies to date at the North Chicago potential wetland banking site in Lake County. Observations and some preliminary recommendations are included. In June of 1998, we began to examine the hydrogeology and geochemistry of the site. Surface-water levels have been measured since June 1998. Ground-water levels in two reference wetlands have been measured since June 1998, and ground-water levels in the northern half of the site have been measured since April 1999. Geochemical samples of surface water were collected quarterly from November 1998 through November 1999.

Ground-water geology and levels

In a series of 6 borings (see attached figure) made in two transects across the northern half of the site, sediments were dominantly composed of clay-rich glacial till identified as Wadsworth Till. This till is fine grained and will transmit little ground water, although fractures and some lenses of saturated sand and gravel were noted at depth. These site observations correspond to file information. No wells have been installed in the southern half of the site due to the inaccessibility of the area to drilling rigs, but geologic mapping of the area indicates that similar conditions are found there.

Water levels measured in nested monitoring wells show that the direction of ground-water flow is downward through the till, strongly suggesting that no deep ground-water source is available for use in wetland compensation activities.

Shallow ground-water levels were also monitored in two wetlands chosen as references for the site. One wetland is an isolated depression, and the other is located along or on line with a main drainageway through the north half of the site (attached figure). In the isolated wetland, water levels were high from December 1998 through June 1999, then fell rapidly. Levels were sufficient to satisfy wetland hydrology criteria for several weeks at the upland edge to several months near the center of the wetland. In the on-line wetland, water levels did not peak or decline as dramatically, but behaved similarly and satisfied wetland hydrology criteria for a similar period. In the center of the drainageway, water levels never fell below 30 cm in depth,

indicating that water flow through the soil zone (interflow) may be important in sustaining wetlands on site.

Surface-water levels

Surface-water levels were measured using RDS dataloggers at many inlets, outlets, and other key locations. Surface-water levels were found to rise throughout wet seasons and spike during rainfall events. Long-term flows occurred in Fall through late Spring, with increases or flashy flows during precipitation events throughout the year.

Eleven inlets and 3 main outlets were found (attached figure). Only the primary outlet (O-2) flowed throughout the year. However, a significant volume of water exits the site through the three outlets, so that excess water is available for wetland compensation activities.

No drainage tile or major ditches have been found in the site, although drainageways have been altered by off-road vehicle traffic and by placement of large berms as roadbeds and at some of the site boundaries. Former outlets along the eastern boundary have been filled by development along U.S. 41, causing ponding, marsh development, and diversion of flow to other existing outlets. At least one outlet (I-3) is eroding rapidly through the berm that was placed on the east side of the site. This erosion is expected to drain at least some of the wetlands that have formed, so that stabilizing the outlet is of concern.

Surface-water chemistry

Samples were collected quarterly from November 1998 through November 1999 at selected inlets, outlets, and other key locations. In addition, other samples were collected earlier. Although several trends are seen, only a few items are relevant to wetland compensation activities. The most important finding is increased chloride in several inputs, most notably from Illinois 137 (I-1), but levels are also elevated at inputs from Abbott Laboratories (I-10) and from several large parking lots (I-8, I-9) on the west that also likely contain runoff from Waukegan Road (IL 43). Other inputs also show some elevated chloride levels, but less than those already listed.

Adjacent to these inputs, cattails and other invasive plants are colonizing into more pristine wetland, including higher-quality sedge meadows. It is possible that chloride or silt in the runoff is assisting the spread of the invasive plants, and that wetland compensation activities might include measures to reduce impacts to the site from these inputs. At one point, blue-colored water from a detention pond near I-8 was noted flowing into the site, but no responsible compounds were detected. This illustrates the potential for damage to the site by adjacent landowners. When chloride levels are elevated at the inputs, corresponding high-chloride levels are seen at the appropriate outlet location, indicating that the high-chloride waters flow completely through the site.

Preliminary recommendations

Because no drained wetlands have been located, wetland restoration is not a feasible option except small areas where fill has been placed into wetlands. However, in the northern half of

the site, large nonwetland areas are present that may be suitable for wetland creation as shown on the attached figure. Wetlands can be modeled after either isolated wetlands or wetlands that are along drainageways; both types are found on site. Isolated wetlands would require shallow excavation of a basin in a part of the landscape that would supply some runoff and soil-zone interflow from adjacent upland areas. Created wetlands along drainageways would be excavated to an elevation similar to the drainageway, and would utilize water sources listed above as well as surface-water flow down the drainageway. Potential wetland compensation areas shown on the attached figure may also include higher-quality upland areas, so that screening prior to any construction planning is needed. Not all areas suitable for wetlands located in-line with drainageways are shown on the accompanying figure.

Wetland creation could also be targeted at reducing the impacts caused by inputs containing silt or salt. Wetlands could be built near the inputs on the north and west sides of the site to enhance settling and reduce silt and other undesirable constituents. Highly saline inputs could be rerouted into treatment wetlands or to avoid higher-quality wetlands if other water sources are available.

The hydrogeology of the interior of the southern half of the site has not been studied due to extensive undrained wetland complexes and a lack of access for heavy equipment. Management of the area and possible treatment of inflowing runoff is the only recommendation at this point.

This letter does not address the potential for credit to be generated by wetland management and enhancement, but these seem promising (i.e. buckthorn management, fencing to prevent vehicle access). In addition, treating incoming waters, removing fill and realigning altered drainageways, stabilizing eroding outlets, and other similar strategies would seem to be likely candidates to increase the amount of credit generated by the site. We can provide more information on these as needed.

Please let me know if the level of detail in our present study is adequate for your projected needs at the site. If not, we can begin more intensive work in portions of the site, such as measuring water levels in areas targeted for wetland creation. However, buckthorn growth is making much of the site impassable, so that detailed work such as surveying and well installation is becoming more difficult. If I can provide any additional information, please call me at the number listed below.

Sincerely,

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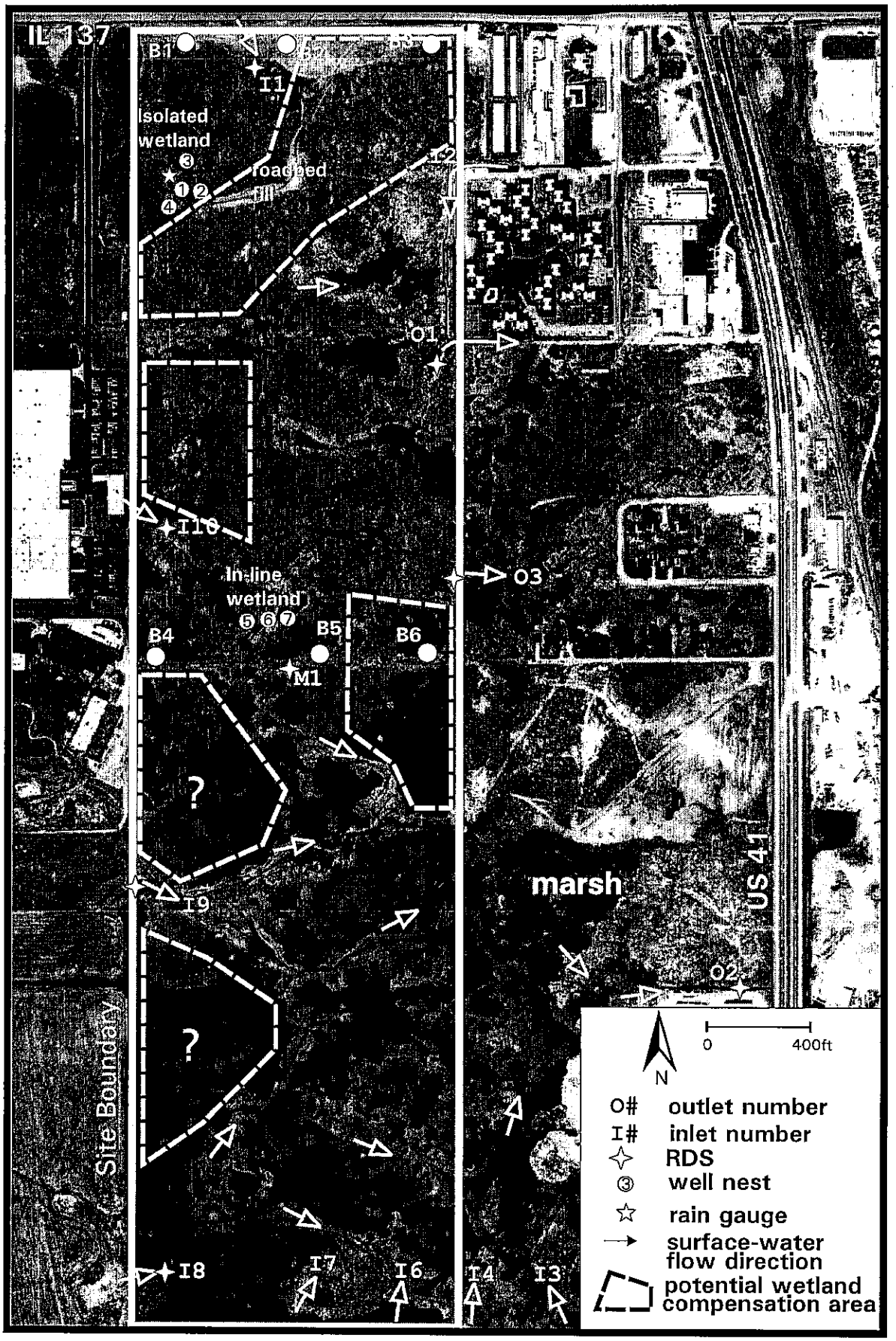
IL 137
B1
B2
B3
I1
Isolated wetland
③
①②
④
roadbed fill
O1
I10
In-line wetland
⑤⑥⑦
B4
B5
B6
M1
O3
?
?
I9
marsh
US 41
O2
Site Boundary
I8
I7
I6
I4
I3
0
400ft
N
O# outlet number
I# inlet number
RDS
③ well nest
☆ rain gauge
surface-water flow direction
potential wetland compensation area