Date: December 12th, 2006

To: President Pierotti and Board of Commissioners

From: Ross Hill, Project Engineer
John Oldenburg, Director, Office of Nat. Resources

Re: Special Restoration Projects Adjacent to the West Branch Preserve Wetland Bank Mitigation Project

On October 16th, 2001, the District Board of Commissioner passed and adopted **Ordinance # 01-486**, "An Ordinance Authorizing the Execution of an Intergovernmental Agreement between the Forest Preserve District of DuPage County and the County of DuPage Providing for the Creation of Wetland Mitigation Banks on Forest Preserve District Property" and executed this IGA dated November 13th, 2001. Over the past year, a team comprised of DuPage County staff, District staff, and Christopher B. Burke Engineering, Ltd. (CBBEL) consultants have worked through concepts and design plans to create a Wetland Bank Project at the West Branch Forest Preserve. DuPage County, as Wetland Bank Administrator, is obligated to create 91 acres of wetlands at a cost not to exceed $4,550,000 ($50K/acre) covering through construction and inclusive of 10-years of maintenance and monitoring. The Wetland Bank Project design plan is nearing final completion and is being prepared for regulatory review and permitting in anticipation of starting in the 2008 construction season.

The District, Office of Natural Resources proposed to the team two additional Special Restoration Projects directly adjacent to and/or integrated with the Wetland Bank Mitigation Project. Although these Special Projects are viewed outside the scope of necessity to achieve the creation of wetland acres, they are viewed positively as a more holistic ecosystem restoration approach that offers expanded community restoration values, enhancements to the Wetland Bank Project, and improves functional stability of the river valley ecosystems. These two Special Projects are: 1) River Improvements at West Branch Forest Preserve and 2) Klein Road Fen Restoration. Due to the potential integration related to all three Projects, staff anticipates overall improved cost effectiveness and logical efficiencies in design, engineering, permitting and phased construction. District staff requested of the team a 30-day delay in plan development in order to seek a secured funding commitment through the District Commission for the Special Projects.

Staff seeks a $2,425,000 funding commitment secured by bond proceeds in order to include these two proposed Special Restoration Projects to be integrated into the Wetland Bank Project at the West Branch Preserve. A brief summary depicting the restoration goals, primary construction elements, and benefits of each project follows for your review. Preliminary cost estimates are also included detailing the elements of each Special Project. These estimates are developed from conceptual designs independently of each other and independent of the Wetland Bank Project. As such, these estimates are considered highly conservative on the high end. Staff will present a review of each project and provide further rationale and detail for your consideration of support of the proposal.

Summary: River Improvements at West Branch Forest Preserve

Project Goals:
This project seeks as a goal to restore and enhance the physical stream bed and bank habitats, develop a new dynamic stability of these habitats under current geomorphological processes, and achieve improved biological function regarding the survival and reproduction of the species diversity and abundance of aquatic life. There is approximately a 1-mile reach of the West Branch of the DuPage River flowing through the southern end of the West Branch Forest Preserve. This reach is currently incised approximately 5-feet into the floodplain and is generally a straightened ditched. Banks are subjected to excessive erosion due to sheer stress during high magnitude flow events that are currently contained within the banks of the channel. Invasive species such as European buckthorn and reed canary grass comprise the bank and floodplain vegetation.

Project Elements:
1. A series of riffle - grade control structures which will be constructed at the southern end of the stream reach to provide a transition of increasing the bed elevation heading upstream.
2. Unsorted, glacial outwash aggregates (sands/gravel/cobble) will be mined on-site or trucked from Blackwell Deep Pool Project, whichever is deemed most cost effective.
3. An aggregate armor layer will be placed into the river bed to raise the channel ~ 2.75 feet over 4,900 feet of river bed until attenuating back to the existing channel elevation.
4. The armor layer will be laid in the 'dry' facilitated by by-pass pumping active work sections of this reach of river. The armor layer will be laid as a consistent lift in order to replicate the existing river bed profile. Special attention will be given to reconstruct the deposition banks, cut banks, and thalweg positions in order to match existing features.
5. Buried rock sills and grade control structures will be placed at strategic intervals, dictated by existing river profile indicators, and will extend into both sides of the adjacent floodplains to prevent head cutting of the stream and thus preventing migration (side to side) of the river and changing its' course.
6. Removal of invasive species and planting of native vegetation along the bank and in-stream locations will complete the stabilization and aquatic habitat improvements.

Benefits:
1. Raising the channel bed will reconnect the river (new normal water elevation) to the floodplain supporting the hydration of the floodplain Wetland Bank Project.
2. Banks will achieve greater stability due to a marked reduction in reduced sheer stress and maximum erosive forces currently found in the incised stream channel.
3. The new normal water elevation will be re-connected to the rooting zone of the bank thus bringing existing structure such as tree roots back into function as fish habitats.
4. Planting and seeding of the bank and emergent zones of the stream bed will improve bank stability and markedly improve in-stream habitats.
5. Re-established riffle – pool sequences will create a diversity of hydraulic flows (faster/slower) within the stream reach and result in applicable bed load sorting (silt/sand/gravels/cobbles) all yielding an improved diversity of habitat for fish, mussels, and other aquatic invertebrates.
6. Approximately $275K expenditures planned for the Wetland Bank can offset costs.

Preliminary Cost Estimate for
River Improvements at West Branch Forest Preserve

This rough cost estimate has been prepared based on the review comments and recommendations provided to Ross Hill by the Office of Natural Resources on November 17, 2006, relative to the preliminary construction plans for the West Branch Wetland Mitigation Bank prepared by CBBEL.

Significant Assumptions

1. A geomorphologist with expertise in stream dynamics will need to be retained before this project progresses to the design phase, to confirm that the general plan outlined by NR is technically sound, and will not result in any offsite negative impacts, such as deposition of waterborne material downstream at Old Wayne Golf Course.

2. During the placement of outwash aggregates in the river, the river's base flow will need to be bypassed around the work zone via temporary pumping. This assumption is made because: 1) it is unlikely that the regulatory agencies would allow active fill placement over a distance of 5,000 LF within the full cross-section of a flowing river, and 2) because dry working conditions are necessary to properly embed and position the outwash aggregates into the river bed and banks in the desired manner for the proposed thalweg, point bars, pools, riffles, etc. Assume bypass pumping will be done in two reaches of 2,500 LF each, and costs will be similar to the 2006 Tronox costs for Reach 3A of the Kress Creek thorium removal project.

3. Suitable outwash aggregates can either be mined onsite, or possibly trucked from Blackwell Deep Pool, if that option is more cost-effective. Based on TSC soil borings at West Branch FP, it is assumed that at least three or four feet of overburden (topsoil and clay) will need to be removed at the borrow site, and the saturated sands & gravels will need to be temporarily dewatered by pumping during extraction. It is also assumed that the excavated outwash materials can be used directly in a "bank run" condition, without the need for significant washing, screening, or sorting.

4. The borrow site for aggregate outwash will be re-graded to become wetlands after mining is complete (i.e., not a deep pool). This will require that the borrow site be relatively large in surface area, with relatively a shallow excavation depth. We will assume that the surface area of the borrow site will be approximately the same size as the river channel to be filled (40'-wide X 5,000'-long ~ 43,560 = 4.6 acres).

5. The volume of required outwash material will be based on an assumed 40'-wide channel X 5,000 feet long X an average fill depth of 2.75 feet ~ 27 = 20,000 CY.

6. Buried grade-control structures will be required at periodic intervals along the river to prevent headcutting and remeandering. Assume we'll need to install ten such grade controls, at intervals of roughly 500 LF, using a riprap-filled buried trench, 5'-deep X 5'-wide X 300'-long ~ 27 = 280 CY each.

7. Seeding costs at the borrow site are assumed to be zero, as site will be within limits of wetland bank.

Cost Estimate for River Improvements at West Branch Wetland Bank

No.	Description of Item	Estimated Quantity	Unit Price	Total
1.	Install double row silt fence around 5 acre borrow site and temporary stockpiles	3,500 LF	$3.00	$10,000
2.	Strip and stockpile an average of 3.5 feet of overburden (topsoil & clay) at 4.5 acre borrow site	25,000 CY	$3.00	$75,000
3.	Excavate aggregate outwash materials	20,000 CY	$4.00	$80,000
4.	Temporary dewatering of borrow site	21 days	$1,000	$21,000
5.	Overburden re-spread at borrow site	25,000 CY	$3.00	$75,000
6.	Place aggregate outwash materials in river	20,000 CY	$6.00	$120,000
7.	Temporary diversion dams (assume sheet piling, @ 1,500 SF each)	2 each	$20,000	$40,000
8.	Bypass pump mobilization, set-up and demobilization	Lump Sum	$100,000	$100,000
9.	Temporary Bypass Piping (24" HDPE)	2,500 LF	$60.00	$150,000
10.	Temporary river bypass pumping	21 days	$5,000.00	$105,000
11.	Excavation of 10 grade control structures, at 280 CY each	2,800 CY	$6.00	$17,000
12.	Placement of A4 riprap at grade control structures	2,800 CY	$50.00	$140,000
13.	Misc. in-stream structures, such as root wads, bank barbs, black willow stakes etc.	50	$1,000	$50,000
14.	Subtotal			$983,000.00
15.	Contingencies (15%)			$147,000
16.	Total Construction Cost			$1,130,000
17.	Design & Construction Engineering (15%)			$170,000
18.	Total Project Cost			$1,300,000

Note: The total cost for obtaining aggregate outwash materials from onsite deposits (Items 1-5 above) is $261,000 X 1.15 X 1.15 = $345,000 or $17.25 per CY. When this project goes out for bid, we may want to consider the alternative of hauling 20,000 CY of aggregate outwash from Blackwell Deep Pool, to see if this can be done for less than $17.25 per CY.

Summary: Klein Road Fen Restoration

Project Goals:
This project seeks as a goal to restore functional hydrology and restore native composition and structure of the vegetation of the largest known hanging fen and calcareous seep community in the District. This unique 30-acre wetland community is comprised of peat soils that developed historically along the valley slopes of West Branch River and floodplain. The community requires perched and artesian ground water seeps to hydrate these sloped organic soils. The hydration is driven by upland hydraulic head pressure from the sub-surface geology. Subsurface aggregates containing calcium carbonates provide calcium and magnesium rich seepages that support a unique plant community and resultant habitat. An extensive tile system currently drains and by-passes the fen community by directly discharging to the river. This system truncates the historical water re-charge system. The drier organic soils become mineralized due to oxidation and are colonized by invasive species such a buckthorn. The buckthorn shades the native ground cover reducing infiltration, accelerating surface discharge down slope causing erosion, and contributes to evapotranspriation of available water to the atmosphere.

Project Elements:
1. Intercept existing tile network in strategic upland tile nodes.
2. Construct 6-8 drywell installation systems to recharge and sustain a hydraulic head in the upland sub-surface gravels.
3. Construct water control structures to manage sediment, debris, and storm flows exceeding infiltration rates.
4. Remove invasive woody and ground flora material by cutting and herbiciding.
5. Restore native fen and seep vegetative community by seeding within the organic soils hydrated and recharged from the subsurface upland hydraulics.

Benefits:
1. Restore the largest hanging fen and seep community known to exist in the District and re-establish habitat conditions for specialized plants and insects.
2. Restoring fen habitats increases surface water infiltration, increases aquifer penetration, and increases the quality, quantity, and temperature of groundwater to the flow of water in the West Branch River.
3. Restored upland hydrology of the subsurface gravel column will greatly enhance the hydration stability and hydraulic function to the Wetland Bank Project (WBP) down slope.
4. The construction of the upland tile intercepts and the drywell infiltration systems will negate the necessity for currently planned infrastructure of the Wetland Bank Project design along the floodplain and can be credited to District to offset portions of the Klein Road Fen Restoration costs.
5. Any created wetland acres resulting from the Klein Road Fen Restoration project can be sold for current or future bank credits up to $ 175,000 per acre, less maintenance and monitoring costs. If the restoration performs as conceptually designed, there is a potential for complete cost recovery of this restoration project.

Preliminary Cost Estimate for Klein Road Fen Restoration

This cost estimate has been prepared as an alternative method to artificially recharge the sand & gravel layer beneath the Klein Road Fen, at West Branch Forest Preserve, with surface runoff that is now conveyed down slope via subsurface tiles and major erosion gullies.

Significant Assumptions

1. Soil borings from TSC that are closest to Klein Road (B-9, B-14, B-19, B-23, B-27, B-31, B-34, and B-38) indicate that the top of the sand & gravel layer that lies beneath the fen begins generally 8 to 13 feet below grade. Our desire is to allow as much surface water as possible to infiltrate into this aggregate layer. To do this, we need to excavate below the intermediate layer of clay that lies between the ground surface and this aggregate layer.

2. The general concept is to excavate a large trench at the top of the slope, at each point where the water is currently conveyed downslope via tile flow or erosion gulley. The trench will be backfilled with large-size riprap (IDOT gradation 4) from the ground surface to the aggregate layer below, so as to encourage infiltration rates and minimize the chance for future plugging with fines. The excavated clay from the hole will be used to create a holding basin around the drywell, to temporarily store runoff during flood events and create head pressure to encourage more rapid infiltration. Upstream of each drywell, we should also excavate a small forebay depression, for the purpose of collecting debris and sediment, which can be periodically removed with a backhoe as necessary. There will undoubtedly be instances in which the rate of surface inflow will exceed the infiltration capacity of the drywell, so each drywell should also be fitted with watertight, gasketed PVC overflow pipe, to convey excess flows down the slope in a non-erosive manner. These overflow pipes will likely be installed in the same trench as the existing drain tiles that are to be removed.

3. Each drywell will need to be individually designed, based on the size of the upstream drainage area to the west and the local topography at each site. Preliminarily, it appears that we may need 6 to 8 drywells. For preliminary cost estimating purposes, we will assume a typical drywell has the following characteristics:

   Volume of drywell: 15'-deep X 10'-wide X 50'-long ~ 27 = 280 CY
   Length of overflow pipe: 600 LF of 12"-dia.

4. The cost estimate for each typical drywell installation is shown below.

No.	Description of Item	Estimated Quantity	Unit Price	Total
1.	Silt fence around drywell, forebay, and overflow pipe	1,500 LF	$3.00	$4,500
2.	Drywell excavation and earthwork to create holding basin & sediment forebay	500 CY	$10.00	$5,000
3.	Placement of gradation 4 riprap in drywell	280 CY	$50.00	$14,000
4.	Water control structure at sediment forebay	1 LS	$1,500.00	$1,500
5.	12" PVC overflow pipe	600 LF	$40.00	$24,000
6.	Site restoration	2.0 AC	$5,000.00	$10,000
7.	Total			$59,000

Total Cost Estimate for Klein Road Fen Restoration

No.	Description of Item	Estimated Quantity	Unit Price	Total
1.	Install infiltration drywells	8	$59,000.00	$472,000
2.	Undesirable tree and brush removal, w herbicide application on cut stumps	30 AC	$4,000.00	$120,000
3.	Backfill eroded gullies with earth	1,500 CY	$25.00	$38,000
4.	Secondary herbicide treatment on tree & brush re-sprouts and invasive plants	30 AC	$500.00	$15,000
5.	Selective seeding	10 AC	$6,000.00	$60,000
6.	Erosion control blanket	48,400 SY	$3.00	$145,000
7.	Subtotal			$850,000
8.	Contingencies (15%)			$128,000
9.	Total Construction Cost			$978,000
10.	Design & Construction Engineering (15%)			$147,000
11.	Total Project Cost			$1,125,000