



**Office of Performance and Analysis**

Dakota County Administration Center ♦ 1590 Hwy. 55, Hastings, MN 55033-2372

Phone: (651) 438-4529 ♦ Fax: (651) 438-4405 ♦ [www.co.dakota.mn.us](http://www.co.dakota.mn.us)

## Memorandum

**Date:** September 6, 2022

**To:** Tom Lewanski, Natural Resource Manager

**cc:** Dave Paulsen, OPA Manager

**From:** Penny Anderson and Josh Hill, OPA Management Analysts

## Greenhouse Cost Study

### Background

The agriculturally rich soils and easy commuting to St. Paul and Minneapolis attracted agriculture and suburban development to Dakota County, which has caused the loss of over ninety percent of the County's original wetlands, prairies, savannas, and upland forests. The remaining natural areas are largely degraded and fragmented, meaning they do not function as healthy natural systems.

In 2017, the Dakota County Natural Resource Management System Plan (NRMSP) was adopted by the Board of Commissioners. The NRMSP provides a five-year roadmap to increasing the structural and biological diversity of our parks, greenway system, and conservation easements leading to increased plant and animal diversity, and ultimately a more complex and resilient park and greenway system. Native trees, shrubs, and forbs<sup>1</sup> must be used to provide the biological diversity necessary to fulfill the goals of the NRMSP.

### Dakota County Parks System

Dakota County parks cover 5,321 acres. 2,079 acres have undergone restoration and are being maintained, 2,320 acres are yet to be stabilized, restored, or maintained, and 922 acres are under other

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<sup>1</sup> Forbs are flowering plants, other than grass.

management. Additional acres are being added to the park system on an annual basis. In addition to greenway segments coming into the system, there are associated trailheads and rain gardens that have natural resource components. According to the Dakota County Parks System Master Plan, there are 153.5 miles of greenways left to acquire and complete.

The majority of acres being restored currently are prairie/savanna. In addition to the restoration work, Parks also needs to re-burn and re-seed each restored area every 5-7 years. This is needed to increase the stability and diversity of the plant community. Thus, there is, and will continue to be, a recurring need to re-seed around 15% of all acres each year.

## **Business Opportunity Investigated**

This study is a cost-benefit analysis of a potential Dakota County-owned and operated greenhouse.

### *Current approach*

The Dakota County Parks department currently has a multi-pronged approach to acquire plugs and seed.

1. Purchase plants and seed from the marketplace
2. Grow plants in an 800 sq ft hoop house
3. In partnership with the Master Gardeners, lease a 1,500 sq ft hoop house at UMore Park to grow plants
4. Contract out plant production

### **Limitations of current approaches**

#### *Marketplace*

There are supply issues that affect Parks' ability to procure plants and seed that are indigenous to Dakota County. Many species may only be available on rare occasions, and/or may be cost-prohibitive in purchasing at the scale required to fulfill the goals of the NRMSP. Additionally, Parks estimates that 10-25% of plugs ordered never materialize due to crop failure. This impacts Parks' ability to implement the activities relating to native plants in the NRMSP. Challenges related to marketplace availability and affordability also reduce the diversity of plants installed, and therefore decrease success in providing an ecologically-resilient and low-maintenance park and greenway system.

#### *Hoop House*

The current 20 x 40 (800 sq ft) hoop house is a temporary, seasonal structure with components (e.g. cladding) requiring replacement cycle of 3-4 years. Production capacity is limited and the program has quickly outgrown the available space. The hoop house can generate an estimated \$60,000 worth of plugs annually.

#### *UMore Greenhouse Lease*

In 2022, Dakota County established a partnership with the Master Gardeners program to lease a 1,500 sq ft hoop house at UMore Park to grow plants. The current agreement runs through December 31, 2023. The UMore 30 x 50 (1500 sq ft) hoop house lease is a beneficial partnership; however, it does not provide the long-term stability, the County control, or sufficient space needed to fully realize the NRMSP goals. The UMore facility can generate \$90,000 --\$115,000 in plugs annually.

### *Contract out plant production*

In the past, Parks has unsuccessfully contracted with vendors for plug production. Dakota County Parks provided the seed, but either did not get any plants back or got very few. For example, Parks gave two vendors tamarack seeds and prairie violet seeds and received nothing in return. These are tough plants to grow that require special attention from the grower.

Commercial growers consistently opt to grow “easy” natives rather than more challenging species. From a business standpoint, by not focusing on the challenging species they are able to produce more plants and generate more revenue with the same time, staff, and space.

## **Peer Research**

In 2019, as Dakota County was planning for its hoop house, OPA and Parks staff visited Three Rivers Park District Nursery facility at Crow-Hasan Park in Hanover and the Prairie Moon Nursery facilities in Winona. Staff from both facilities shared valuable information on a variety of relevant topics. Their staff strongly recommended building at a relatively limited scale at the outset of any operation, while also ensuring that there is sufficient room for expansion of both production facilities and seed-generating and gathering fields adjacent or nearby the greenhouse.

## **Capital Costs**

OPA obtained quotes for structure; environmentals (e.g. heating system, horizontal airflow fans, and retractable curtain system); furniture, fixtures and equipment (FFE); and a security system for three greenhouse sizes – 2,600, 4,100, and 5,000 sq ft, utilizing the following assumptions:

- Greenhouse vendor supplies the structure and environmentals and installs/builds the structure
- Must be erected and finished using “Prevailing Wages”, i.e the hourly wage, usual benefits and overtime, paid to the majority of workers, laborers, and mechanics within a particular area
- Need a permit and engineer stamped drawings (catalog models do not meet this criteria)
- Snow load 50 pounds; wind rating 90 mph sustained, 120 mph gust
- Contract out site prep, concrete foundation, and utility hookups
- Polycarbonate roof and cladding, with estimated 20-year lifespan for these components
- Gutter-connected style of greenhouse allows for possibility of future expansion
- Construction in 2025 in conjunction with Lebanon Hills Regional Park (LHRP) shop near Visitors Center
- 7% inflation rate

Benching, irrigation, containers, racks, trays, domes, and a reverse osmosis system are included in the FFE costs. With utility hookups from the Lebanon Hills Regional Park Shop, the greenhouse is expected to use municipal water. To alleviate concerns regarding chemicals added to municipal water, a reverse osmosis system is included in the project capital costs. The reverse osmosis system has a 55% recovery rate, meaning that 45% of the water is wasted. OPA recommends that Parks consult with Water Resource Specialists to discuss the trade-off of water quality and water waste, and possibly consider including a tank to capture and utilize grey water if a reverse osmosis system is pursued.

**Table 1 Estimated Capital Costs**

	Small	Medium	Large
Square feet	2,600 sq ft	4,100 sq ft	5,000 sq ft
Vendor Structure (structure, polycarbonate panels, heating and cooling system)	\$219,822	\$275,022	\$303,983
Site Prep, Foundation, and Utility Hookups	\$66,000	\$81,000	\$90,000
Furniture, Fixtures, and Equipment (FFE)	\$59,264	\$84,987	\$96,738
Security - card readers; cameras; intrusion system	\$30,000	\$30,000	\$30,000
Other soft costs (permitting, professional fees, testing, plan review, and uncommitted funds, etc.)	\$35,709	\$47,101	\$52,072
Annual Inflation Estimate	7%	7%	7%
Build Year	2025	2025	2025
<b>Full Capital Cost</b>	<b>\$505,445</b>	<b>\$634,707</b>	<b>\$701,696</b>

## Operating Costs

OPA researched costs for building maintenance, staffing, utilities, supplies, and security.

**Table 2 Estimated Operating and Maintenance Costs**

	Small	Medium	Large
Square Feet	2600 sq ft	4100 sq ft	5000 sq ft
Building Maintenance Costs	\$7,800	\$12,300	\$15,000
Utilities	\$2,741	\$3,883	\$4,387
Supplies	\$5,850	\$9,225	\$11,250
Annual security cost (licenses and maintenance)	\$2,000	\$2,000	\$2,000
Staff (PT Natural Resources Tech, FT Natural Resources Specialist, PT Conservation Corps Crew, and building maintenance staff)	\$148,660	\$168,460	\$188,260
Volunteer Time Offset	(\$5,571)	(\$15,125)	(\$20,591)
Total Annual Operating Costs before factoring inflation	\$161,480	\$180,743	\$200,306
<b>Total Annual Operating Costs for first year (calculated for 2025) (Assumed inflation of 3% for staff and 7% for all other expenses)</b>	<b>\$178,887</b>	<b>\$201,130</b>	<b>\$223,198</b>

## Return on Investment/Cost-Benefit

The large greenhouse is projected to see a positive return on investment in under five years. With an estimated 145,775 plugs produced annually at a cost to produce of \$1.69 per plug, the County would save \$117,849 versus paying the market rate of \$2.50 per plug. This would yield a dollar savings of \$3,535,481 over a conservatively estimated 30-year-life of the greenhouse.

<b>Estimates</b>	<b>Small</b>	<b>Medium</b>	<b>Large</b>
Square Feet	2600 sq ft	4100 sq ft	5000 sq ft
Full Capital Cost	\$505,445	\$634,707	\$701,696
Capital Cost per sq ft	\$194	\$155	\$140
Total Annual Operating Costs for first year (calculated for 2025) Assumed inflation of ~3% for operating costs and 7% for capital costs	\$178,887	\$201,130	\$223,198

### Return on investment

Estimated Annual Market Value of Plugs Produced	\$202,370	\$300,125	\$364,438
Simple Payback Capital Costs Only (in years)	2.50	2.11	1.93
Simple Payback Factoring in Annual Operating Costs (in years)	21.52	6.41	4.97

### Savings on Plugs (Comparison of production vs purchase)

Estimated number of plugs produced annually	80,948	120,050	145,775
Cost per plug to produce (Operating Costs + (Capital Costs/30) /Number of plugs produced)	\$2.42	\$1.85	\$1.69
Average cost per plug to purchase on open market	\$2.50	\$2.50	\$2.50
Percent savings per plug producing vs purchasing	3.28%	25.94%	32.34%
Annual dollar savings based on the number of plugs produced	\$6,635	\$77,839	\$117,849
Dollar savings over 30 years	\$199,039	\$2,335,155	\$3,535,481

## **Additional Financial Considerations**

Throughout the course of this project as well as during the presentation to the Board of Commissioners, a number of revenue generating or cost-offsetting ideas were mentioned and may deserve further exploration.

### **Potential market for Dakota County to sell plants**

The primary purpose for greenhouse production would be for internal Parks' use, but sales would be considered under certain circumstances. Parks would consider contract growing for other County departments such as Environmental Resources, Transportation, and Capital Projects. If there are surplus plants of various species due to the unpredictability of germination rates, the surplus could be sold to conservation collaborative partners or other counties.

Sales would be subject to the term of Minn. Stat. 47.185.

471.85 PROPERTY TRANSFER; PUBLIC CORPORATIONS.

Any county, city, town, or school district may transfer its personal property for a nominal or without consideration to another public corporation for public use when duly authorized by its governing body.

To comply with the statute the transfer would likely need to be at around cost (a nominal fee) or free (without consideration); Dakota County could only sell to other public corporations and they must be using the plants for a public use. Generally county governments are prohibited from engaging in for-profit business enterprises.

The County would also have to check to make sure that there are no limitations on any of the funding that is being used for the native plant production program. For example, certain funding sources (grants, bond funds, etc.) prohibit for-profit activities from programs the funds are used to create/support.

### **Potential for state grants**

State grants have a requirement that seeds come from within 150 mile radius. Having certainty that seeds originated from within that radius, such as a local prairie, may allow Dakota County to leverage the plant material value and staff time spent producing it as an in-kind grant match.

### **Potential for private donations**

There are potentially businesses in the area that may consider providing financial support for the greenhouse. The Parks department is currently exploring options for private donations.

## Overall Analysis

A Dakota County-owned greenhouse would provide a semi-permanent environmentally-controlled structure for year-round use. This greenhouse should provide long-term stability, County control, and additional space needed for plant production. It would also allow Parks to have a reliable source for native plants.

It is estimated that the medium and large greenhouses can generate \$300,125 and \$364, 438 respectively worth of plugs annually, which is enough plugs needed for 10.8 or 13.1 acres. Parks could also expand seed production fields for native species in tandem with the greenhouse. The hoop house could be moved adjacent to the greenhouse and be converted to a shade cloth house.

The OPA Cost Study does not support a case for a small greenhouse. The numbers do however demonstrate an anticipated positive return on investment for either the medium or large greenhouse. Both the medium and large greenhouses are estimated to provide the economy of scale for a positive return on investment. Additionally, the building of the new Lebanon Hills Regional Park shop provides a unique opportunity to build the greenhouse at a preferential rate timed with the siting and build of the main shop.