COTTAGE GROVE PLANNING COMMISSION May 20, 2024

12800 RAVINE PARKWAY SOUTH
COTTAGE GROVE, MN 55016

COUNCIL CHAMBER- 7:00 PM

1. Call to Order
2. Roll Call
3. Approval of the Agenda
4. Open Forum
5. Chair's Explanation of the Hearing Process
6. Public Hearing and Applications
   - 6.1 Community Solar Garden - Case IUP2024-007

     Discussion: Enterprise Energy, LLC for EESolar28 LLC, has applied for an interim conditional use permit to allow a 5 MW Community Solar Garden to be located on property west of Lehigh Road and south of 100th Street, owned by Ryan and Karen Finnegan.
7. Approval of Minutes
   - 7.1 Approval of April 22, 2024, Planning Commission Minutes
8. Reports
   - 8.1 Recap of May 1 and 15, 2024, City Council Meetings
   - 8.2 Response to Inquiries
   - 8.3 Planning Commission Requests
9. Adjournment

STAFF REPORT CASE: IUP2024-007

ITEM: 6.1

PUBLIC MEETING DATE: 5/20/24 **TENTATIVE COUNCIL REVIEW DATE: 6/5/24**

APPLICATION

APPLICANT: **Enterprise Energy, LLC for EESolar28 LLC, on behalf of property owners Ryan and Karen Finnegan**

REQUEST: **An interim use permit to allow a 5 MW Community Solar Garden on approximately 34.7 acres of land.**

SITE DATA

LOCATION: **West of Lehigh Road & South of 100th Street (PIN 25.027.21.22.0001)**

ZONING: **AG-1, Agricultural Preserve**

GUIDED LAND USE: **Agricultural Preserve**

LAND USE OF ADJACENT PROPERTIES:	CURRENT	GUIDED
NORTH:	Agricultural	Agricultural Preserve
EAST:	Agricultural	Rural Residential
SOUTH:	Agricultural	Agricultural Preserve
WEST:	Agricultural	Agricultural Preserve

SIZE: **N/A**

DENSITY: **N/A**

RECOMMENDATION

Approval, subject to the conditions stipulated in this staff report.

Cottage Grove
Where Pride and Prosperity Meet

COTTAGE GROVE PLANNING DIVISION

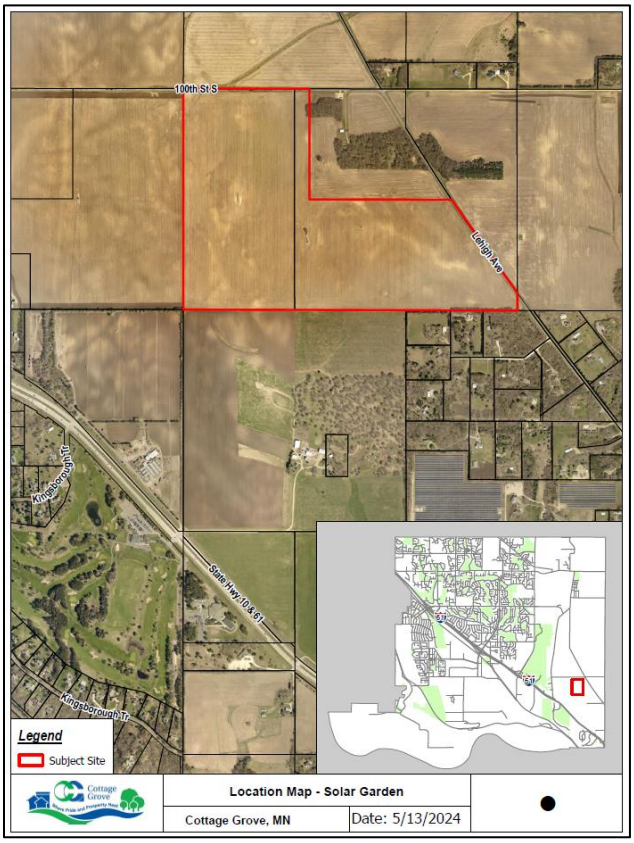
Planning Staff Contact:

Application Accepted: 4/23/2024 60-Day Review Deadline: 6/22/2024

Planning Staff Report
Enterprise Energy Community Solar Garden
Planning Case No. IUP2024-007
May 20, 2024

Proposal

Enterprise Energy, LLC (Applicant) has submitted an application for an Interim Use Permit for the proposed construction of a community solar garden. The subject site consists of two parcels totaling approximately 155 acres of land with the application proposing solar panels on approximately 34.7 acres of the site. The site is located adjacent to 100th Street, Lehigh Avenue, and approximately three-quarter miles east of Kimbro Avenue. The property is currently owned by Ryan and Karen Finnegan with the Applicant proposing to lease the land for the proposed project. The location map below shows the location of the subject site proposed for the community solar garden.



Site Location

Review Schedule

Application Received: April 23, 2024
Application Accepted: April 23, 2024
Planning Commission Meeting: May 20, 2024
Tentative City Council Meeting: June 5, 2024
60-Day Review Deadline: June 22, 2024

Background

Site Conditions

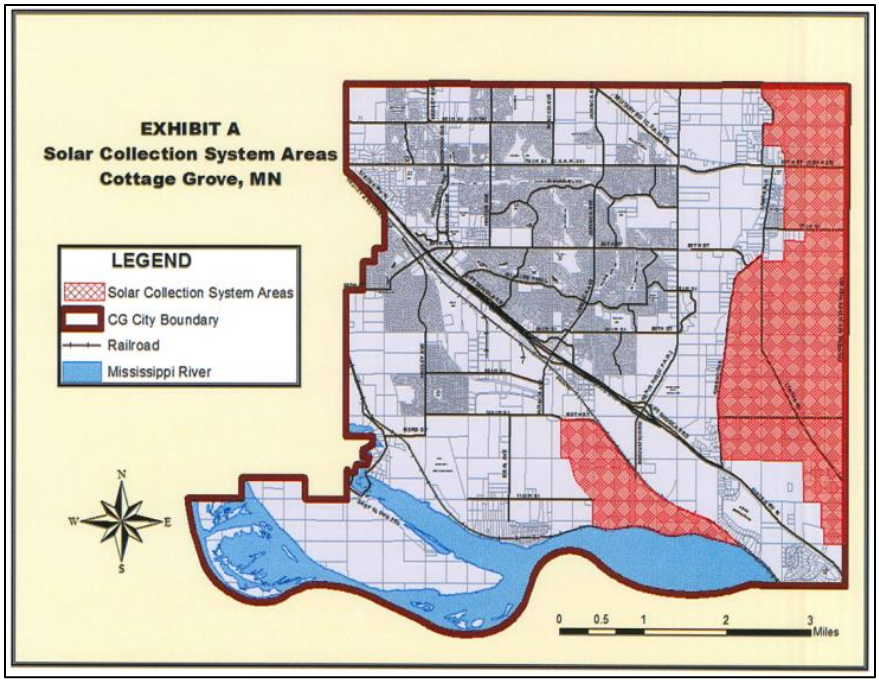
The subject site consists of two parcels totaling approximately 155 acres in size, with the western parcel consisting of 80.1 acres and the eastern parcel consisting of 75.5 acres. The site is currently tilled field utilized for agricultural purposes and has been utilized as such. The majority of the eastern parcel will be unaffected and able to continue being utilized as tilled field. A condition of approval will require the two lots be combined.

2023 Aerial

Ordinance Regulations

The City's Solar Energy Systems ordinance was originally adopted by the City Council on October 7, 2015 (Ord. 948). This ordinance defines a "community solar garden" as a solar-electric (photovoltaic) array that provides retail electric power to multiple community members or businesses residing or located off-site from the location of the solar energy system, under the provisions of Minnesota Statutes 216B.1641 or successor statute.

Following the enactment and enforcement of the ordinance in 2015, the City Council adopted Ordinance No. 985 on July 19, 2017. This ordinance changed the minimum setback requirements for a community solar garden from complying with the principal structure setbacks to 300 feet from all boundary lines. In addition, the revised ordinance adopted in 2017 also required an interim use permit for all community solar gardens. Exhibit A of Ordinance No. 985 depicts areas in the community as eligible sites for community solar gardens.



Ordinance No. 985 Exhibit A

The City's solar energy systems ordinance for community solar garden systems requires the following:

- An interim use permit is granted by the City.
- The site is located within the designated areas shown in Exhibit A of the solar energy system ordinance.
- The system is located on a minimum of five acres of land.
- Applicant provides a decommissioning plan.
- The standards and regulations contained in the solar energy systems ordinance are complied with.

Neighborhood Meeting

The Applicant held a neighborhood meeting on May 14, 2024. Notice of the neighborhood meeting was sent to the surrounding property owners within 500 feet of the project area. The intent of the meeting was to give the neighboring property owners the opportunity to ask questions and present concerns they might have to the Applicant in the early planning stages of the proposed project. Four property owners attended the meeting. Below are the main concerns from residents along with responses to each item:

- Will construction traffic on Leigh Road negatively impact the roadway and what is the plan for repairs?
    - A condition of approval will require the Applicant to enter into a Memorandum of Understanding (MOU) with the City that outlines the designated construction traffic route and the requirements of any potential repairs to adjacent roadways caused by construction traffic. As part of the MOU, the Applicant will be required to document the condition of the roadway of the designated construction traffic route prior to construction traffic activity as well as provide the City with all necessary and required letters of credit for the repair of the designated construction traffic route.

- Based on the proposed site plan, it appears to be difficult to mow and maintain around the utility poles proposed along the southern property line. Is it possible to move the poles or to bury the electric line along the south property line that is proposed on poles?
    - The Applicant indicated they cannot control whether Xcel Energy buries their electric line currently proposed on poles, but the Applicant can and will request the lines be buried. In response to resident concerns about maintenance around the proposed poles, the Applicant has moved the proposed poles from the south side of the access road to the north side. This allows additional room for maintenance and a further setback from the property line to the south. A condition of approval requires the lines be buried unless written evidence and a finding of support is received from Xcel Energy detailing the lines must be above ground.
- Will water runoff be increased to the property to the south?
    - The Applicant has submitted a detailed stormwater management report prepared by a professional consultant that will meet the standards and requirements of the City's stormwater standards. Furthermore, based on City standards and requirements, the Applicant shall not increase water runoff onto adjacent properties.
- How will the growth of weed vegetation be managed and removed?
    - The Applicant has submitted a detailed Vegetative Management Plan (VMP) containing the proposed seed mix within the solar array area. In addition, the VMP contains a maintenance plan detailing a required amount of site visits by the vegetative restoration professionals. Furthermore, based on resident feedback, the Applicant has agreed to conduct monthly site visits to ensure weeds are being removed and the site is being maintained according to the VMP.
- A chain link security fence is proposed, can the color of the fence be changed?
    - Based on resident feedback and desire to have a black in color chain link fence to blend into the existing environment, the Applicant has agreed to install a chain link fence that is black coated. A condition of approval will require the chain link fence meet the requirements of City Code Title 11-3-6 and be black coated. In addition, the Applicant has revised the site plan to include a proposed row of Black Hills Spruce Trees along the south boundary of the solar array area to further screen the site. Furthermore, the Applicant has indicated the property owner intends to continue agricultural farming in the non-array areas of the site.

Planning Considerations

Zoning and Comprehensive Plan

The subject site is zoned AG-1, Agricultural, and is guided as Agricultural in the 2040 Comprehensive Plan. The proposed use is consistent with the City's zoning ordinance and the 2040 Comprehensive Plan. Community solar gardens are permitted within the within the AG-1 Zoning District with an Interim Use Permit.

Interim Use Permit

City Code Title 11-4-13 requires an Interim Use Permit (IUP) for a community solar garden. Per City Code Title 11-2-9, the purpose and intent of an interim use permit is, "To allow a use that is presently judged acceptable by the City Council, but that with anticipated development or redevelopment, will not be acceptable in the future or will be replaced in the future by a permitted or

conditional use allowed within the respective district." The Applicant requested the IUP length be a total of 35 years from the commercial operation date. However, staff has noted a potential for development to reach the subject site within the proposed 35-year time frame. Therefore, staff is proposing this IUP last for 25 years from the commercial operation date with a potential extension of up to 10 years. Review of the IUP will occur at the end of the 24th year of operation by the City Council, in which a determination will be made as to whether the community solar garden will inhibit any proposed development. If an extension is granted, a condition of approval will require the community solar garden cease use and be removed within one year if a development application of an adjacent parcel is received.

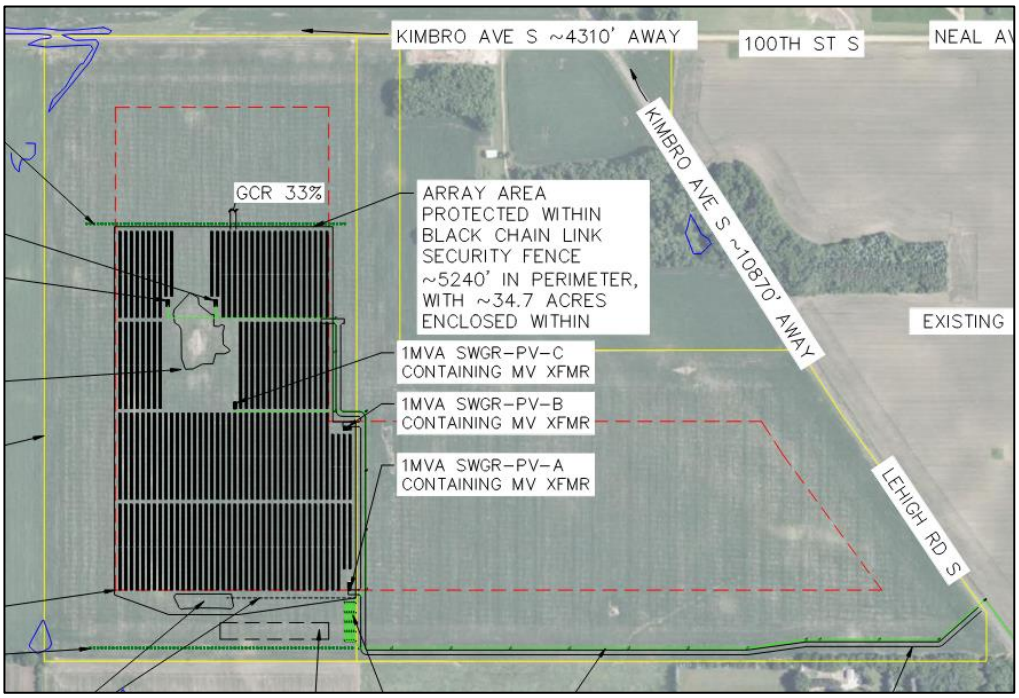
Agriculture Preserve Program

The Agriculture Preserve Program was established by Minnesota State Statute in 1980 with the intent to encourage and preserve areas planned and zoned for long-term agricultural use within the seven-county metropolitan area (except for Ramsey County as it is fully developed). The program established a local planning process to designate agricultural areas as a long-term land use and to provide benefits to maintain viable, productive farm operations.

The subject site was enrolled in the Agricultural Preserve Program in 1982. In January 2014, the property owner completed and recorded the Notice Initiating Expiration of a Metropolitan Agricultural Preserve which stated an expiration date of November 18, 2021. The subject site is no longer enrolled in the program and thus there are no conflictions with the proposed project.

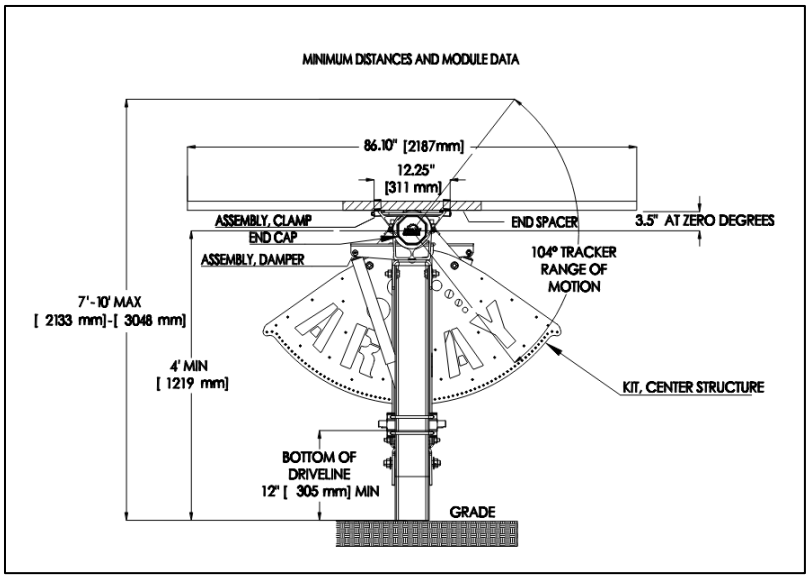
Site Plan

The Applicant is proposing a five-megawatt community solar garden on approximately 34.7 acres of the 155-acre site. The 34.7-acre array area is located on the western side of the site meeting the required 300-foot setback to all property lines after the two parcels are combined.



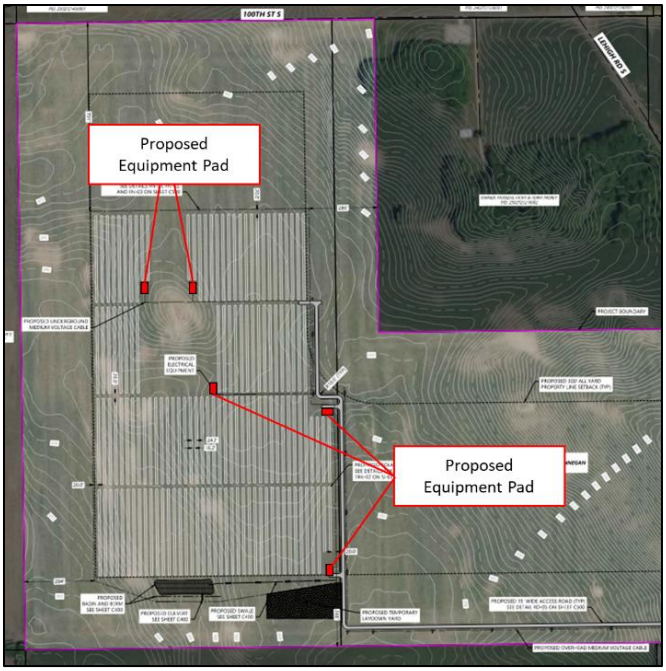
Proposed Site Plan

The Applicant is proposing the rows of solar panels to run from north to south with panels able to pivot on a single axis following the sun from east to west. The pivoting motion of the panels does not create any noise, and the panels are relatively low to the ground as the maximum height of the panel at full tilt is seven to ten feet.



Solar Panel Elevation Profile

Generally, each one-megawatt community solar garden consists of one concrete equipment pad about 200 square feet in size. The proposed project is a five-megawatt project; however, the project is engineered so that there are five one-megawatt solar arrays tied together to create the total five-megawatt solar garden. Therefore, the Applicant is proposing a total of five concrete equipment pads, one for each megawatt of the proposed solar garden. Each equipment pad is located within the approximate 34.7-acre array area that is enclosed with fencing.



Proposed Equipment Pad Locations

The property will be fenced for security and safety reasons. The proposed fence is a black-coated 6-foot chain link fence without barbed wire that meets the requirements of City Code Title 11-3-6. Placement of the fence will be around the perimeter of the approximate 34.7-acre solar garden area and not around the entire 155 acres subject site. An illustration of the proposed chain link fence is below.

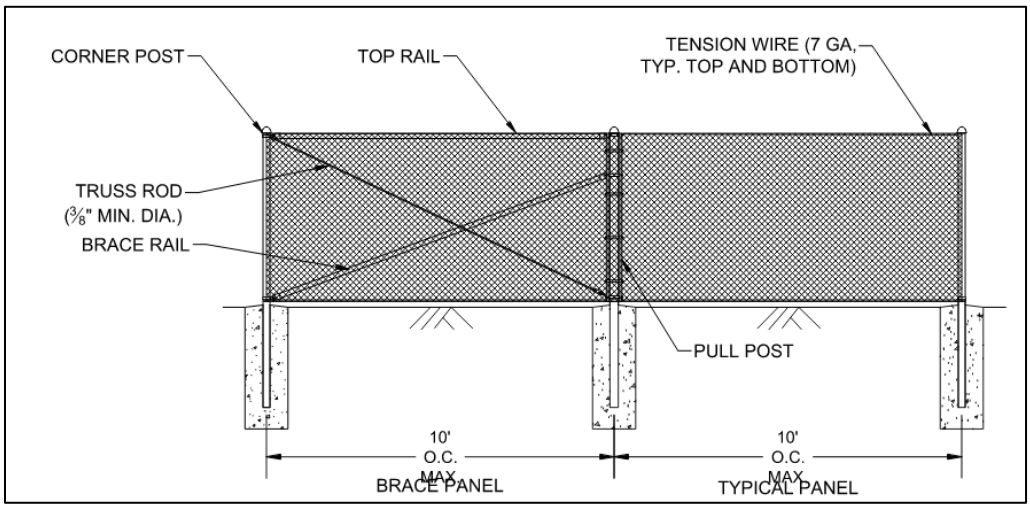
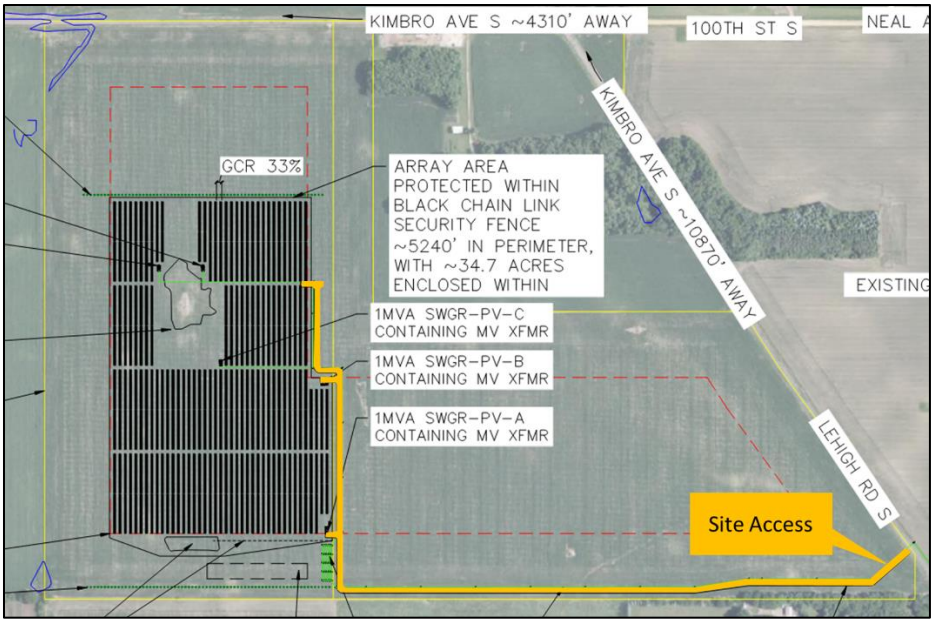


Illustration of Proposed Chain Link Fence

Transportation/Site Access

The subject site is located off 100th Street South and Lehigh Road South. Access to the project is proposed to be located off Lehigh Road South in the southeastern corner of the site and extend along the southern boundary. The Applicant is proposing a fifteen-foot-wide Class V gravel access road with a 20-foot entrance.



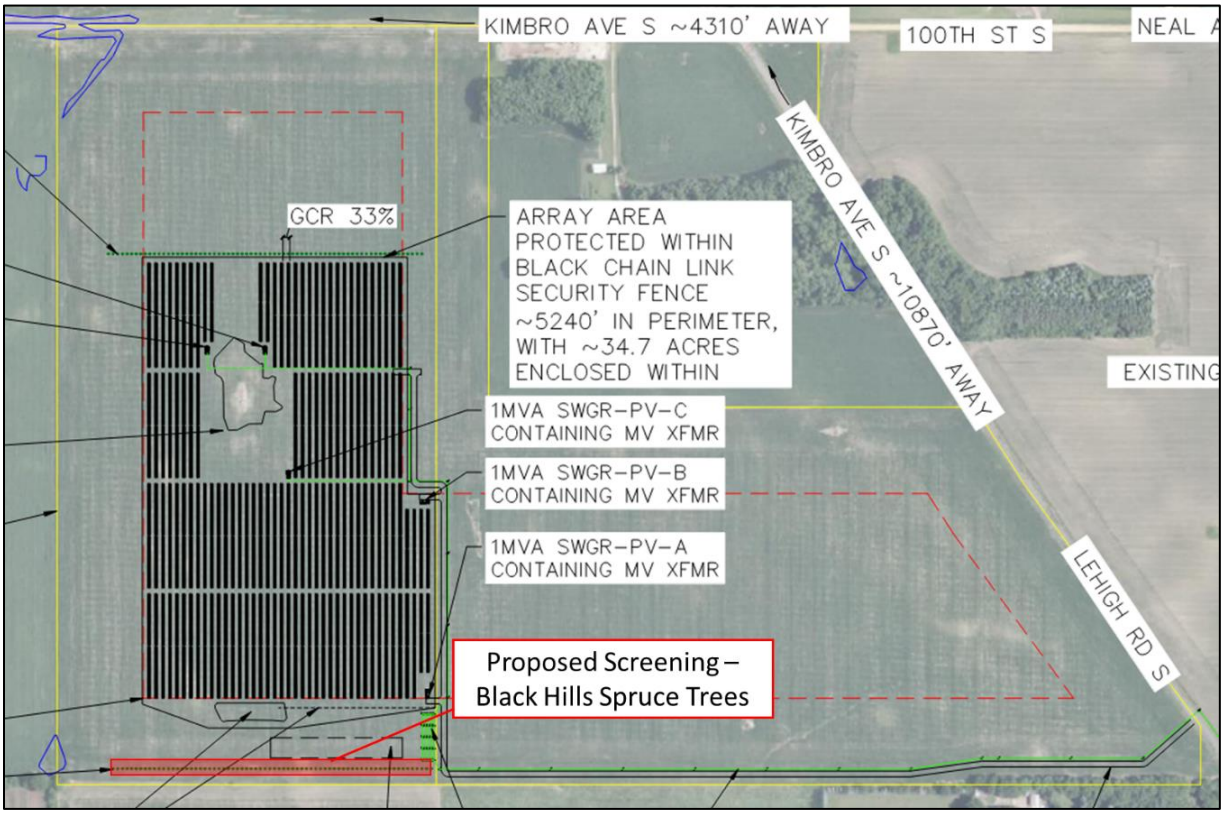
Site Access

The large majority of traffic impact will occur during site construction as materials are brought to the site. Anticipated traffic during site construction will include semi truckloads with equipment

drop off (solar panels, steel racking, etc.) as well as pickup trucks and passenger vehicles. All construction parking will be located entirely within the subject site.

Following the completion of site construction, access to the site will be minimal. An engineer will access the site via pickup truck twice per year to examine the equipment and ensure it is functioning correctly. In addition, maintenance crews will access the site twice per year to manage the vegetative cover and to do routine site maintenance such as weed removal.

Screening
The Applicant is proposing a single row of black hills spruce trees along the southern border of the solar array area in order to screen it from residents to the south.



Proposed Screening

Vegetative Management Plan
The Applicant has submitted a detailed vegetative management plan (VMP). The plan includes a vegetative restoration plan in which the entire approximate 34.7-acre array area will be seeded with a native pollinator friendly mix. The VMP details the maintenance of the establishment phase of years 1 to 3 and the maintenance phase of years 4-plus. Both phases will require site visits each year by maintenance crews to ensure the VMP is followed and maintained properly. Further vegetation management requirements will be included in the stormwater maintenance agreement.

Glare Study
The Applicant completed and submitted a detailed glare study in order to determine any potential glare risk for neighbors and aircraft. The glare study revealed the proposed project has no glare risk and meets all FAA requirements.

Decommissioning Plan
City Code Title 11-4-13 states a decommissioning plan shall be submitted with all applications for community solar gardens. The Applicant has submitted a detailed decommissioning plan meeting the requirements in City Code. The plan describes the decommissioning of the project's operation and facilities necessary to be completed in order to restore the land to pre-construction conditions.

The process of decommissioning generally takes approximately six months or less. All photovoltaic modules will be disconnected, removed from the racks, packaged, and transported to a designated location for resale, recycling, or disposal. The panel racking system will be unbolted, disassembled, and transported off-site for salvage or reuse. All electrical equipment, buildings, and foundations will also be removed from the site. All access roads and parking areas will be removed to allow the complete restoration of these areas. Clean topsoil would be imported onsite, replaced over disturbed areas, and leveled to match the existing grades. The area will be seeded with native grass species for the purpose of erosion control.

City Code Title 11-4-13 allows the City, at its discretion, to require the owner and/or operator of the solar energy system to provide a financial security in an amount equal to 125 percent of the cost estimate for decommissioning the system. A condition of approval will require the Applicant provide the City with the financial security upon the City's acceptance of the decommissioning cost estimate and prior to the issuance of a building permit.

Grading and Stormwater Management Plan
The Applicant is proposing minor grading in multiple areas of the site prior to installing the solar panels. The removal of topsoil will be required to prepare for installing the gravel access roads. As a condition of final approval, the applicant will be required to meet stormwater requirements established by the state, watershed district, as well as the city's ordinances and Surface Water Management Plan. In the preliminary civil site plans, stormwater is routed to an infiltration basin and swale. The Applicant will be required to update plans based on comments in the engineering review memo dated May 14, 2024. A stormwater maintenance agreement will be required for the on-going maintenance of the infiltration basin and swale as well as the maintenance of the native vegetation. Well-maintained vegetation is conducive to stormwater infiltration and is therefore key to reducing runoff rates and volumes and improving stormwater quality.

Public Hearing Notices
The public hearing notice for the May 20, 2024, Planning Commission meeting was published in the *Saint Paul Pioneer Press* and mailed on May 8, 2024, to 25 property owners that are within 500 feet of the proposed project. Staff has not received any comments at the time of writing the report.

Recommendation

That the Planning Commission recommend that the City Council approve the Interim Use Permit for a five-megawatt community solar garden to be constructed on approximately 35 acres of a 155-acre site (PID: 25.027.21.22.0001 and 25.027.21.24.0001) as shown on the development plans dated April 19, 2024, subject to the following conditions of approval:

1. The project shall be completed in accordance with the plans submitted as amended by the conditions of approval. Any significant changes to the plans, as determined by planning staff, shall require review and approval by the Planning Commission and City Council.

2. Prior to the issuance of a building permit, the Applicant shall incorporate the recommendations, requirements, and evaluations noted in the Bolton & Menk stormwater comment letter dated May 14, 2024, and the City comment letter dated May 14, 2024, and subject to modifications that are agreed to by the Applicant and City Engineer. All comments shall be adopted herein by reference.

3. All applicable permits (i.e.; building, electrical, grading, and right of way) and a commercial plan review packet must be completed, submitted, and approved by the City prior to the commencement of any construction activities. Detailed construction plans must be reviewed and approved by the Building Official, City Engineer, and Fire Marshal.

4. The Interim Use Permit shall last for 25 years, beginning at the date of commercial operation and sunset on December 31, 2052. At the end of the 24th year of operation, a review of the IUP shall occur and the City Council may grant an extension of up to 10 years. If an extension is granted and a development application is received on an adjacent parcel during the extension period, the onsite operations shall cease and be removed within one (1) year in order not to inhibit development.

5. The approvals of this Interim Use Permit shall become null and void if a building permit is not issued within 2 years from the date of approval.

6. Pursuant to City Code Title 11-4-13.D.5, all on-site and off-site electric power lines necessary to interconnect the electric power created from the community solar garden to the utility company grid system must be underground. If written verification and a finding of support is supplied to the City, and approved by planning staff, by Xcel Energy or local utility then above ground electric powerlines shall be permitted.

7. Prior to the issuance of a building permit, planning staff shall review and approve a final landscaping plan.

8. Prior to the issuance of a building permit, the Applicant shall enter into a Memorandum of Understanding outlining the designated construction traffic route, the preconstruction roadway testing requirements by the Applicant of the designated traffic route, and requirements of any potential repairs to designated traffic route from construction traffic by the Applicant. The adjacent City roadways (100th Street and Lehigh Road) are both load limited roadways.

9. Installation of landscaping shall occur in a timely fashion and be consistent with the approved landscape plan and vegetative management plan. Prior to the issuance of a building permit, a letter of credit in the amount of 150 percent of the landscape estimate shall be submitted to the City as required by City ordinance. The financial guarantee shall be held until all required plantings are installed. At such time of installation, the Planning Department shall conduct an inspection to verify compliance with the landscape plan. If the inspection is approved, 50 percent of the financial guarantee shall be released. One year

from the date of initial inspection a follow-up inspection shall be conducted to verify survivability. If the follow-up inspection is approved, the remainder of the financial guarantee shall be released.

10. Upon the City's acceptance of the decommissioning estimate as noted in the decommissioning plan, the applicant shall provide the City with a cash escrow or irrevocable letter of credit in the amount equal to 125 percent of the accepted decommissioning estimate. The financial guarantee must be accepted by the City prior to the issuance of a building permit.

11. The grading and erosion control plan for the site must comply with NPDES II Permit requirements. Erosion control devices must be installed prior to commencement of any grading activity. Erosion control must be performed in accordance with the recommended practices of the Minnesota Stormwater Manual and the conditions stipulated in Title 9-7-1, Erosion Control During Construction, of the City's Subdivision Ordinance. The Applicant shall be responsible for the costs for the City to inspect the site in relation to erosion control conformance.

12. The Applicant must provide the City with an as-built survey of all utilities and grading plan.

13. The applicant must prepare a stormwater management plan and submit it to the City for review and comment. The plan must be approved and a stormwater maintenance agreement executed before the City will issue the building permit for the proposed community solar garden project.

14. The Applicant is responsible for removing debris from all adjacent public and private roadways during their grading and construction process. The adjacent streets shall be swept clean daily or as needed.

15. All areas of the site, where practical, shall be established and maintained per the approved Vegetative Management Plan. A vegetative restoration professional shall visit the site once per month to ensure weed growth is being mitigated and managed and the site is being maintained according to the Vegetative Management Plan.

16. The maximum area occupied by the solar array area and ancillary equipment is limited to 40 acres of land on the western parcel of the site (PID: 2502721220001). Any proposed changes to the solar array area shall be reviewed and approved by planning staff in writing. If the proposed changes substantially alter site operations, planning staff may refer the proposal to the Planning Commission and City Council for review and approval.

17. Prior to the issuance of a building permit, planning staff shall approve the final fencing proposed onsite. The fence shall meet the standards of City Code Title 11-3-6 and any proposed chain link fence must be black in color.

18. All construction improvements shall be limited to the following hours and days of operation:

Monday through Friday	7:00 A.M. to 7:00 P.M.
Saturday	9:00 A.M. to 7:00 P.M.
Sunday	Not Allowed

Prepared by:
Conner Jakes
Associate Planner

Attachments:
- Applicant's Narrative
- Development Plans
- Civil Plan Set
- Solar Panel Detail
- Inverter Detail
- Vegetative Management Plan
- Glare Study
- Preliminary Stormwater Management Plan
- Decommissioning Plan
- Engineering Comment Letter Dated May 14, 2024
- Stormwater Management Comment Letter Dated May 14, 2024

Date: April, 2024
Land Use Authority: City of Cottage Grove, MN

ENTERPRISE
ENERGY

Application for Interim Use Permit

Finnegan 5MW Community Solar Garden

Enterprise Energy LLC for EESolar32 LLC

Enterprise Energy LLC, a Minnesota limited liability company ("Applicant") submits this Interim Use Permit and Lot Combination application on behalf of EESolar32 LLC, a Minnesota limited liability company and subsidiary of Enterprise Energy. Applicant requests a permit to construct 5 MW Alternating Current of community solar gardens on land owned by Ryan and Karen Finnegan, Washington County, MN, Tax ID 2502721220001 & 2502721240001, legally described by Section 10 of this Narrative. The owner has applied to combine the parcels.

The project will consist of 5 1MW gardens that will look and function as a single garden and be under common ownership but have separate points of interconnection located adjacent to one another. The 5MW project is collectively referred to as the "solar array." The site was selected due to its compliance with the zoning ordinance, its proximity to electrical infrastructure, it's physical characteristics and suitability for solar development, and landowner participation. The application form is attached.

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ENTERPRISE ENERGY

Enterprise Energy
2925 Dean Parkway, Executive Suite 300
Minneapolis, MN 55416
(952) 212-0824

1. Summary of Project

A Community Solar Garden is a solar power plant that allows people who don't have a good spot for solar panels to be treated by the electric utility as though these solar panels are on their property. We lease land somewhere that is good for solar, such as this parcel, and pay to develop and install the Community Solar Garden. When the array puts power into the Grid, it receives a "bill credit" from the electric utility for that amount of power. The bill credit grants the right to take that same amount of power out of the electric grid at a different location for no cost. We then sell the bill credit to the people who don't have a good spot for solar, thereby allowing them to save money through solar even though they don't have a good spot for solar panels. The people who buy the bill credits are referred to as the "subscribers" since they subscribe to the Community Solar Garden by agreeing to buy the bill credits.

The installation will operate as a "Community Solar Garden" as defined by Minnesota law and Section 11-4-13 of the City Ordinance. The requested term of the IUP is 35 years from the commercial operation date. Section 11-4-113(E) of the ordinance permits community solar farms as an interim use subject to certain requirements, including being in the area shown on Exhibit A of Resolution 985 on file with the City, and subject to a 300' property line setback. Potential solar sites are also limited to parcels that are not enrolled in the Ag Preserve Program. This proposed project meets all requirements of the ordinance, including the 300' setback, Resolution 985, and non-enrollment in Ag-Preserve.

The Minnesota legislature recently passed a bill that increases the size of Community Solar developments from 1MW AC to 5MW AC. You may recall some legacy solar projects that were developed prior to 2016 were similar in size. However, after 2016 the state limited community solar projects to 1MW, until now. This size increase is tremendously important for because it unlocks better (less visible) development sites that pay a lot more tax revenue than a 1MW project would. Due to the City's 300 foot solar setbacks, it does not make economic sense from an land owner's prospective to put a 1MW solar development in the middle of a large field. However, a 5MW project can make better use of the whole parcel while satisfying the setback. Also, because larger projects have better economies of scale, they can afford more electric upgrade costs, including longer interconnection power lines to a farther way distribution power grid. This results in developments being less visible and more off the beaten path.

The new law also drastically increases tax revenue to the City and County because in Minnesota, solar projects under 1MW don't pay production tax. However, under the new law, this 5MW project will pay production tax. Production Tax is $1.20 per Megawatt Hour produced. A 5MW Solar Array can produce about 12,500 MWH of solar per year. The following table shows that the proposed project will generate about $525,000.00 in additional tax revenue, and it does not include potential annual escalation in Production Tax, which would add even more tax revenue.

ENTERPRISE ENERGY

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Apart from Production Tax, farmland generates far more tax revenue for when it has a large solar installation on it because the assessor can change the tax *usage* classification of the property from Agricultural to Commercial / Industrial. Solar does not change the zoning or property valuation. However, there is an enormous increase in tax revenue from changing ***use*** alone.

2. Methods of Construction

We would like to begin construction as soon as spring 2025 and complete before winter. However, the actual construction process will only take about three months. We haven't set an groundbreaking date yet. The construction process begins with preliminary site testing for soil conditions for footings, as well as environmental, historical, and cultural diligence. A construction trailer and portable toilet will be placed on site when we begin groundbreaking.

Construction can be thought of as four phases: footings, racking, panels, electrical, and testing. Typically, a subsequent phase begins when the previous phase is about halfway done. Footings will consist of rows of I-beams that are driven into the ground to a depth of about 10-15 feet with no concrete footing. When about half of the field has I-beams installed, the racking system begins being placed on the I-beams. When the raking is installed on about half of the field, electricians will begin installing the solar panels on the completed portion. When the solar panels about installed about halfway through the field, electricians will begin wiring the system together. After the installation is complete it will undergo about a month of testing from the installer and the electric utility before it becomes commercially operational.

The rows of solar panels will run from North to South, and pivot on a single axis following the sun from East to West.

The racking system is attached to driven I-beam that secures the installation to the ground. The I-Beam is driven directly into the ground. The racking and footings are within accepted

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(952) 212-0824

professional standards given the local soil and climate, and are professional engineered to withstand winds exceeding 150 MPH.

Solar panels produce direct current (DC) electricity. The electrical grid uses alternating current (AC) electricity. The power produced from the array will be run through an "Inverter" that changes the power from direct current to alternating current. The process of inverting the electricity loses some efficiency. Therefore, it will produce more DC power than AC. This conversion is expressed as a DC/AC ratio. This project will have roughly a 1.5 DC/AC Ratio, meaning that for every MW AC that it produces, it produces 1.5MW direct current.

A community solar garden has one concrete equipment pad that takes up about 200 sf. The solar panels are connected by underground electric conduit that leads to the equipment pad where metering equipment is mounted. The amount of electricity that is produced by the solar development is measured by the solar development owner and the electric utility. The power

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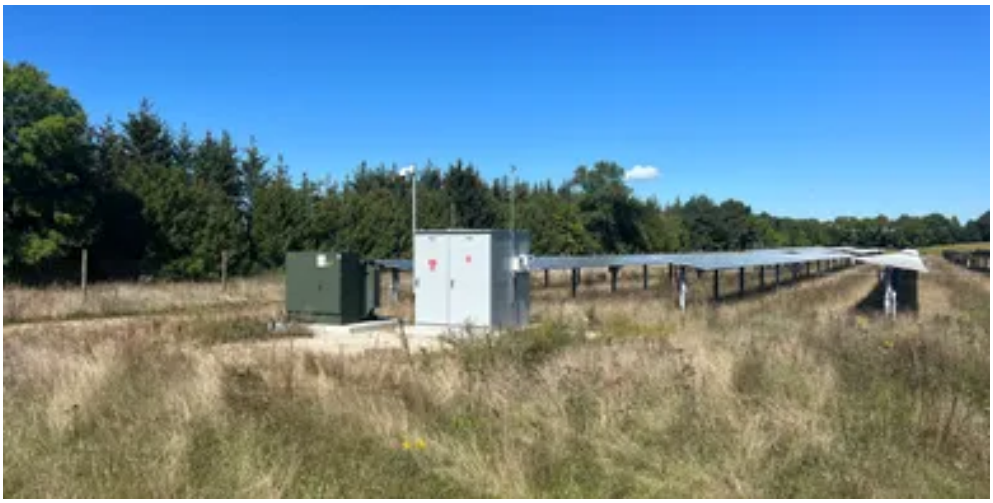
production and equipment are monitored 24/7 by a satellite or cellular based security system. An emergency shutoff switch is also on site.



After the power is metered at the equipment pad, it interconnects into the electric utility's existing three phase distribution power distribution network. The solar installation includes a pole that houses overhead wires and leads to another pole that is controlled by the electric utility. Each 1MW of solar on the site will have its own point of interconnection. All points of interconnection will be adjacent to one another.

The solar array will be contained within a security fence as described by the site plan. The fence will meet electrical code requirements and prevent people from trespassing, while allowing birds, insects, rodents, and other wildlife to pass through. A single fence will surround all 5 MW.

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We are flexible as to the style and color of the fencing, and look forward to working out a preferred solution with the city and neighboring property owners.

3. **Access, Parking and Roads**

Access to the site will be by a packed class five gravel road approximately fifteen feet wide with a 20-foot entrance. Construction parking will be located entirely within the parcel. No additional parking is required. Multiple simi truckloads of equipment such as solar panels and steel racking will be delivered through the construction process. Multiple pickup trucks, workers, passenger vehicles, bobcats and equipment will be on site most days during construction.

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4. Operation

Access to the site will be minimal after construction. An engineer will need to access the property by pickup truck at least twice a year to examine the equipment. Maintenance crews will be on site at least twice a year to manage the vegetative cover and remove weeds.

The array will be monitored 24/7 365 days a year by a computer monitoring system that measures the power being produced on site. If a problem arises, the system will alert the system owner so that appropriate personnel can be dispatched to the site to resolve the issue.

The development will be owned and operated by an owner operator selected by the Developer. We have not determined who the owner will be yet.

5. Vegetation Management and Landscape Plan & Visual Impact

The Minnesota state legislature has passed a law that encourages solar developers to plant solar arrays in pollinator friendly plantings, Minn Stat. 216B.1642. The Minnesota Board of Water and Soil Resources has issues guidelines for the establishment of such pollinator habitat underneath solar developments, including tools evaluating the establishment and maintenance of the pollinator plantings. We submit the attached vegetation management plan in compliance with the abovementioned guidelines. The vegetative management plan will create wildlife habitat for birds, rodents, and insects that cannot live in farmed soils due to pesticides, as well as carnivorous animals that eat them. Unlike row crops, the vegetative cover will have deep roots that will improve the permeability of the soil, promote soil health, slow down the velocity of water runoff, and prevent topsoil erosion, thereby naturally improving the quality of any surrounding waterbodies and wetlands.

The proposed project is hardly visible to adjoining properties. Homes to the West and South are about a half a mile away. Properties to the Southeast are about a quarter mile away. The closest home (to the NE) is on a heavily wooded lot. Apart from setbacks, we also prepared an FAA glare study to determine if the project could potentially create glare for neighbors and aircraft. That study did not reveal any glare risk.

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6. Stormwater Management Plan

We hired Westwood Professional Services to prepare a Stormwater Management Report for the project. This document was prepared by Minnesota licensed engineers and includes detailed stormwater runoff calculations, HydroCad modeling, and mitigation measures. It complies with local laws and rules, as well as the Minnesota Board of Soil and Water, DNR, MPCA, and other state and federal requirements.

No County drain tile or cross property tile is located on the parcel. Under the lease agreement with the landowner, the developer assumes responsibility for any tile damaged during construction. The developer will identify the location of tile and either avoid hitting it or replace it to restore drainage to its preexisting condition.

7. Decommissioning Plan

A decommission plan that complies with section 11-4-13F of the City ordinance is attached. The solar tenant and its successors shall be responsible for decommissioning of the solar installation upon the expiration of the lease, land use permits, or the cessation of power generation for a period longer than 12 months, at which point the solar installation will be deconstructed and removed. All footings, electrical components and underground wires, fences, and other solar equipment will be removed, and the land can be restored to agricultural production.

The solar installation will comply with any decommissioning security requirements or procedures that are required by the land use authority. The land lease for solar installation contains a contractual obligation for the solar tenant to decommission the solar installation and restore the property. It also requires that the tenant post a security for removal in the form of a bond, escrow, or letter of credit prior to construction, payable to the property owner, in the event that the land use authority does not require one. The purpose of the security is to ensure that sufficient money is set aside to remove the solar installation before it is built.

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8. Fire Prevention Plan

The solar installation will comply with the international building code, including sections 605.11-605.11.2 regarding the location of underground electrical conduit, the national electric code, and all local electric and fire codes and ordinances. The solar installation will have emergency contact information posted on a sign at the fence entrance. The local fire department will be given an emergency key to the security fence. Solar production will be monitored 24/7 for electrical and mechanical issues.

9. Legal Description

The West Half of the Northwest Quarter of Section 25, Township 27 North, Range 21 West, City of Cottage Grove, Washington County, MN (2502721220001) and That part of the East Half of the Northwest Quarter and that part of the West Half of the Northeast Quarter, all in Section 25, Township 27 North, Range 21 West, City of Cottage Grove, Washington County, Minnesota, described as follows: Commencing at the Northeast corner of said East Half of the Northwest Quarter; thence North 89 degrees 54 minutes 36 seconds West, assumed bearing, along the North line of said East Half of the Northwest Quarter, a distance of 1147.27 feet to the point of beginning of the parcel of land to be described; thence South 00 degrees 02 minutes 09 seconds East a distance of 1316.22 feet; thence South 89 degrees 52 minutes 19 seconds East, a distance of 1693.76 feet to the intersection with the traveled centerline of Lehigh Ave North; thence southerly along said East line of the Southeast corner of said West Half of the Northeast Quarter; thence Westerly along the South lines of said West Half of the Northeast Quarter and said East Half of the Northwest Quarter to the Southwestern corner of said East Half of the Northwest Quarter; thence Northerly along the West line of said East Half of the Northwest Quarter to the Northeast corner thereof thence Easterly along the North line of said East Half of the Northwest Quarter to the point of beginning. Containing 75.45 acres, more or less (2502721240001).

10. Exhibit List

a. Application Form
b. Site Plan (Site Map)
c. Demonstration Equipment Specifications
d. Vegetation Management Plan
e. Glare Study
f. Stormwater Management Plan
g. Decommissioning Plan

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Minneapolis, MN 55416
(952) 212-0824

ENTERPRISE ENERGY

2925 DEAN PARKWAY, EXECUTIVE STE 300
MINNEAPOLIS, MN 55416
612-470-7152
WWW.ENTERPRISEENERGY.COM

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THIS DRAWING IS FOR PLANNING PURPOSES ONLY, AND NOT TO BE USED FOR CONSTRUCTION.

PV SYSTEM OVERVIEW	
DC SYSTEM SIZE (kWDC)	7,618
AC SYSTEM SIZE (kWAC)	5,000
DC/AC RATIO	1.524
QTY PV MODULES	12,912
QTY INVERTERS	20
ARRAY TILT	±52°
ARRAY AZIMUTH	180°
PV MODULE SPECIFICATIONS	
MANUFACTURER	Q.CELLS
MODEL NUMBER	Q.PEAK DUO XL-G11S.3/BFG
POWER (WDC-STC)	590
MAX SYSTEM VOLTAGE (VDC)	1500
PV INVERTER SPECIFICATIONS	
MANUFACTURER	SOLECTRIA
MODEL NUMBER	XGI 1500 250/250-600
MAX OUTPUT POWER (kWAC / KVA)	250 / 250
OUTPUT VOLTAGE (VAC)	600
MAX INPUT VOLTAGE (VDC)	1,500

ENGINEER'S STAMP:

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

_____

NAME _____
DATE _____
REGISTRATION NUMBER _____

NO.	REVISION / ISSUE	DATE
0	INTERCONNECTION APPLICATION	11/19/2023
1	CUP PACKAGE	1/8/2024
2	TOPO AND SCREENING	1/31/2024
3	CUP PACKAGE V2	2/17/2024
4	REMOVE NWI STREAM	3/5/2024
5	INFILTRATION BASIN RELOCATION	4/22/2024
6	PLANNING MEETING COMMENTS	5/15/2024
7		
8		
9		
10		
11		

PROJECT NAME:

FINNEGAN CSG
EESOLAR32 LLC
SRC#: _____

LOCATION:

10555 LEHIGH RD S
HASTINGS, MN 55033
44.8008620907°, -92.8796944934°
WASHINGTON COUNTY, MN

EPC OPERATOR:

XCEL ENERGY

DRAWING TITLE:

SITE PLAN

SHEET:	SHEET SIZE:
A001	22"x34"

LEGEND:

- PROJECT BOUNDARY
- NONPARTICIPATING PROPERTY
- PARCEL LINES
- EX. 5' INDEX CONTOUR
- EX. 1' INTERVAL CONTOUR
- EX. OVERHEAD POWER
- PROPOSED MODULE SETBACK
- PROPOSED SOLAR ARRAY
- PROPOSED ACCESS ROAD
- PROPOSED SECURITY FENCE
- PROPOSED LAYDOWN YARD
- PROPOSED ELECTRICAL EQUIPMENT
- PROPOSED OVERHEAD MEDIUM VOLTAGE CABLE
- PROPOSED UNDERGROUND MEDIUM VOLTAGE CABLE
- PROPOSED BASIN
- PROPOSED BERM
- PROPOSED SWALE
- PROPOSED CULVERT

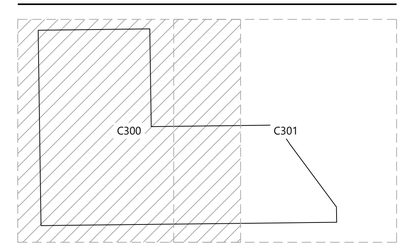
SETBACK REQUIREMENTS		
	REQUIRED (FT)	PROVIDED (FT)
NORTH	300	812
SOUTH	300	308
EAST	300	306
WEST	300	314

SYSTEM SPECIFICATIONS	
SYSTEM SIZE DC (kW)	7,618
SYSTEM SIZE AC (kW)	5,000
DC/AC RATIO	1.524
INVERTER MANUFACTURER	SOLECTRIA
INVERTER MODEL NUMBER	XGI 1500 250/250-600
INVERTER RATING (kW / KVA)	250 / 250
INVERTER QUANTITY	20
MODULE MANUFACTURER	Q.CELLS
MODULE MODEL NUMBER	Q.PEAK DUO XL-G11S.3/BFG
MODULE RATING (W)	590
TOTAL MODULE QUANTITY	12,912
TOTAL NO. OF 96-MODULE TRACKERS	127
TOTAL NO. OF 72-MODULE TRACKERS	10
INTER-ROW SPACING (FT)	16.2
PITCH (FT)	24.2
GCR (%)	33.3
FENCED AREA (AC)	35.9

NOTES:

1. INSTALLATION TO COMPLY WITH NEC 2017 ARTICLE 690 AND ALL APPLICABLE LOCAL, STATE, AND NATIONAL CODES AND REGULATIONS.
2. EQUIPMENT SHALL BE LABELED PER NEC 690 AND XCEL ENERGY REGULATIONS.
3. 15' ACCESS ROADS SHALL BE DESIGNED TO ACCOMMODATE ALL CONSTRUCTION, OPERATIONS, MAINTENANCE, AND UTILITY TRAFFIC THROUGHOUT THE SITE.

KEY MAP:



Westwood

Phone (608) 821-6600
8401 Greenway Blvd., Suite 400
Middleton, WI 53562
westwoodps.com

Westwood Professional Services, Inc.

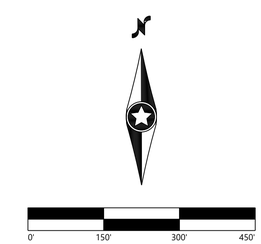
PREPARED FOR:

ENTERPRISE ENERGY

2925 Dean Parkway, Suite 300
Minneapolis, MN 55416

REVISIONS:

#	DATE	COMMENT
A	04/15/24	Permitting Plan Set
B	04/19/24	Permitting Plan Set



Finnegan Solar Project

Cottage Grove, MN

PV Site Plan

NOT FOR CONSTRUCTION

DATE: 04/19/2024

SHEET: C300

REV: B

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LEGEND:

- PROJECT BOUNDARY
- NONPARTICIPATING PROPERTY
- PARCEL LINES
- EX. 5' INDEX CONTOUR
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SETBACK REQUIREMENTS		
	REQUIRED (FT)	PROVIDED (FT)
NORTH	300	812
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SYSTEM SPECIFICATIONS	
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INVERTER MODEL NUMBER	XGI 1500 250/250-600
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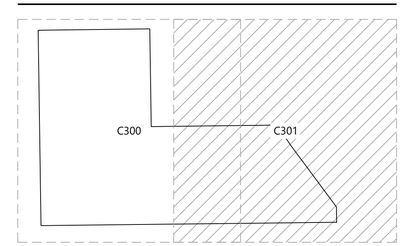

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Westwood Professional Services, Inc.

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2925 Dean Parkway, Suite 300
Minneapolis, MN 55416

REVISIONS:

#	DATE	COMMENT
A	04/15/24	Permitting Plan Set
B	04/19/24	Permitting Plan Set

0' 150' 300' 450'

Finnegan Solar Project

Cottage Grove, MN

PV Site Plan

NOT FOR CONSTRUCTION

DATE: 04/19/2024

SHEET: C301

REV: B

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LEGEND:

- PROJECT BOUNDARY
- NONPARTICIPATING PROPERTY
- PARCEL LINES
- EX. 5' INDEX CONTOUR
- EX. 1' INTERVAL CONTOUR
- EX. OVERHEAD POWER
- PROPOSED MODULE SETBACK
- PROPOSED SOLAR ARRAY
- PROPOSED ACCESS ROAD
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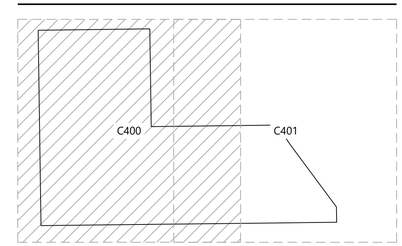
- PROPOSED LAYDOWN YARD
- PROPOSED ELECTRICAL EQUIPMENT
- PROPOSED OVERHEAD MEDIUM VOLTAGE CABLE
- PROPOSED UNDERGROUND MEDIUM VOLTAGE CABLE
- PROPOSED CULVERT
- PROPOSED 5' INDEX CONTOUR
- PROPOSED 1' INTERVAL CONTOUR
- PROPOSED GRADING LIMITS
- PROPOSED SILT FENCE
- PROPOSED EROSION CONTROL BLANKET
- PROPOSED RIP RAP
- PROPOSED CONSTRUCTION ENTRANCE
- DRAINAGE AREA BOUNDARY

GRADING QUANTITIES		
	CUT (CY)	FILL (CY)
ARRAY	300	1400
BASIN	1200	0
BERM	0	200
SWALE	500	0
TOTAL	2000	1600

NOTES:

1. INTERNAL ROADS WILL BE CONSTRUCTED TO MATCH THE SURROUNDING EXISTING GROUND ELEVATIONS TO ALLOW EXISTING DRAINAGE PATTERNS TO PERSIST.
2. ALL EROSION AND SEDIMENT CONTROLS SHALL BE INSTALLED PRIOR TO ANY UPSLOPE GROUND DISTURBANCE COMMENCING.
3. TOPSOIL SHALL BE SEGREGATED FROM ALL EARTHWORK ACTIVITIES THAT REQUIRE SUBSOIL EXCAVATION.
4. MINOR SURFACE SMOOTHING MAY OCCUR FOR RACKING INSTALLATION.
5. FINAL TOP OF CONCRETE PAD ELEVATION SHALL BE AT LEAST 2" ABOVE THE SURROUNDING FINAL FINISHED GRADE AND CONTRACTOR SHALL ENSURE FINISHED GRADE PROVIDES POSITIVE DRAINAGE AWAY FROM EQUIPMENT PADS.
6. THE ENTIRETY OF THE SITE REQUIRES VEGETATION ESTABLISHMENT PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION ACTIVITIES.
7. THE CONTRACTOR SHALL DEVELOP AN ACCESS PLAN TO ISOLATE VEHICLE AND EQUIPMENT ACCESS TO DEFINED AREAS SO DISTURBANCE CAN BE CALCULATED. IF EQUIPMENT AND ACCESS IS NOT CONTROLLED, THE POTENTIAL FOR RUTTING AND SOIL DISTURBANCE FROM TIRES AND TRACKED EQUIPMENT IS HIGH AND COULD RESULT IN EXCESSIVE SOIL DISTURBANCE.
8. WESTWOOD RECOMMENDS PRESERVING A MINIMUM 10' VEGETATED BUFFER STRIP BETWEEN PROJECT FENCE AND ARRAY AREA.
9. PERIMETER SEDIMENT CONTROL BMPS (EG. SILT FENCE, STABILIZED SOIL BERMS, FIBER LOGS) ARE STILL REQUIRED.
10. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO INSPECT AND OBSERVE DISTURBED SOIL AREAS.
11. IF DISTURBED AREAS ARE NOT STABILIZED USING SEEDING OR MULCH, FIBER ROLLS SHALL BE INSTALLED PER DETAIL SW-05 ON SHEET C502.
12. WESTWOOD RECOMMENDS STABILIZING DISTURBED AREAS FOLLOWING SITE GRADING, PILE DELIVERY AND INSTALLATION, AND RACKING DELIVERY AND INSTALLATION.
13. SEE SHEET C300 FOR APPLICABLE DIMENSIONS.

KEY MAP:



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REVISIONS:

#	DATE	COMMENT
A	04/15/24	Permitting Plan Set
B	04/19/24	Permitting Plan Set

0' 150' 300' 450'

Finnegan Solar Project

Cottage Grove, MN

Grading, Erosion, and Sediment Control Plan

NOT FOR CONSTRUCTION

DATE: 04/19/2024

SHEET: C400

REV: B

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LEGEND:

- PROJECT BOUNDARY
- NONPARTICIPATING PROPERTY
- PARCEL LINES
- EX. 5' INDEX CONTOUR
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- DRAINAGE AREA BOUNDARY

GRADING QUANTITIES		
	CUT (CY)	FILL (CY)
ARRAY	300	1400
BASIN	1200	0
BERM	0	200
SWALE	500	0
TOTAL	2000	1600

NOTES:

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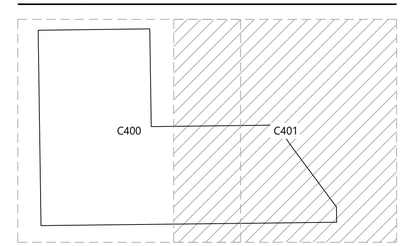
13. SEE SHEET C300 FOR APPLICABLE DIMENSIONS.

KEY MAP:



Westwood

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A	04/15/24	Permitting Plan Set
B	04/19/24	Permitting Plan Set

0' 150' 300' 450'

Finnegan Solar Project

Cottage Grove, MN

Grading, Erosion, and Sediment Control Plan

NOT FOR CONSTRUCTION

DATE: 04/19/2024

SHEET: C401

REV: B

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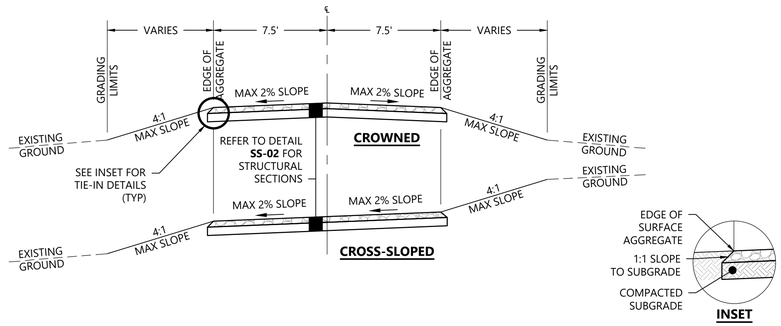
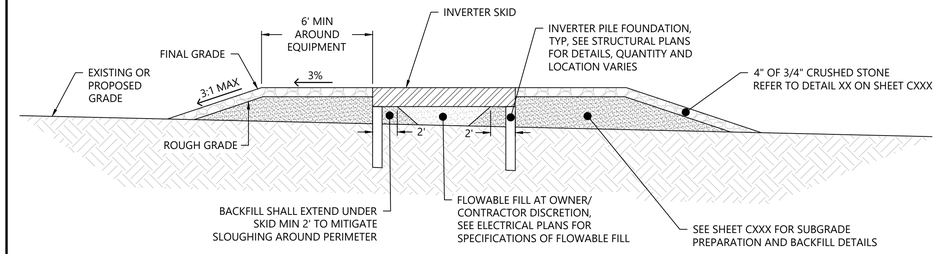


NOTES:

1. ENSURE THAT ROADS REMAIN WELL-DRAINED.
2. CONSTRUCT CROSS-SLOPE WHERE ROADS ARE CONSTRUCTED ON A SIDE SLOPE, AND WHERE OTHERWISE NOTED ON PLANS.
3. SLOPES SHOWN ARE TYPICAL. SOME ROAD LOCATIONS MAY REQUIRE VARIATIONS IN SLOPE.
4. ALL DISTURBED GROUND NOT COVERED WITH AGGREGATE SHALL BE STABILIZED PER THE NPDES PERMIT.

Westwood | TYPICAL ACCESS ROAD | NOT TO SCALE | RD-05

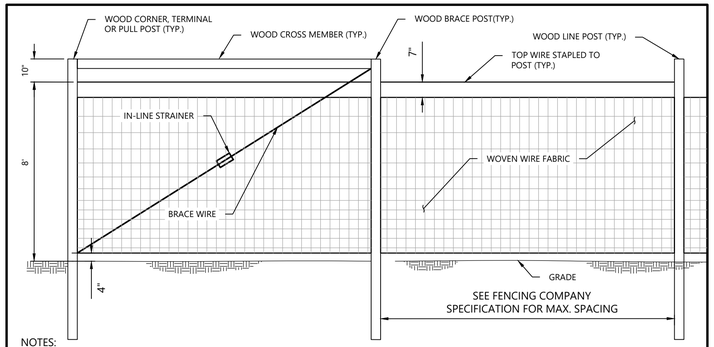


SECTION A-A

NOTES:

1. MINIMUM SERVICE APRON WIDTH AROUND EQUIPMENT TO BE CONFIRMED BY ELECTRICAL ENGINEER FOR COMPLIANCE WITH THE GOVERNING ELECTRICAL CODE FOR ALL PROPOSED EQUIPMENT ON THE SKID.
2. PROVIDE 1' OF FREEBOARD ABOVE THE 100 YR FLOOD DEPTH TO THE TOP OF INVERTER SKID.
3. VERIFY EXISTING GRADE IN FIELD PRIOR TO PREPARING SUBGRADE.
4. TOP OF SKID ELEVATION MAY BE RAISED HIGHER THAN MINIMUM SKID ELEVATION. SEE STRUCTURAL PLAN SET FOR MINIMUM AND MAXIMUM PILE REVEALS.
5. SEE STRUCTURAL PLAN SET FOR PILE FOUNDATION, CAP PLATE, AND PILE/PLACEMENT/SPACING DETAILS.
6. BACKFILL SHALL BE PLACED AFTER INVERTER SKID IS IN PLACE, ATTACHED AND THE FINAL STRUCTURAL INSPECTION IS COMPLETED.
7. FLOWABLE FILL SHALL NOT BE PLACED UNTIL CONDUIT ROUTING HAS BEEN COMPLETED AND APPROVED.

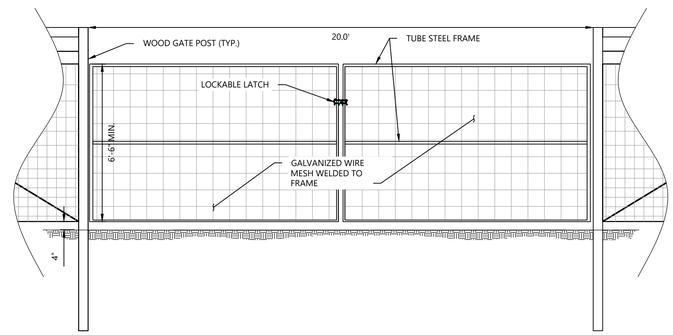
Westwood | TYPICAL INVERTER SKID SERVICE APRON | NOT TO SCALE | SL-01



NOTES:

1. TYPICAL FENCE AND GATE INFORMATION SHOWN IS INTENDED FOR PLANNING PURPOSES. ACTUAL DIMENSIONS AND INFORMATION TO BE PROVIDED BY FENCE SUPPLIER.
2. REFER TO FENCE SUPPLIER SPECIFICATIONS AND DETAILS.
3. STRUCTURAL DESIGN OF FENCE POSTS AND FOUNDATIONS TO BE PROVIDED BY FENCE SUPPLIER. STRUCTURAL PLANS AND FENCE SUPPLIER DRAWINGS SHALL SUPERSEDE THIS DETAIL IF CONFLICTS ARE PRESENT.
4. FENCE AND GATE TYPE TO BE APPROVED BY OWNER PRIOR TO CONSTRUCTION.

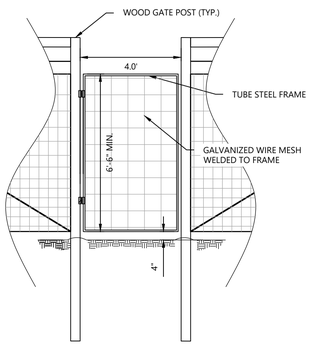
Westwood | LIVESTOCK FENCE | NOT TO SCALE | FN-01



NOTES:

1. SEE NOTES ON DETAIL **FN-01**.

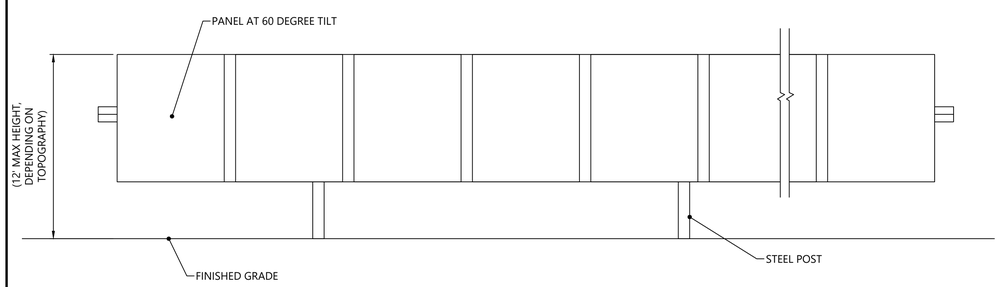
Westwood | VEHICLE GATE | NOT TO SCALE | FN-02



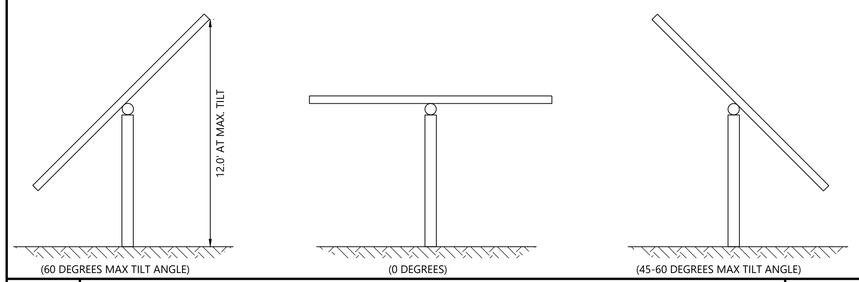
NOTES:

1. SEE NOTES ON DETAIL **FN-01**.

Westwood | PERSONNEL GATE | NOT TO SCALE | FN-03



Westwood | EAST OR WEST - TYPICAL TRACKER ELEVATION | NOT TO SCALE | TRK-01



Westwood | TYPICAL SOLAR TRACKER PROFILE VIEWS | NOT TO SCALE | TRK-02

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REVISIONS:

#	DATE	COMMENT
A	04/15/24	Permitting Plan Set
B	04/19/24	Permitting Plan Set

Finnegan Solar Project

Cottage Grove, MN

Typical Details

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DATE: 04/19/2024

SHEET: C500 REV: B

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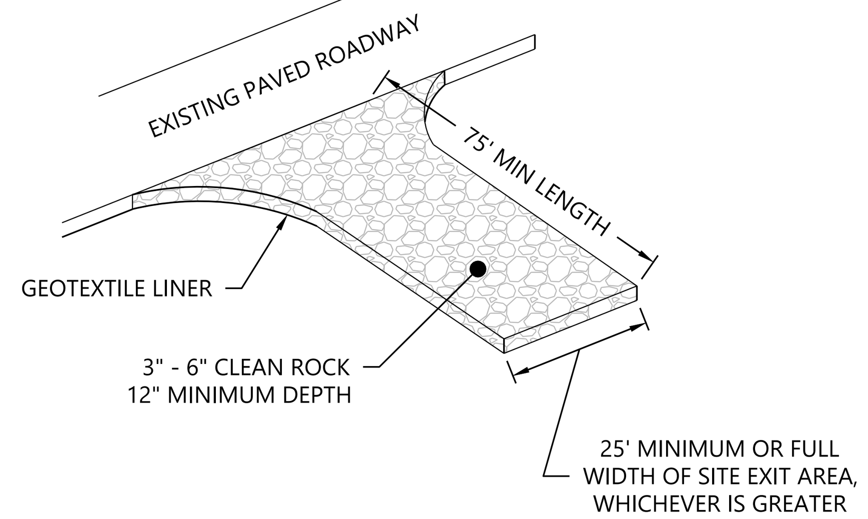
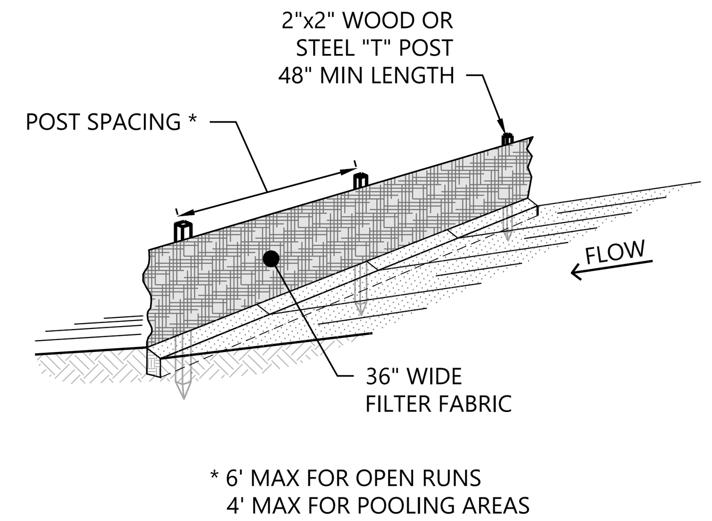


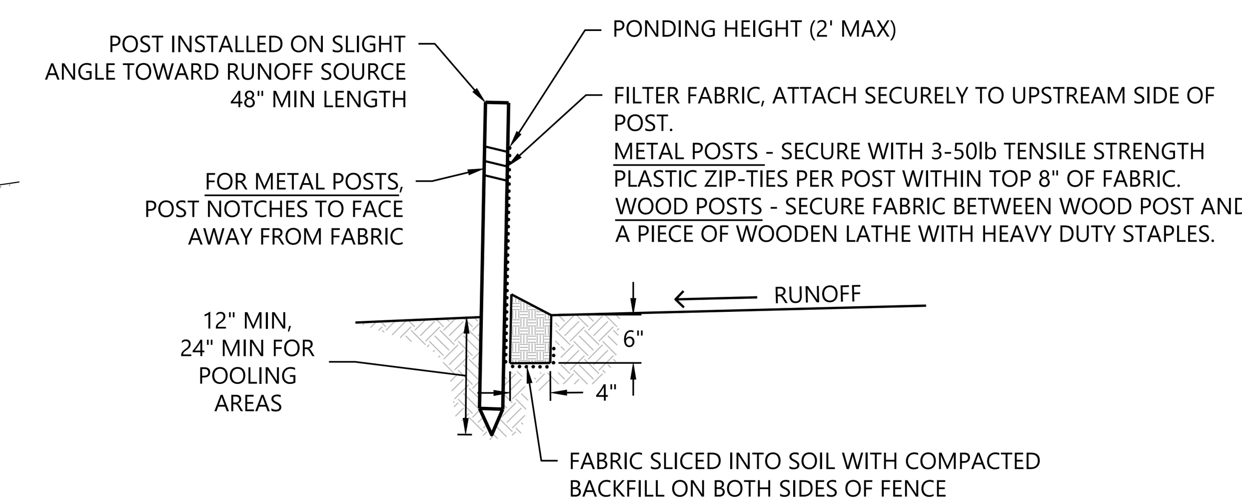
NOTES:

1. IF SEDIMENT TRACKING IS OBSERVED ON EXISTING PAVED ROADWAY, THE CONTRACTOR SHALL SCRAPE AND SWEEP THE SURFACE WITH A PICKUP BROOM ATTACHMENT OR VEHICLE.
2. REGULAR INSPECTION AND MAINTENANCE SHALL BE PERFORMED OVER LIFE OF USE.
3. LENGTH MAY NEED TO BE EXTENDED AS NECESSARY TO IMPROVE PERFORMANCE.

Westwood | VEHICLE TRACKOUT CONTROL - ROCK EXIT | NOT TO SCALE | SW-40



PERSPECTIVE VIEW

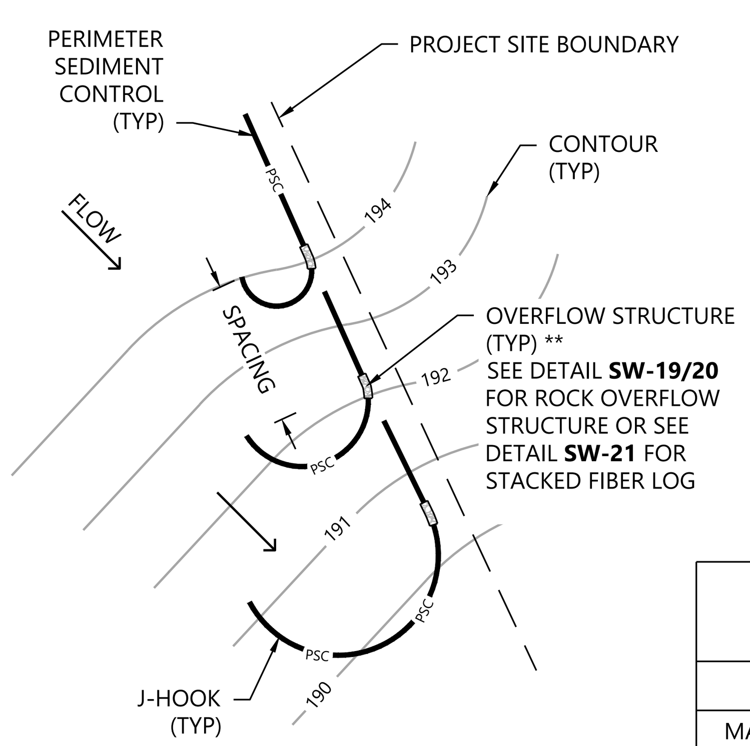


POST AND TRENCH DETAIL

NOTES:

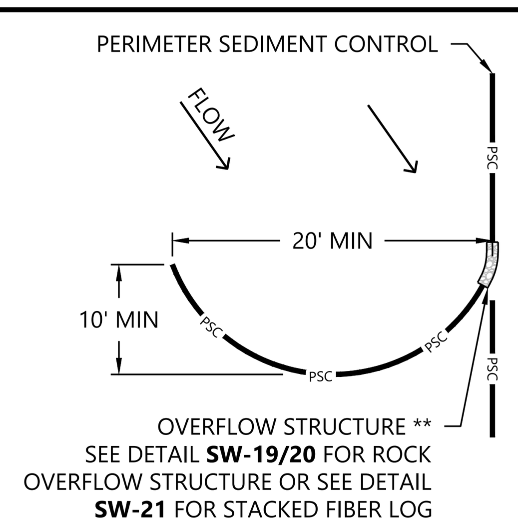
1. SILT FENCE MATERIAL SHOULD BE POLYPROPYLENE, POLYETHYLENE OR POLYAMIDE WOVEN OR NONWOVEN FABRIC. THE FABRIC WIDTH SHOULD BE 36 INCHES, WITH A MINIMUM UNIT WEIGHT OF 4.5 OZ/YD, MULLEN BURST STRENGTH EXCEEDING 190 LB/IN 2 , ULTRAVIOLET STABILITY EXCEEDING 70%, AND MINIMUM APPARENT OPENING SIZE OF U.S. SIEVE NO. 30.
2. SILT FENCE SHOULD BE SECURELY FASTENED TO EACH SUPPORT POST. THERE SHOULD BE A 3 FT OVERLAP, SECURELY FASTENED WHERE ENDS OF FABRIC MEET.
3. SILT FENCE SHALL BE PLACED ON SLOPE CONTOURS TO MAXIMIZE PONDING EFFICIENCY.
4. ALL ENDS OF THE SILT FENCE SHALL BE WRAPPED UPSLOPE SO THE ELEVATION OF THE BOTTOM OF FABRIC IS HIGHER THAN "PONDING HEIGHT".
5. INSPECT AND REPAIR FENCE AFTER EACH STORM EVENT AND REMOVE SEDIMENT WHEN ACCUMULATED TO **1/3 HEIGHT** OF THE FABRIC OR MORE.
6. REMOVED SEDIMENT SHALL BE DEPOSITED TO AN AREA THAT WILL NOT CONTRIBUTE SEDIMENT OFF-SITE AND CAN BE PERMANENTLY STABILIZED.
7. SILT FENCE SHOULD REMAIN IN PLACE AND MAINTAINED UNTIL THE DISTURBED AREA IS PERMANENTLY STABILIZED.
8. INSTALL A SECOND ROW OF SILT FENCE APPROXIMATELY 5' FROM INITIAL ROW WHEN REDUNDANT PROTECTION IS REQUIRED WITHIN 50' OF WETLANDS AND STREAMS.
9. AVOID SPLICED SECTIONS IN LOW LYING (LOAD BEARING) LOCATIONS.

Westwood | SILT FENCE - TRENCHED | NOT TO SCALE | SW-11



PERSPECTIVE VIEW

** OVERFLOW STRUCTURES MAY BE OMITTED WHEN FIBER LOGS ARE UTILIZED AS PERIMETER SEDIMENT CONTROL (PSC)



J-HOOK DETAIL

SPACING RECOMMENDATIONS

		SOIL TYPE		
MATERIAL	SLOPE	SILTY	CLAYS	SANDY
SILT FENCE	3:1	75 FT	100 FT	125 FT
	4:1	100 FT	125 FT	150 FT
	≤10:1	125 FT	150 FT	200 FT
9" FIBER LOG	≤3%	46 FT	56 FT	75 FT

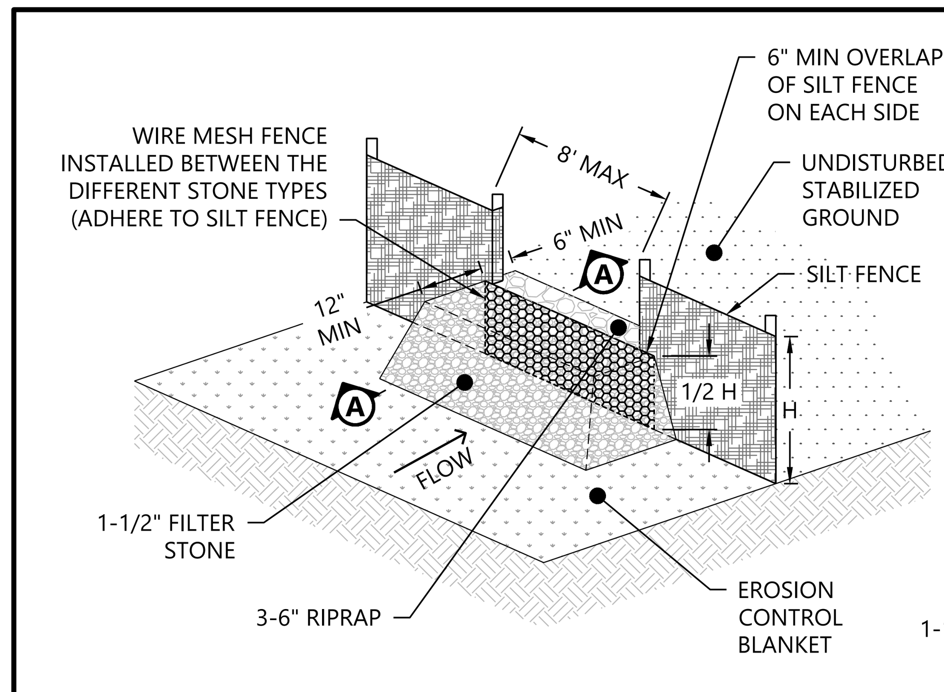
APPLICATION NOTES:

1. INSTALL J-HOOKS WHENEVER THE PERIMETER SEDIMENT CONTROL (PSC) BARRIER IS INSTALLED AT AN ANGLE OF 30 DEGREES OR GREATER FROM PARALLEL TO CONTOURS.
2. ADHERE TO J-HOOK SPACING REQUIREMENTS ACCORDING TO SURFACE SLOPE DETAILED IN TABLE.
3. WHERE MINIMUM HOOK DIMENSIONS SHOWN CANNOT BE ACHIEVED, NARROWER HOOKS MAY BE USED WITH HIGHER FREQUENCY SPACING.
4. WHERE PONDING DEPTH BEGINS TO EXCEED 1.5 FEET OR THE PSC BARRIER AND ROCK OUTLET OTHERWISE FAIL TO PROVIDE CONTROL, FREQUENCY AND SIZING OF J-HOOKS MUST BE ADJUSTED TO REMEDY THE ISSUE.
5. WHEN OVERLAND SHEET FLOW SLOPE IS LESS THAN OR EQUAL TO 3%, FIBER LOGS MAY BE USED AS PERIMETER SEDIMENT CONTROL. IF SHEET FLOW SLOPE IS GREATER THAN 3%, SILT FENCE MUST BE USED.

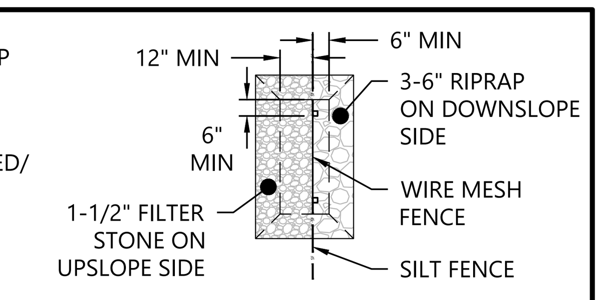
INSTALLATION NOTES:

1. INSTALL J-HOOK LOCATED IMMEDIATELY DOWN GRADIENT FROM THE ROCK OUTLET TO ENSURE THE WATER IS NOT DIVERTED TO THE LOWEST AREAS WHERE A COMPLEX SLOPE EXISTS.
2. UP-GRADIENT PSC BARRIER AND J-HOOK ARE ONE CONTINUOUS BARRIER.
3. START DOWN-GRADIENT PSC BARRIER AS CLOSE AS POSSIBLE TO THE UP-GRADIENT J-HOOK.
4. BOTTOM OF PSC BARRIER ELEVATIONS AT THE END OF J-HOOK NEED TO BE HIGHER THAN THE TOP OF BARRIER ELEVATIONS AT THE MIDDLE OF J-HOOK.
5. TOP OF BARRIER ELEVATIONS AT THE MIDDLE OF J-HOOK NEED TO BE HIGHER THAN THE ROCK OUTLET ELEVATIONS.

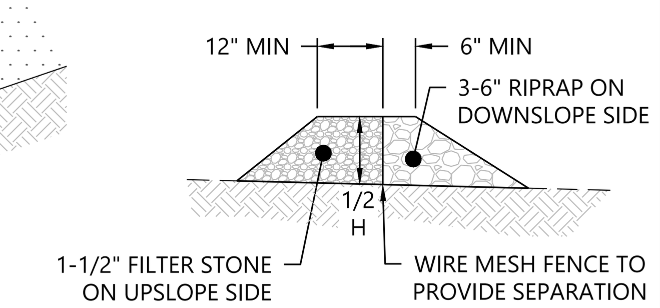
Westwood | PERIMETER SEDIMENT CONTROL - J-HOOK APPLICATION | NOT TO SCALE | SW-18



PERSPECTIVE VIEW



PLAN VIEW



SECTION A-A

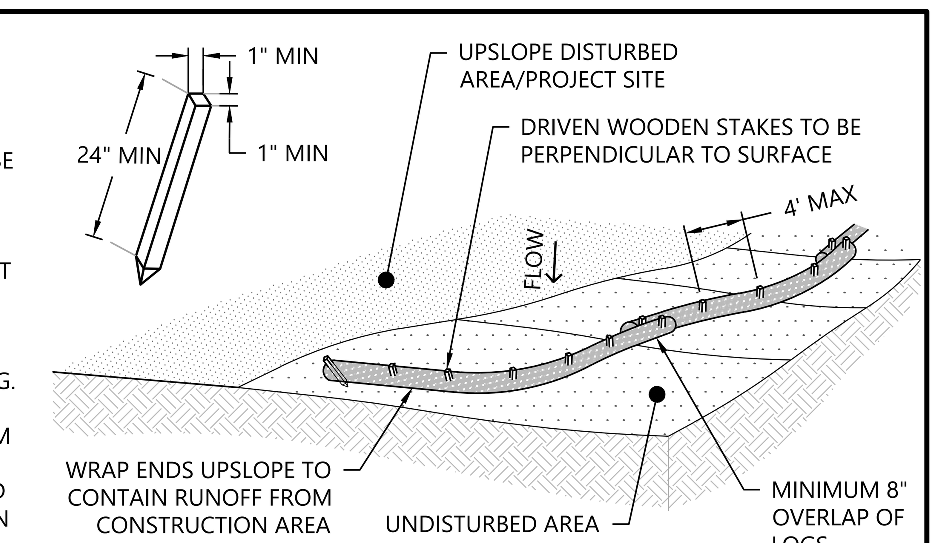
NOTES:

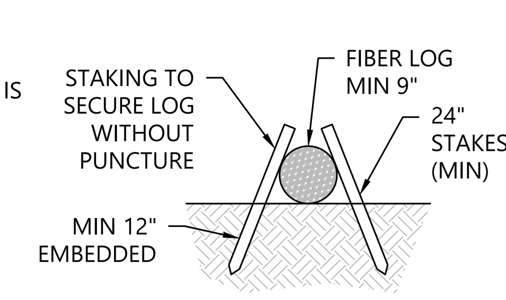
1. LOCATIONS OF ROCK OVERFLOW STRUCTURES ARE INDICATED ON THE PLANS AND/OR AS DETERMINED BY QUALIFIED PERSONNEL BASED ON FIELD CONDITIONS TO MAINTAIN PERMIT COMPLIANCE. QUALIFIED PERSONNEL MUST BE TRAINED AND CERTIFIED IN EROSION AND SEDIMENT CONTROL.
2. ROCK OVERFLOW STRUCTURES ARE RECOMMENDED AT ALL LOW POINTS AND AT A SPACING OF 300 FEET WHERE NO LOW POINT IS APPARENT.

Westwood | ROCK OVERFLOW STRUCTURE FOR SILT FENCE - HALF HEIGHT | NOT TO SCALE | SW-19

NOTES:

1. FIBER LOGS SHALL BE INSTALLED PRIOR TO UPSLOPE DISTURBANCE ACTIVITIES COMMENCE.
2. FIBER LOGS SHALL BE PREFABRICATED AND MADE FROM CERTIFIED STRAW, WOOD, OR COCONUT FIBER MATERIAL BOUND INTO A TIGHT TUBULAR LOG BY NETTING. USE A 9" DIA. LOG MINIMUM.
3. TRENCHES SHALL BE CREATED ALONG THE SLOPE OF THE PERIMETER. THE TRENCH DEPTH SHOULD BE 1/4 TO 1/3 OF THE THICKNESS OF THE LOG, AND THE WIDTH SHOULD EQUAL THE LOG DIAMETER, IN ORDER TO PROVIDE AREA TO BACKFILL THE TRENCH.
4. STAKE FIBER LOGS INTO THE TRENCH. DRIVE STAKES AT THE END OF EACH FIBER LOG AND SPACED 4 FEET MAXIMUM ON CENTER. USE HARD WOOD STAKES WITH NOMINAL CLASSIFICATION OF AT LEAST 1" BY 1" AND A MINIMUM LENGTH OF 24". STAKES SHALL BE EMBEDDED A MINIMUM DEPTH OF 12".
5. LOGS SHALL BE INSTALLED PERPENDICULAR TO WATER MOVEMENT, AND PARALLEL TO THE SLOPE CONTOUR.
6. TURN THE ENDS OF THE FIBER LOGS UP SLOPE TO PREVENT RUNOFF FROM GOING AROUND THE LOG. THE UPSLOPE POINT SHOULD BE A MINIMUM 12" HIGHER IN ELEVATION THAN THE LOW POINT.
7. IF MORE THAN ONE FIBER LOG IS PLACED IN A ROW, THE LOGS SHOULD BE OVERLAPPED A MINIMUM OF 8 INCHES, NOT ABUTTED.
8. FIBER LOGS ENCASED WITH PLASTIC NETTING ARE USED FOR A TEMPORARY APPLICATION ONLY AND SHOULD BE REMOVED FOLLOWING STABILIZATION. FIBER LOGS USED IN A PERMANENT APPLICATION SHALL BE ENCASED WITH A BIODEGRADABLE MATERIAL AND MAY BE LEFT IN.
9. TEMPORARY INSTALLATIONS SHOULD ONLY BE REMOVED WHEN UP GRADIENT AREAS ARE STABILIZED PER GENERAL PERMIT REQUIREMENTS, AND/OR POLLUTANT SOURCES NO LONGER PRESENT A HAZARD. BUT, THEY SHOULD ALSO BE REMOVED BEFORE VEGETATION BECOMES TOO MATURE SO THAT THE REMOVAL PROCESS DOES NOT DISTURB MORE SOIL AND VEGETATION THAN IS NECESSARY
10. FIBER LOGS MUST BE INSPECTED IN ACCORDANCE WITH GENERAL PERMIT REQUIREMENTS FOR THE ASSOCIATED PROJECT TYPE AND RISK LEVEL.
11. REPAIR OR REPLACE SPLIT, TORN, UNRAVELING, OR SLUMPING FIBER LOGS.
12. SEDIMENT THAT ACCUMULATES UPSLOPE OF THE BMP SHOULD BE PERIODICALLY REMOVED IN ORDER TO MAINTAIN BMP EFFECTIVENESS. REFER TO CONSTRUCTION GENERAL PERMIT FOR SEDIMENT ACCUMULATION MAINTENANCE INTERVALS.
13. RILL, UNDERMINING, AND/OR GULLIES MAY BEGIN TO FORM FOLLOWING MAJOR STORM EVENTS WHERE RUNOFF HAS OVERTOPPED THE FIBER LOGS. THESE RILLS OR GULLIES SHOULD BE PROMPTLY REPAIRED.





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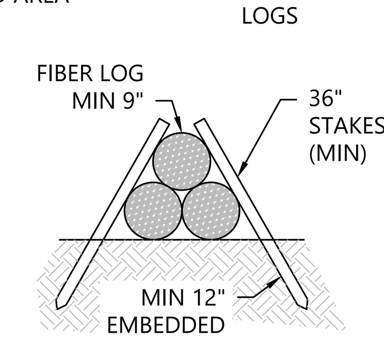
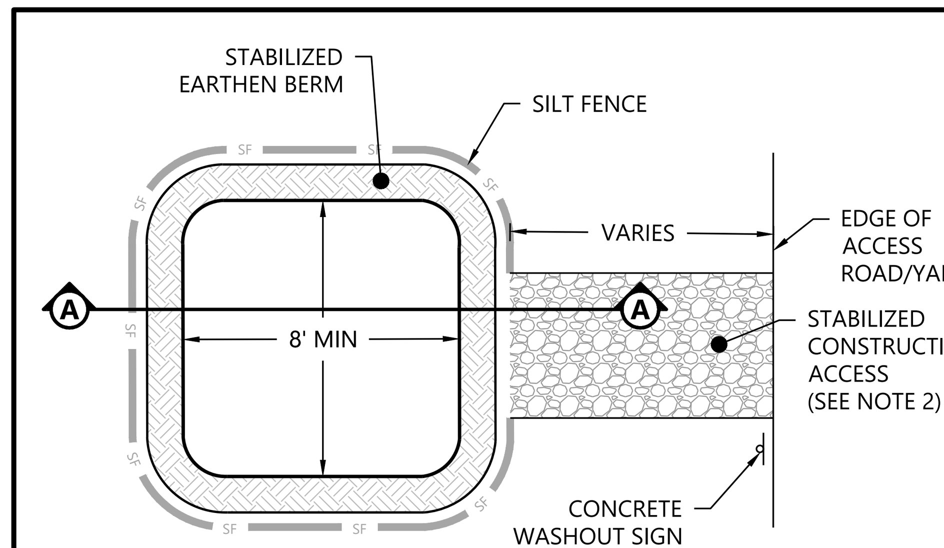
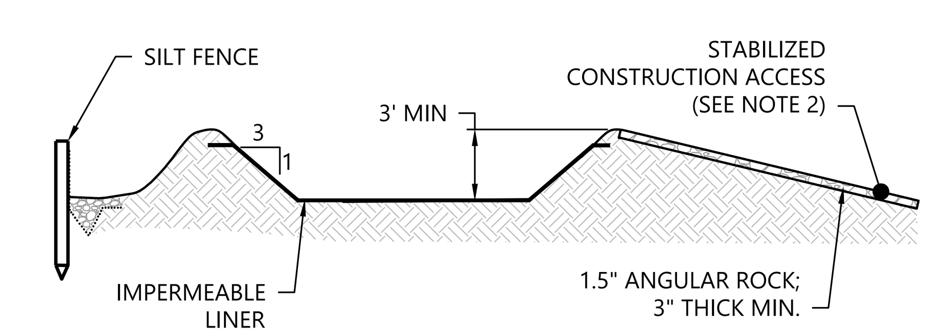


STACKING METHOD

Westwood | PERIMETER SEDIMENT CONTROL - FIBER LOGS | NOT TO SCALE | SW-13



PLAN VIEW



SECTION A-A

NOTES:

1. CONCRETE WASHOUT AREAS SHALL BE LINED WITH A 10 MIL PLASTIC IMPERMEABLE LINER TO PREVENT CONCRETE WASHOUT WATER FROM INFILTRATING/CONTACTING WITH SOIL.
2. PROVIDE STABILIZED CONSTRUCTION ACCESS IF SEDIMENT TRACKING CONTROLS ARE NECESSARY.
3. ALTERNATE WASHOUT SYSTEMS MAY BE USED IF APPROVED.
4. REFER TO PROJECT NPDES PERMIT FOR ADDITIONAL CONSTRUCTION, MAINTENANCE, AND REMOVAL REQUIREMENTS

Westwood | CONCRETE WASHOUT AREA | NOT TO SCALE | SW-60

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Finnegan Solar Project

Cottage Grove, MN

Typical Details

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DATE: 04/19/2024

SHEET: C501 REV: B

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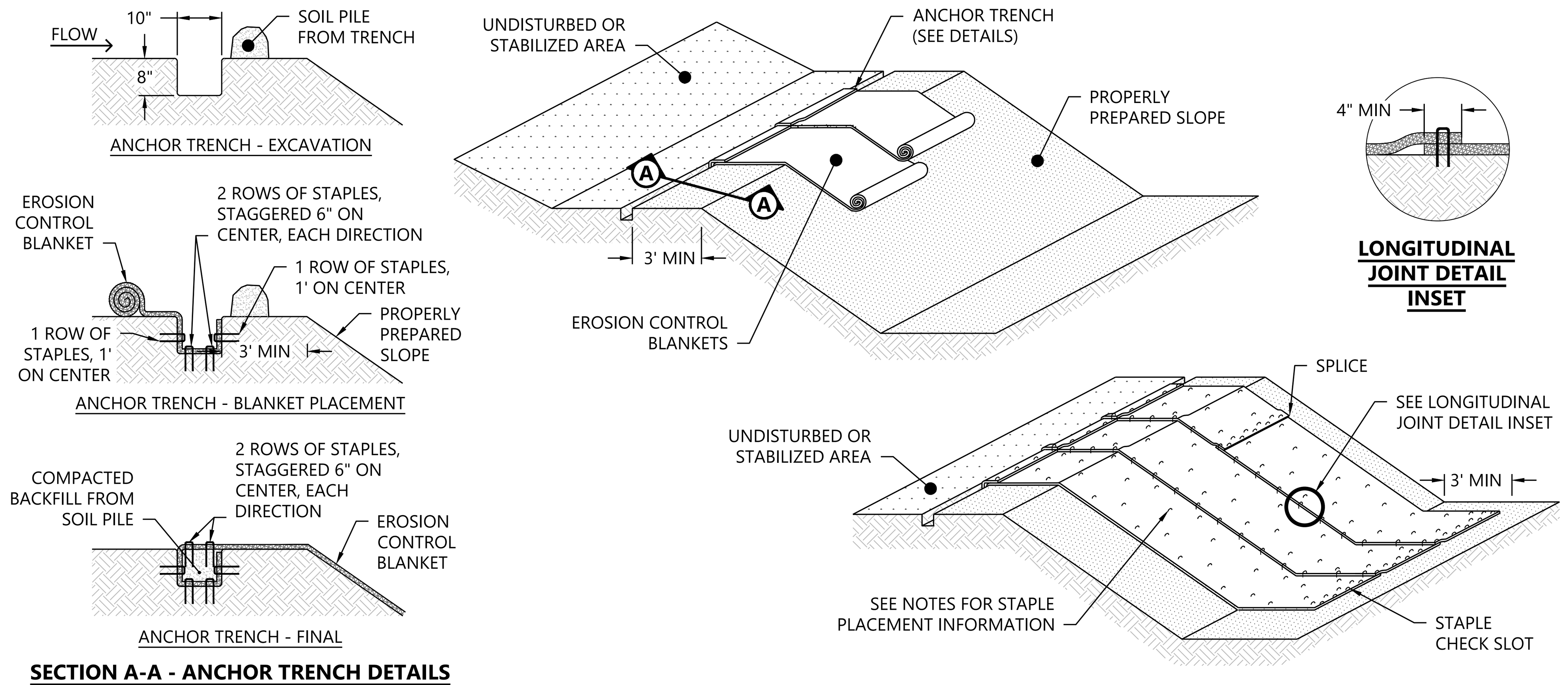
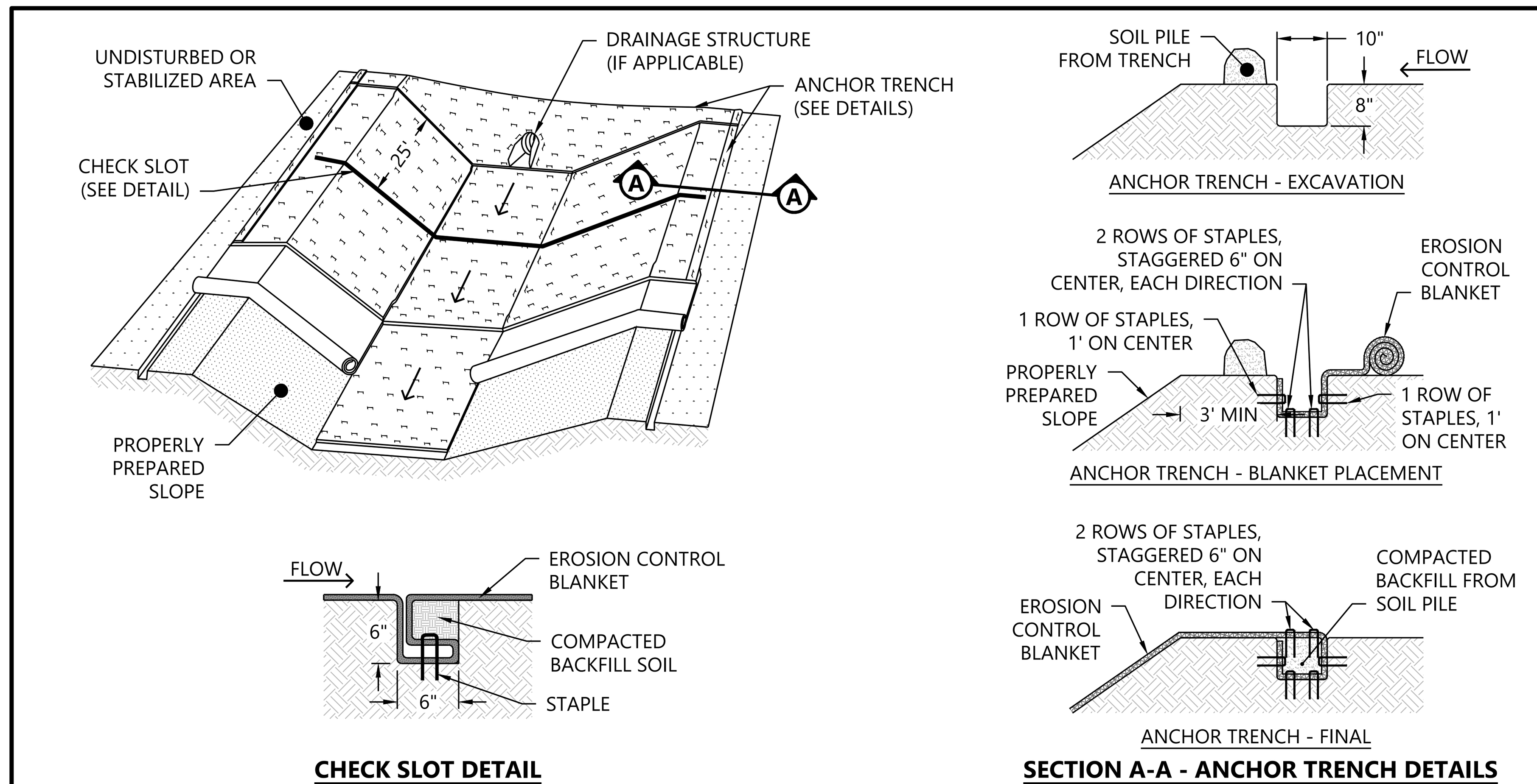


NOTES:

1. EROSION CONTROL BLANKETS ARE INTENDED TO BE USED AS AN IMMEDIATE MULCH COVER FOR DISTURBED SLOPES THAT HAVE BEEN TEMPORARILY OR PERMANENTLY SEEDED.
2. EROSION CONTROL BLANKETS SHALL BE INSTALLED ACCORDING TO MANUFACTURERS SPECIFICATIONS. WHEN NOT AVAILABLE, INSTALL ACCORDING TO THIS DETAIL AND THE FOLLOWING NOTES:
   - 2.1. STEP ONE: SITE PREPARATION. TO PREVENT TENTING THE SITE SHOULD BE FINE GRADED TO A SMOOTH PROFILE AND RELATIVELY FREE FROM ALL WEEDS, CLODS, STONES, ROOTS, STICKS, RIVULETS, GULLIES, CRUSTING, AND CAKING. FILL ANY VOIDS AND MAKE SURE THE SLOPE IS COMPACTED PROPERLY.
   - 2.2. STEP TWO: ADEQUATE TOPSOIL SHALL BE REAPPLIED AFTER GRADING PRIOR TO SEEDING.
   - 2.3. STEP THREE: SEEDING. SEEDING WITHOUT MULCH SHOULD BE APPLIED TO THE AREA TO BE VEGETATED.
   - 2.4. STEP FOUR: PREPARE THE ANCHOR TRENCH. AT THE TOP OF THE SLOPE EXCAVATE AN ANCHOR TRENCH 8" X 10". THE EROSION CONTROL BLANKET WILL BE ANCHORED INTO THE TRENCH BY STAPLES. ALLOW A MINIMUM OF 3' FROM THE CREST OF THE SLOPE TO THE ANCHOR TRENCH.
   - 2.5. STEP FIVE: SECURE THE EROSION CONTROL BLANKET IN THE ANCHOR TRENCH. PLACE THE BEGINNING OF THE EROSION CONTROL BLANKET INTO THE ANCHOR TRENCH SIDE CLOSEST TO THE SLOPE. ANCHOR THE EROSION CONTROL BLANKET WITH STAPLES 1' ON CENTER IN THE ANCHOR TRENCH SIDES AND 2 ROWS OF STAPLES, STAGGERED 6" ON CENTER, EACH DIRECTION, ON THE BOTTOM OF THE TRENCH WHEN NO OTHER GUIDANCE IS AVAILABLE. DRIVE STAPLES FLUSH WITH THE SOIL SURFACE. BACKFILL THE ANCHOR TRENCH AND COMPACT THE SOIL. PLACE SEED OVER THE COMPACTED SOIL. COVER THE COMPACTED SOIL BY ROLLING THE EROSION CONTROL BLANKET DOWN THE SLOPE. PLACE 2 ROWS OF STAPLES, STAGGERED 6" ON CENTER, EACH DIRECTION, OVER THE ANCHOR TRENCH.
   - 2.6. STEP SIX: EROSION CONTROL BLANKET DEPLOYMENT. STARTING AT THE CREST OF THE SLOPE, ROLL THE EROSION CONTROL BLANKET DOWN THE SLOPE IN A CONTROLLED MANNER TO PREVENT EXCESSIVE STRETCHING. APPROXIMATELY EVERY 20'-25' PULL THE EROSION CONTROL BLANKET TO TAKE OUT ANY EXCESS SLACK. THE GOAL IS TO HAVE THE EROSION CONTROL BLANKET CONTOUR AND INITIATE CONTACT WITH THE SOIL.
   - 2.7. STEP SEVEN: STAPLE OR STAKE THE EROSION CONTROL BLANKET. SECURE THE OVERLAP OR THE EDGES WITH STAPLES. THE TYPICAL INSTALLATION WILL REQUIRE ONE STAPLE PLACED AT 3' INTERVALS ALONG THE VERTICAL LENGTH OF THE EROSION CONTROL BLANKET. STAPLES SHOULD BE STAGGERED EVERY 18" TO 24" HORIZONTALLY ACROSS THE EROSION CONTROL BLANKET. IF THE EROSION CONTROL BLANKET NEEDS TO BE SPLICED IN THE MIDDLE OF A SLOPE BE SURE THE EROSION CONTROL BLANKET IS "SHINGLED" WITH UP-SLOPE EROSION CONTROL BLANKET OVERLAPPING THE DOWN-SLOPE EROSION CONTROL BLANKET. THERE SHOULD BE A MINIMUM OF 4" OF OVERLAP IN A SPLICE. USE A STAPLE CHECK SLOT TO SECURE THE OVERLAP. A STAPLE CHECK SLOT IS MADE BY PLACING A ROW OF STAPLES 4" ON CENTER AND THEN PLACING A SECOND ROW OF STAPLES 4" ON CENTER, STAGGERED FROM THE FIRST ROW.
   - 2.8. STEP EIGHT: SECURING THE EROSION CONTROL BLANKET AT THE TOE OF THE SLOPE. ROLL THE EROSION CONTROL BLANKET 36" PAST THE TOE OF THE SLOPE. CONSTRUCT A STAPLE CHECK SLOT ALONG THE TERMINAL END OF THE EROSION CONTROL BLANKET BY INSTALLING 2 ROWS OF STAGGERED STAPLES 4" APART ON 4" CENTERS. IN HIGH WIND REGIONS, AN ALTERNATE METHOD FOR SECURING THE BLANKET IS TO UTILIZE THE SAME ANCHOR TRENCH METHOD UTILIZED AT THE CREST OF SLOPE.

Westwood | EROSION CONTROL BLANKET INSTALLATION FOR SLOPE | NOT TO SCALE | SW-01



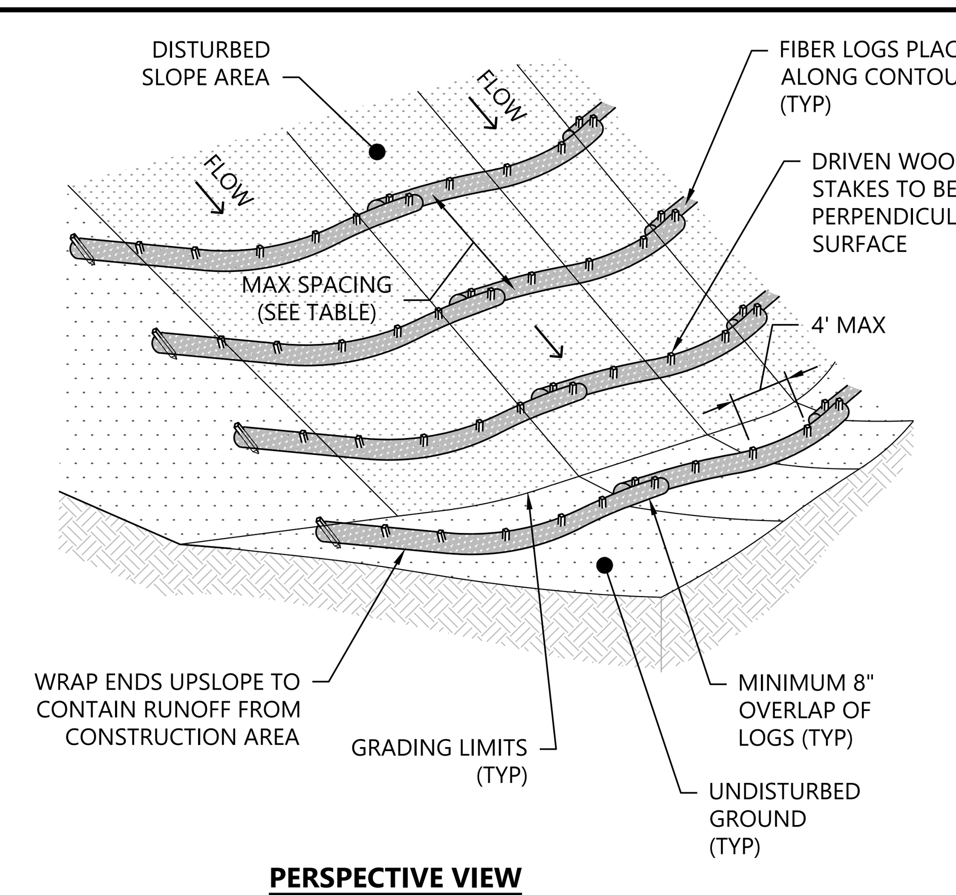
NOTES:

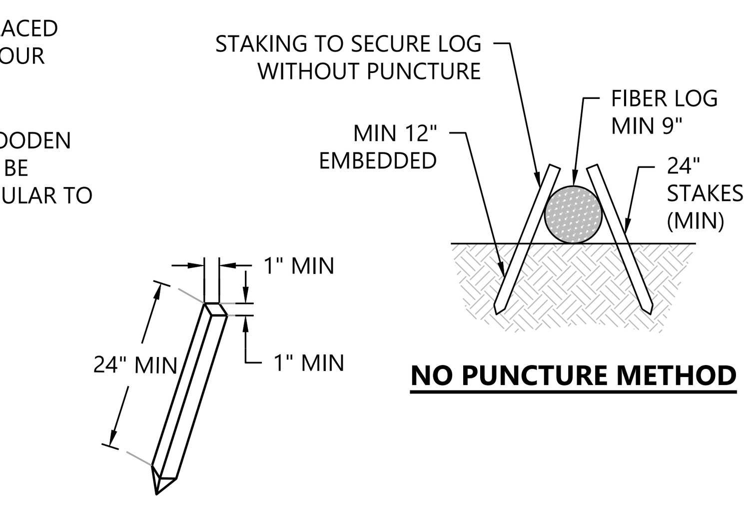
1. EROSION CONTROL BLANKETS ARE USED TO TEMPORARILY AND PERMANENTLY STABILIZE DITCHES AND SWALES.
2. EROSION CONTROL BLANKETS SHALL BE INSTALLED ACCORDING TO MANUFACTURER'S SPECIFICATIONS. WHEN NOT AVAILABLE INSTALL ACCORDING TO THIS DETAIL AND THE FOLLOWING NOTES:
   - 2.1. STEP ONE: SITE PREPARATION. TO PREVENT TENTING THE CHANNEL SHOULD BE FINE GRADED TO A SMOOTH PROFILE AND RELATIVELY FREE FROM ALL WEEDS, CLODS, STONES, ROOTS, STICKS, RIVULETS, GULLIES, CRUSTING, AND CAKING. FILL ANY VOIDS AND MAKE SURE THE CHANNEL IS COMPACTED PROPERLY.
   - 2.2. STEP TWO: ADEQUATE TOPSOIL SHALL BE REAPPLIED AFTER GRADING PRIOR TO SEEDING.
   - 2.3. STEP THREE: SEEDING. SEEDING WITHOUT MULCH SHOULD BE APPLIED TO THE AREA TO BE VEGETATED.
   - 2.4. STEP FOUR: ANCHORING THE EROSION CONTROL BLANKET. EROSION CONTROL BLANKETS SHALL BE ANCHORED AT THE BEGINNING OF THE CHANNEL. A 8" X 10" DEEP TRENCH SHOULD BE EXCAVATED PERPENDICULAR TO THE DIRECTION OF WATER FLOW ACROSS THE ENTIRE WIDTH OF THE CHANNEL. PLACE THE BEGINNING OF THE EROSION CONTROL BLANKET INTO THE ANCHOR TRENCH SIDE CLOSEST TO THE SLOPE. ANCHOR THE EROSION CONTROL BLANKET WITH STAPLES 1' ON CENTER IN THE ANCHOR TRENCH SIDES AND 2 ROWS OF STAPLES, STAGGERED 6" ON CENTER, EACH DIRECTION, ON THE BOTTOM OF THE TRENCH WHEN NO OTHER GUIDANCE IS AVAILABLE. DRIVE STAPLES FLUSH WITH THE SOIL SURFACE. BACKFILL THE ANCHOR TRENCH AND COMPACT THE SOIL. PLACE SEED OVER THE COMPACTED SOIL. COVER THE COMPACTED SOIL BY ROLLING THE EROSION CONTROL BLANKET DOWN THE SLOPE. PLACE 2 ROWS OF STAPLES, STAGGERED 6" ON CENTER, EACH DIRECTION, OVER THE ANCHOR TRENCH.
   - 2.5. STEP FIVE: EROSION CONTROL BLANKET DEPLOYMENT IN THE CHANNEL BOTTOM. THE EROSION CONTROL BLANKETS SHOULD BE UNROLLED IN THE DIRECTION OF WATER FLOW. FIRST THE EROSION CONTROL BLANKET IS DEPLOYED IN THE CHANNEL BOTTOM. IT IS ALSO NECESSARY TO PREVENT A SEAM FROM GOING DOWN THE CENTER OF THE CHANNEL BOTTOM OR IN AREAS OF CONCENTRATED WATER FLOW. WHEN INSTALLING TWO EROSION CONTROL BLANKETS SIDE BY SIDE IN A WATERWAY THE CENTER OF THE EROSION CONTROL BLANKET SHOULD BE CENTERED IN THE AREA OF CONCENTRATED WATER FLOW. INSTALL ADJOINING EROSION CONTROL BLANKETS AWAY FROM THE CENTER OF THE CHANNEL BOTTOM. ADJOINING EROSION CONTROL BLANKETS SHOULD BE OVERLAPPED 4" TO 6". CONTINUE TO INSTALL A COMMON ROW OF STAPLES AT 2' CENTERS ALONG THE LENGTH OF THE OVERLAP.
   - 2.6. STEP SIX: CHECK SLOTS. CHECK SLOTS SHOULD BE PLACED PERPENDICULAR TO THE FLOW DIRECTION ACROSS THE ENTIRE WIDTH OF THE CHANNEL AT 25' INTERVALS AND AT THE TERMINAL END OF THE CHANNEL. THE CHECK SLOTS SHOULD BE PLACED IN A 6" X 6" TRENCH AS SHOWN. SECURE THE EROSION CONTROL BLANKET IN THE UPSTREAM SIDE OF THE CHECK SLOT WITH STAPLES OR STAKES ON 12" CENTERS. FLIP THE EROSION CONTROL BLANKET ROLL ON THE UPSTREAM EDGE. BACK FILL THE CHECK SLOT AS SHOWN AND COMPACT THE SOIL. CONTINUE ROLLING THE EROSION CONTROL BLANKET DOWNSTREAM OVER THE COMPLETED CHECK SLOT.
   - 2.7. STEP SEVEN: EROSION CONTROL BLANKET DEPLOYMENT ON THE SIDE SLOPES. CONTINUE TO ROLL THE EROSION CONTROL BLANKET ALONG THE CHANNEL BOTTOM AND SIDE SLOPES IN THE DIRECTION OF THE WATER FLOW. AS THE EROSION CONTROL BLANKET IS INSTALLED FROM THE CHANNEL BOTTOM UP THE SLOPE, A SHINGLE TYPE INSTALLATION IS NECESSARY WITH THE UP-SLOPE EROSION CONTROL BLANKET OVERLAPPING THE LOWER EROSION CONTROL BLANKET APPROXIMATELY 4". ANCHOR THE EROSION CONTROL BLANKETS WITH A MINIMUM OF ONE STAPLE EVERY 24" ACROSS THE WIDTH AND ONE STAPLE EVERY 36" DOWN ITS LENGTH. IF THE EROSION CONTROL BLANKET NEEDS TO BE SPLICED, BE SURE THE EROSION CONTROL BLANKET IS "SHINGLED" WITH THE UPSTREAM EROSION CONTROL BLANKET OVERLAPPING THE DOWNSTREAM EROSION CONTROL BLANKET. THERE SHOULD BE A MINIMUM OF 4" OF OVERLAP IN A SPLICE. USE A STABLE CHECK SLOT TO SECURE THE OVERLAP. ANCHOR THE EROSION CONTROL BLANKET PLACED AT THE TOP OF THE CHANNEL SLOPE IN THE SAME MANNER AS SHOWN.
   - 2.8. STEP EIGHT: TERMINAL END. SECURE THE EROSION CONTROL BLANKET AT THE TERMINAL END OF THE CHANNEL WITH A SLOT SIMILAR TO THE ONE MADE AT THE BEGINNING OF THE CHANNEL.

Westwood | EROSION CONTROL BLANKET INSTALLATION FOR CHANNEL | NOT TO SCALE | SW-02

NOTES:

1. FIBER LOGS SHALL BE PREFABRICATED AND MADE FROM WEED FREE RICE STRAW, FLAX, OR A SIMILAR AGRICULTURAL MATERIAL BOUND INTO A TIGHT TUBULAR LOG BY NETTING.
2. STAKE FIBER LOGS INTO THE TRENCH. DRIVE STAKES AT THE END OF EACH FIBER LOG AND SPACED 4 FEET MAXIMUM ON CENTER. USE WOOD STAKES WITH NOMINAL CLASSIFICATION OF 1" BY 1" AND A MINIMUM LENGTH OF 24".
3. PREPARE THE SLOPE BEFORE BEGINNING THE INSTALLATION.
4. DIG SMALL TRENCHES ACROSS THE SLOPE ON THE CONTOUR. THE TRENCH DEPTH SHOULD BE 1/4 TO 1/3 OF THE THICKNESS OF THE LOG, AND THE WIDTH SHOULD EQUAL THE LOG DIAMETER, IN ORDER TO PROVIDE AREA TO BACKFILL THE TRENCH.
5. LOGS SHALL BE INSTALLED PERPENDICULAR TO WATER MOVEMENT, AND PARALLEL TO THE SLOPE CONTOUR.
6. START BUILDING TRENCHES AND INSTALLING LOGS FROM THE BOTTOM OF THE SLOPE AND WORK UP.
7. TURN THE ENDS OF THE FIBER LOGS UP SLOPE TO PREVENT RUNOFF FROM GOING AROUND THE LOG.
8. IF MORE THAN ONE FIBER LOG IS PLACED IN A ROW, THE LOGS SHOULD BE OVERLAPPED, NOT ABUTTED.
9. FIBER LOGS ENCASED WITH PLASTIC NETTING ARE USED FOR A TEMPORARY APPLICATION ONLY AND SHOULD BE REMOVED FOLLOWING STABILIZATION. FIBER LOGS USED IN A PERMANENT APPLICATION SHALL BE ENCASED WITH A BIODEGRADABLE MATERIAL AND MAY BE LEFT IN.
10. TEMPORARY INSTALLATIONS SHOULD ONLY BE REMOVED WHEN UP GRADIENT AREAS ARE STABILIZED PER GENERAL PERMIT REQUIREMENTS, AND/OR POLLUTANT SOURCES NO LONGER PRESENT A HAZARD. BUT, THEY SHOULD ALSO BE REMOVED BEFORE VEGETATION BECOMES TOO MATURE SO THAT THE REMOVAL PROCESS DOES NOT DISTURB MORE SOIL AND VEGETATION THAN IS NECESSARY
11. FIBER LOGS MUST BE INSPECTED IN ACCORDANCE WITH GENERAL PERMIT REQUIREMENTS FOR THE ASSOCIATED PROJECT TYPE AND RISK LEVEL. IT IS RECOMMENDED THAT A MINIMUM, THE BMPS BE INSPECTED WEEKLY, PRIOR TO FORECASTED RAIN EVENTS, DAILY DURING EXTENDED RAIN EVENTS, AND AFTER THE CONCLUSION OF RAIN EVENTS.
12. REPAIR OR REPLACE SPLIT, TORN, UNRAVELING, OR SLUMPING FIBER LOGS.
13. IF THE FIBER LOG IS USED AS A SEDIMENT CAPTURE DEVICE, OR AS AN EROSION CONTROL DEVICE TO MAINTAIN SHEET FLOWS, SEDIMENT THAT ACCUMULATES IN THE BMP SHOULD BE PERIODICALLY REMOVED IN ORDER TO MAINTAIN BMP EFFECTIVENESS. SEDIMENT SHOULD BE REMOVED WHEN SEDIMENT ACCUMULATION REACHES ONE-THIRD THE DESIGNATED SEDIMENT STORAGE DEPTH.
14. IF FIBER LOGS ARE USED FOR EROSION CONTROL, SEDIMENT REMOVAL SHOULD NOT BE REQUIRED AS LONG AS THE SYSTEM CONTINUES TO CONTROL THE GRADE. SEDIMENT CONTROL BMPS WILL LIKELY BE REQUIRE IN CONJUNCTION WITH THIS TYPE OF APPLICATION.
15. REPAIR ANY RILLS OR GULLIES PROMPTLY.





MAXIMUM SPACING RECOMMENDATIONS

	FIBER LOG SIZE		
SLOPE	9" DIA.	12" DIA.	20" DIA.
≤4:1	40 FT	60 FT	80 FT
3:1	30 FT	45 FT	60 FT
2:1	20 FT	30 FT	40 FT
1:1	10 FT	15 FT	20 FT

Westwood | FIBER LOGS - SLOPE APPLICATION | NOT TO SCALE | SW-05

Westwood

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Westwood Professional Services, Inc.

PREPARED FOR:

ENTERPRISE ENERGY

2925 Dean Parkway, Suite 300
Minneapolis, MN 55416

REVISIONS:

#	DATE	COMMENT
A	04/15/24	Permitting Plan Set
B	04/19/24	Permitting Plan Set

Finnegan Solar Project

Cottage Grove, MN

Typical Details

NOT FOR CONSTRUCTION

DATE: 04/19/2024

SHEET: C502 REV: B

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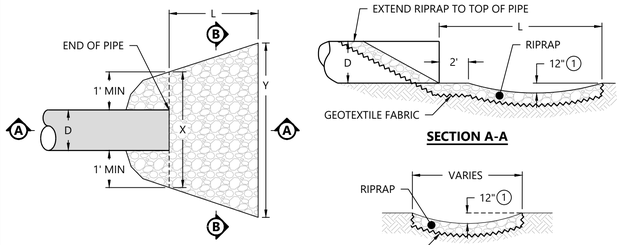
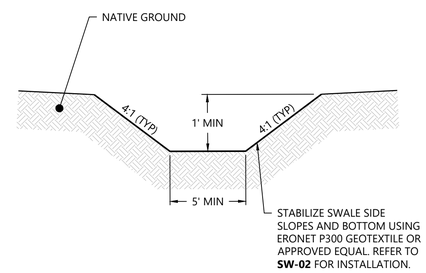


RIPRAP AT CULVERT OUTLETS						
PIPE DIAMETER (D)		L	X	Y	RIPRAP SIZE (D50)	RIPRAP DEPTH
(IN)	(FT)	(FT)	(FT)	(FT)	(IN)	(FT)
12	1	8	3	8	6	1
15	1.25	8	3.3	9	6	1
18	1.5	8	3.5	10	6	1
21	1.75	8	3.8	11	9	1.5
24	2	8	4	11	9	1.5
30	2.5	10	4.5	14	9	1.5
36	3	15	5	19	12	2
42	3.5	18	5.5	22	12	2
48	4	20	6	25	12	2
54	4.5	27	6.5	31.5	12	2
60	5	30	7	35	12	2
>60	>5	CONTACT ENGINEER FOR SPECIFIC DESIGN				

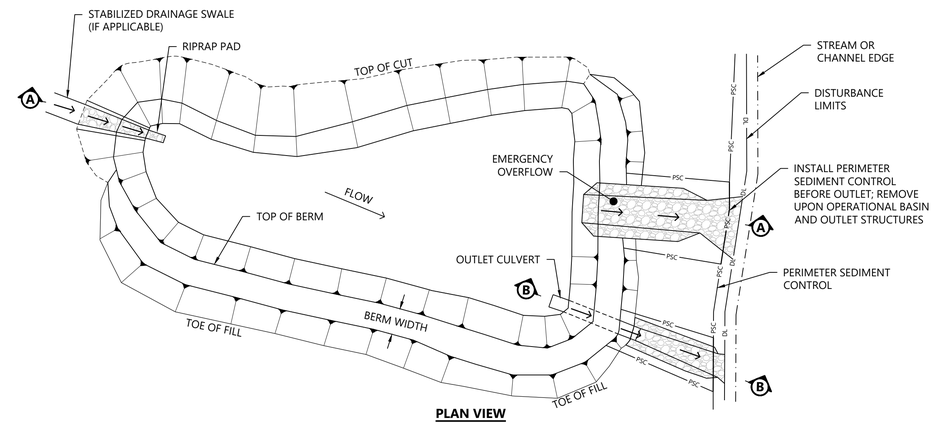
NOTES:

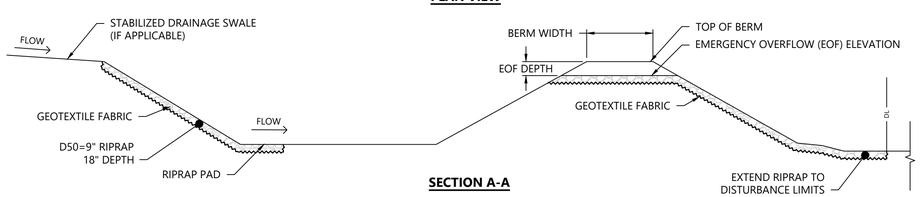
1. FOR PIPES GREATER OR EQUAL TO 30", USE 1.5'.
2. RIPRAP IS NOT REQUIRED AT CULVERTS 21" OR LESS IF BOTH THE INLET AND OUTLET SIDE OF FLOW LINE REMAIN UNDISTURBED DURING CULVERT INSTALLATION AND THE CULVERT DRAINS INTO AN UNDISTURBED VEGETATED AREA. IF DISTURBANCE OCCURS, AN APPROVED ALTERNATIVE TO RIPRAP MAY BE USED TO MITIGATE FLOW VELOCITIES DURING VEGETATION ESTABLISHMENT.
3. RIPRAP SHALL BE INSTALLED AT ALL CULVERTS 24" THROUGH 60" PER THIS DETAIL, UNLESS APPROVED BY THE ENGINEER.
4. CONFIRM REQUIREMENTS IN PUBLIC RIGHT-OF-WAY WITH THE AUTHORITY HAVING JURISDICTION.
5. THE CONTRACTOR SHALL PLACE RIPRAP, PULVERIZED TOPSOIL, SEED AND WOODFIBER BLANKET IMMEDIATELY AFTER PIPE IS INSTALLED, EXTEND AREA TO MATCH UNDISTURBED SOIL.
6. DIMENSION "D" EQUALS INSIDE DIAMETER OF PIPE.
7. RIPRAP SHALL EXTEND THE ENTIRE WIDTH BETWEEN MULTIPLE CULVERTS.
8. RIPRAP MATERIAL SHALL MEET THE REQUIREMENTS OF THE LATEST EDITION OF THE FHWA STANDARD SPECIFICATIONS FP-14 SECTION 705.02. CONSTRUCTION METHODS SHALL BE IN ACCORDANCE WITH SECTION 251.

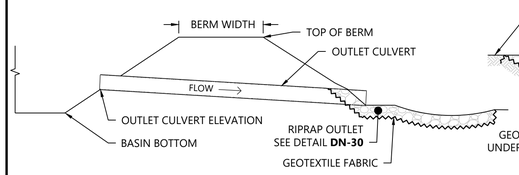
Westwood | PERMANENT RIPRAP AT CULVERT OUTLETS | NOT TO SCALE | DN-30

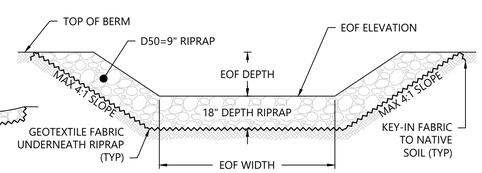


Westwood | VEGETATED DRAINAGE SWALE | NOT TO SCALE | DN-20









NOTES:

1. REFER TO TABLE 1 ON THIS SHEET FOR ELEVATIONS.
2. SEE PLANS FOR BASIN LOCATIONS.
3. ALL GRADED SLOPES SHALL BE A MAXIMUM 4H:1V UNLESS SHOWN OTHERWISE.
4. REFER TO NPDES PERMIT AND ESC PLAN FOR ADDITIONAL BASIN BMPS AND INSPECTION AND MAINTENANCE PROCEDURES.
5. IMMEDIATELY FOLLOWING BASIN CONSTRUCTION, THE SIDE SLOPES OF THE BASIN SHALL BE FULLY STABILIZED. TEMPORARY EROSION AND SEDIMENT CONTROL FEATURES SHALL REMAIN UNTIL PROJECT SITE IS FULLY STABILIZED AND THE BASIN IS CONVERTED TO PERMANENT CONDITIONS.
6. REMOVE SEDIMENT FOLLOWING CONSTRUCTION AND CONVERSION TO PERMANENT CONDITIONS.

Westwood | STORMWATER INFILTRATION BASIN | NOT TO SCALE | DN-44

TABLE 1: STORMWATER BASIN TABLE

BASIN ID	TYPE	BOTTOM ELEVATION (CT)	OUTLET ELEVATION (FT)	EOF ELEVATION (FT)	TOP ELEVATION (FT)
P2	INFILTRATION	882.0	885.0	886.0	886.5

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Westwood Professional Services, Inc.

PREPARED FOR:

ENTERPRISE ENERGY

2925 Dean Parkway, Suite 300
Minneapolis, MN 55416

REVISIONS:

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A	04/15/24	Permitting Plan Set
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Finnegan Solar Project

Cottage Grove, MN

Typical Details

NOT FOR CONSTRUCTION

DATE: 04/19/2024

SHEET: C503 REV: B

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SOLECTRIA® XGI 1500-250 SERIES

PREMIUM 3-PHASE TRANSFORMERLESS UTILITY-SCALE INVERTERS

FEATURES

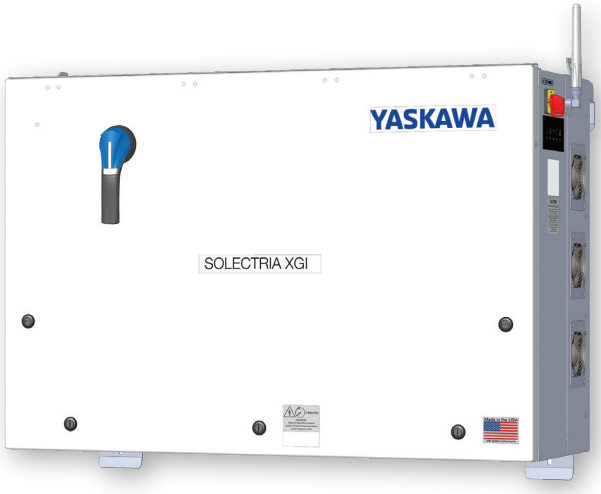
- NEW and MORE POWERFUL!
  - XGI 1500-250/250-600
  - XGI 1500-225-600 (Selectable: 225kW/225kVA or 225kW/250kVA)
  - XGI 1500-200/200-480
  - XGI 1500-175-480 (Selectable: 175kW/175kVA or 175kW/200kVA)
- Industry-leading maximum DC/AC Ratio of 2.0
- Accepts two input PV Output Circuits, with no overcurrent protection required
- Made in the USA with global components
- Buy American Act (BAA) compliant
- 99.0% peak efficiency
- Flexible solution for distributed and centralized system architecture
- Advanced grid-support functionality Rule 21/UL1741SB
- Robust, dependable and built to last
- Lowest O&M and installation costs
- Access all inverters on site via WiFi from one location
- Remote diagnostics and firmware upgrades
- SunSpec Modbus Certified
- Tested compatible with the TESLA PowerPack Microgrid System

OPTIONS

- PV Source Circuit Combiners
- Web-based monitoring
- Extended warranty

MADE IN THE USA
With U.S. and Global Components

Yaskawa Solectria Solar is pleased to introduce its most powerful XGI 1500 inverters, with the XGI 1500-250 models at 600 Vac, and the XGI 1500-200 models for 480 Vac service.



The XGI 1500-250 and XGI 1500-200 feature SiC technology, high power and high efficiency that places them at the top end of the utility-scale string inverters in the market.

Yaskawa Solectria Solar designs all XGI 1500 utility-scale string inverters for high reliability and builds them with the highest quality components -- selected, tested and proven to last beyond their warranty. The XGI 1500 inverters provide advanced grid-support functionality and meet the latest IEEE 1547 and UL 1741 standards for safety.

The XGI 1500 inverters provide ideal solutions for ground-mounted utility-scale PV systems, with models available for service connections at 600 Vac and 480 Vac. Designed and engineered in Lawrence, MA, the SOLECTRIA XGI inverters are assembled and tested at Yaskawa America's facilities in Buffalo Grove, IL. The XGI 1500 inverters are Made in the USA with global components, and are compliant with the Buy American Act.

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Yaskawa Solectria Solar 1-978-683-9700 | Email: sales@solectria.com | solectria.com
Document No. FL.XGI1500-04 | 10/04/2023 | © 2021 Yaskawa America, Inc.

SPECIFICATIONS

PRODUCT SPECIFICATION		XGI 1500 INVERTER MODEL			
		XGI 1500 250/250-600	XGI 1500 225-600	XGI 1500 200/200-480	XGI 1500 175-480
DC Input	Absolute Maximum Input Voltage	1500 VDC			
	Maximum Power Voltage Range (MPPT)	860-1250 VDC		750-1250 VDC	
	Operating Voltage Range (MPPT)	860-1450 VDC		750-1450 VDC	
	Number of MPP Trackers	1 MPPT			
	Maximum Operating Input Current	296.7 A	267 A	237.3 A	207.6 A
	Maximum Operating PV Power	255 kW	230 kW	204 kW	179 kW
	Maximum DC/AC Ratio | Max Rated PV Power	2.0 | 500 kW	2.22 | 500 kW	2.5 | 500 kW	2.86 | 500 kW
	Max Rated PV Short-Circuit Current (∑Isc x 1.25)	800 A			
AC Output	Nominal Output Voltage	600 VAC, 3-Phase		480 VAC, 3-Phase	
	AC Voltage Range	-12% to +10%			
	Continuous Real Output Power	250 kW	225 kW	200 kW	175 kW
	Continuous Apparent Output Power (kVA)	250	250 225	200	200 175
	Maximum Output Current (A_{RMS})	240.6	XGI 1500-225/225: 216.5 225/250: 240.6	240.6	XGI 1500-175/175: 210.5 175/200: 240.6
	Fault Current Contribution (1 cycle RMS)	390 A	390 A 351 A	312 A	312 A 273 A
	Conductor Compatibility	600 kcmil max, Cu or Alum, 1 or 2 conductors with lugs			
	Nominal Output Frequency	60 Hz			
	Power Factor (Unity default)	+/- 0.80 Adjustable			
	Total Harmonic Distortion (THD) @ Rated Load	< 5%			
	Grid Connection Type	3-Ph + N/GND			
Efficiency	Peak Efficiency	99.0%			
	CEC Average Efficiency	98.5%			
	Tare Loss	<1 W			
Temperature	Ambient Temperature Range	-40°F to 140°F (-40°C to 60°C)			
	De-Rating Temperature	113°F (45°C)	127°F (53°C)	113°F (45°C)	131°F (55°C)
	Storage Temperature Range	-40°F to 167°F (-40°C to 75°C)			
	Relative Humidity (non-condensing)	0 - 95%			
	Operating Altitude	9,840 ft (3 km)			
Communications	Advanced Graphical User Interface	WiFi			
	Communication Interface	Ethernet			
	Third-Party Monitoring Protocol	SunSpec Modbus TCP/IP			
	Web-Based Monitoring	Optional			
	Firmware Updates	Remote and Local			
Testing & Certifications	Safety Listings & Certifications	UL 1741, IEEE 1547, UL 1998, UL 1699b Photovoltaic Arc-Fault Circuit Protection Certified			
	Advanced Grid Support Functionality	Rule 21, UL 1741SB			
	Testing Agency	ETL			
	FCC Compliance	FCC Part 15 (Subpart B, Class A)			
Warranty	Standard and Options	5 Years Standard; Option for 10 Years			
Enclosure	Acoustic Noise Rating	73 dBA @ 1 m ; 67dBA @ 3 m			
	DC Disconnect	Integrated 2-Pole 400 A DC Disconnect			
	Mounting Angle	Vertical only			
	Dimensions	Height: 29.5 in. (750 mm) | Width: 44.3 in. (1125 mm) | Depth: 15.4 in. (390 mm)			
	Weight	290 lbs (131.5 kg)			
	Enclosure Rating and Finish	NEMA 4X, IEC IP66, Type 3R, Polyester Powder-Coated Aluminum			

IT'S PERSONAL

YASKAWA SOLECTRIA SOLAR

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PREMIUM 3-PHASE TRANSFORMERLESS UTILITY-SCALE INVERTERS

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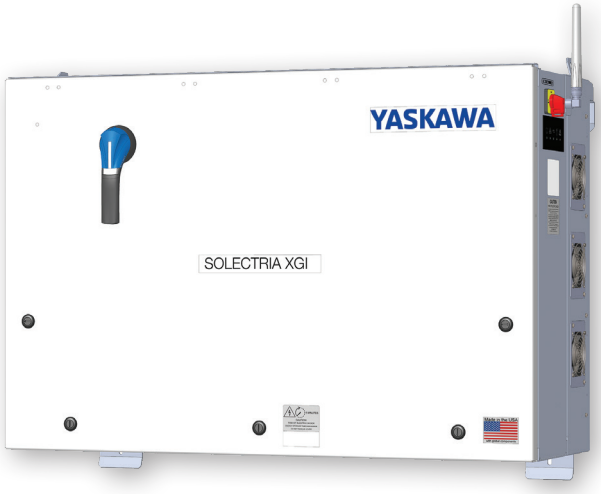

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	Maximum Output Current (A_{RMS})	240.6	XGI 1500-225/225: 216.5 225/250: 240.6	240.6	XGI 1500-175/175: 210.5 175/200: 240.6
	Fault Current Contribution (1 cycle RMS)	390 A	390 A 351 A	312 A	312 A 273 A
	Conductor Compatibility	600 kcmil max, Cu or Alum, 1 or 2 conductors with lugs			
	Nominal Output Frequency	60 Hz			
	Power Factor (Unity default)	+/- 0.80 Adjustable			
	Total Harmonic Distortion (THD) @ Rated Load	< 5%			
	Grid Connection Type	3-Ph + N/GND			
Efficiency	Peak Efficiency	99.0%			
	CEC Average Efficiency	98.5%			
	Tare Loss	<1 W			
Temperature	Ambient Temperature Range	-40°F to 140°F (-40°C to 60°C)			
	De-Rating Temperature	113°F (45°C)	127°F (53°C)	113°F (45°C)	131°F (55°C)
	Storage Temperature Range	-40°F to 167°F (-40°C to 75°C)			
	Relative Humidity (non-condensing)	0 - 95%			
	Operating Altitude	9,840 ft (3 km)			
Communications	Advanced Graphical User Interface	WiFi			
	Communication Interface	Ethernet			
	Third-Party Monitoring Protocol	SunSpec Modbus TCP/IP			
	Web-Based Monitoring	Optional			
	Firmware Updates	Remote and Local			
Testing & Certifications	Safety Listings & Certifications	UL 1741, IEEE 1547, UL 1998, UL 1699b Photovoltaic Arc-Fault Circuit Protection Certified			
	Advanced Grid Support Functionality	Rule 21, UL 1741SB			
	Testing Agency	ETL			
	FCC Compliance	FCC Part 15 (Subpart B, Class A)			
Warranty	Standard and Options	5 Years Standard; Option for 10 Years			
Enclosure	Acoustic Noise Rating	73 dBA @ 1 m ; 67dBA @ 3 m			
	DC Disconnect	Integrated 2-Pole 400 A DC Disconnect			
	Mounting Angle	Vertical only			
	Dimensions	Height: 29.5 in. (750 mm) | Width: 44.3 in. (1125 mm) | Depth: 15.4 in. (390 mm)			
	Weight	290 lbs (131.5 kg)			
	Enclosure Rating and Finish	NEMA 4X, IEC IP66, Type 3R, Polyester Powder-Coated Aluminum			

IT'S PERSONAL

YASKAWA SOLECTRIA SOLAR

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Vegetation Installation and Management Plan for Finnegan CSG

V3 March 2024

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Site Location & Name	Finnegan Community Solar Garden EESolar32 LLC 10555 Lehigh Road South Hastings, MN Washington County
Site Developer	Enterprise Energy, LLC 2925 Dean Parkway, Suite 300 Minneapolis, MN 55416
Developer Contact	Evan Carlson 612.470.7152 EvanC@Enterpriseenergy.com
Vegetation Restoration	Natural Resource Services, Inc 2885 Quail Road NE Sauk Rapids MN 56379 320.290.5363 and 16425 W. State Route 90 Princeville, IL 61559

Proposed Finnegan CSG

Overview of Site Conditions and Restoration

Finnegan Community Solar Garden is proposed on approximately 35 acres of land in Washington County near the town of Hastings. The land is currently used for agriculture in typical row crops. Prior to this recent farm use it was an Upland Prairie for thousands of years.

The vegetation restoration plan includes seeding the entire array area inside the fence and under the single axis tracking panels with the native pollinator friendly mix. This mix can be referenced on page 10 of this Plan. An area of elevation lies within the array site on the western portion and this sloped area will not include panels. Minimal grading will be necessary near this elevation and any land inside the security fence will be seeded with the array native mix.

The site is well drained to excessively well drained and contains sandy loam and silty loam soils throughout 80% of it, with a narrow drainage creek bordering the west side of the array. A basin seed mix is planned for this lower lying area in the southwest corner. The basin mix can be found on page 11 of this Plan.

Permanent Seeding

The native species selected will aid in improving stormwater and snowmelt infiltration, erosion control and restoration of native habitat. No fertilizers or soil amendments will be needed or used on this site. When seeded as planned, this site will exceed the 85 points necessary to achieve the Gold Standard as Native Pollinator Friendly on the MN Board of Soil and Water Resources Solar Habitat Friendly scorecard.

When construction is completed or at a minimum reduced to only foot traffic, site prep and permanent seeding can begin. All grading must be completed and the site cleared of debris.

If the site was allowed to go fallow for any length of time during the growing season it may require an herbicide treatment prior to disking and seeding. If this is necessary, the site will be treated with an appropriate herbicide such as glyphosate or similar. The site should be allowed to stand undisturbed for 10-14 days as required. Separate herbicides will be used for the different groups of plants found on the site, broadleaf vs perennial weeds, for example. Broadleaf herbicides require up to 30 days standing time so adequate planning is necessary.

Following the required activation time, the site should be disked and harrowed, then seeded. A cover crop of oats or winter wheat, seasonally determined, should be included at the time of seeding.

At this time, no screening is planned for the Finnegan site.

All native grass seed will be applied using a mechanical broadcast seeder followed by the cover crop of oats or wheat, seasonally determined, followed by the forbs. Areas inaccessible to equipment will be hand broadcast. The site will be harrowed once again after all seeding is completed.

Maintenance of these sites plays a vital role in the eventual success of any native landscape installation, especially during the establishment period of years one through three.

Active management of all areas of the Finnegan site are similar: dry and wet areas of the site are inspected annually followed by maintenance necessary to encourage healthy native species while discouraging non-native/invasive species. During the growing season of the first year of establishment, the site shall be inspected a minimum of three times.

1. During the germination year, the site will be mowed to control annual weed development and to aid in the growth of the prairie seedlings by reducing competition. Mowing may also be necessary if the weeds are about to set seed. Optimum cutting height is typically 4 to 6 inches. The mowing should finely mulch the clippings to prevent smothering young plants.

2. In years following the first growing season, Integrated Vegetation Management (IVM) services are utilized to control annual, biennial and perennial weed species within the developing native landscape. Typical IVM services include spot herbicide spraying, spot mowing, and herbicide wicking.

Finnegan Community Solar Garden

Kimbro Avenue South and Lehigh Road South, Hastings.

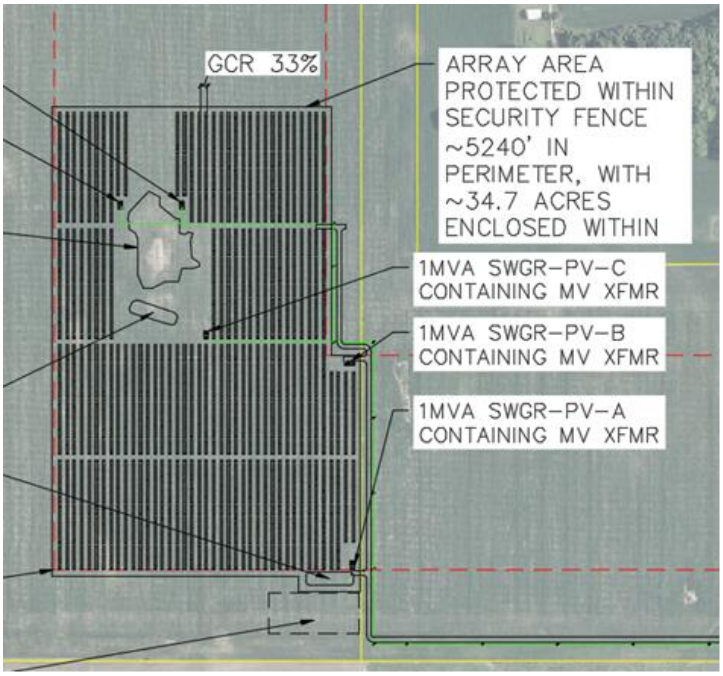


Fig A.
Finnegan CSG proposed layout.

Fig B.
Midwest pollinator friendly solar site, year one.

Natural Resource Services

Site Preparation

1. Inspection of the project area to assess site conditions and determine the need for any site prep mowing or spraying activities.

2. If necessary, an herbicide application will be completed using glyphosate (Round-up® or equivalent) as per manufacturer's directions in areas with actively growing vegetation. Allow a minimum of 10 days before disturbing the soil or completing seeding activities.

3. When perennial broadleaf vegetation is present a triclopyr herbicide will be added (Garlon 3A® or equivalent) as per manufacturer's directions. When a broadleaf herbicide is used allow a minimum of 30 days before disturbing the site or completing seeding.

4. Depending on the type and density of vegetation present (i.e., annual vs perennial) a complete site mowing might be advisable in lieu of an herbicide application. For instance, if the site is dominated by foxtail (an annual), mowing would be preferrable to an herbicide application.

Seed and Seeding Installation

1. Construction debris, garbage and building materials will be removed and/or staged outside the intended seeding areas.

2. Disk soil as conditions allow, within the project area in preparation for seeding. Harrow or rake the soil to achieve the proper seedbed.

3. Following disking, the site will be broadcast seeded using the lowland mix throughout most of the site and the upland mix for the drier areas.

4. A cover crop will be seeded along with the other seed, either winter wheat or oats, seasonally determined.

5. Harrowing will be completed as site conditions allow, after all planned seed mixes and cover crop seeding is completed.

6. Areas inaccessible to equipment will be hand seeded.

Recommended Vegetation Management Procedures

Establishment Phase

Growing seasons 1, 2 and 3

Year

1 Complete site mowings to control annual/biennial weed canopy and prevent production of viable seed.

- 3 mowings are typical depending on soils, weather patterns and planting dates.
- Mowing to be done using specialized zero-radius mowers and/or flail mowers
- Target mowing height of 4-6 inches.
- Project monitoring for erosion; repair/reseed as needed.

2

- Complete site mowing to control annual/biennial weed canopy and prevent production of viable weed seed.
- 3 site visits: 2 mowings likely in the late spring or early summer plus 1 Integrated Vegetation Management (IVM) visit.
- Mowing to be done using specialized zero-radius mowers and/or flail mowers
- Target mowing height of 4-6 inches.
- IVM visits Includes spot mowing, spot herbicide application, herbicide wicking, etc.

3

Integrated Vegetation Management

- 3 IVM site visits are typical depending on growth and weed populations.
- Includes spot mowing, spot herbicide application, herbicide wicking, etc.

Maintenance Phase

Years 4 - 34: Integrated Vegetation Management

- Two IVM site visits are typical depending on vegetation status.
- Each visit will likely include mowing, spot herbicide applications and/or herbicide wicking.
- Equipment used includes tractor and/or ATV mounted sprayers.
- Includes a complete site mowing once every 3 years to mulch up biomass and recycle nutrients.

Monitoring

Consistent monitoring of the project is essential in order to evaluate vegetative establishment, weed presence and possible erosion concerns. This information helps determine which management technique to use, the proper timing of the implementation and whether or not any other remedial action is required.

Additional Notes on Vegetation Management:

- Vegetation management crews will control weed growth underneath the panels only where height is a concern. Mowing/trimming around every post is not necessary from a plant community health standpoint.

- Utilizing herbicide to provide targeted control of unwanted species should only be completed by licensed applicators with a comprehensive knowledge of herbicides, application techniques and species morphology. Applying the correct herbicide with the proper application device at the correct period in the plant's lifecycle is essential to successful control and to minimizing collateral damage.

- Additional mowing or trimming may be needed if shading of the panels occurs, either by native or non-native vegetation. As a general rule, this type of mowing, if needed, should be limited to the areas immediately in front of the panel's lower edge.

Proposed Finnegan CSG Array Seed Mix

Common Name	Scientific Name	% of Mix	Seeds/ft^2	Total	
Grasses					
Sideoats Grama	Bouteloua curtipendula	26.03%	6.6	21.86	PLS lb
Blue Grama	Bouteloua gracilis	10.68%	18.0	8.96	PLS lb
Plains Oval Sedge	Carex brevior	1.40%	1.7	1.17	PLS lb
Silky Wild Rye	Elymus villosus	2.96%	0.7	2.48	PLS lb
June Grass	Koeleria cristata	1.31%	11.1	1.10	PLS lb
Little Bluestem	Schizachyrium scoparium	30.47%	19.3	25.58	PLS lb
Prairie Dropseed	Sporobolus heterolepis	0.16%	0.1	0.14	PLS lb
Prairie Brome	Bromus kalmii	0.90%	0.3	0.76	PLS lb
Forbs					
Western Yarrow	Achillea millefolium	0.65%	4.9	0.55	PLS lb
Anise Hyssop	Agastache foeniculum	0.10%	0.4	0.09	PLS lb
Prairie Onion	Allium stellatum	0.65%	0.3	0.55	PLS lb
Lead Plant	Amorpha canescens	1.30%	0.9	1.10	PLS lb
Columbine	Aquilegia canadensis	0.13%	0.2	0.11	PLS lb
Common Milkweed	Asclepias syriaca	0.33%	0.1	0.27	PLS lb
Butterfly Milkweed	Asclepias tuberosa	0.89%	0.2	0.74	PLS lb
Sky Blue Aster	Aster azureus	0.13%	0.4	0.11	PLS lb
Upland White Aster	Aster ptarmicoides	0.65%	1.8	0.55	PLS lb
Partridge Pea	Chamaecrista fasciculata	2.61%	0.3	2.19	PLS lb
White Prairie Clover	Dalea candidum	4.66%	3.7	3.91	PLS lb
Purple Prairie Clover	Dalea purpurea	5.87%	4.5	4.93	PLS lb
Dotted Blazingstar (sub)	Liatris punctata	0.10%	0.0	0.09	PLS lb
Wild Lupine	Lupinus perennis	0.37%	0.0	0.31	PLS lb
Spotted Bee Balm	Monarda punctata	0.16%	0.6	0.14	PLS lb
Large-flowered Beardtongue	Penstemon grandiflorus	0.65%	0.4	0.55	PLS lb
Long-headed Coneflower	Ratibida columnifera	1.30%	2.3	1.10	PLS lb
Prairie Wild Rose	Rosa arkansana	0.07%	0.0	0.05	PLS lb
Black-eyed Susan	Rudbeckia hirta	1.96%	7.6	1.64	PLS lb
Gray Goldenrod	Solidago nemoralis	0.07%	0.8	0.05	PLS lb
Hoary Vervain	Verbena stricta	1.30%	1.5	1.10	PLS lb
Golden Alexanders	Zizia aurea	2.12%	1.0	1.78	PLS lb

Seeding rate 11.5 lbs/acre
(89.9 seeds/sq foot)

Finnegan CSG Basin Seed Mix

Common Name	Scientific Name	% of Mix	Seeds/ft^2	Total	
Grasses					
Virginia Wild Rye (sub)	Elymus virginicus	29.35%	4.9	3.185	PLS lb
Fringed Brome	Bromus ciliatus	23.04%	9.2	2.500	PLS lb
Bottlebrush Sedge	Carex comosa	1.84%	2.2	0.200	PLS lb
Fringed Sedge	Carex crinita	6.27%	5.7	0.680	PLS lb
Pointed-broom Sedge	Carex scoparia	1.84%	6.2	0.200	PLS lb
Common Fox Sedge	Carex stipata	2.49%	3.4	0.270	PLS lb
Brown Fox Sedge	Carex vulpinoidea	3.69%	14.7	0.400	PLS lb
Fowl Manna Grass	Glyceria striata	1.84%	11.8	0.200	PLS lb
Fowl Bluegrass	Poa palustris	6.13%	31.8	0.665	PLS lb
Little Bluestem	Schizachyrium scoparium	9.68%	5.8	1.050	PLS lb
Forbs					
Canada Anemone	Anemone canadensis	0.86%	0.3	0.094	PLS lb
New England Aster (sub)	Symphyotrichum novae-angliae	0.17%	0.5	0.019	PLS lb
Canada Milkvetch	Astragalus canadensis	1.77%	1.2	0.192	PLS lb
Nodding Bur Marigold	Bidens cernua	0.43%	0.4	0.047	PLS lb
Northern Blue Flag Iris (sub)	Iris versicolor	0.86%	0.0	0.094	PLS lb
Great Blue Lobelia	Lobelia siphilitica	0.35%	6.9	0.038	PLS lb
Monkey Flower	Mimulus ringens	0.17%	15.8	0.019	PLS lb
Virginia Mountain Mint	Pycnanthemum virginianum	0.86%	7.6	0.094	PLS lb
Black-eyed Susan	Rudbeckia hirta	2.38%	8.7	0.258	PLS lb
Ohio Spiderwort	Tradescantia ohiensis	2.16%	0.7	0.234	PLS lb
Blue Vervain	Verbena hastata	0.35%	1.3	0.038	PLS lb
Golden Alexanders	Zizia aurea	3.46%	1.5	0.375	PLS lb

Seeding rate: 10.85 lbs./acre, 140.4 seeds/square foot

Natural Resource Services

Habitat Friendly Solar Site Assessment Form for Project Planning

For Solar Companies, Local Governments and Other Partners to Meet Habitat Friendly Solar Standards

Updated 12-22-23

Note: The use of state developed solar seed mixes over 70% of the plantable area of a site will result in automatically meeting the standard.

1) PLANNED PERCENT OF PLANTABLE AREAS WITHIN PROJCT FOOTPRINT DOMINATED BY NATIVE SPECIES COVER (forbs, grasses, sedges, rushes, ferns). PROJECTS MUST HAVE A GOAL OF AT LEAST 70% COVER OF NATIVE VEGETATION TO MEET HABITAT FRIENDLY SOLAR STANDARDS

☐	70-84%	+15 points	
☑	85% and above	+20 points	Total Points 20

2) PERCENT OF PROPOSED SITE VEGETATION COVER TO BE DOMINATED BY FORBS (not grasses, sedges and rushes)

☐	10-19%	+5 points	
☐	20-29%	+10 points	
☑	30-39%	+15 points	
☐	40 and above	+15 points	Total Points 15

Note: Projects may have "array" mixes and diverse border mixes; forb dominance should be averaged across the entire site. The dominance should be calculated from total numbers of forb seeds vs. grass seeds based on seeds per square foot (from all seed mixes to be planted).

3) PLANNED COVER DIVERSITY (# of species in seed mixes; numbers from upland and moist soil mixes can be combined

☐	10-19 species	+5 points	
☐	20-25 species	+10 points	
☐	26-39 species	+15 points	
☑	40 and above	+20	Total Points 20

4) PLANNED SEASONS WITH AT LEAST THREE BLOOMING SPECIES (check all that apply)

☑	Spring (April-May)	+4 points	
☑	Summer (June-August)	+3 points	
☑	Fall (September-October)	+3 points	Total Points 10

See BWSR pollinator toolbox about bloom season

5) SITE PLANNING

☑	Detailed establishment and management plan (see notes)	+20 points	
☑	Seed Mixes are composed of at least 40 seeds per square foot	+5 points	
☐	All seed genetic origin is within 200 miles of site (see notes)	+5 points	
☐	At least .5% milkweed cover within each seed mix	+5 points	
☑	Plant species with more than 3 flower colors in mixes (see notes)	+5 points	Total Points 30

6) INSECTICIDE RISK

☐	Planned on-site insecticide use (excluding buildings/electrical boxes, etc.)	-30 points	
☐	Communication with local chemical applicators/neighbors about need to prevent drift from adjacent areas.	+10 points	Total Points -

GRAND TOTAL 95

Gold Standard 85+ points
Meets Standard 70 points

Project Name: Finnegan CSG
Project County: Washington County
Project Size: 36 acres
Evaluation Date: February 2024, Natural Resource Services, Inc.

See notes related to the questions on the back side of this form

FORGESOLAR GLARE ANALYSIS

Project: **Finnegan CSG**
5MW SAT CSG in Washington County, MN

Site configuration: **v1**

Created 31 Jan, 2024
Updated 31 Jan, 2024
Time-step 1 minute
Timezone offset UTC-6
Minimum sun altitude 0.0 deg
DNI peaks at 1,000.0 W/m^2
Category 1 MW to 5 MW
Site ID 110946.19208

Ocular transmission coefficient 0.5
Pupil diameter 0.002 m
Eye focal length 0.017 m
Sun subtended angle 9.3 mrad
PV analysis methodology V2

Summary of Results

Glare with low potential for temporary after-image predicted

PV Array	Tilt	Orient	Annual Green Glare		Annual Yellow Glare		Energy
	°	°	min	hr	min	hr	kWh
PV array 1	SA tracking	SA tracking	1,372	22.9	0	0.0	21,740,000.0

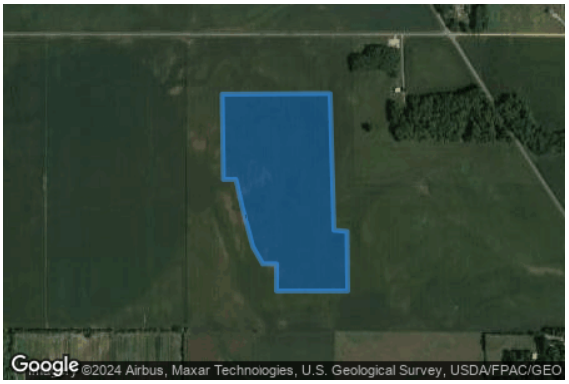
Total glare received by each receptor; may include duplicate times of glare from multiple reflective surfaces.

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
FP 1	1,372	22.9	0	0.0
FP 2	0	0.0	0	0.0

Component Data

PV Arrays

Name: PV array 1
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 52.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.33
Rated power: 8015.0 kW
Panel material: Smooth glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material



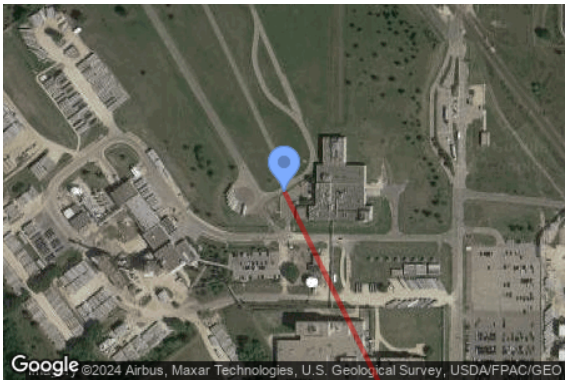
Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	44.803109	-92.882152	899.64	0.00	899.64
2	44.803125	-92.878440	907.33	0.00	907.33
3	44.799805	-92.878311	894.10	0.00	894.10
4	44.799775	-92.877860	892.82	0.00	892.82
5	44.798329	-92.877839	886.39	0.00	886.39
6	44.798329	-92.880285	885.04	0.00	885.04
7	44.798983	-92.880285	890.07	0.00	890.07
8	44.798983	-92.880757	885.29	0.00	885.29
9	44.799410	-92.881100	885.96	0.00	885.96
10	44.800369	-92.881465	891.54	0.00	891.54
11	44.801039	-92.881680	894.13	0.00	894.13
12	44.801039	-92.882109	888.06	0.00	888.06

Flight Path Receptors

Name: FP 1
Description:
Threshold height: 50 ft
Direction: 156.0°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°

Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	44.801605	-92.922610	800.22	50.00	850.22
Two-mile	44.828028	-92.939171	847.11	556.54	1403.65

Name: FP 2
Description:
Threshold height: 50 ft
Direction: 333.6°
Glide slope: 3.0°
Pilot view restricted? Yes
Vertical view: 30.0°
Azimuthal view: 50.0°



Point	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
Threshold	44.793101	-92.916905	803.88	50.00	853.88
Two-mile	44.767199	-92.898781	782.95	624.35	1407.30

Glare Analysis Results

Summary of Results Glare with low potential for temporary after-image predicted

PV Array	Tilt	Orient	Annual Green Glare		Annual Yellow Glare		Energy
	°	°	min	hr	min	hr	kWh
PV array 1	SA tracking	SA tracking	1,372	22.9	0	0.0	21,740,000.0

Total glare received by each receptor; may include duplicate times of glare from multiple reflective surfaces.

Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
FP 1	1,372	22.9	0	0.0
FP 2	0	0.0	0	0.0

PV: PV array 1 low potential for temporary after-image

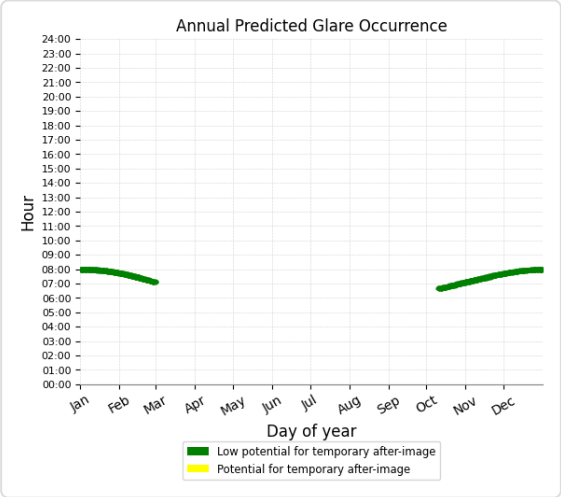
Receptor results ordered by category of glare

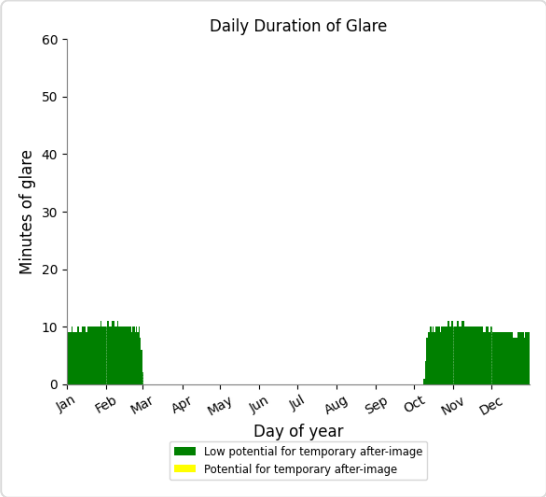
Receptor	Annual Green Glare		Annual Yellow Glare	
	min	hr	min	hr
FP 1	1,372	22.9	0	0.0
FP 2	0	0.0	0	0.0

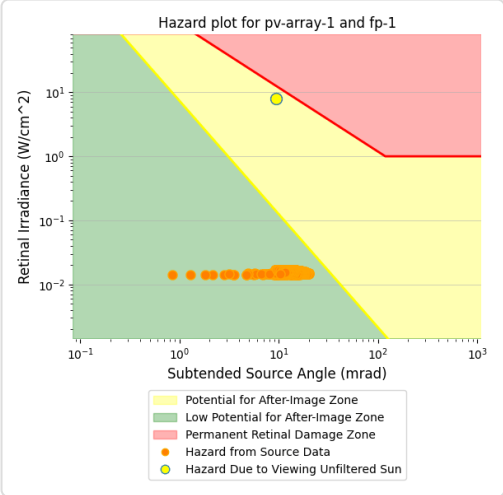
PV array 1 and FP: FP 1

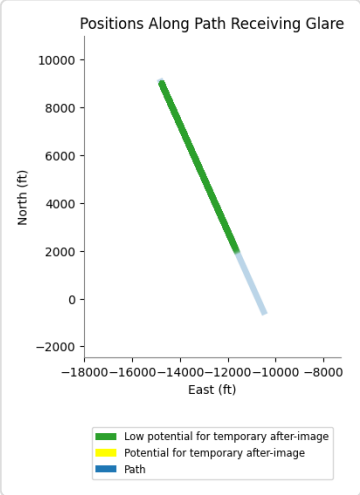
Yellow glare: none

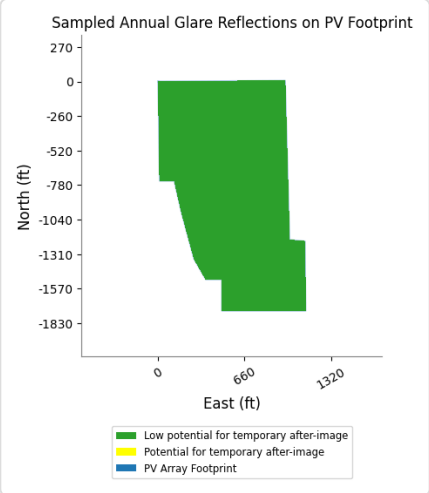
Green glare: 1,372 min.

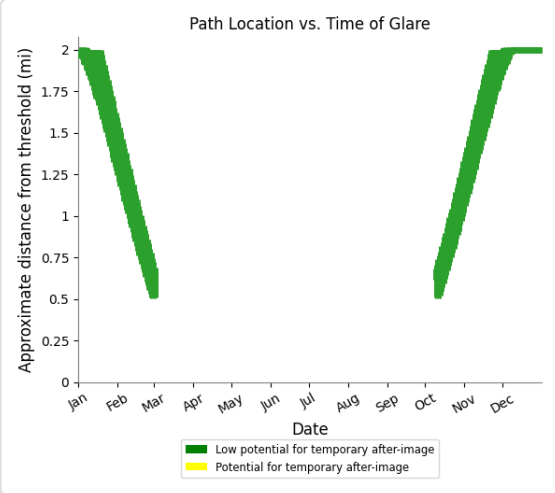












PV array 1 and FP: FP 2

No glare found

Assumptions

"Green" glare is glare with low potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
"Yellow" glare is glare with potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
The algorithm does not rigorously represent the detailed geometry of a system; detailed features such as gaps between modules, variable height of the PV array, and support structures may impact actual glare results. However, we have validated our models against several systems, including a PV array causing glare to the air-traffic control tower at Manchester-Boston Regional Airport and several sites in Albuquerque, and the tool accurately predicted the occurrence and intensity of glare at different times and days of the year.
Several V1 calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare. This primarily affects V1 analyses of path receptors.
Random number computations are utilized by various steps of the annual hazard analysis algorithm. Predicted minutes of glare can vary between runs as a result. This limitation primarily affects analyses of Observation Point receptors, including ATCTs. Note that the SGHAT/ ForgeSolar methodology has always relied on an analytical, qualitative approach to accurately determine the overall hazard (i.e. green vs. yellow) of expected glare on an annual basis.
The analysis does not automatically consider obstacles (either man-made or natural) between the observation points and the prescribed solar installation that may obstruct observed glare, such as trees, hills, buildings, etc.
The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size. Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
The variable direct normal irradiance (DNI) feature (if selected) scales the user-prescribed peak DNI using a typical clear-day irradiance profile. This profile has a lower DNI in the mornings and evenings and a maximum at solar noon. The scaling uses a clear-day irradiance profile based on a normalized time relative to sunrise, solar noon, and sunset, which are prescribed by a sun-position algorithm and the latitude and longitude obtained from Google maps. The actual DNI on any given day can be affected by cloud cover, atmospheric attenuation, and other environmental factors.
The ocular hazard predicted by the tool depends on a number of environmental, optical, and human factors, which can be uncertain. We provide input fields and typical ranges of values for these factors so that the user can vary these parameters to see if they have an impact on the results. The speed of SGHAT allows expedited sensitivity and parametric analyses.
The system output calculation is a DNI-based approximation that assumes clear, sunny skies year-round. It should not be used in place of more rigorous modeling methods.
Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid based on aggregated research data. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.
Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
Refer to the Help page at **www.forgesolar.com/help/** for assumptions and limitations not listed here.

Default glare analysis parameters and observer eye characteristics (for reference only):

- Analysis time interval: 1 minute
- Ocular transmission coefficient: 0.5
- Pupil diameter: 0.002 meters
- Eye focal length: 0.017 meters
- Sun subtended angle: 9.3 milliradians

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PRELIMINARY STORMWATER MANAGEMENT REPORT

Finnegan Solar Project

Washington County, Minnesota

APRIL 2024

PREPARED FOR:

ENTERPRISE ENERGY

PREPARED BY:

Westwood

Preliminary Stormwater Management Report

Finnegan Solar Project

Washington County, Minnesota

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Project Number: R0052583.00
Date: April 19, 2024

Westwood

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Introduction

The purpose of this report is to summarize the proposed stormwater management for the Finnegan Solar Project ("the project"). This report was prepared to meet water quality and water quantity requirements per the City of Cottage Grove, South Washington Watershed District, and the State of Minnesota, and is intended for submittal to these agencies for permitting review and approval.

The project site is proposed within a 155-acre property boundary and will encompass approximately 39.8 acres. The project is located approximately 15 miles southeast of downtown St. Paul in Washington County, Minnesota, with the nearest town being Cottage Grove. Cottage Grove is located directly northwest of the project area. The site's current use is agricultural row crops.

The proposed use of the site will be a solar facility with the area below the solar panels assumed to be pervious within Minnesota regulations. The proposed site will consist of 29.1 acres of meadow grasses and 1.6 acres of the new impervious surface including gravel access roads, inverters mounted on concrete pads, 9.1 acres of solar panels, and other associated solar infrastructure.

FEMA has completed a study to determine flood hazards for the selected location; the project area contains no FEMA Zone A areas. No preliminary or pending FEMA data was located that will affect the project area.

Minimal grading will be proposed on site and existing drainage patterns will be maintained. Stormwater management practices including an infiltration basin are proposed on site to meet the requirements of the City of Cottage Grove, South Washington Watershed District, and the State of Minnesota. Other stormwater measures are proposed to route water through the site include a berm and a swale.

Data Sources

Table 1: Data Sources

Task	Format	Source	Use
Elevation	1-meter DEM	MnTOPO	Offsite Model Elevations
Landcover	Shapefile	USDA 2021 Crop Data Layer	Existing Landcover
Soils	Shapefile	USGS SSURGO Dataset	Curve Numbers
Precipitation	PDF File	NOAA Atlas 14	Design Storms
Site Boundary	AutoCAD drawing	Enterprise Energy	Define Model Extents
2014 Aerial Photography	ArcGIS Map Service	USDA FSA	Reference
FEMA Flood Zones	PDF; Shapefile	FEMA	Reference

Site Conditions

Site Location

The project site is proposed within a 155-acre property boundary and will encompass approximately 39.8 acres. The project is located approximately 15 miles southeast of downtown St. Paul in Washington County, Minnesota, with the nearest town being Cottage Grove. Cottage Grove is located directly northwest of the project area. See Exhibit 1 for a map of the project location.

Topography Description

The existing topographic information used in this analysis was obtained from MnTOPO 1-meter elevation data provided by the Minnesota Department of Natural Resources and the Minnesota Geospatial Information Office. The site is generally flat with slopes around 1%-5% and a small section in the center at a localized high area with steep slopes up to 10%.

Drainage Patterns

Approximately 900 acres of offsite runoff enters the site from the north. Onsite runoff is split into 3 drainage areas based on discharge locations and flowpaths. On-site drainage areas are shown in Exhibits 5 & 6.

The site has one ultimate discharge location, Seeger Creek, a small intermittent stream that runs through the site and drains directly to the Mississippi River. Discharge locations are shown in Exhibits 5 & 6.

FEMA Flood Zones

FEMA has completed a study to determine flood hazards for the selected location; the project area is covered by panels 27163C0417E and 27163C0440E. Panel 27163C0417E can be found in Appendix F, whereas Panel 27163C0440E has not been printed by FEMA. There are no FEMA Zone A or Zone AE flood hazard areas within the project area. A FEMA Zone A flood hazard area is a 100-year flood hazard area with no base flood elevation determined. A FEMA Zone AE flood hazard area is a 100-year flood hazard area with a base flood elevation determined. No preliminary or pending FEMA changes are proposed within the project area. See Exhibit 2 for the FEMA Zones near the project area.

Soils

Soils data was obtained from SSURGO and incorporated into the analysis. This dataset provided coverage for the entire site.

The site consists primarily of Hydrologic Soil Group (HSG) A soils with some locations with HSG B, C, and D. Type A soils have low runoff potential and high infiltration rates. Type B soils have moderate runoff potential and infiltration rates. Type C soils have moderate runoff potential and low infiltration rates. Type D soils have high runoff potential and low infiltration rates. Low infiltration rates can cause localized flooding in low areas for extended periods on site. See Exhibit 3 for the soils distribution throughout the site.

Landcover

A review of aerial photographs and the USDA 2021 Crop Data Layer shows that the site is currently used and has historically been used for agricultural row crops. See Exhibit 4 for a map of the landcover throughout the site.

Requirements

State and County requirements have been reviewed for the project. All requirements determined to be relevant to the project are summarized below.

Construction Stormwater Requirements

Information on the construction stormwater management for the project will be included as a separate study.

Stormwater Management Requirements

The following requirements need to be met for the project.

Table 2: Stormwater Management Requirements

Agency	Location of Requirements	Water Quantity Requirement	Water Quality Requirement	Other
State of Minnesota	MPCA Stormwater Manual	Post Construction Runoff Rates ≤ Pre Construction Runoff Rates (2-, 10-, 100-year 24-hour events)	1.0" of runoff over contributing area	Infiltration within 48 hours
City of Cottage Grove	Stormwater Summary Solar Site Development Memo (Appendix G)	Post Construction Runoff Rates ≤ Pre Construction Runoff Rates (2-, 10-, 100-year 24-hour events)	50% TSS and 80% TP Removal	

Drainage Improvements

Proposed drainage improvements will be sized per Table 3 below.

Table 3: Drainage Improvement Sizing Requirements

Drainage Improvement	Regulating Agency	Requirement
Internal Swales	EPA	2-year, 24-hour storm for temporary conditions
Boundary Berms	EPA	2-year, 24-hour storm for temporary conditions

Methodology

Existing and proposed conditions are modeled in HydroCAD software. HydroCAD is a widely accepted hydrologic and hydraulic modeling package based on TR-20 unit hydrograph equations. It models stormwater runoff discharge rates and velocities from ponds, culverts, outlet control structures, and stream reaches.

Hydrology

Curve Number methodology, based on the NRCS-TR 55 method, was used in the modeling for predicting direct runoff. Curve numbers were assigned by reviewing the soil and landcover for each drainage area.

Times of concentration were calculated for each drainage area in HydroCAD using the lag method. The lag method uses the hydraulic length (distance traveled by a drop of water from the most distant part of the subcatchment to the outlet point) and the average land slope (average slope of entire watershed). The weighted curve number along with the lag information is used to get the time of concentration for each drainage area.

Atlas 14 precipitation data and the MSE3 rainfall distribution were used for the analysis (Appendix A).

Table 4: Rainfall Table

Storm Event	2-year 24-hour	10-year 24-hour	100-year 24-hour
Rainfall (in)	2.79	4.15	7.38

Stormwater Management Approach

A solar project differs greatly from other commercial or residential developments. When constructed, a solar project will include solar panels, at-grade gravel access roads, and other electrical equipment. The panels will be mounted above the ground with a low maintenance perennial meadow grass growing below. While solar projects may require grading, the existing terrain is smoothed to accommodate array installation, rather than significant changes to grades or slopes, and the grading is designed to maintain existing drainage patterns. Access roads are installed at grade and allow for runoff to sheet flow through the proposed meadow cover which provides treatment and reduction in runoff. The proposed vegetation slows the runoff and allows for water to filter into the soils for treatment.

Water quality is improved over pre-development conditions due to the land cover's conversion from a higher runoff rate row-crop field to a lower runoff rate meadow grass. Water quality concerns are also minimized due to the low percentage of impervious surfaces, and that runoff from these surfaces filters through the meadow grasses on site prior to discharging.

Runoff from the majority of the proposed solar array will sheet flow to a proposed swale along the southern side of the project. The swale will direct runoff to an infiltration basin. Some runoff is expected to flow towards the east, which will be routed along a berm to the swale on the southern side. A small drainage area in the northwest of the site will sheet flow out of the project area.

As described in the Minnesota Stormwater Manual, better site design techniques have been incorporated to ensure a site where all impervious surfaces are fully disconnected and routed over grass prior to leaving the site. (http://stormwater.pca.state.mn.us/index.php/Better_site_design). The MPCA has developed a spreadsheet tool to calculate the volume of the stormwater that must be treated on site from solar installations (Appendix H).

An infiltration basin is proposed to provide rate control and treatment as needed to meet the requirements of the City of Cottage Grove. An infiltration rate of 0.8 in/hour was used in the analysis of the site based on the Type A loamy soils present in the basin location. The storage

volume provided below the emergency overflow will infiltrate into the soils below the basin for treatment and a reduction in runoff volume. The outlet structures are designed to meet the runoff rate requirements of the site.

In addition to typical stormwater management BMPs, the recommended approach for solar projects should include the following: limit the amount of impervious surfaces to reduce runoff, minimize the amount of grading to promote sheet flow, and the planting of the meadow grass on the majority of the site to provide both runoff reduction and treatment.

Modeling

The site is modeled in existing and proposed conditions in order to complete the water quantity analysis required.

Existing Conditions

The existing site consists of row crops. Curve numbers were assigned based on the landcover and soil types using the values found in the Minnesota Stormwater Management Manual per City of Cottage Grove requirements, see Table 5 for a summary of existing conditions.

Table 5: Existing Conditions Cover

Cover	CN	Area (ac)
Row Crops, HSG A	67	27.6
Row Crops, HSG B	78	9.9
Row Crops, HSG D	89	2.3
Total		39.8

Proposed Conditions

The use of the site will be a solar facility. The solar panels will be located above grade with meadow grass below the proposed array. Gravel access roads and inverters are included in the impervious areas. Curve number values are derived from the Minnesota Stormwater Management Manual per City of Cottage Grove requirements. See Table 6 below for a summary of proposed conditions.

Table 6: Proposed Conditions Cover

Cover	CN	Area (ac)
Meadow, HSG A	39	26.9
Meadow, HSG B	61	9.0
Meadow, HSG D	80	2.3
Roads and Inverters	98	1.6
Total		39.8

Results

The results of the various analyses are described below.

Water Quantity Analysis

Stormwater quantity calculations for the site were prepared using HydroCAD. As indicated in the Stormwater Summary Solar Site Development Memo (Appendix G), the MSE3 rainfall distribution was used along with Atlas-14 precipitation data. The proposed site meets the rate control requirements of the City of Cottage Grove. Tables 7 and 8 show a summary of the runoff rates and volumes for the required storm events at each site discharge locations. Calculations are included in Appendices B & C.

Table 7: Runoff Rate Summary

Location	2-year Runoff (cfs)		10-year Runoff (cfs)		100-year Runoff (cfs)	
	Existing	Proposed	Existing	Proposed	Existing	Proposed
1	15.3	1.0	38.7	1.9	107.5	4.9

Table 8: Runoff Volume Summary

Location	2-year Runoff (af)		10-year Runoff (af)		100-year Runoff (af)	
	Existing	Proposed	Existing	Proposed	Existing	Proposed
1	2.2	0.2	5.0	0.5	13.5	2.4

Water Quality Analysis

Stormwater quality calculations for the site were prepared using the P8 Urban Catchment Model. Treatment of the stormwater quality volume for the site will be provided within Drainage Area 2 from the proposed infiltration basin. The basin has been sized to retain and infiltrate 1" of runoff over the proposed impervious surfaces and partial imperviousness from the solar panels, per the state requirement. Table 9 shows the required and provided storage volumes for each discharge location. Calculations can be found in Appendix H.

Table 9: Basin Storage Summary

Basin ID	Proposed Impervious (ac)	Required Storage Volume (ac-ft)	Provided Storage Volume (ac-ft)
P2	1.6	0.3	1.1

Pollutant Removal

The City of Cottage Grove requires that new development reduce the total suspended solids (TSS) load by 80% and total phosphorous (TP) load by 50%. Per South Washington Watershed District requirements, the TSS and TP removal from the site overland flow were calculated for the project using the P8 Urban Catchment Model program. Additional specifications for P8 modeling were adhered to per the Stormwater Summary Solar Site Development Memo (Appendix G). For the existing conditions, weighted curve numbers were used to represent the existing row crop vegetation for each corresponding watershed and HSG. For the proposed conditions, weighted curve numbers were used to represent the proposed meadow grass vegetation for each corresponding surfaces on site, including aggregate access roads, inverters, and solar panels. The runoff generated from the solar panels will flow to the edge of the panels and be allowed to drip onto the pervious meadow vegetation below. The results of the TSS and TP analyses can be found in Appendix D and Table 10 below.

Table 10: Pollutant Removal

Pollutant	Load In (lbs)	Load Out (lbs)	Load Reduction (%)
TSS	6,536	136	97.9
TP	31.6	0.8	97.5

Stormwater Management Practices

Basin Calculations

The proposed basins must meet various state requirements. See Table 11 below for a summary of the basin design factors.

Table 11: Detailed Basin Requirements

Item	Requirement
Depth	3.2' maximum dead storage depth
Primary Outlet	12" CMP culvert
Secondary Outlet	Emergency Overflow Spillway
Drawdown Time	Max. 48 hours

The results of the MPCA spreadsheet show the site is meeting the requirements based on the solar panels being allowed to sheet flow over the pervious ground and the addition of the infiltration basin. One basin is also provided to make up the remainder of the volume required and exceeds the required volume. Tables 12 and 13 summarize the proposed basins on site. Calculations can be found in Appendix H.

Table 12: Proposed Basin Geometry

Basin ID	Type	Bottom Elevation (ft)	Outlet Elevation (ft)	Emergency Overflow Elevation (ft)	Top Elevation (ft)
P2	Infiltration	882	885	886	886.5

Table 13: Basin Drawdown Summary

Basin	Proposed Depth of Dead Storage (ft)	Infiltration Rate (in/hr)	Drawdown Time (hours)
P2	3.0	0.8	45

Swale Sizing

A swale is proposed to avoid flooding of proposed infrastructure and route water to proposed basins. The swale is sized to safely pass the 100-year 24-hour rainfall events for construction conditions. HydroCAD was used to size the proposed swale. Calculations can be found in Appendix E. Lining materials were chosen based on shear stress through the proposed swales. Table 14 summarizes the proposed swale. See civil plans for swale location.

Table 14: Swale Summary

Location	Bottom Width (ft)	Depth (ft)	Side Slopes	Shear Stress (lb/sf)	Lining Material
Swale 1	5	1.0	4:1	2.1	EroNet P300*

*Or approved equal

Conclusion

The proposed site was designed to meet the water quality and quantity requirements of the City of Cottage Grove, South Washington Watershed District, and the State of Minnesota. The proposed site consists of one proposed infiltration basin, one swale, and one berm in order to maintain existing drainage patterns, reduce runoff rates, and provide required treatment volumes. Minimal grading on site and the proposed swale maintain existing drainage areas throughout the site. The proposed vegetative cover below the array and infiltration basin reduce runoff rates for the final conditions.

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Exhibits

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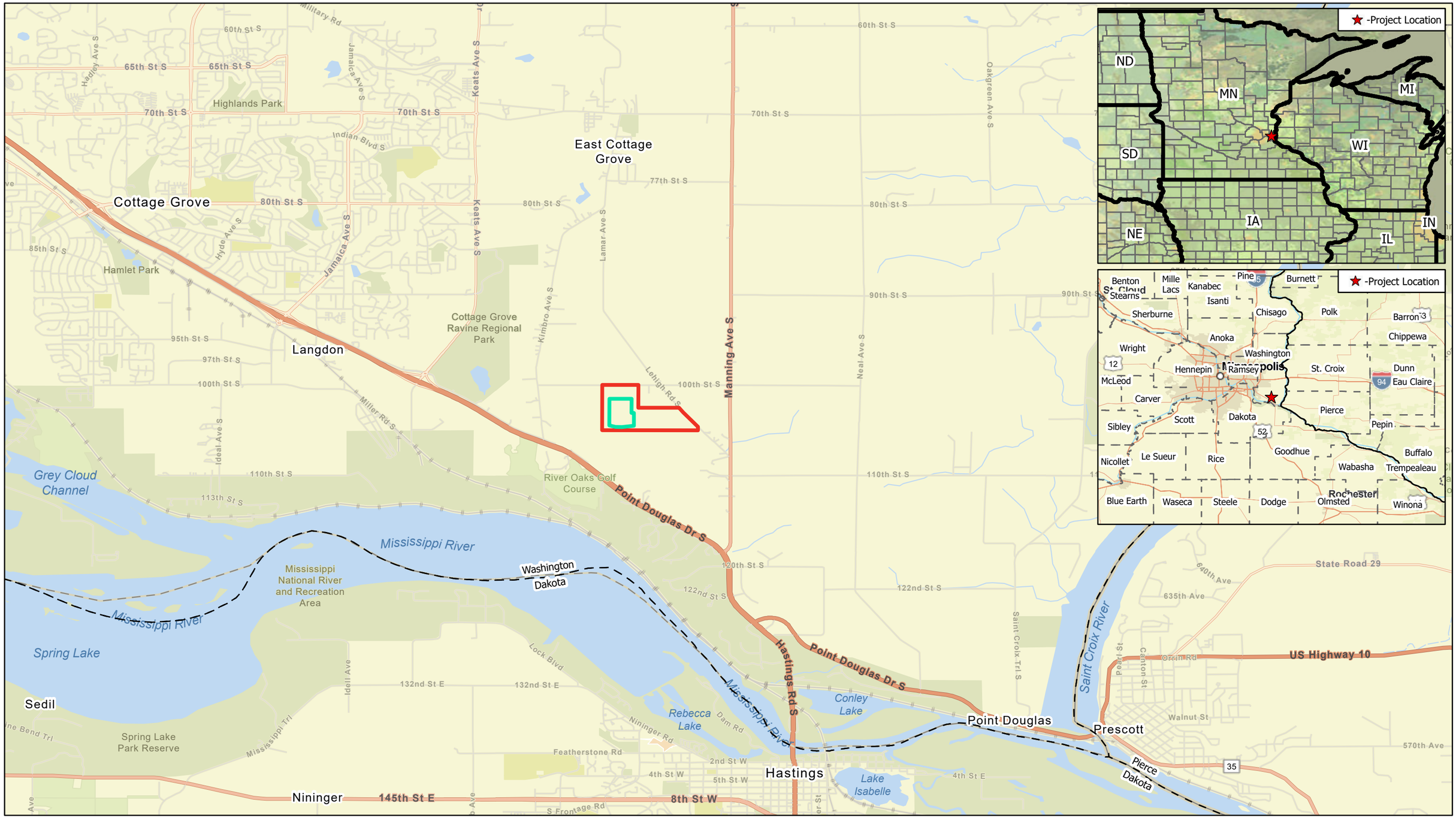

Data Source(s): Westwood (2024); Esri WMS Basemap Imagery (Accessed 2024); USGS (2024); FEMA (2024); USDA (2024)

Legend

- Project Area
- County Boundary
- Fence Area

N

0 1 Miles

Finnegan Solar Project

Washington County, Minnesota

Exhibit 1: Location Map

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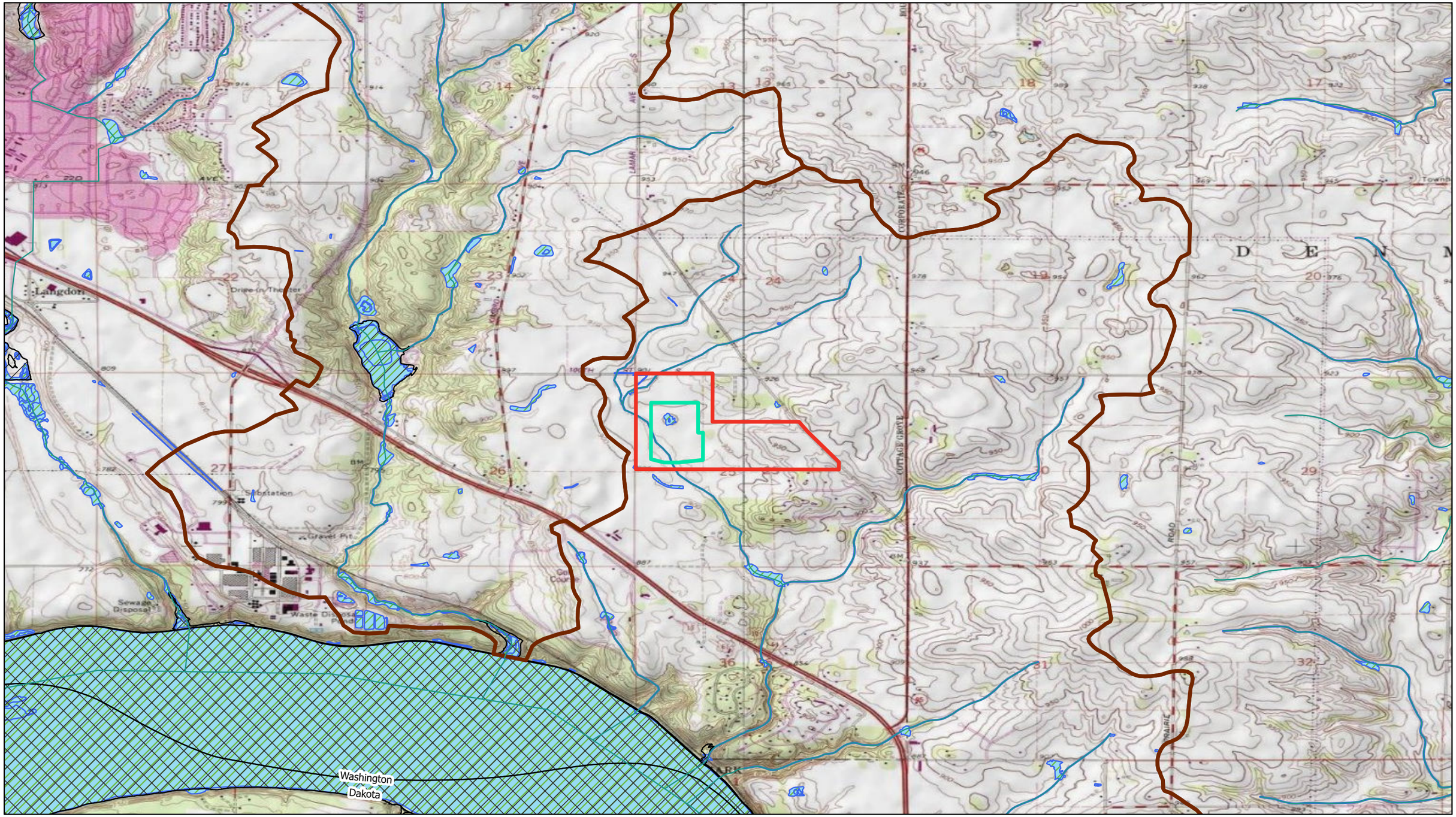

Data Source(s): Westwood (2024); Esri WMS Basemap Imagery (Accessed 2024); USGS (2024); FEMA (2024); USDA (2024)

Legend

- Project Area
- Fence Area
- HUC-12 Boundary
- County Boundary
- FEMA Zone A
- FEMA Zone AE
- NWI Wetlands
- NHD Flowlines

N

0 0.5 Miles

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Washington County, Minnesota

Exhibit 2: Base Hydrologic Map

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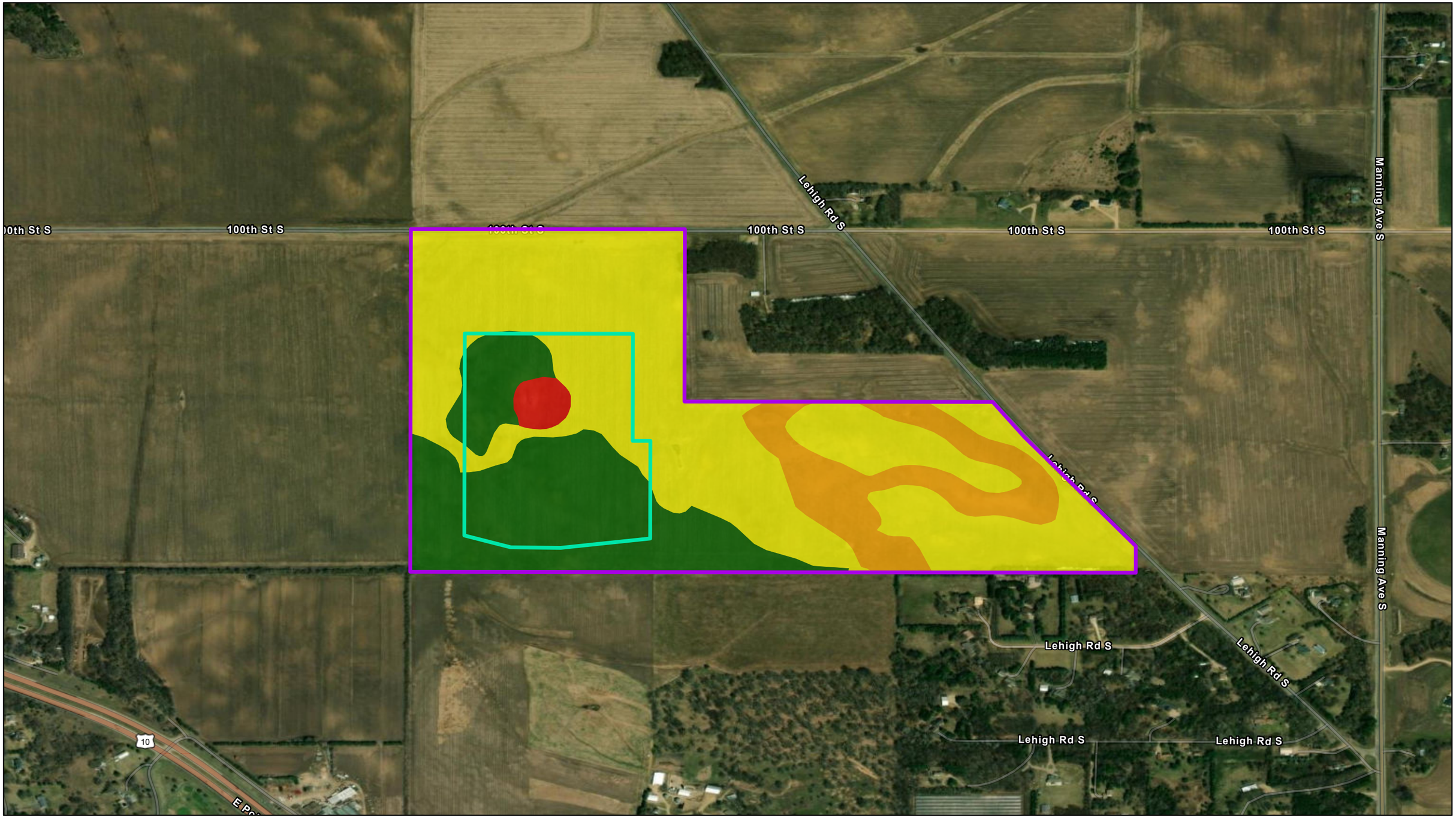

Data Source(s): Westwood (2024); Esri WMS Basemap Imagery (Accessed 2024); USGS (2024); FEMA (2024); USDA (2024)

Legend

- Project Area
- Fence Area

Hydrologic Soil Group

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Water

N

0 700 Feet

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Washington County, Minnesota

Exhibit 3: Soils Map

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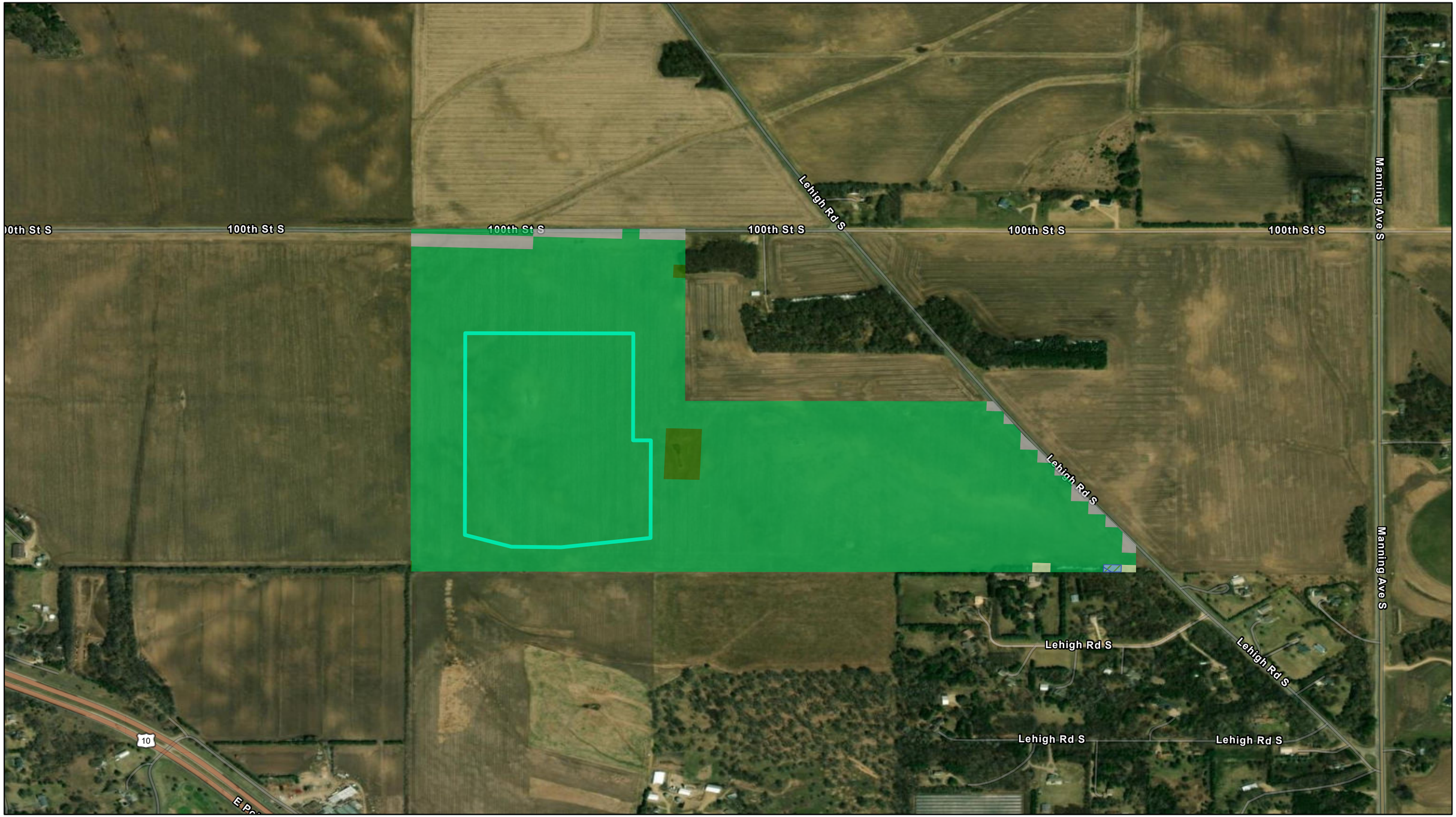

Data Source(s): Westwood (2024); Esri WMS Basemap Imagery (Accessed 2024); USGS (2024); FEMA (2024); USDA (2024)

Legend

- Project Area
- Fence Area
- Cultivated
- Developed
- Fallow
- Barren
- Woods
- Pastureland
- Shrubland
- Water
- Wetland

Landcover

N

0 700 Feet

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Washington County, Minnesota

Exhibit 4: Landcover Map

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LEGEND:

- PROJECT BOUNDARY
- EX. INDEX CONTOUR
- EX. INTERVAL CONTOUR
- EX. PAVED ROAD
- EX. GRAVEL ROAD
- EX. WETLAND
- EX. ONSITE DRAINAGE AREA BOUNDARY
- EX. TIME OF CONCENTRATION LINE
- DISCHARGE LOCATION
- 1 DRAINAGE AREA LABEL
- 1ER DISCHARGE AREA LABEL

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REVISIONS:

#	DATE	COMMENT	BY	CHK	APR

N

0' 200' 400' 600'

Finnegan Solar Project

Washington County, Minnesota

Existing Drainage Map

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DATE: 04/19/2024

REV:

SHEET: 5

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- PROJECT BOUNDARY
- EX. INDEX CONTOUR
- EX. INTERVAL CONTOUR
- EX. PAVED ROAD
- EX. GRAVEL ROAD
- EX. WETLAND
- PROPOSED SOLAR ARRAY
- PROPOSED ACCESS ROAD
- PROPOSED SECURITY FENCE
- PROPOSED ELECTRICAL EQUIPMENT
- PROPOSED ELECTRICAL POLE
- PROPOSED LAYDOWN YARD
- PROPOSED BASIN
- PROPOSED SWALE
- PROPOSED BERM
- PROPOSED OVERHEAD COLLECTION
- PROPOSED UNDERGROUND COLLECTION
- PROPOSED SILT FENCE
- PROPOSED ONSITE DRAINAGE AREA BOUNDARY
- PROPOSED TIME OF CONCENTRATION LINE
- PROPOSED GRADING LIMITS
- PROPOSED INDEX CONTOUR
- PROPOSED INTERVAL CONTOUR
- DISCHARGE LOCATION
- 1 DRAINAGE AREA LABEL
- 1PR DISCHARGE AREA LABEL

Westwood

Phone (952) 937-5150
Toll Free (888) 937-5150
12701 Whitewater Drive, Suite #300
Minnetonka MN, 55343
westwoodps.com

Westwood Professional Services, Inc.

PREPARED FOR:

ENTERPRISE ENERGY
2925 Dean Parkway, Suite 300
Minneapolis, MN 55416

REVISIONS:

#	DATE	COMMENT	BY	CHK	APR

0' 200' 400' 600'

Finnegan Solar Project

Washington County, Minnesota

Proposed Drainage Map

NOT FOR CONSTRUCTION

DATE: 04/19/2024

REV:

SHEET: 6

N:\005\5583-05_CAD_Water Resources\005583-05-DRB-01.dwg, 4/19/2024 1:51 PM Jennifer Mangi

Appendix A

NOAA Atlas 14 Rainfall Data

NOAA Atlas 14, Volume 8, Version 2
Location name: Cottage Grove, Minnesota, USA*
Latitude: 44.8008°, Longitude: -92.8775°
Elevation: 900 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffery Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.358 (0.278-0.465)	0.424 (0.329-0.551)	0.537 (0.415-0.700)	0.636 (0.488-0.830)	0.778 (0.581-1.04)	0.893 (0.651-1.21)	1.01 (0.714-1.39)	1.14 (0.771-1.59)	1.31 (0.856-1.86)	1.45 (0.919-2.07)
10-min	0.524 (0.406-0.681)	0.621 (0.481-0.808)	0.786 (0.608-1.02)	0.931 (0.715-1.22)	1.14 (0.851-1.53)	1.31 (0.953-1.77)	1.48 (1.04-2.03)	1.67 (1.13-2.32)	1.92 (1.25-2.72)	2.12 (1.35-3.02)
15-min	0.639 (0.496-0.830)	0.757 (0.587-0.985)	0.959 (0.741-1.25)	1.14 (0.872-1.48)	1.39 (1.04-1.86)	1.59 (1.16-2.15)	1.81 (1.28-2.48)	2.03 (1.38-2.83)	2.34 (1.53-3.32)	2.59 (1.64-3.69)
30-min	0.894 (0.694-1.16)	1.06 (0.826-1.39)	1.36 (1.05-1.77)	1.61 (1.24-2.10)	1.98 (1.48-2.66)	2.27 (1.66-3.07)	2.58 (1.82-3.54)	2.91 (1.97-4.05)	3.35 (2.19-4.75)	3.70 (2.35-5.28)
60-min	1.17 (0.907-1.52)	1.38 (1.07-1.80)	1.76 (1.36-2.30)	2.12 (1.63-2.77)	2.66 (2.01-3.62)	3.13 (2.29-4.26)	3.63 (2.57-5.01)	4.17 (2.84-5.85)	4.95 (3.24-7.05)	5.58 (3.54-7.96)
2-hr	1.44 (1.13-1.85)	1.70 (1.33-2.18)	2.17 (1.70-2.80)	2.63 (2.05-3.39)	3.35 (2.57-4.53)	3.98 (2.96-5.38)	4.67 (3.35-6.41)	5.43 (3.74-7.57)	6.54 (4.33-9.26)	7.46 (4.78-10.5)
3-hr	1.61 (1.28-2.06)	1.88 (1.49-2.40)	2.41 (1.90-3.08)	2.94 (2.30-3.76)	3.80 (2.94-5.13)	4.57 (3.43-6.17)	5.42 (3.93-7.43)	6.39 (4.44-8.88)	7.80 (5.21-11.0)	8.98 (5.79-12.6)
6-hr	1.89 (1.52-2.38)	2.19 (1.75-2.75)	2.80 (2.23-3.52)	3.42 (2.72-4.33)	4.46 (3.51-5.99)	5.41 (4.12-7.24)	6.47 (4.75-8.79)	7.68 (5.40-10.6)	9.48 (6.40-13.3)	11.0 (7.15-15.3)
12-hr	2.12 (1.72-2.64)	2.48 (2.01-3.08)	3.18 (2.57-3.96)	3.86 (3.11-4.82)	4.96 (3.93-6.52)	5.93 (4.56-7.81)	7.01 (5.19-9.38)	8.22 (5.83-11.2)	9.98 (6.80-13.8)	11.4 (7.53-15.8)
24-hr	2.46 (2.02-3.01)	2.79 (2.30-3.42)	3.47 (2.84-4.26)	4.15 (3.38-5.11)	5.26 (4.23-6.84)	6.26 (4.88-8.16)	7.38 (5.54-9.77)	8.64 (6.20-11.6)	10.5 (7.23-14.4)	12.0 (8.01-16.5)
2-day	2.85 (2.38-3.44)	3.17 (2.64-3.82)	3.82 (3.17-4.62)	4.49 (3.70-5.45)	5.60 (4.56-7.19)	6.61 (5.22-8.51)	7.75 (5.89-10.2)	9.05 (6.58-12.1)	11.0 (7.64-14.9)	12.6 (8.45-17.1)
3-day	3.13 (2.63-3.75)	3.44 (2.88-4.12)	4.07 (3.41-4.89)	4.74 (3.94-5.71)	5.85 (4.81-7.46)	6.87 (5.46-8.78)	8.03 (6.14-10.4)	9.34 (6.84-12.4)	11.3 (7.93-15.3)	12.9 (8.75-17.4)
4-day	3.36 (2.84-4.00)	3.67 (3.10-4.37)	4.32 (3.63-5.16)	4.99 (4.17-5.98)	6.11 (5.04-7.73)	7.13 (5.69-9.06)	8.28 (6.37-10.7)	9.60 (7.06-12.7)	11.5 (8.13-15.5)	13.2 (8.95-17.7)
7-day	3.90 (3.33-4.59)	4.29 (3.66-5.06)	5.04 (4.29-5.95)	5.77 (4.88-6.84)	6.93 (5.74-8.60)	7.94 (6.38-9.92)	9.07 (7.02-11.6)	10.3 (7.63-13.4)	12.1 (8.61-16.1)	13.6 (9.35-18.2)
10-day	4.40 (3.79-5.15)	4.88 (4.19-5.70)	5.73 (4.91-6.72)	6.52 (5.55-7.67)	7.72 (6.40-9.45)	8.74 (7.05-10.8)	9.84 (7.64-12.4)	11.0 (8.19-14.2)	12.7 (9.07-16.8)	14.1 (9.73-18.7)
20-day	5.97 (5.21-6.88)	6.65 (5.80-7.67)	7.78 (6.76-8.99)	8.74 (7.54-10.1)	10.1 (8.40-12.0)	11.1 (9.06-13.5)	12.2 (9.57-15.1)	13.3 (9.98-16.9)	14.9 (10.6-19.3)	16.0 (11.2-21.0)
30-day	7.38 (6.49-8.43)	8.22 (7.22-9.40)	9.59 (8.39-11.0)	10.7 (9.30-12.3)	12.2 (10.2-14.3)	13.3 (10.9-15.9)	14.4 (11.3-17.6)	15.5 (11.6-19.4)	16.9 (12.2-21.7)	18.0 (12.6-23.5)
45-day	9.24 (8.19-10.5)	10.3 (9.13-11.7)	12.0 (10.6-13.6)	13.3 (11.7-15.2)	15.0 (12.6-17.4)	16.2 (13.3-19.1)	17.4 (13.7-21.0)	18.5 (13.9-22.8)	19.8 (14.3-25.1)	20.7 (14.6-26.9)
60-day	10.9 (9.70-12.2)	12.1 (10.8-13.7)	14.1 (12.5-15.9)	15.6 (13.7-17.7)	17.5 (14.7-20.1)	18.8 (15.5-22.0)	20.0 (15.9-24.0)	21.1 (16.0-26.0)	22.4 (16.2-28.3)	23.2 (16.4-30.0)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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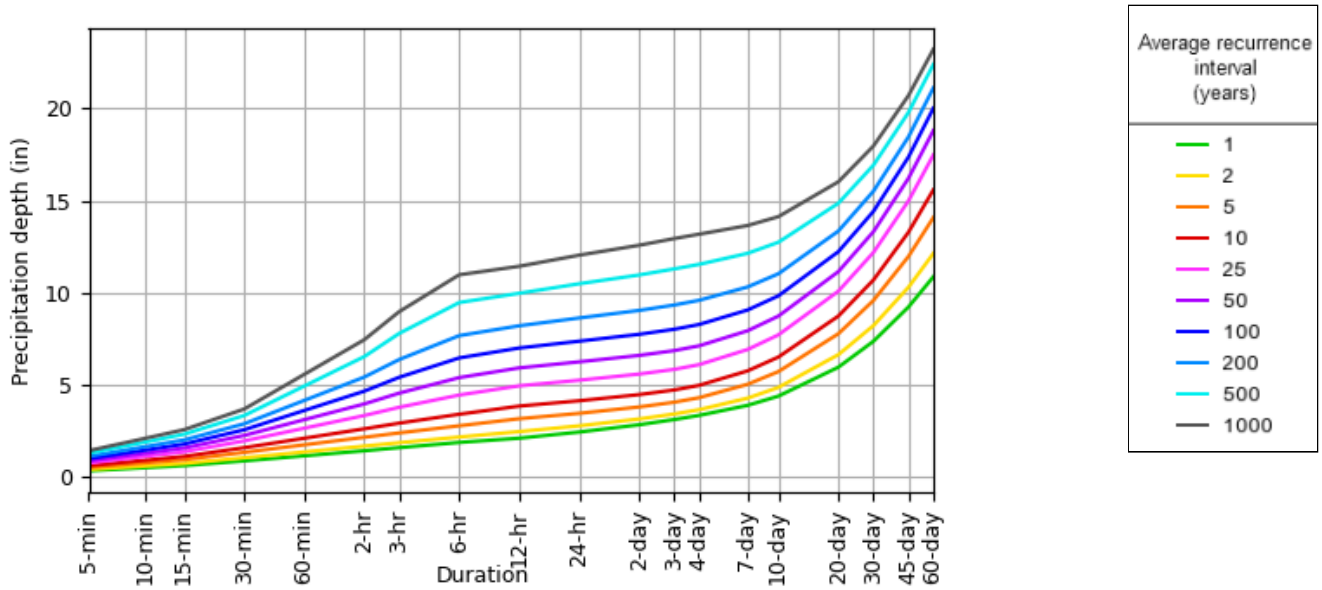
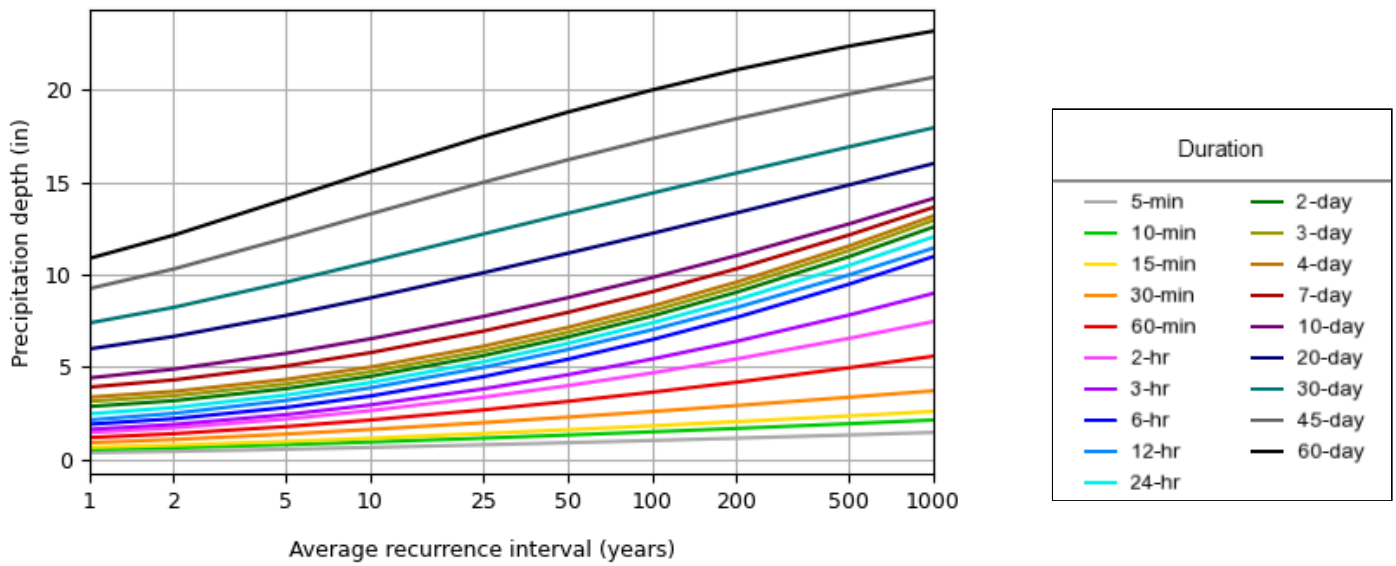
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 44.8008°, Longitude: -92.8775°





NOAA Atlas 14, Volume 8, Version 2

Created (GMT): Fri Mar 29 20:17:45 2024

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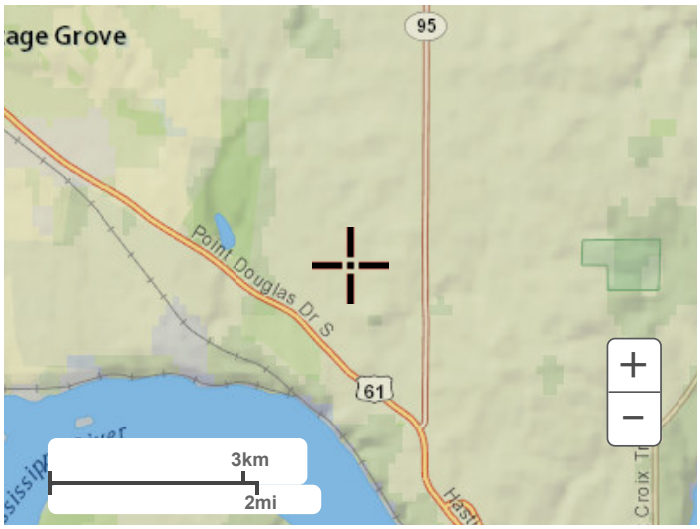
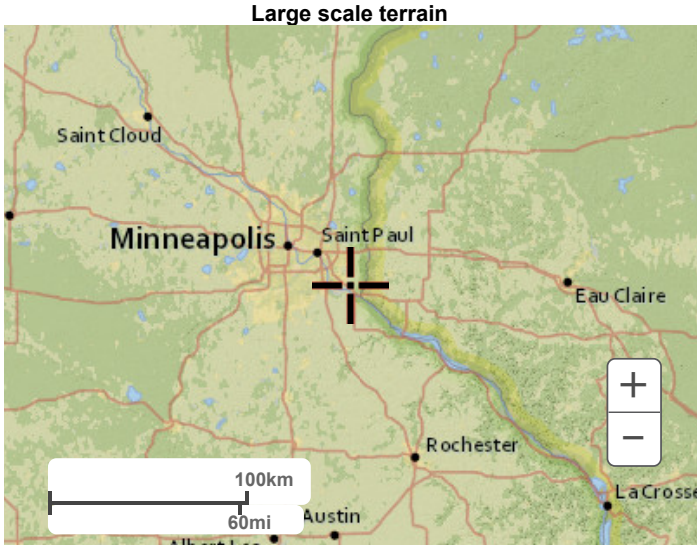
Maps & aerials

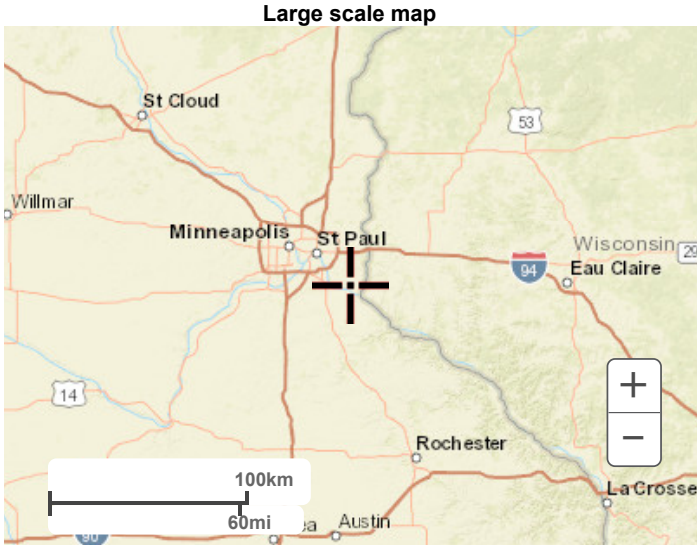
Small scale terrain



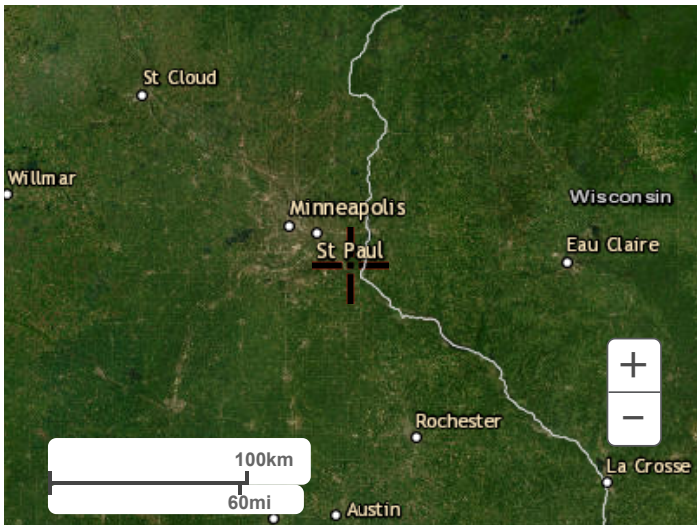
Large scale terrain



Large scale map



Large scale aerial



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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

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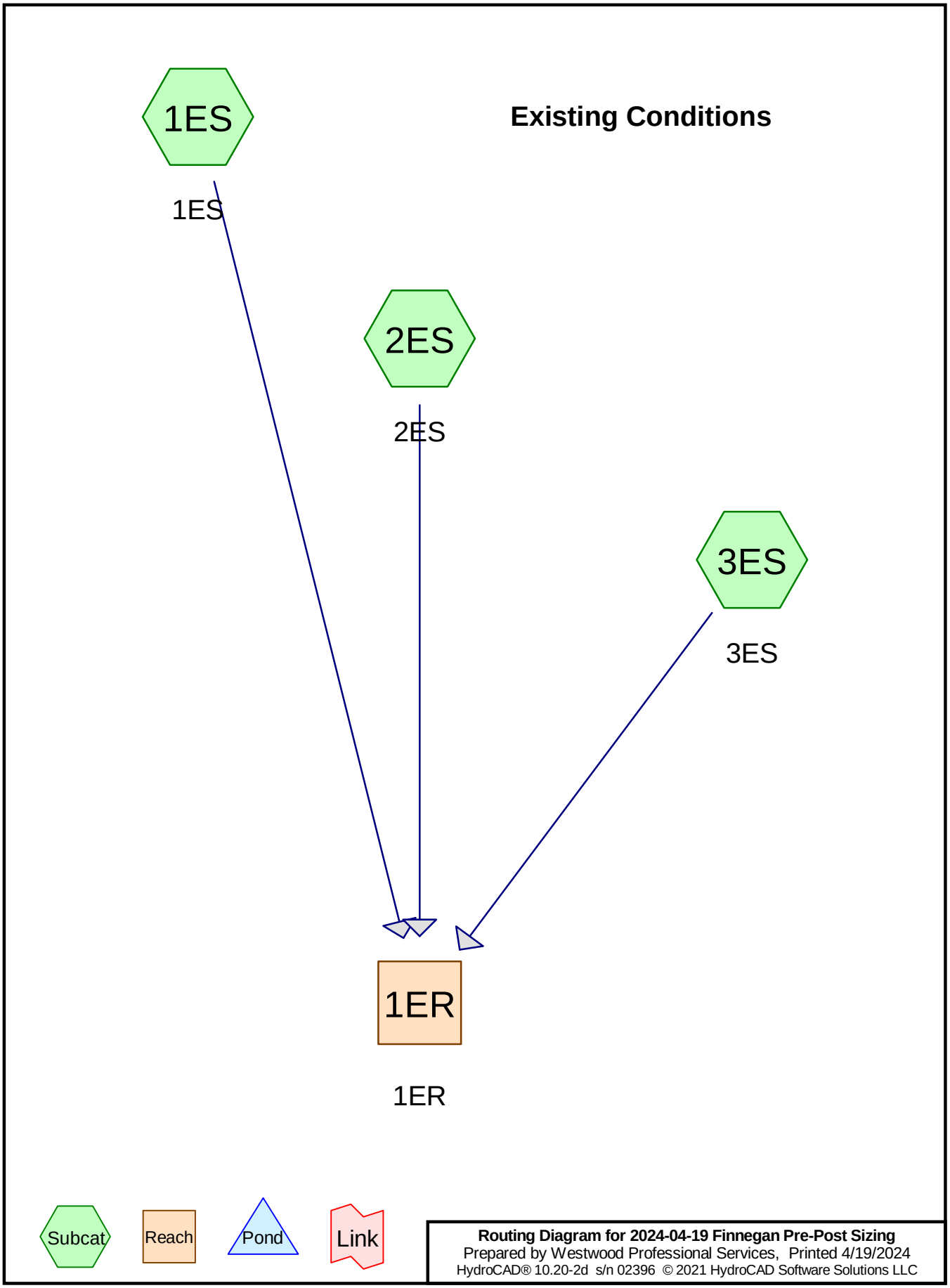
Appendix B

Existing Conditions HydroCAD Results


Existing Conditions
1ES
1ES
2ES
2ES
3ES
3ES
1ER
1ER
Subcat
Reach
Pond
Link
Routing Diagram for 2024-04-19 Finnegan Pre-Post Sizing
Prepared by Westwood Professional Services, Printed 4/19/2024
HydroCAD® 10.20-2d s/n 02396 © 2021 HydroCAD Software Solutions LLC

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
27.600	67	Row crops, straight row, Good, HSG A (1ES, 2ES, 3ES)
9.900	78	Row crops, straight row, Good, HSG B (1ES, 2ES, 3ES)
2.300	89	Row crops, straight row, Good, HSG D (1ES, 2ES)
39.800	**71**	**TOTAL AREA**

Summary for Subcatchment 1ES: 1ES

Runoff = 2.76 cfs @ 12.23 hrs, Volume= 0.200 af, Depth= 0.52"
Routed to Reach 1ER : 1ER

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-yr Rainfall=2.79"

Area (ac)	CN	Description
0.100	89	Row crops, straight row, Good, HSG D
0.200	78	Row crops, straight row, Good, HSG B
4.300	67	Row crops, straight row, Good, HSG A
4.600	68	Weighted Average
4.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	400	0.0300	0.54		**Lag/CN Method,**

Summary for Subcatchment 2ES: 2ES

Runoff = 11.57 cfs @ 12.70 hrs, Volume= 1.560 af, Depth= 0.73"
Routed to Reach 1ER : 1ER

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-yr Rainfall=2.79"

Area (ac)	CN	Description
14.600	67	Row crops, straight row, Good, HSG A
8.800	78	Row crops, straight row, Good, HSG B
2.200	89	Row crops, straight row, Good, HSG D
25.600	73	Weighted Average
25.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
46.1	1,900	0.0200	0.69		**Lag/CN Method,**

Summary for Subcatchment 3ES: 3ES

Runoff = 3.78 cfs @ 12.47 hrs, Volume= 0.417 af, Depth= 0.52"
Routed to Reach 1ER : 1ER

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-yr Rainfall=2.79"

Area (ac)	CN	Description
8.700	67	Row crops, straight row, Good, HSG A
0.900	78	Row crops, straight row, Good, HSG B
9.600	68	Weighted Average
9.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.8	710	0.0150	0.43		**Lag/CN Method,**

Summary for Reach 1ER: 1ER

Inflow Area = 39.800 ac, 0.00% Impervious, Inflow Depth = 0.66" for 2-yr event
Inflow = 15.30 cfs @ 12.63 hrs, Volume= 2.177 af
Outflow = 15.30 cfs @ 12.63 hrs, Volume= 2.177 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Subcatchment 1ES: 1ES

Runoff = 8.09 cfs @ 12.22 hrs, Volume= 0.499 af, Depth= 1.30"
Routed to Reach 1ER : 1ER

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-yr Rainfall=4.15"

Area (ac)	CN	Description
0.100	89	Row crops, straight row, Good, HSG D
0.200	78	Row crops, straight row, Good, HSG B
4.300	67	Row crops, straight row, Good, HSG A
4.600	68	Weighted Average
4.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	400	0.0300	0.54		**Lag/CN Method,**

Summary for Subcatchment 2ES: 2ES

Runoff = 28.15 cfs @ 12.66 hrs, Volume= 3.490 af, Depth= 1.64"
Routed to Reach 1ER : 1ER

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-yr Rainfall=4.15"

Area (ac)	CN	Description
14.600	67	Row crops, straight row, Good, HSG A
8.800	78	Row crops, straight row, Good, HSG B
2.200	89	Row crops, straight row, Good, HSG D
25.600	73	Weighted Average
25.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
46.1	1,900	0.0200	0.69		**Lag/CN Method,**

Summary for Subcatchment 3ES: 3ES

Runoff = 10.99 cfs @ 12.43 hrs, Volume= 1.041 af, Depth= 1.30"
Routed to Reach 1ER : 1ER

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-yr Rainfall=4.15"

Area (ac)	CN	Description
8.700	67	Row crops, straight row, Good, HSG A
0.900	78	Row crops, straight row, Good, HSG B
9.600	68	Weighted Average
9.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.8	710	0.0150	0.43		**Lag/CN Method,**

Summary for Reach 1ER: 1ER

Inflow Area = 39.800 ac, 0.00% Impervious, Inflow Depth = 1.52" for 10-yr event
Inflow = 38.68 cfs @ 12.56 hrs, Volume= 5.030 af
Outflow = 38.68 cfs @ 12.56 hrs, Volume= 5.030 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Subcatchment 1ES: 1ES

Runoff = 24.08 cfs @ 12.21 hrs, Volume= 1.426 af, Depth= 3.72"
Routed to Reach 1ER : 1ER

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr Rainfall=7.38"

Area (ac)	CN	Description
0.100	89	Row crops, straight row, Good, HSG D
0.200	78	Row crops, straight row, Good, HSG B
4.300	67	Row crops, straight row, Good, HSG A
4.600	68	Weighted Average
4.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	400	0.0300	0.54		**Lag/CN Method,**

Summary for Subcatchment 2ES: 2ES

Runoff = 75.55 cfs @ 12.64 hrs, Volume= 9.098 af, Depth= 4.26"
Routed to Reach 1ER : 1ER

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr Rainfall=7.38"

Area (ac)	CN	Description
14.600	67	Row crops, straight row, Good, HSG A
8.800	78	Row crops, straight row, Good, HSG B
2.200	89	Row crops, straight row, Good, HSG D
25.600	73	Weighted Average
25.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
46.1	1,900	0.0200	0.69		**Lag/CN Method,**

Summary for Subcatchment 3ES: 3ES

Runoff = 33.31 cfs @ 12.40 hrs, Volume= 2.976 af, Depth= 3.72"
Routed to Reach 1ER : 1ER

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr Rainfall=7.38"

Area (ac)	CN	Description
8.700	67	Row crops, straight row, Good, HSG A
0.900	78	Row crops, straight row, Good, HSG B
9.600	68	Weighted Average
9.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.8	710	0.0150	0.43		**Lag/CN Method,**

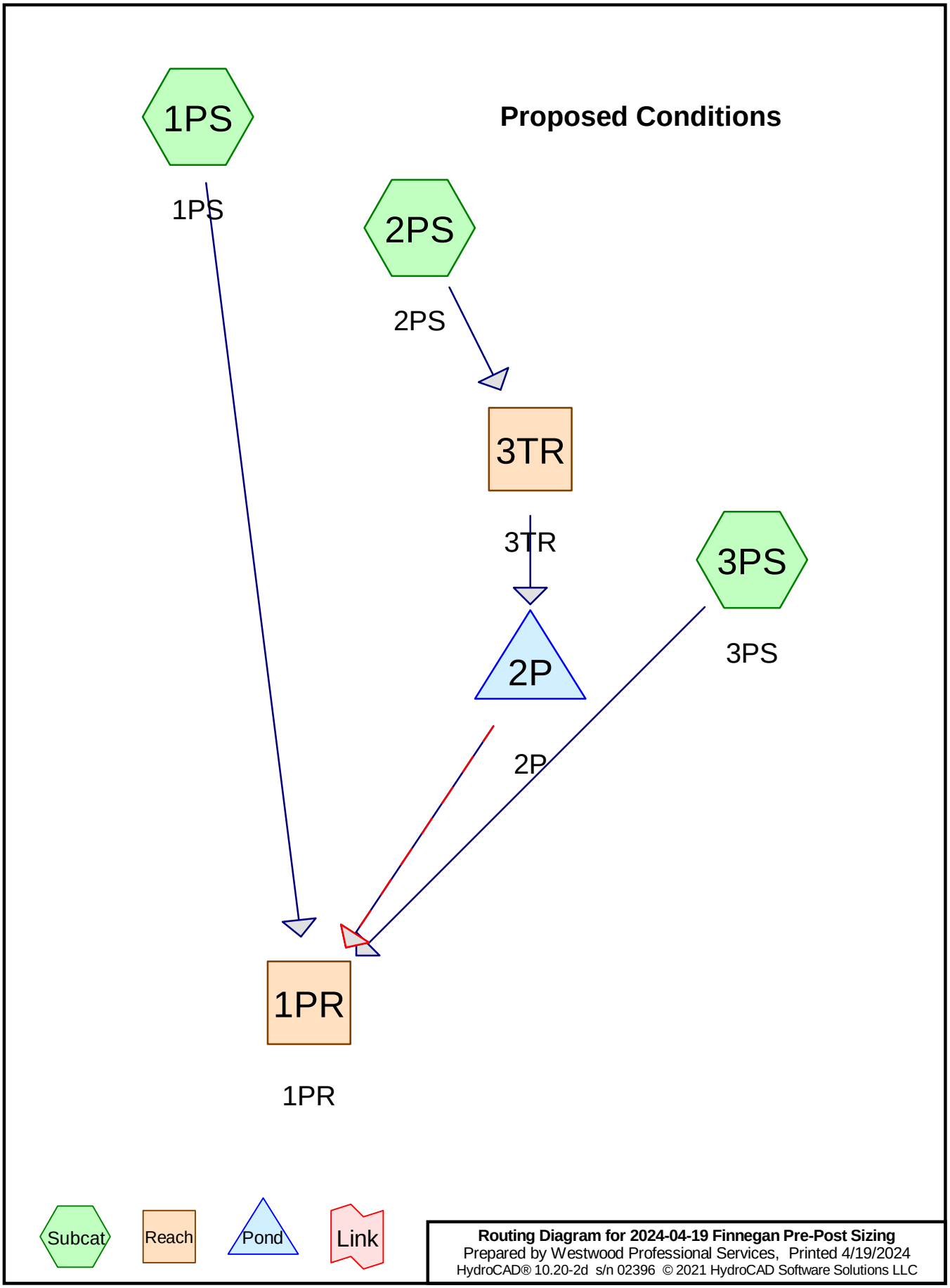
Summary for Reach 1ER: 1ER

Inflow Area = 39.800 ac, 0.00% Impervious, Inflow Depth = 4.07" for 100-yr event
Inflow = 107.52 cfs @ 12.52 hrs, Volume= 13.500 af
Outflow = 107.52 cfs @ 12.52 hrs, Volume= 13.500 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Appendix C

Proposed Conditions HydroCAD Results


Proposed Conditions
1PS
1PS
2PS
2PS
3TR
3TR
3PS
3PS
2P
2P
1PR
1PR
Subcat
Reach
Pond
Link
Routing Diagram for 2024-04-19 Finnegan Pre-Post Sizing
Prepared by Westwood Professional Services, Printed 4/19/2024
HydroCAD® 10.20-2d s/n 02396 © 2021 HydroCAD Software Solutions LLC

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
26.890	39	Meadow, non-grazed, HSG A (1PS, 2PS)
9.050	61	Meadow, non-grazed, HSG B (1PS, 2PS, 3PS)
2.300	80	Meadow, non-grazed, HSG D (1PS, 2PS)
1.560	98	Unconnected pavement, HSG A (1PS, 2PS, 3PS)
39.800	**49**	**TOTAL AREA**

Summary for Subcatchment 1PS: 1PS

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Reach 1PR : 1PR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-yr Rainfall=2.79"

	Area (ac)	CN	Description
*	4.300	39	Meadow, non-grazed, HSG A
*	0.190	61	Meadow, non-grazed, HSG B
*	0.100	80	Meadow, non-grazed, HSG D
	0.010	98	Unconnected pavement, HSG A
	4.600	41	Weighted Average
	4.590		99.78% Pervious Area
	0.010		0.22% Impervious Area
	0.010		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.9	400	0.0300	0.27		**Lag/CN Method,**

Summary for Subcatchment 2PS: 2PS

Runoff = 0.10 cfs @ 15.90 hrs, Volume= 0.067 af, Depth= 0.02"
Routed to Reach 3TR : 3TR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-yr Rainfall=2.79"

	Area (ac)	CN	Adj	Description
*	22.590	39		Meadow, non-grazed, HSG A
*	8.150	61		Meadow, non-grazed, HSG B
*	2.200	80		Meadow, non-grazed, HSG D
	0.260	98		Unconnected pavement, HSG A
	33.200	48	47	Weighted Average, UI Adjusted
	32.940			99.22% Pervious Area
	0.260			0.78% Impervious Area
	0.260			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
88.1	1,900	0.0200	0.36		**Lag/CN Method,**

Summary for Subcatchment 3PS: 3PS

Runoff = 0.98 cfs @ 13.61 hrs, Volume= 0.236 af, Depth= 1.41"
Routed to Reach 1PR : 1PR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-yr Rainfall=2.79"

	Area (ac)	CN	Description
*	0.000	39	Meadow, non-grazed, HSG A
*	0.710	61	Meadow, non-grazed, HSG B
	1.290	98	Unconnected pavement, HSG A
	2.000	85	Weighted Average
	0.710		35.50% Pervious Area
	1.290		64.50% Impervious Area
	1.290		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
120.8	8,403	0.0150	1.16		**Lag/CN Method,**

Summary for Reach 1PR: 1PR

Inflow Area = 39.800 ac, 3.92% Impervious, Inflow Depth = 0.07" for 2-yr event
Inflow = 0.98 cfs @ 13.61 hrs, Volume= 0.236 af
Outflow = 0.98 cfs @ 13.61 hrs, Volume= 0.236 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach 3TR: 3TR

Inflow Area = 33.200 ac, 0.78% Impervious, Inflow Depth = 0.02" for 2-yr event
Inflow = 0.10 cfs @ 15.90 hrs, Volume= 0.067 af
Outflow = 0.10 cfs @ 16.53 hrs, Volume= 0.067 af, Atten= 2%, Lag= 38.2 min
Routed to Pond 2P : 2P

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.43 fps, Min. Travel Time= 22.3 min
Avg. Velocity = 0.29 fps, Avg. Travel Time= 33.0 min

Peak Storage= 127 cf @ 16.16 hrs
Average Depth at Peak Storage= 0.04' , Surface Width= 5.34'
Bank-Full Depth= 1.00' Flow Area= 9.0 sf, Capacity= 25.25 cfs

5.00' x 1.00' deep channel, n= 0.034
Side Slope Z-value= 4.0 '/' Top Width= 13.00'
Length= 580.0' Slope= 0.0069 '/'
Inlet Invert= 889.00', Outlet Invert= 885.00'

‡

Summary for Pond 2P: 2P

Inflow Area = 33.200 ac, 0.78% Impervious, Inflow Depth = 0.02" for 2-yr event
Inflow = 0.10 cfs @ 16.53 hrs, Volume= 0.067 af
Outflow = 0.09 cfs @ 19.39 hrs, Volume= 0.067 af, Atten= 6%, Lag= 171.1 min
Discarded = 0.09 cfs @ 19.39 hrs, Volume= 0.067 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 1PR : 1PR
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 1PR : 1PR

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 882.03' @ 19.39 hrs Surf.Area= 0.179 ac Storage= 0.006 af

Plug-Flow detention time= 44.7 min calculated for 0.067 af (100% of inflow)
Center-of-Mass det. time= 44.7 min (1,241.1 - 1,196.4)

Volume	Invert	Avail.Storage	Storage Description
#1	882.00'	4.972 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
882.00	0.178	0.000	0.000
883.00	0.226	0.202	0.202
884.00	0.277	0.251	0.453
885.00	1.051	0.664	1.118
886.00	3.133	2.092	3.210
886.50	3.918	1.763	4.972

Device	Routing	Invert	Outlet Devices
#1	Primary	885.00'	**12.0" Round Culvert** L= 20.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 885.00' / 884.50' S= 0.0250 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 0.79 sf
#2	Secondary	886.00'	**50.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Discarded	882.00'	**0.800 in/hr Exfiltration over Surface area** Phase-In= 0.05'

Discarded OutFlow Max=0.09 cfs @ 19.39 hrs HW=882.03' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.09 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=882.00' (Free Discharge)
└**1=Culvert** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=882.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Subcatchment 1PS: 1PS

Runoff = 0.11 cfs @ 13.36 hrs, Volume= 0.040 af, Depth= 0.10"
Routed to Reach 1PR : 1PR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-yr Rainfall=4.15"

	Area (ac)	CN	Description
*	4.300	39	Meadow, non-grazed, HSG A
*	0.190	61	Meadow, non-grazed, HSG B
*	0.100	80	Meadow, non-grazed, HSG D
	0.010	98	Unconnected pavement, HSG A
	4.600	41	Weighted Average
	4.590		99.78% Pervious Area
	0.010		0.22% Impervious Area
	0.010		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.9	400	0.0300	0.27		**Lag/CN Method,**

Summary for Subcatchment 2PS: 2PS

Runoff = 2.28 cfs @ 13.71 hrs, Volume= 0.754 af, Depth= 0.27"
Routed to Reach 3TR : 3TR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-yr Rainfall=4.15"

	Area (ac)	CN	Adj	Description
*	22.590	39		Meadow, non-grazed, HSG A
*	8.150	61		Meadow, non-grazed, HSG B
*	2.200	80		Meadow, non-grazed, HSG D
	0.260	98		Unconnected pavement, HSG A
	33.200	48	47	Weighted Average, UI Adjusted
	32.940			99.22% Pervious Area
	0.260			0.78% Impervious Area
	0.260			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
88.1	1,900	0.0200	0.36		**Lag/CN Method,**

Summary for Subcatchment 3PS: 3PS

Runoff = 1.83 cfs @ 13.57 hrs, Volume= 0.432 af, Depth= 2.59"
Routed to Reach 1PR : 1PR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-yr Rainfall=4.15"

	Area (ac)	CN	Description
*	0.000	39	Meadow, non-grazed, HSG A
*	0.710	61	Meadow, non-grazed, HSG B
	1.290	98	Unconnected pavement, HSG A
	2.000	85	Weighted Average
	0.710		35.50% Pervious Area
	1.290		64.50% Impervious Area
	1.290		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
120.8	8,403	0.0150	1.16		**Lag/CN Method,**

Summary for Reach 1PR: 1PR

Inflow Area = 39.800 ac, 3.92% Impervious, Inflow Depth = 0.14" for 10-yr event
Inflow = 1.93 cfs @ 13.56 hrs, Volume= 0.472 af
Outflow = 1.93 cfs @ 13.56 hrs, Volume= 0.472 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach 3TR: 3TR

Inflow Area = 33.200 ac, 0.78% Impervious, Inflow Depth = 0.27" for 10-yr event
Inflow = 2.28 cfs @ 13.71 hrs, Volume= 0.754 af
Outflow = 2.26 cfs @ 13.92 hrs, Volume= 0.754 af, Atten= 1%, Lag= 12.5 min
Routed to Pond 2P : 2P

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.36 fps, Min. Travel Time= 7.1 min
Avg. Velocity = 0.59 fps, Avg. Travel Time= 16.5 min

Peak Storage= 965 cf @ 13.80 hrs
Average Depth at Peak Storage= 0.27' , Surface Width= 7.18'
Bank-Full Depth= 1.00' Flow Area= 9.0 sf, Capacity= 25.25 cfs

5.00' x 1.00' deep channel, n= 0.034
Side Slope Z-value= 4.0 '/' Top Width= 13.00'
Length= 580.0' Slope= 0.0069 '/'
Inlet Invert= 889.00', Outlet Invert= 885.00'

‡

Summary for Pond 2P: 2P

Inflow Area = 33.200 ac, 0.78% Impervious, Inflow Depth = 0.27" for 10-yr event
Inflow = 2.26 cfs @ 13.92 hrs, Volume= 0.754 af
Outflow = 0.32 cfs @ 22.37 hrs, Volume= 0.637 af, Atten= 86%, Lag= 506.9 min
Discarded = 0.32 cfs @ 22.37 hrs, Volume= 0.637 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 1PR : 1PR
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 1PR : 1PR

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 884.16' @ 22.37 hrs Surf.Area= 0.400 ac Storage= 0.507 af

Plug-Flow detention time= 820.2 min calculated for 0.637 af (84% of inflow)
Center-of-Mass det. time= 754.8 min (1,760.1 - 1,005.3)

Volume	Invert	Avail.Storage	Storage Description
#1	882.00'	4.972 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
882.00	0.178	0.000	0.000
883.00	0.226	0.202	0.202
884.00	0.277	0.251	0.453
885.00	1.051	0.664	1.118
886.00	3.133	2.092	3.210
886.50	3.918	1.763	4.972

Device	Routing	Invert	Outlet Devices
#1	Primary	885.00'	**12.0" Round Culvert** L= 20.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 885.00' / 884.50' S= 0.0250 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 0.79 sf
#2	Secondary	886.00'	**50.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Discarded	882.00'	**0.800 in/hr Exfiltration over Surface area** Phase-In= 0.05'

Discarded OutFlow Max=0.32 cfs @ 22.37 hrs HW=884.16' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.32 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=882.00' (Free Discharge)
└**1=Culvert** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=882.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Subcatchment 1PS: 1PS

Runoff = 3.53 cfs @ 12.45 hrs, Volume= 0.411 af, Depth= 1.07"
Routed to Reach 1PR : 1PR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr Rainfall=7.38"

	Area (ac)	CN	Description
*	4.300	39	Meadow, non-grazed, HSG A
*	0.190	61	Meadow, non-grazed, HSG B
*	0.100	80	Meadow, non-grazed, HSG D
	0.010	98	Unconnected pavement, HSG A
	4.600	41	Weighted Average
	4.590		99.78% Pervious Area
	0.010		0.22% Impervious Area
	0.010		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.9	400	0.0300	0.27		**Lag/CN Method,**

Summary for Subcatchment 2PS: 2PS

Runoff = 20.01 cfs @ 13.36 hrs, Volume= 4.430 af, Depth= 1.60"
Routed to Reach 3TR : 3TR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr Rainfall=7.38"

	Area (ac)	CN	Adj	Description
*	22.590	39		Meadow, non-grazed, HSG A
*	8.150	61		Meadow, non-grazed, HSG B
*	2.200	80		Meadow, non-grazed, HSG D
	0.260	98		Unconnected pavement, HSG A
	33.200	48	47	Weighted Average, UI Adjusted
	32.940			99.22% Pervious Area
	0.260			0.78% Impervious Area
	0.260			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
88.1	1,900	0.0200	0.36		**Lag/CN Method,**

Summary for Subcatchment 3PS: 3PS

Runoff = 3.94 cfs @ 13.56 hrs, Volume= 0.936 af, Depth= 5.62"
Routed to Reach 1PR : 1PR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr Rainfall=7.38"

	Area (ac)	CN	Description
*	0.000	39	Meadow, non-grazed, HSG A
*	0.710	61	Meadow, non-grazed, HSG B
	1.290	98	Unconnected pavement, HSG A
	2.000	85	Weighted Average
	0.710		35.50% Pervious Area
	1.290		64.50% Impervious Area
	1.290		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
120.8	8,403	0.0150	1.16		**Lag/CN Method,**

Summary for Reach 1PR: 1PR

Inflow Area = 39.800 ac, 3.92% Impervious, Inflow Depth = 0.72" for 100-yr event
Inflow = 4.86 cfs @ 13.43 hrs, Volume= 2.392 af
Outflow = 4.86 cfs @ 13.43 hrs, Volume= 2.392 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach 3TR: 3TR

Inflow Area = 33.200 ac, 0.78% Impervious, Inflow Depth = 1.60" for 100-yr event
Inflow = 20.01 cfs @ 13.36 hrs, Volume= 4.430 af
Outflow = 19.97 cfs @ 13.46 hrs, Volume= 4.430 af, Atten= 0%, Lag= 5.9 min
Routed to Pond 2P : 2P

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.63 fps, Min. Travel Time= 3.7 min
Avg. Velocity = 0.94 fps, Avg. Travel Time= 10.3 min

Peak Storage= 4,408 cf @ 13.40 hrs
Average Depth at Peak Storage= 0.89' , Surface Width= 12.11'
Bank-Full Depth= 1.00' Flow Area= 9.0 sf, Capacity= 25.25 cfs

5.00' x 1.00' deep channel, n= 0.034
Side Slope Z-value= 4.0 '/' Top Width= 13.00'
Length= 580.0' Slope= 0.0069 '/'
Inlet Invert= 889.00', Outlet Invert= 885.00'

‡

Summary for Pond 2P: 2P

Inflow Area = 33.200 ac, 0.78% Impervious, Inflow Depth = 1.60" for 100-yr event
Inflow = 19.97 cfs @ 13.46 hrs, Volume= 4.430 af
Outflow = 3.68 cfs @ 16.27 hrs, Volume= 4.029 af, Atten= 82%, Lag= 168.8 min
Discarded = 2.14 cfs @ 16.27 hrs, Volume= 2.985 af
Primary = 1.54 cfs @ 16.27 hrs, Volume= 1.045 af
Routed to Reach 1PR : 1PR
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 1PR : 1PR

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 885.77' @ 16.27 hrs Surf.Area= 2.659 ac Storage= 2.550 af

Plug-Flow detention time= 502.0 min calculated for 4.029 af (91% of inflow)
Center-of-Mass det. time= 459.8 min (1,391.6 - 931.8)

Volume	Invert	Avail.Storage	Storage Description
#1	882.00'	4.972 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
882.00	0.178	0.000	0.000
883.00	0.226	0.202	0.202
884.00	0.277	0.251	0.453
885.00	1.051	0.664	1.118
886.00	3.133	2.092	3.210
886.50	3.918	1.763	4.972

Device	Routing	Invert	Outlet Devices
#1	Primary	885.00'	**12.0" Round Culvert** L= 20.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 885.00' / 884.50' S= 0.0250 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 0.79 sf
#2	Secondary	886.00'	**50.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Discarded	882.00'	**0.800 in/hr Exfiltration over Surface area** Phase-In= 0.05'

Discarded OutFlow Max=2.14 cfs @ 16.27 hrs HW=885.77' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 2.14 cfs)

Primary OutFlow Max=1.54 cfs @ 16.27 hrs HW=885.77' (Free Discharge)
└**1=Culvert** (Inlet Controls 1.54 cfs @ 2.36 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=882.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Appendix D

Water Quality Calculations

P8 Urban Catchment Model, Version 3.5				Run Date	04/19/24
Case	2024-04-08_Finnegan_ExistingP8 Model.p8c	FirstDate	01/01/71	Precip(in)	870.4
Title	Existing Conditions	LastDate	12/31/00	Rain(in)	756.51
PrecFile	MSP_19700101-20001231.pcp	Events	2196	Snow(in)	113.84
PartFile	nurp50.p8p	TotalHrs	261888	TotalYrs	29.88

Mass Balances by Device

Device: Pre-existing	Type:	PIPE																							
	Flow	Loads(lbs)												Concentrations (ppm)											
Mass Balance Term	acre-ft	P0%	P10%	P30%	P50%	P80%	TSS	TP	TKN	CU	PB	ZN	HC	P0%	P10%	P30%	P50%	P80%	TSS	TP	TKN	CU	PB	ZN	HC
01 watershed inflows	238.27	647.62	7313.89	7313.89	7313.89	14627.79	36569.47	148.59	717.70	21.24	7.88	76.55	984.72	1.00	11.29	11.29	11.29	22.59	56.47	0.23	1.11	0.03	0.01	0.12	1.52
06 normal outlet	238.27	647.62	7313.89	7313.89	7313.89	14627.79	36569.47	148.59	717.70	21.24	7.88	76.55	984.72	1.00	11.29	11.29	11.29	22.59	56.47	0.23	1.11	0.03	0.01	0.12	1.52
09 total inflow	238.27	647.62	7313.89	7313.89	7313.89	14627.79	36569.47	148.59	717.70	21.24	7.88	76.55	984.72	1.00	11.29	11.29	11.29	22.59	56.47	0.23	1.11	0.03	0.01	0.12	1.52
10 surface outflow	238.27	647.62	7313.89	7313.89	7313.89	14627.79	36569.47	148.59	717.70	21.24	7.88	76.55	984.72	1.00	11.29	11.29	11.29	22.59	56.47	0.23	1.11	0.03	0.01	0.12	1.52
12 total outflow	238.27	647.62	7313.89	7313.89	7313.89	14627.79	36569.47	148.59	717.70	21.24	7.88	76.55	984.72	1.00	11.29	11.29	11.29	22.59	56.47	0.23	1.11	0.03	0.01	0.12	1.52
Load Reduction (%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00												

P8 Urban Catchment Model, Version 3.5				Run Date	04/19/24
Case	2024-04-08_Finnegan_ExistingP8 Model.p8c	FirstDate	01/01/71	Precip(in)	870.4
Title	Existing Conditions	LastDate	12/31/00	Rain(in)	756.51
PrecFile	MSP_19700101-20001231.pcp	Events	2196	Snow(in)	113.84
PartFile	nurp50.p8p	TotalHrs	261888	TotalYrs	29.88

Devices Listed in Downstream Order

Device:	Pre-existing	Type:	PIPE
	Runoff from watershed		Drainage Area 1
	Runoff from watershed		Drainage Area 2
	Runoff from watershed		Drainage Area 3

P8-V3.X 2024-04-08_Finnegan_ExistingP8 Model.p8c

							Directly Connected UnSwept Areas--->				Directly Connected Swept Areas--->				Street Sweeping Parameters			
	Total			Pervious	Indirect	Pervious		Depress		Imperv		Depress		Imperv	Start	Stop		Sweep
Watershed	Area	Outflow	Percol	Curve	Imperv	Load	Imperv	Storage	Runoff	Load	Imperv	Storage	Runoff	Load	Date	Date	Sweep	Freq
Label	acres	Device	Device	Number	Fraction	Factor	Fraction	inches	Coef	Factor	Fraction	inches	Coef	Factor	MMDD	MMDD	Effic	1/week
Drainage Area 1	4.6	Pre-existing		68	0.000	1	0	0.1	0.9	1	0	0.1	0.9	1	101	1231	0	0
Drainage Area 2	25.6	Pre-existing		73	0.000	1	0	0.1	0.9	1	0	0.1	0.9	1	101	1231	0	0
Drainage Area 3	9.6	Pre-existing		68	0.000	1	0	0.1	0.9	1	0	0.1	0.9	1	101	1231	0	0

P8 Urban Catchment Model, Version 3.5				Run Date	04/19/24
Case	2024-04-08_Finnegan_ExistingP8 Model.p8c	FirstDate	01/01/71	Precip(in)	870.4
Title	Existing Conditions	LastDate	12/31/00	Rain(in)	756.51
PrecFile	MSP_19700101-20001231.pcp	Events	2196	Snow(in)	113.84
PartFile	nurp50.p8p	TotalHrs	261888	TotalYrs	29.88

Case Title	Existing Conditions
Case Data File	2024-04-08_Finnegan_ExistingP8 Model.p8c
Path	N:\0052583.00\070_Water Resources\SWMP\P8\
Case Notes:	simple startup case
Storm Data File	MSP_19700101-20001231.pcp
Particle File	nurp50.p8p
Air Temp File File	MSP_19700101-20001231.tem

Time Steps Per Hour	4
Minimum Inter-Event Time (hrs)	10
Maximum Continuity Error %	2
Rainfall Breakpoint (inches)	0.8
Precipitation Scale Factor	1
Air Temp Offset (deg-F)	0
Loops Thru Storm File	5
Simulation Dates	
Start	1/1/1971
Keep	1/1/1971
Stop	12/31/2000

Max Snowfall Temperature (deg-f)	32.0
SnowMelt Temperature (deg-f)	32.0
Snowmelt Coef (in/degF-Day)	0.06
Soil Freeze Temp (deg-F)	32.0
Snowmelt Abstraction Factor	1.00
Evapo-Trans. Calibration Factor	1.00
Growing Season Start Month	5
Growing Season End Month	10

5-Day Antecedent Rainfall + Runoff (inches)		
CN Antecedent Moisture Condition	AMC-II	AMC-III
Growing Season	1.40	2.10
NonGrowing Season	0.50	1.10

Watershed Data

Watershed Name	Drainage Area 1	Drainage Area 2	Drainage Area 3
Runoff to Device	Pre-existing	Pre-existing	Pre-existing
Infiltration to Device			
Watershed Area	4.6	25.6	9.6
SCS Curve Number (Pervious)	68	73	68
Scale Factor for Pervious Runoff Load	1	1	1
Indirectly Connected Imperv Fraction	0	0	0
UnSwept Impervious Fraction	0	0	0
UnSwept Depression Storage (inches)	0.1	0.1	0.1
UnSwept Imperv. Runoff Coefficient	0.9	0.9	0.9
UnSwept Scale Factor for Particle Loads	1	1	1
Swept Impervious Fraction	0	0	0
Swept Depression Storage (inches)	0.1	0.1	0.1
Swept Imperv. Runoff Coefficient	0.9	0.9	0.9
Swept Scale Factor for Particle Loads	1	1	1
Sweeping Frequency	0	0	0
Sweeping Efficiency	0	0	0
Sweeping Start Date (MMDD)	101	101	101
Sweeping Stop Date (MMDD)	1231	1231	1231

Device Data

Device Name	Pre-existing
Device Type	PIPE
Infiltration Outlet	
Normal Outlet	
Spillway Outlet	
Particle Removal Scale Factor	
Bottom Elevation (ft)	
Bottom Area (acres)	
Permanent Pool Area (acres)	
Permanent Pool Volume (ac-ft)	
Perm Pool Infilt Rate (in/hr)	

Flood Pool Area (acres)																									
Flood Pool Volume (ac-ft)																									
Flood Pool Infilt Rate (in/hr)																									
Infilt Basin Void Fraction (%)																									
Detention Pond Outlet Parameters																									
Outlet Type																									
Outlet Orifice Diameter (in)																									
Orifice Discharge Coef																									
Outlet Weir Length (ft)																									
Weir Discharge Coef																									
Perforated Riser Height (ft)																									
Number of Holes in Riser																									
Holes Diameter																									
Flood Pool Drain Time (hrs)																									
Swale Parameters																									
Length of Flow Path (ft)																									
Slope of Flow Path %																									
Bottom Width (ft)																									
Side Slope (ft-v/ft-h)																									
Maximum Depth of Flow (ft)																									
Mannings n Constant																									
Hydraulic Model																									
Pipe, Splitter, Aquifer Parameter																									
Hydraulic Res. Time (hrs)	0																								

Particle Data					
Particle File	nurp50.p8p				
Particle Class	P0%	P10%	P30%	P50%	P80%
Filtration Efficiency (%)	60	25	100	100	100
Settling Velocity (ft/hr)	0	0.03	0.3	1.5	15
First Order Decay Rate (1/day)	0	0	0	0	0
2nd Order Decay (1/day-ppm)	0	0	0	0	0
Impervious Runoff Conc (ppm)	1	0	0	0	0
Pervious Runoff Conc (ppm)	1	100	100	100	200
Pervious Conc Exponent	0	1	1	1	1
Accum. Rate (lbs-ac-day)	0	1.75	1.75	1.75	3.5
Particle Removal Rate (1/day)	0	0.25	0.25	0.25	0.25
Washoff Coefficient	0	20	20	20	20
Washoff Exponent	0	2	2	2	2
Sweeper Efficiency	0	0	0	5	15

Water Quality Component Data										
Component Name	TSS	TP	TKN	CU	PB	ZN	HC			
Water Quality Criteria (ppm)										
Level 1	5	0.025	2	2	0.02	5	0.1			
Level 2	10	0.05	1	0.0048	0.014	0.0362	0.5			
Level 3	20	0.1	0.5	0.02	0.15	0.38	1			
Content Scale Factor	1	1	1	1	1	1	1			
Particle Composition (mg/kg)										
P0%	0	99000	600000	13600	2000	64000	250000			
P10%	1000000	3850	15000	340	180	1600	22500			
P30%	1000000	3850	15000	340	180	1600	22500			
P50%	1000000	3850	15000	340	180	1600	22500			
P80%	1000000	0	0	340	180	0	22500			

P8 Urban Catchment Model, Version 3.5				Run Date	04/19/24
Case	2024-04-08_Finnegan_ExistingP8 Model.p8c	FirstDate	01/01/71	Precip(in)	870.4
Title	Existing Conditions	LastDate	12/31/00	Rain(in)	756.51
PrecFile	MSP_19700101-20001231.pcp	Events	2196	Snow(in)	113.84
PartFile	nurp50.p8p	TotalHrs	261888	TotalYrs	29.88

File Directory	N:\0052583.00\070_Water Resources\SWMP\P8\
Case Title	Existing Conditions
Case File	2024-04-08_Finnegan_ExistingP8 Model.p8c
Particle File	nurp50.p8p
Temperature File	MSP_19700101-20001231.tem
Storm File	MSP_19700101-20001231.pcp
Precip Scale Factor	1
Watersheds	3
Devices	1
Particles	5
WQ Components	7
Start Date	01/01/71
Keep Date	01/01/71
Stop Date	12/31/00
Storm Count	2196
Total Hours	261888
Wet Hours	28761
Precip (in)	870
Rain (in)	757
Snowfall (in)	114
Snowmelt (in)	116
EvapoTran(in)	655
Overall TSS Removal(%)	0
Water Balance Error(%)	0
TSS Mass Balance Error (%)	0

P8 Urban Catchment Model, Version 3.5				Run Date	04/19/24
Case	2024-04-08_Finnegan_ProposedP8 Model.p8c	FirstDate	01/01/71	Precip(in)	870.4
Title	Proposed Conditions	LastDate	12/31/00	Rain(in)	756.51
PrecFile	MSP_19700101-20001231.pcp	Events	2196	Snow(in)	113.84
PartFile	nurp50.p8p	TotalHrs	261888	TotalYrs	29.88

Mass Balances by Device

Device: POND	Type:	INF_BASIN													
	Flow	Loads(lbs)							Concentrations (ppm)						
Mass Balance Term	acre-ft	P0%	P10%	P30%	P50%	P80%	TSS	TP	P0%	P10%	P30%	P50%	P80%	TSS	TP
01 watershed inflows	61.20	166.35	1307.17	1307.17	1307.17	2614.34	6535.84	31.57	1.00	7.86	7.86	7.86	15.72	39.29	0.19
03 infiltrate	60.26	163.61	587.07	128.43	30.21	6.40	752.12	19.07	1.00	3.58	0.78	0.18	0.04	4.59	0.12
04 exfiltrate	60.26	16.36	0.00	0.00	0.00	0.00	0.00	1.62	0.10						0.01
05 filtered	0.00	147.25	587.07	128.43	30.21	6.40	752.12	17.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00
07 spillway outlet	0.94	2.55	63.18	48.01	20.41	4.52	136.12	0.76	1.00	24.73	18.80	7.99	1.77	53.29	0.30
08 sedimen + decay	0.00	0.00	637.93	1128.93	1256.16	2603.34	5626.37	11.64		0.00	0.00	0.00	0.00	0.00	0.00
09 total inflow	61.20	166.35	1307.17	1307.17	1307.17	2614.34	6535.84	31.57	1.00	7.86	7.86	7.86	15.72	39.29	0.19
10 surface outflow	0.94	2.55	63.18	48.01	20.41	4.52	136.12	0.76	1.00	24.73	18.80	7.99	1.77	53.29	0.30
11 groundw outflow	60.26	16.36	0.00	0.00	0.00	0.00	0.00	1.62	0.10						0.01
12 total outflow	61.20	18.92	63.18	48.01	20.41	4.52	136.12	2.38	0.11	0.38	0.29	0.12	0.03	0.82	0.01
13 total trapped	0.00	147.25	1225.00	1257.36	1286.38	2609.74	6378.48	29.09							
14 storage increase	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00							
15 mass balance check	0.00	0.19	18.99	1.79	0.38	0.08	21.25	0.10							
Load Reduction (%)	0.00	88.52	93.71	96.19	98.41	99.82	97.59	92.15							

P8 Urban Catchment Model, Version 3.5				Run Date	04/19/24
Case	2024-04-08_Finnegan_ProposedP8 Model.p8c	FirstDate	01/01/71	Precip(in)	870.4
Title	Proposed Conditions	LastDate	12/31/00	Rain(in)	756.51
PrecFile	MSP_19700101-20001231.pcp	Events	2196	Snow(in)	113.84
PartFile	nurp50.p8p	TotalHrs	261888	TotalYrs	29.88

Devices Listed in Downstream Order

Device:	POND	Type:	INF_BASIN
	Runoff from watershed		Drainage Area 2

P8-V3.X 2024-04-08_Finnegan_ProposedP8 Model.p8c

							Directly Connected UnSwept Areas--->				Directly Connected Swept Areas--->				Street Sweeping Parameters			
	Total			Pervious	Indirect	Pervious		Depress		Imperv		Depress		Imperv	Start	Stop		Sweep
Watershed	Area	Outflow	Percol	Curve	Imperv	Load	Imperv	Storage	Runoff	Load	Imperv	Storage	Runoff	Load	Date	Date	Sweep	Freq
Label	acres	Device	Device	Number	Fraction	Factor	Fraction	inches	Coef	Factor	Fraction	inches	Coef	Factor	MMDD	MMDD	Effic	1/week
Drainage Area 1	4.6	total		41	0.000	1	0.002	0.1	0.9	1	0	0.02	1	1	101	1231	0	0
Drainage Area 2	33.2	POND		47	0.000	1	0.0078	0.1	0.9	1	0	0.02	1	1	101	1231	0	0
Drainage Area 3	2	total		61	0.000	1	0.645	0.1	0.9	1	0	0.02	1	1	101	1231	0	0

P8 Urban Catchment Model, Version 3.5				Run Date	04/19/24
Case	2024-04-08_Finnegan_ProposedP8 Model.p8c	FirstDate	01/01/71	Precip(in)	870.4
Title	Proposed Conditions	LastDate	12/31/00	Rain(in)	756.51
PrecFile	MSP_19700101-20001231.pcp	Events	2196	Snow(in)	113.84
PartFile	nurp50.p8p	TotalHrs	261888	TotalYrs	29.88

Case Title	Proposed Conditions
Case Data File	2024-04-08_Finnegan_ProposedP8 Model.p8c
Path	N:\0052583.00\070_Water Resources\SWMP\P8\
Case Notes:	simple startup case
Storm Data File	MSP_19700101-20001231.pcp
Particle File	nurp50.p8p
Air Temp File File	MSP_19700101-20001231.tem

Time Steps Per Hour	4
Minimum Inter-Event Time (hrs)	10
Maximum Continuity Error %	2
Rainfall Breakpoint (inches)	0.8
Precipitation Scale Factor	1
Air Temp Offset (deg-F)	0
Loops Thru Storm File	5
Simulation Dates	
Start	1/1/1971
Keep	1/1/1971
Stop	12/31/2000

Max Snowfall Temperature (deg-f)	32.0
SnowMelt Temperature (deg-f)	32.0
Snowmelt Coef (in/degF-Day)	0.06
Soil Freeze Temp (deg-F)	32.0
Snowmelt Abstraction Factor	1.00
Evapo-Trans. Calibration Factor	1.00
Growing Season Start Month	5
Growing Season End Month	10

5-Day Antecedent Rainfall + Runoff (inches)		
CN Antecedent Moisture Condition	AMC-II	AMC-III
Growing Season	1.40	2.10
NonGrowing Season	0.50	1.10

Watershed Data

Watershed Name	Drainage Area 2
Runoff to Device	POND
Infiltration to Device	
Watershed Area	33.2
SCS Curve Number (Pervious)	47
Scale Factor for Pervious Runoff Load	1
Indirectly Connected Imperv Fraction	0
UnSwept Impervious Fraction	0.0078
UnSwept Depression Storage (inches)	0.1
UnSwept Imperv. Runoff Coefficient	0.9
UnSwept Scale Factor for Particle Loads	1
Swept Impervious Fraction	0
Swept Depression Storage (inches)	0.02
Swept Imperv. Runoff Coefficient	1
Swept Scale Factor for Particle Loads	1
Sweeping Frequency	0
Sweeping Efficiency	0
Sweeping Start Date (MMDD)	101
Sweeping Stop Date (MMDD)	1231

Device Data

Device Name	POND
Device Type	INF_BASIN
Infiltration Outlet	
Normal Outlet	
Spillway Outlet	
Particle Removal Scale Factor	1
Bottom Elevation (ft)	882
Bottom Area (acres)	0.2
Permanent Pool Area (acres)	
Permanent Pool Volume (ac-ft)	
Perm Pool Infilt Rate (in/hr)	

Flood Pool Area (acres)	1.1																								
Flood Pool Volume (ac-ft)	1.1																								
Flood Pool Infilt Rate (in/hr)	0.8																								
Infilt Basin Void Fraction (%)	100																								
Detention Pond Outlet Parameters																									
Outlet Type																									
Outlet Orifice Diameter (in)																									
Orifice Discharge Coef																									
Outlet Weir Length (ft)																									
Weir Discharge Coef																									
Perforated Riser Height (ft)																									
Number of Holes in Riser																									
Holes Diameter																									
Flood Pool Drain Time (hrs)																									
Swale Parameters																									
Length of Flow Path (ft)																									
Slope of Flow Path %																									
Bottom Width (ft)																									
Side Slope (ft-v/ft-h)																									
Maximum Depth of Flow (ft)																									
Mannings n Constant																									
Hydraulic Model																									
Pipe, Splitter, Aquifer Parameter																									
Hydraulic Res. Time (hrs)																									

Particle Data					
Particle File	nurp50.p8p				
Particle Class	P0%	P10%	P30%	P50%	P80%
Filtration Efficiency (%)	90	100	100	100	100
Settling Velocity (ft/hr)	0	0.03	0.3	1.5	15
First Order Decay Rate (1/day)	0	0	0	0	0
2nd Order Decay (1/day-ppm)	0	0	0	0	0
Impervious Runoff Conc (ppm)	1	0	0	0	0
Pervious Runoff Conc (ppm)	1	100	100	100	200
Pervious Conc Exponent	0	1	1	1	1
Accum. Rate (lbs-ac-day)	0	1.75	1.75	1.75	3.5
Particle Removal Rate (1/day)	0	0.25	0.25	0.25	0.25
Washoff Coefficient	0	20	20	20	20
Washoff Exponent	0	2	2	2	2
Sweeper Efficiency	0	0	0	5	15

Water Quality Component Data										
Component Name	TSS	TP	TKN	CU	PB	ZN	HC			
Water Quality Criteria (ppm)										
Level 1	5	0.025	2	2	0.02	5	0.1			
Level 2	10	0.05	1	0.0048	0.014	0.0362	0.5			
Level 3	20	0.1	0.5	0.02	0.15	0.38	1			
Content Scale Factor	1	1	1	1	1	1	1			
Particle Composition (mg/kg)										
P0%	0	99000	600000	13600	2000	64000	250000			
P10%	1000000	3850	15000	340	180	1600	22500			
P30%	1000000	3850	15000	340	180	1600	22500			
P50%	1000000	3850	15000	340	180	1600	22500			
P80%	1000000	0	0	340	180	0	22500			

Appendix E

Swale Sizing Calculations

Swale Erosion Control

Parameter	Value	Notes
2-Year Ditch Flow (cfs)	0.1	*From HydroCAD or other Modeling*
2-Year Ditch Flow Depth (ft)	0.04	*From HydroCAD or other Modeling*
Ditch Slope (ft/ft)	0.0069	*As Designed*
Unit Weight of Water (lb/ft^3)	62.43	*Known*
2-Year Shear Stress (lb/ft^2)	**0.02**	*Calculation*
Safety Factor	1	*Typically 1*
Selected Lining	EroNet P300	*Select from References on Right*
Selected Lining Permissable Shear Stress (lb/ft^2)	3	*Fill in Based on Reference*
Acceptable (Yes/No)	YES	

ROLLMAX™
ROLLED EROSION CONTROL

Specification Sheet – EroNet™ P300® Permanent Erosion Control Blanket

DESCRIPTION

The permanent erosion control blanket shall be a machine-produced mat of 100% UV stable polypropylene fiber. The matting shall be of consistent thickness with the synthetic fibers evenly distributed over the entire area of the mat. The matting shall be covered on the top side with black heavyweight UV-stabilized polypropylene netting having ultraviolet additives to delay breakdown and an approximate 0.50 x 0.50 inch (1.27 x 1.27 cm) mesh. The bottom net shall also be UV-stabilized polypropylene with a 0.63 x 0.63 inch (1.57 x 1.57 cm) mesh size. The blanket shall be sewn together on 1.5 inch (3.81 cm) centers with non-degradable thread. All mats shall be manufactured with a colored thread stitched along both outer edges as an overlap guide for adjacent mats. The P300 shall meet Type 5A, 5B, specification requirements established by the Erosion Control Technology Council (ECTC) and Federal Highway Administration's (FHWA) FP-03 Section 713.18

Material Content		
Matrix	100% UV stable Polypropylene Fiber	0.7 lbs/sq yd (0.38 kg/sm)
Netting	Top: UV-stabilized Polypropylene	5 lbs/1000 sq ft (24.4 g/sm)
	Bottom: UV-stabilized Polypropylene	3 lbs/1000 sq ft (14.7 g/sm)
Thread	Polypropylene, UV stable	

Standard Roll Sizes		
Width	6.5 ft (2.0 m)	8 ft (2.44 m)
Length	108 ft (32.92 m)	112 ft (35.14 m)
Weight ± 10%	61 lbs (27.66 kg)	76.25 lbs (34.59 kg)
Area	80 sq yd (66.0 sm)	100 sq yd (83.61 sm)

Slope Design Data: C Factors			
	Slope Gradients (S)		
Slope Length (L)	≤ 3:1	3:1 – 2.1	≥ 2:1
≤ 20 ft (6 m)	0.001	0.029	0.082
20-50 ft	0.036	0.060	0.086
≥ 50 ft (15.2 m)	0.070	0.090	0.110

Index Property	Test Method	Typical
Thickness	ASTM D6525	0.47 in. (11.94 mm)
Resiliency	ASTM D6524	91.5%
Density	ASTM D792	0.916 g/cm^3
Mass/Unit Area	ASTM 6566	13.03 oz/sy (443 g/m2)
UV Stability	ASTM D4355/ 1000 hr	90%
Porosity	ECTC Guidelines	95.89%
Stiffness	ASTM D1388	0.94 in-lb (1085378 mg-cm)
Light Penetration	ASTM D6567	17.9%
Tensile Strength - MD	ASTM D6818	438 lbs/ft (6.49 kN/m)
Elongation - MD	ASTM D6818	28.1%
Tensile Strength - TD	ASTM D6818	291.9 lbs/ft (4.32 kN/m)
Elongation - TD	ASTM D6818	26.7%
Biomass Improvement	ASTM D7322	497%

Design Permissible Shear Stress		
	Short Duration	**Long Duration**
Phase 1: Unvegetated	3.0 psf (144 Pa)	2.0 psf (96 Pa)
Phase 2: Partially Veg.	8.0 psf (383 Pa)	8.0 psf (383 Pa)
Phase 3: Fully Veg.	8.0 psf (383 Pa)	8.0 PSF (383 Pa)
Unvegetated Velocity	9.0 fps (2.7 m/s)	
Vegetaged Velocity	16 fps (4.9 m/s)	

Roughness Coefficients – Unveg.	
Flow Depth	Manning's n
≤ 0.50 ft (0.15 m)	0.034
0.50 – 2.0 ft	0.034-0.020
≥ 2.0 ft (0.60 m)	0.020

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Appendix F

FEMA FIRM Panel

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 15. The **horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

Spatial Reference System Division
National Geodetic Survey, NOAA
Silver Spring Metro Center
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713- 3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was obtained from the Minnesota Land Management Information Center (LMIC). The orthophotos have a resolution of one meter and are dated 2008.

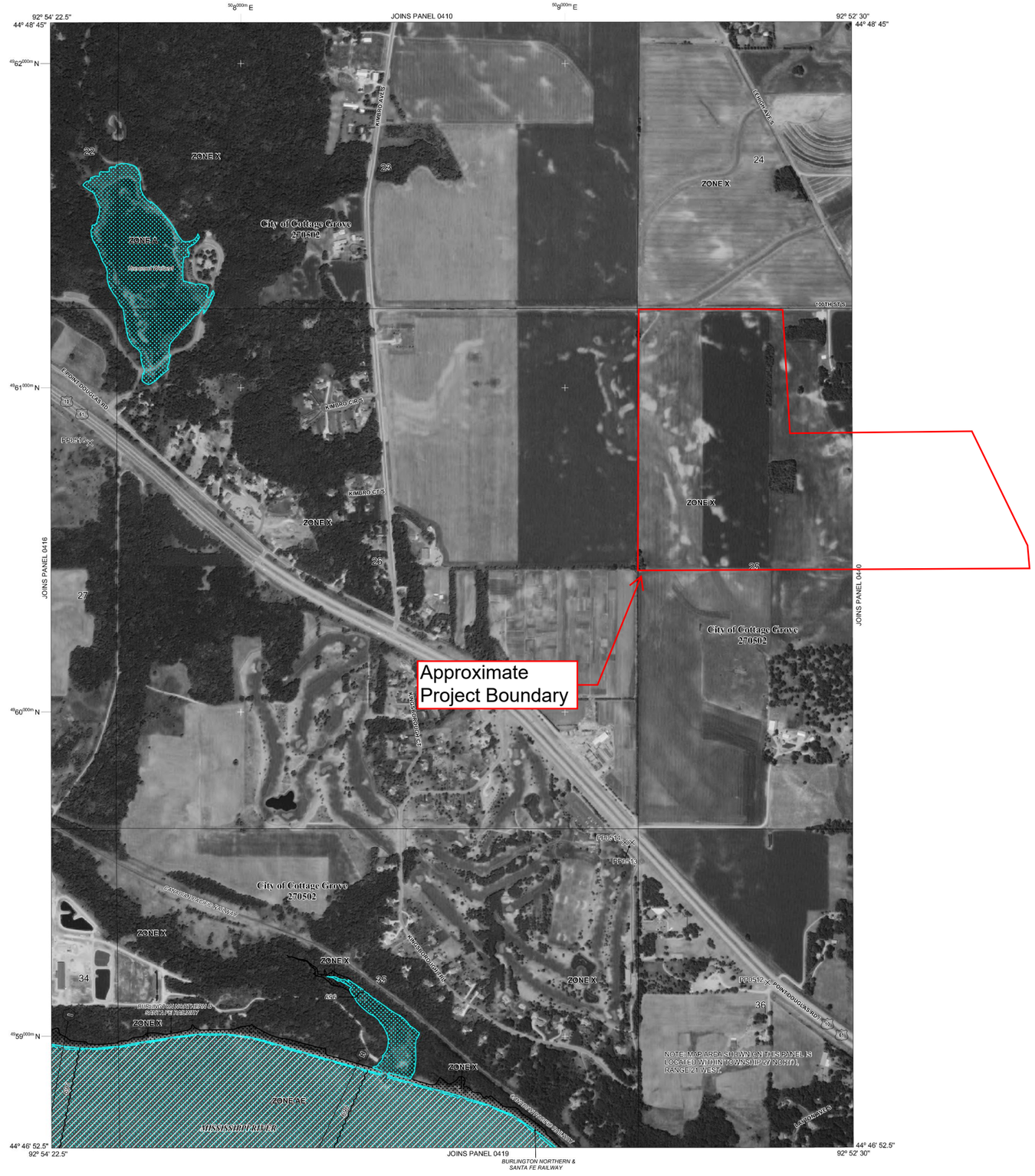
The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the Special Flood Hazard Area.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1- 877- FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary
0.2% annual chance floodplain boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

A — A	Cross section line
23 - - - - - 23	Transect line
45° 02' 08", 93° 02' 12"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
$^{49}89^{000m}$ N	1000-meter Universal Transverse Mercator grid values, zone 15
ML5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORIES
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
FEBRUARY 3, 2010

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET
150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0417E

FIRM

FLOOD INSURANCE RATE MAP

WASHINGTON COUNTY, MINNESOTA
AND INCORPORATED AREAS

PANEL 417 OF 456

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COTTAGE GROVE, CITY OF	270502	0417	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
27163C0417E

EFFECTIVE DATE
FEBRUARY 3, 2010

Federal Emergency Management Agency

Appendix G

Stormwater Summary Solar Site Development Memo

BOLTON & MENK
Real People. Real Solutions.

3507 High Point Drive North
Bldg. 1 Suite E130
Oakdale, MN 55128

Ph: (651) 704-9970
Bolton-Menk.com

MEMORANDUM

Date: 02/14/2024

To: Joe Fox, PE

From: Brent Johnson, PE

Subject: Stormwater Summary Solar Site Development
City of Cottage Grove, MN
Project No.: N15.103963

Development is being planned on the 80-acre and 75.5-acre parcels near 100th and Lehigh Road South (Section 25, T27N, R21W PID: 2502721220001, and 2502721240001).

The following notes regarding the Cottage Grove stormwater rules and standards are excerpts from the City's Surface Water Management Plan and the South Washington Watershed District rules. The future conditions land use map indicates agricultural land uses.

Runoff from Solar Projects: The MPCA Stormwater Manual includes reference material and a calculator for computing runoff from solar projects. Please use the MPCA method for computing runoff (as applicable) for the proposed project.

Fact sheet on stormwater guidance for solar farm projects - Minnesota Stormwater Manual (state.mn.us)

Stormwater management for solar projects and determining compliance with the NPDES construction stormwater permit - Minnesota Stormwater Manual (state.mn.us)

Volume Control: The city requires a uniform volume control treatment equal to 1" of runoff from the sum of new and fully reconstructed impervious areas. The city does not allow infiltration within potential problem areas outlined by the MN Department of Health, or the MPCA Stormwater Manual. The project site lies outside of the 10-year Composite Groundwater Capture Zone, so infiltration is allowed by the city unless prohibited by other criteria of the MPCA Stormwater Manual or the Health Department (depth to bedrock, depth to groundwater, or other criteria).

Where infiltration to fully meet the volume control measure is not desirable or is impossible, an Alternative Sequencing procedure will be applied to achieve compliance. The applicant will use to the maximum extent practical filtration and biofiltration practices, using a clay liner and an underdrain sized to meet the volume control requirement for the site, or use wet sediment basins sized per the standards within the MPCA General Construction Stormwater Permit.

Rate Control: Peak flow rates after development shall not exceed pre-development peak flow rates for the critical 2-year, 10-year, and 100-year recurrence interval precipitation events. Use 24-hour NOAA

Bolton & Menk is an equal opportunity employer.

Atlas 14 Precipitation events and MSE3 distribution for rate control analyses and pond storage design More restrictive rate control criteria may be required to protect the integrity of downstream conveyance channels and ponds.

The project site is located within the Seeger Creek (SC) drainage within Subwatershed SC-A2. The proposed condition outflow rate for SC-A2 lands needs to be at or below the unit peak outflow rate of 0.19 cfs/acre, or existing rate, whichever is lower.

Description	Peak Flow from Parcel (cfs)	Unit Flow Rate (cfs/acre)
Solar Site on parcel 2502721220001 and Part of Access Road within Subwatershed SC-A2	80.6 acres @ 0.19 cfs/acre = 15.7 cfs	0.19 cfs/acre
Part of Access Road within Subwatershed SC-A7	0.34 acres to match existing rates	Not applicable

Curve Numbers: The South Washington Watershed District Standards Manual specifies: *Project proposers shall use runoff curve numbers (CN) based on land cover and HSG as published in the Minnesota Stormwater Manual: Stormwater runoff coefficients/curve numbers for different land uses – Minnesota Stormwater Manual (state.mn.us)*

The site soils are hydrologic soils group A, B, C and D so we expect that proposed conditions pervious areas will be simulated with curve numbers of 39, 61, 74 and 80, respectively.

Water Quality: *The city requires that new development projects include BMPs that at a minimum achieve post-development reductions in TP and TSS by 50% and 80%, respectively. Since the project site drains to the Mississippi River, Watershed rules call for TP loading rate of 0.22 lbs./acre/year or existing loading rates, whichever is less. Submit a water quality analysis using a method such as the P8 or MIDS models. For water quality analyses using the MIDS or P8 models, the South Washington Watershed District (SWWD) Standards Manual (November 2023) includes required adjustments to the MIDS and P8 models:*

Model	*Parameter*	*Required*
MIDS	*Retention Requirement*	*1.0 inch*
MIDS	*Total Phosphorus EMC, Change from Default 0.3 mg/l*	*0.31 mg/l*
P8	*Precipitation and Temperature Files*	*Download modified .pcp and .tmp files from District website*
P8	*Start Date*	*1-1-1971*
P8	*Keep Date*	*1-1-1971*
P8	*Stop Date*	*12-31-2000*
P8	*Number of passes through the storm file*	*5*
P8	*Impervious Depression Storage*	*0.1*
P8	*Impervious Runoff Coefficient*	*0.9*
P8	*Max infiltration rate*	*0.8 inch/hour*
P8	*Phosphorus Event Mean Concentration*	*Nurp50 particle file*
P8	*Total Suspended Solids Event Mean Concentration*	*Nurp50 particle file*

The Standards Manual is available at the link below:
SWWD_Standards-Guidance-Manual_Final_11062023.pdf (swwdmn.org)

If on-site BMPs, such as infiltration, are not sufficient to meet the water quality total phosphorus loading rates, the purchase of off-site mitigation credits is an option.

Freeboard standards: For stormwater facilities with emergency overflows, the low adjacent grade elevation for all new structures must be a minimum of 3 feet above both the peak surface water elevation for the 100-year precipitation event and 2 feet above the emergency overflow elevation of any immediately adjacent new stormwater basin. For backyard and side-yard conveyance and temporary ponding areas, there must be at least 1 foot between the overland overflow elevation and the low adjacent grade elevation of the adjacent structure.

Pretreatment: The city requires adequate pretreatment of stormwater runoff from development and redevelopment activities prior to discharge into all waterbodies. The city will encourage that private infiltration basins be constructed to be "off-line" so that the basins fill along with their pretreatment basins, and higher flood flows are not routed through the infiltration basins, in order to have better long-term operation and less maintenance. If wet sediment ponds are used for pretreatment, they should include equalizer pipes to connect with the infiltration basin.

Soil Borings: Soil borings are required in the vicinity of proposed volume control BMPs. Borings are needed to identify soil conditions and the presence of groundwater or bedrock. Soil borings should extend a minimum of 5 feet below the lowest constructed elevation of proposed BMPs.

Testing: The city will require post-construction testing to verify the infiltration/filtration rate and drawdown period of any infiltration/filtration basins. Please add the following to the infiltration basin plan notes: "Post construction testing of the infiltration rate and drawdown period will be required." Post construction testing should yield results of approximately twice the design rate, providing a safety factor consistent with Section 16.11 of the NPDES Construction Stormwater Permit. If test results exceed 8.3 inches per hour, Section 16.16 requires that soils be amended to slow the infiltration rate below 8.3 inches per hour.

Wetlands: The South Washington Watershed District will act as the Local Government Unit (LGU) for administration of the Wetland Conservation Act (WCA). Please provide copies of wetland delineation and permitting correspondence to the city. The South Washington Watershed District rules call for wetland buffers and other requirements based on wetland management classification and size.

Public Waters: A branch of Seeger Creek flows through the parcel. The MN DNR includes this stream on the Public Waters Inventory. This stream is also subject to Minnesota's Buffer Law which requires perennial vegetative buffers of up to 50 feet along lakes, rivers, and streams. The vegetated buffer extends 50 feet out from the stream bank on each side of the channel.

Floodplain Standards/Easements
Floodplains adjacent to existing and future waters and waterways shall be preserved by dedication and/or perpetual easement to the community in which they are located. These easements shall cover

those portions of the property which are adjacent to the water or waterway and which lie below one (1) foot above the 100-year flood elevation. The local governing unit shall be responsible for all necessary stormwater facility maintenance within the drainage easement.

Control Erosion at Construction Sites:
The city requires that applications for new or redevelopment activity include in their applications for City review, a SWPPP as required under the NPDES construction permit in effect at the time of review. Construction sites will be inspected to ensure compliance with the existing erosion and sediment control ordinance, Watershed District requirements, and with the construction site permit under NPDES Phase II MS4 rules. The city completes quality assurance inspections on all NPDES permits in the city (where the city is not the owner) twice each month. Erosion and sediment control best management practices as outlined in the Minnesota Stormwater Manual will be required and must be shown on required submittals to the City for approval. Any street sweeping conducted by the City to remove erosional debris from streets will be charged to the owner of the property.

Models: Please note that digital copies of the final version stormwater models and shapefiles or CAD drawings of existing and proposed drainage areas are to be submitted to the city once the review and revision process is complete.

NPDES Construction Stormwater Permit
Due to the size of the development area and the potential areas of disturbance and new impervious surfaces, an NPDES Construction Stormwater Permit and associated NPDES permanent stormwater treatment are required.

Appendix H

MPCA Impervious Treatment Requirements

MPCA CALCULATOR INPUTS							
Drainage Area ID	Area (ac)	Soil Type	Panel Area (ac)	Inverters & Roads (ac)	Impervious Area (sf)	Pervious Area (sf)	I/P Ratio
1	4.6	A	1.01	0.01	43996	155945	0.28
2	33.2	A	8.04	0.26	350222	1084644	0.32
3	2.0	A	0.00	1.29	0	30928	0.00

Input for MPCA Spreadsheet
Output from MPCA Spreadsheet

Drainage Area 1

I/P Interpolator		
	I/P Ratio	Runoff Depth
	0.2	4.6
	0.5	4.9
I/P Ratio from MPCA Calc	0.28	4.7

Drainage Area 2

I/P Interpolator		
	I/P Ratio	Runoff Depth
	0.2	4.6
	0.5	4.9
I/P Ratio from MPCA Calc	0.32	4.7

Drainage Area 3

I/P Interpolator		
	I/P Ratio	Runoff Depth
	0.5	4.9
	1.0	5.5
I/P Ratio from MPCA Calc	0.00	4.3

MPCA CALCULATOR OUTPUTS	
Drainage Area ID	WQv - Panels (ft^3)
1	939.13
2	7301.62
3	0.0

WATER QUALITY VOLUME CALCS				
Drainage Area ID	Total Impervious Area - non-panel (ac)	WQv from impervious (ac-ft)	WQv from panels (ac-ft)	Total Required WQv (ac-ft)
1	0.01	0.00	0.022	0.022
2	0.26	0.02	0.168	0.189
3	1.29	0.11	0.000	0.108

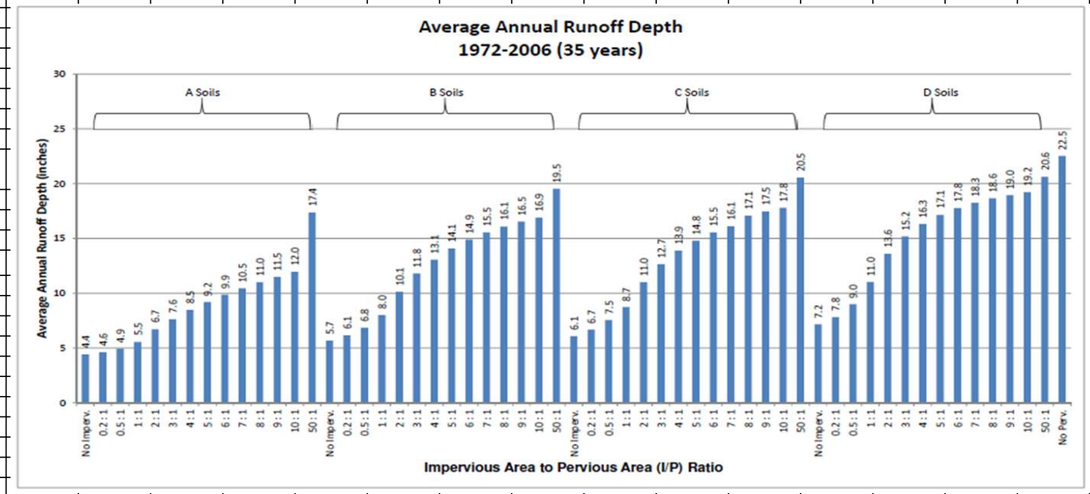
User Input
Final Required Volume

REQUIRED VOLUME PER BASIN			
Discharge Location	Drainage Areas	Basin ID(s)	Required WQv (ac-ft)
1	1, 2, & 3	2P	0.319

This spreadsheet makes calculations for an individual solar panel.

Enter values in blue cells

Soil	A		select from dropdown; determine soil on site
I/P ratio	0.282		calculated
Term	**Value**	**Units**	
Pervious area	155945.00	square feet	user entered; determine on site
Impervious area (area of solar panel)	43996.00	square feet	user entered; determine on site
Runoff depth from pervious areas	4.40	inches	default = 4.4 for A soil, 5.7 for B, 6.1 for C, 7.2 for D
Redirected runoff depth from solar panel (called average annual runoff depth)	4.70	inches	determine from plot called ***Average annual runoff depth***
Runoff depth from solar panel	22.50	inches	default = 22.5 inches
Performance goal	1.00	inches	

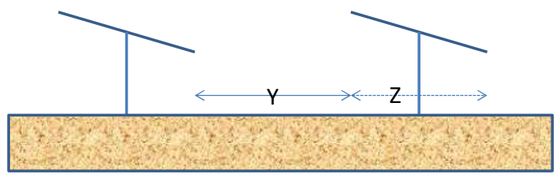


SUMMARY

Pre-disconnection			
Runoff from impervious	82493	ft3	calculated
Runoff from pervious	57180	ft3	calculated
Total runoff	139672	ft3	calculated
Post-disconnection			
Total runoff	78310	ft3	calculated
Total runoff reduced	61362	ft3	calculated
Runoff from pervious	57180	ft3	calculated
Runoff from impervious	21130	ft3	calculated
Adjusted impervious	11269.542	square feet	calculated
Performance Goal Summary			
Performance goal	**3666.33**	ft3	calculated
BMP volume credit ($BMP_{volume\ credit}$)	**2727.20**	ft3	calculated
% of performance goal achieved	**74.4**	%	calculated
Remaining water quality volume to be treated (per panel)	**939.13**	ft3	calculated

Pervious area = (Y + Z) * W; where W is the width of the solar panel and Z is the average horizontal distance of the panel

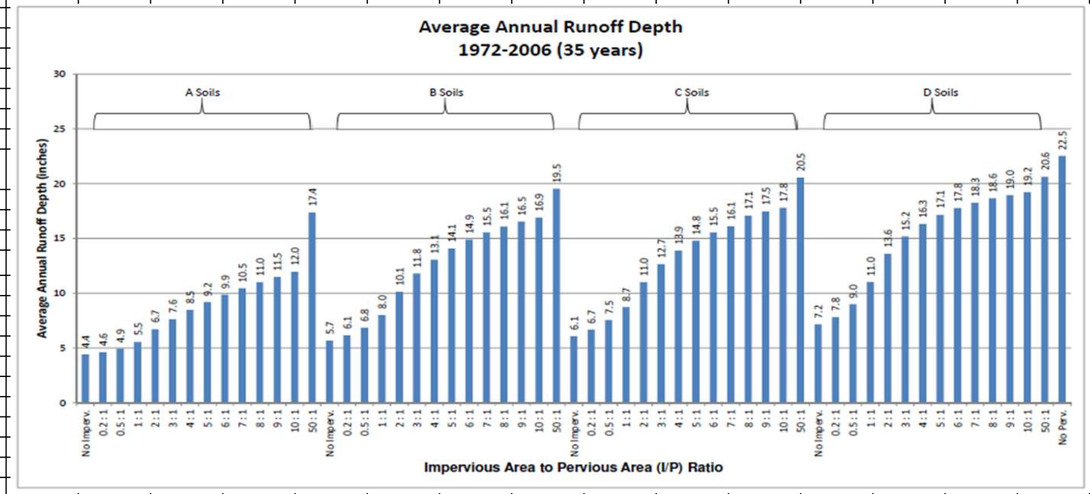
Impervious area = Z * W; where W is the width of the solar panel and Z is the average horizontal distance of the panel



This spreadsheet makes calculations for an individual solar panel.

Enter values in blue cells

Soil	A		select from dropdown; determine soil on site
I/P ratio	0.323		calculated
Term	**Value**	**Units**	
Pervious area	1084644.00	square feet	user entered; determine on site
Impervious area (area of solar panel)	350222.00	square feet	user entered; determine on site
Runoff depth from pervious areas	4.40	inches	default = 4.4 for A soil, 5.7 for B, 6.1 for C, 7.2 for D
Redirected runoff depth from solar panel (called average annual runoff depth)	4.70	inches	determine from plot called ***Average annual runoff depth***
Runoff depth from solar panel	22.50	inches	default = 22.5 inches
Performance goal	1.00	inches	

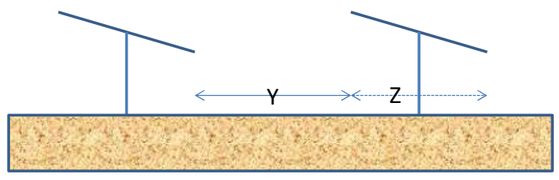


SUMMARY

Pre-disconnection			
Runoff from impervious	656666	ft3	calculated
Runoff from pervious	397703	ft3	calculated
Total runoff	1054369	ft3	calculated
Post-disconnection			
Total runoff	561989	ft3	calculated
Total runoff reduced	492380	ft3	calculated
Runoff from pervious	397703	ft3	calculated
Runoff from impervious	164286	ft3	calculated
Adjusted impervious	87619.404	square feet	calculated
Performance Goal Summary			
Performance goal	**29185.17**	ft3	calculated
BMP volume credit ($BMP_{volume\ credit}$)	**21883.55**	ft3	calculated
% of performance goal achieved	**75.0**	%	calculated
Remaining water quality volume to be treated (per panel)	**7301.62**	ft3	calculated

Pervious area = (Y + Z) * W; where W is the width of the solar panel and Z is the average horizontal distance of the panel

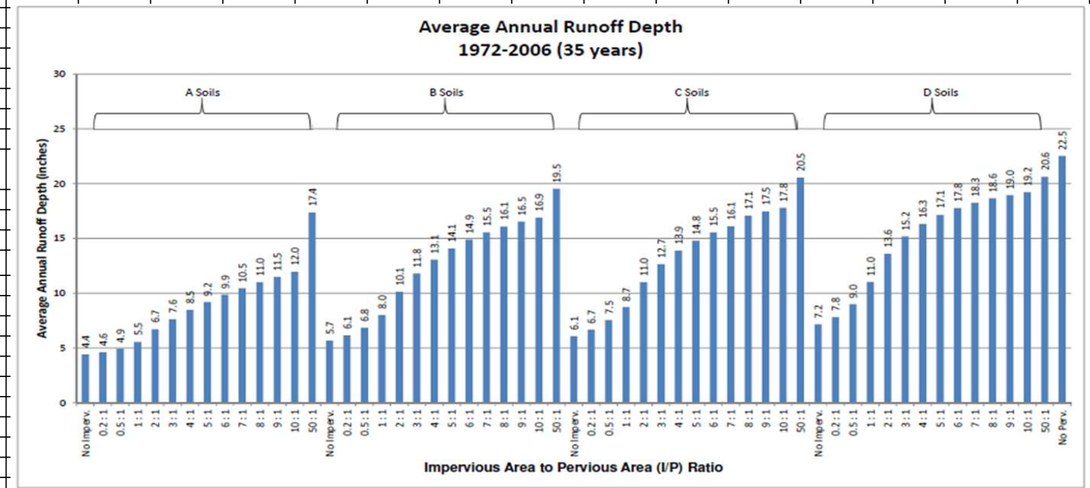
Impervious area = Z * W; where W is the width of the solar panel and Z is the average horizontal distance of the panel



This spreadsheet makes calculations for an individual solar panel.

Enter values in blue cells

Soil	A		select from dropdown; determine soil on site
I/P ratio	0.000		calculated
Term	**Value**	**Units**	
Pervious area	30928.00	square feet	user entered; determine on site
Impervious area (area of solar panel)	0.00	square feet	user entered; determine on site
Runoff depth from pervious areas	4.40	inches	default = 4.4 for A soil, 5.7 for B, 6.1 for C, 7.2 for D
Redirected runoff depth from solar panel (called average annual runoff depth)	4.40	inches	determine from plot called ***Average annual runoff depth***
Runoff depth from solar panel	22.50	inches	default = 22.5 inches
Performance goal	1.00	inches	

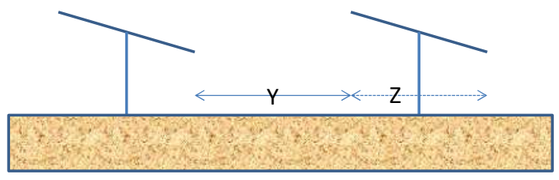


SUMMARY

Pre-disconnection			
Runoff from impervious	0	ft3	calculated
Runoff from pervious	11340	ft3	calculated
Total runoff	11340	ft3	calculated
Post-disconnection			
Total runoff	11340	ft3	calculated
Total runoff reduced	0	ft3	calculated
Runoff from pervious	11340	ft3	calculated
Runoff from impervious	0	ft3	calculated
Adjusted impervious	0.000	square feet	calculated
Performance Goal Summary			
Performance goal	0.00	ft3	calculated
BMP volume credit ($BMP_{volume\ credit}$)	0.00	ft3	calculated
% of performance goal achieved	#DIV/0!	%	calculated
Remaining water quality volume to be treated (per panel)	0.00	ft3	calculated

Pervious area = (Y + Z) * W; where W is the width of the solar panel and Z is the average horizontal distance of the panel

Impervious area = Z * W; where W is the width of the solar panel and Z is the average horizontal distance of the panel



EESolar32 LLC Decommissioning Plan

Enterprise Energy, LLC

2925 Dean Parkway, Executive Ste 300
Minneapolis, MN 55416
(612) 470-7152

DECOMMISSIONING PLAN

The Solar Garden consists of many recyclable materials, including glass, semiconductor material, steel, aluminum, copper, and plastics. When the Solar Garden reaches the end of its operational life, the component parts will be dismantled and recycled as described below. We have a lease contract with the property owner, which requires us to decommission and restore the site at our expense. The decommissioning plan would commence at the end of the lease term or in the event of twelve (12) months of non-operation. At the time of decommissioning, the Solar Garden components will be dismantled and removed using minimal impact construction equipment, and materials will be safely recycled or disposed of. EESolar32 LLC will be responsible for all the decommissioning costs.

REMOVAL PROCESS

The decommissioning of the Solar Garden proceeds in the following reverse order of the installation:

1. The solar system will be disconnected from the utility power grid
2. PV modules will be disconnected and removed
3. Electrical cables will be removed and recycled off-site
4. PV module racking will be removed and recycled off-site
5. PV module support posts will be removed and recycled off-site
6. Electrical devices, including transformers and inverters, will be removed and recycled off-site
7. Concrete pads will be removed and recycled off-site
8. Fencing will be removed and recycled off-site
9. Reclaim soils in the access driveway and equipment pad areas by removing imported aggregate material and concrete foundations; replace with soils as needed

The Solar Garden site may be converted to other uses in accordance with applicable land use regulations at the time of decommissioning. There are no permanent changes to the site, and it will be returned in terrific condition. This is one of the many great things about community solar gardens. If desired, the site. can return to productive farmland after the system is removed.

DECOMMISSIONING CONSIDERATIONS

We ask that City of Cottage Grove take note of 3 important considerations: 1) a community solar garden is not a public nuisance, 2) the resale and recycle value are expected to greatly offset the cost of decommissioning, and 3) City of Cottage Grove and taxpayers are not at risk.
1) Our modules do not contain hazardous materials and the Solar Garden is not connected to government utilities (water, sewer, etc.). The Solar Garden will be fenced in for security and will be sheltered from residences with new vegetative screening. Additionally, almost all the land is permanent vegetation which improves erosion control, soil quality, and water quality. For these reasons, the Solar Garden, whether operational or non-operational, is not a public nuisance threat that would require government involvement in decommissioning or removal of the Solar Garden. Compare this to an abandoned home, barn, etc. that may regularly include hazardous materials and/or become a public nuisance.
2) Upon the end of the Solar Garden's life, the component parts may be resold and recycled. The aggregate value of the equipment is expected to greatly offset the cost of decommissioning and removal. Solar modules, for example, have power output warranties guaranteeing a minimum power output in Year 25 of at least 80% of Year 1. Since the value of solar panels is measured by their production of watts and the value of electricity, it is easy to calculate expected resale value. Even using extremely conservative assumptions, the value of the solar modules greatly offsets the cost of decommissioning. This does not factor in the recycle value of other raw materials like steel, copper, etc.
3) In the extremely unlikely, "worst-case" scenario where (1) the Solar Garden owner fails to decommission and neither our lender nor any power generation entities want the assets, and then (2) the landowner fails to decommission the Solar Garden (which the landowner would have the right to do under the Property lease), and then (3) the decommissioning financial surety was insufficient to decommission the Solar Garden, City of Cottage Grove would have its standard police powers to enforce decommissioning. If that process ultimately resulted in City of Cottage Grove gaining ownership of the property, City of Cottage Grove could sell the parcel which would absolutely exceed the decommissioning cost.

DECOMMISSIONING FINANCIAL SURETIES

Despite the considerations of 1) the Solar Garden is not a public nuisance, 2) the resale and recycle value is expected to greatly offset the cost of decommissioning, and 3) City of Cottage Grove and taxpayers are not at risk, we are cognizant that City of Cottage Grove will require the posting of a bond, letter of credit, or the establishment of an escrow account as a condition of issuing EESolar32 LLC a Conditional Use Permit. Of course, City of Cottage Grove would be the beneficiary of any required security.
We are offering a $225,000 bond for a decommissioning financial surety, which is 125% of the cost estimate required as shown in the cost breakdown table.

This financial surety provides an extra layer of security that the Solar Garden site will be returned to the appropriate condition at the end of the Solar Garden's useful life or earlier, should the Solar Garden cease operations for a twelve-month period. City of Cottage Grove will be the designated beneficiary of the fund and the landowner will be provided a copy of the document, thereby establishing the obligation before construction commences.

INSURANCE INFORMATION

EESolar32 LLC will be required to meet insurance requirements under long-term contracts with several parties, including the site landowner, Xcel Energy and its Solar Garden lenders and investors. EESolar32 LLC will be listed on a policy that includes:

- Liability coverage that will include $1,000,000 in coverage against damage to rented property Excess liability coverage of an additional $1,000,000 per occurrence
- Property coverage in an amount necessary to cover the value of the Solar Garden and up to one year of lost revenue in the event the project is destroyed and needs to be rebuilt.

1.0 DECOMMISSIONING PLAN

1.1 General

EESolar32 LLC is a proposed 8.0-megawatt direct current (MW-dc) or 5.0-megawatt alternating current (MW-ac) solar electric generating facility using ground-mounted photovoltaic panels located in City of Cottage Grove, Minnesota. The facility will be located in a fenced area of approximately 36.2 acres. The vast majority of the site is currently in agricultural use, most of it farmed in row crops. Following decommissioning of the facility, the land will be restored to its pre-construction condition to the extent practicable.

The decommissioning plan (plan) presents the following provisions that are intended to ensure that facilities are properly removed after their useful life. The plan includes provisions for the complete removal of all structures, foundations, underground cables, transformers, inverters, foundations, and the restoration of soil and vegetation. The Contractors will comply with the requirements of all permits during the decommissioning process. Disposal of structures and foundations will comply with any applicable County Solid Waste regulations.

1.2 Decommissioning and Reclamation

Solar projects typically have a life span of approximately 30-40 years, though some replacing or updating of equipment may occur during that time frame. The Owner will be responsible for the removal of all aboveground and underground equipment to full depth within the Project area at the end of the solar project life span. The Owner will restore and reclaim the site to pre-construction topography and topsoil to the extent practical.

Decommissioning includes removing the solar panels, solar panel racking, steel foundation posts and beams, inverters, transformers, overhead and underground cables and lines, equipment pads and foundations, equipment cabinets, and ancillary equipment. The civil facilities, access road, security fence, and any drainage structures are also included in the scope. Standard decommissioning practices would be utilized, including dismantling and repurposing, salvaging/recycling, or disposing of the solar energy improvements.

After all the equipment is removed, any holes or voids created by poles, concrete pads, and other equipment will be filled in with native soil to the surrounding grade and the site will be restored to pre-construction conditions, to the extent practicable. All access roads and other areas compacted by the equipment will be de-compacted to a depth necessary to ensure drainage of the soil and root penetration prior to fine grading and tilling to a farmable condition.

1.3 List of Decommissioning Activities

1.3.1 Timeline

Decommissioning is estimated to take approximately 25-30 weeks to complete. The decommissioning crew(s) will ensure that all equipment and materials are recycled or disposed of properly.

1.3.2 Removal and Disposal of Site Components

The removal and disposal details of the site components are found below.

Modules: Modules will be inspected for physical damage, tested for functionality, and disconnected and removed from racking. Functioning modules will be packed, palletized, and shipped to an offsite facility for reuse or resale. Non-functioning modules will be shipped to the manufacturer or a third party for recycling or disposal.

Racking: Racking and racking components will be disassembled and removed from the steel foundation posts, processed to an appropriate size, and sent to a metal recycling facility.

Steel Foundation Posts: All structural foundation steel posts will be pulled out to full depth, removed, processed to an appropriate size, and shipped to a recycling facility. The posts can be removed using backhoes or similar equipment. During decommissioning, the area around the foundation posts may be compacted by equipment and, if compacted, the area will be de-compacted in a manner to adequately restore the topsoil and sub-grade material to a density consistent for vegetation.

Overhead and Underground Cables and Lines: All underground cables and conduits will be removed to full depth in a way that will not impede the reintroduction of farming. Topsoil will be segregated and stockpiled for later use prior to any excavation and the subsurface soils will be staged next to the excavation. The subgrade will be compacted per standards. Topsoil will be

redistributed across the disturbed area. Overhead lines will be removed from the project and taken to a recycling facility.

Inverters, Transformers, and Ancillary Equipment: All electrical equipment will be disconnected and disassembled. All parts will be removed from the site and reconditioned and reused, sold as scrap, recycled, or disposed of appropriately, at the Owner's sole discretion, consistent with applicable regulations and industry standards.

Equipment Foundation and Ancillary Foundations: The ancillary foundation for Slayton Solar are pile foundations for the equipment pads. As with the solar array steel foundation posts, the foundation Piles are typically removed full depth using a vibratory hammer mounted on a backhoe or similar type of equipment. During the excavation, the topsoil will be segregated from the subsoil, so that the soil can be replaced in the excavation and compacted to restore the pre-construction soil profile. Duct banks will be excavated to full depth. All unexcavated areas compacted by equipment used in decommissioning will be de-compacted in a manner to adequately restore the topsoil and sub-grade material to a density similar to the surrounding soils. All materials will be removed from the site and reconditioned and reused, sold as scrap, recycled, or disposed of appropriately, at the Owner's sole discretion, consistent with applicable regulations and industry standards.

Fence: All fence parts and foundations will be removed from the site and reconditioned and reused, sold as scrap, recycled, or disposed of appropriately, at the Owner's sole discretion, consistent with applicable regulations and industry standards. The surrounding areas will be restored to pre-solar farm conditions to the extent feasible.

Access Roads: Facility access roads will be used for decommissioning purposes, after which removal of roads will be discussed with the Landowner, using the following process:

1) After final clean-up, access roads may be left intact through mutual agreement of the landowner and the Owner.

2) If a road is to be removed, aggregate will be removed and shipped from the site to be reused, sold, or disposed of appropriately, at the Owner's sole discretion, consistent with applicable regulations and industry standards. Clean aggregate can often be used as "daily cover" at landfills for no disposal cost. All internal service roads are constructed with geotextile fabric and eight inches of aggregate over compacted subgrade. Any ditch crossing connecting access roads to public roads will be removed unless the landowner requests it remains. The subgrade will be de-compacted using a chisel plow or other appropriate subsoiling equipment. All rocks larger than four inches will be removed. The access roads and adjacent areas that are compacted by the equipment will be de-compacted.

1.3.3 Restoration/Reclamation of Site

The Owner will restore and reclaim the site to the pre-solar farm condition to the extent practical consistent with the site lease agreement. The Owner assumes that most of the site will be returned to farmland and/or pasture after decommissioning and will implement appropriate measures to facilitate such uses. If no specific use is identified, the Owner will vegetate the site with a seed mix approved by the local soil and water conservation district or similar agency. The goal of restoration will be to restore natural hydrology and plant communities to the extent practicable while minimizing new disturbance and removal of native vegetation. The decommissioning effort will implement best management practices (BMPs) to minimize erosion and to contain sediment on the Project to the extent practicable with the intent of meeting this goal include:

1. Minimize new disturbance and removal of native vegetation to the greatest extent practicable.

2. Remove solar equipment and all access roads up to full depth, backfill with subgrade material and cover with suitable topsoil to allow adequate root penetration for plants, and so that subsurface structures do not substantially disrupt groundwater movements.

3. Any topsoil that is removed from the surface for decommissioning will be stockpiled to be reused when restoring plant communities. Once decommissioning activity is complete, topsoil will be re-spread to assist in establishing and maintaining plant communities.

4. Stabilize soils and return them to agricultural use according to the lease agreements.

5. Prior to and after decommissioning activities, install erosion and sediment control measures, such as silt fences, bio-rolls, and ditch checks in all disturbance areas where the potential for erosion and sediment transport exists, consistent with stormwater management objectives and requirements.

Decommissioning and restoration activities at each site will be completed within 5-6 weeks after the solar energy farm is considered a discontinued use.

1.4 Post-Restoration Monitoring

Decommissioning of the site will comply with permits for the National Pollutant Discharge Elimination System/State Disposal System (NPDES/SDS) Construction Storm Water (CSW) Permit, Spill Containment, and Countermeasure (SPCC) Plan, and Storm Water Pollution Prevention Plan (SWPPP), if grading activities are necessary and exceed applicable permit thresholds. Decommissioning may include post-restoration monitoring as required by the NPDES/SDS CSW Permit and SWPPP and other applicable requirements.

Decommissioning Costs Table

Project Name: EESolar 32, LLC
Date: January, 2024
Project Size 8.0 MW-DC | 5.0 MW-AC

	Quantity	*Unit*	*Unit Price*	*Line Item Price*
Mobilization/Demobilization	1	Lump Sum	**$48,639**	**$48,639**
Mobilization was estimated to be approximately 7% of total cost of other items. This number was developed from speaking with contractors.				
Permitting				
State Permits	1	Lump Sum	$10,000	$10,000
Subtotal Permitting				**$10,000**
Decommissioning will require a SWPPP and SPCC plan, cost is an estimate of the permit preparation cost.				
Civil Infrastructure				
Removal Gravel Surfacing from Road	1863	Cubic Yards	$2.59	$4,825.17
Haul Gravel Removed from Road	1863	Cubic Yards	$5.44	$10,134.72
Disposal of Gravel Removal from Road	2781	Tons	$0.00	$0.00
Removal Geotextile Fabric from Road Area	8,382	Square Yards	$1.40	$11,734.80
Haul Geotech Fabric Removed from Beneath Access Roads	2.31	Tons	$3.99	$9.22
Disposal of Geotech Fabric Removed from Beneath Access Roads	2.31	Tons	$81.00	$187.23
Removal Culvert from Beneath Road	1	Each	$1,200.00	$1,200.00
Haul Culvert Removed from Road	1	Each	$3.99	$3.99
Disposal of Culverts	1	Each	$24.30	$24.30
Grade Road Corridor (Re-spread Topsoil)	4,715	Linear Feet	$1.59	$7,496.85
Erosion and Sediment Control for Road Restoration	4614	Linear Feet	$3.29	$15,180.06
Till to Farmable Condition	0.106	Acres	$402.87	$42.70
Removal of Security Fence	5,730	Linear Feet	$12.43	$71,223.90
Subtotal Civil Infrastructure				**$122,062.95**
Structural Infrastructure				
Removal Steel Foundation Posts (Arrays, Equipment, Met Towers)	2110	Each	$13.38	$28,231.80
Haul Tracker Steel Post	155	Tons	$10.24	$1,587.20
Removal Drive Motor Posts	138	Each	$13.38	$1,839.75
Haul Drive Motor Posts	10	Ton	$10.24	$102.40
Removal Tracker Racking	107	Each	$160.00	$17,120.00
Haul Tracker Racking	124	Ton	$10.24	$1,270.35
Subtotal Structural Infrastructure				**$50,151.50**
Steel removal costs were calculated by using information from array manufacturers for installation rates and using the same rates to calculate total days to remove equipment. Hauling calculations are based on the locations of metals recyclers.				
Electrical Collection/Transmission System				
Removal of PV Modules	13,584	Each	$5.27	$71,587.68
Haul PV Modules for Disposal	351	Tons	$3.99	$1,401.01
Disposal of PV Modules	351	Tons	$81.00	$28,441.50
Removal of Inverters	50	Each	$48.00	$2,400.00
Removal of PCU Station (Inverters/Panelboard/Transformer)	1	Each	$4,000.00	$4,000.00
Haul PCU Equipment to Recycler	1	Each	$230.50	$230.50
Remove Equipment Pad and Foundations	1	Each	$784.49	$784.49
Haul Concrete Foundations	10	Tons	$3.99	$39.90
Disposal of Concrete from Transformer Foundation	10	Tons	$81.00	$810.00
Remove, Haul, and Dispose of Timber Transmission Poles	15	Each	$1,000.00	$15,000.00
Remove and Haul MV Power Cables	5625	Linear Feet	$18.14	$102,037.50
Removal of DC Collector System Cables (copper)	5	Per MW	$1,950.00	$9,750.00
Removal of Underground (AC) Cables	1300	Linear Foot	$2.70	$3,510.00
Load and Haul Cables for Recycling	12.5	Ton	$8.25	$103.13
Subtotal Electrical Collection/Transmission System				**$240,095.70**

Electrical removal costs of PV Modules and Combiner Boxes were based on industry standards for installation rates of a two man work crew. PCU Station, MV Equipment and Scada Equipment removal cost are based on removal of equipment, concrete pads, and conduits using a truck mounted crane and contractor provided information on installation rates. Cable removal assumed using trenching, standard industry production rates.

Site Restoration				
Stabilized Construction Entrance	1	Each	$2,000.00	$2,000.00
Perimeter Controls	5,730	Linear Feet	$3.29	$18,851.70
Till to farmable condition at array areas and basin	36	Acres	$150.48	$5,417.28
Clearing and grubbing for Trees	1.76	Acres	$7,259.43	$12,776.60
Remove Sedimentation Basin	3	Each	$6,997.80	$20,993.40
Subtotal Site Restoration				**$60,038.98**
Site restoration costs are based on past solar project experience.				
Project Management				
Project Manager - half time	25	Weeks	$1,900.00	$47,500.00
Superintendent	25	Weeks	$3,525.00	$88,125.00
Field Engineer	25	Weeks	$2,325.00	$58,125.00
Clerk	25	Weeks	$750.00	$18,750.00
Subtotal Project Management				**$212,500.00**
Standard industry weekly rates from RS Means. 2 week schedule used				
Subtotal Demolition/Removals				**$743,488.57**
Contingency (10%)				$74,348.86
Total Demolition/Removals				**$817,837.43**
Salvage				
Fencing	70	Tons	$348.75	$24,412.50
Steel Posts	155	Tons	$348.75	$54,056.25
Module Racking	124	Tons	$348.75	$43,265.22
PV Modules	13,584	Each	$32.76	$445,011.84
Inverters and Transformers	1	Each	$44,520.90	$44,520.90
Scada Equipment	1	Each	$5,000.00	$5,000.00
DC Collection Lines	30,110	Pounds	$0.75	$22,582.50
AC Collection Lines	1950	Pounds	$0.38	$741.00
Salvage values are a combination of the following factors; current market metal salvage prices, current secondary market for solar panel module recycling, discussions with national companies that specialize in recycling and reselling electrical transformers and inverters, and the assumption that care is taken to prevent any damage or breakage of equipment.				
Subtotal Salvage				**$639,590.21**
Net Demolition Minus Salvage				**$178,247.22**

Notes:

1. Prices used in analysis are estimated based on research of current average costs and salvage values.
2. Prices provided are estimates and may fluctuate over the life of the project.
3. Contractor means and methods may vary and price will be affected by these.

Decommissioning Assumptions

To develop a cost estimate for the decommissioning of the Project, the following assumptions and pricing references were utilized. Costs were estimated based on current pricing, technology, and regulatory requirements. The assumptions are listed in order from top to bottom of the estimate spreadsheet.

1. The projected life of the Project is 25-35 years.

2. Decommissioning will utilize a full-time Project Manager or support staff.

3. Common labor will be used for most of the tasks except for heavy equipment operation.

4. Mobilization was estimated at approximately 7% of the total cost of other items.

5. Permit applications required include the preparation of a Storm Water Pollution Protection Plan (SWPPP) and a Spill Prevention Control and Countermeasure (SPCC) Plan.

6. Road gravel removal was estimated on a time and material basis using a 16-foot width and an 8-inch thickness for the access roads. Because the material will not remain on-site, a hauling cost is added to the removal cost. Road aggregate can often be disposed of by giving to landowners for use on driveways and parking areas. Many landfills will accept clean aggregate for use as "daily cover" and do not charge for the disposal.

7. Grade Road Corridor reflects the cost of mobilizing and operating light equipment to spread and smooth the topsoil stockpiled on-site to replace the aggregate removed from the road.

8. Erosion and sediment control along roads reflect the cost of silt fence on the downhill side of the roads and surrounding all on-site wetlands.

9. In most cases, topsoil is required to be stockpiled on the Project site during construction, therefore any such stockpiled topsoil can be used to replace the road aggregate, once removed. This will help in eliminating the costs for any borrowed landfill. Tilling to an agriculture-ready condition is estimated at $402.87 per acre (based on DOT bid prices for Soil Bed Preparation). The majority of the Project area is assumed to be tilled to an agriculture-ready condition. Because decommissioning activities are not expected to eliminate the grasses and vegetation under the arrays or heavily compact the soils the restoration effort is expected to be limited. Array areas left as pasture will require little restoration effort because the arrays will have been planted with native plants and pollinator seed mixes. As a result, the soils will have been rejuvenated by having been removed from intensive farming.

10. Fence removal includes loading, hauling, and recycling or disposal. The fence and posts weigh approximately 10 pounds per foot.

11. Array support posts are generally lightweight "I" beam sections installed deep into the ground. Crew productivity is approximately 30 posts per hour, and the same crew and equipment should have similar productivity removing the posts, resulting in a per ton cost of approximately $13.38. When salvage values have not been recognized the costs for processing metal to size and the hauling cost to a more distant recycling facility are generally not included, but the minimum decommissioning financial security controls by such a large margin that the lower price for removals and freight are not shown.

12. The underground collector system cables are placed in trenches with a minimum of four feet of cover.

13. To reduce tracking of sediment off-site by trucks removing materials, we have included a stabilized construction entrance price to the “Site Restoration” section based on state DOT bid prices for similar items.

14. Perimeter control pricing is based on a sediment fence placed on the downgrade side of the work area perimeters and protecting wetlands and drainage swales within the project area.

15. No topsoil will be removed from the landowner's property or used on other landowner's property during decommissioning. The majority of the Project site is not anticipated to have been compacted by heavy truck or equipment traffic so no topsoil will need to be imported, and very few areas will need to be de-compacted.

Cottage Grove
Where Pride and Prosperity Meet

To: Evan Carlson, Enterprise Energy

From: Joe Fox, PE, Project Engineer

Date: May 14, 2024

Subject: City Review of Finnegan Solar Project Plans

This memo is a review of the 4-24-24 submittal for the Finnegan Solar Project. Plans are dated 4-19-24.

1. In the southeast corner of the development, where the access road connects to Lehigh Road, the access road runs through a triangular area that isn't owned by Finnegan. Do you have permission to build within that area?
2. Grading and utility record plans containing surveyed as-built data shall be submitted to the city on completion of the project, in both PDF and DWG format.
3. A NPDES construction stormwater permit is required for this project. Send confirmation of this permit to the city.
4. A city ROW permit is required for work on Lehigh.
5. A state or county ROW permit is required for work on Manning Ave.
6. A stormwater maintenance agreement must be executed with the city for private stormwater facilities on site.
    a. Stormwater maintenance agreement will include a section on planting and maintenance of native vegetation throughout the site.
7. A pre-construction meeting must be held prior to start of construction. Call Joe Fox at 651-458-2826 to set up the meeting.
8. Installation of utility poles along Lehigh Rd and Manning Ave should be shown on the plans.
    a. Traffic management plan should be included.
9. Drainage from the site should not negatively impact downstream neighbors.
10. Sheets C400 and C503: Infiltration Basin:
    a. Prior to construction, two soil borings at the site of the infiltration basin must be conducted to show infiltration rate at least twice the rate that is used in HydroCAD model.
    b. Post construction infiltration testing – by double-ring infiltrometer or other approved method – must be conducted and results submitted to city. The results must show infiltration rate at least twice the rate that is used in HydroCAD model.
    c. C400 note #6 is not a city rule. Vegetation must be established after construction.
    d. C400 note #11: use city detail plate for fiber rolls.
    e. Detail DN-44: pond shape is different in this detail than on the grading plan. Which one is correct?
11. Sheets C400 and C401:
    a. City Engineering Guidelines require a maximum intersection approach grade of 2% or less for private roads for at least 100 feet from intersection with public

roads. This means the access grade cannot exceed 2% grade for 100 feet from center of Lehigh Road.

b. Maximum road grade at any point cannot exceed 10%.
    i. A culvert would be necessary under the access road to maintain flow in the roadside ditch.
c. Section 21.2 of the Construction Stormwater Permit requires that individuals designing a SWPPP – i.e. those designing the erosion and sediment control plans – must be certified. Please provide the name of the individual who prepared the SWPPP for this project and their Minnesota certification.
d. Silt fence should be installed along the south side of the project to account for upstream grading of berm and infiltration basin.
e. Additional silt fence will be required along downstream side of road construction.
f. Show detail of access road at Lehigh Road. Will access road widen to accommodate turning vehicles? Will the planned access road connection to Lehigh be affected by the existing culvert under Lehigh? Include existing culvert under Lehigh Road on plans to identify any conflicts between the culvert and new construction.
g. Will construction of the access roads involve removing existing soil?
h. What is a typical section of access road – depth of aggregate?

12. Sheets C500, C501, C502, C503:
    a. Use Cottage Grove detail plates for rip rap at end of pipe, rock construction entrance, silt fence, J-hook silt fence, and other erosion control applications. City detail plates available here: https://www.cottagegrovemn.gov/251/City-Standards
    b. Detail RD-05 mentions detail SS-02, but SS-02 isn't included in the plans. Please include.

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Bolton-Menk.com

MEMORANDUM

Date: 05/14/2024

To: Joe Fox, PE

From: Brent Johnson, PE

Subject: Finnegan Solar Project Stormwater Review
City of Cottage Grove, MN
Project No.: N15.103963

This memo summarizes the review of stormwater related documents submitted by Westwood Professional Services, Inc. received 04/30/2024. The submittal included plans and stormwater report:

Exhibit B. 2024-04-19 Finnegan Prelim Civil Set RevB.pdf
Exhibit F. 2024-04-19 Finnegan Preliminary SWMR.pdf

- Exhibit B. 2024-04-19 Finnegan Prelim Civil Set RevB.pdf
- Exhibit F. 2024-04-19 Finnegan Preliminary SWMR.pdf

1. **HydroCAD**: Please include hydrograph plots in the HydroCAD reports so we can review the model routings, stability and drawdown periods.
2. **Infiltration Basin:** Please add the following labels and notes to the plans.
   - High water level (HWL) and emergency overflow (EOF) elevations must be labeled on the plans for ponds, infiltration basins, and similar BMPs.
   - Please add notes on the plans indicating how to stage construction and use low-impact earth moving equipment to avoid compaction of the soils under the infiltration system in order to improve the likelihood of successful infiltration.
3. **Testing:** The city will require post-construction testing to verify the infiltration/filtration rate and drawdown period of any infiltration/filtration basins. Please add the following to the infiltration basin plan notes: "Post construction testing of the infiltration rate and drawdown period will be required." Post construction testing should yield results of approximately twice the design rate, providing a safety factor consistent with Section 16.11 of the NPDES Construction Stormwater Permit. If test results exceed 8.3 inches per hour, Section 16.16 requires that soils be amended to slow the infiltration rate below 8.3 inches per hour.
4. **Public Waters**: A branch of Seeger Creek flows through the site of the proposed solar project. The MN DNR includes this stream on the Public Waters Inventory. This stream is also subject to Minnesota's Buffer Law which requires perennial vegetative buffers of up to 50 feet along lakes, rivers, and streams. The vegetated buffer extends 50 feet out from the stream bank on each side of the channel. Please show Seeger Creek and the 50-foot buffers on the plans and realign the solar panels to outside of the stream buffer or demonstrate that the DNR has given approval for panels within the stream buffer.

Bolton & Menk is an equal opportunity employer.

5. **Floodplain Standards/Easements:** Floodplains adjacent to existing and future waters and waterways shall be preserved by dedication and/or perpetual easement to the community in which they are located. These easements shall cover those portions of the property which are adjacent to the water or waterway, and which lie below one (1) foot above the 100-year flood elevation. The local governing unit shall be responsible for all necessary stormwater facility maintenance within the drainage easement.
6. **Soil Borings**: Soil borings are required in the vicinity of proposed volume control BMPs. Borings are needed to identify soil conditions and the presence of groundwater or bedrock. Soil borings should extend a minimum of 5 feet below the lowest constructed elevation of proposed BMPs.
7. **Infiltration Media:** For a successful vegetation establishment in the infiltration basin, the city recommends providing a Filter Topsoil Borrow (MnDOT 3877.2G) consisting of 70% sand (meeting the gradation requirements of 3126 "Fine Aggregate for Portland Cement Concrete") and 30% Grade 2 Compost (MnDOT 3890). Lower compost levels have typically proved difficult when establishing vegetation in infiltration or filtration basins.
8. **Seed Mixes**: Please identify the seed mixes and seeding rates that are proposed for the site. The proposed infiltration basin should include a native seed mix such as MnDOT 33-261 (Stormwater South & West).
9. **NPDES Construction Stormwater Permit:** As this project disturbs more than 1 acre, an NPDES Construction Stormwater Permit and SWPPP will be required. The city requires that applications for new or redevelopment activity include in their applications for City review, a SWPPP as required under the NPDES construction permit in effect at the time of review. Construction sites will be inspected to ensure compliance with the existing erosion and sediment control ordinance, Watershed District requirements, and with the construction site permit under NPDES Phase II MS4 rules. The city completes quality assurance inspections on all NPDES permits in the city (where the City is not the owner) twice each month. Erosion and sediment control best management practices as outlined in the Minnesota Stormwater Manual will be required and must be shown on required submittals to the City for approval. Any street sweeping conducted by the City to remove erosional debris from streets will be charged to the owner of the property.
10. **Models and CAD Files**: Please note that digital copies of the final version stormwater models (HydroCAD, P8) and shapefiles or CAD drawings of existing and proposed drainage areas are to be submitted to the city once the review and revision process is complete.

COTTAGE GROVE PLANNING COMMISSION April 22, 2024

12800 Ravine Parkway South
Cottage Grove, MN 55016

COUNCIL CHAMBER – 7:00 P.M.

The Regular Meeting of the Planning Commission was held in the Council Chamber and telecast on Local Government Cable Channel 16.

1. CALL TO ORDER

Frazier called the Planning Commission meeting to order at 7:00 p.m.

2. ROLL CALL

Pradeep Bhat-Here; Ken Brittain-Here; Jessica Fisher-Here; Evan Frazier-Here; Eric Knable-Here; Derek Rasmussen-Here; Emily Stephens-Here

Members Absent: None.

Staff Present: Emily Schmitz, Community Development Director; Conner Jakes, Associate Planner; Mike Mrosla, Senior Planner; Crystal Raleigh, Assistant City Engineer; Riley Rooney, Associate Planner; Tony Khambata, City Council Liaison.

3. APPROVAL OF AGENDA

Fisher made a motion to approve the agenda. Rasmussen seconded. The motion was approved unanimously (7-to-0 vote).

4. OPEN FORUM

Frazier opened the open forum and asked if anyone wished to address the Planning Commission on any non-agenda item.

Bonnie Matter, 6649 Inskip Avenue South, stated tonight there are public hearings, and asked if that means that audience members can approach and ask questions. Frazier replied there are public hearings on the lot split at 9670 Kimbro, the School Bus Garage Fuel Tank, and the Zoning and Sign Code Update. Those will be public hearings that we will discuss when those come up. Matter stated okay, so then my next question is on the zoning and code amendments and asked if you are going to go through them one by one, or are you going to just like take them as a bundle. Frazier replied well, it's one application, so they move as an application. Matter stated thank you.

As no one else wished to speak, Frazier closed the open forum.

5. CHAIR'S EXPLANATION OF THE PUBLIC HEARING PROCESS

Frazier explained the purpose of the Planning Commission, which serves in an advisory capacity to the City Council, and that the City Council makes all final decisions. In addition, he explained the process of conducting a public hearing and requested that any person wishing to speak should go to the microphone and state their full name and address for the public record.

6. PUBLIC HEARINGS AND APPLICATIONS

6.1 LOT SPLIT AT 9670 KIMBRO - CASES MS2024-011 & V2024-011

Joshua John has applied for a minor subdivision to subdivide a 10.1720-acre parcel located at 9670 Kimbro Avenue South, previously known as the Brown Farm, into two separate parcels. The applicant has proposed to create a 4.086-acre parcel that would include the existing house and accessory structures, and a 6.086-acre buildable parcel that could support a new home; and a variance to the City's minimum lot width at the front property line for the newly created 6.086-acre parcel and a 6-foot setback for the existing driveway.

Rooney summarized the staff report and recommended approval based on the findings of fact and subject to the conditions stipulated in the staff report. Riley stated a representative of the applicant is here to answer any questions you may have.

Bhat asked when we subdivide this into two parcels, do the accesses have to be within the parcel; could this be planned so that the accesses are contained within a single parcel. Riley clarified that the access would be on the 6-acre parcel itself, and then she showed on the site plan where the accesses to the existing parcel would come down from; the County wouldn't allow for another access. Bhat stated he's just curious why would access to Parcel 2D have to go through Parcel 2C; I mean, can it be contained within one single parcel. Riley deferred to Schmitz to answer that question. Schmitz stated they're proposing a shared acces because they couldn't have a second access off of Kimbro Avenue, per the County. So, they had to find a way to access both of these new parcels with one access point. Therefore, that's why you're seeing that shared driveway, or that shared access. So, it's only on one parcel, technically, but it provides access to Parcel 2D. Schmitz asked if that helps clarify; Bhat replied that's fine, thank you.

Fisher stated to piggyback off of that, I'm assuming that an easement will need to be recorded for the existing parcel so that if some day the second parcel is sold, that there's still deeded access to the first parcel, correct? Is that part of the stipulations? Riley replied that's correct; there would be a shared driveway access agreement between the two properties, and that would stay with the properties themselves; so, if people moved, that would still remain.

Frazier told Schmitz I just want to go back to what you just briefly mentioned. So, off of Kimbro Avenue, that's a County-controlled roadway, and so they've got policies about how many accesses can be onto that road, how close; so that's why there can only be one access onto these two pieces of property. Schmitz replied that's correct.

Frazier asked if the applicant would like to approach and add anything.

Tim Freeman, land surveyor and land planner with Folz Freeman Surveying, 5770 Newgate Avenue North, Oak Park Heights, MN, stated I was involved in the platting of the two parcels in 2017. I was involved in a minor subdivision in 2018, and here I am again today. So, the variance for the 90 feet up there really was because it was the only viable place for that driveway. It used to come

off right where the existing house was, and they had to vacate that; the County wouldn't allow it, as the spacing doesn't allow two driveways, it just allows one. So, the only way to really do it would be to move it up to the north there, and the parcel just isn't wide enough, so that's how that 90-foot piece got there. If you look on your screen, you'll see that there's kind of a green-looking tree there, right at the intersection of the first driveway going south, and that's really the reason why it got put there. The applicant hired an excavator to build the gravel driveway; the excavator went out there, looked at the property line, and said there's a five-foot easement there. Then he saw the tree and said, well, I'll go right between them, and that's where he built it. So, the staff report did a really good job of explaining all of the details; I don't have anything else to add unless you or the public have any questions.

Rasmussen stated, so, that existing driveway is about six feet from the property line, correct? Freeman replied yes. Rasmussen asked how is that land flow, how is the drainage there; are we draining off onto the neighbor's property, or is it coming toward the south? Freeman replied no, it's coming toward the south. It's actually fairly flat through there; I included a couple of photographs that aren't in your packet, but it's basically wide open, and there's this great big maple tree, and it runs between the property line and a maple tree. We knew that the City staff was interested, as we were, to keep the trees; so, that's how it ended up there.

Frazier opened the public hearing. No one spoke. Frazier closed the public hearing.

Rasmussen stated I think their request makes sense, and it was approved last time, so I'm fine with it this time.

Fisher stated I'm just curious to know if there are any construction plans for the new parcel. Freeman replied not yet.

Brittain made a motion to approve the minor subdivision and variance, based on the findings of fact and subject to the conditions stipulated in the staff report. Rasmussen seconded. Motion passed unanimously (7-to-0 vote).

6.2 SCHOOL BUS GARAGE FUEL TANK - CASES PP2024-010 & SP2024-010

BKBM Engineers, on behalf of ISD #833, has applied for a preliminary plat to replat the property at 8587 West Point Douglas Road and to plat the property at 8585 West Point Douglas Road to combine the two existing parcels into one platted lot; and a site plan review for the installation of a new above-ground fuel tank and associated pumps/paving.

Jakes summarized the staff report and recommended approval subject to the conditions stipulated in the staff report.

Rasmussen asked Jakes to help him understand the difference between metes and bounds versus platted property. Jakes replied before a property is platted, it technically has a metes and bounds legal description that is hard to understand, that describes the boundary of that parcel. When a plat comes through, it converts it into Lot and Blocks, so that's typically what you see in residential or business development, where's it's Lot 1, Block 2 or Lot 2, Block 2, etc. So, as part of the platting of that parcel to the east, it was part of the Glengrove Business Addition, so that was platted as Lot 1, Block 1, which is this blue parcel. Lot 2, Block 2 was actually the business center, so it converts it really to Lot and Block. Rasmussen stated so both are giving me the same information, it's just

how it's organized here. Jakes stated yes, that's correct. And then with the plat, it would also show the easements clearer, instead of paper easements, which don't show up on County GIS, for example.

Stephens asked can you explain, as it was kind of hard to tell on the plans, what all is being replaced or what's all being dug up, and are they redoing the pond? Maybe you could just talk about that, and then I'll probably have a follow-up question. Jakes replied the fuel tanks are currently located here, so that would be dug up; those tanks would be removed or sealed, per Code requirements and MPCA standards. He pointed out on the site the disturbed area where the new tank would be; I believe it's currently a grass area shown, so that would be replaced with concrete for the fuel tanks, pumps, and related equipment. The applicant reconfigured the pond to account for the impervious increase and has submitted the required modeling to show that reconfiguration is sufficient to also handle that increase in impervious. Stephens stated I'm pretty sure the answer is no, but when you do something like this, if they were redeveloping it, would they be required to test and see if there was contamination in the soils? Is that something that would be beneficial at this time with the underground tanks? Jakes replied under a redevelopment scenario, that would be correct. Due to the application where they're removing and replacing, I don't believe we would require any contamination testing, but I'll defer to our Assistant City Engineer if she has anything to add. I don't believe, with a proposal like this, that would be required. I know the applicant will follow all MPCA standards, so if they do pull those tanks and there is contamination noted at the time they're pulling them, then they'll go in and do the sufficient testing that's required at that point. Stephens stated okay, I was just curious. I was thinking if there was any testing and they were redoing the pond, if the pond wasn't lined, it might be a good time to line it to prevent further contamination. I guess that's all I was thinking. Jakes added that they are proposing to line that pond and bring it to current-day standards. Stephens stated perfect, thank you.

Bhat stated he has a follow-up question; why is the underground fuel tank being replaced by an above-ground fuel tank? What is the necessity there? Jakes replied I will defer to the applicant to answer that question. I believe it's probably just preference.

Knable asked are they just going to run new lines to the gas pumps on Lot 1, or how are they providing access to the above-ground tank? Jakes showed on the site plan where the access is now for the buses to come through, in a direction to allow access for the buses. Those new pumps would be located next to the tank, and then the lines will be run from the tank to the pumps, so there will be circulation through the site with the two secure rolling-gate access points. Knable stated okay, he just wasn't sure if they were going to run piping underneath there, to where the old pumps were. Jakes replied I don't believe so.

Frazier asked if the applicant would like to approach.

Kevin Bohl, with BKBM Engineers, 11623 Fergus Street NE, Blaine, Minnesota, stated to answer your question about the replacements, the tanks are just getting old and near the end of their useful life. If you go out there, you can see that all the pumps and everything are just starting to get really rusted; overall, there's just concerns about the length that these tanks have been in the ground, trying to get them replaced, and new ones put in. It's just our preference.

Bhat asked why above-ground replacement instead of in the ground? Bohl replied above ground is cheaper, for one; it also provides them the ability to move them if they ever needed to in the future. There are also a lot of reasons just in case there's any leakage, you can see it easier versus it

being underground; not that we're expecting leakage, but it's just kind of easier to maintain and see it when it's above ground vs. below grade, like that. He stated one last thing, for the contamination portion, as you'd mentioned, we do have unit pricing, it's already in the contract and everything; if we do encounter contamination, we'll mitigate that per the MPCA's requirements.

Frazier opened the public hearing.

Bonnie Matter, 6649 Inskip Avenue South, stated the only thing that she wondered about when reading through this is why an above-ground; but I was more concerned about how close it is to the railroad tracks. And is there a possibility of a derailment; probably not, but how close is it to the railroad tracks? Thank you.

No one else spoke. Frazier closed the public hearing.

Frazier asked staff to talk about how close it is to the railway; I'm assuming there's a setback requirement from the railroad. Jakes replied that he does not have the exact measurement of how far that tank is from the railroad, but CP Rail was contacted and approved that location without worries. Staff also went through a derailment scenario, etc. to account for any possible scenarios in the City. So, we're aware of that, and we're working with CP Rail, and received their approval without any concerns or comments related to that.

Fisher stated so there's fencing that goes around the west side of that; is that going to be the picture of the fence that you showed because right now it's chain-link, right? So, is that going to be between the tank and the railroad track back there, too, as well? Jakes replied yes, there's a fence proposed that would basically come through here and tie into that chain-link fence. Fisher stated it has to be enclosed because obviously there's controlled gates and whatever, so it has to be completely enclosed. Jakes stated that is correct.

Fisher made a motion to approve the preliminary plat and site plan review, subject to the conditions stipulated in the staff report. Brittain seconded. Motion passed unanimously (7-to-0 vote).

6.3 ZONING AND SIGN CODE UPDATES - CASE TA2024-012

The City of Cottage Grove has applied for zoning text amendments to the City of Cottage Grove Zoning Code (Title 11) and Sign Code (Title 11-3-14).

Mrosla summarized the staff report and recommended approval.

Stephens asked two questions about the impervious changes. You talked about updating the stormwater management plan, I'm just very curious if you applied these new, if you assume everybody maxes it out, did you get a lump sum; like what's the difference of new impervious, assuming it all develops out from the existing percentages to the proposed percentages, and like how big of a difference does that make in the City? Lastly, with the high-density residential, if you move it from 50 to 65, does that leave enough room, are there a lot of like tree and landscape plans, and how does that impact room for those? Like, you talk about the lots being thinner, then are you going to have room for trees on either side, if everybody's maximizing it out? Mrosla stated with the first question, he will let our Assistant City Engineer, Crystal Raleigh, address that one. Mrosla stated on the second one, that 65 percent we actually could have gone a little higher than that; I think our

storm and surface water management can allow us to go to 70 or 75, but we thought 65 was a good number to allow for landscaping and all those items to fit on that site nicely. We thought that would be a nice middle mix, but the Surface Water Management Plan (SWMP) allowed it to go up to 70 or 75; 65 is a little lower, leaves room for landscaping, etc. Raleigh stated I understand the review of the SWMP that was done, I'm not positive that it went into the level of detail like you're asking: If everything was built out per the impervious percentages, how much do we have left to go? They did a very detailed review of how the curve numbers that are in the SWMP equate to these percent impervious numbers; as Mike just alluded to, there's room, there's a lot of fluff, especially in the high density. Our SWMP plans for quite a bit more impervious than what we're proposing here, so it would allow for more and we'd still be meeting our SWMP.

Stephens stated I'm not as concerned about the SWMP. I guess just in terms of new impervious, because it impacts everything, but I get what you're saying. Raleigh stated we don't expect any ponds to blow up or any of our downstream infrastructure to be impacted by these changes. Mrosla added we shared these numbers with the South Washington Watershed District, too, to make sure they were comfortable with that as well. I just want to point that out.

Frazier opened the public hearing.

Bonnie Matter, 6649 Inskip Avenue South, stated on this I wrote down the majority of my questions to help you move this project up. She distributed her questions to the Planning Commissioners to help with the time because it's more than three minutes to ask all of that. I'm going to talk fast. I'm just going to start in on my questions: Item 2: I guess I'll go through it; I'm looking at a different document, it was the document that was in with the meeting materials. Item 2 will allow accessory structures to be constructed in front yards when adjacent to the Mississippi River and within the MRCCA. And I just would like to make sure that whenever that happens, that the name, title, and department of the authorizing DNR representative who said the MRCCA database update was not required is included. So, that's what I'd like to see happen there, and any time a name from the DNR is mentioned, I would appreciate the department, the title, and the name because there's many different departments. Item 3: Update impervious surface coverage percentages for R Districts and title the table line the same for all R Districts to be consistent. Staff is proposing to increase the impervious surface area amounts by 10 to 15 percent, depending on the Zoning District and lot sizes. Does the Mississippi Landing stormwater design account for the potential increase in impervious surfaces on individual lots under this ordinance change? That area down there is a different animal, and so I would like to make sure I understand that, thank you. And I'd like a copy of the Mississippi Landing stormwater design; I requested it on April 1, I think, I might have requested it before then, but I still have not received it. I had also called and requested the SWPPP Plan for the City and the MS4; I was told it was being, I don't even know if I was told it was being updated. I think when I looked on the website it's not up to date, and I requested the current plan but I haven't received it. Item 6: Clarify the Site Plan Review procedure and submittal requirements. What does this clarification mean? Does this mean developers can decide to make Site Plan changes without coming back to the Planning Commission for review? How will this differ from what is done today? What are the boundaries for this type of decision? What would be considered minimal, what would be considered out of bounds? Provide some examples. How would this change affect the Mississippi Landing development? Is this request due, in part, to the Cottage Grove City Council Meeting and preliminary Development Agreement with Rachel Development on September 6, 2023? Confirm that the City of Cottage Grove has and will follow the 11.15.5H MRCCA Admin Ordinance; Cottage Grove has a different numbering system, theirs would be 11.13.5H, for notification requirements for developments in the area of or that may impact Grey Cloud Dunes Scientific

and Natural Area (SNA) and the Grey Cloud slough Mississippi River. Item 8: Remove language stating that accessory structures cannot exceed the footprint of the principal structure. Please include language that all site structures cannot exceed maximum allowable impervious surface area for the lot size. Item 9: Reduce lot width standard in R-4, Transitional Residential Zoning District, to 45 feet. With the reduction of lot widths and increased density, what is the requirement for fire resistant barriers or walls between homes? I just want to go back to this impervious surface thing. When they say an additional +10 percent or +15 percent, if you actually get into the acreage, it's a considerable amount, you know, it's a lot. Do you know what I'm saying? If you take 40 percent of 10,000 feet or 50 percent of 10,000 feet, it's a different percent when you get into actual physical acreage. That's it, thank you very much.

Frazier stated to Ms. Matter that we will accept the letter and put that in the record as part of the public hearing.

As no one else spoke, Frazier closed the public hearing.

Frazier stated I don't know how staff wants to divide that up. Schmitz replied there are several items in here that will require follow up in writing that we're not going to address right away this evening. We'll provide an update back to the Planning Commission next month and, of course, to Ms. Matter over the next month, as we provide some clarification to some of these detailed questions.

Frazier stated some of these we can probably deal with now; he asked Mrosla to come back up. I realize some requests from Ms. Matter are to provide some documentation, provide some information, so we're not going to do that tonight. So, Item 3, the Mississippi Landing stormwater design, account for the potential increase. I think during your presentation you had mentioned that City staff has looked at the stormwater design, the watershed design plans for the City, and accounting for this change, is that correct? Mrosla replied that is correct. Frazier stated okay, so that would include the Mississippi Landing plan. Mrosla stated as part of the review process, that has been reviewed by staff.

Frazier stated regarding Item 8, which is on Page 2, changing the language, specifically in that section, include that the total site structures can't exceed the maximum impervious surface area for lot size. There is already a separate part of the ordinance that requires all lots to stay under the maximum impervious surface. Mrosla replied that is correct, there are normal parameters that we use to make sure that the impervious coverage is met, there are setbacks, there is lot coverage, there are a number of items that we use. So, that's the way we keep our checks and balances. Frazier stated okay, so builders and developers are required to follow all City Ordinances on building and structure setback ordinances and requirements. Mrosla replied yes. Even before today, I was working on a plan at my desk that was for an accessory garage, and I had to make sure that the plans had the appropriate coverage and make sure that they're meeting the ordinance standards. Frazier stated okay, so making this change in the language would be duplicitous because it's already been covered somewhere else. Mrosla replied correct.

Frazier stated Item 9, on Page 3, I know we've talked about this before with these thinner lots, where we're getting down to 40 to 45-foot wide lots, and we talk about fire barriers; but maybe you can just talk briefly about the City's practice and experience with these thinner lots and the requirements that I think Public Safety, as well as the builders have, for those. Mrosla replied correct; so, when we receive these applications, we forward them to our Fire Marshal for review and our Building Inspections team to review them. Generally, when the separation is less than 10 feet, there has

to be a difference in material on those walls, fire-rated materials; especially on the eaves that overhang a bit closer, there are requirements for that to be fire rated, but usually it's under 10 feet. We try to work with our applicants to make sure they're 10 feet or more. A lot of builders try to keep that so they don't have to put that cost into it. So, that is something that they're aware of, usually before they apply for an application. If they do, we have the standards ready for that, just in case.

Frazier stated let's go back to Item 6; I kind of skipped that one because it's got a bunch of questions in there. Item 6 is essentially, my understanding, streamlining how a Site Plan Review comes before the Planning Commission and City Council and how that gets funneled. Mrosla stated yes, it's partially that, and our part, as staff, is to know what triggers a Site Plan Review. The current language is very vague, so we want to add language in there, if the applicant, for example, is adding more than 10 percent of total square footage to the building, that triggers a Site Plan Review. Or if you're modifying the parking lot, that triggers it. So, we just want to make sure that when an application comes before us, we know what triggers that, and right now, the language is very vague. We had one earlier this year where we were like we don't know, so we had to ask our City Attorney; we want to provide great customer service, so the intent behind that is for staff more or less to have that checkbox saying does it meet one of these things. For a Site Plan Review, instead of it being very vague, there's the process on how to streamline it through the Planning Commission and City Council. Frazier stated okay, so the proposal before us, then, is to make these categories of what's a minimum versus something that needs to come before Planning Commission and City Council clearer for staff and the applicants. Mrosla stated that is correct; it also helps with building permits.

Schmitz stated it looks like we made it through all of these, so we won't follow up in writing because I think we did a pretty good job of providing some detailed clarification. The one under #6 that I would add, I want to make it very clear, we're talking about a Site Plan Review process, and what Mike's proposing is amended. The Mississippi Landing project is a Preliminary Plat, so those are two different processes, so I just wanted to clarify that.

Frazier asked if anyone on the commission had questions for staff.

Bhat stated so this is regarding your proposal to separate out the Sign Code from the Zoning Code. I'm not very familiar with the Sign Code, what is a Sign Code; what kind of signs are we talking about here? Mrosla replied with our Sign Code, we regulate all signs, not your Public Safety street signs, but signs on buildings, directional signs in parking lots. For example, if you go to McDonald's, we have standards for all the signs on that building and in the parking lot, for directional and where the drive-through goes. There are many board standards, and a lot of its very cut and dried. Like a menu board cannot exceed 10 square feet, and so we just go through there and it's a checklist, but this regulates all signs in the community. It also regulates yard signs, for example; right now, our Code is quiet on that, so we're allowing residents to have up to two yard signs in their yard, all the time. Right now, it's silent on the matter, so we put that in there clarified language on garage sale signs, it's just all about signs. The hard part about signs is it's a First Amendment, free speech, so we had to work very closely with our City Attorney on that because technically, as staff, we cannot read the sign; we have to enforce it by its location and size, etc. We can't go up to the sign and read it, per se. Many times it comes down to aesthetics, health, safety, and general welfare of the community on the sign ordinance. Bhat said my follow-up question is by moving this Sign Code from 11 to 12, do we tend to lose something? Are we overlooking something? Why is it there in the first place, and by removing it, are we going to miss something? Mrosla replied a lot of cities have their Sign Code in their Zoning Code. Our City Attorney historically has had it in the Zoning Code for other municipalities that she's worked for; however, the City of Cottage Grove historically has

had it not in there. So, we're not really losing anything, we're just moving it out so in the event that a change had to occur, especially with First Amendment items, we sometimes have to make quick changes or modifications, and it will go straight to the City Council. The City Council can make that modification approval without delaying the process. So, a lot of those things happen very quickly, and we have to have like a severability clause or something else in there; so, we'd bring it right to our City Council then to get that amended due to the impact of the First Amendment.

Rasmussen made a motion to approve the amendments to the City Code Title 11, Zoning regulations, and relocate Section 11-3-14, Signs, to Title 12, subject to minor modifications by City Attorney. Knable seconded. Motion passed unanimously (7-to-0 vote).

7. APPROVAL OF PLANNING COMMISSION MINUTES OF MARCH 25, 2024

Fisher made a motion to approve the minutes of the March 25, 2024, Planning Commission meeting. Rasmussen seconded. Motion passed unanimously (7-to-0 vote).

8. REPORTS

8.1 RECAP OF APRIL CITY COUNCIL MEETINGS

Schmitz provided a summary of actions taken at the April 3 and April 17, 2024, City Council meetings.

Schmitz said Council Member Khambata is here to add anything additional or if commissioners have questions for him. Khambata stated I don't have anything additional to add, but I'll make myself available for questions. Frazier asked if there were any questions for Council Member Khambata, but none were asked.

8.2 RESPONSE TO PLANNING COMMISSION INQUIRIES

<u>Response to Open Forum - Mississippi Landing Traffic and Roadways:</u>
Schmitz stated several members of the Grey Cloud Island Township Board provided some comments at last month's meeting as it relates to the limited traffic from the construction that can go underneath the railroad bridge from the Mississippi Landing development. Yes, some of the equipment, of course, that is coming to the site is not able to make it underneath that bridge; therefore, they need to take the alternate route up Grey Cloud Island Trail, which extends of course through Cottage Grove, the Township, and then into St. Paul Park. Recognizing there are four jurisdictions that are impacted by this potential construction traffic, we've coordinated a meeting with all of these jurisdictions to kind of talk through what that looks like; we have that scheduled for April 30 to sit down together to have a better understanding of any potential impacts.

8.3 PLANNING COMMISSION REQUESTS – None.

9. ADJOURNMENT

Rasmussen made a motion to adjourn the meeting. Brittain seconded. Motion passed unanimously (7-to-0 vote). The meeting was adjourned at 8:09 p.m.

Cottage Grove
Where Pride and Prosperity Meet

TO: Bonnie Matter

FROM: Emily Schmitz, Community Development Director

DATE: April 29, 2024

RE: Response to 4-22-2024 Planning Commission Public Hearing: Zoning Text Amendments to City Zoning Code (Title 11)

Item #2. Provide name, title, and department of authorizing DNR representative who said MRCCA database update was not required.

- *The proposed amended code is 11-3-5 and is not an amendment to Chapter 13, Mississippi River Corridor Critical Area Overlay District. Staff submitted the proposed ordinance amendment to MN DNR Ordinance Review and the East Metro Area Hydrologist, Dan Scollan responded with the attached email.*

Item #3. Does the Mississippi Landing stormwater design account for the potential increase in impervious surfaces on individual lots under this ordinance change?

- *The enforcement regarding maximum impervious surface is a two-part enforcement. The first portion is through the base development submittal and review of the associated stormwater management plan. This plan needs to comply with the City's Surface Water Management Plan as well as other jurisdictional requirements (i.e., SWWD). The Surface Water Management Plan specifies "curve numbers" to be used in stormwater design for new development. In general, curve numbers range from 30 (grassy meadow in good soils) to 98 (fully impervious pavement) and vary from site to site based on a variety of factors. Curve numbers are used in stormwater modeling rather than percentage imperviousness due to factors affecting surface water flow such as compaction, vegetation, soil types, etc. The intent of the zoning code is then for the second part of the enforcement process for any future additions to individual lots such as patios, accessory structures, etc. for many reasons including ensuring the development stormwater design will be able to manage the additional impervious surface. Planning and Engineering staff, with collaboration with the City's Engineering Consultant team, reviewed the proposed impervious surface maximums for the zoning code to ensure they would align with the assumptions in the Surface Water Management Plan.*

Item #6.

- What does this "clarification" mean?
  - *Proposed code language clarifies when a site plan review process is required i.e., for all new commercial building construction on a platted lots and substantive changes to an existing site as determined by the Community Development Director. A single-family residential development requires a preliminary and final plat and not a site plan review process. Site plan review is generally used for few buildings or expansions of multi-family, commercial and industrial uses.*

- Does this mean developers can decide to make site plan changes without coming back to the Planning Commission for review?
    - *The proposed language requires a site plan review process for all new construction and substantive changes to approved site plans as determined by the Community Development Director.*
- How will this differ from what is done today?
    - *The proposed amended language does not change the City's process rather provides clarity when a site plan review is required.*
- What are the boundaries for this type of decision?
    - *Proposed improvements that may be permitted via an administrative review process are outlined in 11-2-4E. The proposed amended language does not change the boundaries for this type of decision.*
- How would this change affect the Mississippi Landing Development?
    - *This amendment has no impact on the approvals as a site plan review is not required for the proposed project per the standards in the zoning code.*
- Confirm the City of Cottage Grove has and will follow 11-15-5H "Notification requirements".
    - *The City has and will continue to follow notification requirements as outlined in 11-13-5H for planning applications received from properties within the MRCCA. Building permits do not trigger this notification process.*

Item #9.

- With the reduction of lot widths and increased density, what are the requirements for fire resistant barriers or walls between homes?
    - *Five feet is the number that has been determined by the national code body that the state of Minnesota has adopted. If the distance to the property line is five feet or greater then no fire protection is required. Once the distance is less than five feet, fire resistive construction must be used such as fire walls, limited opening in the wall for windows and doors, or penetrations in the wall for vents and exhaust. In some of the homes the roof edge projects into the five-foot separation, soffit venting is not allowed in these situations and the vent is located on the lower edge of the roof behind the exterior wall. Also required is solid blocking between the roof trusses from top plate to the bottom side of the roof sheathing. Platted*

From: Scollan, Daniel (DNR)
To: Mike Mrosla
Cc: MN_Ordinance Review (DNR)
Subject: RE: Accessory Structures Amendment
Date: Tuesday, April 16, 2024 1:59:22 PM
Attachments: image006.png
image007.png
image008.png
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Hello Mike,

Thanks for consulting with me on the proposed zoning code amendment. Since the proposed amendment addresses a general zoning provision (detached garage location), and would not affect the standards of the Mississippi River Corridor Critical Area (MRCCA) overlay district (such as bluff or ordinary high water level setbacks), there is no need for formal DNR review or approval of this amendment.

Best Regards,

Dan Scollan
East Metro Area Hydrologist – Ramsey and Washington Counties
Division of Ecological and Water Resources

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DEPARTMENT OF NATURAL RESOURCES

From: Mike Mrosla <MMrosla@cottagegrovemn.gov>
Sent: Wednesday, April 10, 2024 11:53 AM
To: Scollan, Daniel (DNR) <daniel.scollan@state.mn.us>; MN_Ordinance Review (DNR) <ordinance.review.dnr@state.mn.us>
Subject: Accessory Structures Amendment

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Good Morning Dan,

I wanted to run our proposed code amendment by you. We are working on updating our zoning code and one thing we are proposing is to allow accessory structures to be constructed in front yards of properties impacted by bluffs or the Mississippi River setbacks and located within the Mississippi River Corridor Critical Area Overlay (MRCCA). The proposed language is base off the DNR's Shoreland ordinance. Below is the proposed language and findings.

11-3-5.F.7 Detached accessory garages over 400 square feet may be located in the front yard between the dwelling and front property line on properties located adjacent to the Mississippi River or are impacted by bluffs within the Mississippi River Corridor Critical Area Overlay (MRCCA) provided all of the following are met:

1. Detached accessory garages shall meet the underlying zoning district's development standards and shall not be located within the minimum front yard setback.
2. Exterior materials including color and roof material of detached garages and accessory structures shall match or complement the existing primary residential structure and shall conform to all other requirements of the underlying zoning district.
3. No other accessory structures are permitted in the front yard.

Finding: City code currently requires detached garages and accessory structures to be located behind the principal structure; however, constructing an accessory structure behind the principal structure on lots adjacent to the Mississippi River may not be achievable due to the river setback and MRCCA standards. Upon review, at least nine properties located adjacent to the Mississippi River have received approvals to construct detached accessory garages in front of the principal structure. The same is true for properties impacted by bluffs in the MRCCA. Upon review, at least six properties impacted by bluffs that have received approvals to construct detached accessory garages in front of the principal structure. Instead of going through the variance process for these multiple properties that have clear practical difficulties, staff is proposing to permit detached accessory garages over 400 square feet to be constructed in the front yard if the property is adjacent to the Mississippi River and meets all other applicable zoning standards.

Properties with detached accessory garages in front of the principal structure

Properties impacted by bluffs and the MRCCA bluff setback

If you have any questions, please feel free to contact me.

Thank you,

Mike Mrosla
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