

NEVADA COUNTY, CALIFORNIA  
IDAHO-MARYLAND MINE  
**RECLAMATION PLAN**

**NOVEMBER** | 2019

**Lead Agency:**  
Nevada County, Community Development Planning Department

**Prepared for:**  
Rise Grass Valley Inc.

**Preparer:**  
Benchmark Resources

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950 Maidu Avenue, Nevada City, California 95959

**Prepared for:**

Rise Grass Valley Inc.  
PO Box 271, Grass Valley, California 95945

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## 1. SUMMARY

Rise Grass Valley Inc. (Rise) proposes to reinitiate underground mining and gold mineralization processing of the Idaho-Maryland Mine (the “site”) in unincorporated Nevada County (County) (see Figure 1, “Regional Location,” and Figure 2, “Site Location”). Thus, a reclamation plan must be prepared for all surface-related disturbance, in accordance with the requirements of the California Surface Mining and Reclamation Act (SMARA), found in California Public Resources Code (PRC) Section 2710 et seq., Title 14 of California Code of Regulations (CCR) Section 3500 et seq., and the County’s (the lead agency) implementing ordinance (Nevada County Code Section L-II 3.22, Surface Mining Permits and Reclamation Plans).

The facilities and operations will be located on two properties owned by Rise and referred to as the Brunswick Industrial Site and Centennial Industrial Site. The operation comprises five primary elements (see Sheets 1, “Brunswick Industrial Site Plan—Final Grading and Topography,” 2, “Brunswick Industrial Site—Site Plan Details,” 3, “Brunswick Industrial Site—Grading Plan,” and 4, “Centennial Industrial Site Plan,” and 5, “Centennial Industrial Site—Grading Plan” and 6, “Brunswick and Centennial Industrial Site—Section Views”):

1. dewatering the existing underground mine workings,
2. mining existing and new underground mine workings,
3. processing gold mineralization and rock,
4. placing engineered fill at the Brunswick and Centennial Industrial Sites, and
5. export of engineered fill from the Brunswick Industrial Site to support local construction projects.

The majority of aboveground facilities, the treated-water outfall structure, and engineered fill will be located on Rise’s 119-acre Brunswick Industrial Site. Engineered fill will also be placed on Rise’s 56-acre Centennial Industrial Site. Of the total 175 acres in surface land holdings, approximately 104 acres will be disturbed as a result of construction of the facilities proposed to support dewatering, mining, and processing at the Idaho-Maryland Mine. In addition, Rise owns approximately 2,585 acres of subsurface rights that encompass the historic Idaho-Maryland Mine workings and Idaho-Maryland gold mining operation. Once the aboveground facilities are constructed, Rise will begin dewatering the mine, performing advanced exploration, and mining the underground workings.

Table 1, “Reclamation Plan Summary for Operation Components,” lists the components of the operation and the plan for each component at reclamation. Appendix A, “Index to Required Content,” provides a table with the location in this document for specific requirements, practices, and standards for reclamation plans.

**TABLE 1**  
**RECLAMATION PLAN SUMMARY FOR OPERATION COMPONENTS**

Site Component	Reclamation Plan
Potable water extension	To remain to service East Bennett residential area.
<b>BRUNSWICK INDUSTRIAL SITE</b>	
Engineered fill	Transported from process plant. Compacted and graded to 3:1 (horizontal to vertical) slopes. Side slopes will be vegetated and the pad will be an area for future industrial use.

Site Component	Reclamation Plan
Covered conveyor from Brunswick headframe to process plant	To be dismantled and removed.
Brunswick and Service shaft headframes and headframe buildings	To be dismantled and removed.
Brunswick shaft	To be closed per applicable stated and federal regulations.
Service shaft	To be closed per application state and federal regulations.
Buildings (Including Mineral processing plant, changeroom and office, warehouse, hoist rooms, generator, water treatment plant, etc.)	Contents of buildings to be removed; buildings to remain for future industrial use.
Site drainage facilities	To remain on-site for support of future industrial development.
Diesel fuel tank (30,000 gallon)	To be emptied and removed.
Process tanks (clean water, process water, tailing thickener, paste filter feed tank, cement silo, finish water tank)	To remain for future industrial use
Water treatment pond	To remain for future industrial use
South Fork Wolf Creek	Outfall pipeline to be removed after mine dewatering activities no longer needed.
Paved surfaces, access, and roads	To remain.
<b>CENTENNIAL INDUSTRIAL SITE</b>	
Engineered fill	Transported from process plant, compacted and graded in lifts per geotechnical report recommendations. Side slopes will be vegetated and the pad will be an area for future industrial use.
Site drainage facilities	To remain on-site for support of future industrial development.
Paved surfaces, access, and roads	To remain.

## 2. BACKGROUND

The Idaho-Maryland Mine is a historic, past-producing, underground gold mine. The mine produced 2,414,000 ounces of gold between 1866 and 1956. The mine has been inactive since its closure in 1956 and was inactive for several periods during its production period. In 1901 the mine was allowed to flood with water, and then the mine was dewatered in 1904. In 1914 it was again allowed to flood, and then it was dewatered in 1919. The mine was allowed to flood again after its final closure in 1956.

During its operation, the Idaho-Maryland Mine was one of California’s and the United States’ most important mines. In 1941, the mine employed approximately 1,000 workers and was California’s largest lode gold mine and the United States’ second-largest lode gold mine by annual production. The Idaho-Maryland Mine encompasses an extensive system of approximately 73 miles of underground tunnels, many raises, four inclined shafts, and two vertical shafts. The historic mining operation had extensive surface infrastructure adjacent to the Centennial Industrial Site and at the Brunswick Industrial Site, most of which has been dismantled and removed.

Idaho-Maryland Mine used the Centennial Industrial Site to deposit mine tailings. These mine tailings were never compacted. Some of the materials used to build the tailings berm and small quantities of mineralized rock contain elevated metals. As a result, under existing conditions, the majority of the Centennial Industrial Site cannot be developed because of unstable soils and/or contamination. Rise is working with the California Department of Toxic Substances Control (DTSC) to develop a plan that consolidates and caps the contaminated soils in a manner consistent with current federal and state regulations. Rise will use the engineered fill to fill and grade the Centennial Industrial Site. The

environmental cleanup work at the Centennial Industrial Site will be completed under the DTSC voluntary cleanup program and is not a component of the operation for review under SMARA.

The Idaho-Maryland Mine as it now exists represents a consolidation of past mines, including Eureka, Idaho, Maryland and Brunswick. The Union Hill Mine is a smaller mine adjacent to the Idaho-Maryland Mine that was closed in 1918 and has been flooded with groundwater since then. The Union Hill Mine is not connected to the Idaho-Maryland Mine, but is near the Brunswick portion of the Idaho-Maryland Mine. The gold-quartz veins of the Union Hill Mine are believed to be part of the Brunswick vein system. Rise is proposing to dewater the Idaho-Maryland Mine, but not the Union Hill Mine.

A sawmill previously operated on the Brunswick Industrial Site and closed in 1991. All buildings related to the sawmill have been removed. A clay-lined constructed pond and significant paved areas remain from the sawmill operation.

In 1995, in an effort to reopen the Idaho-Maryland Mine, Emgold Mining Corporation acquired a use permit from Nevada County to dewater the mine. This permit was allowed to expire and no work was completed on the dewatering project. In 2005, Emgold submitted an application to the City of Grass Valley to dewater the Idaho-Maryland Mine and restart mining and processing operations. Between 2005 and 2011, the City of Grass Valley implemented environmental review of the application consistent with the California Environmental Quality Act. Emgold subsequently abandoned the use permit application because it could not pay the fees required for continued processing. Rise has no affiliation with Emgold.

### **3. SITE DESCRIPTION**

The following sections provide general site details such as contact information for the mine owner and operator; evidence of landowner notification of reclamation; reclamation responsibility; and site location, size, site features, and land uses.

#### **3.1 Contact Information**

**Owner of Property Name:** Rise Grass Valley, Inc.

**Owner of Mineral Rights:** Rise Grass Valley, Inc.

**Street Address:** PO Box 271

**City, State, Zip Code:** Grass Valley, California 95945

**Telephone Number:** (604) 260-4577

#### **3.2 Operator**

**Mine Operator:** Rise Grass Valley, Inc.

**Street Address:** PO Box 271

**City, State, Zip Code:** Grass Valley, California 95945

**Telephone Number:** (604) 260-4577

**Contact Person:** Ben Mossman, President

#### **3.3 Notification of Landowner**

Rise Grass Valley, Inc. is the sole owner of the property.

### 3.4 Reclamation Responsibility

A statement for responsibility to complete reclamation in accordance with this plan is provided by the current operator in Appendix B, "Statement of Responsibility."

### 3.5 Location, Size, and Legal Description

The site location is shown on Figures 1 and 2 and includes the Brunswick and Centennial Industrial Sites and the route of the potable pipeline. The site is located in western unincorporated Nevada County, California. The Centennial Industrial Site is adjacent to the Grass Valley city limits and within the City of Grass Valley's (City's) near-term annexation boundary (see Figure 2). The Brunswick Industrial Site is approximately 2 miles from the center of the city of Grass Valley and State Route 49 (SR 49) (see Figure 2).

The location is also identified as follows:

- **Assessor's Parcel Numbers (APNs):**
  - **Brunswick Industrial Site:**  
006-441-003, 006-441-004, 006-441-005, 006-441-034, 009-630-037, 009-630-039
  - **Centennial Industrial Site:**  
009-550-032, 009-550-037, 009-550-038, 009-550-039, 009-550-040, 009-560-036
  - **Potable Water Pipeline Easement:** 009-560-045, 009-560-016
- **U.S. Geological Survey Township and Range:** Sections 25, 26, and 36 of Township 16 North, Range 8 East and Section 31 of Township 16 North, Range 9 East of the Grass Valley U.S. Geological Survey 7.5-minute quadrangle
- **Latitude and Longitude:** 39.207272, -121.013084 degrees at the Brunswick Industrial Site, Brunswick Road entrance; 39.222170, -121.039058 degrees at Centennial Industrial Site, Whispering Pines Lane entrance

The property includes approximately 175 acres (118.93 acres on the Brunswick Industrial Site and 56.41 acres on the Centennial Industrial Site). The legal description of the property and parcels under ownership is provided in Appendix C, "Parcels, Legal Description, and Easements." In addition, a new potable water pipeline (approximately 1.5 miles long) will be constructed primarily along East Bennett Road.

### 3.6 Conditions of Approval and Mitigation Measures

In accordance with PRC Section 2772(b)(1)(B), Appendix D, "Conditions of Approval and Mitigation Measures," provides a listing of conditions of approval or binding mitigation measures adopted by the County upon approval of this reclamation plan pursuant to the California Environmental Quality Act (CEQA) that were deemed necessary to meet the requirements of SMARA.

### 3.7 Existing and Allowed Land Uses

Land use on the site is visible in Figure 3a, "Existing Conditions Aerial Photograph," Figure 3b, "Existing Site Conditions: Brunswick Industrial Site," and Figure 3c, "Existing Site Conditions: Centennial Industrial Site." The majority of the approximately 175-acre site is open space. Remnants of the previous gold mining and sawmill operations exist on-site.

Table 2, “Land Use and Zoning Designations,” provides the *Nevada County General Plan* (Nevada County 2014) and zoning land use designations for each parcel within the site. Figure 4, “General Plan Designations,” shows these *Nevada County General Plan* designations for the site and surrounding area. All parcels are designated for industrial uses. The Light Industrial (M1) district provides for production, repairs, distribution, goods and equipment warehouses, storage of explosives, and storage of bulk petroleum products. The County allows surface drilling on properties zoned M1, and drilling has been conducted periodically since October 2017.

**TABLE 2  
LAND USE AND ZONING DESIGNATIONS**

Parcel Number	Acreage	General Plan Designation	Zoning
<b>BRUNSWICK INDUSTRIAL SITE</b>			
006-441-003	15.19	Industrial (IND)	Light Industrial (M1) with Site Performance Combining District (SP)
006-441-004	0.85	Industrial (IND)	Light Industrial (M1) with Site Performance Combining District (SP)
006-441-005	50.01	Industrial (IND)	Light Industrial (M1) with Site Performance Combining District (SP)
006-441-034	16.01	Industrial (IND)	Light Industrial (M1) with Site Performance Combining District (SP)
009-630-037	21.8	Industrial (IND)	Light Industrial (M1) with Site Performance Combining District (SP)
009-630-039	15.07	Industrial (IND)	Light Industrial (M1) with Site Performance Combining District (SP)
<b>CENTENNIAL INDUSTRIAL SITE</b>			
009-550-032	0.48	Industrial (IND)	Light Industrial (M1)
009-550-037	4.47	Industrial (IND)	Light Industrial (M1)
009-550-038	40.1	Industrial (IND)	Light Industrial (M1)
009-550-039	0.98	Industrial (IND)	Light Industrial (M1)
009-550-040	0.13	Industrial (IND)	Light Industrial (M1)
009-560-036	10.25	Industrial (IND)	Light Industrial (M1)

Sources: Nevada County 2019, Nevada County Zoning Ordinance.

As shown in Table 2 and Figure 5, “Zoning,” the site is zoned Light Industrial with six parcels having a Site Performance Combining District. With implementation of the operation, the Brunswick Industrial Site will be rezoned a Light Industrial with Mineral Extraction Combining District (M1-ME). The ME zoning allows for mining operations on the surface, including processing, waste disposal, and the reclamation thereof, subject to the regulations in Section L-II 3.22, Surface Mining Permits and Reclamation Plans, of the County Zoning Ordinance.

### 3.8 Site Features, including Utilities and Easements

Existing site features are shown in Figures 3a, b, and c, and Appendix C provides the easements. The following utilities are necessary for operation and are available at the site:

- **Power:** Electricity will be supplied by Pacific Gas and Electric Company. Total connected load is estimated at approximately 10 megawatts (MW) with a net load of approximately 6 MW. Backup power generation will be provided by four diesel generators with a capacity to provide approximately 6 MW on a continuous basis.

- **Water:** The Idaho-Maryland Mine will have a surplus of water from the natural groundwater flow into the underground workings. Once dewatering is completed, approximately 1.9 cubic feet per second (cfs), 850 gallons per a minute (approximately 1,224,000 gallons per a day) are estimated to be pumped to the surface and settling pond. This water will support all operation-related water demand. Total consumptive water requirements are estimated at 123,000 gallons per day. Potable water for sinks, toilets, and showers installed in buildings at the Brunswick Industrial Site will be purchased from Nevada Irrigation District (NID). Water for compaction and dust suppression at the Centennial Industrial Site will also be purchased from NID. Approximately 42,000 gallons of water per day may be required for dust suppression and compaction. Compaction of the engineered fill, conducted 8 hours per day, 5 day per week, requires up to 125 gallons of water per minute.
- **Sewage:** An on-site septic field system will be built at the Brunswick Industrial Site for toilets, sinks, and shower facilities planned. The operation will include providing sanitary systems using portable chemical toilets and hand-washing stations to employees working underground and at the Centennial Industrial Site.

### 3.9 Topography, Climate Characteristics, and Soil Types

#### 3.9.1 Topography

The elevation of the site ranges from approximately 2,500 feet mean sea level (msl) on the Centennial Industrial Site to 3,000 feet msl on the Brunswick Industrial Site. The topography of the sites varies between flat ridges and valleys to gently and moderately sloping hillsides.

#### 3.9.2 Climate

Summers in the property area are hot, arid, and mostly clear and the winters are long, cold, wet, and partly cloudy. Over the course of the year, the average temperature typically varies from 39°F to 88°F and is rarely below 32°F or above 95°F (Weather Spark 2019).

#### 3.9.3 Soil Types

The U.S. Department of Agriculture (USDA) identifies several soil types within the property. Figure 6, "Soils," shows the locations of these soil types on-site.

##### **Brunswick Industrial Site**

The USDA Soil Survey Mapper (Web Soil Survey 2019, as cited in Matuzak 2019a, 2019b) indicates that the Brunswick Industrial Site includes 10 soil types: Aiken loam on 9 to 15 percent slopes (AfC), Aiken loam on 15 to 30 percent slopes (AfD), Aiken loam on 30 to 50 percent slopes (AfE), Alluvial land, clayey (Ao), Cohasset loam, summits, on 2 to 15 percent slopes (CmB), Cohasset loam, shoulders, on 3 to 20 percent slopes (CmC), Cohasset loam, back slopes, on 5 to 30 percent slopes (CmD), Cohasset cobbly loam on 5 to 30 percent slopes (CoD), Placer diggings (Pr), and Sites loam on 15 to 30 percent slopes (SID). These soil types are described in detail below and are shown in Figure 6:

- **Aiken loam on 9 to 15 percent slopes (AfC):** The Aiken series consists of deep, well-drained soils typically occurring on ridgetops and side slopes of andesitic flows. These soils form from the weathering of volcanic rock. Drainage is moderately slow with a medium rate of surface runoff. The Aiken series is not hydric. A typical profile for this series consists of dark

to reddish brown (5YR 3/3) loam from 0 to 11 inches. This layer is underlain by a yellowish red (5YR 4/6) loam from 11 to 21 inches. A dark red (2.5 YR 3/6) loam is present from 21 to 29 inches followed by a clay loam layer of the same color from 29 to 42 inches. From 42 to 52 inches is yellowish red (5YR 4/6) clay loam which is underlain by a reddish brown (5YR 4/4) clay loam. This layer is underlain by bedrock.

- **Aiken loam on 15 to 30 percent slopes (AfD):** The description of this soil is the same as the AfC description, only it is found on steeper slopes.
- **Aiken loam on 30 to 50 percent slopes (AfE):** The description of this soil is the same as the AfC description, only it is found on steeper slopes than AfD soils.
- **Alluvial land, clayey (Ao):** This series consists of moderately well-drained soils in floodplains and drainages. These soils formed from alluvium derived from granitic or mixed metabasic rocks. Permeability and runoff are both slow. This is a hydric soil. A typical soil for alluvial soils consists of 3 to 10 inches of sandy loam or loam underlain by 30 to 45 inches of a clay loam.
- **Cohasset loam, summits, on 2 to 15 percent slopes (CmB):** The Cohasset series consists of well-drained soils on ridgetops and side slopes. These soils formed from weathered volcanic rock. Drainage is moderate and runoff is slow to rapid. These soils are not hydric. A typical profile for the Cohasset series consists of pine and fir needles from 0 to 3 inches. This layer is underlain by a dark reddish brown (ranges from 5YR 3/2, 3/3, 3/4) cobbly loam from 0 to 24 inches. This layer is underlain by a dark reddish brown (5YR 3/4 or 4/4) cobbly clay loam from 24 to 96 inches. At 96 inches is a weathered andesitic conglomerate.
- **Cohasset loam, shoulders, on 3 to 20 percent slopes (CmC):** The description of this soil is the same as the CmB description, only it is found on steeper slopes and shoulders.
- **Cohasset loam, backslopes, on 5 to 30 percent slopes (CmD):** The description of this soil is the same as the CmB description above, only it is found on steeper slopes and backslopes.
- **Cohasset cobbly loam on 5 to 30 percent slopes (CoD):** The description of this soil is the same as the CmB description above, only it is found on steeper slopes and is a cobbly loam rather than a Cohasset loam like CmB, CmC, and CmD above, containing a mixture of cobbles within the loamy soil.
- **Placer diggings (Pr):** The soil series description for Placer diggings is above within the descriptions for the Centennial Industrial Site area.
- **Sites loam on 15 to 30 percent slopes (SID):** The Sites series consists of well drained soils that occur in mountain uplands. The soils formed from weathered residuum of metabasic and metasedimentary rocks. Drainage is moderately soil and runoff is slow to very high. This soil is not hydric. A typical profile for this complex consists of dark reddish brown loam (5YR 3/4) from 0 to 3 inches. This layer is underlain by yellowish red loam (5YR 4/6) from 3 to 12 inches. From 12 to 23 inches is a layer of red (2.5 YR 4/6) clay loam. This layer is underlain by red (10R 4/6) clay from 23 to 56 inches and red (10R 4/8) light clay from 53 to 69 inches. From 68 to 78 inches is a red (2Y 4/8) clay loam underlain at 78 inches by a layer of weathered metasedimentary rock.

### Centennial Industrial Site

The USDA Soil Survey Mapper (Web Soil Survey 2019, as cited in Matuzak 2019a, 2019b) indicates that the Centennial Industrial Site includes four soil types: cut and fill land (Ct), Placer diggings (Pr),

Rock outcrop-Dubakella complex on 5 to 50 percent slopes (RrE), and Secca-Rock outcrop complex on 2 to 50 percent slopes (ScE). These soil types are described in detail below and are shown in Figure 6:

- **Cut and fill land (Ct):** This soil type consists of areas that have been altered by activities other than mining such that there are no intact soil characteristics. This soil is not hydric.
- **Placer diggings (Pr):** The Placer diggings series consists of remnant tertiary river deposits associated with hydraulic mining and placer mining operations as well natural deposits within stream channels. Areas with this soil type are 90 to 100 percent rock, cobble or gravel. 50 to 75 percent of these lands have a mixture of rock, cobbles, gravel, and soil. This soil contains unnamed hydric inclusions in drainages and depressions.
- **Rock outcrop-Dubakella complex on 5 to 50 percent slopes (RrE):** The rock outcrop-Dubakella complex consists of well-drained soils on mountains. This complex is made up of 50 percent Dubakella gravelly loam, 40 percent rock outcrop, and 10 percent included soils. These soils formed from weathered rocks with a large amount of serpentinitic minerals. Drainage is slow and runoff is very high. These soils are not hydric. A typical profile for this complex consists of dark-brown (7.5YR 3/2) gravelly loam from 0 to 2 inches underlain by a reddish-brown (5YR 3/4) gravelly clay loam from 2 to 10 inches. This layer is underlain by a variegated yellowish-brown (10YR 4/4) and reddish-brown (7.5YR 4/4) very cobbly clay from 11 to 21 inches. This layer underlain by a blue-green, hard, fractured and partly weathered serpentinitized layer at 21 inches.
- **Secca-Rock outcrop complex on 2 to 50 percent slopes (ScE):** This complex consists of moderately well-drained soils on gently sloping to steep mountain terrain. These soils formed from basic igneous and metamorphic rock. Drainage is slow and runoff is slow to rapid. These soils are not hydric. A typical profile for Secca-Rock outcrop complex consists of brown (5YR 3/4), gravelly, silt loam from 0 to 6 inches. This layer is underlain by a reddish-brown (5YR 3/4), gravelly, silt loam from 6 to 15 inches. This layer is underlain by dark-reddish-brown (5YR 3/4), cobbly, silty clay loam from 15 to 22 inches. From 22 to 36 inches is a strong brown (7.5YR 4/4), cobbly clay, which is underlain by a yellowish-brown (10YR 5/6), cobbly clay from 36 to 45 inches. At 45 inches is weathered metabasic rock.

### 3.10 Geology of the Site and Surrounding Area

The Idaho-Maryland gold mining operation is located in the Grass Valley area of the Western Sierra Nevada Foothills of Northern California. This belt of rocks consists of late Paleozoic marine sedimentary and ophiolitic rocks, and early and late Mesozoic submarine volcanic-arc and basinal terranes.

The Jura-Triassic arc belt has yielded the majority of gold production in the Western Sierra Nevada Foothills. Gold deposits in Jura-Triassic arc belt are associated with second, third, and fourth-order faults related to the regionally significant Wolf Creek/Bear Mountain and Melones faults.

The Grass Valley area is dominated by blocks of variably metamorphosed volcanic, mafic plutonic, and minor sedimentary rocks hosted in a serpentinite matrix. The whole package of rocks exhibits a region foliation and is interpreted as a serpentinite-matrix tectonic mélange. These rocks were variably metamorphosed from lower greenschist to amphibolite facies during and after accretion to the continental margin. Two distinct gold vein groups exist within the Grass Valley district: steeply dipping E-W-trending veins in the northern and generally N-S trending veins with gentler dips averaging 35° in the southern part of the district. The most important E-W veins are associated with the Idaho-Maryland

Mine operation. Both vein sets have extraordinary vertical and lateral persistence; individual veins extend for kilometers.

All of the significant gold production from the Idaho-Maryland Mine was localized within and around the Brunswick Block, which consists of variably metamorphosed volcanic and intrusive, and minor sedimentary rocks. The Brunswick Block is surrounded to the west, north, and east by gabbro and serpentinite rocks. Overlying Tertiary volcanic rocks mask rock units along the southern boundary of the Brunswick Block. The contacts between the Brunswick Block and surrounding gabbro and serpentinite are dominated by the 6-3, the Idaho, and the Morehouse fault domains. Mineralization is closely associated with these significant second or third order structures close to the contact between the Brunswick block and serpentinite contact. Gold in the quartz veins occurs as native gold, ranging from very fine grains to large nuggets within the quartz. Sulfide minerals, primarily pyrite with lesser galena, chalcopyrite, from 1% to 4% are commonly associated with gold mineralization. Scheelite is common in the Union Hill area near the Brunswick mine. Gangue minerals include quartz, carbonate, sericite, chlorite, mariposite, and albite. Ankerite is a common alteration mineral and may occur in the mafic and ultra-mafic rocks and the meta-volcanic rocks. The mineralized wallrock is strongly carbonate altered (AMEC 2017).

### **3.11 Hydrological Setting**

The following subsections include descriptions of the surface water and groundwater hydrology related to the Idaho-Maryland Mine site.

#### **3.11.1 Surface Water**

The site includes two perennial streams: South Fork Wolf Creek and Wolf Creek. Wolf Creek generally runs parallel to and immediately south of Idaho Maryland Road along the northern boundary of the Centennial Industrial Site. South Fork Wolf Creek begins within the Brunswick Industrial Site (forming near an existing large, clay-lined pond) and runs within the northwestern section of the Brunswick Industrial Site before heading northwest along the southern side of East Bennett Road, where it eventually connects with the main stem of Wolf Creek within the City of Grass Valley (west of the Centennial Industrial Site). Water within the site drains generally to Wolf Creek or South Fork Wolf Creek.

Natural hydrological sources for the site include precipitation, upstream drainage, and surface runoff from adjacent lands. Mean annual rainfall in the area is 53.74 inches (NRCS 2018, as cited in Matuzak 2019a, 2019b).

#### **Brunswick Industrial Site**

South Fork Wolf Creek, a perennial stream, begins along the southwest side of a large clay-lined pond and is fed by surface drainage from a large culvert that runs underneath the Brunswick Industrial Site. The large culvert connecting to South Fork Wolf Creek is not connected to the large, clay-lined pond. Several additional mapped intermittent and ephemeral streams cross the Brunswick Industrial Site and flow towards South Fork Wolf Creek. Surface and subsurface hydrologic inputs combine in this area to support a large continuous wetland across much of the northwestern section of the site (Matuzak 2019d).

## **Centennial Industrial Site**

Wolf Creek, a perennial creek, runs along the north side of the Centennial Industrial Site from east to west. A pond located just east of the Centennial Industrial Site drains onto the property through a culvert providing a regular source of water for the eastern and northern portions of the site. An unnamed drainage flows onto the Centennial Industrial Site from a neighboring property to the west and feeds into the northwestern wetland complex. A small spring feeds water in a small wetland and a small drainage connecting another small wetland.

The wetlands and waters in the eastern portion of this site drain to the northwest through an apparent artificial intermittent drainage. This drainage ends in an area containing Fremont cottonwood trees in the northwest portion of the site and flows into the main stem of Wolf Creek through several culverts. Each of the mapped wetlands and drainage features within this site has a direct connection to Wolf Creek (Matuzak 2019c).

### **3.11.2 Groundwater**

Groundwater occurs within fractured bedrock at and near the site. No alluvial groundwater basins are near the mine site (DWR 2019). The nearest groundwater basin is the South Yuba portion of the Sacramento Valley groundwater basin (DWR Basin No. 5-21.61), located more than 15 miles west of Grass Valley.

## **3.12 Biological Setting**

The site is located in the northern-central Sierra Nevada foothills. The Sierra Nevada foothills lie between the western edge of the Sierra Nevada and the eastern border of the Central Valley. The foothills form a belt 10 to 30 miles wide that ranges from 500 to 5,000 feet in elevation in a series of northwest to north-northwest aligned ridges that decline in elevation from northeast to southwest. Many rapidly flowing rivers and streams run westerly in deeply incised canyons with bedrock channels to the Central Valley and eventually to the Pacific Ocean. Alluvial fans, floodplains, and terraces are not extensive; and all but the largest streams are generally dry during the summer. Dominant vegetation communities include grasslands, oak woodlands, and chaparral.

Within the site, terrain varies between flat ridges and valleys to gently and moderately sloping hillsides. Site elevation ranges from approximately 2,600 to 2,800 feet msl. The site is located between Wolf Creek and South Fork Wolf Creek.

Primary upland habitats within the site areas include ponderosa pine, montane hardwood, montane hardwood-conifer, mixed chaparral, annual grassland, Sierran mixed conifer forest, montane riparian, wet meadow and seasonal wetlands, freshwater emergent marsh wetlands, and a large pond. (Matuzak 2019a, 2019b)

### **3.12.1 Special-Status Species**

#### **Plant Species**

The Pine Hill flannelbush (*Fremontodendron decumbens*) special-status plant species was identified on the Centennial Industrial Site (Matuzak 2019b).

No special-status plant species were identified on the Brunswick Industrial Site (Matuzak 2019a).

The site does not contain protected oak resources per the Nevada County Land Use and Development Code (Matuzak 2019a, 2019b).

### **Wildlife Species**

The California Natural Diversity Database 5-mile buffer search revealed six special-status wildlife species that have previously been identified and mapped within 5 miles of the mine sites (Matuzak 2019a, 2019b):

- California black rail (*Laterallus jamaicensis coturiculus*),
- Cooper's hawk (*Accipiter cooperii*),
- coast horned lizard (*Phrynosoma blainvillii*),
- western bumble bee (*Bombus occidentalis*),
- foothill yellow-legged frog (*Rana boylei*), and
- Townsend's big-eared bat (*Corynorhinus townsendii*).

Two additional species have the potential to occur given the presence of perennial streams and a large pond within the sites (Matuzak 2019a, 2019b):

- western pond turtle (*Emys marmorata*) and
- California red-legged frog (*Rana aurora draytonii*).

### **3.12.2 Wetlands**

Within the Brunswick Industrial Site and East Bennet Road right-of-way, a total of 9.44 acres of waters of the United States, including wetlands, was identified and mapped. The 9.44 acres of wetland waters includes 8.72 acres of mapped wetlands and 0.72 acres of mapped other waters of the United States, including South Fork Wolf Creek and several intermittent and ephemeral streams.

Within the Centennial Industrial Site, a total of 4.97 acres of waters of the United States, including wetlands, was identified and mapped. The 4.97 acres of wetland waters includes 4.37 acres of mapped wetlands and 0.60 acres of mapped other waters of the United States, including the main stem of Wolf Creek and several intermittent and ephemeral streams. (Matuzak 2019a, 2019b)

## **4. MINING**

The following sections provide an overview of the mining operation.

### **4.1 Brunswick Industrial Site**

The site plan for the Brunswick Industrial Site comprises five areas: aboveground site facilities, underground mining, treated and potable water pipelines, the Brunswick engineered fill area, and outfall for the treated water to South Fork Wolf Creek (see Sheet 1–3 and 6). The approximately 29-acre aboveground area will provide all the facilities and infrastructure necessary to support dewatering, underground mining, gold mineralization and rock processing, and loading and transport off-site. An aboveground pipe will convey treated water from the water treatment facility at the Brunswick Industrial Site along an existing trail to the planned discharge point at South Fork Wolf Creek. The pipe and discharge point are located entirely within the property boundaries. Engineered fill will be placed on approximately 31 acres of the Brunswick Industrial Site to create a level pad of approximately 21 acres for

future industrial use. In total, up to approximately 60 of the 119-acre site could be subject to surface disturbance and/or development for the aboveground facilities and fill placement. Removal of vegetation and overburden preceding disturbance activities will be limited to those areas where disturbance is necessary to implement operation activities. The remaining 59 acres will remain as open space and will not be subject to surface disturbance or infrastructure improvements (see Sheets 1–3).

Surface drilling on the Brunswick Industrial Site is an allowed use on property zoned Light Industrial (M1). Drilling is conducted to characterize underground resources in anticipation of future mining. Core from the drilling is logged and samples are analyzed off-site.

#### **4.2 Centennial Industrial Site**

Engineered fill will be transported by truck from the Brunswick Industrial Site and placed on approximately 44 acres of the Centennial Industrial Site to create approximately 37 acres for future industrial use (see Sheets 4–6). Removal of vegetation and overburden preceding disturbance activities will be kept to a minimum. The remaining approximately 12 acres will remain as a private driveway for site access and open space. The open space area will include Wolf Creek, a 100-foot setback area on Wolf Creek, and an undisturbed zone containing special status plant species.

#### **4.3 Material Quantity and Type**

Approximately 20 tons of gold concentrate will be produced and bagged on-site per day. Engineered fill is generated as a waste by-product of the gold mining process. Engineered fill consists of crushed barren rock and sand tailings not returned to the underground mine as fill. Underground mine development is expected to result in the production of approximately 500 tons per day (182,500 tons per year) of barren rock (i.e., unmineralized rock). Tunneling and long-hole blasting produces 1,000 tons of gold mineralization per day (365,000 tons per year). The site is proposed to be permitted for 80 years.

#### **4.4 Mining Initiation and Termination Dates**

The operation will begin upon approval of the use permit and continue for 80 years from the date of approval, approximately December 31, 2099.

#### **4.5 Equipment Storage**

Equipment and supplies are to be stored inside the various buildings to be constructed on the Brunswick Industrial Site, as shown in Sheet 1–3.

### **5. RECLAMATION**

#### **5.1 Subsequent Use and Approach**

The reclaimed land use plan for the sites following mining is industrial and open space. Additional surfaces for industrial use will be created on-site through placement of engineered fill, a by-product of the underground mining. The majority of facilities and infrastructure added to the Brunswick Industrial Site will remain on-site to support future industrial uses. Open space of 12 acres on the Centennial Industrial Site will include Wolf Creek, a 100-foot setback on Wolf Creek, and an undisturbed zone containing special status plant species. An undisturbed area of 59 acres on the Brunswick Industrial Site will include South Fork Wolf Creek, a large area of meadow wetlands and riparian wetlands, and surrounding areas.

## **5.2 Future Mining Potential and Impact of Reclamation on Surrounding Land Uses**

Reclamation activities will not physically or economically preclude future access to mineral resources, should additional recovery be pursued in the future. The engineered fill pads will facilitate future industrial use of the site, consistent with the industrial use designations provided in the *Nevada County General Plan* and County Zoning Ordinance. The open space that would be left in place on-site would have no impacts.

## **5.3 Soil Resources, Salvage, and Storage**

The following subsections provide details on when and how vegetation, topsoil, and mine waste materials (i.e., crushed barren rock and sand tailings not returned to the underground mine as fill) are to be removed and stored. See Section 3.9.3, "Soil Types," for details on soil redistribution. See Section 5.13, "Phased Reclamation," for details on the timing of mining and reclamation activities.

### **5.3.1 Topsoil and Vegetation Stripping and Salvaging**

When areas are graded for placement of engineered fill, facilities, and infrastructure, available topsoil will be salvaged from those areas and stockpiled on-site. Before topsoil is salvaged, the area will be cleared of woody vegetation and root balls using chainsaws and a portable excavator. Plant debris will be chipped in place and spread on the topsoil. This organic matter will be blended with the topsoil during harvest. In addition, topsoil may be imported to augment the topsoil available on-site.

Salvaging topsoil for reclamation helps ensure productivity of reclaimed lands. Identifying topsoil locations and depth is important to securing appropriate topsoil in optimal locations. Topsoil depth can vary and can be identified by color. When bright-colored earth tones or distinct color change occurs, it usually means topsoil has ended.

### **5.3.2 Topsoil Stockpiling**

The following actions will be implemented related to topsoil stockpiles:

- Topsoil and vegetation will not be removed more than 1 year before necessary and will be kept to a minimum.
- After topsoil is stripped, it will be hauled and stored if it cannot be used at that time for concurrent reclamation activities.
- Topsoil will be stockpiled in a manner that will not obstruct natural drainage.
- The topsoil will be compacted as little as possible. If compacting of a portion of the stockpiles is necessary for stability, compacting will occur to the minimum extent necessary. Topsoil compaction will not be such that its ability to perform as a planting medium will be compromised.
- Topsoil stockpiles will be protected from sediment transport by surface roughening, watering, and perimeter silt fencing.
- Topsoil stockpile areas will be identified and well-marked.
- Relocation of topsoil after it is stockpiled will be minimized.
- If topsoil is stored during the winter rainy season, erosion control measures will be implemented. See Section 5.5 for erosion control measures.

- A small bulldozer or similar equipment will be used to rip and blend the soil materials as necessary.
- To the extent feasible, rocks and plant material in excess of 4 inches in greatest dimension should be removed from the topsoil.
- Any topsoil stockpile remaining longer than 30 days will be seeded with a sterile temporary cover or the specified erosion-control seed mixture.

### **5.3.3 Overburden and Mine Waste Stockpiling**

Any overburden that must be removed from the surface, if it will not be immediately transported to the fills areas, will be stockpiled for future use.

Barren rock will be crushed underground to specification meeting engineered fill criteria, skipped to the surface, and stored in a concrete silo, as shown in Sheets 1–3. The engineered fill will be conveyed from the silo to a truck loadout facility.

No piles or dumps will be placed in wetlands or any waters of the U.S. without mitigation.

## **5.4 Geotechnical**

The following subsections cover cut and fill slopes and compaction specifications.

### **5.4.1 Cut Slopes**

This is an underground mine. Thus, cut slopes on-site will consist of grading to repair a pond berm and to create the service shaft collar, the building pad, the entrance area, roads, and the engineered fill area. The topography and design for these areas is shown in Sheets 1–6.

### **5.4.2 Final Slopes**

Rise will use the engineered fill generated as waste by-product of the gold mining process to create the engineered fill areas. The topography and design for these areas is shown in Sheets 1–6. The engineered fill areas for both sites will include placing, grading, and compacting the fill in a series of lifts (see Section 5.4.3, “Compaction” for details).

The proposed fill slopes will be addressed like any other engineered fill slope designed to support roadways or foundations. Thus, the local building code (including Chapter 18/18A and Appendix J of the California Building Code) will govern the grading design.

The fill slopes will be 3:1 (horizontal to vertical). Consistent with SMARA Section 3704(d), final reclaimed fill slopes will not exceed 2:1, and therefore, no site-specific geologic and engineering analysis would be required in order to show slope stability. The proposed fill material will comprise a flexible composite range of blast rock and sand tailings produced underground. The predicted “critical gradient” (angle of repose/angle of internal friction) for compacted angular gravel and cobbles is 45 degrees (approximately 1:1), and for medium dense (compacted) sand it is 35–40 degrees (approximately 1.3:1 to 1.1:1 slopes). The inclusion of silt into these compacted granular materials would provide additional cohesion, and therefore would increase the friction angle of the fill. A conservative critical gradient of the proposed fill, for design purposes, would be 35 degrees. This would include the lower end of medium dense sand with no rock, or a fill comprising only the sand tailings. However, the fill slope angle will be 3:1, or 18.4 degrees, which is half of the conservative critical gradient estimate for the proposed fill material.

Following completion of fill activities, the fill slopes will be revegetated to control erosion and ensure slope stability.

Details on each engineered fill area are provided in the following subsections.

### **Brunswick Industrial Site**

Engineered fill will be transported across the Brunswick Industrial Site using haul trucks for placement on an approximately 31-acre area for future industrial use. The elevation of the fill will be between 2,820 and 2,830 msl (approximately 80 feet to 90 feet above ground surface).

### **Centennial Industrial Site**

The fill will be transported by truck from the Brunswick Industrial Site to the Centennial Industrial Site for placement on an approximately 44-acre area to create a pad for future industrial uses. Engineered fill will be placed to an elevation between 2,520 and 2,570 msl (approximately 30 to 70 feet above ground surface).

### **5.4.3 Compaction**

Engineered fill will be processed, moisture conditioned, placed and compacted in accordance with the geotechnical recommendations and the California Building Code, including compaction testing and oversight by geotechnical specialists during construction.

## **5.5 Grading, Drainage, and Erosion Control**

The site is designed to include erosion-control methods sufficient for a 20-year, 1-hour intensity return frequency interval (or intensity duration frequency) storm event. BMPs for construction, operation, and reclamation activities will be applied as outlined in the storm water pollution prevention plan (SWPPP). Temporary measures such as silt fences, berms, hay bales, or similar means to deter erosion may be employed as necessary at locations of identified concern, depending upon the particular configuration of the grading work and roadways. Engineered fill will be stored in silos and topsoil and overburden stockpiles will comply with BMPs. Processing equipment is stored underground and in enclosed structures, where material processing is also performed, which will prevent stormwater from coming in contact with pollutants. In accordance with the SWPPP, an inspection for erosion of slopes, drainage channels, and unpaved areas at the facility is completed after each significant rain storm. The SWPPP is required to be revised and implemented prior to specific changes in industrial activities, as specified by the National Pollutant Discharge Elimination System General Permit.

Both the Brunswick and Centennial Industrial Sites include stormwater drainage, storage, and conveyance features meeting County requirements. As shown on Sheets 1–3, the developed portions of the Brunswick Industrial Site will be graded to drain into storm drain lines. In addition, concrete-lined v-ditches will be constructed at the top and toe of the engineered fill pad. The storm drain lines and v-ditches will transport stormwater flows to a detention basin. The detention basin is designed to accommodate up to a 100-year storm event and discharge into South Wolf Creek.

As described in Appendix E, “Drainage Study,” engineered fill will be brought onto the Centennial Industrial Site to construct a pad for future development. The engineered fill pad will be surrounded by both storm drain lines and concrete v-ditches that transport stormwater flows to a detention basin designed to accommodate up to a 100-year storm event. The detention basin will discharge to the existing discharge point into Wolf Creek.

The proposed detention basins at each site are intentionally located at the downstream toe of each fill site. This is done so that they may be constructed and made functional relatively early in the process of the fill operations. Therefore, as the fill areas rise throughout the anticipated duration of this portion of the mining operation, flows will be directed to these facilities via the drainage pipes, which proceed downhill from the surface of the fill, allowing the flows to be directed to the detention basins. These pipes in the proposed 3:1 slope, at any given point in the process of placing the fills, will be extended up slope from the detention basins to the then current surface. Interceptor ditches and catchment sumps will be formed at the surface, and will be replaced periodically as the fill operation progresses and the surface elevation rises. Thus, site drainage will continually be positively controlled throughout the process of the engineered fill placement operation.

Spillways are designed to be constructed from concrete to prevent erosion.

## **5.6 Disposal of Mine Waste and Overburden**

Mine waste and overburden will be placed as engineered fill on the Brunswick and Centennial Industrial Sites, as shown in Sheets 1–6. Approximately 1.6 million tons of engineered fill over a 5-year period will be trucked from the Brunswick Industrial Site to the Centennial Industrial Site for placement and compaction. The final grading will result in the development of 37 acres of flat developable land on property zoned industrial. Following completion of fill placement at the Centennial Industrial Site, engineered fill will be transported from silos on the Brunswick Industrial Site for placement, where approximately 2.2 million tons of engineered fill over a 6-year period will be placed and compacted to result in approximately 21 acres of flat developable land on property zoned industrial. Engineered fill produced will also be used in the local and regional construction markets.

## **5.7 Soil Amendments and Topsoil Placement**

After final grading activities have been completed, planting areas will be prepared for the 3:1 engineered fill slopes. Topsoil will be placed to a uniform depth of approximately 6 inches. No fertilizers or soil amendments are planned to be used, but would be applied if determined to be necessary.

## **5.8 Revegetation**

### **5.8.1 Vegetation**

Following completion of fill activities, the Brunswick and Centennial Industrial Sites fill slopes will be hydroseeded with an erosion-control native seed mix to reduce erosion and maintain fill slope stability. Irrigation will be used as necessary to support revegetation. The flat surface of the fill pads will not be revegetated and will be available for future industrial purposes.

**TABLE 3  
 SEED LIST<sup>1</sup>**

Common Name	Latin Name
<i>Lotus purshianus</i>	4.4
<i>Nassella cernua</i>	2.2
<i>Bromus carinatus</i>	13.8
<i>Festuca rubra molate</i>	2.4
<i>Hordeum californicum</i>	7.1
<i>Leymus triticoides</i>	3.1
<b>TOTAL: 33 POUNDS PLS PER ACRE</b>	

**Note:** PLS= Pure Live Seed.

<sup>1</sup> Minor species and/or quantity adjustment may be made based on availability at the time of purchase.

### 5.8.2 Surface Protection

Vehicles will use roads to access the surface of the fill pads and will not be allowed to drive on the hydroseeded areas. Pedestrian access to the revegetated fill slopes will be prevented through signage and fencing, as necessary.

### 5.9 Weed Abatement

After revegetation of the engineered fill slopes, targeted invasive plants will be removed and maintained using a combination of mechanical (e.g., mowing or pruning) and chemical (i.e., herbicide application) methods. The site will be monitored to determine the appropriate time to mow or plan for herbicide applications.

Revegetation of the mined slopes is planned to discourage weedy species by incorporating fast-growing annual species as a deterrent and by limiting water and nutrient soil conditions to those most favorable to annual and perennial grass species.

### 5.10 Environmental Protections

The operation would comply with federal, state, and local regulatory requirements related to the protection of plant and wildlife special-status species, including preconstruction surveys. In addition, the operation design includes a buffer of 100 feet from Wolf Creek for the engineered fill on the Centennial Industrial Site. The land on the Brunswick Industrial Site that surrounds the South Fork Wolf Creek would remain as open space except near the southernmost area of the creek, to allow for the treated water outlet.

SMARA Section 2772.1(a)(7)(B) requires that official copy of the reclamation plan amendment include an index showing any permit conditions of approval or binding mitigation measures adopted or certified pursuant to the California Environmental Quality Act that are necessary to comply with SMARA and the County’s Surface Mining Ordinance. Those conditions of approval and mitigation measures are included in an Appendix D and are considered part of the reclamation compliance requirements and subject to the annual inspection requirements.

The following subsections describe actions to protect water quality and drainages and control erosion.

### **5.10.1 Surface Water Protection**

Best management practices (BMPs) will include good housekeeping, preventative maintenance, spill prevention and response, stormwater management practices, employee training, inspections, and monitoring. A SWPPP (under the Statewide General Permit for Storm Water Discharges Associated with Industrial Activities, Order 2014-0057-DWQ as amended by 2015-0122-DWQ [2018]) will be prepared before operations begin.

The site design and actions to control drainage, siltation, and erosion will be effective in protecting downstream beneficial uses of surface water in accordance with the Porter-Cologne Water Quality Control Act, Water Code § 13000, et seq., and the federal Clean Water Act, 33 U.S. Code § 1251, et seq.

### **5.10.2 Groundwater Protection**

BMPs will be included in the industrial SWPPP that will help to protect surface water from exposure to contaminants and thus reduce the potential for contaminants in groundwater related to mining and reclamation activities.

### **5.10.3 Groundwater Recharge**

The actions that would occur as part of the operation on-site would not reduce the potential for groundwater recharge through the compaction of soils or installation of impermeable surfaces (e.g., pavement) in areas where those effects have not already occurred as part of past activities. The development of new operating facilities and infrastructure, including installation of the potable water lines, would occur on land that has already been disturbed and partially paved for previous industrial activities on the sites. Installation of the potable water lines and the treated water discharge line would occur within East Bennett Road and across industrial land between East Bennett Road and Wolf Creek. These areas consist of paved, disturbed, and previously compacted soils due to the long history of industrial and public right-of-way uses along the pipeline route.

The areas of engineered fill placement will affect areas where the native soils have already been compacted from past industrial activities. Engineered fill will be placed to develop pads for future industrial uses of this property, consistent with current zoning.

### **5.10.4 Floodplain and State Highway Bridge Protection**

No state highway bridges are within 1 mile up- or downstream of either site. The northern boundary of the Centennial Industrial Site, in the area of Wolf Creek, is within a high risk floodplain area (see Figure 7, "Centennial Industrial Site Floodplain Area"); however, the remaining area of the site is not within the floodplain (FEMA 2019) and site activities and engineered fill would be set back 100 feet from Wolf Creek (see Sheets 4 and 5). The Brunswick Industrial Site is not within the floodplain (FEMA 2019).

## **5.11 Public Safety Considerations**

### **5.11.1 Land Status**

The site is private property. The postmining land use of industrial will not increase the level of public exposure to the site. Final fill slopes are consistent with SMARA and therefore will not pose safety hazard.

### **5.11.2 Access**

Access to the sites is through gated entrances. Security will be provided during construction at the Centennial Industrial Site. The Brunswick Industrial Site is fenced and gated; these features will remain at reclamation.

## **5.12 Removal and Closure Activities**

The following subsections describe those operation components that will be removed or remain and their related reclamation activities.

### **5.12.1 Waste Disposal**

Mine waste disposal is required to be consistent with Title 27, Chapter 7, Article 1 of the California Code of Regulations (CCR) (formerly codified as CCR Title 23, Chapter 15, Article 7). No waste from mining remains on-site. The SWPPP will ensure all other waste is disposed of in accordance with state and local health and safety ordinances.

### **5.12.2 Structure and Equipment Removal**

Equipment, vehicles, and the general contents of all structures on-site will be removed; the headframes and covered conveyor will be removed; however, all other structures will remain.

### **5.12.3 Roads**

All roads will remain in place to support the future industrial use.

### **5.12.4 Closure of Openings**

Drill holes, water wells, monitoring wells will be completed or abandoned in accordance with laws, unless necessary for the proposed end use. Access to underground openings will be protected from public and wildlife (e.g., bats) in accordance with applicable local, state, and federal regulations.

### **5.12.5 Water Supply Pipeline**

The buried potable water pipeline providing water to residences along a portion of East Bennett Road will remain.

## **5.13 Phased Reclamation**

Table 4, "Mining and Reclamation Schedule," provides the duration for each component of the mine operation and reclamation. Placement of engineered at the Centennial Industrial Site and the Brunswick Industrial Site will occur concurrent with underground exploration and mining activities. After operations cease, dewatering will stop; related piping to the South Fork Wolf Creek will be removed; and the equipment, vehicles, and the general contents of all structures on-site will be removed; however, all structures (except for the headframes and covered conveyor), paved surfaces, roads, and site fencing and gating will remain.

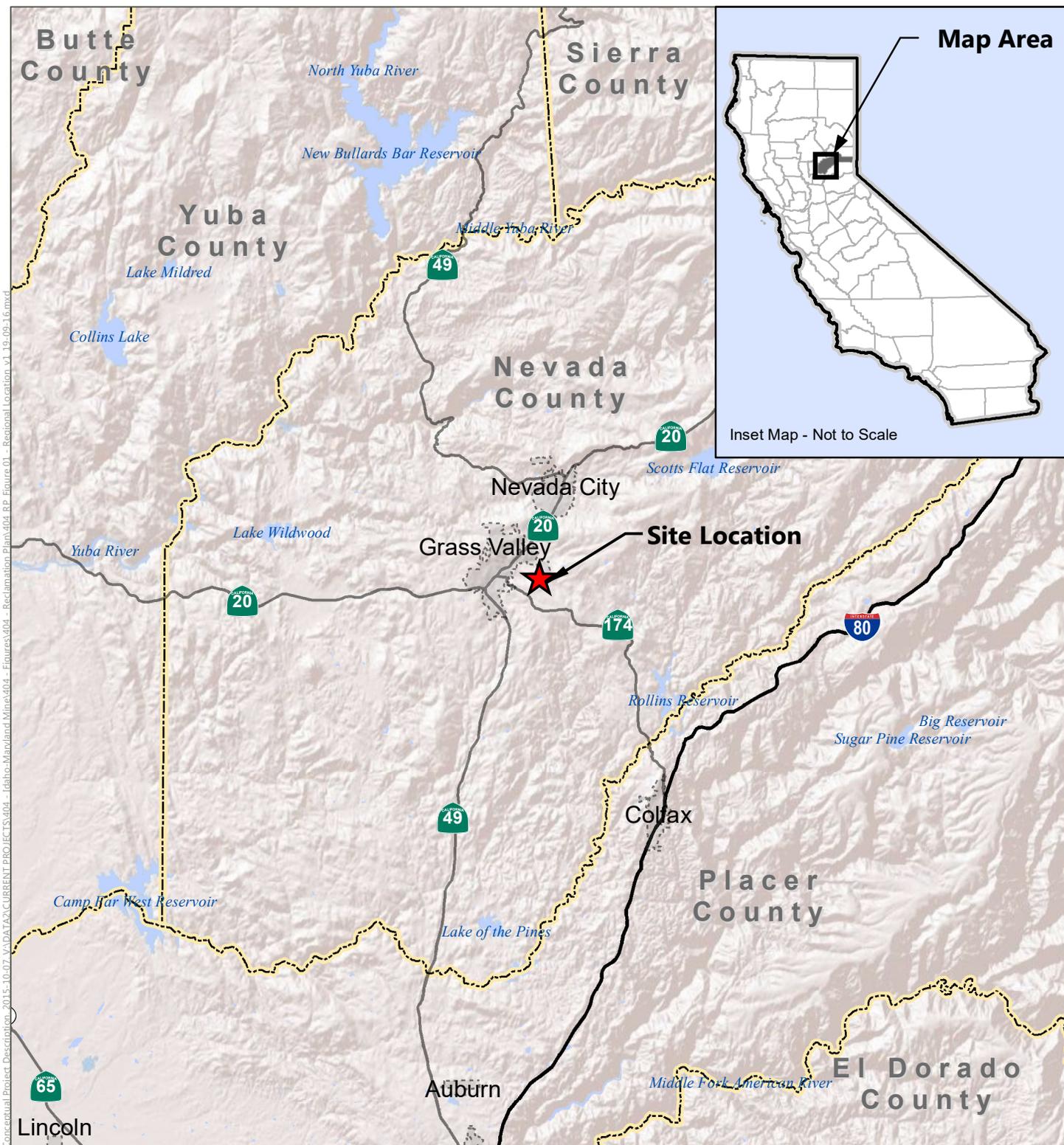
**TABLE 4**  
**MINING AND RECLAMATION SCHEDULE**

<b>Operation Element</b>	<b>Duration<sup>1</sup></b>
<b>BEFORE SURFACE DISTURBANCE ACTIVITIES</b>	
Permitting	Through approximately January 2021
<b>INITIAL ACTIVITIES</b>	
Initial dewatering	6 months
Aboveground facility outside construction	18 months
Aboveground facility inside construction	18 months
<b>DURING MINE OPERATION</b>	
Aboveground facility operations—gold mineralization processing	80 years
Underground exploration/mining	80 years
Placement, grading, and compaction of engineered fill at Centennial Industrial Site (concurrent with underground exploration/mining)	5 years
Placement, grading, and compaction of engineered fill at Brunswick Industrial Site (after completion of fill placement at the Centennial Industrial Site)	6 years
Off-site hauling—gold concentrate	80 years
Off-site hauling—engineered fill	80 years
Outside truck loading by loader	80 years
<b>AFTER MINE OPERATIONS CEASE</b>	
Removal of equipment, vehicles, and the general contents of structures; closure of shaft openings, removal of headframes and covered conveyor (after operations cease)	2-5 years

**Notes:** CUP = conditional use permit.

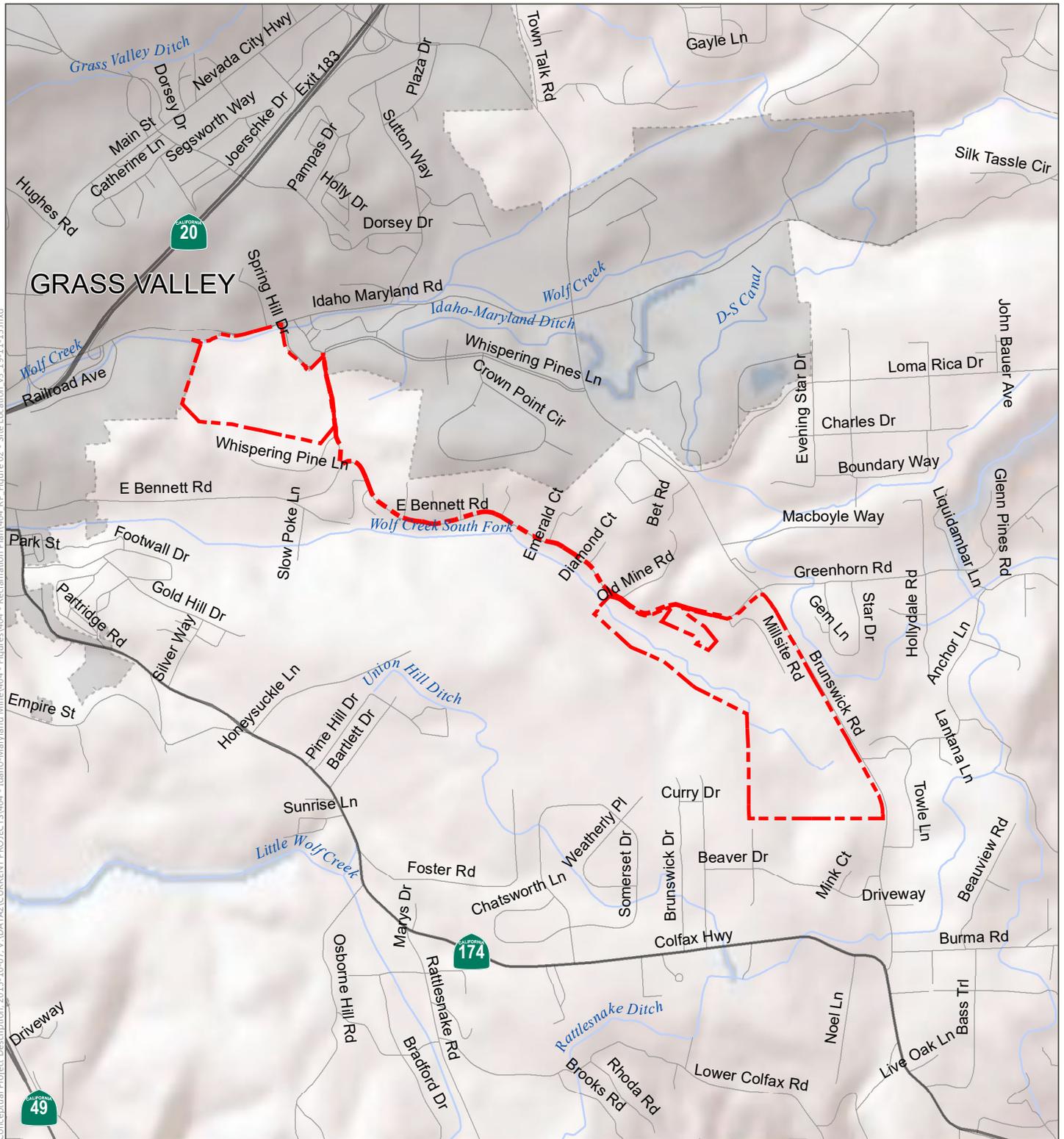
<sup>1</sup> Durations are approximate and depend on factors such as equipment and personnel availability, fluctuations in the economy, and technical details.

## FIGURES



SOURCES: ESRI World Shaded Relief accessed May 2019; ESRI World Topographic Map accessed May 2019; ESRI World Streetmap, 2009; compiled by Benchmark Resources in 2019

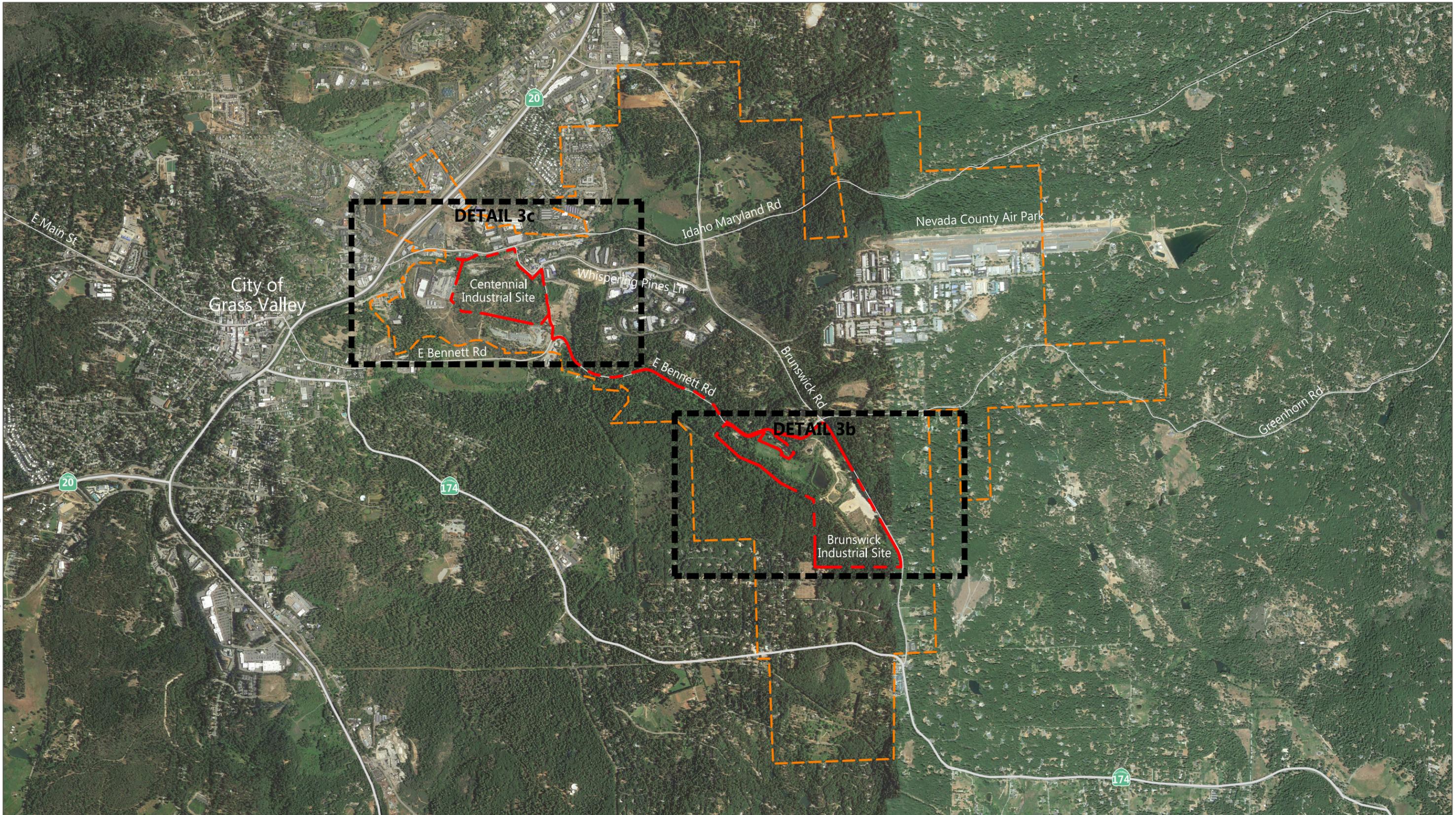
-  Site Location
-  City Boundary
-  County Boundary
-  Interstate Highway
-  State Route



SOURCES: ESRI World Shaded Relief accessed May 2019, ESRI World Topographic Map accessed May 2019; ESRI World Streetmap, 2009; City Boundary–Nevada County Open Data - GIS Division, accessed November 2019; adapted by Benchmark Resources in 2019

- Site Boundary
- City Boundary
- State Route
- Street
- Waterway

V:\DATA\CURRENT PROJECTS\404 - Idaho-Maryland Mine\404 - Figures\404 - Reclamation Plan

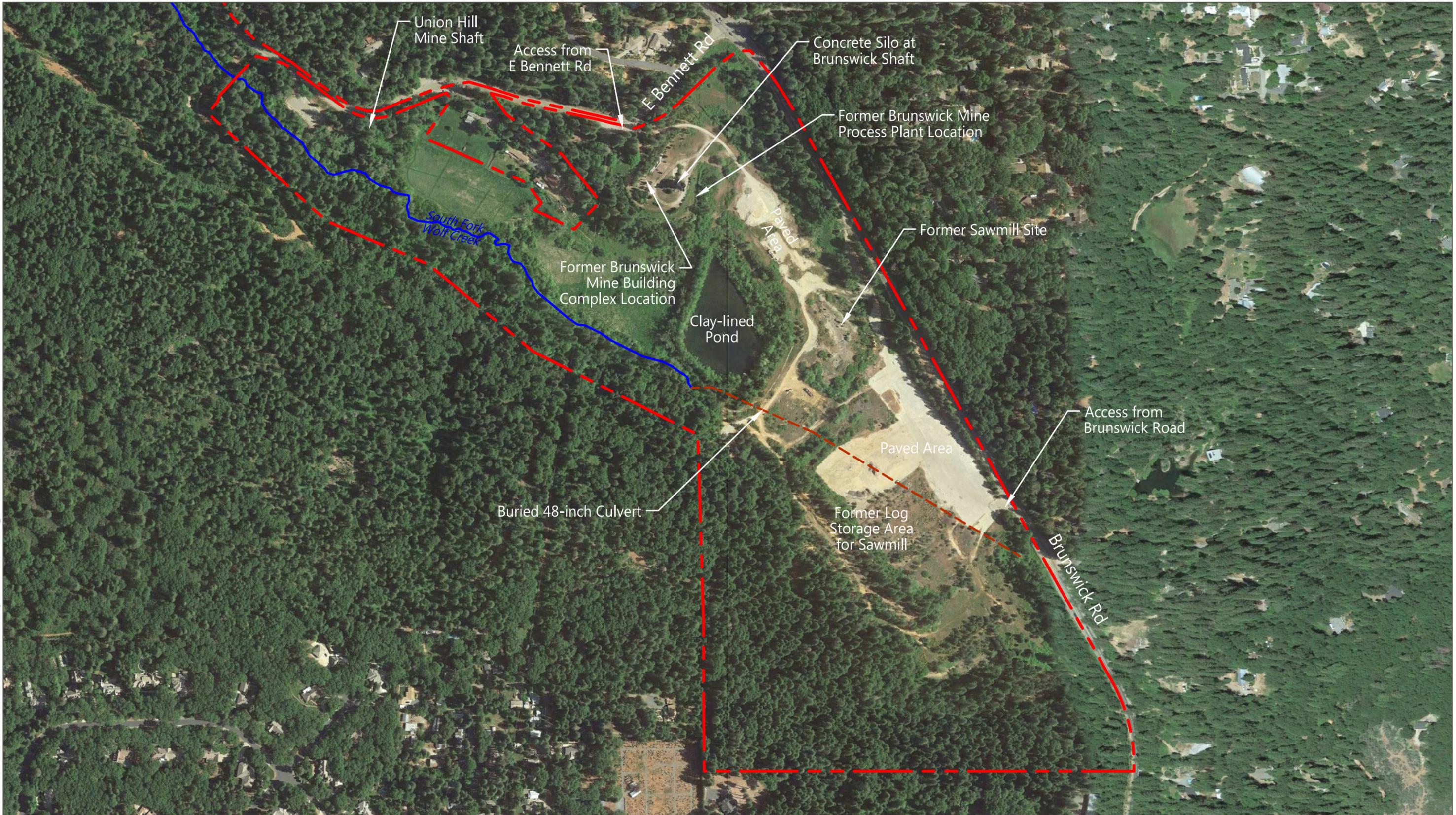


SOURCE: Google Earth Pro (flown 5-17-2018); compiled by Benchmark Resources in 2019

- NOTES:
1. New underground workings will not extend within 500 feet of the surface, except at access points on-site.
  2. See Figure 3b and Figure 3c for detail maps shown.

- - - - - Site Boundary
- - - - - Underground Mineral Rights Boundary
- State Route
- Street

V:\DATA\CURRENT PROJECTS\404 - Idaho-Maryland Mine\404 - Figures\404 - Reclamation Plan



SOURCE: AERIAL-Google Earth Pro (flown 5-17-2018); compiled by Benchmark Resources in 2019

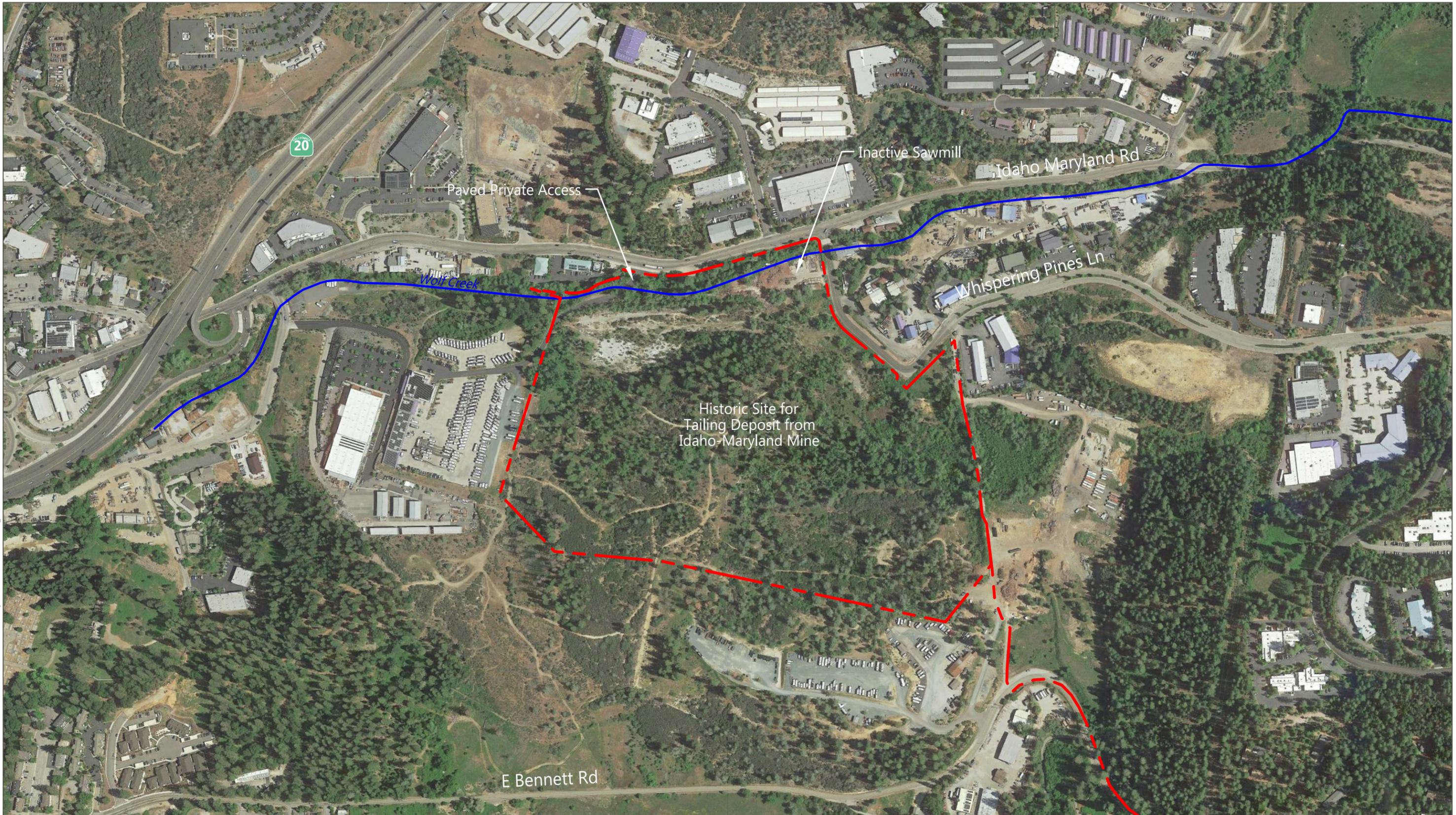
NOTES:  
1. See Figure 3a for detail location.

- - - - - Site Boundary
- - - - - Buried Culvert
- — — — — Waterway



**Existing Site Conditions: Brunswick Industrial Site**  
IDAHO-MARYLAND MINE RECLAMATION PLAN  
**Figure 3b**

V:\DATA\CURRENT PROJECTS\404 - Idaho-Maryland Mine\404 - Figures\404 - Reclamation Plan

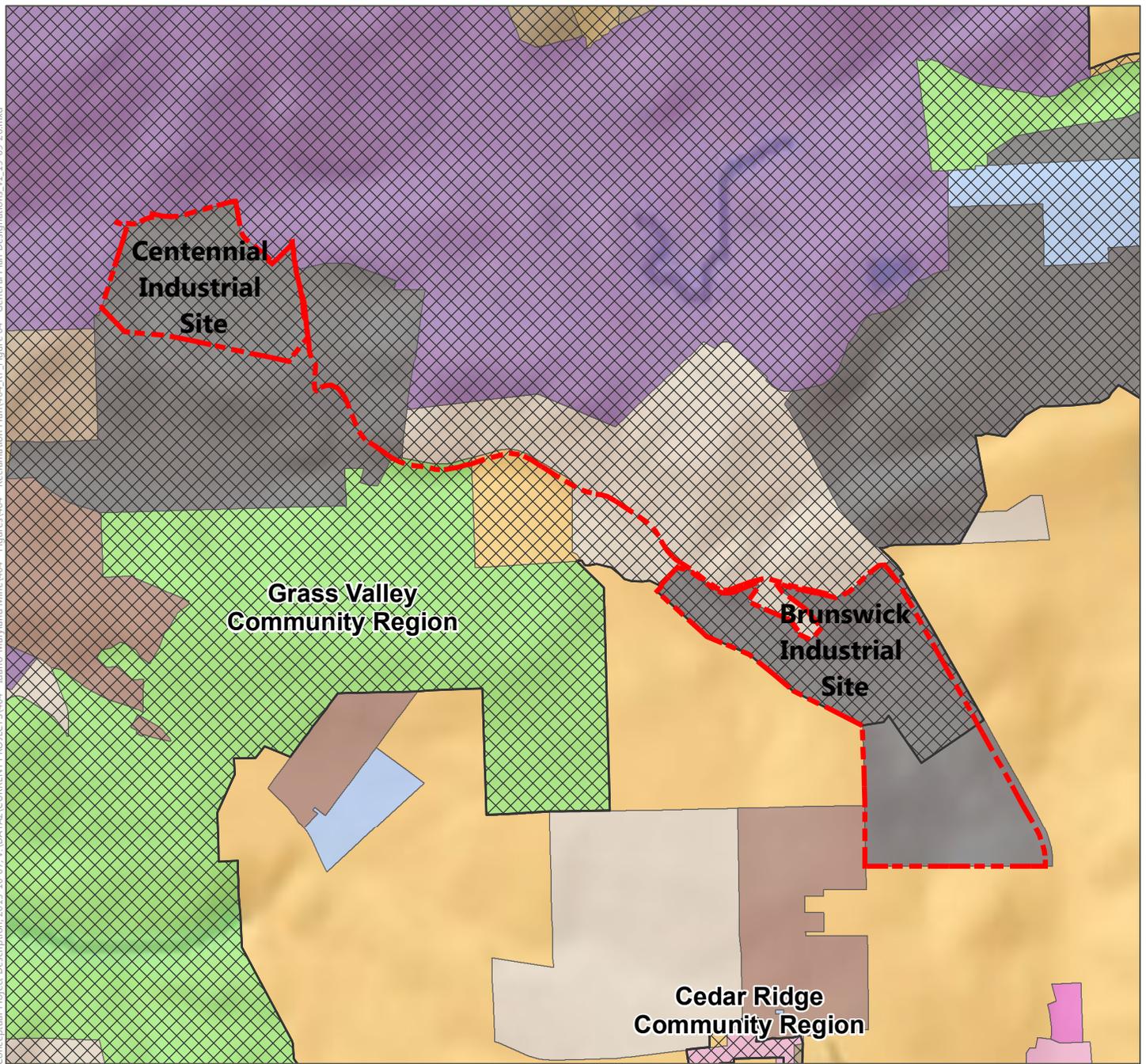


SOURCE: Google Earth Pro (flown 5-17-2018); compiled by Benchmark Resources in 2019

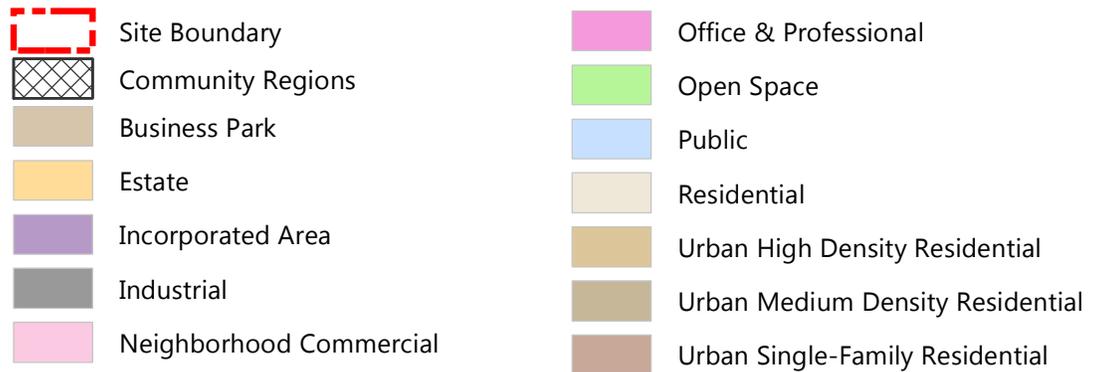
NOTES:  
1. See Figure 3a for detail location.

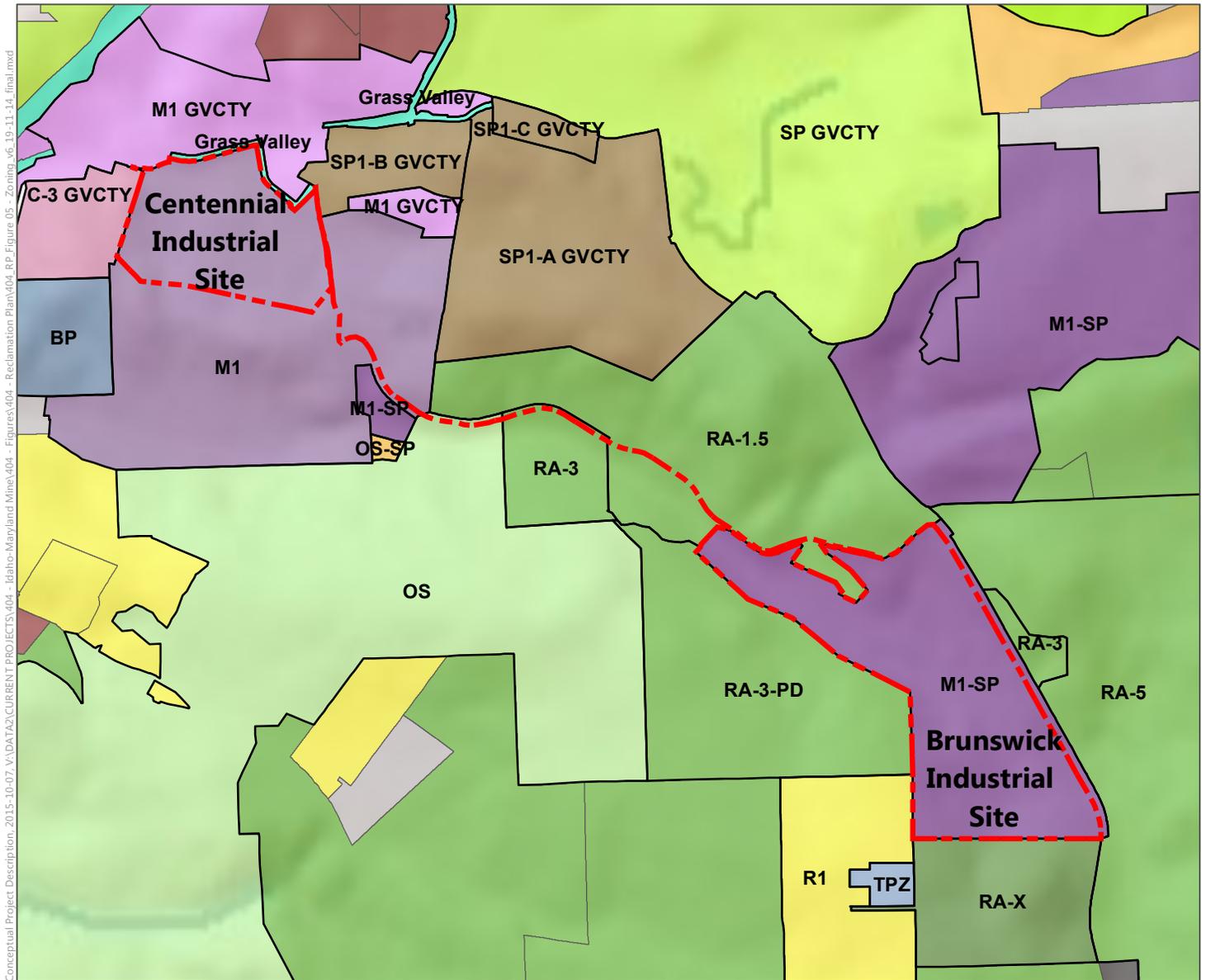
- - - Site Boundary  
— Waterway

Conceptual Project Description, 2015-10-07, V:\DATA\CURRENT PROJECTS\404 - Idaho-Maryland Mine\404 - Reclamation Plan\404.RP.Figure 04 - General Plan Designations\_v1\_19-09-26.mxd



SOURCES: ESRI World Shaded Relief accessed May 2019, ESRI World Topographic Map accessed May 2019; ESRI World Streetmap, 2009; General Plan Designations—County of Nevada - Open Data - GIS Division "General Plan - Landuse"; adapted by Benchmark Resources in 2019

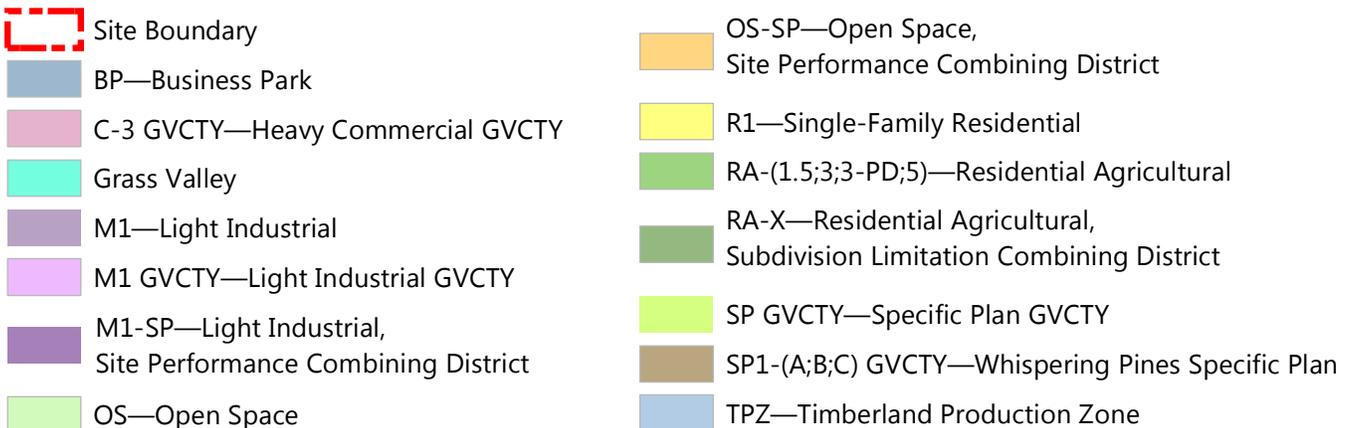


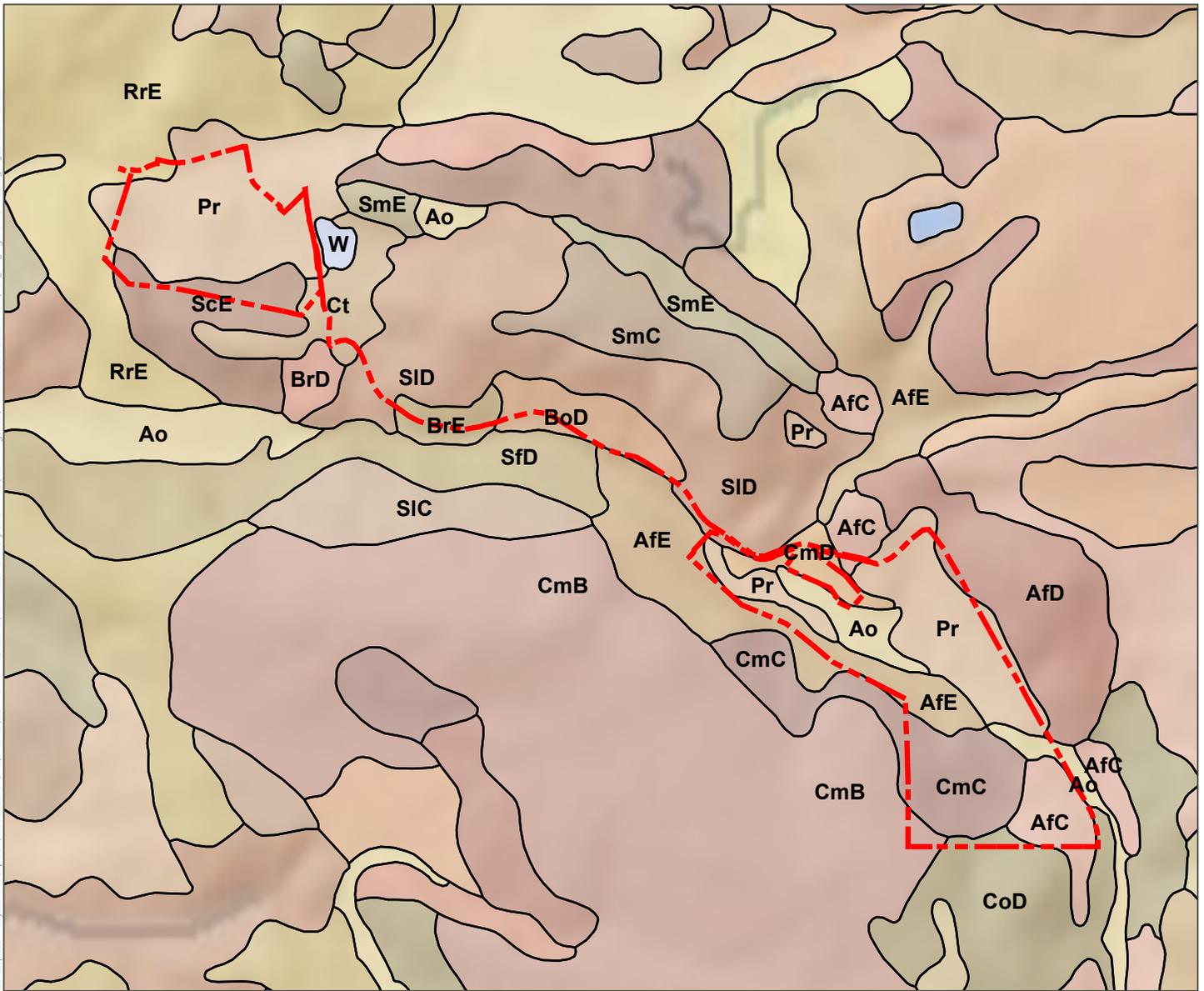


SOURCES: ESRI World Shaded Relief accessed May 2019, Zoning—County of Nevada - Open Data - GIS Division "Zoning Districts" (10-17-2018); Nevada County Zoning Ordinance (Article 2; Section L-II 2.1 Establishment of Zoning Districts); adapted by Benchmark Resources in 2019

NOTES:

1. "GVCTY" refers to City of Grass Valley Zoning Ordinance descriptions.
2. Zoning descriptions pulled from "ZONEDETAIL" field attributes for areas under Nevada County Zoning Ordinance; descriptions pulled from "ZONETYPE" field attributes for areas under City of Grass Valley Zoning Ordinance.
3. Labels pulled from "ZONECODE" filed with some labels combined in legend for simplicity.





SOURCES: ESRI World Shaded Relief accessed Nov. 2019, U.S. Department of Agriculture Natural Resources Conservation Service Web Soils Survey (USDA NRCS WSS), accessed Nov. 2019; adapted by Benchmark Resources in 2019

NOTES:

- Labels pulled from "MUSYM" field of USDA NRCS WSS data set.

Site Boundary

<b>AfC</b>	Aiken loam, 15 to 30 percent slopes, N Low Mid Montane	<b>Ct</b>	Cut and fill land
<b>AfD</b>	Aiken loam, 30 to 50 percent slopes	<b>Pr</b>	Placer diggings
<b>AfE</b>	Aiken loam, 9 to 15 percent slopes, high precip	<b>RrE</b>	Rock outcrop-Dubakella complex, 5 to 50 percent slopes
<b>Ao</b>	Alluvial land, clayey	<b>ScE</b>	Secca-Rock outcrop complex, 2 to 50 percent slopes
<b>BoD</b>	Boomer loam, hard bedrock, 7 to 28 percent slopes	<b>SfD</b>	Sierra sandy loam, deep, 15 to 30 percent slopes, LRU 18XI
<b>BrD</b>	Boomer, hard bedrock - Rock outcrop complex, 15 to 60 percent slopes	<b>SIC</b>	Sites silt loam, 15 to 30 percent slopes, N low montane
<b>BrE</b>	Boomer, hard bedrock - Rock outcrop complex, 5 to 30 percent slopes	<b>SID</b>	Sites silt loam, 9 to 15 percent slopes, N low montane
<b>CmB</b>	Cohasset loam, backslopes, 5 to 30 percent slopes	<b>SmC</b>	Sites very stony loam, 15 to 50 percent slopes
<b>CmC</b>	Cohasset loam, shoulders, 3 to 20 percent slopes	<b>SmE</b>	Sites very stony loam, 2 to 15 percent slopes
<b>CmD</b>	Cohasset loam, summits, 2 to 15 percent slopes	<b>W</b>	Water
<b>CoD</b>	Cohasset cobbly loam, 5 to 30 percent slopes		

Conceptual Project Description, 2015-10-07, V:\DATA\2\CURRENT PROJECTS\404 - Idaho-Maryland Mine\404 - Figures\404 - Reclamation Plan\404\_RP\_Figure 07 - Centennial Industrial Site Floodplain Area\_v3\_19-11-13\_recover.mxd



SOURCE: Aerial-DigitalGlobe flown 6-22-2018; Flood Areas-Federal Emergency Management Agency (FEMA) National Flood Hazard Layer (NFHL) Viewer download, accessed November 2019; adapted by Benchmark Resources in 2019

-  Site Boundary
-  100-Year Floodplain
-  Street
-  Waterway

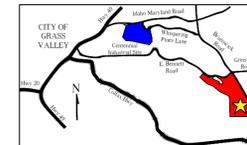
SHEETS



Building Number	Building Name	Area (ft <sup>2</sup> )	Building Number	Building Name	Area (ft <sup>2</sup> )
1	Brunswick Headframe	2,600	16	Cement Silo	110
2	Brunswick Shaft Building	1,700	17	Water Treatment Plant	8,500
3	Brunswick Raise Building	280	18	Treated Water Tank	310
4	Brunswick Conveyor Building	420	19	Machinery Building	1,600
5	Brunswick Rock Truck Loading	1,700	20	Changeroom and Offices	24,600
6	Brunswick Electrical	800	21	Warehouse	28,900
7	Brunswick Mine Compressor	1,600	22	Service Shaft	2,700
8	Brunswick Hoist	2,800	22a	Service Headframe	300
9	Covered Conveyor	3,400	23	Security Building	2,400
10	Process Plant	29,200	24	Service Hoist	2,800
11	Process Plant Addition	7,300	25	Machinery Building	1,600
12	Clean Water Tank	530	26	Service Electrical	800
13	Process Water Tank	450	27	Breezeway	1,400
14	Tailings Thickener	2,400	28	Fuel Tank (30,000 gal)	600
15	Paste Filter Feed Tank	530	29	Generator Building	3,900



Idaho-Maryland Mine Project  
 Rise Grass Valley Inc.  
 PO Box 271  
 Grass Valley, California, USA 95945



Brunswick Industrial Site  
 Nevada County  
 SEC. 31, T. 16N, R. 9E., M.D.M  
 Total Area = 118.93 Acres  
 Assessor Parcel Numbers:  
 09-630-37, 09-630-39, 09-441-03, 09-441-04,  
 09-441-05, 09-441-34  
 Current Zoning M1-SP  
 Proposed Zoning M1-ME

**LEGEND**

- Water Treatment Pond
- Structure - Planned
- Structure - Planned - removed at mine closure
- Paved Road - Existing offsite
- Paved Road - Planned onsite
- Paved Parking and Sidewalks - Planned
- Paved Area - Planned

- Section Line
- Brunswick Industrial Site - Boundary
- Elevation Contour Line - 2 foot intervals
- Elevation Contour Line - 10 foot intervals
- Proposed treated mine water discharge pipe
- Creek - Perennial

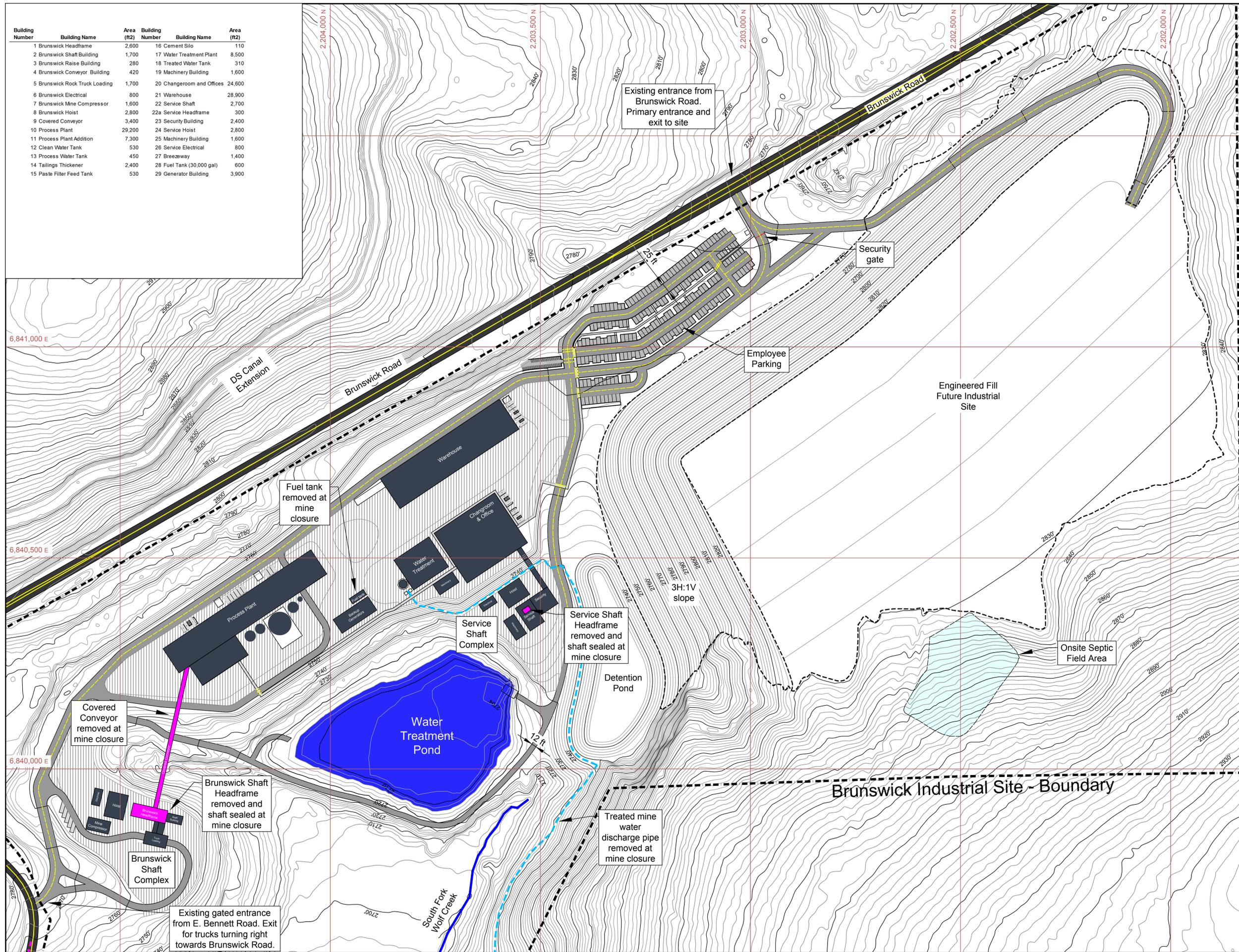
Domestic water source: Nevada Irrigation District  
 Industrial water source: Treated mine water (groundwater)  
 Sewage disposal by onsite septic system  
 Orphir Hill Fire Protection District  
 Electrical power from Pacific Gas and Electric Company  
 Asphalt surfacing on all roads and parking areas.  
 Surface run-off shown on grading and drainage plan drawings  
 Exterior lighting details shown on lighting plan drawings  
 Landscaping details shown on landscaping plan drawings  
 Final grading topography based on:  
 Preliminary Grading Plan prepared by Nevada City  
 Engineering Inc.

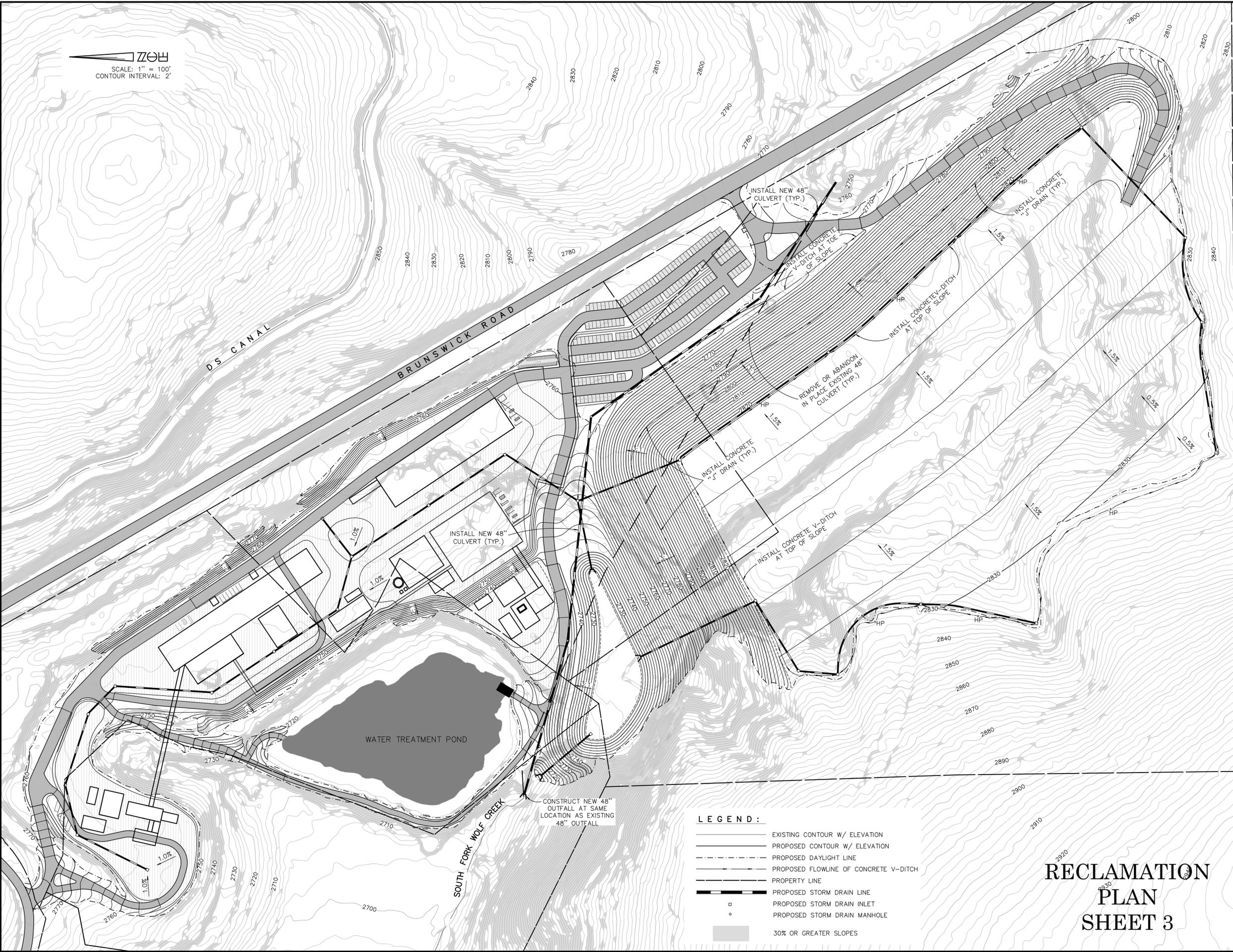


SCALE 1"=100'  
 250 ft

**Reclamation Plan**  
**Sheet 2**  
 Brunswick Industrial Site Plan Details

Drawnby : Rise Grass Valley  
 Nov 11 / 19





SCALE: 1" = 100'  
CONTOUR INTERVAL: 2'

- LEGEND:**
- EXISTING CONTOUR W/ ELEVATION
  - - - PROPOSED CONTOUR W/ ELEVATION
  - - - - PROPOSED DAYLIGHT LINE
  - - - - PROPOSED FLOWLINE OF CONCRETE V-DITCH
  - PROPERTY LINE
  - PROPOSED STORM DRAIN LINE
  - PROPOSED STORM DRAIN INLET
  - PROPOSED STORM DRAIN MANHOLE
  - 30% OR GREATER SLOPES

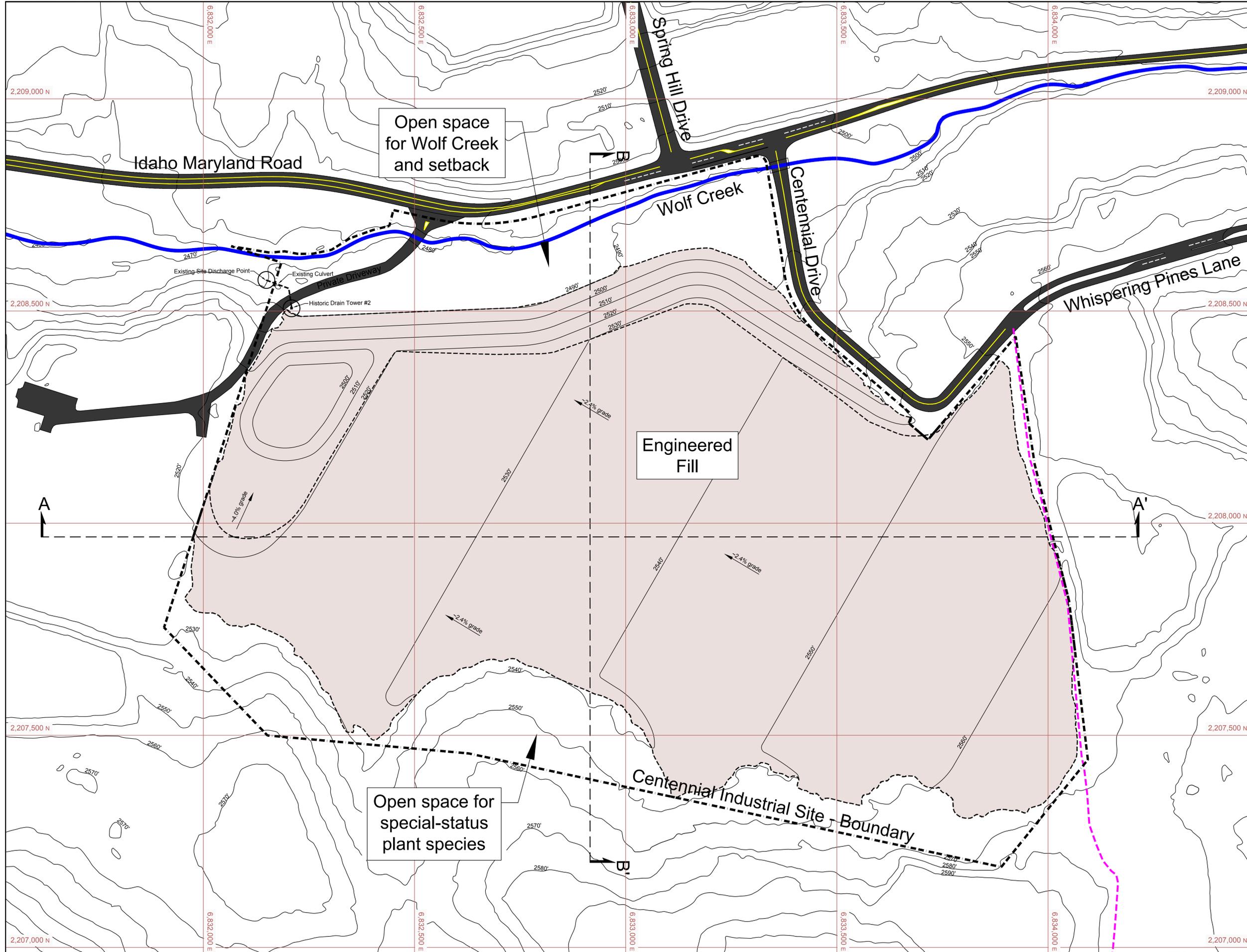
REVISION:	DATE:	DESCRIPTION:

BRUNSWICK SITE  
**RISE GRASS VALLEY INC.**  
SEC. 31, T.16N., R.9E., M.D.M.  
NEVADA COUNTY, CALIFORNIA

**RECLAMATION PLAN SHEET 3**

GRADING PLAN

**B-1**



Idaho-Maryland Mine Project  
 Rise Grass Valley Inc.  
 PO Box 271  
 Grass Valley, California, USA 95945



Centennial Industrial Site  
 Nevada County, SEC. 26, T.16N, R.8E.,  
 M.D.M  
 Total Area = 56.41 Acres  
 Assessor Parcel Numbers:  
 09-550-32, 09-550-37, 09-550-38, 09-550-39,  
 09-550-40, 09-560-36  
 Current Zoning M1 / Proposed Zoning M1

**LEGEND**

- Engineered Fill
- Paved Road - Existing
- Section Line
- Centennial Industrial Site - Boundary
- Elevation Contour Line - 10 foot intervals
- Proposed NID potable water pipe extension
- Creek - Perennial

Final grading topography based on:  
 Preliminary Grading Plan prepared by Nevada City  
 Engineering Inc.



SCALE 1"=100'  
 250 ft

Lidar & Airphotos by Aero Geometrics with survey control by Nevada City Engineering, May 7th 2018; Grass Valley, CA; Horizontal Datum: NAD83 (2011), Vertical Datum: GEOID 12B, NAVD 88 Projection: California State Plane Zone 2, Combined Scale Factor: 0.9999891

**Reclamation Plan**  
 Sheet 4  
 Centennial Industrial Site Plan

Drawnby : Rise Grass Valley  
 Nov 11 / 19  
 Scale : 1" = 100 feet

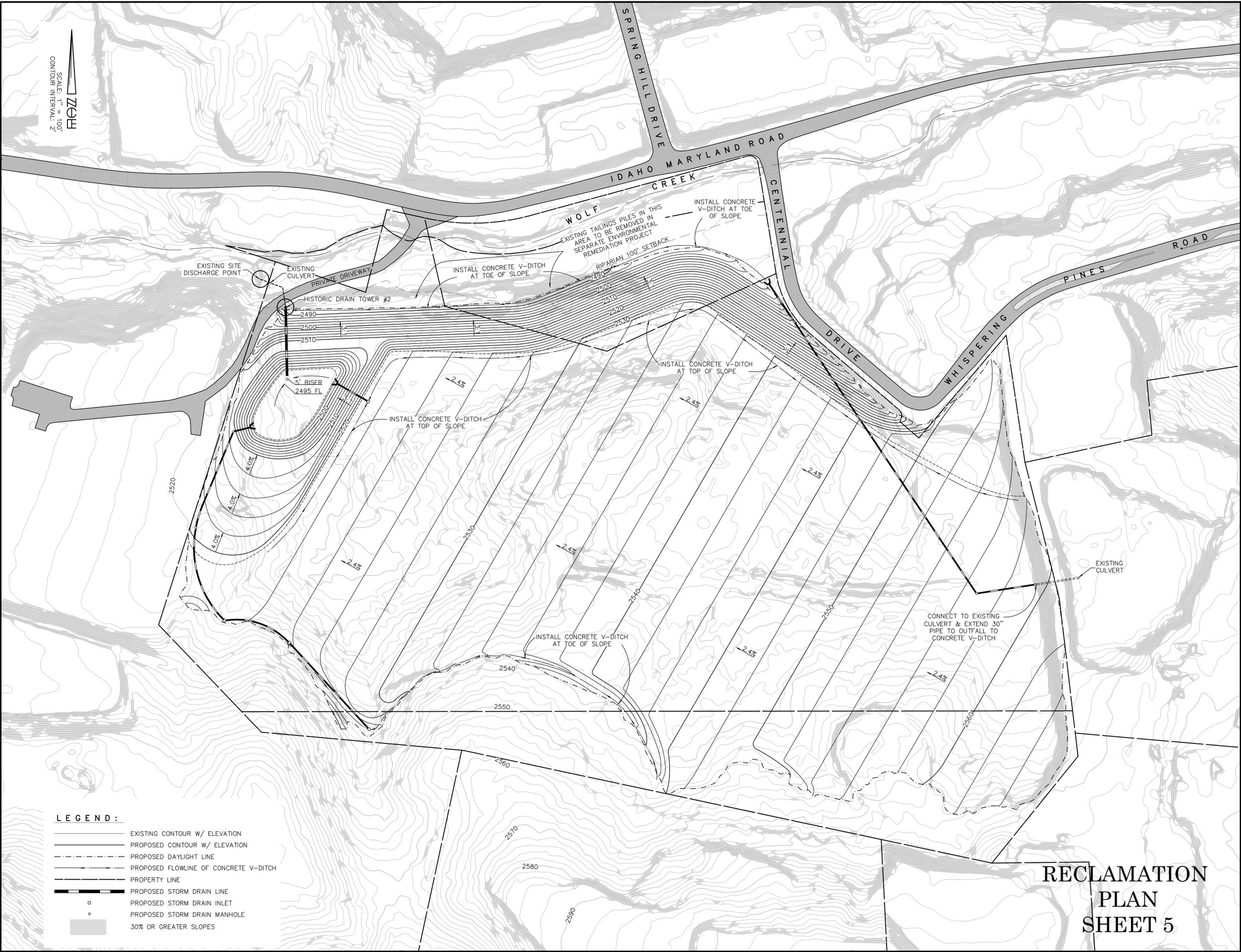


REVISION:	DATE:	DESCRIPTION:

CENTENNIAL SITE  
**RISE GRASS VALLEY INC.**  
SEC. 26, T.16N., R.8E., M.D.M.  
NEVADA COUNTY , CALIFORNIA

GRADING PLAN

C-1



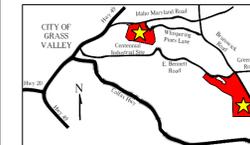
- LEGEND:**
- EXISTING CONTOUR W/ ELEVATION
  - - - PROPOSED CONTOUR W/ ELEVATION
  - - - - PROPOSED DAYLIGHT LINE
  - - - - PROPOSED FLOWLINE OF CONCRETE V-DITCH
  - PROPERTY LINE
  - PROPOSED STORM DRAIN LINE
  - PROPOSED STORM DRAIN INLET
  - PROPOSED STORM DRAIN MANHOLE
  - 30% OR GREATER SLOPES

**RECLAMATION  
PLAN  
SHEET 5**

SCALE: 1" = 100'  
CONTOUR INTERVAL: 2'



Idaho-Maryland Mine Project  
 Rise Grass Valley Inc.  
 PO Box 271  
 Grass Valley, California, USA 95945



**Brunswick Industrial Site**  
 Nevada County  
 SEC. 31, T. 16N, R. 9E., M.D.M  
 Total Area = 118.93 Acres  
 Assessor Parcel Numbers:  
 09-630-37, 09-630-39, 09-441-03, 09-441-04,  
 09-441-05, 09-441-34  
 Current Zoning M1-SP  
 Proposed Zoning M1-ME

**Centennial Industrial Site**  
 Nevada County, SEC. 26, T. 16N, R. 8E.,  
 M.D.M  
 Total Area = 56.41 Acres  
 Assessor Parcel Numbers:  
 09-550-32, 09-550-37, 09-550-38, 09-550-39,  
 09-550-40, 09-560-36  
 Current Zoning M1 / Proposed Zoning M1

**LEGEND**

- Area of fill excavation planned
- Undisturbed Ground
- Current / original ground surface
- Property Boundary
- Final Ground Surface

Final grading topography based on:  
 Preliminary Grading Plan prepared by Nevada City  
 Engineering Inc.



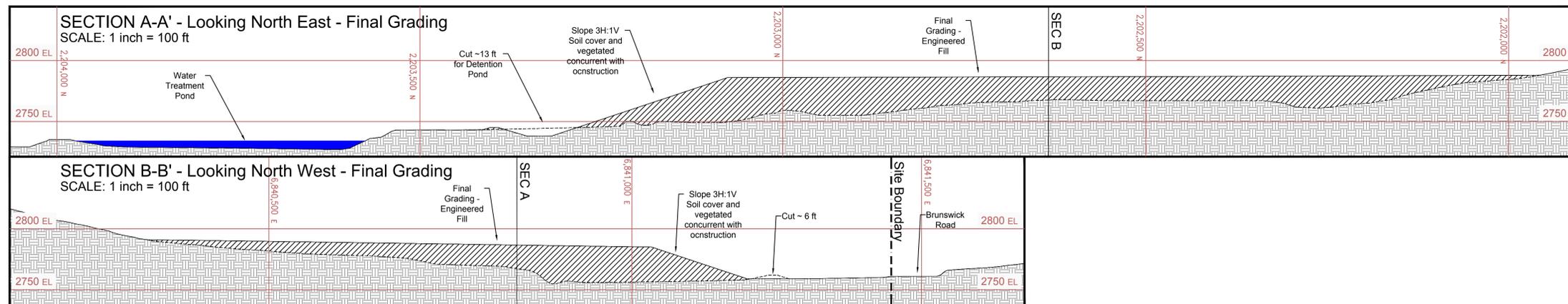
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Lidar & Airphotos by Aero Geometrics with survey control by Nevada City Engineering, May 7th 2018; Grass Valley, CA; Horizontal Datum: NAD83 (2011), Vertical Datum: GEOID 12B, NAVD 88 Projection: California State Plane Zone 2, Combined Scale Factor: 0.9979891

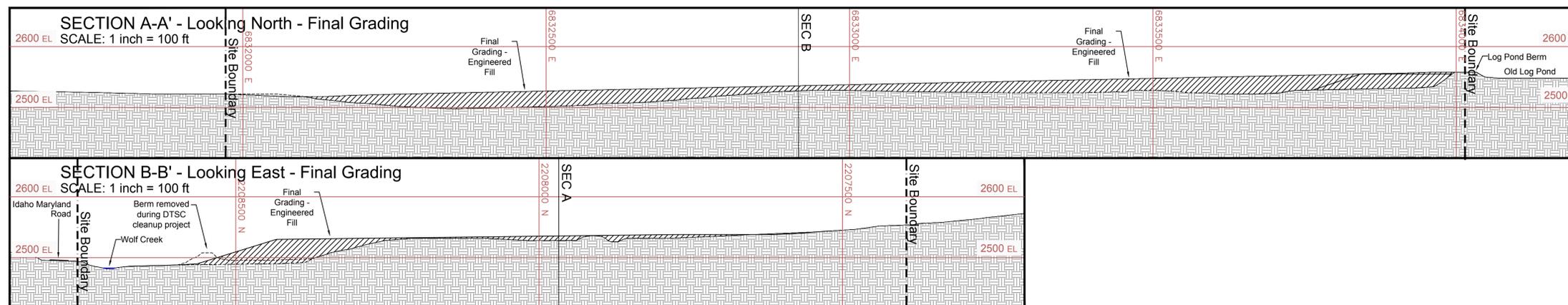
**Reclamation Plan**  
 Sheet 6  
 Section Views

Drawnby : Rise Grass Valley  
 Nov 11 / 19

**BRUNSWICK INDUSTRIAL SITE - SECTIONS**



**CENTENNIAL INDUSTRIAL SITE - SECTIONS**



## REFERENCES AND RESOURCES

## REFERENCES AND RESOURCES

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- AMEC (Amec Foster Wheeler Americas Limited). 2017. *Technical Report on the Idaho-Maryland Project, Grass Valley California, USA*. Vancouver, BC.
- Clark, L. D. 1976. *Stratigraphy of the North Half of the Western Sierra Nevada Metamorphic Belt, California*. U.S. Geological Survey Professional Paper 923.
- DWR (California Department of Water Resources). 2019. Sustainable Groundwater Management Act Basin Prioritization Dashboard. Available: <https://gis.water.ca.gov/app/bp2018-dashboard/p1/>. Accessed February 28, 2019.
- FEMA (Federal Emergency Management Agency). FEMA Flood Map Service Center. Available: <https://msc.fema.gov>. Accessed August 8, 2019.
- Johnston, W.D., Jr. 1940. *The Gold Quartz Veins of Grass Valley, California*. U.S. Geological Survey Professional Paper 194.
- Matuzak, G. 2019a (October). *Brunswick Industrial Site and East Bennett Road Right of Way (ROW) Biological Resources Assessment*. Nevada City, CA.
- Matuzak, G. 2019b (October). *Centennial Industrial Site Biological Resources Assessment*. Nevada City, CA.
- Matuzak, G. 2019c (October). *Brunswick Industrial Site and East Bennett Road Aquatic Resources Delineation of Waters of the United States and State of California*. Nevada City, CA.
- Matuzak, G. 2019d (October). *Centennial Industrial Site Aquatic Resources Delineation of Waters of the United States and State of California*. Nevada City, CA.
- Nevada County. 2014. *Nevada County General Plan*. Approved in 1996. Nevada City, CA.
- Nevada County. 2019. My Neighborhood Web Application. Available: <https://gis.nevcounty.net/MyNeighborhood/>. Accessed August 8, 2019.
- Weather Spark. 2019. Average Weather in Grass Valley California, United States. Available: <https://weatherspark.com/y/1178/Average-Weather-in-Grass-Valley-California-United-States-Year-Round>. Accessed August 27, 2019.
- Web Soil Survey. 2019. Results of electronic database search. U.S. Natural Resources Conservation Services. Available: <https://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/survey/>. Cited in Matuzak 2019a, 2019 b.

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APPENDIX A  
INDEX TO REQUIRED CONTENT

## APPENDIX A

### INDEX TO REQUIRED CONTENT

**Mine Name:** Idaho-Maryland Mine      **Amendments:** None  
**End Use:** Industrial and open space      **Date:** November 13, 2019

Authority	Requirements/Practices/Standards	Applicable	Source Location or Explanation
<b>GENERAL CONSIDERATIONS</b>			
PRC 2772(b)	Required contents chart: A chart identifying the location (e.g. page number, chapter, appendix, or other location in the reclamation plan) of content that meets the requirements of PRC Sections 2772, 2773, 2773.3 and CCR Articles 1 and 9 (as delineated in this checklist).	Yes	Appendix A
PRC 2772(c)(1)	Contact information: Name and address of the surface mining operator and any person designated by the operator as an agent for service of process (must reside in CA).	Yes	Section 3.1
PRC 2772(c)(2)	Material quantity and type: The anticipated total quantity and type of minerals to be mined (see Annual Report Instructions, Exhibit B, for mineral types and units of measure).	Yes	Section 4.3
PRC 2772(c)(3)	Dates: The initiation and termination dates of mining (be as specific as possible, e.g. December 31, 2030).	Yes	Section 4.4
PRC 2772(c)(4)	Depth of mining: The maximum anticipated depth of surface mining in relation to a verifiable benchmark such as Mean Sea Level.	No	This is an underground mine
PRC 2772(c)(5) (A-F)	Reclamation plan maps shall include: Size and legal description of lands affected by surface mining operations;	Yes	Appendix C
	Names and addresses of owners of all surface interests and mineral interests;	Yes	Sheets 1, 2, 4, 6
	Property lines, setbacks, and the reclamation plan boundary;	Yes	Sheets 1–6; Figures 3a, b, c
	Existing and final topography with contour lines at appropriate intervals;	Yes	Sheets 1–6
	Detailed geologic description of the area of the surface mining operation;	Yes	Figure 6
	Locations of railroads, utility features, and roads (access roads, temporary roads to be reclaimed, and any roads remaining for the end use).	Yes	Figures 3a, b, and c; Sheets 1, 2, 4
	All maps, diagrams, or calculations that are required to be prepared by a California-licensed professional shall include the preparer’s name, license number, signature & seal.	Yes	Sheets 3, 5
PRC 2772(c)(6)	Mining method and schedule: A description of the mining methods and a time schedule that provides for completion of mining on each segment so that reclamation can be concurrent or phased.	Yes	Sections 4.1, 4.2, 5.13

Authority	Requirements/Practices/Standards	Applicable	Source Location or Explanation
PRC 2772(c)(7)	Subsequent use(s): A description of the proposed subsequent use(s) after reclamation	Yes	Section 5.1
	Evidence that all landowners have been notified of the proposed use.	Yes	Section 3.3
PRC 2772(c)(9)	Impact on future mining: A statement regarding the impact of reclamation on future mining on the site.	Yes	Section 5.2
PRC 2772(c)(10)	Signed statement: Statement signed by the operator accepting responsibility for reclamation of the mined lands per the reclamation plan.	Yes	Appendix B
PRC 2776(b-c)	Pre-SMARA areas: Reclamation plans shall apply to operations conducted after January 1, 1976 or to be conducted in the future. Mined lands disturbed prior to January 1, 1976 <i>and not disturbed after that date</i> may be excluded from the reclamation plan.	No	No pre-SMARA areas are on-site
CCR 3502(b)(2)	Public health and safety: A description of how any potential public health and safety concerns that may arise due to exposure of the public to the site will be addressed.	Yes	Section 5.11
CCR 3709(a)	Equipment storage and waste disposal: Designate areas for equipment storage and show on maps.	Yes	Sheets 1–6
	All waste shall be disposed of in accordance with state and local health and safety ordinances.	Yes	Section 5.6
CCR 3709(b)	Structures and equipment removed: Structures and equipment should be dismantled and removed at closure, except as demonstrated to be necessary for the proposed end use.	Yes	Section 5.12.2
CCR 3713(a)	Well closures: Drill holes, water wells, monitoring wells will be completed or abandoned in accordance with laws, unless demonstrated necessary for the proposed end use.	Yes	Section 5.12.4
CCR 3713(b)	Underground openings: Any portals, shafts, tunnels, or openings will be gated or protected from public entry, and to preserve access for wildlife (e.g. bats).	Yes	Section 5.12.4
<b>GEOLOGY AND GEOTECHNICAL</b>			
PRC 2772(c)(5)	A description of the general geology of the area	Yes	Section 3.10
	A detailed description of the geology of the mine site.	Yes	Section 3.10
PRC 2773.3	If a metallic mine is located on, or within one mile of, any “Native American sacred site” and is located in an “area of special concern, ” the reclamation plan shall require that all excavations and/or excess materials be backfilled and graded to achieve the approximate original contours of the mined lands prior to mining.	No	Not located on or within 1 mile of a Native American sacred site or located in an area of special concern
CCR 3502(b)(4)	The source and disposition of fill materials used for backfilling or grading shall be considered in the reclamation plan.	Yes	Section 5.4, 5.5

Authority	Requirements/Practices/Standards	Applicable	Source Location or Explanation
CCR 3502(b)(3)	The designed steepness and treatment of final slopes must consider the physical properties of slope materials, maximum water content, and landscaping.	Yes	Section 5.4, 5.5, 5.8
	The reclamation plan shall specify slope angles flatter than the critical gradient for the type of slope materials.	Yes	Section 5.4
	When final slopes approach the critical gradient, a Slope Stability Analysis will be required.	No	Slopes no steeper than 3:1 (Section 5.4.2)
CCR 3704.1	Backfilling required for surface mining operations for metallic minerals.	No	Not an open-pit mine
CCR 3704(a)	For urban use, fill shall be compacted in accordance with Uniform Building Code, local grading ordinance, or other methods approved by the lead agency.	Yes	Section 5.4
CCR 3704(b)	For resource conservation, compact to the standards required for that end use.	No	End use not resource conservation
CCR 3704(d)	Final reclamation fill slopes shall not exceed 2:1 (H:V), except when allowed by site-specific engineering analysis, and the proposed final slope can be successfully revegetated. See also Section 3502(b)(3).	No	Slopes no steeper than 3:1 (Section 5.4.2)
CCR 3704(e)	At closure, all fill slopes shall conform with the surrounding topography or approved end use.	Yes	Section 5.4.2, Sheets 1-6
CCR 3704(f)	Final cut slopes must have a minimum slope stability factor of safety that is suitable for the end use and conforms with the surrounding topography or end use.	Yes	Section 5.4.1
<b>HYDROLOGY AND WATER QUALITY</b>			
PRC 2770.5	For operations within the 100-year flood plain (defined by FEMA) and within one mile up- or downstream of a state highway bridge, Caltrans must be notified and provided a 45-day review period by the lead agency.	Yes	Section 5.10.4
PRC 2772(c)(8)(A)	Description of the manner in which contaminants will be controlled and mine waste will be disposed.	Yes	Section 5.10, 5.12.1
PRC 2772(c)(8)(B)	The reclamation plan shall include a description of the manner in which stream banks/beds will be rehabilitated to minimize erosion and sedimentation.	Yes	Section 5.5
PRC 2773(a)	The reclamation plan shall establish site-specific sediment and erosion control criteria for monitoring compliance with the reclamation plan.	Yes	Section 5.3.3, 5.5
CCR 3502(b)(6)	Temporary stream and watershed diversions shall be detailed in the reclamation plan.	No	No stream or watershed diversions
CCR 3503(a)(2)	Stockpiles of overburden and minerals shall be managed to minimize water and wind erosion.	Yes	Section 5.3
CCR 3503(b)(2)	Operations shall be conducted to substantially prevent siltation of groundwater recharge areas.	Yes	Section 5.10
CCR 3503(a)(3)	Erosion control facilities shall be constructed and maintained where necessary to control erosion.	Yes	Section 5.5
CCR 3503(b)(1)	Settling ponds shall be constructed where they will provide a significant benefit to water quality.	Yes	Section 5.5

Authority	Requirements/Practices/Standards	Applicable	Source Location or Explanation
CCR 3503(d)	Disposal of mine waste and overburden shall be stable and shall not restrict natural drainage without suitable provisions for diversion.	Yes	Section 5.3.3, 5.5, 5.6
CCR 3503(e)	Grading and revegetation shall be designed to minimize erosion and convey surface runoff to natural drainage courses or interior basins.	Yes	Section 5.5
	Spillway protection shall be designed to prevent erosion.	Yes	Section 5.5
CCR 3706(a)	Surface mining and reclamation activities shall be conducted to protect on-site and downstream beneficial uses of water.	Yes	Section 5.10
CCR 3706(b)	Water quality, recharge potential, and groundwater storage that is accessed by others shall not be diminished.	Yes	Section 5.10
CCR 3706(c)	Erosion and sedimentation shall be controlled during all phases of construction, operation, reclamation, and closure of surface mining operations to minimize siltation of lakes and water courses as per RWQCB/SWRCB.	Yes	Section 5.5
CCR 3706(d)	Surface runoff and drainage shall be controlled to protect surrounding land and water resources.	Yes	Section 5.5
	Erosion control methods shall be designed for not less than 20 year/1 hour intensity storm event.	Yes	Section 5.5
CCR 3706(e)	Impacted drainages shall not cause increased erosion or sedimentation. Mitigation alternatives shall be proposed in the reclamation plan.	Yes	Section 5.5
CCR 3706(f)(1)	Stream diversions shall be constructed in accordance with the Lake and Streambed Alteration Agreement (LSAA) between the operator and the Department of Fish and Wildlife.	No	No stream diversions
CCR 3706(f)(2)	Stream diversions shall also be constructed in accordance with Federal Clean Water Act and the Rivers and Harbors Act of 1899.	No	No stream diversions
CCR 3706(g)	All temporary stream diversions shall eventually be removed and the affected land reclaimed.	No	No stream diversions
CCR 3710(a)	Surface and groundwater shall be protected from siltation and pollutants in accordance with the Porter-Cologne Act, the Federal Clean Water Act, and RWQCB/SWRCB requirements.	Yes	Section 5.5, 5.10
CCR 3710(b)	In-stream mining shall be conducted in accordance with Section 1600 et seq. of the California Fish and Game Code, Section 404 of the Clean Water Act, and Section 10 of the Rivers and Harbors Act of 1899.	No	No in-stream mining
CCR 3710(c)	In-stream mining shall be regulated to prevent impacts to structures, habitats, riparian vegetation, groundwater levels, and banks.	No	No in-stream mining
	In-stream channel elevations and bank erosion shall be evaluated annually using extraction quantities, cross-sections, and aerial photos.	No	No in-stream mining
CCR 3712	Mine waste and tailings and mine waste disposal units are governed by SWRCB waste disposal regulations and shall be reclaimed in accordance with this article: CCR Article 1. Surface Mining and Reclamation Practice. Section 3500 et seq.	Yes	Section 5.12.1

Authority	Requirements/Practices/Standards	Applicable	Source Location or Explanation
<b>SENSITIVE SPECIES AND HABITAT</b>			
CCR 3502(b)(1)	A description of the environmental setting (identify sensitive species, wildlife habitat, sensitive natural communities, e.g. wetlands).	Yes	Section 3.12
	Impacts of reclamation on surrounding land uses.	Yes	Section 5.2
CCR 3503(c)	Fish and wildlife habitat shall be protected by all reasonable measures.	Yes	Section 5.10
CCR 3703(a)	Sensitive species shall be conserved or mitigated as prescribed by the federal and California Endangered Species Acts.	Yes	Section 5.10
CCR 3703(b)	Wildlife habitat shall be established on disturbed land at least as good as pre-project, unless end use precludes its use as wildlife habitat.	Yes	Section 5.1
CCR 3703(c)	Wetlands shall be avoided or mitigated at 1:1 minimum for both acreage and habitat value.	Yes	Section 3.12.2, 5.1
CCR 3704(g)	Piles or dumps shall not be placed in wetlands without mitigation.	Yes	Section 5.3.3
CCR 3710(d)	In-stream mining shall not cause fish to be trapped in pools or off-channel pits, or restrict migratory or spawning activities.	No	No in-stream mining
<b>TOPSOIL</b>			
CCR 3503(a)(1)	Removal of vegetation and overburden preceding mining shall be kept to a minimum.	Yes	Section 4.1, 4.2
CCR 3503(f)	When the reclamation plan calls for resoiling, mine waste shall be leveled and covered with a layer of finer material. A soil layer shall then be placed on this prepared surface.	Yes	Section 5.7
	The use of soil conditioners, mulches, or imported topsoil shall be considered where such measures appear necessary.	Yes	Section 5.3.1
CCR 3704(c)	Mine waste shall be stockpiled to facilitate phased reclamation and kept separate from topsoil or other growth media.	Yes	Section 5.3.3
CCR 3705(e)	If soil is altered or other than native topsoil, soil analysis is required. Add fertilizers or soil amendments if necessary.	Yes	Section 5.7
CCR 3711(a)	All salvageable topsoil shall be removed as a separate layer.	Yes	Section 5.3.1
	Topsoil and vegetation removal should not precede mining by more than one year.	No	Mining is underground; surface disturbance related to building and other facility construction may begin sooner
CCR 3711(b)	Topsoil resources shall be mapped prior to stripping and location of topsoil stockpiles shown on map included in the reclamation plan.	Yes	Section 5.3.1
	Topsoil and other growth media shall be maintained in separate stockpiles.	Yes	Section 5.3.2
	Test plots may be required to determine the suitability of growth media for revegetation purposes.	No	Not necessary for hydroseeded side slopes; no other revegetation will occur

Authority	Requirements/Practices/Standards	Applicable	Source Location or Explanation
CCR 3711(c)	Soil salvage operations and phases of reclamation shall be set forth in the reclamation plan to minimize the area disturbed and to achieve maximum revegetation success.	Yes	Section 5.3.1, 5.13
CCR 3711(d)	Topsoil and growth media shall be used to phase reclamation as soon as can be accommodated following the mining of an area.	Yes	Section 4.1, 4.2, 5.1, 5.3, 5.5, 5.13
	Topsoil stockpiles shall not be disturbed until needed for reclamation.	Yes	Section 5.3
	Topsoil stockpiles shall be clearly identified with signs.	Yes	Section 5.3.2
	Topsoil shall be planted with vegetation or otherwise protected to prevent erosion and discourage weeds.	Yes	Section 5.3.2
CCR 3711(e)	Topsoil shall be redistributed in a manner resulting in a stable, uniform thickness consistent with the end use.	Yes	Section 5.7
<b>REVEGETATION</b>			
PRC 2773(a)	The reclamation plan shall be specific to the property and shall establish site-specific criteria for evaluating compliance with the reclamation plan with respect to revegetation.	Yes	Section 5.8 (Hydroseeded side slopes; no other revegetation will occur)
CCR 3503(g)	Available research regarding revegetation methods and selection of species given the topography, resoiling characteristics, and climate of the mined areas shall be used.	Yes	Section 5.8
CCR 3705(a)	Baseline studies shall be conducted prior to mining activities to document vegetative cover, density, and species richness.	No	Not necessary for hydroseeded side slopes; no other revegetation will occur
	Vegetative cover shall be similar to surrounding habitats and self-sustaining.	Yes	Section 5.8
CCR 3705(b)	Test plots shall be conducted simultaneously with mining to ensure successful implementation of the proposed revegetation plan.	No	Not necessary for hydroseeded side slopes; no other revegetation will occur
CCR 3705(c)	Decompaction methods, such as ripping and disking, shall be used in areas to be revegetated to establish a suitable root zone for planting.	Yes	Section 5.7
CCR 3705(d)	Roads shall be stripped of roadbase materials, resoiled, and revegetated, unless exempted.	Yes	Section 5.12.3
CCR 3705(f)	Temporary access shall not disrupt the soil surface on arid lands except where necessary for safe access. Barriers shall be installed to keep unauthorized vehicles out.	No	No arid lands
CCR 3705(g)	Use local native plant species (unless non-native species meet the end use).	Yes	Section 5.8
	Areas to be developed for industrial, commercial, or residential shall be revegetated for the interim period to control erosion.	Yes	Section 5.3, 5.5, 5.8
CCR 3705(h)	Planting shall be conducted during the most favorable period of the year for plant establishment.	Yes	Section 5.8

Authority	Requirements/Practices/Standards	Applicable	Source Location or Explanation
CCR 3705(i)	Use soil stabilizing practices and irrigation when necessary to establish vegetation.	Yes	Section 5.5, 5.7
CCR 3705(j)	If irrigation is used, demonstrate that revegetation has been self-sustaining without irrigation for two years prior to the release of financial assurance.	No	Section 5.8, Not necessary for hydroseeded side slopes; no other revegetation will occur
CCR 3705(k)	Weeds shall be monitored and managed.	Yes	Section 5.9
CCR 3705(l)	Plant protection measures such as fencing and caging shall be used where needed for revegetation success. Protection measures shall be maintained until revegetation efforts are successfully completed and the lead agency authorizes removal.	Yes	Section 5.8.2
CCR3705(m)	Quantitative success standards for vegetative cover, density, and species richness shall be included in the reclamation plan.	No	Not necessary for hydroseeded side slopes; no other revegetation will occur
	Monitoring to occur until success standards have been achieved.	No	Not necessary for hydroseeded side slopes; no other revegetation will occur
	Sampling techniques for measuring success shall be specified. Sample size must be sufficient to provide at least an 80 percent statistical confidence level.	No	Not necessary for hydroseeded side slopes; no other revegetation will occur
<b>AGRICULTURE</b>			
CCR 3707(a)	Where the end use will be agriculture, prime agricultural land shall be returned to a fertility level specified in the reclamation plan.	No	Not agricultural end use
CCR 3707(b)	Segregate and replace topsoil in proper sequence by horizon in prime agricultural soils.	No	Not agricultural land
CCR 3707(c)	Post reclamation productivity rates for prime agricultural land must be equal to pre-project condition or to a similar site for two consecutive years.	No	Not agricultural land
	Productivity rates shall be specified in the reclamation plan.	No	Not necessary for hydroseeded side slopes; no other revegetation will occur
CCR 3707(d)	If fertilizers and amendments are applied, they shall not cause contamination of surface or groundwater.		Section 5.7, 5.10
CCR 3708	For sites where the end use is to be agricultural, non-prime agricultural land must be reclaimed to be capable of sustaining economically viable crops common to the area.	No	Not agricultural end use

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APPENDIX B  
STATEMENT OF RESPONSIBILITY

**Name and Address of Owner/Operator**

(PRC § 2772[c][1]):

Rise Grass Valley, Inc.  
PO Box 271  
Grass Valley, California 95945  
Contact: Ben Mossman  
Telephone: (604) 260-4577

**Name and Address of Agent**

(PRC § 2772[c][1]):

Rise Grass Valley, Inc.  
PO Box 271  
Grass Valley, California 95945  
Contact: Ben Mossman  
Telephone: (604) 260-4577

**STATEMENT OF RECLAMATION RESPONSIBILITY** (PRC § 2772[c][10])

I certify that the information in this reclamation plan is correct, to the best of my knowledge, and that all of the owners of possessory interest in the property in question have been notified of the planned operation and potential uses of the land after reclamation. I also certify that I am authorized on behalf of Rise Grass Valley, Inc. to accept responsibility for reclaiming the mined lands described and submitted herein, with any modification required by Nevada County and agreed to as conditions of approval.

Signed this 13 day of November, 2019.

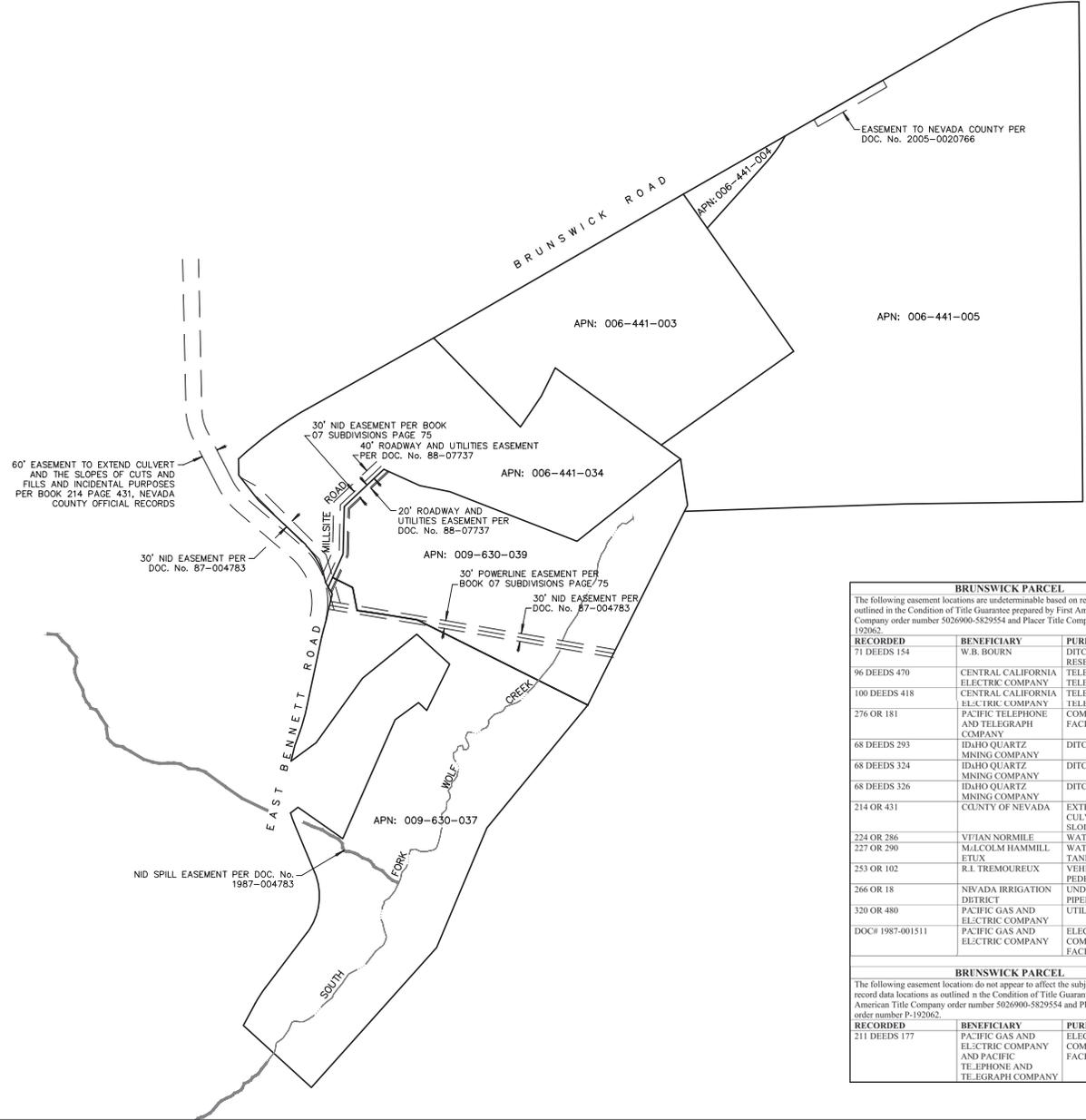


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Ben Mossman  
President, CEO, Director for Rise Grass Valley, Inc.

APPENDIX C  
LEGAL DESCRIPTION

ZOH  
 SCALE: 1" = 200'  
 CONTOUR INTERVAL: 2'



BRUNSWICK PARCEL		
The following easement locations are undeterminable based on record data locations as outlined in the Condition of Title Guarantee prepared by First American Title Company order number 5026900-5829554 and Placer Title Company order number P-192062.		
RECORDED	BENEFICIARY	PURPOSE
71 DEEDS 154	W.B. BOURN	DITCH AND RESERVOIR
96 DEEDS 470	CENTRAL CALIFORNIA ELECTRIC COMPANY	TELEPHONE AND TELEGRAPH PURPOSES
100 DEEDS 418	CENTRAL CALIFORNIA ELECTRIC COMPANY	TELEPHONE AND TELEGRAPH PURPOSES
276 OR 181	PACIFIC TELEPHONE AND TELEGRAPH COMPANY	COMMUNICATION FACILITIES
68 DEEDS 293	IDaho QUARTZ MINING COMPANY	DITCH
68 DEEDS 324	IDaho QUARTZ MINING COMPANY	DITCH
68 DEEDS 326	IDaho QUARTZ MINING COMPANY	DITCH
214 OR 431	COUNTY OF NEVADA	EXTENSION OF CULVERTS AND SLOPES
224 OR 286	VIVIAN NORMILE	WATER AND PIPELINE
227 OR 290	MILCOLM HAMMILL ETUX	WATER AND SEPTIC TANK
253 OR 102	R.L. TREMOUREUX	VEHICLE OR PEDES'RIAN TRAVEL
266 OR 18	NEVADA IRRIGATION DISTRICT	UNDERGROUND PIPELINE
320 OR 480	PACIFIC GAS AND ELECTRIC COMPANY	UTILITY FACILITIES
DOC# 1987-001511	PACIFIC GAS AND ELECTRIC COMPANY	ELECTRICAL AND COMMUNICATION FACILITIES
BRUNSWICK PARCEL		
The following easement locations do not appear to affect the subject parcels based on record data locations as outlined in the Condition of Title Guarantee prepared by First American Title Company order number 5026900-5829554 and Placer Title Company order number P-192062.		
RECORDED	BENEFICIARY	PURPOSE
211 DEEDS 177	PACIFIC GAS AND ELECTRIC COMPANY AND PACIFIC TELEPHONE AND TELEGRAPH COMPANY	ELECTRICAL AND COMMUNICATION FACILITIES

ENGINEERING • SURVEYING  
 PLANNING

**NEVADA CITY ENGINEERING, INC.**

305-B COYOTE STREET NEVADA CITY  
 530/265-6911



REVISION:	DATE:	DESCRIPTION:

BRUNSWICK SITE

**RISE GRASS VALLEY INC.**

SEC. 31, T.16N., R.9E., M.D.M.

NEVADA COUNTY , CALIFORNIA

EASEMENTS

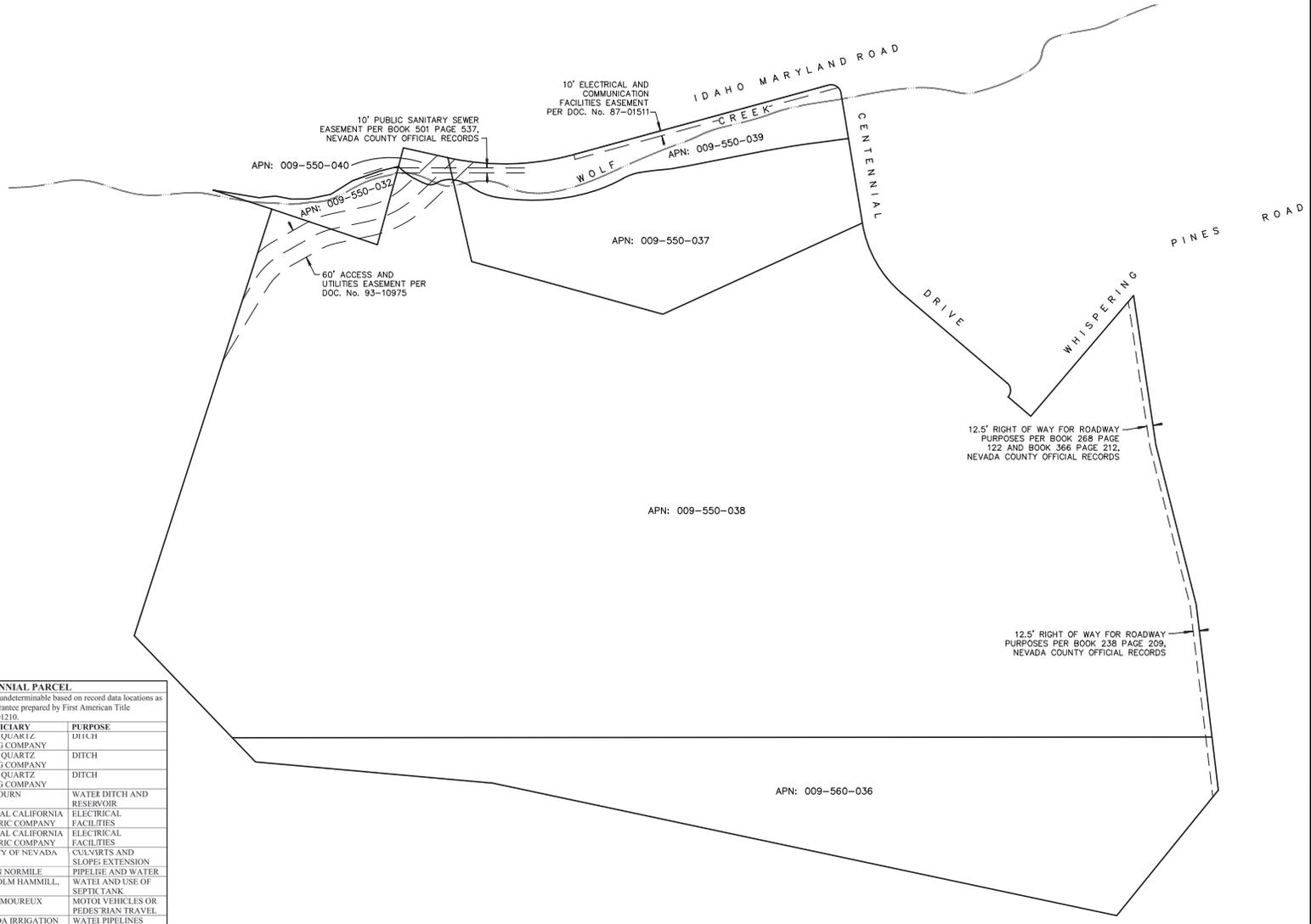
B-2



REVISION:	DATE:	DESCRIPTION:

CENTENNIAL SITE  
**RISE GRASS VALLEY INC.**  
SEC. 26, T.16N., R.8E., M.D.M.  
NEVADA COUNTY , CALIFORNIA

**EASEMENTS**



CENTENNIAL PARCEL		
The following easement locations are undeterminable based on record data locations as outlined in the Condition of Title Guarantee prepared by First American Title Company Order number 5026900-5801210.		
RECORDED	BENEFICIARY	PURPOSE
08 DEEDS 293	IDAHO QUARTZ MINING COMPANY	DITCH
68 DEEDS 324	IDAHO QUARTZ MINING COMPANY	DITCH
68 DEEDS 326	IDAHO QUARTZ MINING COMPANY	DITCH
71 DEEDS 154	W.B. BOURN	WATER DITCH AND RESERVOIR
96 DEEDS 470	CENTRAL CALIFORNIA ELECTRIC COMPANY	ELECTRICAL FACILITIES
100 DEEDS 418	CENTRAL CALIFORNIA ELECTRIC COMPANY	ELECTRICAL FACILITIES
214 OR 431	COUNTY OF NEVADA	CULVERTS AND SLOPE EXTENSION
224 OR 286	VIVIAN NORMILE	PIPELINE AND WATER
227 OR 290	MALCOLM HAMMILL, ETUX	WATER AND USE OF SEPTIC TANK
253 OR 102	R.L. TROUREUX	MOTOR VEHICLES OR PEDESTRIAN TRAVEL
280 OR 355	NEVADA IRRIGATION DISTRICT	WATER PIPELINES
276 OR 181	PACIFIC TELEPHONE AND TELEGRAPH COMPANY	COMMUNICATION FACILITIES
370 OR 480	PACIFIC GAS AND ELECTRIC COMPANY	UTILITY FACILITIES
CENTENNIAL PARCEL		
The following easements locations do not appear to affect the subject parcels based on record data locations as outlined in the Condition of Title Guarantee prepared by First American Title Company Order number 5026900-5801210.		
RECORDED	BENEFICIARY	PURPOSE
366 DEEDS 212	SUM-GOLD CORPORATION	60' ROAD AND UTILITY
475 DEEDS 234	THE COUNTY OF NEVADA	PUBLIC SANITARY SEWER

5

Nevada County Recorder  
Gregory J. Diaz  
Document#: 20180009581  
Tuesday May 15 2018, at 08:00:00 AM  
Rec Fee:\$26.00 Transfer tax:\$2090.00  
Paid: \$2116.00  
Recorded By:AB

RECORDING REQUESTED BY:

Placer Title Company

WHEN RECORDED MAIL TO:

RISE GRASS VALLEY, INC.  
1090 West Georgia Street, Suite 448  
Vancouver, BC V6E 3V7

Order No: P-192062

APN: 06-441-34, 06-441-03, 06-441-04, 06-441-05

**Grant Deed**

(Please fill in document title(s) on this line)

- Exempt from fee per GC27388.1 due to being recorded in connection with concurrent transfer that is subject to the imposition of documentary transfer tax, or,
- Exempt from fee per GC27388.1 due to the maximum fees being paid on documents in this transaction, or,
- Partially exempt from fee per GC27388.1. Only \$75.00 to be charged as \$150.00 in fees has been paid on documents recorded immediately prior hereto or,
- Exempt from fee per GC27388.1 due to being recorded in connection with concurrent transfer that is a residential dwelling to an owner-occupier, or,
- Exempt from the fee per GC27388.1(a) (1); Not related to real property, or,
- Exempt from fee under GC27388.1 for the following reasons:

NOTE: The following exemptions may not be acceptable for use in all counties:

- Exempt from fee per GC27388.1 due to being recorded in connection with a transfer that was subject to documentary transfer tax which was paid on document recorded previously on (date) as document number of Official Records, or,
- Exempt from fee per GC27388.a due to the maximum fees having been paid on documents in the transaction(s) recorded previously on (date) as document number(s) of Official Records, or,
- Partially exempt from fee per GC27388.1. Only \$75.00 to be charged as \$150.00 in fees having been paid on documents in this transaction(s) recorded previously on (date) as document number(s) of Official Records, or,
- Exempt from fee per GC27388.1 due to it being recorded in connection with a transfer of real property that is a residential dwelling to an owner-occupier. The recorded document transferring the dwelling to the owner-occupier was recorded on (date) as document number(s).

THIS PAGE ADDED TO PROVIDE SENATE BILL 2 EXEMPTION INFORMATION  
(Additional recording fee applies)

**RECORDING REQUESTED BY:**

Placer Title Company  
Escrow Number: P-192062  
Branch: 1401

**AND WHEN RECORDED MAIL TO**

RISE GRASS VALLEY, INC.  
1090 West Georgia Street, Suite 448  
Vancouver, BC V6E 3V7

A.P.N.: 06-441-34, 06-441-03, 06-441-04, 06-441-05 SPACE ABOVE THIS LINE FOR RECORDER'S USE

**GRANT DEED**

The undersigned grantor(s) declare(s):

Documentary transfer tax is \$2,090.00 City Transfer Tax: \$0.00

( X ) Unincorporated Area ( ) City of

( X ) computed on full value of property conveyed, or

( ) computed on full value less value of liens and encumbrances remaining at time of sale.

FOR A VALUABLE CONSIDERATION, receipt of which is hereby acknowledged, **Sierra Pacific Industries, a California Corporation**

Hereby GRANT(S) to **RISE GRASS VALLEY, INC., A NEVADA CORPORATION**

The land described herein is situated in the State of California, County of Nevada, unincorporated area, described as follows:

**(SEE EXHIBIT "A" ATTACHED HERETO AND MADE A PART HEREOF)**

Dated: May 7, 2018

SIERRA PACIFIC INDUSTRIES, A CALIFORNIA CORPORATION

By:   
Name & Title: M.D. Emerson, CFO

MAIL TAX STATEMENTS TO PARTY SHOWN ON FOLLOWING LINE; IF NO PARTY SHOWN, MAIL AS DIRECTED ABOVE

SAME AS ABOVE

Name

Street Address  
Page 1 of 4

City & State

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

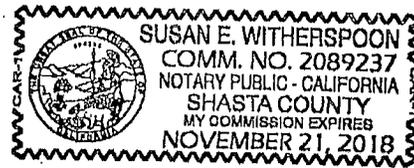
State of CALIFORNIA )  
County of SHASTA ) ss.

On May 7, 2018 before me, Susan E. Witherspoon  
Notary Public personally appeared M. D. Emmerson

\_\_\_\_\_ who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/hers/their authorized capacity(ies), and that by his/hers/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct. WITNESS my hand and official seal.

SIGNATURE Susan E. Witherspoon



Order Number: P-192062

**EXHIBIT "A"**  
**LEGAL DESCRIPTION**

The land described herein is situated in the State of California, County of Nevada, unincorporated area, described as follows:

Parcel One:

The surface and sub-surface of a depth of 75 feet below the surface of a portion of the Northwest one-quarter of Section 31, Township 16 North, Range 9 East M.D.M., described as follows, to wit:

Beginning at a point on a Southwesterly line of that certain County Road known as the Brunswick Road from which the Northwest corner of Section 31, Township and Range aforesaid, bears North 38°50'44" West 1125.89 feet distant; thence from said point of commencement with true bearings South 46°19' West 469.54 feet to a steel drill; thence South 55°18' East 140.65 feet to a steel drill; thence South 62°53' East 118.76 feet to a steel drill; thence South 36°38' West 495.05 feet to a steel drill; thence South 34°37' East 612.51 feet to a steel drill; thence North 55°33' East 725.10 feet to a steel drill situate on the said Southwesterly line of the Brunswick Road; thence along said line North 29°16'14" West 1088.66 feet to a steel drill, the place of beginning.

APN: 06-441-03

Parcel Two:

All that certain portion of the Northwest one-quarter of Section 31, Township 16 North, Range 9 East, M.D.M., described as follows:

Beginning at the Southeast corner of that certain 14.044 acre tract of land as described in deed dated December 3, 1956, recorded December 10, 1956, in Book 227 of Official Records, Page 292, File No. 4997, Nevada County Records, executed by Idaho Maryland Mines Corporation to Milton Balmaln and Ina V. Balmaln at a point on the Southwesterly line of the "New Brunswick" County Road as described in Parcel 2 of Deed dated October 24, 1955, recorded November 4, 1955 in Book 214 of Official Records, Page 431, File No. 4722, Nevada County Records, executed by Idaho Maryland Mines Corporation to County of Nevada; thence from said point of beginning, South 55°33' West along the Southeasterly line of said 14.044 acre tract to its intersection with the Southwesterly line of the former Nevada County Narrow Gauge Railroad right of way; thence Southeasterly along the Southwesterly line of said Railroad right of way to its intersection with the Southwesterly line of said County Road; thence North 29°16'14" West along the Southwesterly line of said County Road to the point of beginning.

APN: 06-441-04

Parcel Three:

All that portion of the West one-half of Section 31, Township 16 North, Range 9 East, M.D.M., described as follows:

Beginning at the West one-quarter section corner of said Section 31; thence North 1°21' West 834.65 feet along the West line of the Northwest one-quarter of said Section 31 to a point in the Southerly line of the Wm. Ghidotti (formerly Idaho Maryland) property; thence along said Southerly line the following three courses: South 62°46' East 33.07 feet; thence North 81°56' East 176.00 feet; thence North 33°38' East 90.00 feet to a corner of Pendola (formerly Yuba River Lumber Company); thence along two courses of Pendola as follows: South 34°37' East 612.51 feet, and North 55°33' East

568.30 feet to a point in the Southwesterly right of way line of abandoned Nevada County Narrow Gauge Railroad; thence along said Southwesterly right of way line the following two courses: South 47°23' East 340.52 feet; thence along a curve to the left with radius of 490.74 feet, through an angle of 13°16'41" for a distance of 113.73 feet, the long chord of which bears South 54°01'26" East 113.47 feet; thence along the Westerly line of Brunswick Road, County Road Number 31 the following two courses: South 29°16'14" East 825.46 feet; thence along a curve to the right with radius of 750 feet; through an angle of 31°29'41" for a distance of 412.27 feet, the long chord of which bears South 13°31'26" East 407.09 feet; thence West 1886.14 feet to a point in the West line of the Southwest one-quarter of said Section 31; thence North 0°28' West 676.80 feet to the point of beginning.

Excepting therefrom all minerals, gas, oil and mineral deposits below a depth of 200 feet beneath such surface; together with all necessary and convenient rights to explore for, develop, produce, extract and take the same subject to the express limitations that the foregoing shall not include any right of entry upon the surface of said land without the consent of the owner of such surface of said land as excepted in the Deed recorded August 12, 1959, in Book 266 of Official Records, at page 185, by Idaho Maryland Mines Corporation, a Nevada Corporation.  
APN: 06-441-05

Parcel Four:

Lot 8 as shown upon the Subdivision Map of Bet Acres, No. 85-7, filed in the office of the Recorder, County of Nevada, State of California, on February 24, 1987, in Book 7 of Subdivisions, Page 75.

Excepting therefrom all minerals, gas, oil and mineral deposits below a depth of 200 feet beneath such surface; together with all necessary and convenient rights to explore for, develop, produce, extract and take the same subject to the express limitations that the foregoing shall not include any right of entry upon the surface of said land without the consent of the owner of such surface of said land as excepted in the Deed recorded August 12, 1959, in Book 266 of Official Records, at page 185, by Idaho Maryland Mines Corporation, a Nevada Corporation.

Also excepting therefrom the following described portion:

Beginning at a point on the Southeasterly right of way line of Brunswick Road as described in that certain deed recorded November 4, 1955 in Book 214 Official Records, at Page 431, Nevada County Records, and being the most Northerly corner of said Lot 8 from which the Northwest corner of Section 31, Township 16 North, Range 9 East, M.D.M., bears North 64°01'34" West, 235.16 feet; thence from said point of beginning, along the Southwesterly right of way line of said Brunswick Road, in a Southeasterly direction along a curve concave to the Southwest with a radius of 1,350 feet, to which a radial line bears North 44°43'16" East; thence Southeasterly 53.62 feet along said curve through a central angle of 2°16'34", to a radial line of said curve which bears North 44°43'16" East; thence leaving said West right of way line, South 88°55'01" West, 60.76 feet; thence South 51°52'43" West, 120.52 feet to the Northwesterly line of said Lot 8 of Bet Acres; thence North 46°01'53" East, 164.25 feet, along said Northwesterly line of said Lot 8 of Bet Acres to the point of beginning; as conveyed to the County of Nevada by Deed recorded June 8, 1990, Document No. 90-17706.

Also excepting therefrom all the mineral, metal matter and rock lying below 200 feet of the surface, with the right to extract and remove said mineral, metal matter and rock from any depth up to 200 feet of the surface of said premises, without disturbing the surface thereof; as excepted and reserved by Mary Bouma, Erica Erickson and William Toms in Grant Deed recorded April 1, 1988, Document No. 88-07737.  
APN: 06-441-34

**Recording Requested By and  
When Recorded Mail To:**

G. Braiden Chadwick  
3001 Lava Ridge Court, Suite 120  
Roseville, CA 95661

Nevada County Recorder  
Gregory J. Diaz  
Document#: 20170001985  
Thursday January 26 2017, at 03:44:03 PM  
Rec Fee: \$44.00 Transfer tax: \$2200.00  
Paid: \$2244.00  
Recorded By: KP

(THE ABOVE SPACE FOR RECORDER'S USE ONLY)

APNs: 09-550-32; 09-550-37; 09-550-38; 09-550-39; 09-550-40; 09-560-36; 09-630-37; 09-630-39

The Undersigned grantor(s) declare(s)

DOCUMENTARY TRANSFER TAX is \$ 2,200

computed on full value of property conveyed, or

computed on full value less value of liens or encumbrances remaining at time of sale,

Unincorporated Area of Nevada County or  City of

**QUITCLAIM DEED**

FOR GOOD AND VALUABLE CONSIDERATION, the receipt of which is hereby acknowledged, Rica Kids, LLC, a California limited liability company, Tangold, LLC, a California limited liability company, the Estate of Erica Erickson, and the Estate of Mary Bouma, (collectively "Grantors") hereby remise, release, relinquish, surrender and forever quitclaim to Rise Grass Valley Inc., a Nevada Corporation, (hereinafter referred to as "Grantee") any and all right, title and interest that Grantors may have in that certain real property in Nevada County, State of California, as set forth in Exhibit A to this Quitclaim Deed.

IN WITNESS WHEREOF, Grantors have executed this Quitclaim Deed on the date affixed to its signature. This Quitclaim Deed may be signed in counterparts, which taken together, shall constitute one original.

**Rica Kids, LLC**

A California limited liability company

Earlene M. Johnson

Date:

1/18/17

Name: Earlene M. Johnson

Title: Member

Carol A. Frost

Date:

1/18/17

Name: Carol A. Frost

Title: Member

This is true certified copy of the record if it bears the seal, imprinted in purple ink, of the County Recorder.

**JAN 26 2017**

Gregory J. Diaz

County Recorder

NEVADA COUNTY, CALIFORNIA



{00028289;1 }

\*\*Mail Tax Statement To: Mitchell Chadwick LLP, 3001 Lava Ridge Court, ste. 120  
Roseville, CA 95661

**Tangold, LLC**

Gail Palen  
Name: Gail Palen  
Title: Member

Date: 1-17-2017

\_\_\_\_\_  
Name: Leslie Toms  
Title: Member

Date: \_\_\_\_\_

**The Estate of Mary A. Bouma**

\_\_\_\_\_  
Name: Sandra J. Brislane  
Title: Executor

Date: \_\_\_\_\_

**The Estate of Erica Erickson**

\_\_\_\_\_  
Name: Earlene M. Johnson  
Title: Executor

Date: \_\_\_\_\_

\_\_\_\_\_  
Name: Carol A. Frost  
Title: Executor

Date: \_\_\_\_\_

**Tangold, LLC**

\_\_\_\_\_  
Name: Gail Palen  
Title: Member

Date: \_\_\_\_\_

*Leslie Toms*  
\_\_\_\_\_  
Name: Leslie Toms  
Title: Member

Date: Jan. 18, 2017

**The Estate of Mary A. Bouma**

\_\_\_\_\_  
Name: Sandra J. Brislane  
Title: Executor

Date: \_\_\_\_\_

**The Estate of Erica Erickson**

\_\_\_\_\_  
Name: Earlene M. Johnson  
Title: Executor

Date: \_\_\_\_\_

\_\_\_\_\_  
Name: Carol A. Frost  
Title: Executor

Date: \_\_\_\_\_

**Tangold, LLC**

\_\_\_\_\_  
Name: Gail Palen  
Title: Member

Date: \_\_\_\_\_

\_\_\_\_\_  
Name: Leslie Toms  
Title: Member

Date: \_\_\_\_\_

**The Estate of Mary A. Bouma**

*Sandra J. Brislane*  
\_\_\_\_\_  
Name: Sandra J. Brislane  
Title: Executor

Date: *January 24, 2011*

**The Estate of Erica Erickson**

\_\_\_\_\_  
Name: Earlene M. Johnson  
Title: Executor

Date: \_\_\_\_\_

\_\_\_\_\_  
Name: Carol A. Frost  
Title: Executor

Date: \_\_\_\_\_

**Tangold, LLC**

\_\_\_\_\_  
Name: Gail Palen  
Title: Member

Date: \_\_\_\_\_

\_\_\_\_\_  
Name: Leslie Toms  
Title: Member

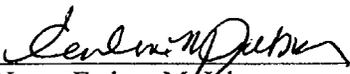
Date: \_\_\_\_\_

**The Estate of Mary A. Bouma**

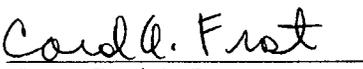
\_\_\_\_\_  
Name: Sandra J. Brislane  
Title: Executor

Date: \_\_\_\_\_

**The Estate of Erica Erickson**

  
\_\_\_\_\_  
Name: Earlene M. Johnson  
Title: Executor

Date: 4/18/17

  
\_\_\_\_\_  
Name: Carol A. Frost  
Title: Executor

Date: 1/18/17

**Exhibit "A"**

(Legal Description of Property)

**SURFACE LAND**

<b>Parcel Number</b>	<b>Description</b>	<b>Lot Size</b>
09-550-32	SEC 26, TWN 16N, RNG 8E, MDBM, PTN N 1/2 26-16-8	20,908 SF
09-550-37	SEC 26, TWN 16N, RNG 8E, MDBM, PTN NE 1/4 26-16-8	4.47 AC
09-550-38	SEC 26, TWN 16N, RNG 8E, MDBM, PTN NE 1/4 26-16-8	40.1 AC
09-550-39	SEC 26, TWN 16N, RNG 8E, MDBM, PTN NE 1/4 26-16-8 344 CENTENNIAL DRIVE GRASS VALLEY, CA 95945	42,668 SF
09-550-40	SEC 26, TWN 16N, RNG 8E, MDBM, PTN NE 1/4 26-16-8	5,662 SF
09-560-36	SEC 26, TWN 16N, RNG 8E, MDBM, PTN N 1/2 SE 1/4 26-16-8	10.25 AC
09-630-37	LOT 6	21.8 AC
09-630-39	LOT 7	15.07 AC

**SUBSURFACE LAND**

All property described in that certain Quit Claim Deed by Idaho Maryland Industries Inc. in favor of William Ghidotti and Marian Ghidotti, his wife as tenants in common, dated June 10, 1963 and located at vol. 337, pp. 175-196 in the official records of Nevada County, as recorded on June 12, 1963.

All rights to minerals within, on, and under the property shown upon the Subdivision Map of BET ACRES, No. 85-7, filed in the Office of the County Records, Nevada County, California, on February 24, 1987, in Book 7 of Subdivisions, at Page 75 et seq.

All rights to minerals within, on, and under the land located in Sections 23, 24, 25, 26, 34, and 35, Township 16 North, Range 8 East, Mount Diablo Base and Meridian, Sections 19, 20, 29, 30, and 31, Township 16 North, Range 9 East, Mount Diablo Base and Meridian, and Section 6, Township 15 North, Range 9 East, Mount Diablo Base and Meridian, and all other mineral rights associated with the Idaho-Maryland Mine.

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

**ACKNOWLEDGMENT**

State of OREGON            )  
  )ss.  
County of Hood River    )

On this 17 day of January, 2017, personally appeared before me Gail Palen who stated that (s)he is the Member of Targold LLC, a corporation, and that the instrument was signed in behalf of the said corporation by authority of its board of directors and acknowledged said instrument to be its voluntary act and deed. Before me:

Sheri L Proebstel  
Notary Public for Oregon  
My Commission Expires: July 8, 2019

Official Stamp



Document Description

This certificate is attached to page 4 of a Quitclaim Deed, dated Jan 17, 2017, consisting of 4 pages.

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

**ACKNOWLEDGMENT**

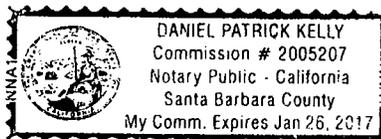
STATE OF CALIFORNIA )  
COUNTY OF Seventeenth )

On Jan 18th, 2017, before me, Daniel Patrick Kelly, a Notary Public, personally appeared Leslie Toms, who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument, the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

[Signature]  
NOTARY PUBLIC



(Seal)





APPENDIX D  
CONDITIONS OF APPROVAL AND MITIGATION MEASURES

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*Conditions of Approval to be inserted upon approval.*

APPENDIX E  
DRAINAGE STUDY

JOHN E. BAKER  
*President*

DAN HOAGLAND  
*Land Surveyor*

ANDREW R. CASSANO  
*Land Use Planner*

ROBERT M. ROURKE  
*Civil Engineer*

# NEVADA CITY ENGINEERING, INC.

505 COYOTE STREET, SUITE B • P.O. BOX 1437  
NEVADA CITY, CALIFORNIA 95959 • TELEPHONE (530) 265-6911 • FAX (530) 265-8058

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*Engineering • Surveying • Planning*

## RISE GRASS VALLEY INC.

### HYDROLOGY & HYDRAULIC CALCULATIONS

for

### Preliminary Drainage Analysis & Detention Basin Sizing for Centennial & Brunswick Sites



October 2019

**PRELIMINARY DRAINAGE ANALYSIS  
&  
DETENTION BASIN SIZING  
For  
Centennial Industrial Site & Brunswick Industrial Site**

**Executive Summary**

The following Preliminary Drainage Analysis has been prepared by Nevada City Engineering, Inc. ("NCE") as supporting documentation for the Preliminary Grading Plans related to the Use Permit Application by Rise Grass Valley Inc. ("Rise") in anticipation of the re-opening of portions of the former Idaho Maryland Mine, located in unincorporated territory of Nevada County, CA. Rise Grass Valley Inc. plans to re-open mining operations from a new facility to be located on the site of the former New Brunswick Shaft, located southwest of the intersection of Brunswick Road and East Bennett Road. Rise plans to use materials generated from underground tunneling and ore processing as engineered fill which will be placed and compacted in areas of the Centennial and Brunswick Industrial Sites. When operations are completed it is planned that the engineered fill areas will be redeveloped as industrial park facilities, ultimately adding lasting economic benefit to western Nevada County. It should be noted that final development as an industrial park facility is not part of the Use Permit Application by Rise. During the active period of mining operations, water from the underground mine will be treated on site before being discharged to South Fork Wolf Creek. This Drainage and Detention Study anticipates a peak flow rate of 2,500 gallons per minute (gpm) or 5.6 cubic feet per second (cfs) from the dewatering operation. The detention basin for the Brunswick Site is sized to detain storm flows to compensate for the quantity of treated mine water discharged to South Fork Wolf Creek, in addition to compensating for increased runoff from ultimate development of the site. The hydrologic calculations and detention studies for both sites anticipate runoff at full development. Therefore, when mining operations are completed and the sites are developed as industrial parks, all potential increases in runoff due to increases in impervious surfaces (pavement and buildings) will already be accounted for. Moreover, the drainage calculations and detention basins are specifically designed to respond to the drainage requirements of the County of Nevada and consist of Hydrologic Calculations and a Detention Study. Detailed hydraulic calculations, other than for the reservoir routing analysis contained in the Detention Study, have been omitted at this time as additional storm drain pipes that will convey site drainage flows to the detention basins will ultimately be designed to flow at less than their total capacity. Therefore, the overall system will function hydraulically as intended.

Post project storm-water discharge from both the Centennial and Brunswick Sites, including, in the case of the Brunswick Site, the treated mine water discharge of 5.6 cfs will be equal to or less than the estimated pre-project storm-water discharge levels. Therefore, with the construction of the storm-water detention ponds, the project will have no impact or increase of flows in creeks during storm events. Following is a Summary Table of Pre- and Post-Development Storm-Water flows from the location of the Brunswick Site.

**Summary Table of Pre- and Post-Development Storm-Water Flows, Brunswick Site:**

<b>Storm Event</b>	<b>Pre-Development current</b>	<b>Post Development with detention and 5.6 cfs mine water discharge</b>
2 year	79 cfs	36 cfs
10 year	140 cfs	84 cfs
25 year	195 cfs	158 cfs
100 year	227 cfs	207 cfs

**Hydrologic Calculations**

For the drainage basins identified on the attached Hydrology Maps as Drainage Areas >A-1= and >A-2', and >B-1' through >B-3', hydrologic calculations were developed utilizing the unit hydrograph method as contained in the Pond Pack Version 8i computer program. In accordance with the requirements of the County of Nevada's Use Permit Application process, values for the 10-year and 100-year frequency storms were developed using the County of Nevada's Design Storm Depth tables for a 24 hour storm as contained in County of Nevada, Department of Transportation Standard Drawings D-13 and D-14. Depths for a Mean Annual Precipitation of 56" were used (6.80" for Q-10, and 9.64" for Q-100). At the request of Rise Grass Valley Inc., NCE has also included analyses for the 2-year, and 25-year storms at the Brunswick site. Design storm depths for these events were attained from information published on the National Oceanic and Atmospheric Administration (NOAA) "Hydrometeorological Design Studies Center, Precipitation Frequency Data Server" website for the specific location of the Brunswick Site. For the Brunswick Site the depths were 4.73" for the 2-year storm and 8.59" for the 25-year storm.

To develop the storm hydrographs for each storm event at each site, Runoff Curve Numbers consistent with County of Nevada Standard Drawing D-16 were generated for each drainage subarea based on existing land use and vegetative conditions for the pre-development analyses. Similarly, post-development curve numbers were generated based on anticipated ultimate development for each site. Governing Times of Concentration for each drainage area were developed in accordance with County of Nevada Standard Drawing D-9 as a further input into the program.

The layouts of the storm drain systems are designed to capture flows from newly developed portions of the sites (Drainage Areas >A-1' and 'B-1' and 'B-2') routing them into and through the proposed detention basins and into proposed 60" diameter outlet riser structures. They are also designed to bypass flows from certain undeveloped and/or unchanged portions of the sites' upstream areas, along with flows from some off-site upstream tributary areas, which do not change from historic pre-development conditions. These consist of Drainage Areas 'A-2' and 'B-3'.

### **Detention Study**

Input for the Detention Study was prepared by Nevada City Engineering, Inc. utilizing the hydrology developed as described above. The storm flows collected by the proposed on-site storm drain systems were then routed through the proposed detention basins into 60" diameter CSP (corrugated steel pipe) outlet riser structures. The results indicated reductions of peak flows ranging from 8.9% to 54.4%. The specifics of these reductions are summarized on Page 7 of the Detention Study. The total drainage areas mitigated by the proposed detention basins consist of 66.86 acres for the Centennial Site, and 126.69 acres for the Brunswick Site, in their post-development conditions. Consequently, the impact of the detention basins is to reduce the flow emanating from the developed areas of the sites to less than pre-development levels. The drainage systems draining off-site areas for which the pre- and post-development flows do not change are designed to bypass the detention basins resulting in no net impact to downstream properties.

### **Grading Process**

Grading Plans at 1"=100' scale for both sites are included with the Use Permit Submittal. The Grading Plans demonstrate, in addition to the layout of the Brunswick Site and processing facilities, the completed engineered fill operation grading and the related drainage systems which are analyzed in this report. On-site fills are proposed to be constructed at a slope ratio of 3:1. Under this scenario, due to the relatively mild gradient, mid slope benches will not be required. Where slope banks are great enough in height to require mid-slope interceptor ditches, "J" Ditches as indicated on the detail included on Page 14 of this study will be provided. These will eliminate any likelihood of erosion occurring on the slope faces. Additionally, the 3:1 slopes have a softer, more natural look which will make the proposed ultimate development of the engineered fill areas into industrial parks more aesthetically pleasing than benched slopes. These flatter slopes will also enhance the viability of landscaping and vegetative efforts on those slopes.

The proposed detention basins at each site are intentionally located at the downstream toe of each fill site. This is done so that they may be constructed and made functional relatively early in the process of the fill operations. Therefore, as the fill areas rise throughout the anticipated duration of this portion of the mining operation, flows will be directed to these facilities via the drainage pipes which proceed downhill from the surface of the fill, allowing the flows to be directed to the detention basins. These pipes in the proposed 3:1 slope, at any given point in the process of placing the fills, will be extended up slope from the detention basins to the then current surface. Interceptor ditches and catchment sumps will be formed at the surface, as indicated on the Grading Plans, and will be replaced periodically as the fill operation progresses and the surface elevation rises. By this strategy, site drainage will continually be positively controlled throughout the process of the engineered fill placement operation.

### **SMARA (Surface Mining and Reclamation Act) Coordination**

The Nevada County drainage requirements indicate that new storm drain systems and channels shall be designed to convey the 10- and 100-year, 24 hour storm event. Furthermore, SMARA states that erosion control methods shall be designed for the 20-year, 1 hour storm and shall control erosion and sedimentation during operations as well as after reclamation is complete (see

CCR Title 14, Section 3706). The 2-, 10-, 25-, and 100-year, 24 hour storm events were analyzed in this report, which more than satisfies the Nevada County requirements. Since the 100-year, 24 hour event is greater than the SMARA required 20-year, 1 hour event, the 100-year, 24 hour results will provide a greater factor of safety in the drainage design.

**Summary**

In summation, the proposed grading will result in significant areas which will be ready for final development as industrial parks, while the proposed drainage systems fully mitigate any impacts of development of the properties, resulting in downstream flows which range from 8.9% to 54.4% less than pre-development levels depending on the design storm. These mitigated flows will be released, through control outlet structures, in the case of the Centennial Site, to the main branch of Wolf Creek, and in the case of the Brunswick Site, to South Fork Wolf Creek.

**Detailed Calculations**

1. Develop Times of Concentration

a. Subarea A-1 (Centennial Site):

Pre-Development:  $L = 3,080 \text{ lf}$ ,  $S_o = 2,590-2,490/3,080 = 0.0325$

$T_c = 3,080 \text{ lf}/4.3 \text{ ft/sec}/60 \text{ sec/min} = 11.94 \text{ min. Use } \mathbf{12.0 \text{ min.}}$

Post-Development:  $L = 2,600 \text{ lf}$ ,  $S_o = 2,590-2,495/2,600 = 0.0365$

$T_c = 2,600 \text{ lf}/4.4 \text{ ft/sec}/60 \text{ sec/min} = 9.85 \text{ min. Use } \mathbf{10.0 \text{ min.}}$

b. Subarea A-2 (Centennial Site):

Pre- and Post-Development:  $L = 2,130 \text{ lf}$ ,  $S_o = 2,744-2,548/2,130 = 0.0920$

$T_c =$  sheet flow:  $200 \text{ lf} @ 12.0\%$ , avg. grass,  $t_c = 12.7 \text{ min.}$

channel flow:  $S_o = 2,720-2,548/1,930 = 0.0891$

$t_c = 1,930 \text{ lf}/7.14 \text{ ft/sec}/60 \text{ sec/min} = \underline{4.5 \text{ min.}}$

Total  $T_c = 17.2 \text{ min.}$

**For sizing culvert extension from existing log pond**

c. Subarea B-1 (Brunswick Site):

Pre-Development:  $L = 3,955 \text{ lf}$ ,  $S_o = 2,946-2,716/3,955 = 0.0582$

$T_c = 3,955 \text{ lf}/5.3 \text{ ft/sec}/60 \text{ sec/min} = 12.43 \text{ min.}$

Post-Development:  $L = 3,806 \text{ lf}$ ,  $S_o = 2,946-2,725/3,806 = 0.0581$

$T_c = 3,806 \text{ lf}/5.3 \text{ ft/sec}/60 \text{ sec/min} = 11.97 \text{ min. Use } \mathbf{12.0 \text{ min., both scenarios}}$

d. Subarea B-2 (Brunswick Site):

Pre-Development:  $L = 1,370 \text{ lf}$ ,  $S_o = 2,852-2,716/1,370 = 0.0993$

$T_c =$  sheet flow:  $300 \text{ lf} @ 18.0\%$ , avg. grass,  $t_c = 13.0 \text{ min.}$

channel flow:  $S_o = 2,798-2,716/1,070 = 0.0766$

$t_c = 1,070 \text{ lf}/6.40 \text{ ft/sec}/60 \text{ sec/min} = \underline{2.8 \text{ min.}}$

Total  $T_c = 15.8 \text{ min.}$

Post-Development:  $L = 1,340$  lf,  $S_o = 2,852-2,725/1,340 = 0.0948$   
 Tc = sheet flow:  $300$  lf @  $18.0\%$ , avg. grass, tc =  $13.0$  min.  
 channel flow:  $S_o = 2,798-2,725/1,040 = 0.0702$   
 tc =  $1,040$  lf/ $6.0$  ft/sec/ $60$  sec/min =  $2.9$  min.  
 Total Tc =  $15.9$  min.

**For conservatism and consistency use 12.0 min. per Subarea B-1**

e. Subarea B-3 (Brunswick Site):

Pre- and Post-Development:  $L = 3,500$  lf,  $S_o = 2,866-2,738/3,500 = 0.0366$   
 Tc = sheet flow:  $500$  lf @  $12.0\%$ , avg. grass, tc =  $16.0$  min.  
 channel flow:  $S_o = 2,806-2,738/3,000 = 0.0227$   
 tc =  $3,000$  lf/ $3.50$  ft/sec/ $60$  sec/min =  $14.3$  min.  
 Total Tc =  $30.3$  min.

**For checking capacity of existing 48" culvert across/under site**

2. Develop CN Values

a. Centennial Site:

Pre-Development:

$69.96$  ac./ $69.96$  ac. =  $100\%$  Wood or Forest Land, Good Cover, Soil Type 'D'  
 CN =  $77.0$

Post-Development:

$38.11$ ac./ $66.86$ ac. = $57\%$ Industrial/Commercial/Business, Soil Type 'D':	$0.57 \times 93$	$53.01$
$28.75$ ac./ $66.86$ ac. = $43\%$ Wood or Forest Land, Good Cover, Soil Type 'D':	$0.43 \times 77 =$	<u><math>33.11</math></u>
<b>Total</b>		<b><math>86.12</math></b>

b. Brunswick Site:

Pre-Development

Subarea B-1:

$76.10$ ac./ $89.36$ ac. = $85\%$ Wood or Forest Land, Good Cover, Soil Type 'D':	$0.85 \times 77 =$	$65.45$
$8.26$ ac./ $89.36$ ac. = $9\%$ Open Space, Fair Condition, Soil Type 'D':	$0.09 \times 84 =$	$7.56$
$5.00$ ac./ $89.36$ ac. = $6\%$ Industrial/Commercial/Business, Soil Type 'D':	$0.06 \times 93 =$	<u><math>5.58</math></u>
<b>Total</b>		<b><math>78.59</math></b>

Subarea B-2:

$12.45$ ac./ $34.33$ ac. = $36\%$ Wood or Forest Land, Good Cover, Soil Type 'D':	$0.36 \times 77 =$	$27.72$
$15.00$ ac./ $34.33$ ac. = $44\%$ Open Space, Fair Condition, Soil Type 'D':	$0.44 \times 84 =$	$36.96$
$6.88$ ac./ $34.33$ ac. = $20\%$ Industrial/Commercial/Business, Soil Type 'D':	$0.20 \times 93 =$	<u><math>18.60</math></u>
<b>Total</b>		<b><math>83.28</math></b>

Post-Development:

Subarea B-1:

56.90 ac./98.55 ac. =	58% Wood or Forest Land, Good Cover, Soil Type 'D':	0.58 x 77 =	44.66
18.15 ac./98.55 ac. =	18% Open Space, Fair Condition, Soil Type 'D':	0.18 x 84 =	15.12
23.50 ac./98.55 ac. =	24% Industrial/Commercial/Business, Soil Type 'D':	0.24 x 93 =	22.32
<b>Total</b>			<b>82.10</b>

Subarea B-2:

4.48 ac./28.14 ac. =	16% Wood or Forest Land, Good Cover, Soil Type 'D':	0.16 x 77 =	12.32
8.30 ac./28.14 ac. =	30% Open Space, Fair Condition, Soil Type 'D':	0.30 x 84 =	25.20
15.36 ac./28.14 ac. =	54% Industrial/Commercial/Business, Soil Type 'D':	0.54 x 93 =	50.22
<b>Total</b>			<b>87.74</b>

3. Input Storm Depth Values

a. Centennial Site

10-yr, 24 hr storm: 6.80 inches+  
100-yr, 24 hr storm: 9.64 inches+

b. Brunswick Site

2-yr, 24 hr storm: 4.73 inches\*  
10-yr, 24 hr storm: 6.80 inches+  
25-yr, 24 hr storm: 8.59 inches\*  
100-yr, 24 hr storm: 9.64 inches+

\* Values obtained from NOAA, "Hydrometeorological Design Studies Center, Precipitation Frequency Data Server"

+ Values obtained from County of Nevada Standard Drawings D-13 & D-14

4. Summary of Flow Values – Centennial Site

	<u>Pre-Dev:</u>	<u>Post-Dev:</u>	<u>Target Outflow:</u>	<u>After Detention</u>
10-yr. storm:	72.44 cfs	89.68 cfs	72.44 cfs	45.14 cfs
100-yr. storm:	121.02 cfs	137.41 cfs	121.02 cfs	75.75 cfs

5. Summary of Flow Values - Brunswick Site

	<u>Pre-Dev:</u>	<u>Post-Dev:</u>	<u>Target Outflow:</u>	<u>After Detention:</u>
2-yr. storm:	78.92 cfs	93.31 cfs	78.92-5.57 = 73.35 cfs	30.74 cfs
10-yr. storm:	139.98 cfs	157.48 cfs	139.98-5.57 = 134.41 cfs	78.63 cfs
25-yr. storm:	194.52 cfs	213.78 cfs	194.52-5.57 = 188.95 cfs	152.78 cfs
100-yr. storm:	226.76 cfs	247.08 cfs	226.76-5.57 = 221.19 cfs	201.21 cfs

6. Size Extension of Drainage Culvert from Subarea A-2

$$C = \frac{\text{Slope}}{0.15} + \frac{\text{soil}}{0.12} + \frac{\text{veg.}}{0.06} + \frac{\text{surface}}{0.12} = \frac{\text{Total}}{0.45}$$

A = 28.06 ac. Tc = 17.2 min. I-100 = 2.98 in./hr.  
 Q = CIA = 0.45 x 2.98 x 28.06 = 37.6 cfs  
 So = 2,534–2,500/1,040 = 0.0327

$$d = [Qn / K'So^{1/2}]^{3/8} = [37.6(0.012)/0.463*(0.0327)^{1/2}]^{3/8} = 1.88 \text{ ft.}$$

**Use 30" pipe for extra margin of safety**

\* K' from King's Handbook of Hydraulics, 6<sup>th</sup> Edition, for pipe flowing at D/d = 0.82

7. Verify Size of Existing 48" Culvert Draining Subarea B-3

$$C = \frac{\text{Slope}}{0.07} + \frac{\text{soil}}{0.11} + \frac{\text{veg.}}{0.04} + \frac{\text{surface}}{0.07} = \frac{\text{Total}}{0.29}$$

A = 167.60 ac. Tc = 30.3 min. I-100 = 2.28 in./hr.  
 Q = CIA = 0.29 x 2.28 x 167.6 = 110.8 cfs  
 So = 2,740–2,710/1,645 = 0.0182

$$K' = Qn/d^{8/3}So^{1/2} = 110.8(0.024)/4.0^{8/3}(0.0182)^{1/2} = 0.4889$$

From King's Handbook of Hydraulics, 6<sup>th</sup> Edition, for K' = 0.4889, D/d = 0.0883

So, 48" pipe will flow at a depth of 0.0883 x 4.0 = 3.5 ft.

**Therefore, 48" pipe is OK.**

8. Size outfall culvert for Centennial Site

$$So = 2,495–2,490/170 = 0.0294, Q_{100} = 121 \text{ cfs}$$

$$d = [Qn / K'So^{1/2}]^{3/8} = [121(0.024)/0.463*(0.0294)^{1/2}]^{3/8} = 3.85 \text{ ft.}$$

**Therefore, use 48" pipe**

\* K' from King's Handbook of Hydraulics, 6<sup>th</sup> Edition, for pipe flowing at D/d = 0.82

$$K' = Qn/d^{8/3}So^{1/2} = 121(0.024)/4.0^{8/3}(0.0294)^{1/2} = 0.4201$$

From King's Handbook of Hydraulics, 6<sup>th</sup> Edition, for K' = 0.4201, D/d = 0.7468

So, 48" pipe will flow at a depth of 0.7468 x 4.0 = 2.98 ft.

9. Size outfall culvert for Brunswick Site

$$So = 2,725–2,710/160 = 0.0938, Q_{100} = 227 \text{ cfs}$$

$$d = [Qn / K'So^{1/2}]^{3/8} = [227(0.024)/0.463*(0.0938)^{1/2}]^{3/8} = 3.93 \text{ ft.}$$

**Therefore, use 48" pipe**

\* K' from King's Handbook of Hydraulics, 6<sup>th</sup> Edition, for pipe flowing at D/d = 0.82

$$K' = Qn/d^{8/3}So^{1/2} = 227(0.024)/4.0^{8/3}(0.0938)^{1/2} = 0.5095$$

From King's Handbook of Hydraulics, 6<sup>th</sup> edition, for K' = 0.5095, D/d = 0.07803

So, 48" pipe will flow at a depth of 0.7803 x 4.0 = 3.12 ft.

10. Size Treated Mine Water Outfall to South Fork Wolf Creek, Brunswick Site

$$K' = Qn/d_{8/3}S_o^{1/2} = 5.57(0.012)/1.00_{8/3}(0.0385)^{1/2} = 0.3406$$

From King's Handbook of Hydraulics, 6<sup>th</sup> Edition, for  $K' = 0.3406$ ,  $D/d = 0.6371$

So, 12" treated mine water outfall pipe will flow at a depth of  $0.6371 \times 1.0 = 0.64$  ft.

Check Velocity at Outfall:

$$\text{At } D/d = 0.6371, C_a = 0.5281, A = C_a(d^2) = 0.5281(1.0^2) = 0.53 \text{ ft}^2$$

$$V = Q/A = 5.57/0.53 = 10.51 \text{ ft./sec.}$$

Determine Length of Outfall Apron:

$$L = 0.37V_oD^{1/2} = 0.37(10.51)1.0^{1/2} = 3.89 \text{ ft.}$$

**Therefore, for conservatism, use L=5.0 ft.**

**Note:** The existing flow line and portions of the banks of South Fork Wolf Creek are currently lined with miscellaneous rocks which will act as a stabilizing structure for both the flow line and the banks. Due to the small amount of flow being released into the South Fork Wolf Creek, it should not be necessary to install any additional armoring of either the channel bottom or its banks.

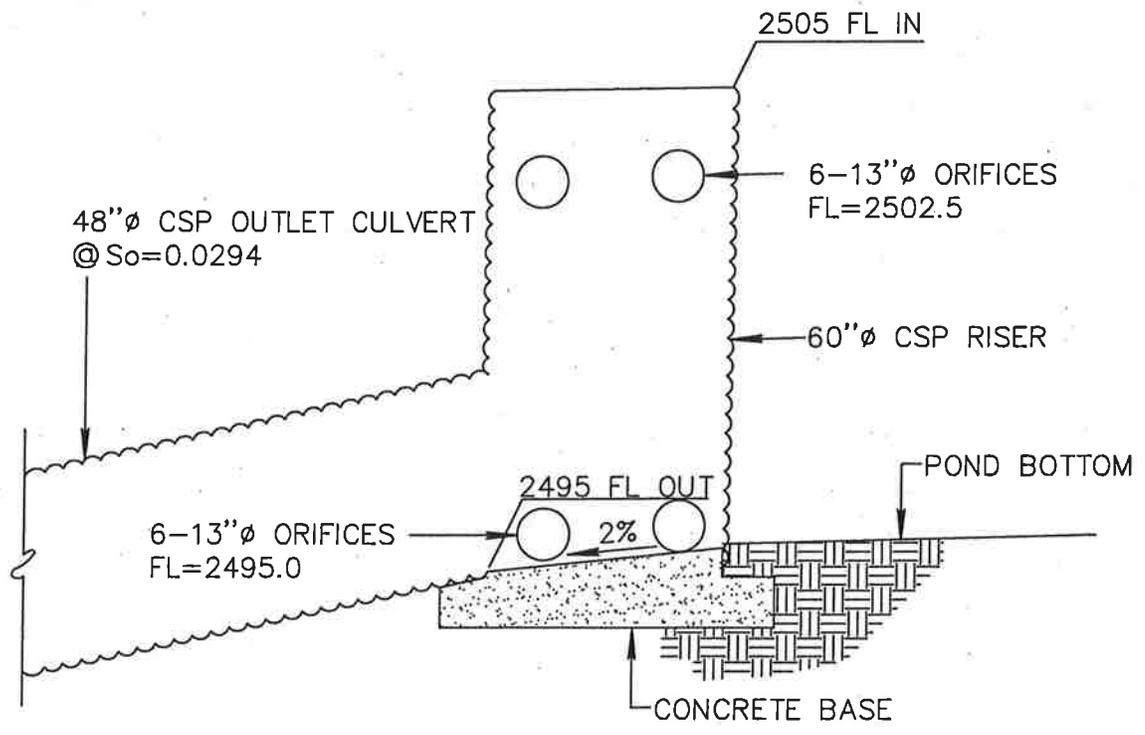
### **Glossary of Terminology and Technical Abbreviations**

- A - Area
- ac. - acres
- C - Coefficient of Runoff for use in the Rational Formula
- $C_a$  - Coefficient for determining the cross sectional area of flow in a circular conduit (pipe)
- cfs - flow rate in cubic feet per second
- CN - Soil Conservaton Service Curve Number
- D - Depth of flow in a circular conduit (pipe)
- d - diameter of a circular conduit (pipe)
- ft. - feet
- hr. - hour
- I - Intensity (normally in inches per hour)
- in. - inches
- $K'$  - Conveyance factor related to Manning's equation
- L - Length
- lf. - linear feet
- n - Manning's "n" value
- V - Velocity
- $V_o$  - Velocity at outlet
- $S_o$  - Slope of the flow line of a pipe or open channel
- $T_c$  - Time of Concentration
- Q - Flow rate (normally in cfs)
- $Q_{10}$  - Flow rate for the statistical frequency of occurrence (10-year for instance)

# DETAILS



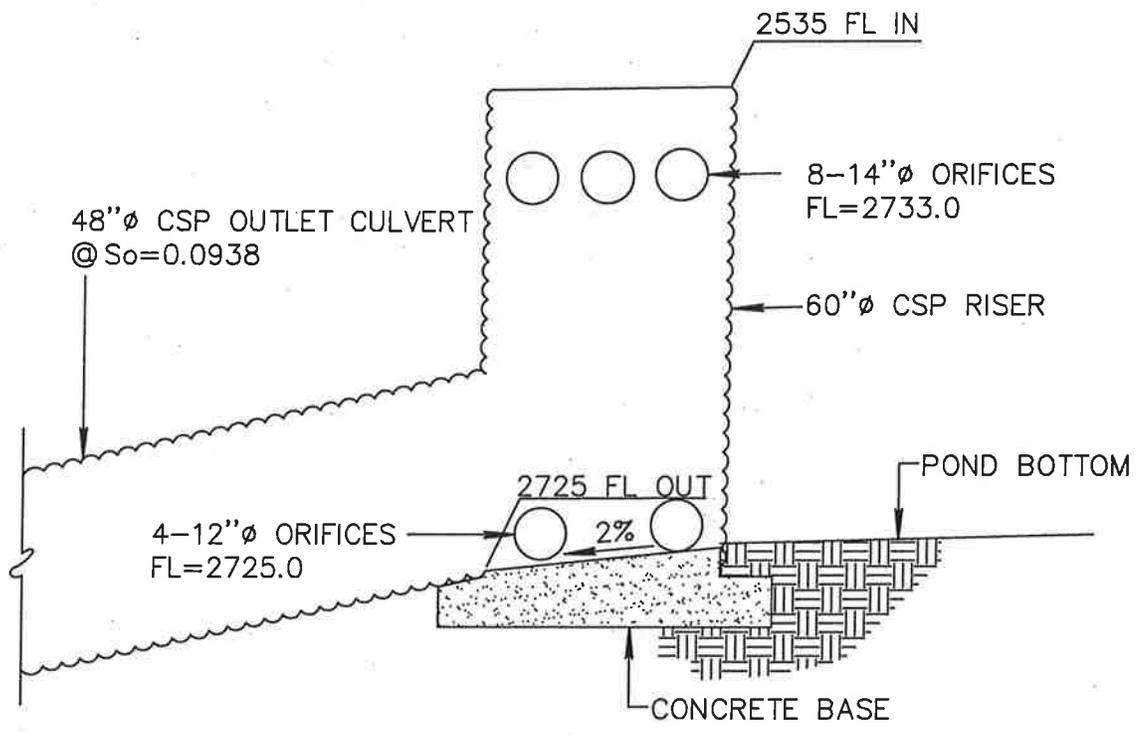
SCALE: 1" = 4'



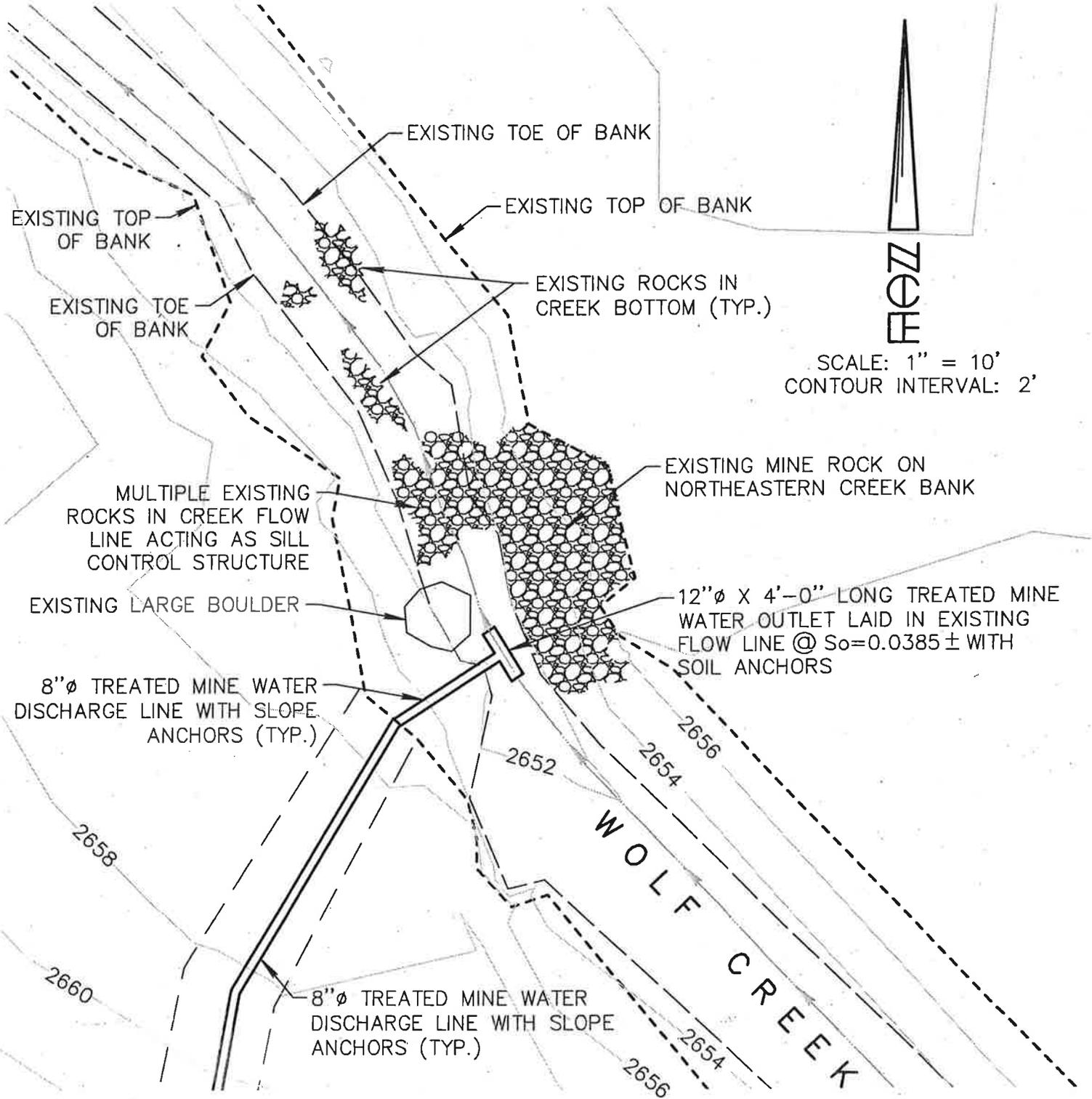
## DETENTION POND OUTLET STRUCTURE CENTENNIAL SITE



SCALE: 1" = 4'

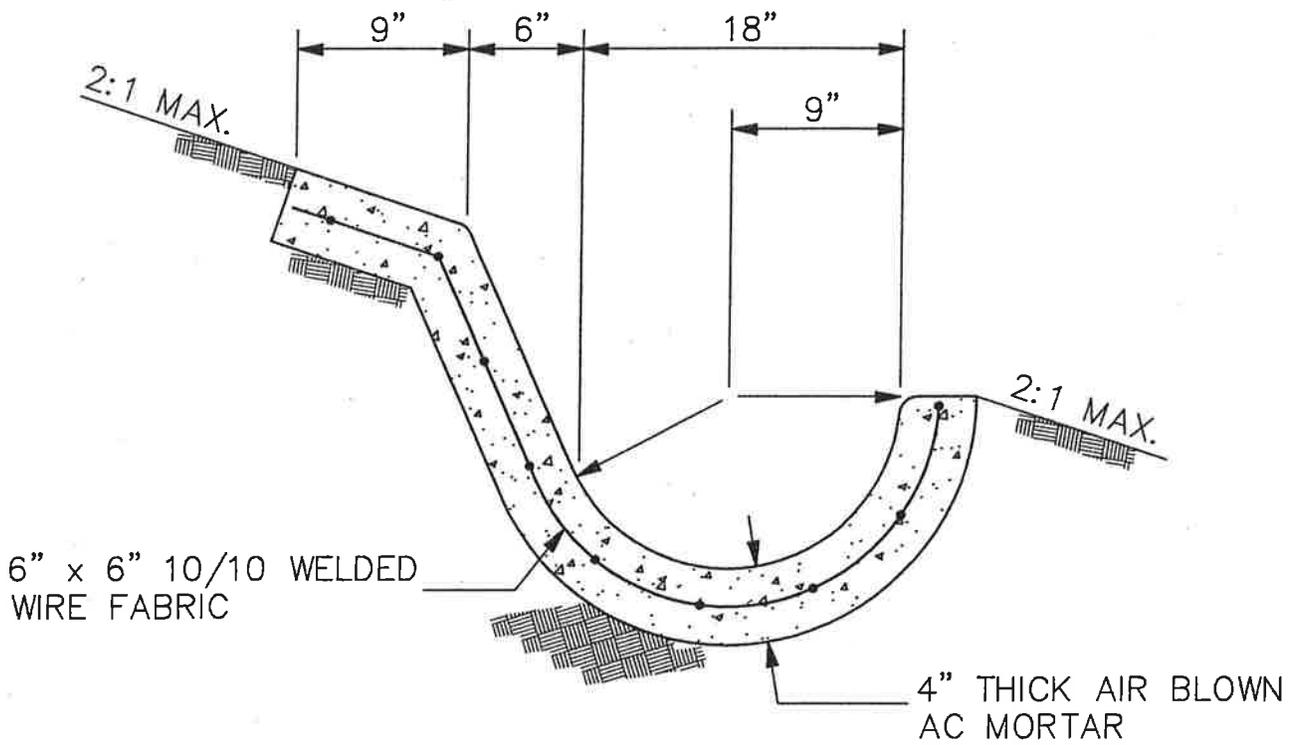


# DETENTION POND OUTLET STRUCTURE BRUNSWICK SITE



SCALE: 1" = 10'  
 CONTOUR INTERVAL: 2'

**TREATED MINE WATER OUTFALL to  
 SOUTH FORK WOLF CREEK**



**CONCRETE 'J' DRAIN**

SCALE: 1" = 1'

**HYDROLOGY & HYDRAULIC  
CALCULATIONS  
for  
Reservoir Routing & Detention Basin Sizing**

## Brunswick Site

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### Project Summary

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Title	New Brunswick Site
Engineer	RMR
Company	Nevada City Engineering, Inc.
Date	9/10/2019

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Notes

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## Brunswick Site

Subsection: Master Network Summary

### Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft <sup>3</sup> /s)
CM-1	Pre-Development 2	2	18.803	8.000	53.72
CM-1	Post-Development 2	2	23.297	8.000	69.03
CM-1	Pre-Development 10	10	32.332	8.000	97.35
CM-1	Post-Development 10	10	38.790	8.000	118.73
CM-1	Pre-Development 25	25	44.603	8.000	136.61
CM-1	Post-Development 25	25	52.660	8.000	162.57
CM-1	Pre-Development 100	100	51.946	8.000	159.89
CM-1	Post-Development 100	100	60.912	7.950	188.38
CM-2	Pre-Development 2	2	8.421	8.000	25.20
CM-2	Post-Development 2	2	7.900	8.000	24.28
CM-2	Pre-Development 10	10	13.872	8.000	42.63
CM-2	Post-Development 10	10	12.528	7.950	38.79
CM-2	Pre-Development 25	25	18.732	8.000	57.90
CM-2	Post-Development 25	25	16.600	7.950	51.36
CM-2	Pre-Development 100	100	21.619	7.950	66.93
CM-2	Post-Development 100	100	19.005	7.950	58.70

### Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft <sup>3</sup> /s)
O-1	Pre-Development 2	2	27.223	8.000	78.92
O-1	Post-Development 2	2	31.197	8.000	93.31
O-1	Pre-Development 10	10	46.204	8.000	139.98
O-1	Post-Development 10	10	51.318	8.000	157.48
O-1	Pre-Development 25	25	63.336	8.000	194.52
O-1	Post-Development 25	25	69.260	8.000	213.78
O-1	Pre-Development 100	100	73.565	8.000	226.76
O-1	Post-Development 100	100	79.918	7.950	247.08

### Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft <sup>3</sup> /s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
PO-1 (IN)	Post-Development 2	2	31.197	8.000	93.31	(N/A)	(N/A)

## Brunswick Site

Subsection: Master Network Summary

### Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft <sup>3</sup> /s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
PO-1 (OUT)	Post-Development 2	2	31.197	8.000	93.31	0.00	0.000
PO-1 (IN)	Post-Development 10	10	51.318	8.000	157.48	(N/A)	(N/A)
PO-1 (OUT)	Post-Development 10	10	51.318	8.000	157.48	0.00	0.000
PO-1 (IN)	Post-Development 25	25	69.260	8.000	213.78	(N/A)	(N/A)
PO-1 (OUT)	Post-Development 25	25	69.260	8.000	213.78	0.00	0.000
PO-1 (IN)	Post-Development 100	100	79.918	7.950	247.08	(N/A)	(N/A)
PO-1 (OUT)	Post-Development 100	100	79.918	7.950	247.08	0.00	0.000

## Brunswick Site

Subsection: Time-Depth Curve  
 Label: NC airport/NOAA

Return Event: 10 years  
 Storm Event: Brunswick NC 10-yr

Time-Depth Curve: Brunswick NC 10-yr	
Label	Brunswick NC 10-yr
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	10 years

**CUMULATIVE RAINFALL (in)**  
**Output Time Increment = 0.100 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.1
0.500	0.1	0.1	0.1	0.1	0.1
1.000	0.1	0.2	0.2	0.2	0.2
1.500	0.2	0.3	0.3	0.3	0.3
2.000	0.3	0.4	0.4	0.4	0.4
2.500	0.4	0.5	0.5	0.5	0.5
3.000	0.6	0.6	0.6	0.6	0.6
3.500	0.7	0.7	0.7	0.7	0.8
4.000	0.8	0.8	0.8	0.9	0.9
4.500	0.9	0.9	1.0	1.0	1.0
5.000	1.1	1.1	1.1	1.2	1.2
5.500	1.2	1.3	1.3	1.3	1.4
6.000	1.4	1.4	1.5	1.5	1.6
6.500	1.6	1.7	1.7	1.7	1.8
7.000	1.8	1.9	1.9	2.0	2.0
7.500	2.1	2.3	2.4	2.6	2.7
8.000	2.9	3.0	3.1	3.1	3.2
8.500	3.3	3.3	3.4	3.4	3.5
9.000	3.5	3.6	3.6	3.7	3.7
9.500	3.7	3.8	3.8	3.9	3.9
10.000	3.9	4.0	4.0	4.0	4.1
10.500	4.1	4.1	4.2	4.2	4.2
11.000	4.2	4.3	4.3	4.3	4.4
11.500	4.4	4.4	4.4	4.5	4.5
12.000	4.5	4.5	4.6	4.6	4.6
12.500	4.6	4.7	4.7	4.7	4.7
13.000	4.8	4.8	4.8	4.8	4.9
13.500	4.9	4.9	4.9	5.0	5.0
14.000	5.0	5.0	5.1	5.1	5.1
14.500	5.1	5.1	5.2	5.2	5.2
15.000	5.2	5.3	5.3	5.3	5.3
15.500	5.3	5.4	5.4	5.4	5.4
16.000	5.4	5.5	5.5	5.5	5.5

## Brunswick Site

Subsection: Time-Depth Curve  
 Label: NC airport/NOAA

Return Event: 10 years  
 Storm Event: Brunswick NC 10-yr

**CUMULATIVE RAINFALL (in)**  
**Output Time Increment = 0.100 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
16.500	5.6	5.6	5.6	5.6	5.6
17.000	5.7	5.7	5.7	5.7	5.7
17.500	5.8	5.8	5.8	5.8	5.8
18.000	5.8	5.9	5.9	5.9	5.9
18.500	5.9	6.0	6.0	6.0	6.0
19.000	6.0	6.0	6.1	6.1	6.1
19.500	6.1	6.1	6.2	6.2	6.2
20.000	6.2	6.2	6.2	6.3	6.3
20.500	6.3	6.3	6.3	6.3	6.4
21.000	6.4	6.4	6.4	6.4	6.4
21.500	6.4	6.5	6.5	6.5	6.5
22.000	6.5	6.5	6.6	6.6	6.6
22.500	6.6	6.6	6.6	6.6	6.7
23.000	6.7	6.7	6.7	6.7	6.7
23.500	6.7	6.7	6.8	6.8	6.8
24.000	6.8	(N/A)	(N/A)	(N/A)	(N/A)

## Brunswick Site

Subsection: Time-Depth Curve  
 Label: NC airport/NOAA

Return Event: 10 years  
 Storm Event: Brunswick NC 10-yr

Time-Depth Curve: Brunswick NC 10-yr	
Label	Brunswick NC 10-yr
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	10 years

**CUMULATIVE RAINFALL (in)**  
**Output Time Increment = 0.100 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.1
0.500	0.1	0.1	0.1	0.1	0.1
1.000	0.1	0.2	0.2	0.2	0.2
1.500	0.2	0.3	0.3	0.3	0.3
2.000	0.3	0.4	0.4	0.4	0.4
2.500	0.4	0.5	0.5	0.5	0.5
3.000	0.6	0.6	0.6	0.6	0.6
3.500	0.7	0.7	0.7	0.7	0.8
4.000	0.8	0.8	0.8	0.9	0.9
4.500	0.9	0.9	1.0	1.0	1.0
5.000	1.1	1.1	1.1	1.2	1.2
5.500	1.2	1.3	1.3	1.3	1.4
6.000	1.4	1.4	1.5	1.5	1.6
6.500	1.6	1.7	1.7	1.7	1.8
7.000	1.8	1.9	1.9	2.0	2.0
7.500	2.1	2.3	2.4	2.6	2.7
8.000	2.9	3.0	3.1	3.1	3.2
8.500	3.3	3.3	3.4	3.4	3.5
9.000	3.5	3.6	3.6	3.7	3.7
9.500	3.7	3.8	3.8	3.9	3.9
10.000	3.9	4.0	4.0	4.0	4.1
10.500	4.1	4.1	4.2	4.2	4.2
11.000	4.2	4.3	4.3	4.3	4.4
11.500	4.4	4.4	4.4	4.5	4.5
12.000	4.5	4.5	4.6	4.6	4.6
12.500	4.6	4.7	4.7	4.7	4.7
13.000	4.8	4.8	4.8	4.8	4.9
13.500	4.9	4.9	4.9	5.0	5.0
14.000	5.0	5.0	5.1	5.1	5.1
14.500	5.1	5.1	5.2	5.2	5.2
15.000	5.2	5.3	5.3	5.3	5.3
15.500	5.3	5.4	5.4	5.4	5.4
16.000	5.4	5.5	5.5	5.5	5.5

## Brunswick Site

Subsection: Time-Depth Curve  
 Label: NC airport/NOAA

Return Event: 10 years  
 Storm Event: Brunswick NC 10-yr

**CUMULATIVE RAINFALL (in)**  
**Output Time Increment = 0.100 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
16.500	5.6	5.6	5.6	5.6	5.6
17.000	5.7	5.7	5.7	5.7	5.7
17.500	5.8	5.8	5.8	5.8	5.8
18.000	5.8	5.9	5.9	5.9	5.9
18.500	5.9	6.0	6.0	6.0	6.0
19.000	6.0	6.0	6.1	6.1	6.1
19.500	6.1	6.1	6.2	6.2	6.2
20.000	6.2	6.2	6.2	6.3	6.3
20.500	6.3	6.3	6.3	6.3	6.4
21.000	6.4	6.4	6.4	6.4	6.4
21.500	6.4	6.5	6.5	6.5	6.5
22.000	6.5	6.5	6.6	6.6	6.6
22.500	6.6	6.6	6.6	6.6	6.7
23.000	6.7	6.7	6.7	6.7	6.7
23.500	6.7	6.7	6.8	6.8	6.8
24.000	6.8	(N/A)	(N/A)	(N/A)	(N/A)

## Brunswick Site

Subsection: Time-Depth Curve  
 Label: NC airport/NOAA

Return Event: 25 years  
 Storm Event: Brunswick NC 25-yr

Time-Depth Curve: Brunswick NC 25-yr	
Label	Brunswick NC 25-yr
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	25 years

**CUMULATIVE RAINFALL (in)**  
**Output Time Increment = 0.100 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.1	0.1
0.500	0.1	0.1	0.1	0.1	0.2
1.000	0.2	0.2	0.2	0.2	0.3
1.500	0.3	0.3	0.4	0.4	0.4
2.000	0.4	0.5	0.5	0.5	0.5
2.500	0.6	0.6	0.6	0.6	0.7
3.000	0.7	0.7	0.8	0.8	0.8
3.500	0.8	0.9	0.9	0.9	1.0
4.000	1.0	1.0	1.1	1.1	1.1
4.500	1.2	1.2	1.2	1.3	1.3
5.000	1.3	1.4	1.4	1.5	1.5
5.500	1.5	1.6	1.6	1.7	1.7
6.000	1.8	1.8	1.9	1.9	2.0
6.500	2.0	2.1	2.1	2.2	2.2
7.000	2.3	2.4	2.4	2.5	2.6
7.500	2.7	2.8	3.0	3.3	3.5
8.000	3.7	3.8	3.9	4.0	4.1
8.500	4.1	4.2	4.3	4.3	4.4
9.000	4.5	4.5	4.6	4.6	4.7
9.500	4.7	4.8	4.8	4.9	4.9
10.000	5.0	5.0	5.0	5.1	5.1
10.500	5.2	5.2	5.2	5.3	5.3
11.000	5.4	5.4	5.4	5.5	5.5
11.500	5.5	5.6	5.6	5.6	5.7
12.000	5.7	5.7	5.8	5.8	5.8
12.500	5.9	5.9	5.9	6.0	6.0
13.000	6.0	6.1	6.1	6.1	6.1
13.500	6.2	6.2	6.2	6.3	6.3
14.000	6.3	6.4	6.4	6.4	6.4
14.500	6.5	6.5	6.5	6.6	6.6
15.000	6.6	6.6	6.7	6.7	6.7
15.500	6.7	6.8	6.8	6.8	6.9
16.000	6.9	6.9	6.9	7.0	7.0

## Brunswick Site

Subsection: Time-Depth Curve  
 Label: NC airport/NOAA

Return Event: 25 years  
 Storm Event: Brunswick NC 25-yr

**CUMULATIVE RAINFALL (in)**  
**Output Time Increment = 0.100 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
16.500	7.0	7.0	7.1	7.1	7.1
17.000	7.1	7.2	7.2	7.2	7.2
17.500	7.3	7.3	7.3	7.3	7.4
18.000	7.4	7.4	7.4	7.5	7.5
18.500	7.5	7.5	7.6	7.6	7.6
19.000	7.6	7.6	7.7	7.7	7.7
19.500	7.7	7.8	7.8	7.8	7.8
20.000	7.8	7.9	7.9	7.9	7.9
20.500	7.9	8.0	8.0	8.0	8.0
21.000	8.0	8.1	8.1	8.1	8.1
21.500	8.1	8.2	8.2	8.2	8.2
22.000	8.2	8.3	8.3	8.3	8.3
22.500	8.3	8.4	8.4	8.4	8.4
23.000	8.4	8.4	8.5	8.5	8.5
23.500	8.5	8.5	8.5	8.6	8.6
24.000	8.6	(N/A)	(N/A)	(N/A)	(N/A)

## Brunswick Site

Subsection: Time-Depth Curve  
 Label: NC airport/NOAA

Return Event: 25 years  
 Storm Event: Brunswick NC 25-yr

Time-Depth Curve: Brunswick NC 25-yr	
Label	Brunswick NC 25-yr
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	25 years

**CUMULATIVE RAINFALL (in)**  
**Output Time Increment = 0.100 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.1	0.1
0.500	0.1	0.1	0.1	0.1	0.2
1.000	0.2	0.2	0.2	0.2	0.3
1.500	0.3	0.3	0.4	0.4	0.4
2.000	0.4	0.5	0.5	0.5	0.5
2.500	0.6	0.6	0.6	0.6	0.7
3.000	0.7	0.7	0.8	0.8	0.8
3.500	0.8	0.9	0.9	0.9	1.0
4.000	1.0	1.0	1.1	1.1	1.1
4.500	1.2	1.2	1.2	1.3	1.3
5.000	1.3	1.4	1.4	1.5	1.5
5.500	1.5	1.6	1.6	1.7	1.7
6.000	1.8	1.8	1.9	1.9	2.0
6.500	2.0	2.1	2.1	2.2	2.2
7.000	2.3	2.4	2.4	2.5	2.6
7.500	2.7	2.8	3.0	3.3	3.5
8.000	3.7	3.8	3.9	4.0	4.1
8.500	4.1	4.2	4.3	4.3	4.4
9.000	4.5	4.5	4.6	4.6	4.7
9.500	4.7	4.8	4.8	4.9	4.9
10.000	5.0	5.0	5.0	5.1	5.1
10.500	5.2	5.2	5.2	5.3	5.3
11.000	5.4	5.4	5.4	5.5	5.5
11.500	5.5	5.6	5.6	5.6	5.7
12.000	5.7	5.7	5.8	5.8	5.8
12.500	5.9	5.9	5.9	6.0	6.0
13.000	6.0	6.1	6.1	6.1	6.1
13.500	6.2	6.2	6.2	6.3	6.3
14.000	6.3	6.4	6.4	6.4	6.4
14.500	6.5	6.5	6.5	6.6	6.6
15.000	6.6	6.6	6.7	6.7	6.7
15.500	6.7	6.8	6.8	6.8	6.9
16.000	6.9	6.9	6.9	7.0	7.0

## Brunswick Site

Subsection: Time-Depth Curve  
 Label: NC airport/NOAA

Return Event: 25 years  
 Storm Event: Brunswick NC 25-yr

**CUMULATIVE RAINFALL (in)**  
**Output Time Increment = 0.100 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Depth (in)				
16.500	7.0	7.0	7.1	7.1	7.1
17.000	7.1	7.2	7.2	7.2	7.2
17.500	7.3	7.3	7.3	7.3	7.4
18.000	7.4	7.4	7.4	7.5	7.5
18.500	7.5	7.5	7.6	7.6	7.6
19.000	7.6	7.6	7.7	7.7	7.7
19.500	7.7	7.8	7.8	7.8	7.8
20.000	7.8	7.9	7.9	7.9	7.9
20.500	7.9	8.0	8.0	8.0	8.0
21.000	8.0	8.1	8.1	8.1	8.1
21.500	8.1	8.2	8.2	8.2	8.2
22.000	8.2	8.3	8.3	8.3	8.3
22.500	8.3	8.4	8.4	8.4	8.4
23.000	8.4	8.4	8.5	8.5	8.5
23.500	8.5	8.5	8.5	8.6	8.6
24.000	8.6	(N/A)	(N/A)	(N/A)	(N/A)

## Brunswick Site

Subsection: Time-Depth Curve  
 Label: NC airport/NOAA

Return Event: 2 years  
 Storm Event: Brunswick NC 2-yr

Time-Depth Curve: Brunswick NC 2-yr	
Label	Brunswick NC 2-yr
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	2 years

**CUMULATIVE RAINFALL (in)**  
**Output Time Increment = 0.100 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.1	0.1	0.1	0.1
1.000	0.1	0.1	0.1	0.1	0.2
1.500	0.2	0.2	0.2	0.2	0.2
2.000	0.2	0.3	0.3	0.3	0.3
2.500	0.3	0.3	0.3	0.4	0.4
3.000	0.4	0.4	0.4	0.4	0.4
3.500	0.5	0.5	0.5	0.5	0.5
4.000	0.5	0.6	0.6	0.6	0.6
4.500	0.6	0.7	0.7	0.7	0.7
5.000	0.7	0.8	0.8	0.8	0.8
5.500	0.9	0.9	0.9	0.9	0.9
6.000	1.0	1.0	1.0	1.1	1.1
6.500	1.1	1.1	1.2	1.2	1.2
7.000	1.3	1.3	1.3	1.4	1.4
7.500	1.5	1.6	1.7	1.8	1.9
8.000	2.0	2.1	2.1	2.2	2.2
8.500	2.3	2.3	2.4	2.4	2.4
9.000	2.5	2.5	2.5	2.5	2.6
9.500	2.6	2.6	2.7	2.7	2.7
10.000	2.7	2.8	2.8	2.8	2.8
10.500	2.8	2.9	2.9	2.9	2.9
11.000	3.0	3.0	3.0	3.0	3.0
11.500	3.1	3.1	3.1	3.1	3.1
12.000	3.1	3.2	3.2	3.2	3.2
12.500	3.2	3.2	3.3	3.3	3.3
13.000	3.3	3.3	3.4	3.4	3.4
13.500	3.4	3.4	3.4	3.4	3.5
14.000	3.5	3.5	3.5	3.5	3.5
14.500	3.6	3.6	3.6	3.6	3.6
15.000	3.6	3.7	3.7	3.7	3.7
15.500	3.7	3.7	3.7	3.8	3.8
16.000	3.8	3.8	3.8	3.8	3.8
16.500	3.9	3.9	3.9	3.9	3.9

## Brunswick Site

Subsection: Time-Depth Curve  
 Label: NC airport/NOAA

Return Event: 2 years  
 Storm Event: Brunswick NC 2-yr

**CUMULATIVE RAINFALL (in)**  
**Output Time Increment = 0.100 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
17.000	3.9	3.9	4.0	4.0	4.0
17.500	4.0	4.0	4.0	4.0	4.1
18.000	4.1	4.1	4.1	4.1	4.1
18.500	4.1	4.1	4.2	4.2	4.2
19.000	4.2	4.2	4.2	4.2	4.2
19.500	4.3	4.3	4.3	4.3	4.3
20.000	4.3	4.3	4.3	4.4	4.4
20.500	4.4	4.4	4.4	4.4	4.4
21.000	4.4	4.4	4.5	4.5	4.5
21.500	4.5	4.5	4.5	4.5	4.5
22.000	4.5	4.5	4.6	4.6	4.6
22.500	4.6	4.6	4.6	4.6	4.6
23.000	4.6	4.6	4.7	4.7	4.7
23.500	4.7	4.7	4.7	4.7	4.7
24.000	4.7	(N/A)	(N/A)	(N/A)	(N/A)

## Brunswick Site

Subsection: Time-Depth Curve  
 Label: NC airport/NOAA

Return Event: 2 years  
 Storm Event: Brunswick NC 2-yr

Time-Depth Curve: Brunswick NC 2-yr	
Label	Brunswick NC 2-yr
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	2 years

**CUMULATIVE RAINFALL (in)**  
**Output Time Increment = 0.100 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.1	0.1	0.1	0.1
1.000	0.1	0.1	0.1	0.1	0.2
1.500	0.2	0.2	0.2	0.2	0.2
2.000	0.2	0.3	0.3	0.3	0.3
2.500	0.3	0.3	0.3	0.4	0.4
3.000	0.4	0.4	0.4	0.4	0.4
3.500	0.5	0.5	0.5	0.5	0.5
4.000	0.5	0.6	0.6	0.6	0.6
4.500	0.6	0.7	0.7	0.7	0.7
5.000	0.7	0.8	0.8	0.8	0.8
5.500	0.9	0.9	0.9	0.9	0.9
6.000	1.0	1.0	1.0	1.1	1.1
6.500	1.1	1.1	1.2	1.2	1.2
7.000	1.3	1.3	1.3	1.4	1.4
7.500	1.5	1.6	1.7	1.8	1.9
8.000	2.0	2.1	2.1	2.2	2.2
8.500	2.3	2.3	2.4	2.4	2.4
9.000	2.5	2.5	2.5	2.5	2.6
9.500	2.6	2.6	2.7	2.7	2.7
10.000	2.7	2.8	2.8	2.8	2.8
10.500	2.8	2.9	2.9	2.9	2.9
11.000	3.0	3.0	3.0	3.0	3.0
11.500	3.1	3.1	3.1	3.1	3.1
12.000	3.1	3.2	3.2	3.2	3.2
12.500	3.2	3.2	3.3	3.3	3.3
13.000	3.3	3.3	3.4	3.4	3.4
13.500	3.4	3.4	3.4	3.4	3.5
14.000	3.5	3.5	3.5	3.5	3.5
14.500	3.6	3.6	3.6	3.6	3.6
15.000	3.6	3.7	3.7	3.7	3.7
15.500	3.7	3.7	3.7	3.8	3.8
16.000	3.8	3.8	3.8	3.8	3.8
16.500	3.9	3.9	3.9	3.9	3.9

## Brunswick Site

Subsection: Time-Depth Curve  
 Label: NC airport/NOAA

Return Event: 2 years  
 Storm Event: Brunswick NC 2-yr

**CUMULATIVE RAINFALL (in)**  
**Output Time Increment = 0.100 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
17.000	3.9	3.9	4.0	4.0	4.0
17.500	4.0	4.0	4.0	4.0	4.1
18.000	4.1	4.1	4.1	4.1	4.1
18.500	4.1	4.1	4.2	4.2	4.2
19.000	4.2	4.2	4.2	4.2	4.2
19.500	4.3	4.3	4.3	4.3	4.3
20.000	4.3	4.3	4.3	4.4	4.4
20.500	4.4	4.4	4.4	4.4	4.4
21.000	4.4	4.4	4.5	4.5	4.5
21.500	4.5	4.5	4.5	4.5	4.5
22.000	4.5	4.5	4.6	4.6	4.6
22.500	4.6	4.6	4.6	4.6	4.6
23.000	4.6	4.6	4.7	4.7	4.7
23.500	4.7	4.7	4.7	4.7	4.7
24.000	4.7	(N/A)	(N/A)	(N/A)	(N/A)

## Brunswick Site

Subsection: Time-Depth Curve  
 Label: NC airport/NOAA

Return Event: 100 years  
 Storm Event: Brunswick NC 100-yr

Time-Depth Curve: Brunswick NC 100-yr	
Label	Brunswick NC 100-yr
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	100 years

**CUMULATIVE RAINFALL (in)**  
**Output Time Increment = 0.100 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.1	0.1
0.500	0.1	0.1	0.1	0.2	0.2
1.000	0.2	0.2	0.2	0.3	0.3
1.500	0.3	0.4	0.4	0.4	0.5
2.000	0.5	0.5	0.5	0.6	0.6
2.500	0.6	0.7	0.7	0.7	0.8
3.000	0.8	0.8	0.9	0.9	0.9
3.500	0.9	1.0	1.0	1.0	1.1
4.000	1.1	1.2	1.2	1.2	1.3
4.500	1.3	1.3	1.4	1.4	1.5
5.000	1.5	1.5	1.6	1.6	1.7
5.500	1.7	1.8	1.8	1.9	1.9
6.000	2.0	2.0	2.1	2.2	2.2
6.500	2.3	2.3	2.4	2.5	2.5
7.000	2.6	2.7	2.7	2.8	2.9
7.500	3.0	3.2	3.4	3.7	3.9
8.000	4.1	4.2	4.4	4.5	4.5
8.500	4.6	4.7	4.8	4.9	4.9
9.000	5.0	5.1	5.1	5.2	5.2
9.500	5.3	5.4	5.4	5.5	5.5
10.000	5.6	5.6	5.7	5.7	5.7
10.500	5.8	5.8	5.9	5.9	6.0
11.000	6.0	6.1	6.1	6.1	6.2
11.500	6.2	6.3	6.3	6.3	6.4
12.000	6.4	6.4	6.5	6.5	6.5
12.500	6.6	6.6	6.7	6.7	6.7
13.000	6.8	6.8	6.8	6.9	6.9
13.500	6.9	7.0	7.0	7.0	7.1
14.000	7.1	7.1	7.2	7.2	7.2
14.500	7.3	7.3	7.3	7.4	7.4
15.000	7.4	7.4	7.5	7.5	7.5
15.500	7.6	7.6	7.6	7.7	7.7
16.000	7.7	7.8	7.8	7.8	7.8

## Brunswick Site

Subsection: Time-Depth Curve  
 Label: NC airport/NOAA

Return Event: 100 years  
 Storm Event: Brunswick NC 100-yr

**CUMULATIVE RAINFALL (in)**  
**Output Time Increment = 0.100 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
16.500	7.9	7.9	7.9	8.0	8.0
17.000	8.0	8.0	8.1	8.1	8.1
17.500	8.2	8.2	8.2	8.2	8.3
18.000	8.3	8.3	8.3	8.4	8.4
18.500	8.4	8.4	8.5	8.5	8.5
19.000	8.6	8.6	8.6	8.6	8.7
19.500	8.7	8.7	8.7	8.7	8.8
20.000	8.8	8.8	8.8	8.9	8.9
20.500	8.9	8.9	9.0	9.0	9.0
21.000	9.0	9.1	9.1	9.1	9.1
21.500	9.1	9.2	9.2	9.2	9.2
22.000	9.2	9.3	9.3	9.3	9.3
22.500	9.4	9.4	9.4	9.4	9.4
23.000	9.5	9.5	9.5	9.5	9.5
23.500	9.5	9.6	9.6	9.6	9.6
24.000	9.6	(N/A)	(N/A)	(N/A)	(N/A)

## Brunswick Site

Subsection: Time-Depth Curve  
 Label: NC airport/NOAA

Return Event: 100 years  
 Storm Event: Brunswick NC 100-yr

Time-Depth Curve: Brunswick NC 100-yr	
Label	Brunswick NC 100-yr
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	100 years

**CUMULATIVE RAINFALL (in)**  
**Output Time Increment = 0.100 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.1	0.1
0.500	0.1	0.1	0.1	0.2	0.2
1.000	0.2	0.2	0.2	0.3	0.3
1.500	0.3	0.4	0.4	0.4	0.5
2.000	0.5	0.5	0.5	0.6	0.6
2.500	0.6	0.7	0.7	0.7	0.8
3.000	0.8	0.8	0.9	0.9	0.9
3.500	0.9	1.0	1.0	1.0	1.1
4.000	1.1	1.2	1.2	1.2	1.3
4.500	1.3	1.3	1.4	1.4	1.5
5.000	1.5	1.5	1.6	1.6	1.7
5.500	1.7	1.8	1.8	1.9	1.9
6.000	2.0	2.0	2.1	2.2	2.2
6.500	2.3	2.3	2.4	2.5	2.5
7.000	2.6	2.7	2.7	2.8	2.9
7.500	3.0	3.2	3.4	3.7	3.9
8.000	4.1	4.2	4.4	4.5	4.5
8.500	4.6	4.7	4.8	4.9	4.9
9.000	5.0	5.1	5.1	5.2	5.2
9.500	5.3	5.4	5.4	5.5	5.5
10.000	5.6	5.6	5.7	5.7	5.7
10.500	5.8	5.8	5.9	5.9	6.0
11.000	6.0	6.1	6.1	6.1	6.2
11.500	6.2	6.3	6.3	6.3	6.4
12.000	6.4	6.4	6.5	6.5	6.5
12.500	6.6	6.6	6.7	6.7	6.7
13.000	6.8	6.8	6.8	6.9	6.9
13.500	6.9	7.0	7.0	7.0	7.1
14.000	7.1	7.1	7.2	7.2	7.2
14.500	7.3	7.3	7.3	7.4	7.4
15.000	7.4	7.4	7.5	7.5	7.5
15.500	7.6	7.6	7.6	7.7	7.7
16.000	7.7	7.8	7.8	7.8	7.8

## Brunswick Site

Subsection: Time-Depth Curve  
 Label: NC airport/NOAA

Return Event: 100 years  
 Storm Event: Brunswick NC 100-yr

**CUMULATIVE RAINFALL (in)**  
**Output Time Increment = 0.100 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
16.500	7.9	7.9	7.9	8.0	8.0
17.000	8.0	8.0	8.1	8.1	8.1
17.500	8.2	8.2	8.2	8.2	8.3
18.000	8.3	8.3	8.3	8.4	8.4
18.500	8.4	8.4	8.5	8.5	8.5
19.000	8.6	8.6	8.6	8.6	8.7
19.500	8.7	8.7	8.7	8.7	8.8
20.000	8.8	8.8	8.8	8.9	8.9
20.500	8.9	8.9	9.0	9.0	9.0
21.000	9.0	9.1	9.1	9.1	9.1
21.500	9.1	9.2	9.2	9.2	9.2
22.000	9.2	9.3	9.3	9.3	9.3
22.500	9.4	9.4	9.4	9.4	9.4
23.000	9.5	9.5	9.5	9.5	9.5
23.500	9.5	9.6	9.6	9.6	9.6
24.000	9.6	(N/A)	(N/A)	(N/A)	(N/A)

## Brunswick Site

Subsection: Unit Hydrograph Equations

### Unit Hydrograph Method (Computational Notes)

#### Definition of Terms

At	Total area (acres): $A_t = A_i + A_p$
Ai	Impervious area (acres)
Ap	Pervious area (acres)
CNi	Runoff curve number for impervious area
CNp	Runoff curve number for pervious area
fLoss	f loss constant infiltration (depth/time)
gKs	Saturated Hydraulic Conductivity (depth/time)
Md	Volumetric Moisture Deficit
Psi	Capillary Suction (length)
hK	Horton Infiltration Decay Rate ( $\text{time}^{-1}$ )
fo	Initial Infiltration Rate (depth/time)
fc	Ultimate(capacity)Infiltration Rate (depth/time)
Ia	Initial Abstraction (length)
dt	Computational increment (duration of unit excess rainfall) Default dt is smallest value of $0.1333T_c$ , $r_{tm}$ , and $t_h$ (Smallest dt is then adjusted to match up with $T_p$ )
UDdt	User specified override computational main time increment (only used if UDdt is $\Rightarrow .1333T_c$ )
D(t)	Point on distribution curve (fraction of P) for time step t
K	$2 / (1 + (T_r/T_p))$ : default $K = 0.75$ : (for $T_r/T_p = 1.67$ )
Ks	Hydrograph shape factor = Unit Conversions * $K = ((1\text{hr}/3600\text{sec}) * (1\text{ft}/12\text{in}) * ((5280\text{ft})^2/\text{sq.mi})) * K$ Default $K_s = 645.333 * 0.75 = 484$
Lag	Lag time from center of excess runoff (dt) to $T_p$ : $\text{Lag} = 0.6T_c$
P	Total precipitation depth, inches
Pa(t)	Accumulated rainfall at time step t
Pi(t)	Incremental rainfall at time step t
qp	Peak discharge (cfs) for 1in. runoff, for 1 hr, for 1 sq.mi. = $(K_s * A * Q) / T_p$ (where $Q = 1\text{in. runoff}$ , $A = \text{sq.mi.}$ )
Qu(t)	Unit hydrograph ordinate (cfs) at time step t
Q(t)	Final hydrograph ordinate (cfs) at time step t
Rai(t)	Accumulated runoff (inches) at time step t for impervious area
Rap(t)	Accumulated runoff (inches) at time step t for pervious area
Rii(t)	Incremental runoff (inches) at time step t for impervious area
Rip(t)	Incremental runoff (inches) at time step t for pervious area
R(t)	Incremental weighted total runoff (inches)
Rtm	Time increment for rainfall table
Si	S for impervious area: $S_i = (1000/CN_i) - 10$
Sp	S for pervious area: $S_p = (1000/CN_p) - 10$
t	Time step (row) number
Tc	Time of concentration
Tb	Time (hrs) of entire unit hydrograph: $T_b = T_p + T_r$
Tp	Time (hrs) to peak of a unit hydrograph: $T_p = (dt/2) + \text{Lag}$
Tr	Time (hrs) of receding limb of unit hydrograph: $T_r = \text{ratio of } T_p$

## Brunswick Site

Subsection: Unit Hydrograph Equations

### Unit Hydrograph Method

#### Computational Notes

##### Precipitation

Column (1)	Time for time step t
Column (2)	$D(t)$ = Point on distribution curve for time step t
Column (3)	$P_i(t) = P_a(t) - P_a(t-1)$ : Col.(4) - Preceding Col.(4)
Column (4)	$P_a(t) = D(t) \times P$ : Col.(2) $\times$ P

##### Pervious Area Runoff (using SCS Runoff CN Method)

Column (5)	$R_{ap}(t)$ = Accumulated pervious runoff for time step t If $(P_a(t) \leq 0.2S_p)$ then use: $R_{ap}(t) = 0.0$ If $(P_a(t) > 0.2S_p)$ then use: $R_{ap}(t) = (Col.(4) - 0.2S_p) \times 2 / (Col.(4) + 0.8S_p)$
Column (6)	$R_{ip}(t)$ = Incremental pervious runoff for time step t $R_{ip}(t) = R_{ap}(t) - R_{ap}(t-1)$ $R_{ip}(t) = Col.(5)$ for current row - $Col.(5)$ for preceding row.

##### Impervious Area Runoff

Column (7 & 8)...	Did not specify to use impervious areas.
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##### Incremental Weighted Runoff

Column (9)	$R(t) = (A_p/A_t) \times R_{ip}(t) + (A_i/A_t) \times R_{ii}(t)$ $R(t) = (A_p/A_t) \times Col.(6) + (A_i/A_t) \times Col.(8)$
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##### SCS Unit Hydrograph Method

Column (10)	$Q(t)$ is computed with the SCS unit hydrograph method using $R(t)$ and $Q_u(t)$ .
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## Brunswick Site

Subsection: Unit Hydrograph Summary  
 Label: CM-1

Return Event: 2 years  
 Storm Event: Brunswick NC 2-yr

Storm Event	Brunswick NC 2-yr
Return Event	2 years
Duration	24.000 hours
Depth	4.7 in
Time of Concentration (Composite)	0.200 hours
Area (User Defined)	98.600 acres
<hr/>	
Computational Time Increment	0.027 hours
Time to Peak (Computed)	8.000 hours
Flow (Peak, Computed)	69.03 ft <sup>3</sup> /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	8.000 hours
Flow (Peak Interpolated Output)	69.03 ft <sup>3</sup> /s
<hr/>	
<b>Drainage Area</b>	
SCS CN (Composite)	82.100
Area (User Defined)	98.600 acres
Maximum Retention (Pervious)	2.2 in
Maximum Retention (Pervious, 20 percent)	0.4 in
<hr/>	
<b>Cumulative Runoff</b>	
Cumulative Runoff Depth (Pervious)	2.8 in
Runoff Volume (Pervious)	23.401 ac-ft
<hr/>	
<b>Hydrograph Volume (Area under Hydrograph curve)</b>	
Volume	23.297 ac-ft
<hr/>	
<b>SCS Unit Hydrograph Parameters</b>	
Time of Concentration (Composite)	0.200 hours
Computational Time Increment	0.027 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

## Brunswick Site

Subsection: Unit Hydrograph Summary  
Label: CM-1

Return Event: 2 years  
Storm Event: Brunswick NC 2-yr

SCS Unit Hydrograph Parameters	
Unit peak, $q_p$	558.59 ft <sup>3</sup> /s
Unit peak time, $T_p$	0.133 hours
Unit receding limb, $T_r$	0.533 hours
Total unit time, $T_b$	0.667 hours

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
 Label: CM-1

Return Event: 2 years  
 Storm Event: Brunswick NC 2-yr

Storm Event	Brunswick NC 2-yr
Return Event	2 years
Duration	24.000 hours
Depth	4.7 in
Time of Concentration (Composite)	0.200 hours
Area (User Defined)	98.600 acres

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

**Output Time Increment = 0.050 hours**

**Time on left represents time for first value in each row.**

Time (hours)	Flow (ft <sup>3</sup> /s)				
3.350	0.00	0.01	0.04	0.10	0.18
3.600	0.28	0.39	0.51	0.63	0.75
3.850	0.88	1.01	1.14	1.27	1.40
4.100	1.52	1.64	1.77	1.89	2.02
4.350	2.15	2.29	2.43	2.57	2.72
4.600	2.87	3.02	3.17	3.33	3.49
4.850	3.66	3.83	4.01	4.20	4.39
5.100	4.59	4.81	5.03	5.25	5.46
5.350	5.67	5.88	6.09	6.30	6.50
5.600	6.67	6.83	7.01	7.21	7.43
5.850	7.66	7.91	8.17	8.44	8.76
6.100	9.17	9.60	10.02	10.39	10.73
6.350	11.05	11.35	11.62	11.88	12.05
6.600	12.06	11.99	11.98	12.09	12.30
6.850	12.58	12.93	13.32	13.79	14.30
7.100	14.88	15.52	16.23	16.99	17.84
7.350	18.74	19.73	20.78	22.00	24.80
7.600	31.84	41.16	49.56	55.80	60.55
7.850	64.11	66.68	68.33	69.03	67.85
8.100	62.82	55.95	49.68	45.03	41.29
8.350	38.23	35.57	33.33	31.36	29.96
8.600	29.43	29.45	29.36	28.97	28.38
8.850	27.73	27.02	26.32	25.62	24.95
9.100	24.28	23.66	23.04	22.47	21.91
9.350	21.38	20.88	20.43	19.99	19.68
9.600	19.60	19.66	19.68	19.61	19.50
9.850	19.36	19.20	19.03	18.86	18.67
10.100	18.44	18.20	17.98	17.78	17.61
10.350	17.46	17.34	17.23	17.13	17.07
10.600	17.09	17.17	17.19	17.16	17.08
10.850	16.98	16.87	16.75	16.63	16.50
11.100	16.38	16.25	16.12	16.00	15.87
11.350	15.74	15.60	15.47	15.34	15.20

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
 Label: CM-1

Return Event: 2 years  
 Storm Event: Brunswick NC 2-yr

**HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)**  
**Output Time Increment = 0.050 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Flow (ft <sup>3</sup> /s)				
11.600	15.01	14.81	14.63	14.50	14.39
11.850	14.31	14.23	14.17	14.13	14.10
12.100	14.08	14.08	14.09	14.13	14.18
12.350	14.25	14.33	14.42	14.53	14.58
12.600	14.47	14.26	14.06	13.94	13.85
12.850	13.78	13.74	13.71	13.68	13.70
13.100	13.82	13.98	14.06	14.04	13.99
13.350	13.92	13.82	13.72	13.63	13.55
13.600	13.48	13.41	13.33	13.27	13.23
13.850	13.19	13.16	13.12	13.10	13.09
14.100	13.11	13.13	13.15	13.15	13.14
14.350	13.12	13.10	13.08	13.06	13.04
14.600	13.02	13.00	12.98	12.95	12.92
14.850	12.90	12.87	12.85	12.84	12.82
15.100	12.80	12.78	12.76	12.74	12.71
15.350	12.69	12.66	12.63	12.60	12.58
15.600	12.56	12.53	12.51	12.49	12.47
15.850	12.46	12.43	12.41	12.38	12.35
16.100	12.32	12.30	12.28	12.25	12.23
16.350	12.20	12.18	12.15	12.13	12.11
16.600	12.08	12.06	12.03	12.01	11.98
16.850	11.96	11.93	11.91	11.89	11.86
17.100	11.83	11.81	11.79	11.76	11.72
17.350	11.69	11.67	11.64	11.62	11.61
17.600	11.58	11.55	11.53	11.51	11.48
17.850	11.45	11.42	11.38	11.36	11.33
18.100	11.31	11.28	11.25	11.23	11.21
18.350	11.19	11.17	11.14	11.10	11.07
18.600	11.04	11.02	10.99	10.96	10.93
18.850	10.91	10.88	10.85	10.83	10.80
19.100	10.77	10.75	10.72	10.70	10.67
19.350	10.64	10.61	10.59	10.56	10.53
19.600	10.50	10.48	10.45	10.42	10.38
19.850	10.35	10.32	10.30	10.27	10.25
20.100	10.23	10.20	10.17	10.14	10.12
20.350	10.08	10.05	10.01	9.98	9.96
20.600	9.93	9.90	9.87	9.85	9.83
20.850	9.81	9.78	9.75	9.71	9.68
21.100	9.65	9.62	9.59	9.56	9.53
21.350	9.50	9.47	9.44	9.42	9.39
21.600	9.36	9.33	9.30	9.28	9.25
21.850	9.21	9.19	9.16	9.13	9.10

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
Label: CM-1

Return Event: 2 years  
Storm Event: Brunswick NC 2-yr

**HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)**  
**Output Time Increment = 0.050 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Flow (ft <sup>3</sup> /s)				
22.100	9.07	9.04	9.01	8.98	8.94
22.350	8.91	8.88	8.85	8.83	8.81
22.600	8.78	8.75	8.72	8.69	8.66
22.850	8.63	8.59	8.56	8.53	8.50
23.100	8.47	8.44	8.41	8.38	8.36
23.350	8.34	8.31	8.28	8.24	8.20
23.600	8.17	8.14	8.11	8.08	8.05
23.850	8.02	7.99	7.96	7.94	(N/A)

## Brunswick Site

Subsection: Unit Hydrograph Summary  
Label: CM-1

Return Event: 2 years  
Storm Event: Brunswick NC 2-yr

Storm Event	Brunswick NC 2-yr
Return Event	2 years
Duration	24.000 hours
Depth	4.7 in
Time of Concentration (Composite)	0.200 hours
Area (User Defined)	89.400 acres
<hr/>	
Computational Time Increment	0.027 hours
Time to Peak (Computed)	8.000 hours
Flow (Peak, Computed)	53.72 ft <sup>3</sup> /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	8.000 hours
Flow (Peak Interpolated Output)	53.72 ft <sup>3</sup> /s
<hr/>	
<b>Drainage Area</b>	
SCS CN (Composite)	78.600
Area (User Defined)	89.400 acres
Maximum Retention (Pervious)	2.7 in
Maximum Retention (Pervious, 20 percent)	0.5 in
<hr/>	
<b>Cumulative Runoff</b>	
Cumulative Runoff Depth (Pervious)	2.5 in
Runoff Volume (Pervious)	18.893 ac-ft
<hr/>	
<b>Hydrograph Volume (Area under Hydrograph curve)</b>	
Volume	18.803 ac-ft
<hr/>	
<b>SCS Unit Hydrograph Parameters</b>	
Time of Concentration (Composite)	0.200 hours
Computational Time Increment	0.027 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

## Brunswick Site

Subsection: Unit Hydrograph Summary  
Label: CM-1

Return Event: 2 years  
Storm Event: Brunswick NC 2-yr

SCS Unit Hydrograph Parameters	
Unit peak, qp	506.47 ft <sup>3</sup> /s
Unit peak time, Tp	0.133 hours
Unit receding limb, Tr	0.533 hours
Total unit time, Tb	0.667 hours

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
Label: CM-1

Return Event: 2 years  
Storm Event: Brunswick NC 2-yr

Storm Event	Brunswick NC 2-yr
Return Event	2 years
Duration	24.000 hours
Depth	4.7 in
Time of Concentration (Composite)	0.200 hours
Area (User Defined)	89.400 acres

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
4.000	0.00	0.01	0.03	0.09	0.16
4.250	0.25	0.34	0.44	0.54	0.65
4.500	0.76	0.87	0.98	1.09	1.21
4.750	1.33	1.46	1.58	1.71	1.85
5.000	1.99	2.13	2.28	2.44	2.61
5.250	2.77	2.93	3.10	3.26	3.43
5.500	3.59	3.75	3.90	4.04	4.19
5.750	4.35	4.53	4.71	4.91	5.11
6.000	5.33	5.57	5.87	6.20	6.51
6.250	6.80	7.07	7.33	7.57	7.80
6.500	8.02	8.18	8.23	8.23	8.26
6.750	8.37	8.56	8.79	9.07	9.38
7.000	9.75	10.15	10.61	11.10	11.66
7.250	12.25	12.91	13.62	14.39	15.21
7.500	16.17	18.32	23.65	30.75	37.24
7.750	42.19	46.06	49.06	51.33	52.90
8.000	53.72	53.04	49.30	44.06	39.25
8.250	35.68	32.79	30.44	28.37	26.64
8.500	25.10	24.02	23.63	23.68	23.63
8.750	23.35	22.90	22.41	21.86	21.31
9.000	20.76	20.24	19.72	19.23	18.74
9.250	18.29	17.84	17.43	17.04	16.67
9.500	16.33	16.09	16.03	16.09	16.11
9.750	16.07	15.99	15.88	15.76	15.63
10.000	15.49	15.35	15.17	14.98	14.80
10.250	14.65	14.52	14.40	14.30	14.22
10.500	14.14	14.10	14.13	14.19	14.22
10.750	14.20	14.14	14.06	13.98	13.88
11.000	13.79	13.69	13.59	13.49	13.39
11.250	13.29	13.19	13.08	12.98	12.87
11.500	12.77	12.65	12.50	12.34	12.20
11.750	12.09	12.00	11.93	11.87	11.83
12.000	11.79	11.78	11.76	11.76	11.78

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
 Label: CM-1

Return Event: 2 years  
 Storm Event: Brunswick NC 2-yr

**HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)**  
**Output Time Increment = 0.050 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Flow (ft <sup>3</sup> /s)				
12.250	11.81	11.86	11.92	11.99	12.07
12.500	12.16	12.21	12.12	11.94	11.79
12.750	11.68	11.61	11.56	11.53	11.50
13.000	11.48	11.50	11.60	11.74	11.81
13.250	11.80	11.76	11.70	11.62	11.54
13.500	11.47	11.40	11.34	11.29	11.23
13.750	11.18	11.14	11.12	11.09	11.06
14.000	11.04	11.04	11.06	11.08	11.09
14.250	11.10	11.09	11.08	11.06	11.05
14.500	11.04	11.02	11.00	10.99	10.97
14.750	10.95	10.93	10.91	10.89	10.88
15.000	10.87	10.86	10.84	10.82	10.81
15.250	10.79	10.77	10.75	10.73	10.71
15.500	10.69	10.67	10.65	10.63	10.62
15.750	10.60	10.59	10.58	10.56	10.54
16.000	10.51	10.49	10.47	10.45	10.43
16.250	10.41	10.40	10.38	10.36	10.34
16.500	10.32	10.30	10.28	10.26	10.24
16.750	10.23	10.21	10.18	10.16	10.15
17.000	10.13	10.11	10.09	10.07	10.05
17.250	10.02	10.00	9.97	9.95	9.93
17.500	9.92	9.90	9.88	9.86	9.84
17.750	9.82	9.80	9.78	9.75	9.73
18.000	9.70	9.68	9.66	9.64	9.62
18.250	9.60	9.58	9.57	9.55	9.52
18.500	9.50	9.47	9.45	9.43	9.40
18.750	9.38	9.36	9.34	9.32	9.29
19.000	9.27	9.25	9.23	9.21	9.18
19.250	9.16	9.14	9.12	9.09	9.07
19.500	9.05	9.03	9.00	8.98	8.96
19.750	8.93	8.90	8.88	8.85	8.83
20.000	8.82	8.80	8.78	8.75	8.73
20.250	8.71	8.69	8.66	8.63	8.60
20.500	8.58	8.56	8.53	8.51	8.48
20.750	8.46	8.45	8.43	8.40	8.38
21.000	8.35	8.32	8.30	8.27	8.25
21.250	8.22	8.20	8.18	8.15	8.13
21.500	8.10	8.08	8.06	8.03	8.01
21.750	7.98	7.96	7.93	7.91	7.89
22.000	7.86	7.84	7.81	7.79	7.77
22.250	7.74	7.71	7.68	7.65	7.63
22.500	7.61	7.59	7.57	7.54	7.52

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
Label: CM-1

Return Event: 2 years  
Storm Event: Brunswick NC 2-yr

**HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)**  
**Output Time Increment = 0.050 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Flow (ft <sup>3</sup> /s)				
22.750	7.50	7.47	7.44	7.41	7.38
23.000	7.35	7.33	7.30	7.28	7.25
23.250	7.23	7.21	7.19	7.17	7.14
23.500	7.11	7.08	7.05	7.03	7.00
23.750	6.98	6.95	6.93	6.90	6.88
24.000	6.86	(N/A)	(N/A)	(N/A)	(N/A)

## Brunswick Site

Subsection: Unit Hydrograph Summary  
 Label: CM-1

Return Event: 10 years  
 Storm Event: Brunswick NC 10-yr

Storm Event	Brunswick NC 10-yr
Return Event	10 years
Duration	24.000 hours
Depth	6.8 in
Time of Concentration (Composite)	0.200 hours
Area (User Defined)	98.600 acres
<hr/>	
Computational Time Increment	0.027 hours
Time to Peak (Computed)	8.000 hours
Flow (Peak, Computed)	118.73 ft <sup>3</sup> /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	8.000 hours
Flow (Peak Interpolated Output)	118.73 ft <sup>3</sup> /s
<hr/>	
<b>Drainage Area</b>	
SCS CN (Composite)	82.100
Area (User Defined)	98.600 acres
Maximum Retention (Pervious)	2.2 in
Maximum Retention (Pervious, 20 percent)	0.4 in
<hr/>	
<b>Cumulative Runoff</b>	
Cumulative Runoff Depth (Pervious)	4.7 in
Runoff Volume (Pervious)	38.948 ac-ft
<hr/>	
<b>Hydrograph Volume (Area under Hydrograph curve)</b>	
Volume	38.790 ac-ft
<hr/>	
<b>SCS Unit Hydrograph Parameters</b>	
Time of Concentration (Composite)	0.200 hours
Computational Time Increment	0.027 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749

## Brunswick Site

Subsection: Unit Hydrograph Summary  
Label: CM-1

Return Event: 10 years  
Storm Event: Brunswick NC 10-yr

SCS Unit Hydrograph Parameters	
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	558.59 ft <sup>3</sup> /s
Unit peak time, Tp	0.133 hours
Unit receding limb, Tr	0.533 hours
Total unit time, Tb	0.667 hours

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
Label: CM-1

Return Event: 10 years  
Storm Event: Brunswick NC 10-yr

Storm Event	Brunswick NC 10-yr
Return Event	10 years
Duration	24.000 hours
Depth	6.8 in
Time of Concentration (Composite)	0.200 hours
Area (User Defined)	98.600 acres

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
2.450	0.00	0.01	0.05	0.14	0.29
2.700	0.46	0.65	0.84	1.04	1.24
2.950	1.43	1.62	1.81	1.99	2.16
3.200	2.33	2.51	2.69	2.87	3.06
3.450	3.25	3.45	3.65	3.89	4.14
3.700	4.40	4.64	4.88	5.11	5.35
3.950	5.59	5.82	6.04	6.24	6.43
4.200	6.63	6.84	7.06	7.29	7.53
4.450	7.77	8.02	8.27	8.53	8.80
4.700	9.07	9.35	9.63	9.93	10.24
4.950	10.56	10.89	11.23	11.61	12.00
5.200	12.40	12.78	13.15	13.51	13.87
5.450	14.22	14.57	14.89	15.15	15.38
5.700	15.65	15.97	16.33	16.72	17.13
5.950	17.56	18.04	18.59	19.31	20.10
6.200	20.84	21.48	22.05	22.56	23.03
6.450	23.45	23.83	24.06	23.95	23.70
6.700	23.57	23.68	23.98	24.42	24.98
6.950	25.63	26.41	27.28	28.28	29.36
7.200	30.58	31.87	33.33	34.87	36.55
7.450	38.33	40.42	45.33	57.82	74.25
7.700	88.81	99.28	106.96	112.45	116.17
7.950	118.26	118.73	116.05	106.94	94.87
8.200	83.92	75.80	69.28	63.98	59.36
8.450	55.51	52.12	49.70	48.74	48.69
8.700	48.46	47.74	46.71	45.58	44.36
8.950	43.15	41.95	40.80	39.67	38.61
9.200	37.56	36.60	35.64	34.76	33.92
9.450	33.15	32.42	31.89	31.73	31.80
9.700	31.81	31.69	31.47	31.23	30.95
9.950	30.66	30.36	30.04	29.65	29.25
10.200	28.87	28.54	28.25	27.99	27.78

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
Label: CM-1

Return Event: 10 years  
Storm Event: Brunswick NC 10-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
10.450	27.59	27.41	27.30	27.32	27.43
10.700	27.45	27.38	27.24	27.07	26.88
10.950	26.68	26.47	26.26	26.05	25.84
11.200	25.62	25.41	25.19	24.98	24.75
11.450	24.54	24.32	24.08	23.77	23.45
11.700	23.16	22.94	22.76	22.62	22.49
11.950	22.39	22.31	22.26	22.23	22.21
12.200	22.23	22.27	22.35	22.45	22.57
12.450	22.70	22.86	22.94	22.75	22.41
12.700	22.10	21.90	21.75	21.64	21.57
12.950	21.51	21.47	21.49	21.67	21.91
13.200	22.03	22.00	21.91	21.79	21.64
13.450	21.48	21.33	21.19	21.07	20.95
13.700	20.84	20.73	20.66	20.60	20.54
13.950	20.48	20.44	20.42	20.44	20.47
14.200	20.49	20.49	20.46	20.43	20.40
14.450	20.37	20.33	20.29	20.25	20.22
14.700	20.18	20.14	20.09	20.04	20.00
14.950	19.97	19.94	19.91	19.87	19.83
15.200	19.79	19.76	19.72	19.67	19.62
15.450	19.57	19.53	19.49	19.45	19.41
15.700	19.37	19.34	19.31	19.28	19.24
15.950	19.19	19.14	19.09	19.05	19.01
16.200	18.97	18.92	18.88	18.85	18.81
16.450	18.76	18.72	18.68	18.64	18.60
16.700	18.56	18.52	18.48	18.43	18.39
16.950	18.36	18.31	18.27	18.23	18.19
17.200	18.15	18.10	18.04	17.99	17.95
17.450	17.91	17.88	17.85	17.81	17.76
17.700	17.72	17.69	17.64	17.59	17.54
17.950	17.49	17.44	17.40	17.36	17.31
18.200	17.27	17.23	17.20	17.17	17.13
18.450	17.08	17.03	16.98	16.93	16.89
18.700	16.84	16.80	16.75	16.72	16.67
18.950	16.62	16.58	16.54	16.50	16.45
19.200	16.41	16.37	16.32	16.28	16.23
19.450	16.19	16.15	16.10	16.06	16.02
19.700	15.97	15.92	15.87	15.81	15.77
19.950	15.73	15.70	15.66	15.62	15.57
20.200	15.53	15.49	15.44	15.39	15.34
20.450	15.28	15.24	15.19	15.15	15.10
20.700	15.06	15.02	14.98	14.95	14.91

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
Label: CM-1

Return Event: 10 years  
Storm Event: Brunswick NC 10-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
20.950	14.86	14.80	14.75	14.70	14.66
21.200	14.61	14.56	14.52	14.48	14.43
21.450	14.38	14.34	14.30	14.25	14.20
21.700	14.16	14.12	14.07	14.02	13.98
21.950	13.94	13.89	13.84	13.80	13.76
22.200	13.71	13.66	13.60	13.54	13.50
22.450	13.46	13.42	13.39	13.34	13.29
22.700	13.25	13.21	13.16	13.11	13.05
22.950	13.00	12.95	12.91	12.86	12.81
23.200	12.76	12.73	12.69	12.65	12.61
23.450	12.56	12.50	12.45	12.40	12.36
23.700	12.31	12.26	12.21	12.17	12.12
23.950	12.08	12.04	(N/A)	(N/A)	(N/A)

## Brunswick Site

Subsection: Unit Hydrograph Summary  
 Label: CM-1

Return Event: 10 years  
 Storm Event: Brunswick NC 10-yr

Storm Event	Brunswick NC 10-yr
Return Event	10 years
Duration	24.000 hours
Depth	6.8 in
Time of Concentration (Composite)	0.200 hours
Area (User Defined)	89.400 acres
<hr/>	
Computational Time Increment	0.027 hours
Time to Peak (Computed)	8.000 hours
Flow (Peak, Computed)	97.35 ft <sup>3</sup> /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	8.000 hours
Flow (Peak Interpolated Output)	97.35 ft <sup>3</sup> /s
<hr/>	
<b>Drainage Area</b>	
SCS CN (Composite)	78.600
Area (User Defined)	89.400 acres
Maximum Retention (Pervious)	2.7 in
Maximum Retention (Pervious, 20 percent)	0.5 in
<hr/>	
<b>Cumulative Runoff</b>	
Cumulative Runoff Depth (Pervious)	4.4 in
Runoff Volume (Pervious)	32.471 ac-ft
<hr/>	
<b>Hydrograph Volume (Area under Hydrograph curve)</b>	
Volume	32.332 ac-ft
<hr/>	
<b>SCS Unit Hydrograph Parameters</b>	
Time of Concentration (Composite)	0.200 hours
Computational Time Increment	0.027 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749

## Brunswick Site

Subsection: Unit Hydrograph Summary  
Label: CM-1

Return Event: 10 years  
Storm Event: Brunswick NC 10-yr

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SCS Unit Hydrograph Parameters	
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	506.47 ft <sup>3</sup> /s
Unit peak time, Tp	0.133 hours
Unit receding limb, Tr	0.533 hours
Total unit time, Tb	0.667 hours

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## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
Label: CM-1

Return Event: 10 years  
Storm Event: Brunswick NC 10-yr

Storm Event	Brunswick NC 10-yr
Return Event	10 years
Duration	24.000 hours
Depth	6.8 in
Time of Concentration (Composite)	0.200 hours
Area (User Defined)	89.400 acres

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
2.950	0.00	0.01	0.04	0.11	0.21
3.200	0.33	0.47	0.61	0.75	0.90
3.450	1.05	1.21	1.37	1.54	1.72
3.700	1.91	2.09	2.28	2.46	2.65
3.950	2.84	3.02	3.21	3.38	3.54
4.200	3.71	3.89	4.07	4.26	4.45
4.450	4.65	4.85	5.06	5.27	5.49
4.700	5.71	5.93	6.16	6.40	6.65
4.950	6.91	7.17	7.45	7.75	8.06
5.200	8.38	8.68	8.99	9.29	9.58
5.450	9.87	10.16	10.44	10.67	10.88
5.700	11.12	11.39	11.70	12.02	12.37
5.950	12.73	13.12	13.57	14.15	14.78
6.200	15.38	15.90	16.38	16.81	17.22
6.450	17.59	17.93	18.15	18.12	17.98
6.700	17.93	18.05	18.33	18.71	19.19
6.950	19.74	20.38	21.10	21.92	22.81
7.200	23.81	24.88	26.08	27.35	28.74
7.450	30.21	31.93	35.91	45.97	59.26
7.700	71.15	79.85	86.38	91.18	94.55
7.950	96.62	97.35	95.45	88.19	78.42
8.200	69.51	62.91	57.60	53.28	49.51
8.450	46.35	43.57	41.60	40.83	40.83
8.700	40.67	40.10	39.26	38.35	37.34
8.950	36.36	35.37	34.42	33.49	32.61
9.200	31.75	30.95	30.16	29.43	28.73
9.450	28.09	27.49	27.05	26.92	27.00
9.700	27.01	26.92	26.75	26.55	26.32
9.950	26.09	25.84	25.58	25.26	24.93
10.200	24.61	24.34	24.10	23.89	23.71
10.450	23.56	23.41	23.32	23.35	23.45
10.700	23.48	23.42	23.31	23.17	23.01

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)

Return Event: 10 years

Label: CM-1

Storm Event: Brunswick NC 10-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
10.950	22.85	22.68	22.51	22.33	22.15
11.200	21.97	21.80	21.61	21.43	21.25
11.450	21.07	20.88	20.68	20.42	20.15
11.700	19.91	19.72	19.57	19.45	19.35
11.950	19.26	19.20	19.16	19.14	19.13
12.200	19.14	19.19	19.26	19.35	19.45
12.450	19.57	19.71	19.78	19.63	19.34
12.700	19.07	18.90	18.77	18.69	18.62
12.950	18.58	18.54	18.57	18.72	18.93
13.200	19.04	19.02	18.94	18.84	18.71
13.450	18.58	18.45	18.34	18.24	18.14
13.700	18.04	17.95	17.89	17.84	17.79
13.950	17.74	17.71	17.70	17.72	17.75
14.200	17.77	17.76	17.75	17.72	17.70
14.450	17.67	17.64	17.61	17.58	17.55
14.700	17.52	17.48	17.44	17.40	17.37
14.950	17.34	17.32	17.30	17.27	17.23
15.200	17.20	17.18	17.14	17.10	17.06
15.450	17.02	16.99	16.96	16.92	16.89
15.700	16.86	16.83	16.81	16.78	16.75
15.950	16.71	16.67	16.63	16.59	16.56
16.200	16.53	16.49	16.46	16.43	16.39
16.450	16.36	16.32	16.29	16.26	16.22
16.700	16.19	16.15	16.12	16.08	16.05
16.950	16.02	15.98	15.94	15.91	15.88
17.200	15.84	15.80	15.76	15.71	15.68
17.450	15.65	15.62	15.59	15.56	15.52
17.700	15.49	15.46	15.42	15.38	15.33
17.950	15.29	15.25	15.22	15.18	15.14
18.200	15.10	15.07	15.05	15.02	14.98
18.450	14.94	14.90	14.85	14.81	14.78
18.700	14.74	14.70	14.67	14.63	14.59
18.950	14.55	14.52	14.49	14.45	14.41
19.200	14.37	14.34	14.30	14.26	14.22
19.450	14.19	14.15	14.11	14.07	14.04
19.700	14.00	13.96	13.91	13.86	13.82
19.950	13.79	13.76	13.73	13.70	13.66
20.200	13.62	13.59	13.55	13.50	13.45
20.450	13.41	13.37	13.33	13.29	13.25
20.700	13.21	13.18	13.15	13.12	13.09
20.950	13.04	12.99	12.95	12.91	12.87
21.200	12.83	12.79	12.75	12.72	12.68

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
Label: CM-1

Return Event: 10 years  
Storm Event: Brunswick NC 10-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
21.450	12.63	12.60	12.56	12.52	12.48
21.700	12.44	12.40	12.36	12.32	12.28
21.950	12.25	12.21	12.17	12.13	12.09
22.200	12.05	12.01	11.96	11.91	11.87
22.450	11.83	11.80	11.77	11.73	11.69
22.700	11.65	11.62	11.58	11.53	11.48
22.950	11.43	11.39	11.35	11.31	11.27
23.200	11.23	11.20	11.17	11.14	11.10
23.450	11.05	11.00	10.96	10.91	10.88
23.700	10.83	10.79	10.75	10.71	10.67
23.950	10.63	10.61	(N/A)	(N/A)	(N/A)

## Brunswick Site

Subsection: Unit Hydrograph Summary  
 Label: CM-1

Return Event: 25 years  
 Storm Event: Brunswick NC 25-yr

Storm Event	Brunswick NC 25-yr
Return Event	25 years
Duration	24.000 hours
Depth	8.6 in
Time of Concentration (Composite)	0.200 hours
Area (User Defined)	98.600 acres
<hr/>	
Computational Time Increment	0.027 hours
Time to Peak (Computed)	7.973 hours
Flow (Peak, Computed)	162.74 ft <sup>3</sup> /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	8.000 hours
Flow (Peak Interpolated Output)	162.57 ft <sup>3</sup> /s
<hr/>	
<b>Drainage Area</b>	
SCS CN (Composite)	82.100
Area (User Defined)	98.600 acres
Maximum Retention (Pervious)	2.2 in
Maximum Retention (Pervious, 20 percent)	0.4 in
<hr/>	
<b>Cumulative Runoff</b>	
Cumulative Runoff Depth (Pervious)	6.4 in
Runoff Volume (Pervious)	52.864 ac-ft
<hr/>	
<b>Hydrograph Volume (Area under Hydrograph curve)</b>	
Volume	52.660 ac-ft
<hr/>	
<b>SCS Unit Hydrograph Parameters</b>	
Time of Concentration (Composite)	0.200 hours
Computational Time Increment	0.027 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749

## Brunswick Site

Subsection: Unit Hydrograph Summary  
Label: CM-1

Return Event: 25 years  
Storm Event: Brunswick NC 25-yr

SCS Unit Hydrograph Parameters	
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	558.59 ft <sup>3</sup> /s
Unit peak time, Tp	0.133 hours
Unit receding limb, Tr	0.533 hours
Total unit time, Tb	0.667 hours

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
Label: CM-1

Return Event: 25 years  
Storm Event: Brunswick NC 25-yr

Storm Event	Brunswick NC 25-yr
Return Event	25 years
Duration	24.000 hours
Depth	8.6 in
Time of Concentration (Composite)	0.200 hours
Area (User Defined)	98.600 acres

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
2.000	0.00	0.00	0.03	0.12	0.29
2.250	0.54	0.82	1.13	1.44	1.75
2.500	2.06	2.37	2.67	2.96	3.24
2.750	3.52	3.80	4.07	4.34	4.60
3.000	4.86	5.11	5.34	5.55	5.77
3.250	6.00	6.24	6.48	6.75	7.02
3.500	7.30	7.60	7.95	8.33	8.71
3.750	9.07	9.41	9.74	10.07	10.40
4.000	10.72	11.02	11.29	11.53	11.79
4.250	12.06	12.36	12.67	12.99	13.33
4.500	13.67	14.02	14.38	14.74	15.11
4.750	15.49	15.89	16.29	16.73	17.17
5.000	17.62	18.09	18.62	19.17	19.72
5.250	20.24	20.76	21.24	21.72	22.19
5.500	22.65	23.07	23.40	23.68	24.02
5.750	24.43	24.91	25.43	25.98	26.56
6.000	27.21	27.96	28.97	30.07	31.09
6.250	31.96	32.72	33.39	34.00	34.54
6.500	35.02	35.27	35.04	34.59	34.33
6.750	34.42	34.79	35.35	36.10	36.97
7.000	38.02	39.20	40.56	42.03	43.69
7.250	45.45	47.44	49.53	51.83	54.24
7.500	57.08	63.86	81.21	103.97	123.97
7.750	138.13	148.31	155.41	160.02	162.40
8.000	162.57	158.48	145.72	129.01	113.91
8.250	102.72	93.75	86.46	80.13	74.85
8.500	70.21	66.90	65.54	65.42	65.06
8.750	64.06	62.62	61.08	59.40	57.75
9.000	56.11	54.54	53.01	51.56	50.14
9.250	48.83	47.54	46.34	45.20	44.15
9.500	43.17	42.44	42.21	42.30	42.29
9.750	42.11	41.82	41.47	41.09	40.70

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
 Label: CM-1

Return Event: 25 years  
 Storm Event: Brunswick NC 25-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
10.000	40.28	39.85	39.32	38.78	38.26
10.250	37.82	37.42	37.07	36.77	36.52
10.500	36.27	36.11	36.14	36.26	36.29
10.750	36.19	35.99	35.77	35.50	35.23
11.000	34.95	34.66	34.37	34.09	33.80
11.250	33.51	33.21	32.92	32.62	32.33
11.500	32.04	31.71	31.30	30.87	30.49
11.750	30.19	29.95	29.76	29.59	29.45
12.000	29.34	29.27	29.22	29.20	29.21
12.250	29.27	29.37	29.50	29.65	29.81
12.500	30.02	30.11	29.87	29.42	29.01
12.750	28.73	28.53	28.39	28.29	28.21
13.000	28.15	28.17	28.40	28.71	28.86
13.250	28.83	28.70	28.54	28.34	28.13
13.500	27.92	27.75	27.58	27.43	27.27
13.750	27.13	27.03	26.95	26.86	26.78
14.000	26.73	26.71	26.73	26.77	26.79
14.250	26.78	26.75	26.70	26.66	26.61
14.500	26.56	26.50	26.45	26.41	26.35
14.750	26.29	26.22	26.16	26.10	26.06
15.000	26.02	25.98	25.92	25.87	25.82
15.250	25.77	25.71	25.65	25.58	25.52
15.500	25.46	25.41	25.35	25.29	25.24
15.750	25.20	25.16	25.11	25.06	25.00
16.000	24.93	24.87	24.81	24.76	24.70
16.250	24.64	24.59	24.54	24.48	24.42
16.500	24.37	24.32	24.26	24.20	24.14
16.750	24.10	24.04	23.98	23.92	23.87
17.000	23.81	23.75	23.70	23.65	23.59
17.250	23.53	23.46	23.39	23.33	23.28
17.500	23.24	23.19	23.14	23.08	23.03
17.750	22.97	22.92	22.85	22.78	22.71
18.000	22.65	22.60	22.54	22.48	22.42
18.250	22.37	22.33	22.29	22.23	22.17
18.500	22.10	22.03	21.97	21.91	21.85
18.750	21.79	21.74	21.68	21.62	21.56
19.000	21.50	21.45	21.39	21.33	21.27
19.250	21.22	21.16	21.10	21.04	20.99
19.500	20.93	20.87	20.81	20.76	20.70
19.750	20.63	20.56	20.49	20.43	20.38
20.000	20.33	20.29	20.23	20.17	20.11
20.250	20.06	20.00	19.93	19.86	19.79

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
Label: CM-1

Return Event: 25 years  
Storm Event: Brunswick NC 25-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
20.500	19.73	19.67	19.61	19.55	19.49
20.750	19.44	19.40	19.35	19.29	19.23
21.000	19.16	19.09	19.02	18.97	18.91
21.250	18.84	18.78	18.73	18.67	18.61
21.500	18.55	18.50	18.43	18.37	18.31
21.750	18.26	18.20	18.13	18.08	18.02
22.000	17.96	17.90	17.84	17.78	17.72
22.250	17.65	17.58	17.51	17.45	17.40
22.500	17.35	17.30	17.24	17.18	17.12
22.750	17.07	17.01	16.94	16.87	16.79
23.000	16.73	16.67	16.61	16.55	16.49
23.250	16.44	16.39	16.35	16.29	16.22
23.500	16.15	16.08	16.01	15.96	15.89
23.750	15.83	15.77	15.72	15.65	15.59
24.000	15.55	(N/A)	(N/A)	(N/A)	(N/A)

## Brunswick Site

Subsection: Unit Hydrograph Summary  
 Label: CM-1

Return Event: 25 years  
 Storm Event: Brunswick NC 25-yr

Storm Event	Brunswick NC 25-yr
Return Event	25 years
Duration	24.000 hours
Depth	8.6 in
Time of Concentration (Composite)	0.200 hours
Area (User Defined)	89.400 acres
<hr/>	
Computational Time Increment	0.027 hours
Time to Peak (Computed)	8.000 hours
Flow (Peak, Computed)	136.61 ft <sup>3</sup> /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	8.000 hours
Flow (Peak Interpolated Output)	136.61 ft <sup>3</sup> /s
<hr/>	
<b>Drainage Area</b>	
SCS CN (Composite)	78.600
Area (User Defined)	89.400 acres
Maximum Retention (Pervious)	2.7 in
Maximum Retention (Pervious, 20 percent)	0.5 in
<hr/>	
<b>Cumulative Runoff</b>	
Cumulative Runoff Depth (Pervious)	6.0 in
Runoff Volume (Pervious)	44.784 ac-ft
<hr/>	
<b>Hydrograph Volume (Area under Hydrograph curve)</b>	
Volume	44.603 ac-ft
<hr/>	
<b>SCS Unit Hydrograph Parameters</b>	
Time of Concentration (Composite)	0.200 hours
Computational Time Increment	0.027 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749

## Brunswick Site

Subsection: Unit Hydrograph Summary  
Label: CM-1

Return Event: 25 years  
Storm Event: Brunswick NC 25-yr

SCS Unit Hydrograph Parameters	
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	506.47 ft <sup>3</sup> /s
Unit peak time, Tp	0.133 hours
Unit receding limb, Tr	0.533 hours
Total unit time, Tb	0.667 hours

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
 Label: CM-1

Return Event: 25 years  
 Storm Event: Brunswick NC 25-yr

Storm Event	Brunswick NC 25-yr
Return Event	25 years
Duration	24.000 hours
Depth	8.6 in
Time of Concentration (Composite)	0.200 hours
Area (User Defined)	89.400 acres

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
2.400	0.00	0.00	0.02	0.10	0.24
2.650	0.42	0.63	0.86	1.08	1.31
2.900	1.54	1.76	1.98	2.20	2.40
3.150	2.60	2.80	3.00	3.20	3.41
3.400	3.63	3.85	4.08	4.32	4.59
3.650	4.88	5.17	5.46	5.73	6.00
3.900	6.27	6.55	6.81	7.07	7.30
4.150	7.52	7.75	7.99	8.24	8.50
4.400	8.78	9.06	9.34	9.64	9.94
4.650	10.24	10.55	10.87	11.20	11.54
4.900	11.90	12.27	12.65	13.04	13.48
5.150	13.93	14.39	14.82	15.25	15.67
5.400	16.08	16.48	16.88	17.25	17.55
5.650	17.81	18.12	18.49	18.90	19.35
5.900	19.82	20.32	20.86	21.50	22.33
6.150	23.24	24.09	24.82	25.48	26.07
6.400	26.61	27.09	27.53	27.78	27.66
6.650	27.36	27.21	27.33	27.68	28.18
6.900	28.83	29.58	30.47	31.48	32.62
7.150	33.86	35.26	36.75	38.43	40.20
7.400	42.14	44.18	46.58	52.24	66.62
7.650	85.54	102.29	114.33	123.15	129.45
7.900	133.70	136.09	136.61	133.51	123.01
8.150	109.11	96.51	87.16	79.66	73.56
8.400	68.25	63.82	59.91	57.13	56.02
8.650	55.96	55.69	54.87	53.68	52.38
8.900	50.97	49.59	48.20	46.88	45.58
9.150	44.36	43.16	42.05	40.95	39.94
9.400	38.97	38.08	37.25	36.63	36.44
9.650	36.53	36.54	36.40	36.15	35.87
9.900	35.54	35.22	34.87	34.50	34.05
10.150	33.59	33.16	32.78	32.44	32.15

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
 Label: CM-1

Return Event: 25 years  
 Storm Event: Brunswick NC 25-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
10.400	31.90	31.69	31.48	31.35	31.38
10.650	31.49	31.53	31.44	31.28	31.09
10.900	30.87	30.64	30.40	30.16	29.91
11.150	29.67	29.42	29.18	28.92	28.68
11.400	28.42	28.17	27.92	27.64	27.29
11.650	26.92	26.59	26.33	26.13	25.97
11.900	25.82	25.70	25.61	25.56	25.52
12.150	25.50	25.52	25.57	25.66	25.78
12.400	25.91	26.06	26.25	26.33	26.12
12.650	25.73	25.37	25.14	24.97	24.84
12.900	24.76	24.69	24.64	24.67	24.87
13.150	25.14	25.28	25.25	25.15	25.01
13.400	24.83	24.65	24.48	24.33	24.18
13.650	24.05	23.91	23.80	23.71	23.64
13.900	23.57	23.50	23.45	23.44	23.46
14.150	23.50	23.52	23.51	23.48	23.45
14.400	23.41	23.38	23.33	23.28	23.24
14.650	23.20	23.16	23.11	23.05	22.99
14.900	22.95	22.91	22.88	22.84	22.80
15.150	22.75	22.71	22.67	22.62	22.57
15.400	22.51	22.46	22.41	22.37	22.32
15.650	22.27	22.22	22.19	22.15	22.12
15.900	22.07	22.02	21.96	21.91	21.86
16.150	21.81	21.76	21.71	21.67	21.63
16.400	21.58	21.53	21.48	21.44	21.39
16.650	21.34	21.29	21.25	21.20	21.15
16.900	21.10	21.06	21.01	20.96	20.91
17.150	20.87	20.82	20.76	20.70	20.64
17.400	20.59	20.55	20.51	20.48	20.43
17.650	20.38	20.33	20.29	20.24	20.18
17.900	20.12	20.06	20.01	19.97	19.91
18.150	19.86	19.81	19.77	19.73	19.70
18.400	19.65	19.59	19.53	19.47	19.42
18.650	19.37	19.32	19.27	19.22	19.18
18.900	19.12	19.07	19.02	18.98	18.92
19.150	18.87	18.82	18.78	18.72	18.67
19.400	18.62	18.58	18.52	18.47	18.42
19.650	18.38	18.32	18.26	18.20	18.14
19.900	18.09	18.04	18.00	17.96	17.91
20.150	17.86	17.81	17.77	17.71	17.66
20.400	17.59	17.53	17.48	17.43	17.37
20.650	17.32	17.27	17.23	17.19	17.15

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
Label: CM-1

Return Event: 25 years  
Storm Event: Brunswick NC 25-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
20.900	17.10	17.04	16.98	16.92	16.86
21.150	16.81	16.76	16.70	16.65	16.61
21.400	16.55	16.50	16.45	16.40	16.34
21.650	16.29	16.24	16.19	16.14	16.08
21.900	16.03	15.98	15.93	15.87	15.82
22.150	15.78	15.72	15.66	15.60	15.53
22.400	15.48	15.43	15.39	15.35	15.30
22.650	15.25	15.20	15.15	15.10	15.04
22.900	14.97	14.91	14.85	14.80	14.75
23.150	14.69	14.64	14.59	14.55	14.51
23.400	14.46	14.40	14.34	14.27	14.22
23.650	14.17	14.11	14.06	14.00	13.96
23.900	13.90	13.85	13.81	(N/A)	(N/A)

## Brunswick Site

Subsection: Unit Hydrograph Summary  
 Label: CM-1

Return Event: 100 years  
 Storm Event: Brunswick NC 100-yr

Storm Event	Brunswick NC 100-yr
Return Event	100 years
Duration	24.000 hours
Depth	9.6 in
Time of Concentration (Composite)	0.200 hours
Area (User Defined)	98.600 acres
<hr/>	
Computational Time Increment	0.027 hours
Time to Peak (Computed)	7.973 hours
Flow (Peak, Computed)	188.66 ft <sup>3</sup> /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	7.950 hours
Flow (Peak Interpolated Output)	188.38 ft <sup>3</sup> /s
<hr/>	
<b>Drainage Area</b>	
SCS CN (Composite)	82.100
Area (User Defined)	98.600 acres
Maximum Retention (Pervious)	2.2 in
Maximum Retention (Pervious, 20 percent)	0.4 in
<hr/>	
<b>Cumulative Runoff</b>	
Cumulative Runoff Depth (Pervious)	7.4 in
Runoff Volume (Pervious)	61.143 ac-ft
<hr/>	
<b>Hydrograph Volume (Area under Hydrograph curve)</b>	
Volume	60.912 ac-ft
<hr/>	
<b>SCS Unit Hydrograph Parameters</b>	
Time of Concentration (Composite)	0.200 hours
Computational Time Increment	0.027 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749

## Brunswick Site

Subsection: Unit Hydrograph Summary  
Label: CM-1

Return Event: 100 years  
Storm Event: Brunswick NC 100-yr

SCS Unit Hydrograph Parameters	
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	558.59 ft <sup>3</sup> /s
Unit peak time, Tp	0.133 hours
Unit receding limb, Tr	0.533 hours
Total unit time, Tb	0.667 hours

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
Label: CM-1

Return Event: 100 years  
Storm Event: Brunswick NC 100-yr

Storm Event	Brunswick NC 100-yr
Return Event	100 years
Duration	24.000 hours
Depth	9.6 in
Time of Concentration (Composite)	0.200 hours
Area (User Defined)	98.600 acres

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
1.850	0.00	0.01	0.08	0.25	0.51
2.100	0.84	1.20	1.57	1.95	2.34
2.350	2.73	3.11	3.48	3.85	4.22
2.600	4.56	4.89	5.21	5.53	5.85
2.850	6.16	6.47	6.77	7.07	7.35
3.100	7.60	7.84	8.08	8.34	8.61
3.350	8.90	9.20	9.52	9.85	10.20
3.600	10.62	11.07	11.53	11.96	12.36
3.850	12.74	13.13	13.52	13.89	14.23
4.100	14.53	14.81	15.10	15.41	15.75
4.350	16.10	16.47	16.86	17.25	17.65
4.600	18.07	18.49	18.92	19.35	19.81
4.850	20.29	20.79	21.30	21.82	22.37
5.100	22.99	23.63	24.27	24.88	25.47
5.350	26.03	26.58	27.11	27.64	28.11
5.600	28.48	28.78	29.15	29.62	30.17
5.850	30.76	31.39	32.05	32.79	33.66
6.100	34.84	36.13	37.32	38.31	39.18
6.350	39.95	40.64	41.24	41.77	42.03
6.600	41.72	41.14	40.80	40.87	41.28
6.850	41.91	42.76	43.76	44.97	46.34
7.100	47.90	49.59	51.51	53.55	55.85
7.350	58.27	60.92	63.70	66.98	74.87
7.600	95.09	121.58	144.77	161.09	172.73
7.850	180.75	185.86	188.38	188.34	183.40
8.100	168.48	149.05	131.51	118.50	108.09
8.350	99.63	92.29	86.18	80.80	76.96
8.600	75.38	75.21	74.77	73.60	71.93
8.850	70.14	68.19	66.29	64.38	62.58
9.100	60.80	59.13	57.49	55.97	54.48
9.350	53.11	51.79	50.58	49.45	48.61
9.600	48.33	48.43	48.41	48.20	47.86

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
 Label: CM-1

Return Event: 100 years  
 Storm Event: Brunswick NC 100-yr

**HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)**  
**Output Time Increment = 0.050 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Flow (ft <sup>3</sup> /s)				
9.850	47.46	47.01	46.55	46.07	45.57
10.100	44.96	44.34	43.74	43.23	42.77
10.350	42.37	42.02	41.73	41.44	41.25
10.600	41.28	41.42	41.45	41.33	41.10
10.850	40.83	40.53	40.22	39.89	39.56
11.100	39.23	38.90	38.56	38.23	37.89
11.350	37.56	37.21	36.88	36.54	36.17
11.600	35.70	35.20	34.76	34.42	34.15
11.850	33.92	33.73	33.56	33.44	33.36
12.100	33.30	33.27	33.28	33.35	33.46
12.350	33.60	33.77	33.96	34.19	34.30
12.600	34.02	33.50	33.03	32.72	32.49
12.850	32.32	32.20	32.12	32.04	32.07
13.100	32.33	32.68	32.85	32.81	32.66
13.350	32.48	32.25	32.00	31.77	31.57
13.600	31.38	31.20	31.02	30.86	30.74
13.850	30.65	30.55	30.46	30.39	30.37
14.100	30.40	30.44	30.46	30.45	30.41
14.350	30.36	30.30	30.25	30.19	30.13
14.600	30.07	30.01	29.95	29.88	29.80
14.850	29.73	29.66	29.61	29.56	29.51
15.100	29.45	29.39	29.33	29.28	29.21
15.350	29.14	29.06	28.98	28.92	28.86
15.600	28.79	28.73	28.66	28.61	28.57
15.850	28.52	28.46	28.39	28.31	28.23
16.100	28.17	28.11	28.04	27.97	27.91
16.350	27.85	27.79	27.72	27.66	27.60
16.600	27.53	27.46	27.40	27.34	27.28
16.850	27.21	27.15	27.09	27.02	26.95
17.100	26.89	26.83	26.76	26.69	26.61
17.350	26.53	26.46	26.41	26.36	26.31
17.600	26.24	26.18	26.11	26.06	25.99
17.850	25.91	25.83	25.76	25.69	25.63
18.100	25.56	25.49	25.42	25.37	25.32
18.350	25.27	25.20	25.13	25.05	24.97
18.600	24.90	24.84	24.77	24.70	24.64
18.850	24.58	24.51	24.44	24.37	24.31
19.100	24.25	24.18	24.11	24.05	23.98
19.350	23.91	23.85	23.79	23.72	23.65
19.600	23.58	23.52	23.45	23.38	23.29
19.850	23.21	23.14	23.09	23.04	22.98
20.100	22.92	22.85	22.79	22.73	22.66

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
 Label: CM-1

Return Event: 100 years  
 Storm Event: Brunswik NC 100-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
20.350	22.58	22.50	22.42	22.35	22.28
20.600	22.21	22.14	22.08	22.02	21.97
20.850	21.92	21.85	21.78	21.69	21.61
21.100	21.54	21.48	21.41	21.34	21.27
21.350	21.21	21.14	21.07	21.00	20.94
21.600	20.87	20.80	20.73	20.67	20.60
21.850	20.53	20.46	20.40	20.33	20.26
22.100	20.19	20.13	20.06	19.99	19.90
22.350	19.82	19.75	19.69	19.64	19.58
22.600	19.52	19.45	19.38	19.32	19.25
22.850	19.17	19.09	19.01	18.94	18.87
23.100	18.80	18.73	18.66	18.60	18.55
23.350	18.50	18.43	18.36	18.27	18.19
23.600	18.12	18.06	17.99	17.91	17.84
23.850	17.78	17.71	17.64	17.60	(N/A)

## Brunswick Site

Subsection: Unit Hydrograph Summary  
 Label: CM-1

Return Event: 100 years  
 Storm Event: Brunswick NC 100-yr

Storm Event	Brunswick NC 100-yr
Return Event	100 years
Duration	24.000 hours
Depth	9.6 in
Time of Concentration (Composite)	0.200 hours
Area (User Defined)	89.400 acres
<hr/>	
Computational Time Increment	0.027 hours
Time to Peak (Computed)	7.973 hours
Flow (Peak, Computed)	159.95 ft <sup>3</sup> /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	8.000 hours
Flow (Peak Interpolated Output)	159.89 ft <sup>3</sup> /s
<hr/>	
<b>Drainage Area</b>	
SCS CN (Composite)	78.600
Area (User Defined)	89.400 acres
Maximum Retention (Pervious)	2.7 in
Maximum Retention (Pervious, 20 percent)	0.5 in
<hr/>	
<b>Cumulative Runoff</b>	
Cumulative Runoff Depth (Pervious)	7.0 in
Runoff Volume (Pervious)	52.151 ac-ft
<hr/>	
<b>Hydrograph Volume (Area under Hydrograph curve)</b>	
Volume	51.946 ac-ft
<hr/>	
<b>SCS Unit Hydrograph Parameters</b>	
Time of Concentration (Composite)	0.200 hours
Computational Time Increment	0.027 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749

## Brunswick Site

Subsection: Unit Hydrograph Summary  
Label: CM-1

Return Event: 100 years  
Storm Event: Brunswick NC 100-yr

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SCS Unit Hydrograph Parameters	
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	506.47 ft <sup>3</sup> /s
Unit peak time, Tp	0.133 hours
Unit receding limb, Tr	0.533 hours
Total unit time, Tb	0.667 hours

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## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
 Label: CM-1

Return Event: 100 years  
 Storm Event: Brunswik NC 100-yr

Storm Event	Brunswik NC 100-yr
Return Event	100 years
Duration	24.000 hours
Depth	9.6 in
Time of Concentration (Composite)	0.200 hours
Area (User Defined)	89.400 acres

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
2.200	0.00	0.01	0.05	0.16	0.36
2.450	0.61	0.88	1.17	1.45	1.73
2.700	2.01	2.29	2.56	2.83	3.10
2.950	3.36	3.62	3.87	4.10	4.32
3.200	4.54	4.77	5.01	5.25	5.51
3.450	5.78	6.05	6.33	6.66	7.02
3.700	7.38	7.73	8.06	8.38	8.70
3.950	9.02	9.34	9.63	9.90	10.15
4.200	10.41	10.69	10.98	11.28	11.61
4.450	11.93	12.27	12.61	12.97	13.32
4.700	13.69	14.06	14.45	14.85	15.28
4.950	15.71	16.15	16.62	17.13	17.67
5.200	18.21	18.72	19.22	19.71	20.18
5.450	20.65	21.11	21.53	21.87	22.15
5.700	22.50	22.92	23.40	23.91	24.46
5.950	25.04	25.68	26.42	27.41	28.48
6.200	29.48	30.33	31.09	31.77	32.38
6.450	32.93	33.42	33.69	33.50	33.10
6.700	32.89	33.00	33.38	33.95	34.69
6.950	35.56	36.60	37.77	39.11	40.56
7.200	42.19	43.93	45.89	47.96	50.22
7.450	52.60	55.40	62.05	79.01	101.28
7.700	120.92	134.93	145.08	152.25	156.98
7.950	159.53	159.89	156.05	143.62	127.26
8.200	112.45	101.47	92.67	85.51	79.29
8.450	74.10	69.53	66.28	64.96	64.86
8.700	64.53	63.55	62.15	60.63	58.98
8.950	57.36	55.74	54.20	52.68	51.26
9.200	49.85	48.56	47.28	46.10	44.98
9.450	43.94	42.97	42.25	42.03	42.12
9.700	42.12	41.95	41.66	41.32	40.95
9.950	40.56	40.15	39.72	39.20	38.67

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
 Label: CM-1

Return Event: 100 years  
 Storm Event: Brunswick NC 100-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
10.200	38.16	37.72	37.32	36.99	36.69
10.450	36.44	36.20	36.04	36.07	36.20
10.700	36.24	36.13	35.94	35.72	35.46
10.950	35.19	34.91	34.63	34.35	34.07
11.200	33.77	33.49	33.20	32.91	32.61
11.450	32.33	32.03	31.71	31.30	30.88
11.700	30.50	30.20	29.96	29.77	29.60
11.950	29.46	29.36	29.29	29.24	29.22
12.200	29.24	29.30	29.40	29.53	29.68
12.450	29.85	30.06	30.15	29.91	29.46
12.700	29.05	28.78	28.58	28.44	28.34
12.950	28.26	28.20	28.23	28.46	28.77
13.200	28.92	28.89	28.77	28.61	28.40
13.450	28.19	27.99	27.82	27.65	27.50
13.700	27.34	27.21	27.10	27.02	26.94
13.950	26.86	26.81	26.79	26.81	26.85
14.200	26.87	26.86	26.83	26.79	26.74
14.450	26.70	26.65	26.60	26.55	26.50
14.700	26.45	26.39	26.32	26.26	26.20
14.950	26.16	26.12	26.08	26.03	25.97
15.200	25.92	25.88	25.82	25.76	25.69
15.450	25.63	25.57	25.52	25.46	25.41
15.700	25.35	25.31	25.27	25.23	25.18
15.950	25.12	25.05	24.98	24.93	24.88
16.200	24.82	24.76	24.71	24.66	24.60
16.450	24.54	24.49	24.44	24.38	24.32
16.700	24.27	24.22	24.16	24.10	24.05
16.950	24.00	23.94	23.88	23.83	23.78
17.200	23.72	23.66	23.59	23.52	23.46
17.450	23.41	23.37	23.33	23.27	23.21
17.700	23.16	23.11	23.05	22.98	22.91
17.950	22.85	22.79	22.73	22.67	22.61
18.200	22.56	22.51	22.47	22.42	22.37
18.450	22.31	22.23	22.17	22.11	22.05
18.700	21.99	21.93	21.87	21.82	21.76
18.950	21.70	21.64	21.59	21.53	21.47
19.200	21.41	21.36	21.30	21.24	21.18
19.450	21.13	21.07	21.01	20.95	20.90
19.700	20.84	20.77	20.70	20.63	20.57
19.950	20.52	20.47	20.43	20.37	20.31
20.200	20.25	20.20	20.14	20.08	20.00
20.450	19.93	19.87	19.81	19.75	19.69

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
Label: CM-1

Return Event: 100 years  
Storm Event: Brunswick NC 100-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
20.700	19.63	19.58	19.54	19.49	19.44
20.950	19.37	19.30	19.23	19.17	19.11
21.200	19.05	18.98	18.93	18.87	18.81
21.450	18.75	18.69	18.64	18.57	18.51
21.700	18.45	18.40	18.34	18.27	18.21
21.950	18.16	18.10	18.04	17.98	17.92
22.200	17.86	17.79	17.72	17.65	17.58
22.450	17.53	17.49	17.44	17.38	17.32
22.700	17.26	17.21	17.15	17.08	17.00
22.950	16.93	16.87	16.81	16.75	16.68
23.200	16.62	16.57	16.53	16.48	16.42
23.450	16.35	16.28	16.21	16.15	16.09
23.700	16.03	15.96	15.90	15.85	15.78
23.950	15.72	15.68	(N/A)	(N/A)	(N/A)

## Brunswick Site

Subsection: Unit Hydrograph Summary  
Label: CM-2

Return Event: 2 years  
Storm Event: Brunswick NC 2-yr

Storm Event	Brunswick NC 2-yr
Return Event	2 years
Duration	24.000 hours
Depth	4.7 in
Time of Concentration (Composite)	0.200 hours
Area (User Defined)	28.100 acres
<hr/>	
Computational Time Increment	0.027 hours
Time to Peak (Computed)	7.973 hours
Flow (Peak, Computed)	24.28 ft <sup>3</sup> /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	8.000 hours
Flow (Peak Interpolated Output)	24.28 ft <sup>3</sup> /s
<hr/>	
<b>Drainage Area</b>	
SCS CN (Composite)	87.740
Area (User Defined)	28.100 acres
Maximum Retention (Pervious)	1.4 in
Maximum Retention (Pervious, 20 percent)	0.3 in
<hr/>	
<b>Cumulative Runoff</b>	
Cumulative Runoff Depth (Pervious)	3.4 in
Runoff Volume (Pervious)	7.932 ac-ft
<hr/>	
<b>Hydrograph Volume (Area under Hydrograph curve)</b>	
Volume	7.900 ac-ft
<hr/>	
<b>SCS Unit Hydrograph Parameters</b>	
Time of Concentration (Composite)	0.200 hours
Computational Time Increment	0.027 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

## Brunswick Site

Subsection: Unit Hydrograph Summary  
Label: CM-2

Return Event: 2 years  
Storm Event: Brunswick NC 2-yr

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SCS Unit Hydrograph Parameters	
Unit peak, qp	159.19 ft <sup>3</sup> /s
Unit peak time, Tp	0.133 hours
Unit receding limb, Tr	0.533 hours
Total unit time, Tb	0.667 hours

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## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
Label: CM-2

Return Event: 2 years  
Storm Event: Brunswick NC 2-yr

Storm Event	Brunswick NC 2-yr
Return Event	2 years
Duration	24.000 hours
Depth	4.7 in
Time of Concentration (Composite)	0.200 hours
Area (User Defined)	28.100 acres

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

**Output Time Increment = 0.050 hours**

**Time on left represents time for first value in each row.**

Time (hours)	Flow (ft <sup>3</sup> /s)				
2.300	0.00	0.00	0.01	0.03	0.07
2.550	0.11	0.15	0.19	0.23	0.27
2.800	0.31	0.35	0.39	0.43	0.47
3.050	0.51	0.55	0.58	0.62	0.65
3.300	0.69	0.72	0.76	0.80	0.84
3.550	0.89	0.94	0.99	1.04	1.10
3.800	1.14	1.19	1.24	1.29	1.34
4.050	1.38	1.42	1.46	1.50	1.54
4.300	1.59	1.64	1.68	1.73	1.79
4.550	1.84	1.89	1.95	2.00	2.06
4.800	2.12	2.18	2.24	2.31	2.37
5.050	2.44	2.52	2.60	2.68	2.76
5.300	2.84	2.91	2.99	3.06	3.13
5.550	3.19	3.24	3.29	3.34	3.41
5.800	3.48	3.56	3.64	3.73	3.83
6.050	3.94	4.09	4.25	4.40	4.53
6.300	4.65	4.75	4.84	4.93	5.01
6.550	5.05	5.02	4.96	4.93	4.95
6.800	5.01	5.10	5.21	5.35	5.50
7.050	5.68	5.88	6.10	6.35	6.62
7.300	6.91	7.23	7.57	7.94	8.36
7.550	9.37	11.94	15.31	18.29	20.42
7.800	21.97	23.07	23.81	24.21	24.28
8.050	23.70	21.83	19.35	17.10	15.44
8.300	14.10	13.02	12.07	11.28	10.59
8.550	10.10	9.90	9.88	9.83	9.69
8.800	9.47	9.24	8.99	8.75	8.50
9.050	8.27	8.04	7.82	7.61	7.41
9.300	7.22	7.04	6.86	6.71	6.56
9.550	6.45	6.42	6.43	6.43	6.41
9.800	6.36	6.31	6.25	6.20	6.13
10.050	6.07	5.99	5.91	5.83	5.76
10.300	5.70	5.65	5.61	5.57	5.53

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
 Label: CM-2

Return Event: 2 years  
 Storm Event: Brunswick NC 2-yr

**HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)**  
**Output Time Increment = 0.050 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Flow (ft <sup>3</sup> /s)				
10.550	5.51	5.51	5.53	5.54	5.52
10.800	5.50	5.46	5.42	5.38	5.34
11.050	5.30	5.25	5.21	5.17	5.12
11.300	5.08	5.03	4.99	4.94	4.90
11.550	4.85	4.79	4.72	4.67	4.62
11.800	4.58	4.56	4.53	4.51	4.49
12.050	4.48	4.47	4.47	4.47	4.48
12.300	4.50	4.52	4.54	4.57	4.60
12.550	4.62	4.58	4.51	4.45	4.41
12.800	4.38	4.35	4.34	4.33	4.32
13.050	4.32	4.36	4.41	4.43	4.42
13.300	4.40	4.38	4.35	4.32	4.29
13.550	4.26	4.24	4.21	4.19	4.17
13.800	4.15	4.14	4.13	4.11	4.11
14.050	4.10	4.11	4.11	4.12	4.12
14.300	4.11	4.10	4.10	4.09	4.08
14.550	4.08	4.07	4.06	4.05	4.04
14.800	4.03	4.02	4.02	4.01	4.00
15.050	4.00	3.99	3.98	3.97	3.97
15.300	3.96	3.95	3.94	3.93	3.92
15.550	3.91	3.90	3.89	3.89	3.88
15.800	3.87	3.87	3.86	3.85	3.84
16.050	3.83	3.82	3.81	3.81	3.80
16.300	3.79	3.78	3.77	3.76	3.75
16.550	3.75	3.74	3.73	3.72	3.71
16.800	3.71	3.70	3.69	3.68	3.67
17.050	3.66	3.65	3.65	3.64	3.63
17.300	3.62	3.61	3.60	3.59	3.58
17.550	3.58	3.57	3.56	3.55	3.54
17.800	3.54	3.53	3.51	3.50	3.50
18.050	3.49	3.48	3.47	3.46	3.45
18.300	3.45	3.44	3.43	3.42	3.41
18.550	3.40	3.39	3.38	3.37	3.36
18.800	3.36	3.35	3.34	3.33	3.32
19.050	3.31	3.30	3.29	3.29	3.28
19.300	3.27	3.26	3.25	3.24	3.23
19.550	3.22	3.22	3.21	3.20	3.19
19.800	3.18	3.17	3.16	3.15	3.14
20.050	3.14	3.13	3.12	3.11	3.10
20.300	3.09	3.08	3.07	3.06	3.05
20.550	3.04	3.03	3.02	3.01	3.01
20.800	3.00	2.99	2.98	2.97	2.96

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
Label: CM-2

Return Event: 2 years  
Storm Event: Brunswick NC 2-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
21.050	2.95	2.94	2.93	2.92	2.91
21.300	2.91	2.90	2.89	2.88	2.87
21.550	2.86	2.85	2.84	2.83	2.82
21.800	2.82	2.81	2.80	2.79	2.78
22.050	2.77	2.76	2.75	2.74	2.73
22.300	2.72	2.71	2.70	2.69	2.68
22.550	2.68	2.67	2.66	2.65	2.64
22.800	2.63	2.62	2.61	2.60	2.59
23.050	2.58	2.57	2.56	2.55	2.54
23.300	2.54	2.53	2.52	2.51	2.50
23.550	2.49	2.48	2.47	2.46	2.45
23.800	2.44	2.43	2.42	2.41	2.41

## Brunswick Site

Subsection: Unit Hydrograph Summary  
Label: CM-2

Return Event: 2 years  
Storm Event: Brunswick NC 2-yr

Storm Event	Brunswick NC 2-yr
Return Event	2 years
Duration	24.000 hours
Depth	4.7 in
Time of Concentration (Composite)	0.200 hours
Area (User Defined)	34.300 acres
<hr/>	
Computational Time Increment	0.027 hours
Time to Peak (Computed)	8.000 hours
Flow (Peak, Computed)	25.20 ft <sup>3</sup> /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	8.000 hours
Flow (Peak Interpolated Output)	25.20 ft <sup>3</sup> /s
<hr/>	
<b>Drainage Area</b>	
SCS CN (Composite)	83.300
Area (User Defined)	34.300 acres
Maximum Retention (Pervious)	2.0 in
Maximum Retention (Pervious, 20 percent)	0.4 in
<hr/>	
<b>Cumulative Runoff</b>	
Cumulative Runoff Depth (Pervious)	3.0 in
Runoff Volume (Pervious)	8.457 ac-ft
<hr/>	
<b>Hydrograph Volume (Area under Hydrograph curve)</b>	
Volume	8.421 ac-ft
<hr/>	
<b>SCS Unit Hydrograph Parameters</b>	
Time of Concentration (Composite)	0.200 hours
Computational Time Increment	0.027 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

## Brunswick Site

Subsection: Unit Hydrograph Summary  
Label: CM-2

Return Event: 2 years  
Storm Event: Brunswick NC 2-yr

SCS Unit Hydrograph Parameters	
Unit peak, qp	194.32 ft <sup>3</sup> /s
Unit peak time, Tp	0.133 hours
Unit receding limb, Tr	0.533 hours
Total unit time, Tb	0.667 hours

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
Label: CM-2

Return Event: 2 years  
Storm Event: Brunswick NC 2-yr

Storm Event	Brunswick NC 2-yr
Return Event	2 years
Duration	24.000 hours
Depth	4.7 in
Time of Concentration (Composite)	0.200 hours
Area (User Defined)	34.300 acres

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
3.100	0.00	0.00	0.01	0.03	0.05
3.350	0.09	0.12	0.16	0.20	0.24
3.600	0.28	0.33	0.37	0.42	0.47
3.850	0.51	0.56	0.61	0.66	0.70
4.100	0.75	0.79	0.84	0.88	0.93
4.350	0.98	1.03	1.08	1.13	1.19
4.600	1.24	1.30	1.35	1.41	1.47
4.850	1.53	1.60	1.66	1.73	1.80
5.100	1.88	1.96	2.04	2.12	2.20
5.350	2.27	2.35	2.43	2.50	2.57
5.600	2.63	2.69	2.75	2.83	2.91
5.850	2.99	3.08	3.17	3.27	3.39
6.100	3.54	3.70	3.86	3.99	4.11
6.350	4.23	4.33	4.43	4.52	4.58
6.600	4.58	4.55	4.54	4.57	4.65
6.850	4.75	4.87	5.01	5.18	5.37
7.100	5.58	5.81	6.07	6.35	6.66
7.350	6.99	7.35	7.73	8.18	9.20
7.600	11.79	15.22	18.30	20.56	22.26
7.850	23.53	24.43	24.99	25.20	24.74
8.100	22.87	20.35	18.05	16.35	14.98
8.350	13.86	12.88	12.07	11.35	10.83
8.600	10.64	10.64	10.60	10.46	10.24
8.850	10.01	9.75	9.49	9.23	8.99
9.100	8.75	8.52	8.29	8.09	7.88
9.350	7.69	7.51	7.34	7.19	7.07
9.600	7.04	7.06	7.07	7.04	7.00
9.850	6.95	6.89	6.83	6.77	6.70
10.100	6.61	6.53	6.45	6.38	6.31
10.350	6.26	6.21	6.17	6.14	6.11
10.600	6.12	6.15	6.16	6.14	6.11
10.850	6.08	6.04	5.99	5.95	5.90
11.100	5.86	5.81	5.76	5.72	5.67

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
 Label: CM-2

Return Event: 2 years  
 Storm Event: Brunswick NC 2-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s) Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
11.350	5.62	5.58	5.53	5.48	5.43
11.600	5.36	5.29	5.23	5.18	5.14
11.850	5.11	5.08	5.06	5.04	5.03
12.100	5.03	5.02	5.03	5.04	5.06
12.350	5.08	5.11	5.14	5.18	5.20
12.600	5.16	5.08	5.01	4.97	4.94
12.850	4.91	4.90	4.89	4.88	4.88
13.100	4.92	4.98	5.01	5.00	4.98
13.350	4.96	4.92	4.89	4.85	4.82
13.600	4.80	4.77	4.75	4.72	4.71
13.850	4.69	4.68	4.67	4.66	4.66
14.100	4.66	4.67	4.68	4.68	4.67
14.350	4.67	4.66	4.65	4.64	4.64
14.600	4.63	4.62	4.61	4.60	4.59
14.850	4.58	4.57	4.57	4.56	4.56
15.100	4.55	4.54	4.53	4.52	4.52
15.350	4.51	4.50	4.48	4.48	4.47
15.600	4.46	4.45	4.44	4.43	4.43
15.850	4.42	4.41	4.40	4.39	4.38
16.100	4.37	4.37	4.36	4.35	4.34
16.350	4.33	4.32	4.31	4.30	4.30
16.600	4.29	4.28	4.27	4.26	4.25
16.850	4.24	4.23	4.22	4.21	4.20
17.100	4.20	4.19	4.18	4.17	4.16
17.350	4.14	4.14	4.13	4.12	4.11
17.600	4.10	4.09	4.09	4.08	4.07
17.850	4.06	4.05	4.03	4.02	4.02
18.100	4.01	3.99	3.99	3.98	3.97
18.350	3.96	3.95	3.94	3.93	3.92
18.600	3.91	3.90	3.89	3.88	3.87
18.850	3.86	3.85	3.84	3.83	3.82
19.100	3.81	3.80	3.79	3.79	3.78
19.350	3.76	3.76	3.75	3.74	3.73
19.600	3.72	3.71	3.70	3.69	3.67
19.850	3.66	3.65	3.64	3.63	3.63
20.100	3.62	3.61	3.60	3.59	3.58
20.350	3.57	3.55	3.54	3.53	3.52
20.600	3.51	3.50	3.49	3.48	3.47
20.850	3.47	3.46	3.45	3.43	3.42
21.100	3.41	3.40	3.39	3.38	3.37
21.350	3.36	3.35	3.34	3.33	3.32
21.600	3.31	3.30	3.29	3.28	3.27

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
Label: CM-2

Return Event: 2 years  
Storm Event: Brunswick NC 2-yr

**HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)**  
**Output Time Increment = 0.050 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Flow (ft <sup>3</sup> /s)				
21.850	3.26	3.25	3.24	3.23	3.22
22.100	3.21	3.20	3.19	3.17	3.16
22.350	3.15	3.14	3.13	3.12	3.11
22.600	3.10	3.09	3.08	3.07	3.06
22.850	3.05	3.04	3.02	3.01	3.00
23.100	2.99	2.98	2.97	2.96	2.95
23.350	2.94	2.93	2.92	2.91	2.90
23.600	2.89	2.88	2.86	2.85	2.84
23.850	2.83	2.82	2.81	2.80	(N/A)

## Brunswick Site

Subsection: Unit Hydrograph Summary  
Label: CM-2

Return Event: 10 years  
Storm Event: Brunswick NC 10-yr

Storm Event	Brunswick NC 10-yr
Return Event	10 years
Duration	24.000 hours
Depth	6.8 in
Time of Concentration (Composite)	0.200 hours
Area (User Defined)	28.100 acres
<hr/>	
Computational Time Increment	0.027 hours
Time to Peak (Computed)	7.973 hours
Flow (Peak, Computed)	38.83 ft <sup>3</sup> /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	7.950 hours
Flow (Peak Interpolated Output)	38.79 ft <sup>3</sup> /s
<hr/>	
<b>Drainage Area</b>	
SCS CN (Composite)	87.740
Area (User Defined)	28.100 acres
Maximum Retention (Pervious)	1.4 in
Maximum Retention (Pervious, 20 percent)	0.3 in
<hr/>	
<b>Cumulative Runoff</b>	
Cumulative Runoff Depth (Pervious)	5.4 in
Runoff Volume (Pervious)	12.574 ac-ft
<hr/>	
<b>Hydrograph Volume (Area under Hydrograph curve)</b>	
Volume	12.528 ac-ft
<hr/>	
<b>SCS Unit Hydrograph Parameters</b>	
Time of Concentration (Composite)	0.200 hours
Computational Time Increment	0.027 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749

## Brunswick Site

Subsection: Unit Hydrograph Summary  
Label: CM-2

Return Event: 10 years  
Storm Event: Brunswick NC 10-yr

SCS Unit Hydrograph Parameters	
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	159.19 ft <sup>3</sup> /s
Unit peak time, Tp	0.133 hours
Unit receding limb, Tr	0.533 hours
Total unit time, Tb	0.667 hours

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
 Label: CM-2

Return Event: 10 years  
 Storm Event: Brunswick NC 10-yr

Storm Event	Brunswick NC 10-yr
Return Event	10 years
Duration	24.000 hours
Depth	6.8 in
Time of Concentration (Composite)	0.200 hours
Area (User Defined)	28.100 acres

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
1.700	0.00	0.00	0.01	0.04	0.10
1.950	0.16	0.23	0.31	0.39	0.47
2.200	0.56	0.64	0.72	0.80	0.88
2.450	0.96	1.04	1.11	1.18	1.25
2.700	1.32	1.38	1.45	1.51	1.57
2.950	1.63	1.69	1.75	1.80	1.85
3.200	1.89	1.95	2.00	2.06	2.12
3.450	2.19	2.26	2.33	2.42	2.51
3.700	2.61	2.70	2.78	2.86	2.94
3.950	3.02	3.10	3.17	3.23	3.28
4.200	3.34	3.40	3.47	3.54	3.62
4.450	3.70	3.78	3.86	3.95	4.03
4.700	4.12	4.21	4.30	4.40	4.50
4.950	4.61	4.72	4.83	4.96	5.09
5.200	5.22	5.35	5.47	5.58	5.69
5.450	5.80	5.91	6.01	6.08	6.13
5.700	6.21	6.30	6.41	6.53	6.66
5.950	6.80	6.95	7.13	7.37	7.64
6.200	7.88	8.09	8.26	8.42	8.56
6.450	8.68	8.78	8.83	8.76	8.63
6.700	8.56	8.56	8.64	8.77	8.95
6.950	9.15	9.40	9.68	10.00	10.34
7.200	10.74	11.16	11.63	12.12	12.67
7.450	13.24	13.91	15.54	19.72	25.19
7.700	29.96	33.30	35.67	37.29	38.31
7.950	38.79	38.75	37.70	34.61	30.60
8.200	26.98	24.30	22.16	20.41	18.90
8.450	17.65	16.54	15.75	15.42	15.38
8.700	15.29	15.05	14.70	14.33	13.93
8.950	13.54	13.15	12.78	12.42	12.07
9.200	11.74	11.43	11.12	10.84	10.57
9.450	10.32	10.09	9.91	9.86	9.88

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)

Return Event: 10 years

Label: CM-2

Storm Event: Brunswick NC 10-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
9.700	9.87	9.83	9.76	9.67	9.58
9.950	9.49	9.39	9.29	9.16	9.03
10.200	8.91	8.81	8.71	8.63	8.56
10.450	8.50	8.44	8.40	8.40	8.43
10.700	8.44	8.41	8.37	8.31	8.25
10.950	8.18	8.12	8.05	7.98	7.91
11.200	7.84	7.78	7.71	7.64	7.57
11.450	7.50	7.43	7.35	7.26	7.16
11.700	7.07	7.00	6.94	6.90	6.86
11.950	6.82	6.80	6.78	6.77	6.76
12.200	6.76	6.78	6.80	6.83	6.86
12.450	6.90	6.95	6.97	6.91	6.80
12.700	6.71	6.65	6.60	6.56	6.54
12.950	6.52	6.51	6.51	6.56	6.64
13.200	6.67	6.66	6.63	6.59	6.55
13.450	6.50	6.45	6.41	6.37	6.33
13.700	6.30	6.26	6.24	6.22	6.20
13.950	6.18	6.17	6.16	6.17	6.18
14.200	6.18	6.18	6.17	6.16	6.15
14.450	6.14	6.12	6.11	6.10	6.09
14.700	6.07	6.06	6.04	6.03	6.02
14.950	6.00	5.99	5.99	5.97	5.96
15.200	5.95	5.94	5.92	5.91	5.89
15.450	5.88	5.86	5.85	5.84	5.82
15.700	5.81	5.80	5.79	5.78	5.77
15.950	5.75	5.74	5.72	5.71	5.70
16.200	5.68	5.67	5.66	5.64	5.63
16.450	5.62	5.60	5.59	5.58	5.56
16.700	5.55	5.54	5.53	5.51	5.50
16.950	5.49	5.47	5.46	5.45	5.44
17.200	5.42	5.41	5.39	5.37	5.36
17.450	5.35	5.34	5.33	5.32	5.30
17.700	5.29	5.28	5.26	5.25	5.23
17.950	5.22	5.20	5.19	5.18	5.16
18.200	5.15	5.14	5.13	5.12	5.10
18.450	5.09	5.07	5.06	5.04	5.03
18.700	5.02	5.00	4.99	4.98	4.96
18.950	4.95	4.93	4.92	4.91	4.89
19.200	4.88	4.87	4.85	4.84	4.83
19.450	4.81	4.80	4.79	4.77	4.76
19.700	4.75	4.73	4.71	4.70	4.68
19.950	4.67	4.66	4.65	4.64	4.62

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)

Return Event: 10 years

Label: CM-2

Storm Event: Brunswick NC 10-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
20.200	4.61	4.60	4.58	4.57	4.55
20.450	4.54	4.52	4.51	4.49	4.48
20.700	4.47	4.46	4.45	4.43	4.42
20.950	4.41	4.39	4.37	4.36	4.35
21.200	4.33	4.32	4.30	4.29	4.28
21.450	4.26	4.25	4.24	4.22	4.21
21.700	4.19	4.18	4.17	4.15	4.14
21.950	4.13	4.11	4.10	4.08	4.07
22.200	4.06	4.04	4.03	4.01	3.99
22.450	3.98	3.97	3.96	3.95	3.93
22.700	3.92	3.91	3.89	3.88	3.86
22.950	3.84	3.83	3.82	3.80	3.79
23.200	3.77	3.76	3.75	3.74	3.73
23.450	3.71	3.69	3.68	3.66	3.65
23.700	3.64	3.62	3.61	3.60	3.58
23.950	3.57	3.56	(N/A)	(N/A)	(N/A)

## Brunswick Site

Subsection: Unit Hydrograph Summary  
Label: CM-2

Return Event: 10 years  
Storm Event: Brunswick NC 10-yr

Storm Event	Brunswick NC 10-yr
Return Event	10 years
Duration	24.000 hours
Depth	6.8 in
Time of Concentration (Composite)	0.200 hours
Area (User Defined)	34.300 acres
<hr/>	
Computational Time Increment	0.027 hours
Time to Peak (Computed)	7.973 hours
Flow (Peak, Computed)	42.63 ft <sup>3</sup> /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	8.000 hours
Flow (Peak Interpolated Output)	42.63 ft <sup>3</sup> /s
<hr/>	
<b>Drainage Area</b>	
SCS CN (Composite)	83.300
Area (User Defined)	34.300 acres
Maximum Retention (Pervious)	2.0 in
Maximum Retention (Pervious, 20 percent)	0.4 in
<hr/>	
<b>Cumulative Runoff</b>	
Cumulative Runoff Depth (Pervious)	4.9 in
Runoff Volume (Pervious)	13.927 ac-ft
<hr/>	
<b>Hydrograph Volume (Area under Hydrograph curve)</b>	
Volume	13.872 ac-ft
<hr/>	
<b>SCS Unit Hydrograph Parameters</b>	
Time of Concentration (Composite)	0.200 hours
Computational Time Increment	0.027 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749

## Brunswick Site

Subsection: Unit Hydrograph Summary

Label: CM-2

Return Event: 10 years

Storm Event: Brunswick NC 10-yr

SCS Unit Hydrograph Parameters	
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	194.32 ft <sup>3</sup> /s
Unit peak time, Tp	0.133 hours
Unit receding limb, Tr	0.533 hours
Total unit time, Tb	0.667 hours

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)

Label: CM-2

Return Event: 10 years

Storm Event: Brunswick NC 10-yr

Storm Event	Brunswick NC 10-yr
Return Event	10 years
Duration	24.000 hours
Depth	6.8 in
Time of Concentration (Composite)	0.200 hours
Area (User Defined)	34.300 acres

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
2.300	0.00	0.00	0.02	0.06	0.12
2.550	0.19	0.26	0.34	0.41	0.48
2.800	0.56	0.63	0.70	0.77	0.84
3.050	0.90	0.97	1.03	1.09	1.15
3.300	1.21	1.28	1.35	1.42	1.49
3.550	1.56	1.65	1.74	1.84	1.93
3.800	2.02	2.10	2.19	2.27	2.36
4.050	2.44	2.51	2.58	2.64	2.72
4.300	2.80	2.88	2.96	3.05	3.14
4.550	3.23	3.33	3.42	3.52	3.62
4.800	3.72	3.83	3.94	4.06	4.18
5.050	4.30	4.43	4.58	4.72	4.86
5.300	4.99	5.12	5.25	5.37	5.50
5.550	5.61	5.70	5.78	5.87	5.99
5.800	6.12	6.25	6.40	6.55	6.72
6.050	6.92	7.18	7.47	7.74	7.96
6.300	8.17	8.35	8.51	8.66	8.80
6.550	8.87	8.82	8.72	8.67	8.70
6.800	8.81	8.96	9.16	9.39	9.67
7.050	9.98	10.34	10.72	11.16	11.62
7.300	12.15	12.70	13.30	13.94	14.69
7.550	16.46	20.96	26.89	32.12	35.87
7.800	38.59	40.52	41.81	42.51	42.63
8.050	41.62	38.33	33.97	30.03	27.11
8.300	24.76	22.85	21.20	19.81	18.59
8.550	17.73	17.38	17.35	17.27	17.01
8.800	16.63	16.23	15.79	15.36	14.93
9.050	14.51	14.11	13.73	13.35	13.01
9.300	12.67	12.35	12.05	11.78	11.52
9.550	11.32	11.27	11.29	11.29	11.25
9.800	11.17	11.08	10.98	10.88	10.77
10.050	10.65	10.51	10.37	10.24	10.12

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
 Label: CM-2

Return Event: 10 years  
 Storm Event: Brunswick NC 10-yr

**HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)**  
**Output Time Increment = 0.050 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Flow (ft <sup>3</sup> /s)				
10.300	10.01	9.92	9.84	9.78	9.71
10.550	9.67	9.68	9.71	9.72	9.70
10.800	9.65	9.59	9.52	9.45	9.37
11.050	9.30	9.22	9.15	9.07	8.99
11.300	8.91	8.84	8.76	8.68	8.60
11.550	8.52	8.41	8.29	8.19	8.11
11.800	8.05	8.00	7.95	7.91	7.89
12.050	7.87	7.86	7.85	7.85	7.87
12.300	7.90	7.93	7.97	8.02	8.08
12.550	8.10	8.04	7.92	7.81	7.73
12.800	7.68	7.64	7.62	7.60	7.58
13.050	7.59	7.65	7.73	7.77	7.77
13.300	7.73	7.69	7.64	7.58	7.53
13.550	7.48	7.43	7.39	7.35	7.32
13.800	7.29	7.27	7.24	7.22	7.21
14.050	7.20	7.21	7.22	7.23	7.22
14.300	7.22	7.20	7.19	7.18	7.17
14.550	7.15	7.14	7.13	7.11	7.10
14.800	7.08	7.06	7.05	7.04	7.03
15.050	7.01	7.00	6.99	6.97	6.96
15.300	6.95	6.93	6.91	6.89	6.88
15.550	6.87	6.85	6.84	6.82	6.81
15.800	6.80	6.79	6.77	6.76	6.74
16.050	6.72	6.71	6.69	6.68	6.66
16.300	6.65	6.64	6.62	6.61	6.59
16.550	6.58	6.56	6.55	6.53	6.52
16.800	6.50	6.49	6.47	6.46	6.44
17.050	6.43	6.41	6.40	6.39	6.37
17.300	6.35	6.33	6.32	6.30	6.29
17.550	6.28	6.27	6.25	6.23	6.22
17.800	6.21	6.19	6.17	6.15	6.14
18.050	6.12	6.11	6.09	6.07	6.06
18.300	6.05	6.04	6.02	6.01	5.99
18.550	5.97	5.95	5.94	5.92	5.91
18.800	5.89	5.88	5.86	5.84	5.83
19.050	5.82	5.80	5.78	5.77	5.75
19.300	5.74	5.72	5.71	5.69	5.68
19.550	5.66	5.64	5.63	5.61	5.60
19.800	5.58	5.56	5.54	5.53	5.52
20.050	5.50	5.49	5.47	5.46	5.44
20.300	5.43	5.41	5.39	5.37	5.35
20.550	5.34	5.32	5.30	5.29	5.28

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)

Return Event: 10 years

Label: CM-2

Storm Event: Brunswick NC 10-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
20.800	5.26	5.25	5.24	5.22	5.20
21.050	5.18	5.16	5.15	5.13	5.11
21.300	5.10	5.08	5.07	5.05	5.04
21.550	5.02	5.00	4.99	4.97	4.96
21.800	4.94	4.92	4.91	4.89	4.88
22.050	4.86	4.84	4.83	4.81	4.79
22.300	4.77	4.76	4.74	4.72	4.71
22.550	4.70	4.68	4.67	4.65	4.64
22.800	4.62	4.60	4.58	4.56	4.55
23.050	4.53	4.51	4.50	4.48	4.47
23.300	4.45	4.44	4.43	4.41	4.39
23.550	4.37	4.35	4.34	4.32	4.30
23.800	4.29	4.27	4.25	4.24	4.23

## Brunswick Site

Subsection: Unit Hydrograph Summary  
Label: CM-2

Return Event: 25 years  
Storm Event: Brunswick NC 25-yr

Storm Event	Brunswick NC 25-yr
Return Event	25 years
Duration	24.000 hours
Depth	8.6 in
Time of Concentration (Composite)	0.200 hours
Area (User Defined)	28.100 acres
<hr/>	
Computational Time Increment	0.027 hours
Time to Peak (Computed)	7.973 hours
Flow (Peak, Computed)	51.37 ft <sup>3</sup> /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	7.950 hours
Flow (Peak Interpolated Output)	51.36 ft <sup>3</sup> /s
<hr/>	
<b>Drainage Area</b>	
SCS CN (Composite)	87.740
Area (User Defined)	28.100 acres
Maximum Retention (Pervious)	1.4 in
Maximum Retention (Pervious, 20 percent)	0.3 in
<hr/>	
<b>Cumulative Runoff</b>	
Cumulative Runoff Depth (Pervious)	7.1 in
Runoff Volume (Pervious)	16.660 ac-ft
<hr/>	
<b>Hydrograph Volume (Area under Hydrograph curve)</b>	
Volume	16.600 ac-ft
<hr/>	
<b>SCS Unit Hydrograph Parameters</b>	
Time of Concentration (Composite)	0.200 hours
Computational Time Increment	0.027 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749

## Brunswick Site

Subsection: Unit Hydrograph Summary  
Label: CM-2

Return Event: 25 years  
Storm Event: Brunswick NC 25-yr

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SCS Unit Hydrograph Parameters	
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	159.19 ft <sup>3</sup> /s
Unit peak time, Tp	0.133 hours
Unit receding limb, Tr	0.533 hours
Total unit time, Tb	0.667 hours

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## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
 Label: CM-2

Return Event: 25 years  
 Storm Event: Brunswick NC 25-yr

Storm Event	Brunswick NC 25-yr
Return Event	25 years
Duration	24.000 hours
Depth	8.6 in
Time of Concentration (Composite)	0.200 hours
Area (User Defined)	28.100 acres

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
1.450	0.00	0.01	0.05	0.13	0.22
1.700	0.33	0.45	0.56	0.68	0.79
1.950	0.90	1.02	1.13	1.25	1.37
2.200	1.49	1.61	1.72	1.84	1.94
2.450	2.05	2.15	2.25	2.34	2.42
2.700	2.50	2.59	2.67	2.75	2.83
2.950	2.90	2.98	3.05	3.11	3.16
3.200	3.22	3.28	3.35	3.42	3.51
3.450	3.59	3.68	3.78	3.90	4.04
3.700	4.17	4.29	4.41	4.51	4.62
3.950	4.72	4.82	4.91	4.98	5.05
4.200	5.12	5.20	5.28	5.38	5.48
4.450	5.58	5.68	5.79	5.90	6.01
4.700	6.12	6.24	6.36	6.49	6.62
4.950	6.76	6.90	7.05	7.22	7.39
5.200	7.57	7.73	7.89	8.04	8.18
5.450	8.32	8.46	8.58	8.66	8.73
5.700	8.82	8.93	9.07	9.23	9.39
5.950	9.57	9.76	10.00	10.32	10.67
6.200	11.00	11.26	11.49	11.69	11.86
6.450	12.01	12.14	12.19	12.07	11.88
6.700	11.76	11.76	11.85	12.01	12.23
6.950	12.50	12.82	13.18	13.60	14.06
7.200	14.58	15.13	15.75	16.40	17.12
7.450	17.87	18.75	20.91	26.48	33.76
7.700	40.08	44.46	47.53	49.58	50.82
7.950	51.36	51.21	49.75	45.61	40.27
8.200	35.47	31.92	29.07	26.76	24.76
8.450	23.10	21.64	20.60	20.16	20.10
8.700	19.97	19.64	19.19	18.70	18.17
8.950	17.65	17.13	16.65	16.17	15.71
9.200	15.27	14.86	14.46	14.09	13.74

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
 Label: CM-2

Return Event: 25 years  
 Storm Event: Brunswick NC 25-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
9.450	13.41	13.11	12.88	12.80	12.82
9.700	12.82	12.76	12.66	12.55	12.43
9.950	12.31	12.17	12.04	11.88	11.71
10.200	11.55	11.41	11.28	11.18	11.08
10.450	11.00	10.92	10.87	10.88	10.91
10.700	10.92	10.88	10.82	10.75	10.67
10.950	10.58	10.49	10.41	10.32	10.23
11.200	10.14	10.05	9.96	9.87	9.77
11.450	9.69	9.59	9.49	9.37	9.24
11.700	9.12	9.03	8.96	8.90	8.85
11.950	8.80	8.77	8.75	8.73	8.72
12.200	8.72	8.74	8.77	8.80	8.84
12.450	8.89	8.95	8.98	8.90	8.77
12.700	8.64	8.56	8.50	8.46	8.42
12.950	8.40	8.38	8.39	8.45	8.54
13.200	8.59	8.57	8.54	8.49	8.42
13.450	8.36	8.30	8.25	8.19	8.15
13.700	8.10	8.06	8.03	8.00	7.97
13.950	7.95	7.93	7.92	7.93	7.94
14.200	7.94	7.94	7.93	7.92	7.90
14.450	7.89	7.87	7.85	7.84	7.82
14.700	7.80	7.79	7.76	7.74	7.73
14.950	7.71	7.70	7.69	7.67	7.65
15.200	7.64	7.62	7.60	7.58	7.56
15.450	7.54	7.53	7.51	7.49	7.47
15.700	7.46	7.44	7.43	7.42	7.40
15.950	7.38	7.36	7.34	7.32	7.31
16.200	7.29	7.27	7.25	7.24	7.22
16.450	7.20	7.19	7.17	7.15	7.14
16.700	7.12	7.10	7.09	7.07	7.05
16.950	7.03	7.02	7.00	6.98	6.97
17.200	6.95	6.93	6.91	6.89	6.87
17.450	6.85	6.84	6.83	6.81	6.79
17.700	6.78	6.76	6.74	6.72	6.70
17.950	6.68	6.66	6.65	6.63	6.61
18.200	6.59	6.58	6.57	6.55	6.53
18.450	6.52	6.49	6.47	6.46	6.44
18.700	6.42	6.40	6.39	6.37	6.35
18.950	6.33	6.32	6.30	6.28	6.26
19.200	6.25	6.23	6.21	6.19	6.18
19.450	6.16	6.14	6.12	6.11	6.09
19.700	6.07	6.05	6.03	6.01	5.99

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
Label: CM-2

Return Event: 25 years  
Storm Event: Brunswick NC 25-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
19.950	5.98	5.96	5.95	5.93	5.91
20.200	5.90	5.88	5.86	5.84	5.82
20.450	5.80	5.78	5.77	5.75	5.73
20.700	5.71	5.70	5.68	5.67	5.65
20.950	5.63	5.61	5.59	5.57	5.56
21.200	5.54	5.52	5.50	5.48	5.47
21.450	5.45	5.43	5.41	5.40	5.38
21.700	5.36	5.34	5.33	5.31	5.29
21.950	5.27	5.26	5.24	5.22	5.20
22.200	5.19	5.16	5.14	5.12	5.10
22.450	5.09	5.07	5.06	5.04	5.02
22.700	5.01	4.99	4.97	4.95	4.93
22.950	4.91	4.89	4.87	4.86	4.84
23.200	4.82	4.81	4.79	4.78	4.76
23.450	4.74	4.72	4.70	4.68	4.66
23.700	4.64	4.63	4.61	4.59	4.57
23.950	4.56	4.54	(N/A)	(N/A)	(N/A)

## Brunswick Site

Subsection: Unjt Hydrograph Summary  
 Label: CM-2

Return Event: 25 years  
 Storm Event: Brunswick NC 25-yr

Storm Event	Brunswick NC 25-yr
Return Event	25 years
Duration	24.000 hours
Depth	8.6 in
Time of Concentration (Composite)	0.200 hours
Area (User Defined)	34.300 acres
<hr/>	
Computational Time Increment	0.027 hours
Time to Peak (Computed)	7.973 hours
Flow (Peak, Computed)	57.99 ft <sup>3</sup> /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	8.000 hours
Flow (Peak Interpolated Output)	57.90 ft <sup>3</sup> /s
<hr/>	
<b>Drainage Area</b>	
SCS CN (Composite)	83.300
Area (User Defined)	34.300 acres
Maximum Retention (Pervious)	2.0 in
Maximum Retention (Pervious, 20 percent)	0.4 in
<hr/>	
<b>Cumulative Runoff</b>	
Cumulative Runoff Depth (Pervious)	6.6 in
Runoff Volume (Pervious)	18.804 ac-ft
<hr/>	
<b>Hydrograph Volume (Area under Hydrograph curve)</b>	
Volume	18.732 ac-ft
<hr/>	
<b>SCS Unit Hydrograph Parameters</b>	
Time of Concentration (Composite)	0.200 hours
Computational Time Increment	0.027 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749

## Brunswick Site

Subsection: Unit Hydrograph Summary  
Label: CM-2

Return Event: 25 years  
Storm Event: Brunswick NC 25-yr

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SCS Unit Hydrograph Parameters	
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	194.32 ft <sup>3</sup> /s
Unit peak time, Tp	0.133 hours
Unit receding limb, Tr	0.533 hours
Total unit time, Tb	0.667 hours

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## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
 Label: CM-2

Return Event: 25 years  
 Storm Event: Brunswick NC 25-yr

Storm Event	Brunswick NC 25-yr
Return Event	25 years
Duration	24.000 hours
Depth	8.6 in
Time of Concentration (Composite)	0.200 hours
Area (User Defined)	34.300 acres

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
1.900	0.00	0.00	0.03	0.08	0.16
2.150	0.26	0.37	0.49	0.60	0.72
2.400	0.83	0.95	1.06	1.17	1.28
2.650	1.38	1.48	1.58	1.68	1.77
2.900	1.87	1.96	2.05	2.14	2.22
3.150	2.29	2.37	2.45	2.53	2.62
3.400	2.71	2.81	2.91	3.02	3.15
3.650	3.29	3.43	3.56	3.68	3.80
3.900	3.92	4.03	4.15	4.25	4.35
4.150	4.43	4.52	4.62	4.72	4.83
4.400	4.95	5.07	5.19	5.31	5.44
4.650	5.57	5.70	5.83	5.98	6.12
4.900	6.28	6.43	6.59	6.76	6.95
5.150	7.15	7.35	7.53	7.71	7.89
5.400	8.06	8.22	8.38	8.53	8.64
5.650	8.74	8.85	9.00	9.17	9.35
5.900	9.55	9.75	9.98	10.25	10.61
6.150	11.00	11.37	11.67	11.94	12.18
6.400	12.39	12.58	12.75	12.83	12.73
6.650	12.56	12.46	12.49	12.61	12.81
6.900	13.07	13.38	13.75	14.17	14.65
7.150	15.17	15.77	16.39	17.10	17.84
7.400	18.66	19.52	20.52	22.95	29.15
7.650	37.29	44.42	49.44	53.03	55.51
7.900	57.10	57.90	57.90	56.40	51.83
8.150	45.86	40.47	36.47	33.27	30.67
8.400	28.42	26.54	24.88	23.70	23.22
8.650	23.17	23.04	22.68	22.16	21.61
8.900	21.01	20.43	19.84	19.29	18.74
9.150	18.23	17.72	17.26	16.80	16.37
9.400	15.97	15.60	15.25	14.99	14.91
9.650	14.93	14.93	14.87	14.76	14.64

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
 Label: CM-2

Return Event: 25 years  
 Storm Event: Brunswick NC 25-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
9.900	14.50	14.36	14.21	14.06	13.87
10.150	13.68	13.49	13.34	13.20	13.07
10.400	12.97	12.88	12.79	12.73	12.74
10.650	12.78	12.79	12.75	12.68	12.60
10.900	12.51	12.41	12.31	12.21	12.11
11.150	12.01	11.90	11.80	11.70	11.59
11.400	11.49	11.38	11.28	11.16	11.02
11.650	10.87	10.73	10.63	10.54	10.47
11.900	10.41	10.36	10.32	10.30	10.28
12.150	10.27	10.28	10.30	10.33	10.38
12.400	10.43	10.49	10.56	10.59	10.50
12.650	10.35	10.20	10.10	10.03	9.98
12.900	9.95	9.92	9.90	9.90	9.99
13.150	10.09	10.15	10.13	10.09	10.03
13.400	9.96	9.88	9.81	9.75	9.69
13.650	9.64	9.58	9.53	9.50	9.47
13.900	9.44	9.41	9.39	9.38	9.39
14.150	9.40	9.41	9.41	9.39	9.38
14.400	9.36	9.35	9.33	9.31	9.29
14.650	9.27	9.25	9.23	9.21	9.18
14.900	9.17	9.15	9.13	9.12	9.10
15.150	9.08	9.06	9.05	9.03	9.00
15.400	8.98	8.96	8.94	8.92	8.90
15.650	8.88	8.86	8.84	8.83	8.81
15.900	8.79	8.77	8.75	8.73	8.71
16.150	8.69	8.67	8.65	8.63	8.61
16.400	8.59	8.57	8.55	8.53	8.51
16.650	8.49	8.47	8.45	8.43	8.41
16.900	8.39	8.37	8.35	8.33	8.31
17.150	8.29	8.27	8.25	8.23	8.20
17.400	8.18	8.16	8.15	8.13	8.11
17.650	8.09	8.07	8.06	8.03	8.01
17.900	7.99	7.96	7.94	7.92	7.90
18.150	7.88	7.86	7.84	7.83	7.81
18.400	7.79	7.77	7.74	7.72	7.70
18.650	7.68	7.66	7.64	7.62	7.60
18.900	7.58	7.56	7.54	7.52	7.50
19.150	7.48	7.46	7.44	7.42	7.39
19.400	7.37	7.36	7.33	7.31	7.29
19.650	7.27	7.25	7.23	7.20	7.18
19.900	7.16	7.14	7.12	7.11	7.09
20.150	7.07	7.05	7.03	7.01	6.98

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
Label: CM-2

Return Event: 25 years  
Storm Event: Brunswick NC 25-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s) Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
20.400	6.96	6.93	6.91	6.89	6.87
20.650	6.85	6.83	6.81	6.79	6.78
20.900	6.76	6.73	6.71	6.68	6.66
21.150	6.64	6.62	6.60	6.58	6.56
21.400	6.54	6.52	6.50	6.48	6.46
21.650	6.43	6.41	6.39	6.37	6.35
21.900	6.33	6.31	6.29	6.27	6.25
22.150	6.23	6.21	6.18	6.16	6.13
22.400	6.11	6.09	6.07	6.06	6.04
22.650	6.02	6.00	5.98	5.95	5.93
22.900	5.90	5.88	5.86	5.84	5.82
23.150	5.79	5.77	5.75	5.74	5.72
23.400	5.70	5.68	5.65	5.63	5.61
23.650	5.59	5.56	5.54	5.52	5.50
23.900	5.48	5.46	5.44	(N/A)	(N/A)

## Brunswick Site

Subsection: Unit Hydrograph Summary  
 Label: CM-2

Return Event: 100 years  
 Storm Event: Brunswick NC 100-yr

Storm Event	Brunswick NC 100-yr
Return Event	100 years
Duration	24.000 hours
Depth	9.6 in
Time of Concentration (Composite)	0.200 hours
Area (User Defined)	28.100 acres
<hr/>	
Computational Time Increment	0.027 hours
Time to Peak (Computed)	7.947 hours
Flow (Peak, Computed)	58.70 ft <sup>3</sup> /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	7.950 hours
Flow (Peak Interpolated Output)	58.70 ft <sup>3</sup> /s
<hr/>	
<b>Drainage Area</b>	
SCS CN (Composite)	87.740
Area (User Defined)	28.100 acres
Maximum Retention (Pervious)	1.4 in
Maximum Retention (Pervious, 20 percent)	0.3 in
<hr/>	
<b>Cumulative Runoff</b>	
Cumulative Runoff Depth (Pervious)	8.1 in
Runoff Volume (Pervious)	19.072 ac-ft
<hr/>	
<b>Hydrograph Volume (Area under Hydrograph curve)</b>	
Volume	19.005 ac-ft
<hr/>	
<b>SCS Unit Hydrograph Parameters</b>	
Time of Concentration (Composite)	0.200 hours
Computational Time Increment	0.027 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749

## Brunswick Site

Subsection: Unit Hydrograph Summary  
Label: CM-2

Return Event: 100 years  
Storm Event: Brunswik NC 100-yr

SCS Unit Hydrograph Parameters	
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	159.19 ft <sup>3</sup> /s
Unit peak time, Tp	0.133 hours
Unit receding limb, Tr	0.533 hours
Total unit time, Tb	0.667 hours

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
Label: CM-2

Return Event: 100 years  
Storm Event: Brunswick NC 100-yr

Storm Event	Brunswick NC 100-yr
Return Event	100 years
Duration	24.000 hours
Depth	9.6 in
Time of Concentration (Composite)	0.200 hours
Area (User Defined)	28.100 acres

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
1.300	0.00	0.00	0.02	0.09	0.20
1.550	0.33	0.48	0.62	0.76	0.89
1.800	1.03	1.17	1.30	1.44	1.57
2.050	1.70	1.84	1.99	2.13	2.26
2.300	2.39	2.52	2.65	2.76	2.88
2.550	2.99	3.09	3.19	3.28	3.37
2.800	3.46	3.55	3.63	3.72	3.80
3.050	3.88	3.94	4.00	4.06	4.13
3.300	4.20	4.29	4.38	4.48	4.58
3.550	4.69	4.83	4.99	5.14	5.28
3.800	5.41	5.53	5.65	5.77	5.88
4.050	5.98	6.06	6.14	6.21	6.30
4.300	6.39	6.50	6.61	6.72	6.84
4.550	6.96	7.08	7.21	7.34	7.47
4.800	7.61	7.75	7.90	8.06	8.22
5.050	8.39	8.58	8.78	8.98	9.16
5.300	9.34	9.51	9.67	9.82	9.98
5.550	10.11	10.20	10.27	10.37	10.50
5.800	10.65	10.83	11.01	11.21	11.43
6.050	11.70	12.07	12.47	12.84	13.14
6.300	13.40	13.62	13.82	13.98	14.12
6.550	14.17	14.02	13.80	13.65	13.64
6.800	13.74	13.92	14.17	14.47	14.83
7.050	15.25	15.72	16.24	16.83	17.46
7.300	18.17	18.91	19.72	20.58	21.58
7.550	24.05	30.44	38.78	46.00	50.99
7.800	54.45	56.75	58.13	58.70	58.48
8.050	56.77	52.02	45.91	40.42	36.35
8.300	33.10	30.46	28.18	26.28	24.61
8.550	23.42	22.92	22.85	22.69	22.32
8.800	21.80	21.24	20.63	20.04	19.46
9.050	18.90	18.35	17.84	17.33	16.87

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
 Label: CM-2

Return Event: 100 years  
 Storm Event: Brunswick NC 100-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s) Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
9.300	16.41	15.99	15.58	15.21	14.86
9.550	14.61	14.52	14.54	14.53	14.46
9.800	14.35	14.23	14.09	13.95	13.80
10.050	13.64	13.46	13.26	13.08	12.93
10.300	12.78	12.66	12.55	12.46	12.37
10.550	12.31	12.32	12.36	12.36	12.32
10.800	12.25	12.17	12.07	11.98	11.88
11.050	11.78	11.68	11.58	11.47	11.37
11.300	11.27	11.17	11.06	10.96	10.86
11.550	10.74	10.60	10.45	10.32	10.22
11.800	10.13	10.07	10.00	9.95	9.92
12.050	9.89	9.87	9.86	9.86	9.88
12.300	9.91	9.95	10.00	10.06	10.12
12.550	10.15	10.07	9.91	9.77	9.68
12.800	9.61	9.56	9.52	9.49	9.47
13.050	9.48	9.55	9.65	9.70	9.69
13.300	9.65	9.59	9.52	9.45	9.38
13.550	9.32	9.26	9.21	9.15	9.10
13.800	9.07	9.04	9.01	8.98	8.96
14.050	8.95	8.96	8.97	8.97	8.97
14.300	8.96	8.94	8.92	8.91	8.89
14.550	8.87	8.85	8.83	8.81	8.79
14.800	8.77	8.75	8.73	8.71	8.69
15.050	8.68	8.66	8.64	8.62	8.61
15.300	8.59	8.56	8.54	8.52	8.50
15.550	8.48	8.46	8.44	8.42	8.40
15.800	8.39	8.37	8.35	8.33	8.31
16.050	8.29	8.27	8.25	8.23	8.21
16.300	8.19	8.17	8.15	8.13	8.11
16.550	8.09	8.07	8.05	8.03	8.02
16.800	8.00	7.97	7.96	7.94	7.92
17.050	7.90	7.88	7.86	7.84	7.82
17.300	7.79	7.77	7.75	7.73	7.72
17.550	7.70	7.68	7.66	7.64	7.63
17.800	7.61	7.58	7.56	7.54	7.52
18.050	7.50	7.48	7.46	7.44	7.42
18.300	7.40	7.39	7.37	7.35	7.32
18.550	7.30	7.28	7.26	7.24	7.22
18.800	7.20	7.18	7.16	7.14	7.12
19.050	7.10	7.08	7.06	7.04	7.03
19.300	7.01	6.98	6.96	6.95	6.93
19.550	6.91	6.89	6.87	6.85	6.82

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
Label: CM-2

Return Event: 100 years  
Storm Event: Brunswick NC 100-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
19.800	6.80	6.78	6.76	6.74	6.72
20.050	6.71	6.69	6.67	6.65	6.63
20.300	6.61	6.59	6.56	6.54	6.52
20.550	6.50	6.48	6.46	6.44	6.42
20.800	6.41	6.39	6.37	6.35	6.33
21.050	6.30	6.28	6.26	6.24	6.22
21.300	6.20	6.18	6.16	6.14	6.12
21.550	6.10	6.08	6.06	6.04	6.02
21.800	6.00	5.98	5.96	5.94	5.92
22.050	5.90	5.88	5.86	5.84	5.82
22.300	5.80	5.77	5.75	5.73	5.72
22.550	5.70	5.68	5.66	5.64	5.63
22.800	5.60	5.58	5.56	5.53	5.51
23.050	5.49	5.47	5.45	5.43	5.41
23.300	5.40	5.38	5.36	5.34	5.32
23.550	5.29	5.27	5.25	5.23	5.21
23.800	5.19	5.17	5.15	5.13	5.12

## Brunswick Site

Subsection: Unit Hydrograph Summary  
Label: CM-2

Return Event: 100 years  
Storm Event: Brunswick NC 100-yr

Storm Event	Brunswick NC 100-yr
Return Event	100 years
Duration	24.000 hours
Depth	9.6 in
Time of Concentration (Composite)	0.200 hours
Area (User Defined)	34.300 acres
<hr/>	
Computational Time Increment	0.027 hours
Time to Peak (Computed)	7.973 hours
Flow (Peak, Computed)	67.01 ft <sup>3</sup> /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	7.950 hours
Flow (Peak Interpolated Output)	66.93 ft <sup>3</sup> /s
<hr/>	
<b>Drainage Area</b>	
SCS CN (Composite)	83.300
Area (User Defined)	34.300 acres
Maximum Retention (Pervious)	2.0 in
Maximum Retention (Pervious, 20 percent)	0.4 in
<hr/>	
<b>Cumulative Runoff</b>	
Cumulative Runoff Depth (Pervious)	7.6 in
Runoff Volume (Pervious)	21.700 ac-ft
<hr/>	
<b>Hydrograph Volume (Area under Hydrograph curve)</b>	
Volume	21.619 ac-ft
<hr/>	
<b>SCS Unit Hydrograph Parameters</b>	
Time of Concentration (Composite)	0.200 hours
Computational Time Increment	0.027 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749

## Brunswick Site

Subsection: Unit Hydrograph Summary  
Label: CM-2

Return Event: 100 years  
Storm Event: Brunswick NC 100-yr

SCS Unit Hydrograph Parameters	
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	194.32 ft <sup>3</sup> /s
Unit peak time, Tp	0.133 hours
Unit receding limb, Tr	0.533 hours
Total unit time, Tb	0.667 hours

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
 Label: CM-2

Return Event: 100 years  
 Storm Event: Brunswick NC 100-yr

Storm Event	Brunswick NC 100-yr
Return Event	100 years
Duration	24.000 hours
Depth	9.6 in
Time of Concentration (Composite)	0.200 hours
Area (User Defined)	34.300 acres

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
1.750	0.00	0.01	0.05	0.13	0.24
2.000	0.36	0.49	0.63	0.77	0.91
2.250	1.05	1.20	1.34	1.47	1.61
2.500	1.74	1.87	1.99	2.11	2.22
2.750	2.33	2.44	2.55	2.66	2.77
3.000	2.87	2.97	3.05	3.14	3.22
3.250	3.31	3.40	3.50	3.61	3.73
3.500	3.84	3.97	4.12	4.29	4.45
3.750	4.61	4.75	4.89	5.03	5.16
4.000	5.30	5.42	5.52	5.62	5.72
4.250	5.82	5.94	6.07	6.20	6.33
4.500	6.47	6.62	6.76	6.91	7.06
4.750	7.22	7.38	7.55	7.73	7.91
5.000	8.09	8.29	8.51	8.74	8.96
5.250	9.18	9.39	9.59	9.78	9.97
5.500	10.15	10.32	10.44	10.54	10.67
5.750	10.83	11.03	11.23	11.45	11.69
6.000	11.95	12.26	12.68	13.14	13.56
6.250	13.91	14.22	14.48	14.73	14.94
6.500	15.12	15.20	15.08	14.86	14.73
6.750	14.75	14.89	15.11	15.41	15.76
7.000	16.18	16.67	17.22	17.82	18.50
7.250	19.22	20.04	20.89	21.83	22.82
7.500	23.98	26.79	33.99	43.43	51.67
7.750	57.44	61.53	64.33	66.09	66.93
8.000	66.87	65.07	59.74	52.82	46.58
8.250	41.95	38.25	35.25	32.64	30.47
8.500	28.56	27.20	26.63	26.57	26.41
8.750	25.99	25.40	24.76	24.07	23.39
9.000	22.72	22.07	21.44	20.85	20.27
9.250	19.73	19.21	18.72	18.25	17.83
9.500	17.42	17.13	17.03	17.06	17.05

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
 Label: CM-2

Return Event: 100 years  
 Storm Event: Brunswick NC 100-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
9.750	16.98	16.85	16.71	16.55	16.39
10.000	16.22	16.04	15.83	15.61	15.40
10.250	15.21	15.05	14.91	14.79	14.68
10.500	14.58	14.51	14.52	14.57	14.58
10.750	14.53	14.45	14.36	14.25	14.14
11.000	14.02	13.91	13.79	13.68	13.56
11.250	13.44	13.32	13.20	13.08	12.96
11.500	12.84	12.71	12.54	12.37	12.21
11.750	12.09	12.00	11.92	11.85	11.79
12.000	11.75	11.72	11.70	11.68	11.69
12.250	11.71	11.75	11.80	11.86	11.92
12.500	12.01	12.04	11.94	11.76	11.60
12.750	11.49	11.40	11.35	11.30	11.27
13.000	11.25	11.26	11.35	11.47	11.53
13.250	11.51	11.46	11.40	11.31	11.23
13.500	11.15	11.08	11.01	10.95	10.88
13.750	10.83	10.78	10.75	10.72	10.68
14.000	10.66	10.65	10.66	10.67	10.68
14.250	10.68	10.66	10.65	10.63	10.61
14.500	10.59	10.56	10.54	10.52	10.50
14.750	10.48	10.45	10.42	10.40	10.38
15.000	10.36	10.35	10.32	10.30	10.28
15.250	10.26	10.24	10.21	10.19	10.16
15.500	10.14	10.11	10.09	10.07	10.05
15.750	10.03	10.01	9.99	9.97	9.95
16.000	9.92	9.89	9.87	9.85	9.82
16.250	9.80	9.78	9.76	9.73	9.71
16.500	9.69	9.67	9.64	9.62	9.60
16.750	9.58	9.55	9.53	9.51	9.49
17.000	9.46	9.44	9.42	9.40	9.37
17.250	9.35	9.32	9.29	9.27	9.25
17.500	9.23	9.21	9.19	9.17	9.14
17.750	9.12	9.10	9.07	9.05	9.02
18.000	8.99	8.97	8.95	8.92	8.90
18.250	8.88	8.86	8.85	8.82	8.80
18.500	8.77	8.74	8.72	8.70	8.67
18.750	8.65	8.62	8.60	8.58	8.55
19.000	8.53	8.51	8.49	8.46	8.44
19.250	8.42	8.39	8.37	8.35	8.32
19.500	8.30	8.28	8.25	8.23	8.21
19.750	8.18	8.15	8.12	8.10	8.08
20.000	8.06	8.04	8.02	8.00	7.97

## Brunswick Site

Subsection: Unit Hydrograph (Hydrograph Table)  
Label: CM-2

Return Event: 100 years  
Storm Event: Brunswick NC 100-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
20.250	7.95	7.93	7.90	7.87	7.84
20.500	7.82	7.80	7.77	7.75	7.72
20.750	7.70	7.69	7.67	7.64	7.62
21.000	7.59	7.56	7.54	7.51	7.49
21.250	7.46	7.44	7.42	7.40	7.37
21.500	7.35	7.33	7.30	7.28	7.25
21.750	7.23	7.21	7.18	7.16	7.14
22.000	7.11	7.09	7.06	7.04	7.02
22.250	6.99	6.96	6.93	6.91	6.89
22.500	6.87	6.85	6.83	6.80	6.78
22.750	6.76	6.73	6.71	6.68	6.65
23.000	6.62	6.60	6.57	6.55	6.53
23.250	6.51	6.49	6.47	6.45	6.42
23.500	6.39	6.36	6.34	6.31	6.29
23.750	6.26	6.24	6.22	6.19	6.17
24.000	6.15	(N/A)	(N/A)	(N/A)	(N/A)

## Brunswick Site

Subsection: Addition Summary  
Label: O-1

Return Event: 2 years  
Storm Event: Brunswick NC 2-yr

### Summary for Hydrograph Addition at 'O-1'

Upstream Link	Upstream Node
Outlet-1	PO-1

### Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft <sup>3</sup> /s)
Flow (From)	Outlet-1	31.197	8.000	93.31
Flow (In)	O-1	31.197	8.000	93.31

## Brunswick Site

Subsection: Addition Summary  
Label: O-1

Return Event: 2 years  
Storm Event: Brunswick NC 2-yr

### Summary for Hydrograph Addition at 'O-1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	CM-1
<Catchment to Outflow Node>	CM-2

### Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft <sup>3</sup> /s)
Flow (From)	CM-1	18.803	8.000	53.72
Flow (From)	CM-2	8.421	8.000	25.20
Flow (In)	O-1	27.223	8.000	78.92

## Brunswick Site

Subsection: Addition Summary  
Label: O-1

Return Event: 10 years  
Storm Event: Brunswick NC 10-yr

### Summary for Hydrograph Addition at 'O-1'

Outlet-1	Upstream Link	PO-1	Upstream Node
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### Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft <sup>3</sup> /s)
Flow (From)	Outlet-1	51.318	8.000	157.48
Flow (In)	O-1	51.318	8.000	157.48

## Brunswick Site

Subsection: Addition Summary  
Label: O-1

Return Event: 10 years  
Storm Event: Brunswick NC 10-yr

### Summary for Hydrograph Addition at 'O-1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	CM-1
<Catchment to Outflow Node>	CM-2

### Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft <sup>3</sup> /s)
Flow (From)	CM-1	32.332	8.000	97.35
Flow (From)	CM-2	13.872	8.000	42.63
Flow (In)	O-1	46.204	8.000	139.98

## Brunswick Site

Subsection: Addition Summary  
Label: O-1

Return Event: 25 years  
Storm Event: Brunswick NC 25-yr

### Summary for Hydrograph Addition at 'O-1'

Upstream Link	Upstream Node
Outlet-1	PO-1

### Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft <sup>3</sup> /s)
Flow (From)	Outlet-1	69.260	8.000	213.78
Flow (In)	O-1	69.260	8.000	213.78

## Brunswick Site

Subsection: Addition Summary  
Label: O-1

Return Event: 25 years  
Storm Event: Brunswick NC 25-yr

### Summary for Hydrograph Addition at 'O-1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	CM-1
<Catchment to Outflow Node>	CM-2

### Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft <sup>3</sup> /s)
Flow (From)	CM-1	44.603	8.000	136.61
Flow (From)	CM-2	18.732	8.000	57.90
Flow (In)	O-1	63.336	8.000	194.52

## Brunswick Site

Subsection: Addition Summary  
Label: O-1

Return Event: 100 years  
Storm Event: Brunswik NC 100-yr

### Summary for Hydrograph Addition at 'O-1'

Upstream Link	Upstream Node
Outlet-1	PO-1

### Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft <sup>3</sup> /s)
Flow (From)	Outlet-1	79.918	7.950	247.08
Flow (In)	O-1	79.918	7.950	247.08

## Brunswick Site

Subsection: Addition Summary  
Label: O-1

Return Event: 100 years  
Storm Event: Brunswick NC 100-yr

### Summary for Hydrograph Addition at 'O-1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	CM-1
<Catchment to Outflow Node>	CM-2

### Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft <sup>3</sup> /s)
Flow (From)	CM-1	51.946	8.000	159.89
Flow (From)	CM-2	21.619	7.950	66.93
Flow (In)	O-1	73.565	8.000	226.76

## Brunswick Site

Subsection: Time vs. Elevation  
 Label: PO-1 (OUT)

Return Event: 2 years  
 Storm Event: Brunswick NC 2-yr

### Time vs. Elevation (ft)

**Output Time increment = 0.050 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
0.000	0.00	0.00	0.00	0.00	0.00
0.250	0.00	0.00	0.00	0.00	0.00
0.500	0.00	0.00	0.00	0.00	0.00
0.750	0.00	0.00	0.00	0.00	0.00
1.000	0.00	0.00	0.00	0.00	0.00
1.250	0.00	0.00	0.00	0.00	0.00
1.500	0.00	0.00	0.00	0.00	0.00
1.750	0.00	0.00	0.00	0.00	0.00
2.000	0.00	0.00	0.00	0.00	0.00
2.250	0.00	0.00	0.00	0.00	0.00
2.500	0.00	0.00	0.00	0.00	0.00
2.750	0.00	0.00	0.00	0.00	0.00
3.000	0.00	0.00	0.00	0.00	0.00
3.250	0.00	0.00	0.00	0.00	0.00
3.500	0.00	0.00	0.00	0.00	0.00
3.750	0.00	0.00	0.00	0.00	0.00
4.000	0.00	0.00	0.00	0.00	0.00
4.250	0.00	0.00	0.00	0.00	0.00
4.500	0.00	0.00	0.00	0.00	0.00
4.750	0.00	0.00	0.00	0.00	0.00
5.000	0.00	0.00	0.00	0.00	0.00
5.250	0.00	0.00	0.00	0.00	0.00
5.500	0.00	0.00	0.00	0.00	0.00
5.750	0.00	0.00	0.00	0.00	0.00
6.000	0.00	0.00	0.00	0.00	0.00
6.250	0.00	0.00	0.00	0.00	0.00
6.500	0.00	0.00	0.00	0.00	0.00
6.750	0.00	0.00	0.00	0.00	0.00
7.000	0.00	0.00	0.00	0.00	0.00
7.250	0.00	0.00	0.00	0.00	0.00
7.500	0.00	0.00	0.00	0.00	0.00
7.750	0.00	0.00	0.00	0.00	0.00
8.000	0.00	0.00	0.00	0.00	0.00
8.250	0.00	0.00	0.00	0.00	0.00
8.500	0.00	0.00	0.00	0.00	0.00
8.750	0.00	0.00	0.00	0.00	0.00
9.000	0.00	0.00	0.00	0.00	0.00
9.250	0.00	0.00	0.00	0.00	0.00
9.500	0.00	0.00	0.00	0.00	0.00
9.750	0.00	0.00	0.00	0.00	0.00
10.000	0.00	0.00	0.00	0.00	0.00

## Brunswick Site

Subsection: Time vs. Elevation  
 Label: PO-1 (OUT)

Return Event: 2 years  
 Storm Event: Brunswick NC 2-yr

### Time vs. Elevation (ft)

**Output Time increment = 0.050 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
10.250	0.00	0.00	0.00	0.00	0.00
10.500	0.00	0.00	0.00	0.00	0.00
10.750	0.00	0.00	0.00	0.00	0.00
11.000	0.00	0.00	0.00	0.00	0.00
11.250	0.00	0.00	0.00	0.00	0.00
11.500	0.00	0.00	0.00	0.00	0.00
11.750	0.00	0.00	0.00	0.00	0.00
12.000	0.00	0.00	0.00	0.00	0.00
12.250	0.00	0.00	0.00	0.00	0.00
12.500	0.00	0.00	0.00	0.00	0.00
12.750	0.00	0.00	0.00	0.00	0.00
13.000	0.00	0.00	0.00	0.00	0.00
13.250	0.00	0.00	0.00	0.00	0.00
13.500	0.00	0.00	0.00	0.00	0.00
13.750	0.00	0.00	0.00	0.00	0.00
14.000	0.00	0.00	0.00	0.00	0.00
14.250	0.00	0.00	0.00	0.00	0.00
14.500	0.00	0.00	0.00	0.00	0.00
14.750	0.00	0.00	0.00	0.00	0.00
15.000	0.00	0.00	0.00	0.00	0.00
15.250	0.00	0.00	0.00	0.00	0.00
15.500	0.00	0.00	0.00	0.00	0.00
15.750	0.00	0.00	0.00	0.00	0.00
16.000	0.00	0.00	0.00	0.00	0.00
16.250	0.00	0.00	0.00	0.00	0.00
16.500	0.00	0.00	0.00	0.00	0.00
16.750	0.00	0.00	0.00	0.00	0.00
17.000	0.00	0.00	0.00	0.00	0.00
17.250	0.00	0.00	0.00	0.00	0.00
17.500	0.00	0.00	0.00	0.00	0.00
17.750	0.00	0.00	0.00	0.00	0.00
18.000	0.00	0.00	0.00	0.00	0.00
18.250	0.00	0.00	0.00	0.00	0.00
18.500	0.00	0.00	0.00	0.00	0.00
18.750	0.00	0.00	0.00	0.00	0.00
19.000	0.00	0.00	0.00	0.00	0.00
19.250	0.00	0.00	0.00	0.00	0.00
19.500	0.00	0.00	0.00	0.00	0.00
19.750	0.00	0.00	0.00	0.00	0.00
20.000	0.00	0.00	0.00	0.00	0.00
20.250	0.00	0.00	0.00	0.00	0.00

## Brunswick Site

Subsection: Time vs. Elevation  
Label: PO-1 (OUT)

Return Event: 2 years  
Storm Event: Brunswick NC 2-yr

### Time vs. Elevation (ft)

**Output Time increment = 0.050 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Elevation (ft)				
20.500	0.00	0.00	0.00	0.00	0.00
20.750	0.00	0.00	0.00	0.00	0.00
21.000	0.00	0.00	0.00	0.00	0.00
21.250	0.00	0.00	0.00	0.00	0.00
21.500	0.00	0.00	0.00	0.00	0.00
21.750	0.00	0.00	0.00	0.00	0.00
22.000	0.00	0.00	0.00	0.00	0.00
22.250	0.00	0.00	0.00	0.00	0.00
22.500	0.00	0.00	0.00	0.00	0.00
22.750	0.00	0.00	0.00	0.00	0.00
23.000	0.00	0.00	0.00	0.00	0.00
23.250	0.00	0.00	0.00	0.00	0.00
23.500	0.00	0.00	0.00	0.00	0.00
23.750	0.00	0.00	0.00	0.00	0.00
24.000	0.00	(N/A)	(N/A)	(N/A)	(N/A)

## Brunswick Site

Subsection: Time vs. Elevation  
 Label: PO-1 (OUT)

Return Event: 10 years  
 Storm Event: Brunswick NC 10-yr

### Time vs. Elevation (ft)

**Output Time increment = 0.050 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
0.000	0.00	0.00	0.00	0.00	0.00
0.250	0.00	0.00	0.00	0.00	0.00
0.500	0.00	0.00	0.00	0.00	0.00
0.750	0.00	0.00	0.00	0.00	0.00
1.000	0.00	0.00	0.00	0.00	0.00
1.250	0.00	0.00	0.00	0.00	0.00
1.500	0.00	0.00	0.00	0.00	0.00
1.750	0.00	0.00	0.00	0.00	0.00
2.000	0.00	0.00	0.00	0.00	0.00
2.250	0.00	0.00	0.00	0.00	0.00
2.500	0.00	0.00	0.00	0.00	0.00
2.750	0.00	0.00	0.00	0.00	0.00
3.000	0.00	0.00	0.00	0.00	0.00
3.250	0.00	0.00	0.00	0.00	0.00
3.500	0.00	0.00	0.00	0.00	0.00
3.750	0.00	0.00	0.00	0.00	0.00
4.000	0.00	0.00	0.00	0.00	0.00
4.250	0.00	0.00	0.00	0.00	0.00
4.500	0.00	0.00	0.00	0.00	0.00
4.750	0.00	0.00	0.00	0.00	0.00
5.000	0.00	0.00	0.00	0.00	0.00
5.250	0.00	0.00	0.00	0.00	0.00
5.500	0.00	0.00	0.00	0.00	0.00
5.750	0.00	0.00	0.00	0.00	0.00
6.000	0.00	0.00	0.00	0.00	0.00
6.250	0.00	0.00	0.00	0.00	0.00
6.500	0.00	0.00	0.00	0.00	0.00
6.750	0.00	0.00	0.00	0.00	0.00
7.000	0.00	0.00	0.00	0.00	0.00
7.250	0.00	0.00	0.00	0.00	0.00
7.500	0.00	0.00	0.00	0.00	0.00
7.750	0.00	0.00	0.00	0.00	0.00
8.000	0.00	0.00	0.00	0.00	0.00
8.250	0.00	0.00	0.00	0.00	0.00
8.500	0.00	0.00	0.00	0.00	0.00
8.750	0.00	0.00	0.00	0.00	0.00
9.000	0.00	0.00	0.00	0.00	0.00
9.250	0.00	0.00	0.00	0.00	0.00
9.500	0.00	0.00	0.00	0.00	0.00
9.750	0.00	0.00	0.00	0.00	0.00
10.000	0.00	0.00	0.00	0.00	0.00

## Brunswick Site

Subsection: Time vs. Elevation  
 Label: PO-1 (OUT)

Return Event: 10 years  
 Storm Event: Brunswick NC 10-yr

### Time vs. Elevation (ft)

**Output Time increment = 0.050 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
10.250	0.00	0.00	0.00	0.00	0.00
10.500	0.00	0.00	0.00	0.00	0.00
10.750	0.00	0.00	0.00	0.00	0.00
11.000	0.00	0.00	0.00	0.00	0.00
11.250	0.00	0.00	0.00	0.00	0.00
11.500	0.00	0.00	0.00	0.00	0.00
11.750	0.00	0.00	0.00	0.00	0.00
12.000	0.00	0.00	0.00	0.00	0.00
12.250	0.00	0.00	0.00	0.00	0.00
12.500	0.00	0.00	0.00	0.00	0.00
12.750	0.00	0.00	0.00	0.00	0.00
13.000	0.00	0.00	0.00	0.00	0.00
13.250	0.00	0.00	0.00	0.00	0.00
13.500	0.00	0.00	0.00	0.00	0.00
13.750	0.00	0.00	0.00	0.00	0.00
14.000	0.00	0.00	0.00	0.00	0.00
14.250	0.00	0.00	0.00	0.00	0.00
14.500	0.00	0.00	0.00	0.00	0.00
14.750	0.00	0.00	0.00	0.00	0.00
15.000	0.00	0.00	0.00	0.00	0.00
15.250	0.00	0.00	0.00	0.00	0.00
15.500	0.00	0.00	0.00	0.00	0.00
15.750	0.00	0.00	0.00	0.00	0.00
16.000	0.00	0.00	0.00	0.00	0.00
16.250	0.00	0.00	0.00	0.00	0.00
16.500	0.00	0.00	0.00	0.00	0.00
16.750	0.00	0.00	0.00	0.00	0.00
17.000	0.00	0.00	0.00	0.00	0.00
17.250	0.00	0.00	0.00	0.00	0.00
17.500	0.00	0.00	0.00	0.00	0.00
17.750	0.00	0.00	0.00	0.00	0.00
18.000	0.00	0.00	0.00	0.00	0.00
18.250	0.00	0.00	0.00	0.00	0.00
18.500	0.00	0.00	0.00	0.00	0.00
18.750	0.00	0.00	0.00	0.00	0.00
19.000	0.00	0.00	0.00	0.00	0.00
19.250	0.00	0.00	0.00	0.00	0.00
19.500	0.00	0.00	0.00	0.00	0.00
19.750	0.00	0.00	0.00	0.00	0.00
20.000	0.00	0.00	0.00	0.00	0.00
20.250	0.00	0.00	0.00	0.00	0.00

## Brunswick Site

Subsection: Time vs. Elevation  
Label: PO-1 (OUT)

Return Event: 10 years  
Storm Event: Brunswick NC 10-yr

### Time vs. Elevation (ft)

Output Time increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)				
20.500	0.00	0.00	0.00	0.00	0.00
20.750	0.00	0.00	0.00	0.00	0.00
21.000	0.00	0.00	0.00	0.00	0.00
21.250	0.00	0.00	0.00	0.00	0.00
21.500	0.00	0.00	0.00	0.00	0.00
21.750	0.00	0.00	0.00	0.00	0.00
22.000	0.00	0.00	0.00	0.00	0.00
22.250	0.00	0.00	0.00	0.00	0.00
22.500	0.00	0.00	0.00	0.00	0.00
22.750	0.00	0.00	0.00	0.00	0.00
23.000	0.00	0.00	0.00	0.00	0.00
23.250	0.00	0.00	0.00	0.00	0.00
23.500	0.00	0.00	0.00	0.00	0.00
23.750	0.00	0.00	0.00	0.00	0.00
24.000	0.00	(N/A)	(N/A)	(N/A)	(N/A)

## Brunswick Site

Subsection: Time vs. Elevation  
 Label: PO-1 (OUT)

Return Event: 25 years  
 Storm Event: Brunswick NC 25-yr

### Time vs. Elevation (ft)

**Output Time increment = 0.050 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
0.000	0.00	0.00	0.00	0.00	0.00
0.250	0.00	0.00	0.00	0.00	0.00
0.500	0.00	0.00	0.00	0.00	0.00
0.750	0.00	0.00	0.00	0.00	0.00
1.000	0.00	0.00	0.00	0.00	0.00
1.250	0.00	0.00	0.00	0.00	0.00
1.500	0.00	0.00	0.00	0.00	0.00
1.750	0.00	0.00	0.00	0.00	0.00
2.000	0.00	0.00	0.00	0.00	0.00
2.250	0.00	0.00	0.00	0.00	0.00
2.500	0.00	0.00	0.00	0.00	0.00
2.750	0.00	0.00	0.00	0.00	0.00
3.000	0.00	0.00	0.00	0.00	0.00
3.250	0.00	0.00	0.00	0.00	0.00
3.500	0.00	0.00	0.00	0.00	0.00
3.750	0.00	0.00	0.00	0.00	0.00
4.000	0.00	0.00	0.00	0.00	0.00
4.250	0.00	0.00	0.00	0.00	0.00
4.500	0.00	0.00	0.00	0.00	0.00
4.750	0.00	0.00	0.00	0.00	0.00
5.000	0.00	0.00	0.00	0.00	0.00
5.250	0.00	0.00	0.00	0.00	0.00
5.500	0.00	0.00	0.00	0.00	0.00
5.750	0.00	0.00	0.00	0.00	0.00
6.000	0.00	0.00	0.00	0.00	0.00
6.250	0.00	0.00	0.00	0.00	0.00
6.500	0.00	0.00	0.00	0.00	0.00
6.750	0.00	0.00	0.00	0.00	0.00
7.000	0.00	0.00	0.00	0.00	0.00
7.250	0.00	0.00	0.00	0.00	0.00
7.500	0.00	0.00	0.00	0.00	0.00
7.750	0.00	0.00	0.00	0.00	0.00
8.000	0.00	0.00	0.00	0.00	0.00
8.250	0.00	0.00	0.00	0.00	0.00
8.500	0.00	0.00	0.00	0.00	0.00
8.750	0.00	0.00	0.00	0.00	0.00
9.000	0.00	0.00	0.00	0.00	0.00
9.250	0.00	0.00	0.00	0.00	0.00
9.500	0.00	0.00	0.00	0.00	0.00
9.750	0.00	0.00	0.00	0.00	0.00
10.000	0.00	0.00	0.00	0.00	0.00

## Brunswick Site

Subsection: Time vs. Elevation  
 Label: PO-1 (OUT)

Return Event: 25 years  
 Storm Event: Brunswick NC 25-yr

### Time vs. Elevation (ft)

**Output Time increment = 0.050 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
10.250	0.00	0.00	0.00	0.00	0.00
10.500	0.00	0.00	0.00	0.00	0.00
10.750	0.00	0.00	0.00	0.00	0.00
11.000	0.00	0.00	0.00	0.00	0.00
11.250	0.00	0.00	0.00	0.00	0.00
11.500	0.00	0.00	0.00	0.00	0.00
11.750	0.00	0.00	0.00	0.00	0.00
12.000	0.00	0.00	0.00	0.00	0.00
12.250	0.00	0.00	0.00	0.00	0.00
12.500	0.00	0.00	0.00	0.00	0.00
12.750	0.00	0.00	0.00	0.00	0.00
13.000	0.00	0.00	0.00	0.00	0.00
13.250	0.00	0.00	0.00	0.00	0.00
13.500	0.00	0.00	0.00	0.00	0.00
13.750	0.00	0.00	0.00	0.00	0.00
14.000	0.00	0.00	0.00	0.00	0.00
14.250	0.00	0.00	0.00	0.00	0.00
14.500	0.00	0.00	0.00	0.00	0.00
14.750	0.00	0.00	0.00	0.00	0.00
15.000	0.00	0.00	0.00	0.00	0.00
15.250	0.00	0.00	0.00	0.00	0.00
15.500	0.00	0.00	0.00	0.00	0.00
15.750	0.00	0.00	0.00	0.00	0.00
16.000	0.00	0.00	0.00	0.00	0.00
16.250	0.00	0.00	0.00	0.00	0.00
16.500	0.00	0.00	0.00	0.00	0.00
16.750	0.00	0.00	0.00	0.00	0.00
17.000	0.00	0.00	0.00	0.00	0.00
17.250	0.00	0.00	0.00	0.00	0.00
17.500	0.00	0.00	0.00	0.00	0.00
17.750	0.00	0.00	0.00	0.00	0.00
18.000	0.00	0.00	0.00	0.00	0.00
18.250	0.00	0.00	0.00	0.00	0.00
18.500	0.00	0.00	0.00	0.00	0.00
18.750	0.00	0.00	0.00	0.00	0.00
19.000	0.00	0.00	0.00	0.00	0.00
19.250	0.00	0.00	0.00	0.00	0.00
19.500	0.00	0.00	0.00	0.00	0.00
19.750	0.00	0.00	0.00	0.00	0.00
20.000	0.00	0.00	0.00	0.00	0.00
20.250	0.00	0.00	0.00	0.00	0.00

## Brunswick Site

Subsection: Time vs. Elevation  
 Label: PO-1 (OUT)

Return Event: 25 years  
 Storm Event: Brunswick NC 25-yr

### Time vs. Elevation (ft)

**Output Time increment = 0.050 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
20.500	0.00	0.00	0.00	0.00	0.00
20.750	0.00	0.00	0.00	0.00	0.00
21.000	0.00	0.00	0.00	0.00	0.00
21.250	0.00	0.00	0.00	0.00	0.00
21.500	0.00	0.00	0.00	0.00	0.00
21.750	0.00	0.00	0.00	0.00	0.00
22.000	0.00	0.00	0.00	0.00	0.00
22.250	0.00	0.00	0.00	0.00	0.00
22.500	0.00	0.00	0.00	0.00	0.00
22.750	0.00	0.00	0.00	0.00	0.00
23.000	0.00	0.00	0.00	0.00	0.00
23.250	0.00	0.00	0.00	0.00	0.00
23.500	0.00	0.00	0.00	0.00	0.00
23.750	0.00	0.00	0.00	0.00	0.00
24.000	0.00	(N/A)	(N/A)	(N/A)	(N/A)

## Brunswick Site

Subsection: Time vs. Elevation  
 Label: PO-1 (OUT)

Return Event: 100 years  
 Storm Event: Brunswick NC 100-yr

### Time vs. Elevation (ft)

**Output Time increment = 0.050 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
0.000	0.00	0.00	0.00	0.00	0.00
0.250	0.00	0.00	0.00	0.00	0.00
0.500	0.00	0.00	0.00	0.00	0.00
0.750	0.00	0.00	0.00	0.00	0.00
1.000	0.00	0.00	0.00	0.00	0.00
1.250	0.00	0.00	0.00	0.00	0.00
1.500	0.00	0.00	0.00	0.00	0.00
1.750	0.00	0.00	0.00	0.00	0.00
2.000	0.00	0.00	0.00	0.00	0.00
2.250	0.00	0.00	0.00	0.00	0.00
2.500	0.00	0.00	0.00	0.00	0.00
2.750	0.00	0.00	0.00	0.00	0.00
3.000	0.00	0.00	0.00	0.00	0.00
3.250	0.00	0.00	0.00	0.00	0.00
3.500	0.00	0.00	0.00	0.00	0.00
3.750	0.00	0.00	0.00	0.00	0.00
4.000	0.00	0.00	0.00	0.00	0.00
4.250	0.00	0.00	0.00	0.00	0.00
4.500	0.00	0.00	0.00	0.00	0.00
4.750	0.00	0.00	0.00	0.00	0.00
5.000	0.00	0.00	0.00	0.00	0.00
5.250	0.00	0.00	0.00	0.00	0.00
5.500	0.00	0.00	0.00	0.00	0.00
5.750	0.00	0.00	0.00	0.00	0.00
6.000	0.00	0.00	0.00	0.00	0.00
6.250	0.00	0.00	0.00	0.00	0.00
6.500	0.00	0.00	0.00	0.00	0.00
6.750	0.00	0.00	0.00	0.00	0.00
7.000	0.00	0.00	0.00	0.00	0.00
7.250	0.00	0.00	0.00	0.00	0.00
7.500	0.00	0.00	0.00	0.00	0.00
7.750	0.00	0.00	0.00	0.00	0.00
8.000	0.00	0.00	0.00	0.00	0.00
8.250	0.00	0.00	0.00	0.00	0.00
8.500	0.00	0.00	0.00	0.00	0.00
8.750	0.00	0.00	0.00	0.00	0.00
9.000	0.00	0.00	0.00	0.00	0.00
9.250	0.00	0.00	0.00	0.00	0.00
9.500	0.00	0.00	0.00	0.00	0.00
9.750	0.00	0.00	0.00	0.00	0.00
10.000	0.00	0.00	0.00	0.00	0.00

## Brunswick Site

Subsection: Time vs. Elevation  
 Label: PO-1 (OUT)

Return Event: 100 years  
 Storm Event: Brunswick NC 100-yr

### Time vs. Elevation (ft)

**Output Time increment = 0.050 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
10.250	0.00	0.00	0.00	0.00	0.00
10.500	0.00	0.00	0.00	0.00	0.00
10.750	0.00	0.00	0.00	0.00	0.00
11.000	0.00	0.00	0.00	0.00	0.00
11.250	0.00	0.00	0.00	0.00	0.00
11.500	0.00	0.00	0.00	0.00	0.00
11.750	0.00	0.00	0.00	0.00	0.00
12.000	0.00	0.00	0.00	0.00	0.00
12.250	0.00	0.00	0.00	0.00	0.00
12.500	0.00	0.00	0.00	0.00	0.00
12.750	0.00	0.00	0.00	0.00	0.00
13.000	0.00	0.00	0.00	0.00	0.00
13.250	0.00	0.00	0.00	0.00	0.00
13.500	0.00	0.00	0.00	0.00	0.00
13.750	0.00	0.00	0.00	0.00	0.00
14.000	0.00	0.00	0.00	0.00	0.00
14.250	0.00	0.00	0.00	0.00	0.00
14.500	0.00	0.00	0.00	0.00	0.00
14.750	0.00	0.00	0.00	0.00	0.00
15.000	0.00	0.00	0.00	0.00	0.00
15.250	0.00	0.00	0.00	0.00	0.00
15.500	0.00	0.00	0.00	0.00	0.00
15.750	0.00	0.00	0.00	0.00	0.00
16.000	0.00	0.00	0.00	0.00	0.00
16.250	0.00	0.00	0.00	0.00	0.00
16.500	0.00	0.00	0.00	0.00	0.00
16.750	0.00	0.00	0.00	0.00	0.00
17.000	0.00	0.00	0.00	0.00	0.00
17.250	0.00	0.00	0.00	0.00	0.00
17.500	0.00	0.00	0.00	0.00	0.00
17.750	0.00	0.00	0.00	0.00	0.00
18.000	0.00	0.00	0.00	0.00	0.00
18.250	0.00	0.00	0.00	0.00	0.00
18.500	0.00	0.00	0.00	0.00	0.00
18.750	0.00	0.00	0.00	0.00	0.00
19.000	0.00	0.00	0.00	0.00	0.00
19.250	0.00	0.00	0.00	0.00	0.00
19.500	0.00	0.00	0.00	0.00	0.00
19.750	0.00	0.00	0.00	0.00	0.00
20.000	0.00	0.00	0.00	0.00	0.00
20.250	0.00	0.00	0.00	0.00	0.00

## Brunswick Site

Subsection: Time vs. Elevation  
Label: PO-1 (OUT)

Return Event: 100 years  
Storm Event: Brunswick NC 100-yr

### Time vs. Elevation (ft)

Output Time increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)				
20.500	0.00	0.00	0.00	0.00	0.00
20.750	0.00	0.00	0.00	0.00	0.00
21.000	0.00	0.00	0.00	0.00	0.00
21.250	0.00	0.00	0.00	0.00	0.00
21.500	0.00	0.00	0.00	0.00	0.00
21.750	0.00	0.00	0.00	0.00	0.00
22.000	0.00	0.00	0.00	0.00	0.00
22.250	0.00	0.00	0.00	0.00	0.00
22.500	0.00	0.00	0.00	0.00	0.00
22.750	0.00	0.00	0.00	0.00	0.00
23.000	0.00	0.00	0.00	0.00	0.00
23.250	0.00	0.00	0.00	0.00	0.00
23.500	0.00	0.00	0.00	0.00	0.00
23.750	0.00	0.00	0.00	0.00	0.00
24.000	0.00	(N/A)	(N/A)	(N/A)	(N/A)

## Brunswick Site

Subsection: Diverted Hydrograph  
Label: Outlet-1

Return Event: 2 years  
Storm Event: Brunswick NC 2-yr

Peak Discharge	93.31 ft <sup>3</sup> /s
Time to Peak	8.000 hours
Hydrograph Volume	31.197 ac-ft

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
2.300	0.00	0.00	0.01	0.03	0.07
2.550	0.11	0.15	0.19	0.23	0.27
2.800	0.31	0.35	0.39	0.43	0.47
3.050	0.51	0.55	0.58	0.62	0.65
3.300	0.69	0.72	0.77	0.84	0.94
3.550	1.07	1.22	1.38	1.55	1.72
3.800	1.90	2.07	2.25	2.43	2.61
4.050	2.78	2.94	3.10	3.27	3.44
4.300	3.61	3.79	3.98	4.16	4.36
4.550	4.55	4.76	4.96	5.17	5.39
4.800	5.61	5.84	6.07	6.32	6.57
5.050	6.83	7.12	7.41	7.72	8.01
5.300	8.30	8.58	8.87	9.15	9.43
5.550	9.69	9.91	10.12	10.35	10.61
5.800	10.91	11.22	11.55	11.89	12.27
6.050	12.70	13.25	13.85	14.42	14.92
6.300	15.38	15.80	16.19	16.55	16.88
6.550	17.10	17.08	16.95	16.92	17.05
6.800	17.32	17.68	18.14	18.67	19.29
7.050	19.98	20.77	21.62	22.58	23.60
7.300	24.75	25.97	27.30	28.71	30.36
7.550	34.17	43.77	56.47	67.85	76.22
7.800	82.52	87.18	90.49	92.54	93.31
8.050	91.55	84.64	75.30	66.79	60.47
8.300	55.39	51.25	47.64	44.62	41.95
8.550	40.06	39.33	39.33	39.19	38.65
8.800	37.85	36.98	36.02	35.07	34.12
9.050	33.22	32.32	31.48	30.65	29.88
9.300	29.12	28.42	27.75	27.13	26.55
9.550	26.13	26.01	26.09	26.11	26.02
9.800	25.86	25.67	25.45	25.23	24.99
10.050	24.74	24.43	24.11	23.81	23.55
10.300	23.31	23.12	22.94	22.80	22.66
10.550	22.57	22.61	22.70	22.73	22.68
10.800	22.57	22.44	22.29	22.13	21.96
11.050	21.80	21.63	21.46	21.29	21.12
11.300	20.94	20.77	20.59	20.42	20.24

## Brunswick Site

Subsection: Diverted Hydrograph  
Label: Outlet-1

Return Event: 2 years  
Storm Event: Brunswick NC 2-yr

**HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)**  
**Output Time Increment = 0.050 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Flow (ft <sup>3</sup> /s)				
11.550	20.05	19.80	19.53	19.30	19.12
11.800	18.98	18.86	18.76	18.68	18.62
12.050	18.58	18.56	18.55	18.57	18.61
12.300	18.68	18.77	18.87	18.99	19.13
12.550	19.19	19.05	18.76	18.51	18.34
12.800	18.22	18.14	18.08	18.04	18.00
13.050	18.02	18.18	18.38	18.48	18.47
13.300	18.39	18.30	18.17	18.04	17.92
13.550	17.81	17.71	17.62	17.52	17.44
13.800	17.38	17.33	17.28	17.24	17.20
14.050	17.20	17.22	17.25	17.26	17.26
14.300	17.25	17.22	17.20	17.18	17.15
14.550	17.11	17.09	17.06	17.03	17.00
14.800	16.96	16.92	16.89	16.86	16.84
15.050	16.82	16.79	16.76	16.73	16.70
15.300	16.67	16.63	16.59	16.56	16.52
15.550	16.49	16.46	16.43	16.40	16.37
15.800	16.35	16.32	16.29	16.26	16.22
16.050	16.18	16.15	16.12	16.08	16.05
16.300	16.01	15.99	15.95	15.92	15.88
16.550	15.85	15.82	15.79	15.75	15.72
16.800	15.69	15.65	15.62	15.59	15.56
17.050	15.52	15.49	15.46	15.42	15.38
17.300	15.34	15.30	15.26	15.23	15.21
17.550	15.18	15.15	15.11	15.08	15.05
17.800	15.02	14.98	14.93	14.89	14.85
18.050	14.82	14.78	14.75	14.71	14.68
18.300	14.66	14.63	14.60	14.56	14.51
18.550	14.47	14.43	14.40	14.36	14.33
18.800	14.29	14.26	14.22	14.18	14.15
19.050	14.12	14.08	14.04	14.00	13.97
19.300	13.94	13.90	13.86	13.83	13.79
19.550	13.75	13.72	13.68	13.65	13.60
19.800	13.56	13.51	13.48	13.44	13.42
20.050	13.39	13.35	13.31	13.28	13.25
20.300	13.21	13.17	13.12	13.07	13.03
20.550	13.00	12.96	12.92	12.88	12.85
20.800	12.83	12.80	12.76	12.72	12.67
21.050	12.63	12.59	12.55	12.51	12.47
21.300	12.44	12.40	12.36	12.32	12.28
21.550	12.25	12.21	12.17	12.13	12.10
21.800	12.06	12.02	11.98	11.95	11.91

## Brunswick Site

Subsection: Diverted Hydrograph  
Label: Outlet-1

Return Event: 2 years  
Storm Event: Brunswick NC 2-yr

**HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)**  
**Output Time Increment = 0.050 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Flow (ft <sup>3</sup> /s)				
22.050	11.87	11.83	11.80	11.76	11.71
22.300	11.66	11.62	11.58	11.55	11.52
22.550	11.49	11.45	11.41	11.37	11.34
22.800	11.30	11.25	11.20	11.16	11.12
23.050	11.08	11.04	11.00	10.96	10.93
23.300	10.90	10.87	10.83	10.79	10.74
23.550	10.69	10.65	10.62	10.57	10.53
23.800	10.49	10.46	10.42	10.38	10.35

## Brunswick Site

Subsection: Diverted Hydrograph  
 Label: Outlet-1

Return Event: 10 years  
 Storm Event: Brunswick NC 10-yr

Peak Discharge	157.48 ft <sup>3</sup> /s
Time to Peak	8.000 hours
Hydrograph Volume	51.318 ac-ft

**HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)**  
**Output Time Increment = 0.050 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Flow (ft <sup>3</sup> /s)				
1.700	0.00	0.00	0.01	0.04	0.10
1.950	0.16	0.23	0.31	0.39	0.47
2.200	0.56	0.64	0.72	0.80	0.88
2.450	0.96	1.05	1.16	1.33	1.54
2.700	1.78	2.03	2.29	2.55	2.81
2.950	3.06	3.32	3.56	3.79	4.01
3.200	4.23	4.45	4.69	4.93	5.18
3.450	5.44	5.70	5.98	6.31	6.65
3.700	7.01	7.34	7.66	7.98	8.29
3.950	8.61	8.92	9.21	9.47	9.72
4.200	9.97	10.24	10.53	10.83	11.15
4.450	11.47	11.80	12.14	12.48	12.83
4.700	13.19	13.56	13.94	14.33	14.75
4.950	15.17	15.61	16.06	16.56	17.09
5.200	17.62	18.12	18.62	19.10	19.56
5.450	20.02	20.48	20.89	21.22	21.51
5.700	21.86	22.27	22.74	23.25	23.79
5.950	24.36	24.99	25.71	26.68	27.74
6.200	28.72	29.56	30.31	30.98	31.59
6.450	32.13	32.62	32.89	32.71	32.33
6.700	32.13	32.24	32.63	33.19	33.93
6.950	34.78	35.81	36.96	38.27	39.70
7.200	41.31	43.03	44.96	46.99	49.22
7.450	51.57	54.33	60.87	77.53	99.44
7.700	118.77	132.59	142.63	149.74	154.47
7.950	157.05	157.48	153.75	141.55	125.47
8.200	110.90	100.10	91.44	84.39	78.27
8.450	73.16	68.66	65.45	64.16	64.07
8.700	63.75	62.79	61.41	59.92	58.29
8.950	56.70	55.10	53.58	52.09	50.68
9.200	49.30	48.02	46.76	45.60	44.49
9.450	43.47	42.51	41.80	41.58	41.68
9.700	41.68	41.51	41.23	40.90	40.53
9.950	40.15	39.74	39.32	38.81	38.28
10.200	37.78	37.35	36.96	36.62	36.33
10.450	36.09	35.85	35.69	35.73	35.86
10.700	35.89	35.79	35.61	35.38	35.13

## Brunswick Site

Subsection: Diverted Hydrograph  
 Label: Outlet-1

Return Event: 10 years  
 Storm Event: Brunswick NC 10-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s) Output Time Increment = 0.050 hours Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
10.950	34.86	34.59	34.31	34.03	33.75
11.200	33.47	33.19	32.90	32.61	32.32
11.450	32.04	31.75	31.43	31.03	30.61
11.700	30.23	29.94	29.70	29.51	29.35
11.950	29.21	29.11	29.04	28.99	28.97
12.200	28.99	29.05	29.15	29.28	29.43
12.450	29.60	29.81	29.90	29.66	29.22
12.700	28.81	28.54	28.35	28.21	28.11
12.950	28.04	27.98	28.00	28.23	28.54
13.200	28.70	28.66	28.54	28.38	28.18
13.450	27.97	27.77	27.60	27.44	27.29
13.700	27.13	27.00	26.90	26.82	26.74
13.950	26.66	26.60	26.59	26.61	26.65
14.200	26.67	26.66	26.63	26.59	26.55
14.450	26.51	26.46	26.40	26.35	26.31
14.700	26.25	26.20	26.13	26.07	26.01
14.950	25.97	25.93	25.89	25.84	25.79
15.200	25.74	25.69	25.64	25.58	25.51
15.450	25.45	25.39	25.34	25.29	25.23
15.700	25.18	25.14	25.10	25.06	25.00
15.950	24.95	24.88	24.81	24.76	24.71
16.200	24.65	24.59	24.54	24.49	24.44
16.450	24.38	24.33	24.28	24.22	24.16
16.700	24.11	24.06	24.00	23.95	23.89
16.950	23.84	23.79	23.73	23.67	23.63
17.200	23.57	23.51	23.43	23.37	23.31
17.450	23.26	23.22	23.18	23.12	23.07
17.700	23.01	22.96	22.91	22.84	22.77
17.950	22.70	22.65	22.59	22.53	22.47
18.200	22.42	22.37	22.33	22.29	22.23
18.450	22.17	22.10	22.03	21.97	21.92
18.700	21.86	21.80	21.74	21.69	21.63
18.950	21.57	21.52	21.46	21.41	21.34
19.200	21.29	21.24	21.18	21.12	21.06
19.450	21.01	20.95	20.89	20.83	20.78
19.700	20.72	20.65	20.58	20.51	20.45
19.950	20.40	20.36	20.31	20.26	20.20
20.200	20.14	20.09	20.03	19.96	19.89
20.450	19.82	19.76	19.70	19.64	19.58
20.700	19.52	19.47	19.43	19.39	19.33
20.950	19.26	19.19	19.12	19.06	19.00
21.200	18.94	18.88	18.82	18.77	18.71

## Brunswick Site

Subsection: Diverted Hydrograph

Return Event: 10 years

Label: Outlet-1

Storm Event: Brunswick NC 10-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
21.450	18.64	18.59	18.53	18.47	18.41
21.700	18.35	18.30	18.24	18.17	18.12
21.950	18.06	18.00	17.94	17.88	17.83
22.200	17.77	17.70	17.62	17.55	17.49
22.450	17.44	17.39	17.35	17.29	17.23
22.700	17.17	17.12	17.06	16.99	16.91
22.950	16.84	16.78	16.72	16.66	16.60
23.200	16.54	16.49	16.44	16.39	16.34
23.450	16.27	16.20	16.13	16.06	16.01
23.700	15.94	15.88	15.82	15.77	15.70
23.950	15.64	15.60	(N/A)	(N/A)	(N/A)

## Brunswick Site

Subsection: Diverted Hydrograph  
Label: Outlet-1

Return Event: 25 years  
Storm Event: Brunswick NC 25-yr

Peak Discharge	213.78 ft <sup>3</sup> /s
Time to Peak	8.000 hours
Hydrograph Volume	69.260 ac-ft

**HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)**  
**Output Time Increment = 0.050 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Flow (ft <sup>3</sup> /s)				
1.450	0.00	0.01	0.05	0.13	0.22
1.700	0.33	0.45	0.56	0.68	0.79
1.950	0.90	1.02	1.13	1.28	1.49
2.200	1.79	2.15	2.55	2.96	3.38
2.450	3.80	4.21	4.62	5.01	5.38
2.700	5.75	6.11	6.47	6.82	7.17
2.950	7.51	7.84	8.16	8.44	8.71
3.200	8.99	9.28	9.59	9.91	10.26
3.450	10.61	10.98	11.38	11.85	12.36
3.700	12.88	13.36	13.81	14.25	14.69
3.950	15.12	15.54	15.93	16.27	16.58
4.200	16.91	17.26	17.64	18.04	18.47
4.450	18.90	19.35	19.80	20.27	20.75
4.700	21.23	21.73	22.25	22.78	23.35
4.950	23.93	24.52	25.14	25.84	26.56
5.200	27.29	27.98	28.65	29.28	29.91
5.450	30.51	31.11	31.65	32.06	32.40
5.700	32.83	33.37	33.99	34.65	35.37
5.950	36.13	36.97	37.95	39.29	40.74
6.200	42.09	43.22	44.21	45.08	45.87
6.450	46.56	47.16	47.45	47.11	46.47
6.700	46.09	46.18	46.64	47.36	48.33
6.950	49.47	50.84	52.39	54.16	56.09
7.200	58.27	60.58	63.19	65.94	68.95
7.450	72.11	75.82	84.77	107.70	137.74
7.700	164.05	182.59	195.84	204.99	210.84
7.950	213.76	213.78	208.22	191.32	169.28
8.200	149.39	134.63	122.82	113.22	104.89
8.450	97.95	91.85	87.49	85.70	85.52
8.700	85.03	83.70	81.81	79.77	77.56
8.950	75.40	73.24	71.19	69.17	67.27
9.200	65.41	63.69	62.00	60.43	58.94
9.450	57.57	56.27	55.32	55.01	55.12
9.700	55.11	54.87	54.48	54.03	53.52
9.950	53.00	52.45	51.89	51.20	50.48
10.200	49.81	49.23	48.70	48.25	47.86
10.450	47.52	47.19	46.98	47.02	47.17

## Brunswick Site

Subsection: Diverted Hydrograph  
Label: Outlet-1

Return Event: 25 years  
Storm Event: Brunswick NC 25-yr

**HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)**  
**Output Time Increment = 0.050 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Flow (ft <sup>3</sup> /s)				
10.700	47.21	47.07	46.81	46.51	46.17
10.950	45.81	45.44	45.07	44.69	44.32
11.200	43.93	43.56	43.17	42.79	42.40
11.450	42.02	41.63	41.21	40.67	40.11
11.700	39.61	39.22	38.91	38.66	38.43
11.950	38.25	38.11	38.02	37.95	37.92
12.200	37.93	38.01	38.13	38.30	38.49
12.450	38.71	38.98	39.09	38.77	38.18
12.700	37.65	37.29	37.03	36.85	36.71
12.950	36.61	36.53	36.56	36.86	37.25
13.200	37.45	37.40	37.24	37.03	36.76
13.450	36.49	36.22	36.00	35.78	35.58
13.700	35.37	35.19	35.05	34.95	34.84
13.950	34.73	34.66	34.63	34.66	34.71
14.200	34.73	34.72	34.68	34.62	34.56
14.450	34.50	34.43	34.36	34.29	34.23
14.700	34.16	34.08	33.99	33.90	33.83
14.950	33.77	33.72	33.66	33.59	33.52
15.200	33.45	33.39	33.32	33.24	33.15
15.450	33.06	32.99	32.92	32.85	32.77
15.700	32.70	32.64	32.59	32.53	32.46
15.950	32.38	32.29	32.21	32.13	32.07
16.200	31.99	31.91	31.84	31.78	31.70
16.450	31.62	31.55	31.49	31.41	31.33
16.700	31.26	31.20	31.12	31.05	30.97
16.950	30.91	30.83	30.75	30.68	30.62
17.200	30.54	30.46	30.36	30.27	30.20
17.450	30.13	30.08	30.02	29.95	29.87
17.700	29.80	29.74	29.66	29.57	29.48
17.950	29.39	29.31	29.25	29.17	29.09
18.200	29.01	28.95	28.90	28.84	28.77
18.450	28.68	28.59	28.50	28.42	28.35
18.700	28.27	28.19	28.12	28.05	27.97
18.950	27.89	27.82	27.75	27.67	27.59
19.200	27.52	27.45	27.38	27.29	27.22
19.450	27.15	27.07	26.99	26.92	26.85
19.700	26.77	26.69	26.59	26.50	26.42
19.950	26.36	26.30	26.24	26.16	26.08
20.200	26.01	25.94	25.86	25.78	25.68
20.450	25.59	25.51	25.44	25.36	25.28
20.700	25.20	25.14	25.08	25.02	24.95
20.950	24.86	24.77	24.68	24.60	24.53

## Brunswick Site

Subsection: Diverted Hydrograph

Return Event: 25 years

Label: Outlet-1

Storm Event: Brunswick NC 25-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
21.200	24.44	24.36	24.29	24.22	24.14
21.450	24.05	23.98	23.91	23.83	23.75
21.700	23.67	23.60	23.52	23.44	23.37
21.950	23.30	23.22	23.13	23.06	22.99
22.200	22.91	22.82	22.72	22.63	22.55
22.450	22.48	22.42	22.36	22.29	22.21
22.700	22.13	22.06	21.98	21.90	21.80
22.950	21.70	21.62	21.55	21.47	21.39
23.200	21.31	21.24	21.19	21.12	21.05
23.450	20.96	20.87	20.77	20.69	20.62
23.700	20.54	20.45	20.38	20.31	20.23
23.950	20.15	20.09	(N/A)	(N/A)	(N/A)

## Brunswick Site

Subsection: Diverted Hydrograph  
Label: Outlet-1

Return Event: 100 years  
Storm Event: Brunswick NC 100-yr

Peak Discharge	247.08 ft <sup>3</sup> /s
Time to Peak	7.950 hours
Hydrograph Volume	79.918 ac-ft

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
1.300	0.00	0.00	0.02	0.09	0.20
1.550	0.33	0.48	0.62	0.76	0.89
1.800	1.03	1.17	1.32	1.52	1.82
2.050	2.21	2.68	3.18	3.70	4.22
2.300	4.74	5.25	5.75	6.25	6.74
2.550	7.21	7.66	8.08	8.49	8.90
2.800	9.31	9.71	10.10	10.49	10.87
3.050	11.22	11.54	11.83	12.14	12.46
3.300	12.81	13.18	13.58	14.00	14.42
3.550	14.89	15.45	16.06	16.67	17.24
3.800	17.77	18.28	18.79	19.29	19.77
4.050	20.21	20.60	20.94	21.31	21.71
4.300	22.14	22.59	23.08	23.58	24.09
4.550	24.61	25.15	25.70	26.26	26.82
4.800	27.42	28.04	28.69	29.36	30.04
5.050	30.76	31.56	32.41	33.25	34.04
5.300	34.81	35.54	36.25	36.93	37.62
5.550	38.22	38.68	39.05	39.52	40.12
5.800	40.82	41.58	42.40	43.26	44.22
6.050	45.36	46.91	48.60	50.16	51.45
6.300	52.58	53.57	54.45	55.22	55.89
6.550	56.19	55.74	54.94	54.45	54.51
6.800	55.02	55.83	56.93	58.23	59.80
7.050	61.58	63.62	65.84	68.35	71.01
7.300	74.02	77.18	80.64	84.28	88.56
7.550	98.92	125.53	160.36	190.77	212.08
7.800	227.18	237.50	243.99	247.08	246.83
8.050	240.18	220.50	194.96	171.93	154.85
8.300	141.19	130.09	120.47	112.46	105.41
8.550	100.38	98.29	98.05	97.47	95.92
8.800	93.73	91.38	88.82	86.33	83.84
9.050	81.47	79.15	76.96	74.82	72.84
9.300	70.89	69.09	67.37	65.79	64.31
9.550	63.21	62.85	62.97	62.94	62.66
9.800	62.21	61.68	61.10	60.50	59.87
10.050	59.21	58.42	57.60	56.83	56.16
10.300	55.55	55.03	54.58	54.19	53.81

## Brunswick Site

Subsection: Diverted Hydrograph  
Label: Outlet-1

Return Event: 100 years  
Storm Event: Brunswick NC 100-yr

**HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)**  
**Output Time Increment = 0.050 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Flow (ft <sup>3</sup> /s)				
10.550	53.56	53.60	53.78	53.81	53.65
10.800	53.35	53.00	52.60	52.19	51.77
11.050	51.34	50.91	50.48	50.03	49.61
11.300	49.16	48.72	48.27	47.84	47.39
11.550	46.91	46.30	45.66	45.08	44.64
11.800	44.28	43.99	43.73	43.52	43.35
12.050	43.25	43.17	43.13	43.15	43.23
12.300	43.37	43.56	43.77	44.01	44.32
12.550	44.45	44.08	43.41	42.80	42.40
12.800	42.10	41.88	41.72	41.61	41.51
13.050	41.55	41.88	42.33	42.55	42.50
13.300	42.31	42.07	41.77	41.45	41.15
13.550	40.89	40.64	40.41	40.17	39.97
13.800	39.81	39.69	39.56	39.44	39.35
14.050	39.33	39.35	39.40	39.43	39.42
14.300	39.36	39.30	39.23	39.16	39.08
14.550	39.00	38.92	38.85	38.76	38.67
14.800	38.57	38.47	38.39	38.32	38.26
15.050	38.19	38.11	38.03	37.95	37.88
15.300	37.80	37.70	37.60	37.50	37.41
15.550	37.34	37.25	37.16	37.08	37.02
15.800	36.95	36.89	36.81	36.72	36.62
16.050	36.52	36.43	36.35	36.27	36.18
16.300	36.10	36.02	35.94	35.85	35.77
16.550	35.69	35.60	35.51	35.43	35.36
16.800	35.27	35.18	35.10	35.02	34.94
17.050	34.85	34.77	34.69	34.60	34.51
17.300	34.40	34.30	34.21	34.14	34.08
17.550	34.01	33.93	33.84	33.76	33.68
17.800	33.60	33.50	33.39	33.29	33.20
18.050	33.12	33.03	32.94	32.86	32.79
18.300	32.72	32.66	32.58	32.48	32.37
18.550	32.27	32.18	32.10	32.01	31.92
18.800	31.84	31.76	31.67	31.58	31.50
19.050	31.42	31.33	31.24	31.15	31.08
19.300	30.99	30.90	30.81	30.73	30.64
19.550	30.55	30.47	30.39	30.30	30.20
19.800	30.09	29.99	29.90	29.83	29.76
20.050	29.69	29.61	29.52	29.43	29.36
20.300	29.27	29.17	29.06	28.96	28.87
20.550	28.78	28.69	28.60	28.51	28.44
20.800	28.38	28.31	28.22	28.13	28.02

## Brunswick Site

Subsection: Diverted Hydrograph  
Label: Outlet-1

Return Event: 100 years  
Storm Event: Brunswick NC 100-yr

**HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)**  
**Output Time Increment = 0.050 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Flow (ft <sup>3</sup> /s)				
21.050	27.92	27.82	27.74	27.65	27.56
21.300	27.47	27.39	27.30	27.21	27.12
21.550	27.04	26.95	26.86	26.78	26.70
21.800	26.61	26.51	26.43	26.35	26.26
22.050	26.16	26.08	26.00	25.91	25.81
22.300	25.70	25.59	25.50	25.43	25.36
22.550	25.29	25.20	25.11	25.03	24.95
22.800	24.86	24.76	24.65	24.54	24.45
23.050	24.37	24.27	24.18	24.09	24.02
23.300	23.95	23.88	23.80	23.70	23.59
23.550	23.49	23.39	23.31	23.22	23.12
23.800	23.04	22.95	22.86	22.78	22.71

## Brunswick Site

Subsection: Pond Routed Hydrograph (total out)  
 Label: PO-1 (OUT)

Return Event: 2 years  
 Storm Event: Brunswick NC 2-yr

Peak Discharge	93.31 ft <sup>3</sup> /s
Time to Peak	8.000 hours
Hydrograph Volume	31.197 ac-ft

**HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)**  
**Output Time Increment = 0.050 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Flow (ft <sup>3</sup> /s)				
2.300	0.00	0.00	0.01	0.03	0.07
2.550	0.11	0.15	0.19	0.23	0.27
2.800	0.31	0.35	0.39	0.43	0.47
3.050	0.51	0.55	0.58	0.62	0.65
3.300	0.69	0.72	0.77	0.84	0.94
3.550	1.07	1.22	1.38	1.55	1.72
3.800	1.90	2.07	2.25	2.43	2.61
4.050	2.78	2.94	3.10	3.27	3.44
4.300	3.61	3.79	3.98	4.16	4.36
4.550	4.55	4.76	4.96	5.17	5.39
4.800	5.61	5.84	6.07	6.32	6.57
5.050	6.83	7.12	7.41	7.72	8.01
5.300	8.30	8.58	8.87	9.15	9.43
5.550	9.69	9.91	10.12	10.35	10.61
5.800	10.91	11.22	11.55	11.89	12.27
6.050	12.70	13.25	13.85	14.42	14.92
6.300	15.38	15.80	16.19	16.55	16.88
6.550	17.10	17.08	16.95	16.92	17.05
6.800	17.32	17.68	18.14	18.67	19.29
7.050	19.98	20.77	21.62	22.58	23.60
7.300	24.75	25.97	27.30	28.71	30.36
7.550	34.17	43.77	56.47	67.85	76.22
7.800	82.52	87.18	90.49	92.54	93.31
8.050	91.55	84.64	75.30	66.79	60.47
8.300	55.39	51.25	47.64	44.62	41.95
8.550	40.06	39.33	39.33	39.19	38.65
8.800	37.85	36.98	36.02	35.07	34.12
9.050	33.22	32.32	31.48	30.65	29.88
9.300	29.12	28.42	27.75	27.13	26.55
9.550	26.13	26.01	26.09	26.11	26.02
9.800	25.86	25.67	25.45	25.23	24.99
10.050	24.74	24.43	24.11	23.81	23.55
10.300	23.31	23.12	22.94	22.80	22.66
10.550	22.57	22.61	22.70	22.73	22.68
10.800	22.57	22.44	22.29	22.13	21.96
11.050	21.80	21.63	21.46	21.29	21.12
11.300	20.94	20.77	20.59	20.42	20.24

## Brunswick Site

Subsection: Pond Routed Hydrograph (total out)  
 Label: PO-1 (OUT)

Return Event: 2 years  
 Storm Event: Brunswick NC 2-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
11.550	20.05	19.80	19.53	19.30	19.12
11.800	18.98	18.86	18.76	18.68	18.62
12.050	18.58	18.56	18.55	18.57	18.61
12.300	18.68	18.77	18.87	18.99	19.13
12.550	19.19	19.05	18.76	18.51	18.34
12.800	18.22	18.14	18.08	18.04	18.00
13.050	18.02	18.18	18.38	18.48	18.47
13.300	18.39	18.30	18.17	18.04	17.92
13.550	17.81	17.71	17.62	17.52	17.44
13.800	17.38	17.33	17.28	17.24	17.20
14.050	17.20	17.22	17.25	17.26	17.26
14.300	17.25	17.22	17.20	17.18	17.15
14.550	17.11	17.09	17.06	17.03	17.00
14.800	16.96	16.92	16.89	16.86	16.84
15.050	16.82	16.79	16.76	16.73	16.70
15.300	16.67	16.63	16.59	16.56	16.52
15.550	16.49	16.46	16.43	16.40	16.37
15.800	16.35	16.32	16.29	16.26	16.22
16.050	16.18	16.15	16.12	16.08	16.05
16.300	16.01	15.99	15.95	15.92	15.88
16.550	15.85	15.82	15.79	15.75	15.72
16.800	15.69	15.65	15.62	15.59	15.56
17.050	15.52	15.49	15.46	15.42	15.38
17.300	15.34	15.30	15.26	15.23	15.21
17.550	15.18	15.15	15.11	15.08	15.05
17.800	15.02	14.98	14.93	14.89	14.85
18.050	14.82	14.78	14.75	14.71	14.68
18.300	14.66	14.63	14.60	14.56	14.51
18.550	14.47	14.43	14.40	14.36	14.33
18.800	14.29	14.26	14.22	14.18	14.15
19.050	14.12	14.08	14.04	14.00	13.97
19.300	13.94	13.90	13.86	13.83	13.79
19.550	13.75	13.72	13.68	13.65	13.60
19.800	13.56	13.51	13.48	13.44	13.42
20.050	13.39	13.35	13.31	13.28	13.25
20.300	13.21	13.17	13.12	13.07	13.03
20.550	13.00	12.96	12.92	12.88	12.85
20.800	12.83	12.80	12.76	12.72	12.67
21.050	12.63	12.59	12.55	12.51	12.47
21.300	12.44	12.40	12.36	12.32	12.28
21.550	12.25	12.21	12.17	12.13	12.10
21.800	12.06	12.02	11.98	11.95	11.91

## Brunswick Site

Subsection: Pond Routed Hydrograph (total out)

Label: PO-1 (OUT)

Return Event: 2 years

Storm Event: Brunswick NC 2-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
22.050	11.87	11.83	11.80	11.76	11.71
22.300	11.66	11.62	11.58	11.55	11.52
22.550	11.49	11.45	11.41	11.37	11.34
22.800	11.30	11.25	11.20	11.16	11.12
23.050	11.08	11.04	11.00	10.96	10.93
23.300	10.90	10.87	10.83	10.79	10.74
23.550	10.69	10.65	10.62	10.57	10.53
23.800	10.49	10.46	10.42	10.38	10.35

## Brunswick Site

Subsection: Pond Routed Hydrograph (total out)  
 Label: PO-1 (OUT)

Return Event: 10 years  
 Storm Event: Brunswick NC 10-yr

Peak Discharge	157.48 ft <sup>3</sup> /s
Time to Peak	8.000 hours
Hydrograph Volume	51.318 ac-ft

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
1.700	0.00	0.00	0.01	0.04	0.10
1.950	0.16	0.23	0.31	0.39	0.47
2.200	0.56	0.64	0.72	0.80	0.88
2.450	0.96	1.05	1.16	1.33	1.54
2.700	1.78	2.03	2.29	2.55	2.81
2.950	3.06	3.32	3.56	3.79	4.01
3.200	4.23	4.45	4.69	4.93	5.18
3.450	5.44	5.70	5.98	6.31	6.65
3.700	7.01	7.34	7.66	7.98	8.29
3.950	8.61	8.92	9.21	9.47	9.72
4.200	9.97	10.24	10.53	10.83	11.15
4.450	11.47	11.80	12.14	12.48	12.83
4.700	13.19	13.56	13.94	14.33	14.75
4.950	15.17	15.61	16.06	16.56	17.09
5.200	17.62	18.12	18.62	19.10	19.56
5.450	20.02	20.48	20.89	21.22	21.51
5.700	21.86	22.27	22.74	23.25	23.79
5.950	24.36	24.99	25.71	26.68	27.74
6.200	28.72	29.56	30.31	30.98	31.59
6.450	32.13	32.62	32.89	32.71	32.33
6.700	32.13	32.24	32.63	33.19	33.93
6.950	34.78	35.81	36.96	38.27	39.70
7.200	41.31	43.03	44.96	46.99	49.22
7.450	51.57	54.33	60.87	77.53	99.44
7.700	118.77	132.59	142.63	149.74	154.47
7.950	157.05	157.48	153.75	141.55	125.47
8.200	110.90	100.10	91.44	84.39	78.27
8.450	73.16	68.66	65.45	64.16	64.07
8.700	63.75	62.79	61.41	59.92	58.29
8.950	56.70	55.10	53.58	52.09	50.68
9.200	49.30	48.02	46.76	45.60	44.49
9.450	43.47	42.51	41.80	41.58	41.68
9.700	41.68	41.51	41.23	40.90	40.53
9.950	40.15	39.74	39.32	38.81	38.28
10.200	37.78	37.35	36.96	36.62	36.33
10.450	36.09	35.85	35.69	35.73	35.86
10.700	35.89	35.79	35.61	35.38	35.13

## Brunswick Site

Subsection: Pond Routed Hydrograph (total out)  
 Label: PO-1 (OUT)

Return Event: 10 years  
 Storm Event: Brunswick NC 10-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s) Output Time Increment = 0.050 hours Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
10.950	34.86	34.59	34.31	34.03	33.75
11.200	33.47	33.19	32.90	32.61	32.32
11.450	32.04	31.75	31.43	31.03	30.61
11.700	30.23	29.94	29.70	29.51	29.35
11.950	29.21	29.11	29.04	28.99	28.97
12.200	28.99	29.05	29.15	29.28	29.43
12.450	29.60	29.81	29.90	29.66	29.22
12.700	28.81	28.54	28.35	28.21	28.11
12.950	28.04	27.98	28.00	28.23	28.54
13.200	28.70	28.66	28.54	28.38	28.18
13.450	27.97	27.77	27.60	27.44	27.29
13.700	27.13	27.00	26.90	26.82	26.74
13.950	26.66	26.60	26.59	26.61	26.65
14.200	26.67	26.66	26.63	26.59	26.55
14.450	26.51	26.46	26.40	26.35	26.31
14.700	26.25	26.20	26.13	26.07	26.01
14.950	25.97	25.93	25.89	25.84	25.79
15.200	25.74	25.69	25.64	25.58	25.51
15.450	25.45	25.39	25.34	25.29	25.23
15.700	25.18	25.14	25.10	25.06	25.00
15.950	24.95	24.88	24.81	24.76	24.71
16.200	24.65	24.59	24.54	24.49	24.44
16.450	24.38	24.33	24.28	24.22	24.16
16.700	24.11	24.06	24.00	23.95	23.89
16.950	23.84	23.79	23.73	23.67	23.63
17.200	23.57	23.51	23.43	23.37	23.31
17.450	23.26	23.22	23.18	23.12	23.07
17.700	23.01	22.96	22.91	22.84	22.77
17.950	22.70	22.65	22.59	22.53	22.47
18.200	22.42	22.37	22.33	22.29	22.23
18.450	22.17	22.10	22.03	21.97	21.92
18.700	21.86	21.80	21.74	21.69	21.63
18.950	21.57	21.52	21.46	21.41	21.34
19.200	21.29	21.24	21.18	21.12	21.06
19.450	21.01	20.95	20.89	20.83	20.78
19.700	20.72	20.65	20.58	20.51	20.45
19.950	20.40	20.36	20.31	20.26	20.20
20.200	20.14	20.09	20.03	19.96	19.89
20.450	19.82	19.76	19.70	19.64	19.58
20.700	19.52	19.47	19.43	19.39	19.33
20.950	19.26	19.19	19.12	19.06	19.00
21.200	18.94	18.88	18.82	18.77	18.71

## Brunswick Site

Subsection: Pond Routed Hydrograph (total out)

Label: PO-1 (OUT)

Return Event: 10 years

Storm Event: Brunswick NC 10-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
21.450	18.64	18.59	18.53	18.47	18.41
21.700	18.35	18.30	18.24	18.17	18.12
21.950	18.06	18.00	17.94	17.88	17.83
22.200	17.77	17.70	17.62	17.55	17.49
22.450	17.44	17.39	17.35	17.29	17.23
22.700	17.17	17.12	17.06	16.99	16.91
22.950	16.84	16.78	16.72	16.66	16.60
23.200	16.54	16.49	16.44	16.39	16.34
23.450	16.27	16.20	16.13	16.06	16.01
23.700	15.94	15.88	15.82	15.77	15.70
23.950	15.64	15.60	(N/A)	(N/A)	(N/A)

## Brunswick Site

Subsection: Pond Routed Hydrograph (total out)

Return Event: 25 years

Label: PO-1 (OUT)

Storm Event: Brunswick NC 25-yr

Peak Discharge	213.78 ft <sup>3</sup> /s
Time to Peak	8.000 hours
Hydrograph Volume	69.260 ac-ft

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
1.450	0.00	0.01	0.05	0.13	0.22
1.700	0.33	0.45	0.56	0.68	0.79
1.950	0.90	1.02	1.13	1.28	1.49
2.200	1.79	2.15	2.55	2.96	3.38
2.450	3.80	4.21	4.62	5.01	5.38
2.700	5.75	6.11	6.47	6.82	7.17
2.950	7.51	7.84	8.16	8.44	8.71
3.200	8.99	9.28	9.59	9.91	10.26
3.450	10.61	10.98	11.38	11.85	12.36
3.700	12.88	13.36	13.81	14.25	14.69
3.950	15.12	15.54	15.93	16.27	16.58
4.200	16.91	17.26	17.64	18.04	18.47
4.450	18.90	19.35	19.80	20.27	20.75
4.700	21.23	21.73	22.25	22.78	23.35
4.950	23.93	24.52	25.14	25.84	26.56
5.200	27.29	27.98	28.65	29.28	29.91
5.450	30.51	31.11	31.65	32.06	32.40
5.700	32.83	33.37	33.99	34.65	35.37
5.950	36.13	36.97	37.95	39.29	40.74
6.200	42.09	43.22	44.21	45.08	45.87
6.450	46.56	47.16	47.45	47.11	46.47
6.700	46.09	46.18	46.64	47.36	48.33
6.950	49.47	50.84	52.39	54.16	56.09
7.200	58.27	60.58	63.19	65.94	68.95
7.450	72.11	75.82	84.77	107.70	137.74
7.700	164.05	182.59	195.84	204.99	210.84
7.950	213.76	213.78	208.22	191.32	169.28
8.200	149.39	134.63	122.82	113.22	104.89
8.450	97.95	91.85	87.49	85.70	85.52
8.700	85.03	83.70	81.81	79.77	77.56
8.950	75.40	73.24	71.19	69.17	67.27
9.200	65.41	63.69	62.00	60.43	58.94
9.450	57.57	56.27	55.32	55.01	55.12
9.700	55.11	54.87	54.48	54.03	53.52
9.950	53.00	52.45	51.89	51.20	50.48
10.200	49.81	49.23	48.70	48.25	47.86
10.450	47.52	47.19	46.98	47.02	47.17

## Brunswick Site

Subsection: Pond Routed Hydrograph (total out)  
 Label: PO-1 (OUT)

Return Event: 25 years  
 Storm Event: Brunswick NC 25-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s) Output Time Increment = 0.050 hours Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
10.700	47.21	47.07	46.81	46.51	46.17
10.950	45.81	45.44	45.07	44.69	44.32
11.200	43.93	43.56	43.17	42.79	42.40
11.450	42.02	41.63	41.21	40.67	40.11
11.700	39.61	39.22	38.91	38.66	38.43
11.950	38.25	38.11	38.02	37.95	37.92
12.200	37.93	38.01	38.13	38.30	38.49
12.450	38.71	38.98	39.09	38.77	38.18
12.700	37.65	37.29	37.03	36.85	36.71
12.950	36.61	36.53	36.56	36.86	37.25
13.200	37.45	37.40	37.24	37.03	36.76
13.450	36.49	36.22	36.00	35.78	35.58
13.700	35.37	35.19	35.05	34.95	34.84
13.950	34.73	34.66	34.63	34.66	34.71
14.200	34.73	34.72	34.68	34.62	34.56
14.450	34.50	34.43	34.36	34.29	34.23
14.700	34.16	34.08	33.99	33.90	33.83
14.950	33.77	33.72	33.66	33.59	33.52
15.200	33.45	33.39	33.32	33.24	33.15
15.450	33.06	32.99	32.92	32.85	32.77
15.700	32.70	32.64	32.59	32.53	32.46
15.950	32.38	32.29	32.21	32.13	32.07
16.200	31.99	31.91	31.84	31.78	31.70
16.450	31.62	31.55	31.49	31.41	31.33
16.700	31.26	31.20	31.12	31.05	30.97
16.950	30.91	30.83	30.75	30.68	30.62
17.200	30.54	30.46	30.36	30.27	30.20
17.450	30.13	30.08	30.02	29.95	29.87
17.700	29.80	29.74	29.66	29.57	29.48
17.950	29.39	29.31	29.25	29.17	29.09
18.200	29.01	28.95	28.90	28.84	28.77
18.450	28.68	28.59	28.50	28.42	28.35
18.700	28.27	28.19	28.12	28.05	27.97
18.950	27.89	27.82	27.75	27.67	27.59
19.200	27.52	27.45	27.38	27.29	27.22
19.450	27.15	27.07	26.99	26.92	26.85
19.700	26.77	26.69	26.59	26.50	26.42
19.950	26.36	26.30	26.24	26.16	26.08
20.200	26.01	25.94	25.86	25.78	25.68
20.450	25.59	25.51	25.44	25.36	25.28
20.700	25.20	25.14	25.08	25.02	24.95
20.950	24.86	24.77	24.68	24.60	24.53

## Brunswick Site

Subsection: Pond Routed Hydrograph (total out)

Label: PO-1 (OUT)

Return Event: 25 years

Storm Event: Brunswick NC 25-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
21.200	24.44	24.36	24.29	24.22	24.14
21.450	24.05	23.98	23.91	23.83	23.75
21.700	23.67	23.60	23.52	23.44	23.37
21.950	23.30	23.22	23.13	23.06	22.99
22.200	22.91	22.82	22.72	22.63	22.55
22.450	22.48	22.42	22.36	22.29	22.21
22.700	22.13	22.06	21.98	21.90	21.80
22.950	21.70	21.62	21.55	21.47	21.39
23.200	21.31	21.24	21.19	21.12	21.05
23.450	20.96	20.87	20.77	20.69	20.62
23.700	20.54	20.45	20.38	20.31	20.23
23.950	20.15	20.09	(N/A)	(N/A)	(N/A)

## Brunswick Site

Subsection: Pond Routed Hydrograph (total out)  
 Label: PO-1 (OUT)

Return Event: 100 years  
 Storm Event: Brunswick NC 100-yr

Peak Discharge	247.08 ft <sup>3</sup> /s
Time to Peak	7.950 hours
Hydrograph Volume	79.918 ac-ft

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
1.300	0.00	0.00	0.02	0.09	0.20
1.550	0.33	0.48	0.62	0.76	0.89
1.800	1.03	1.17	1.32	1.52	1.82
2.050	2.21	2.68	3.18	3.70	4.22
2.300	4.74	5.25	5.75	6.25	6.74
2.550	7.21	7.66	8.08	8.49	8.90
2.800	9.31	9.71	10.10	10.49	10.87
3.050	11.22	11.54	11.83	12.14	12.46
3.300	12.81	13.18	13.58	14.00	14.42
3.550	14.89	15.45	16.06	16.67	17.24
3.800	17.77	18.28	18.79	19.29	19.77
4.050	20.21	20.60	20.94	21.31	21.71
4.300	22.14	22.59	23.08	23.58	24.09
4.550	24.61	25.15	25.70	26.26	26.82
4.800	27.42	28.04	28.69	29.36	30.04
5.050	30.76	31.56	32.41	33.25	34.04
5.300	34.81	35.54	36.25	36.93	37.62
5.550	38.22	38.68	39.05	39.52	40.12
5.800	40.82	41.58	42.40	43.26	44.22
6.050	45.36	46.91	48.60	50.16	51.45
6.300	52.58	53.57	54.45	55.22	55.89
6.550	56.19	55.74	54.94	54.45	54.51
6.800	55.02	55.83	56.93	58.23	59.80
7.050	61.58	63.62	65.84	68.35	71.01
7.300	74.02	77.18	80.64	84.28	88.56
7.550	98.92	125.53	160.36	190.77	212.08
7.800	227.18	237.50	243.99	247.08	246.83
8.050	240.18	220.50	194.96	171.93	154.85
8.300	141.19	130.09	120.47	112.46	105.41
8.550	100.38	98.29	98.05	97.47	95.92
8.800	93.73	91.38	88.82	86.33	83.84
9.050	81.47	79.15	76.96	74.82	72.84
9.300	70.89	69.09	67.37	65.79	64.31
9.550	63.21	62.85	62.97	62.94	62.66
9.800	62.21	61.68	61.10	60.50	59.87
10.050	59.21	58.42	57.60	56.83	56.16
10.300	55.55	55.03	54.58	54.19	53.81

## Brunswick Site

Subsection: Pond Routed Hydrograph (total out)  
 Label: PO-1 (OUT)

Return Event: 100 years  
 Storm Event: Brunswick NC 100-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s) Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
10.550	53.56	53.60	53.78	53.81	53.65
10.800	53.35	53.00	52.60	52.19	51.77
11.050	51.34	50.91	50.48	50.03	49.61
11.300	49.16	48.72	48.27	47.84	47.39
11.550	46.91	46.30	45.66	45.08	44.64
11.800	44.28	43.99	43.73	43.52	43.35
12.050	43.25	43.17	43.13	43.15	43.23
12.300	43.37	43.56	43.77	44.01	44.32
12.550	44.45	44.08	43.41	42.80	42.40
12.800	42.10	41.88	41.72	41.61	41.51
13.050	41.55	41.88	42.33	42.55	42.50
13.300	42.31	42.07	41.77	41.45	41.15
13.550	40.89	40.64	40.41	40.17	39.97
13.800	39.81	39.69	39.56	39.44	39.35
14.050	39.33	39.35	39.40	39.43	39.42
14.300	39.36	39.30	39.23	39.16	39.08
14.550	39.00	38.92	38.85	38.76	38.67
14.800	38.57	38.47	38.39	38.32	38.26
15.050	38.19	38.11	38.03	37.95	37.88
15.300	37.80	37.70	37.60	37.50	37.41
15.550	37.34	37.25	37.16	37.08	37.02
15.800	36.95	36.89	36.81	36.72	36.62
16.050	36.52	36.43	36.35	36.27	36.18
16.300	36.10	36.02	35.94	35.85	35.77
16.550	35.69	35.60	35.51	35.43	35.36
16.800	35.27	35.18	35.10	35.02	34.94
17.050	34.85	34.77	34.69	34.60	34.51
17.300	34.40	34.30	34.21	34.14	34.08
17.550	34.01	33.93	33.84	33.76	33.68
17.800	33.60	33.50	33.39	33.29	33.20
18.050	33.12	33.03	32.94	32.86	32.79
18.300	32.72	32.66	32.58	32.48	32.37
18.550	32.27	32.18	32.10	32.01	31.92
18.800	31.84	31.76	31.67	31.58	31.50
19.050	31.42	31.33	31.24	31.15	31.08
19.300	30.99	30.90	30.81	30.73	30.64
19.550	30.55	30.47	30.39	30.30	30.20
19.800	30.09	29.99	29.90	29.83	29.76
20.050	29.69	29.61	29.52	29.43	29.36
20.300	29.27	29.17	29.06	28.96	28.87
20.550	28.78	28.69	28.60	28.51	28.44
20.800	28.38	28.31	28.22	28.13	28.02

## Brunswick Site

Subsection: Pond Routed Hydrograph (total out)

Label: PO-1 (OUT)

Return Event: 100 years

Storm Event: Brunswick NC 100-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
21.050	27.92	27.82	27.74	27.65	27.56
21.300	27.47	27.39	27.30	27.21	27.12
21.550	27.04	26.95	26.86	26.78	26.70
21.800	26.61	26.51	26.43	26.35	26.26
22.050	26.16	26.08	26.00	25.91	25.81
22.300	25.70	25.59	25.50	25.43	25.36
22.550	25.29	25.20	25.11	25.03	24.95
22.800	24.86	24.76	24.65	24.54	24.45
23.050	24.37	24.27	24.18	24.09	24.02
23.300	23.95	23.88	23.80	23.70	23.59
23.550	23.49	23.39	23.31	23.22	23.12
23.800	23.04	22.95	22.86	22.78	22.71

## Brunswick Site

Subsection: Pond Inflow Summary

Label: PO-1 (IN)

Return Event: 2 years

Storm Event: Brunswick NC 2-yr

### Summary for Hydrograph Addition at 'PO-1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	CM-1
<Catchment to Outflow Node>	CM-2

### Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft <sup>3</sup> /s)
Flow (From)	CM-1	23.297	8.000	69.03
Flow (From)	CM-2	7.900	8.000	24.28
Flow (In)	PO-1	31.197	8.000	93.31

## Brunswick Site

Subsection: Pond Inflow Summary  
Label: PO-1 (IN)

Return Event: 10 years  
Storm Event: Brunswick NC 10-yr

### Summary for Hydrograph Addition at 'PO-1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	CM-1
<Catchment to Outflow Node>	CM-2

### Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft <sup>3</sup> /s)
Flow (From)	CM-1	38.790	8.000	118.73
Flow (From)	CM-2	12.528	7.950	38.79
Flow (In)	PO-1	51.318	8.000	157.48

## Brunswick Site

Subsection: Pond Inflow Summary  
Label: PO-1 (IN)

Return Event: 25 years  
Storm Event: Brunswick NC 25-yr

### Summary for Hydrograph Addition at 'PO-1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	CM-1
<Catchment to Outflow Node>	CM-2

### Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft <sup>3</sup> /s)
Flow (From)	CM-1	52.660	8.000	162.57
Flow (From)	CM-2	16.600	7.950	51.36
Flow (In)	PO-1	69.260	8.000	213.78

## Brunswick Site

Subsection: Pond Inflow Summary  
Label: PO-1 (IN)

Return Event: 100 years  
Storm Event: Brunswick NC 100-yr

### Summary for Hydrograph Addition at 'PO-1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	CM-1
<Catchment to Outflow Node>	CM-2

### Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft <sup>3</sup> /s)
Flow (From)	CM-1	60.912	7.950	188.38
Flow (From)	CM-2	19.005	7.950	58.70
Flow (In)	PO-1	79.918	7.950	247.08

## Brunswick Site

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## Centennial Site

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### Project Summary

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Title	Centennial Site
Engineer	RMR
Company	Nevada City Engineering, Inc.
Date	9/10/2019

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### Notes

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## Centennial Site

Subsection: Master Network Summary

### Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft <sup>3</sup> /s)
CM-1	Pre-Development 10	10	24.300	8.000	72.44
CM-1	Post-Development 10	10	28.807	7.950	89.68
CM-1	Pre-Development 100	100	39.469	8.000	121.02
CM-1	Post-Development 100	100	44.124	7.950	137.41

### Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft <sup>3</sup> /s)
O-1	Pre-Development 10	10	24.300	8.000	72.44
O-1	Post-Development 10	10	28.027	8.350	45.14
O-1	Pre-Development 100	100	39.469	8.000	121.02
O-1	Post-Development 100	100	43.107	8.300	75.75

### Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft <sup>3</sup> /s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
PO-1 (IN)	Post-Development 10	10	28.807	7.950	89.68	(N/A)	(N/A)
PO-1 (OUT)	Post-Development 10	10	28.027	8.350	45.14	2,501.07	3.915
PO-1 (IN)	Post-Development 100	100	44.124	7.950	137.41	(N/A)	(N/A)
PO-1 (OUT)	Post-Development 100	100	43.107	8.300	75.75	2,503.70	6.152

## Centennial Site

Subsection: Time-Depth Curve  
 Label: NC airport/NOAA

Return Event: 100 years  
 Storm Event: Idaho Maryland NC 100-yr

Time-Depth Curve: Idaho Maryland NC 100-yr	
Label	Idaho Maryland NC 100-yr
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	100 years

**CUMULATIVE RAINFALL (in)**  
**Output Time Increment = 0.100 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.1	0.1
0.500	0.1	0.1	0.1	0.2	0.2
1.000	0.2	0.2	0.2	0.3	0.3
1.500	0.3	0.4	0.4	0.4	0.5
2.000	0.5	0.5	0.5	0.6	0.6
2.500	0.6	0.7	0.7	0.7	0.8
3.000	0.8	0.8	0.9	0.9	0.9
3.500	0.9	1.0	1.0	1.0	1.1
4.000	1.1	1.2	1.2	1.2	1.3
4.500	1.3	1.3	1.4	1.4	1.5
5.000	1.5	1.5	1.6	1.6	1.7
5.500	1.7	1.8	1.8	1.9	1.9
6.000	2.0	2.0	2.1	2.2	2.2
6.500	2.3	2.3	2.4	2.5	2.5
7.000	2.6	2.7	2.7	2.8	2.9
7.500	3.0	3.2	3.4	3.7	3.9
8.000	4.1	4.2	4.4	4.5	4.5
8.500	4.6	4.7	4.8	4.9	4.9
9.000	5.0	5.1	5.1	5.2	5.2
9.500	5.3	5.4	5.4	5.5	5.5
10.000	5.6	5.6	5.7	5.7	5.7
10.500	5.8	5.8	5.9	5.9	6.0
11.000	6.0	6.1	6.1	6.1	6.2
11.500	6.2	6.3	6.3	6.3	6.4
12.000	6.4	6.4	6.5	6.5	6.5
12.500	6.6	6.6	6.7	6.7	6.7
13.000	6.8	6.8	6.8	6.9	6.9
13.500	6.9	7.0	7.0	7.0	7.1
14.000	7.1	7.1	7.2	7.2	7.2
14.500	7.3	7.3	7.3	7.4	7.4
15.000	7.4	7.4	7.5	7.5	7.5
15.500	7.6	7.6	7.6	7.7	7.7
16.000	7.7	7.8	7.8	7.8	7.8

## Centennial Site

Subsection: Time-Depth Curve  
 Label: NC airport/NOAA

Return Event: 100 years  
 Storm Event: Idaho Maryland NC 100-yr

**CUMULATIVE RAINFALL (in)**  
**Output Time Increment = 0.100 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
16.500	7.9	7.9	7.9	8.0	8.0
17.000	8.0	8.0	8.1	8.1	8.1
17.500	8.2	8.2	8.2	8.2	8.3
18.000	8.3	8.3	8.3	8.4	8.4
18.500	8.4	8.4	8.5	8.5	8.5
19.000	8.6	8.6	8.6	8.6	8.7
19.500	8.7	8.7	8.7	8.7	8.8
20.000	8.8	8.8	8.8	8.9	8.9
20.500	8.9	8.9	9.0	9.0	9.0
21.000	9.0	9.1	9.1	9.1	9.1
21.500	9.1	9.2	9.2	9.2	9.2
22.000	9.2	9.3	9.3	9.3	9.3
22.500	9.4	9.4	9.4	9.4	9.4
23.000	9.5	9.5	9.5	9.5	9.5
23.500	9.5	9.6	9.6	9.6	9.6
24.000	9.6	(N/A)	(N/A)	(N/A)	(N/A)

## Centennial Site

Subsection: Time-Depth Curve  
 Label: NC airport/NOAA

Return Event: 100 years  
 Storm Event: Idaho Maryland NC 100-yr

Time-Depth Curve: Idaho Maryland NC 100-yr	
Label	Idaho Maryland NC 100-yr
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	100 years

**CUMULATIVE RAINFALL (in)**  
**Output Time Increment = 0.100 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.1	0.1
0.500	0.1	0.1	0.1	0.2	0.2
1.000	0.2	0.2	0.2	0.3	0.3
1.500	0.3	0.4	0.4	0.4	0.5
2.000	0.5	0.5	0.5	0.6	0.6
2.500	0.6	0.7	0.7	0.7	0.8
3.000	0.8	0.8	0.9	0.9	0.9
3.500	0.9	1.0	1.0	1.0	1.1
4.000	1.1	1.2	1.2	1.2	1.3
4.500	1.3	1.3	1.4	1.4	1.5
5.000	1.5	1.5	1.6	1.6	1.7
5.500	1.7	1.8	1.8	1.9	1.9
6.000	2.0	2.0	2.1	2.2	2.2
6.500	2.3	2.3	2.4	2.5	2.5
7.000	2.6	2.7	2.7	2.8	2.9
7.500	3.0	3.2	3.4	3.7	3.9
8.000	4.1	4.2	4.4	4.5	4.5
8.500	4.6	4.7	4.8	4.9	4.9
9.000	5.0	5.1	5.1	5.2	5.2
9.500	5.3	5.4	5.4	5.5	5.5
10.000	5.6	5.6	5.7	5.7	5.7
10.500	5.8	5.8	5.9	5.9	6.0
11.000	6.0	6.1	6.1	6.1	6.2
11.500	6.2	6.3	6.3	6.3	6.4
12.000	6.4	6.4	6.5	6.5	6.5
12.500	6.6	6.6	6.7	6.7	6.7
13.000	6.8	6.8	6.8	6.9	6.9
13.500	6.9	7.0	7.0	7.0	7.1
14.000	7.1	7.1	7.2	7.2	7.2
14.500	7.3	7.3	7.3	7.4	7.4
15.000	7.4	7.4	7.5	7.5	7.5
15.500	7.6	7.6	7.6	7.7	7.7
16.000	7.7	7.8	7.8	7.8	7.8

## Centennial Site

Subsection: Time-Depth Curve  
 Label: NC airport/NOAA

Return Event: 100 years  
 Storm Event: Idaho Maryland NC 100-yr

**CUMULATIVE RAINFALL (in)**  
**Output Time Increment = 0.100 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Depth (in)				
16.500	7.9	7.9	7.9	8.0	8.0
17.000	8.0	8.0	8.1	8.1	8.1
17.500	8.2	8.2	8.2	8.2	8.3
18.000	8.3	8.3	8.3	8.4	8.4
18.500	8.4	8.4	8.5	8.5	8.5
19.000	8.6	8.6	8.6	8.6	8.7
19.500	8.7	8.7	8.7	8.7	8.8
20.000	8.8	8.8	8.8	8.9	8.9
20.500	8.9	8.9	9.0	9.0	9.0
21.000	9.0	9.1	9.1	9.1	9.1
21.500	9.1	9.2	9.2	9.2	9.2
22.000	9.2	9.3	9.3	9.3	9.3
22.500	9.4	9.4	9.4	9.4	9.4
23.000	9.5	9.5	9.5	9.5	9.5
23.500	9.5	9.6	9.6	9.6	9.6
24.000	9.6	(N/A)	(N/A)	(N/A)	(N/A)

## Centennial Site

Subsection: Time-Depth Curve  
 Label: NC airport/NOAA

Return Event: 10 years  
 Storm Event: Idaho Maryland NC 10-yr

Time-Depth Curve: Idaho Maryland NC 10-yr	
Label	Idaho Maryland NC 10-yr
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	10 years

**CUMULATIVE RAINFALL (in)**  
**Output Time Increment = 0.100 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.1
0.500	0.1	0.1	0.1	0.1	0.1
1.000	0.1	0.2	0.2	0.2	0.2
1.500	0.2	0.3	0.3	0.3	0.3
2.000	0.3	0.4	0.4	0.4	0.4
2.500	0.4	0.5	0.5	0.5	0.5
3.000	0.6	0.6	0.6	0.6	0.6
3.500	0.7	0.7	0.7	0.7	0.8
4.000	0.8	0.8	0.8	0.9	0.9
4.500	0.9	0.9	1.0	1.0	1.0
5.000	1.1	1.1	1.1	1.2	1.2
5.500	1.2	1.3	1.3	1.3	1.4
6.000	1.4	1.4	1.5	1.5	1.6
6.500	1.6	1.7	1.7	1.7	1.8
7.000	1.8	1.9	1.9	2.0	2.0
7.500	2.1	2.3	2.4	2.6	2.7
8.000	2.9	3.0	3.1	3.1	3.2
8.500	3.3	3.3	3.4	3.4	3.5
9.000	3.5	3.6	3.6	3.7	3.7
9.500	3.7	3.8	3.8	3.9	3.9
10.000	3.9	4.0	4.0	4.0	4.1
10.500	4.1	4.1	4.2	4.2	4.2
11.000	4.2	4.3	4.3	4.3	4.4
11.500	4.4	4.4	4.4	4.5	4.5
12.000	4.5	4.5	4.6	4.6	4.6
12.500	4.6	4.7	4.7	4.7	4.7
13.000	4.8	4.8	4.8	4.8	4.9
13.500	4.9	4.9	4.9	5.0	5.0
14.000	5.0	5.0	5.1	5.1	5.1
14.500	5.1	5.1	5.2	5.2	5.2
15.000	5.2	5.3	5.3	5.3	5.3
15.500	5.3	5.4	5.4	5.4	5.4
16.000	5.4	5.5	5.5	5.5	5.5

## Centennial Site

Subsection: Time-Depth Curve  
 Label: NC airport/NOAA

Return Event: 10 years  
 Storm Event: Idaho Maryland NC 10-yr

**CUMULATIVE RAINFALL (in)**  
**Output Time Increment = 0.100 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
16.500	5.6	5.6	5.6	5.6	5.6
17.000	5.7	5.7	5.7	5.7	5.7
17.500	5.8	5.8	5.8	5.8	5.8
18.000	5.8	5.9	5.9	5.9	5.9
18.500	5.9	6.0	6.0	6.0	6.0
19.000	6.0	6.0	6.1	6.1	6.1
19.500	6.1	6.1	6.2	6.2	6.2
20.000	6.2	6.2	6.2	6.3	6.3
20.500	6.3	6.3	6.3	6.3	6.4
21.000	6.4	6.4	6.4	6.4	6.4
21.500	6.4	6.5	6.5	6.5	6.5
22.000	6.5	6.5	6.6	6.6	6.6
22.500	6.6	6.6	6.6	6.6	6.7
23.000	6.7	6.7	6.7	6.7	6.7
23.500	6.7	6.7	6.8	6.8	6.8
24.000	6.8	(N/A)	(N/A)	(N/A)	(N/A)

## Centennial Site

Subsection: Time-Depth Curve  
 Label: NC airport/NOAA

Return Event: 10 years  
 Storm Event: Idaho Maryland NC 10-yr

Time-Depth Curve: Idaho Maryland NC 10-yr	
Label	Idaho Maryland NC 10-yr
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	10 years

**CUMULATIVE RAINFALL (in)**  
**Output Time Increment = 0.100 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.1
0.500	0.1	0.1	0.1	0.1	0.1
1.000	0.1	0.2	0.2	0.2	0.2
1.500	0.2	0.3	0.3	0.3	0.3
2.000	0.3	0.4	0.4	0.4	0.4
2.500	0.4	0.5	0.5	0.5	0.5
3.000	0.6	0.6	0.6	0.6	0.6
3.500	0.7	0.7	0.7	0.7	0.8
4.000	0.8	0.8	0.8	0.9	0.9
4.500	0.9	0.9	1.0	1.0	1.0
5.000	1.1	1.1	1.1	1.2	1.2
5.500	1.2	1.3	1.3	1.3	1.4
6.000	1.4	1.4	1.5	1.5	1.6
6.500	1.6	1.7	1.7	1.7	1.8
7.000	1.8	1.9	1.9	2.0	2.0
7.500	2.1	2.3	2.4	2.6	2.7
8.000	2.9	3.0	3.1	3.1	3.2
8.500	3.3	3.3	3.4	3.4	3.5
9.000	3.5	3.6	3.6	3.7	3.7
9.500	3.7	3.8	3.8	3.9	3.9
10.000	3.9	4.0	4.0	4.0	4.1
10.500	4.1	4.1	4.2	4.2	4.2
11.000	4.2	4.3	4.3	4.3	4.4
11.500	4.4	4.4	4.4	4.5	4.5
12.000	4.5	4.5	4.6	4.6	4.6
12.500	4.6	4.7	4.7	4.7	4.7
13.000	4.8	4.8	4.8	4.8	4.9
13.500	4.9	4.9	4.9	5.0	5.0
14.000	5.0	5.0	5.1	5.1	5.1
14.500	5.1	5.1	5.2	5.2	5.2
15.000	5.2	5.3	5.3	5.3	5.3
15.500	5.3	5.4	5.4	5.4	5.4
16.000	5.4	5.5	5.5	5.5	5.5

## Centennial Site

Subsection: Time-Depth Curve  
 Label: NC airport/NOAA

Return Event: 10 years  
 Storm Event: Idaho Maryland NC 10-yr

**CUMULATIVE RAINFALL (in)**  
**Output Time Increment = 0.100 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
16.500	5.6	5.6	5.6	5.6	5.6
17.000	5.7	5.7	5.7	5.7	5.7
17.500	5.8	5.8	5.8	5.8	5.8
18.000	5.8	5.9	5.9	5.9	5.9
18.500	5.9	6.0	6.0	6.0	6.0
19.000	6.0	6.0	6.1	6.1	6.1
19.500	6.1	6.1	6.2	6.2	6.2
20.000	6.2	6.2	6.2	6.3	6.3
20.500	6.3	6.3	6.3	6.3	6.4
21.000	6.4	6.4	6.4	6.4	6.4
21.500	6.4	6.5	6.5	6.5	6.5
22.000	6.5	6.5	6.6	6.6	6.6
22.500	6.6	6.6	6.6	6.6	6.7
23.000	6.7	6.7	6.7	6.7	6.7
23.500	6.7	6.7	6.8	6.8	6.8
24.000	6.8	(N/A)	(N/A)	(N/A)	(N/A)

## Centennial Site

Subsection: Unit Hydrograph Equations

### Unit Hydrograph Method (Computational Notes)

#### Definition of Terms

At	Total area (acres): $A_t = A_i + A_p$
Ai	Impervious area (acres)
Ap	Pervious area (acres)
CNi	Runoff curve number for impervious area
CNp	Runoff curve number for pervious area
fLoss	f loss constant infiltration (depth/time)
gKs	Saturated Hydraulic Conductivity (depth/time)
Md	Volumetric Moisture Deficit
Psi	Capillary Suction (length)
hK	Horton Infiltration Decay Rate ( $\text{time}^{-1}$ )
fo	Initial Infiltration Rate (depth/time)
fc	Ultimate(capacity)Infiltration Rate (depth/time)
Ia	Initial Abstraction (length)
dt	Computational increment (duration of unit excess rainfall) Default dt is smallest value of $0.1333T_c$ , $r_{tm}$ , and $t_h$ (Smallest dt is then adjusted to match up with $T_p$ )
UDdt	User specified override computational main time increment (only used if UDdt is $\Rightarrow .1333T_c$ )
D(t)	Point on distribution curve (fraction of P) for time step t
K	$2 / (1 + (T_r/T_p))$ : default K = 0.75: (for $T_r/T_p = 1.67$ )
Ks	Hydrograph shape factor = Unit Conversions * K: = $((1\text{hr}/3600\text{sec}) * (1\text{ft}/12\text{in}) * ((5280\text{ft})^2/\text{sq.mi})) * K$ Default $K_s = 645.333 * 0.75 = 484$
Lag	Lag time from center of excess runoff (dt) to $T_p$ : $\text{Lag} = 0.6T_c$
P	Total precipitation depth, inches
Pa(t)	Accumulated rainfall at time step t
PI(t)	Incremental rainfall at time step t
qp	Peak discharge (cfs) for 1in. runoff, for 1hr, for 1 sq.mi. = $(K_s * A * Q) / T_p$ (where $Q = 1\text{in. runoff}$ , $A = \text{sq.mi.}$ )
Qu(t)	Unit hydrograph ordinate (cfs) at time step t
Q(t)	Final hydrograph ordinate (cfs) at time step t
Rai(t)	Accumulated runoff (inches) at time step t for impervious area
Rap(t)	Accumulated runoff (inches) at time step t for pervious area
Rii(t)	Incremental runoff (inches) at time step t for impervious area
Rip(t)	Incremental runoff (inches) at time step t for pervious area
R(t)	Incremental weighted total runoff (inches)
Rtm	Time increment for rainfall table
Si	S for impervious area: $S_i = (1000/CN_i) - 10$
Sp	S for pervious area: $S_p = (1000/CN_p) - 10$
t	Time step (row) number
Tc	Time of concentration
Tb	Time (hrs) of entire unit hydrograph: $T_b = T_p + T_r$
Tp	Time (hrs) to peak of a unit hydrograph: $T_p = (dt/2) + \text{Lag}$
Tr	Time (hrs) of receding limb of unit hydrograph: $T_r = \text{ratio of } T_p$

## Centennial Site

Subsection: Unit Hydrograph Equations

### Unit Hydrograph Method

#### Computational Notes

##### Precipitation

Column (1)	Time for time step t
Column (2)	$D(t)$ = Point on distribution curve for time step t
Column (3)	$P_i(t) = P_a(t) - P_a(t-1)$ ; Col.(4) - Preceding Col.(4)
Column (4)	$P_a(t) = D(t) \times P$ ; Col.(2) x P

##### Pervious Area Runoff (using SCS Runoff CN Method)

Column (5)	$R_{ap}(t)$ = Accumulated pervious runoff for time step t If $(P_a(t) \leq 0.2Sp)$ then use: $R_{ap}(t) = 0.0$ If $(P_a(t) > 0.2Sp)$ then use:  $R_{ap}(t) = (Col.(4) - 0.2Sp)^{**2} / (Col.(4) + 0.8Sp)$
Column (6)	$R_{ip}(t)$ = Incremental pervious runoff for time step t $R_{ip}(t) = R_{ap}(t) - R_{ap}(t-1)$ $R_{ip}(t) = Col.(5)$ for current row - $Col.(5)$ for preceding row.

##### Impervious Area Runoff

Column (7 & 8)... Did not specify to use impervious areas.

##### Incremental Weighted Runoff

Column (9)	$R(t) = (A_p/A_t) \times R_{ip}(t) + (A_i/A_t) \times R_{ii}(t)$ $R(t) = (A_p/A_t) \times Col.(6) + (A_i/A_t) \times Col.(8)$
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##### SCS Unit Hydrograph Method

Column (10)  $Q(t)$  is computed with the SCS unit hydrograph method using  $R(t)$  and  $Q_u(t)$ .

## Centennial Site

Subsection: Unit Hydrograph Summary  
Label: CM-1

Return Event: 10 years  
Storm Event: Idaho Maryland NC 10-yr

Storm Event	Idaho Maryland NC 10-yr
Return Event	10 years
Duration	24.000 hours
Depth	6.8 in
Time of Concentration (Composite)	0.170 hours
Area (User Defined)	66.860 acres
<hr/>	
Computational Time Increment	0.023 hours
Time to Peak (Computed)	7.956 hours
Flow (Peak, Computed)	89.70 ft <sup>3</sup> /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	7.950 hours
Flow (Peak Interpolated Output)	89.68 ft <sup>3</sup> /s
<hr/>	
<b>Drainage Area</b>	
SCS CN (Composite)	86.120
Area (User Defined)	66.860 acres
Maximum Retention (Pervious)	1.6 in
Maximum Retention (Pervious, 20 percent)	0.3 in
<hr/>	
<b>Cumulative Runoff</b>	
Cumulative Runoff Depth (Pervious)	5.2 in
Runoff Volume (Pervious)	28.901 ac-ft
<hr/>	
<b>Hydrograph Volume (Area under Hydrograph curve)</b>	
Volume	28.807 ac-ft
<hr/>	
<b>SCS Unit Hydrograph Parameters</b>	
Time of Concentration (Composite)	0.170 hours
Computational Time Increment	0.023 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749

## Centennial Site

Subsection: Unit Hydrograph Summary  
Label: CM-1

Return Event: 10 years  
Storm Event: Idaho Maryland NC 10-yr

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SCS Unit Hydrograph Parameters	
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	445.62 ft <sup>3</sup> /s
Unit peak time, Tp	0.113 hours
Unit receding limb, Tr	0.453 hours
Total unit time, Tb	0.567 hours

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## Centennial Site

Subsection: Unit Hydrograph (Hydrograph Table)  
Label: CM-1

Return Event: 10 years  
Storm Event: Idaho Maryland NC 10-yr

Storm Event	Idaho Maryland NC 10-yr
Return Event	10 years
Duration	24.000 hours
Depth	6.8 in
Time of Concentration (Composite)	0.170 hours
Area (User Defined)	66.860 acres

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
1.900	0.00	0.00	0.03	0.10	0.23
2.150	0.39	0.56	0.74	0.92	1.10
2.400	1.28	1.45	1.62	1.79	1.95
2.650	2.11	2.26	2.41	2.56	2.71
2.900	2.85	2.99	3.13	3.26	3.38
3.150	3.49	3.61	3.73	3.87	4.00
3.400	4.15	4.30	4.46	4.63	4.84
3.650	5.06	5.27	5.47	5.65	5.83
3.900	6.01	6.19	6.37	6.52	6.66
4.150	6.79	6.93	7.08	7.24	7.42
4.400	7.60	7.78	7.97	8.16	8.36
4.650	8.56	8.77	8.98	9.20	9.43
4.900	9.67	9.91	10.16	10.43	10.73
5.150	11.04	11.34	11.62	11.90	12.16
5.400	12.42	12.67	12.92	13.13	13.28
5.650	13.42	13.61	13.85	14.13	14.42
5.900	14.73	15.05	15.42	15.86	16.48
6.150	17.11	17.64	18.08	18.47	18.82
6.400	19.13	19.40	19.64	19.72	19.44
6.650	19.12	19.03	19.14	19.40	19.76
6.900	20.21	20.72	21.33	22.01	22.80
7.150	23.64	24.60	25.61	26.72	27.89
7.400	29.20	30.56	32.11	36.74	49.24
7.650	62.99	73.03	79.67	84.25	87.30
7.900	89.05	89.68	89.09	85.70	76.50
8.150	66.34	58.63	53.15	48.74	45.14
8.400	41.97	39.30	36.97	35.50	35.35
8.650	35.57	35.27	34.61	33.74	32.85
8.900	31.91	31.01	30.12	29.28	28.44
9.150	27.65	26.90	26.20	25.51	24.88
9.400	24.28	23.73	23.20	22.87	22.88
9.650	22.99	22.96	22.84	22.65	22.44

## Centennial Site

Subsection: Unit Hydrograph (Hydrograph Table)  
 Label: CM-1

Return Event: 10 years  
 Storm Event: Idaho Maryland NC 10-yr

**HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)**  
**Output Time Increment = 0.050 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Flow (ft <sup>3</sup> /s)				
9.900	22.22	22.00	21.77	21.52	21.22
10.150	20.91	20.64	20.42	20.21	20.03
10.400	19.88	19.75	19.62	19.55	19.62
10.650	19.71	19.69	19.61	19.48	19.34
10.900	19.19	19.04	18.88	18.73	18.57
11.150	18.41	18.25	18.10	17.93	17.77
11.400	17.61	17.46	17.29	17.11	16.86
11.650	16.62	16.43	16.29	16.17	16.08
11.900	15.99	15.92	15.87	15.84	15.82
12.150	15.81	15.83	15.87	15.94	16.01
12.400	16.10	16.19	16.32	16.34	16.12
12.650	15.82	15.62	15.49	15.40	15.33
12.900	15.29	15.26	15.22	15.26	15.44
13.150	15.62	15.66	15.60	15.51	15.42
13.400	15.29	15.17	15.07	14.97	14.89
13.650	14.80	14.72	14.65	14.60	14.56
13.900	14.52	14.47	14.45	14.45	14.47
14.150	14.49	14.50	14.49	14.46	14.44
14.400	14.41	14.39	14.36	14.32	14.30
14.650	14.27	14.24	14.21	14.17	14.13
14.900	14.11	14.08	14.06	14.04	14.01
15.150	13.98	13.95	13.92	13.89	13.86
15.400	13.82	13.78	13.75	13.73	13.69
15.650	13.66	13.63	13.61	13.59	13.57
15.900	13.54	13.50	13.46	13.43	13.40
16.150	13.37	13.34	13.30	13.28	13.25
16.400	13.22	13.18	13.16	13.13	13.10
16.650	13.06	13.04	13.01	12.98	12.94
16.900	12.92	12.89	12.86	12.82	12.79
17.150	12.77	12.73	12.70	12.66	12.62
17.400	12.59	12.57	12.54	12.52	12.49
17.650	12.45	12.43	12.40	12.37	12.33
17.900	12.29	12.25	12.22	12.19	12.16
18.150	12.13	12.10	12.07	12.05	12.03
18.400	11.99	11.96	11.92	11.88	11.85
18.650	11.82	11.79	11.75	11.72	11.70
18.900	11.66	11.63	11.60	11.57	11.54
19.150	11.50	11.48	11.45	11.41	11.38
19.400	11.35	11.32	11.29	11.25	11.22
19.650	11.20	11.16	11.12	11.08	11.05
19.900	11.01	10.99	10.97	10.94	10.91
20.150	10.87	10.85	10.82	10.78	10.74

## Centennial Site

Subsection: Unit Hydrograph (Hydrograph Table)

Label: CM-1

Return Event: 10 years

Storm Event: Idaho Maryland NC 10-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
20.400	10.70	10.67	10.64	10.61	10.57
20.650	10.54	10.51	10.48	10.46	10.43
20.900	10.40	10.36	10.32	10.28	10.25
21.150	10.23	10.19	10.15	10.12	10.10
21.400	10.06	10.03	10.00	9.97	9.93
21.650	9.90	9.87	9.84	9.81	9.77
21.900	9.74	9.71	9.68	9.64	9.61
22.150	9.58	9.55	9.51	9.47	9.43
22.400	9.40	9.37	9.35	9.32	9.29
22.650	9.26	9.23	9.20	9.16	9.12
22.900	9.08	9.04	9.01	8.98	8.95
23.150	8.91	8.88	8.86	8.83	8.81
23.400	8.77	8.74	8.69	8.66	8.62
23.650	8.60	8.56	8.52	8.49	8.47
23.900	8.43	8.40	8.36	(N/A)	(N/A)

## Centennial Site

Subsection: Unit Hydrograph Summary  
Label: CM-1

Return Event: 10 years  
Storm Event: Idaho Maryland NC 10-yr

Storm Event	Idaho Maryland NC 10-yr
Return Event	10 years
Duration	24.000 hours
Depth	6.8 in
Time of Concentration (Composite)	0.200 hours
Area (User Defined)	69.960 acres
<hr/>	
Computational Time Increment	0.027 hours
Time to Peak (Computed)	8.000 hours
Flow (Peak, Computed)	72.44 ft <sup>3</sup> /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	8.000 hours
Flow (Peak Interpolated Output)	72.44 ft <sup>3</sup> /s
<hr/>	
<b>Drainage Area</b>	
SCS CN (Composite)	77.000
Area (User Defined)	69.960 acres
Maximum Retention (Pervious)	3.0 in
Maximum Retention (Pervious, 20 percent)	0.6 in
<hr/>	
<b>Cumulative Runoff</b>	
Cumulative Runoff Depth (Pervious)	4.2 in
Runoff Volume (Pervious)	24.408 ac-ft
<hr/>	
<b>Hydrograph Volume (Area under Hydrograph curve)</b>	
Volume	24.300 ac-ft
<hr/>	
<b>SCS Unit Hydrograph Parameters</b>	
Time of Concentration (Composite)	0.200 hours
Computational Time Increment	0.027 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749

## Centennial Site

Subsection: Unit Hydrograph Summary

Label: CM-1

Return Event: 10 years

Storm Event: Idaho Maryland NC 10-yr

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SCS Unit Hydrograph Parameters	
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	396.34 ft <sup>3</sup> /s
Unit peak time, Tp	0.133 hours
Unit receding limb, Tr	0.533 hours
Total unit time, Tb	0.667 hours

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## Centennial Site

Subsection: Unit Hydrograph (Hydrograph Table)

Return Event: 10 years

Label: CM-1

Storm Event: Idaho Maryland NC 10-yr

Storm Event	Idaho Maryland NC 10-yr
Return Event	10 years
Duration	24.000 hours
Depth	6.8 in
Time of Concentration (Composite)	0.200 hours
Area (User Defined)	69.960 acres

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
3.200	0.00	0.00	0.03	0.08	0.16
3.450	0.25	0.36	0.47	0.59	0.71
3.700	0.84	0.98	1.11	1.24	1.38
3.950	1.52	1.66	1.79	1.92	2.05
4.200	2.17	2.31	2.44	2.58	2.73
4.450	2.87	3.02	3.17	3.33	3.49
4.700	3.65	3.82	3.99	4.17	4.35
4.950	4.54	4.73	4.94	5.16	5.38
5.200	5.62	5.84	6.07	6.29	6.51
5.450	6.73	6.95	7.15	7.33	7.50
5.700	7.68	7.89	8.12	8.36	8.62
5.950	8.89	9.18	9.51	9.94	10.40
6.200	10.84	11.23	11.59	11.92	12.23
6.450	12.51	12.78	12.95	12.95	12.87
6.700	12.85	12.96	13.17	13.46	13.82
6.950	14.23	14.72	15.26	15.87	16.53
7.200	17.28	18.07	18.96	19.91	20.95
7.450	22.04	23.33	26.28	33.70	43.52
7.700	52.34	58.87	63.80	67.48	70.11
7.950	71.78	72.44	71.14	65.81	58.59
8.200	51.99	47.10	43.16	39.95	37.15
8.450	34.80	32.73	31.26	30.70	30.72
8.700	30.61	30.20	29.58	28.90	28.15
8.950	27.42	26.68	25.98	25.28	24.63
9.200	23.98	23.38	22.79	22.25	21.72
9.450	21.24	20.79	20.46	20.37	20.43
9.700	20.45	20.38	20.26	20.11	19.94
9.950	19.77	19.59	19.39	19.15	18.90
10.200	18.67	18.46	18.28	18.13	17.99
10.450	17.88	17.77	17.71	17.74	17.81
10.700	17.84	17.80	17.71	17.61	17.49
10.950	17.37	17.24	17.11	16.98	16.85

## Centennial Site

Subsection: Unit Hydrograph (Hydrograph Table)

Return Event: 10 years

Label: CM-1

Storm Event: Idaho Maryland NC 10-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
11.200	16.71	16.58	16.44	16.31	16.17
11.450	16.04	15.90	15.74	15.55	15.34
11.700	15.16	15.02	14.91	14.82	14.74
11.950	14.68	14.63	14.60	14.58	14.58
12.200	14.59	14.63	14.68	14.75	14.84
12.450	14.93	15.04	15.09	14.97	14.75
12.700	14.55	14.42	14.33	14.26	14.21
12.950	14.18	14.16	14.17	14.30	14.46
13.200	14.54	14.53	14.47	14.39	14.30
13.450	14.19	14.10	14.01	13.93	13.86
13.700	13.79	13.72	13.67	13.64	13.60
13.950	13.56	13.54	13.53	13.55	13.57
14.200	13.59	13.59	13.57	13.56	13.54
14.450	13.52	13.50	13.47	13.45	13.43
14.700	13.41	13.38	13.35	13.32	13.30
14.950	13.28	13.26	13.24	13.22	13.20
15.200	13.17	13.15	13.13	13.10	13.07
15.450	13.04	13.01	12.99	12.97	12.94
15.700	12.91	12.90	12.88	12.86	12.84
15.950	12.81	12.78	12.75	12.72	12.70
16.200	12.67	12.64	12.62	12.60	12.57
16.450	12.54	12.52	12.49	12.47	12.44
16.700	12.41	12.39	12.36	12.34	12.31
16.950	12.29	12.26	12.23	12.21	12.18
17.200	12.16	12.13	12.09	12.06	12.03
17.450	12.01	11.99	11.97	11.94	11.92
17.700	11.89	11.87	11.84	11.81	11.77
17.950	11.74	11.71	11.69	11.66	11.63
18.200	11.60	11.58	11.56	11.54	11.51
18.450	11.48	11.44	11.41	11.38	11.36
18.700	11.33	11.30	11.27	11.25	11.22
18.950	11.19	11.16	11.13	11.10	11.07
19.200	11.05	11.02	10.99	10.96	10.93
19.450	10.91	10.88	10.85	10.82	10.80
19.700	10.77	10.73	10.70	10.66	10.63
19.950	10.61	10.58	10.56	10.53	10.50
20.200	10.48	10.45	10.42	10.39	10.35
20.450	10.32	10.28	10.26	10.23	10.20
20.700	10.17	10.14	10.12	10.10	10.07
20.950	10.04	10.00	9.96	9.93	9.91
21.200	9.88	9.84	9.81	9.79	9.76
21.450	9.72	9.70	9.67	9.64	9.61

## Centennial Site

Subsection: Unit Hydrograph (Hydrograph Table)

Return Event: 10 years

Label: CM-1

Storm Event: Idaho Maryland NC 10-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
21.700	9.58	9.55	9.52	9.49	9.46
21.950	9.43	9.40	9.37	9.34	9.31
22.200	9.28	9.25	9.21	9.17	9.14
22.450	9.11	9.09	9.07	9.04	9.01
22.700	8.98	8.95	8.92	8.88	8.84
22.950	8.81	8.78	8.75	8.72	8.68
23.200	8.65	8.63	8.60	8.58	8.55
23.450	8.52	8.48	8.44	8.41	8.38
23.700	8.35	8.32	8.29	8.26	8.23
23.950	8.20	8.17	(N/A)	(N/A)	(N/A)

## Centennial Site

Subsection: Unit Hydrograph Summary  
Label: CM-1

Return Event: 100 years  
Storm Event: Idaho Maryland NC 100-yr

Storm Event	Idaho Maryland NC 100-yr
Return Event	100 years
Duration	24.000 hours
Depth	9.6 in
Time of Concentration (Composite)	0.170 hours
Area (User Defined)	66.860 acres
<hr/>	
Computational Time Increment	0.023 hours
Time to Peak (Computed)	7.933 hours
Flow (Peak, Computed)	137.49 ft <sup>3</sup> /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	7.950 hours
Flow (Peak Interpolated Output)	137.41 ft <sup>3</sup> /s
<hr/>	
<b>Drainage Area</b>	
SCS CN (Composite)	86.120
Area (User Defined)	66.860 acres
Maximum Retention (Pervious)	1.6 in
Maximum Retention (Pervious, 20 percent)	0.3 in
<hr/>	
<b>Cumulative Runoff</b>	
Cumulative Runoff Depth (Pervious)	7.9 in
Runoff Volume (Pervious)	44.260 ac-ft
<hr/>	
<b>Hydrograph Volume (Area under Hydrograph curve)</b>	
Volume	44.124 ac-ft
<hr/>	
<b>SCS Unit Hydrograph Parameters</b>	
Time of Concentration (Composite)	0.170 hours
Computational Time Increment	0.023 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749

## Centennial Site

Subsection: Unit Hydrograph Summary

Label: CM-1

Return Event: 100 years

Storm Event: Idaho Maryland NC 100-yr

SCS Unit Hydrograph Parameters	
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	445.62 ft <sup>3</sup> /s
Unit peak time, Tp	0.113 hours
Unit receding limb, Tr	0.453 hours
Total unit time, Tb	0.567 hours

## Centennial Site

Subsection: Unit Hydrograph (Hydrograph Table)

Return Event: 100 years

Label: CM-1

Storm Event: Idaho Maryland NC 100-yr

Storm Event	Idaho Maryland NC 100-yr
Return Event	100 years
Duration	24.000 hours
Depth	9.6 in
Time of Concentration (Composite)	0.170 hours
Area (User Defined)	66.860 acres

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
1.450	0.00	0.01	0.09	0.27	0.52
1.700	0.81	1.11	1.42	1.72	2.02
1.950	2.32	2.62	2.93	3.25	3.57
2.200	3.89	4.19	4.49	4.78	5.06
2.450	5.34	5.61	5.86	6.09	6.31
2.700	6.53	6.75	6.96	7.18	7.39
2.950	7.59	7.79	7.97	8.11	8.25
3.200	8.41	8.59	8.78	8.98	9.21
3.450	9.45	9.69	9.96	10.32	10.69
3.700	11.04	11.35	11.64	11.91	12.19
3.950	12.46	12.72	12.95	13.13	13.30
4.200	13.49	13.71	13.95	14.20	14.47
4.450	14.75	15.03	15.32	15.61	15.91
4.700	16.22	16.53	16.87	17.21	17.58
4.950	17.95	18.33	18.73	19.20	19.68
5.200	20.14	20.57	20.98	21.36	21.74
5.450	22.10	22.46	22.76	22.94	23.11
5.700	23.38	23.72	24.12	24.54	25.00
5.950	25.48	26.03	26.71	27.66	28.64
6.200	29.45	30.11	30.68	31.17	31.60
6.450	31.98	32.29	32.34	31.81	31.22
6.700	31.01	31.13	31.49	31.99	32.66
6.950	33.42	34.35	35.37	36.57	37.85
7.200	39.30	40.82	42.52	44.28	46.27
7.450	48.33	50.68	57.84	77.26	98.51
7.700	113.83	123.75	130.40	134.65	136.88
7.950	137.41	136.10	130.56	116.30	100.66
8.200	88.80	80.38	73.60	68.08	63.23
8.450	59.15	55.60	53.34	53.06	53.36
8.700	52.87	51.85	50.52	49.14	47.71
8.950	46.34	44.98	43.71	42.43	41.24
9.200	40.09	39.03	37.99	37.04	36.12

## Centennial Site

Subsection: Unit Hydrograph (Hydrograph Table)

Return Event: 100 years

Label: CM-1

Storm Event: Idaho Maryland NC 100-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
9.450	35.29	34.50	33.99	33.99	34.14
9.700	34.09	33.89	33.61	33.29	32.95
9.950	32.62	32.26	31.88	31.42	30.97
10.200	30.56	30.21	29.90	29.63	29.40
10.450	29.20	28.99	28.89	28.98	29.11
10.700	29.08	28.95	28.75	28.54	28.31
10.950	28.09	27.85	27.61	27.37	27.13
11.200	26.89	26.66	26.41	26.17	25.93
11.450	25.69	25.45	25.17	24.81	24.45
11.700	24.16	23.95	23.77	23.63	23.50
11.950	23.39	23.32	23.27	23.23	23.22
12.200	23.24	23.30	23.39	23.50	23.62
12.450	23.76	23.94	23.96	23.63	23.20
12.700	22.90	22.71	22.57	22.47	22.40
12.950	22.35	22.30	22.35	22.61	22.88
13.200	22.92	22.84	22.71	22.57	22.38
13.450	22.20	22.04	21.91	21.78	21.65
13.700	21.53	21.42	21.35	21.29	21.22
13.950	21.15	21.12	21.11	21.14	21.17
14.200	21.18	21.16	21.13	21.08	21.04
14.450	21.01	20.96	20.91	20.87	20.83
14.700	20.78	20.73	20.67	20.62	20.58
14.950	20.54	20.51	20.47	20.43	20.38
15.200	20.34	20.30	20.25	20.20	20.14
15.450	20.09	20.04	20.00	19.95	19.90
15.700	19.86	19.83	19.79	19.76	19.71
15.950	19.66	19.60	19.55	19.50	19.46
16.200	19.41	19.36	19.32	19.28	19.23
16.450	19.18	19.14	19.10	19.05	19.00
16.700	18.96	18.92	18.87	18.82	18.78
16.950	18.74	18.69	18.64	18.60	18.56
17.200	18.51	18.45	18.39	18.34	18.29
17.450	18.26	18.22	18.19	18.14	18.09
17.700	18.05	18.01	17.96	17.90	17.84
17.950	17.79	17.74	17.70	17.65	17.60
18.200	17.56	17.52	17.49	17.45	17.40
18.450	17.35	17.29	17.24	17.19	17.15
18.700	17.10	17.05	17.01	16.96	16.91
18.950	16.86	16.82	16.78	16.73	16.68
19.200	16.64	16.60	16.54	16.49	16.45
19.450	16.41	16.36	16.31	16.27	16.22
19.700	16.17	16.12	16.06	16.00	15.96

## Centennial Site

Subsection: Unit Hydrograph (Hydrograph Table)

Return Event: 100 years

Label: CM-1

Storm Event: Idaho Maryland NC 100-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
19.950	15.92	15.89	15.85	15.80	15.75
20.200	15.71	15.67	15.62	15.56	15.50
20.450	15.44	15.40	15.36	15.30	15.25
20.700	15.21	15.17	15.14	15.10	15.05
20.950	15.00	14.94	14.88	14.84	14.80
21.200	14.74	14.69	14.65	14.61	14.56
21.450	14.51	14.46	14.42	14.37	14.32
21.700	14.28	14.23	14.18	14.13	14.09
21.950	14.05	13.99	13.94	13.90	13.86
22.200	13.81	13.75	13.69	13.63	13.59
22.450	13.55	13.52	13.48	13.43	13.38
22.700	13.34	13.29	13.24	13.19	13.13
22.950	13.07	13.02	12.98	12.93	12.88
23.200	12.83	12.80	12.76	12.73	12.68
23.450	12.62	12.56	12.50	12.46	12.42
23.700	12.36	12.31	12.27	12.23	12.17
23.950	12.13	12.08	(N/A)	(N/A)	(N/A)

## Centennial Site

Subsection: Unit Hydrograph Summary  
Label: CM-1

Return Event: 100 years  
Storm Event: Idaho Maryland NC 100-yr

Storm Event	Idaho Maryland NC 100-yr
Return Event	100 years
Duration	24.000 hours
Depth	9.6 in
Time of Concentration (Composite)	0.200 hours
Area (User Defined)	69.960 acres
<hr/>	
Computational Time Increment	0.027 hours
Time to Peak (Computed)	8.000 hours
Flow (Peak, Computed)	121.02 ft <sup>3</sup> /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	8.000 hours
Flow (Peak Interpolated Output)	121.02 ft <sup>3</sup> /s
<hr/>	
<b>Drainage Area</b>	
SCS CN (Composite)	77.000
Area (User Defined)	69.960 acres
Maximum Retention (Pervious)	3.0 in
Maximum Retention (Pervious, 20 percent)	0.6 in
<hr/>	
<b>Cumulative Runoff</b>	
Cumulative Runoff Depth (Pervious)	6.8 in
Runoff Volume (Pervious)	39.629 ac-ft
<hr/>	
<b>Hydrograph Volume (Area under Hydrograph curve)</b>	
Volume	39.469 ac-ft
<hr/>	
<b>SCS Unit Hydrograph Parameters</b>	
Time of Concentration (Composite)	0.200 hours
Computational Time Increment	0.027 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749

## Centennial Site

Subsection: Unit Hydrograph Summary

Return Event: 100 years

Label: CM-1

Storm Event: Idaho Maryland NC 100-yr

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SCS Unit Hydrograph Parameters	
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	396.34 ft <sup>3</sup> /s
Unit peak time, Tp	0.133 hours
Unit receding limb, Tr	0.533 hours
Total unit time, Tb	0.667 hours

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## Centennial Site

Subsection: Unit Hydrograph (Hydrograph Table)

Return Event: 100 years

Label: CM-1

Storm Event: Idaho Maryland NC 100-yr

Storm Event	Idaho Maryland NC 100-yr
Return Event	100 years
Duration	24.000 hours
Depth	9.6 in
Time of Concentration (Composite)	0.200 hours
Area (User Defined)	69.960 acres

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
2.400	0.00	0.02	0.08	0.20	0.36
2.650	0.55	0.75	0.95	1.15	1.36
2.900	1.56	1.76	1.95	2.14	2.32
3.150	2.50	2.67	2.85	3.03	3.21
3.400	3.41	3.60	3.81	4.02	4.26
3.650	4.52	4.78	5.04	5.28	5.52
3.900	5.76	6.01	6.24	6.47	6.67
4.150	6.87	7.07	7.28	7.50	7.73
4.400	7.98	8.23	8.48	8.74	9.01
4.650	9.28	9.55	9.83	10.13	10.43
4.900	10.75	11.08	11.41	11.76	12.14
5.150	12.55	12.95	13.34	13.72	14.09
5.400	14.45	14.81	15.16	15.49	15.75
5.650	15.98	16.25	16.57	16.94	17.33
5.900	17.75	18.19	18.68	19.24	19.98
6.150	20.79	21.54	22.19	22.77	23.29
6.400	23.76	24.19	24.57	24.79	24.68
6.650	24.41	24.27	24.37	24.67	25.11
6.900	25.69	26.35	27.14	28.03	29.04
7.150	30.14	31.38	32.70	34.19	35.75
7.400	37.47	39.28	41.40	46.42	59.18
7.650	75.96	90.80	101.46	109.25	114.80
7.900	118.52	120.60	121.02	118.24	108.92
8.150	96.59	85.42	77.13	70.48	65.07
8.400	60.37	56.44	52.98	50.52	49.54
8.650	49.48	49.24	48.51	47.45	46.30
8.900	45.05	43.82	42.60	41.43	40.28
9.150	39.20	38.13	37.15	36.18	35.28
9.400	34.42	33.64	32.90	32.36	32.19
9.650	32.26	32.27	32.14	31.93	31.67
9.900	31.39	31.09	30.78	30.46	30.07
10.150	29.66	29.27	28.94	28.64	28.38

## Centennial Site

Subsection: Unit Hydrograph (Hydrograph Table)  
 Label: CM-1

Return Event: 100 years  
 Storm Event: Idaho Maryland NC 100-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s) Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
10.400	28.16	27.97	27.78	27.67	27.70
10.650	27.80	27.83	27.75	27.61	27.44
10.900	27.24	27.04	26.82	26.61	26.40
11.150	26.18	25.96	25.75	25.52	25.30
11.400	25.08	24.86	24.63	24.39	24.08
11.650	23.75	23.46	23.23	23.05	22.91
11.900	22.78	22.67	22.59	22.54	22.51
12.150	22.49	22.51	22.55	22.63	22.73
12.400	22.85	22.98	23.15	23.22	23.03
12.650	22.69	22.38	22.17	22.02	21.91
12.900	21.83	21.78	21.73	21.75	21.93
13.150	22.17	22.29	22.27	22.17	22.05
13.400	21.90	21.73	21.58	21.45	21.32
13.650	21.20	21.08	20.98	20.90	20.84
13.900	20.78	20.72	20.68	20.66	20.68
14.150	20.71	20.73	20.73	20.70	20.67
14.400	20.64	20.61	20.57	20.52	20.49
14.650	20.45	20.41	20.37	20.32	20.27
14.900	20.23	20.19	20.16	20.13	20.09
15.150	20.05	20.01	19.98	19.94	19.89
15.400	19.84	19.79	19.75	19.71	19.67
15.650	19.62	19.58	19.55	19.52	19.49
15.900	19.45	19.40	19.35	19.30	19.26
16.150	19.22	19.18	19.13	19.09	19.06
16.400	19.01	18.97	18.93	18.89	18.85
16.650	18.80	18.76	18.72	18.68	18.63
16.900	18.59	18.55	18.51	18.47	18.42
17.150	18.39	18.34	18.29	18.24	18.19
17.400	18.14	18.11	18.07	18.04	18.00
17.650	17.95	17.91	17.87	17.83	17.78
17.900	17.72	17.67	17.63	17.59	17.54
18.150	17.49	17.45	17.42	17.38	17.35
18.400	17.31	17.26	17.20	17.15	17.11
18.650	17.07	17.02	16.97	16.93	16.89
18.900	16.84	16.80	16.75	16.71	16.67
19.150	16.62	16.58	16.54	16.49	16.44
19.400	16.40	16.36	16.31	16.27	16.22
19.650	16.18	16.14	16.08	16.03	15.97
19.900	15.93	15.89	15.85	15.82	15.78
20.150	15.73	15.69	15.65	15.60	15.55
20.400	15.49	15.44	15.39	15.35	15.30
20.650	15.25	15.21	15.17	15.14	15.10

## Centennial Site

Subsection: Unit Hydrograph (Hydrograph Table)  
Label: CM-1

Return Event: 100 years  
Storm Event: Idaho Maryland NC 100-yr

**HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)**  
**Output Time Increment = 0.050 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Flow (ft <sup>3</sup> /s)				
20.900	15.06	15.00	14.95	14.89	14.85
21.150	14.81	14.76	14.71	14.66	14.62
21.400	14.57	14.53	14.48	14.44	14.39
21.650	14.34	14.30	14.26	14.21	14.16
21.900	14.12	14.07	14.03	13.98	13.93
22.150	13.89	13.84	13.79	13.73	13.68
22.400	13.63	13.59	13.55	13.52	13.47
22.650	13.42	13.38	13.34	13.29	13.24
22.900	13.18	13.12	13.07	13.03	12.98
23.150	12.93	12.89	12.85	12.81	12.78
23.400	12.73	12.68	12.62	12.57	12.52
23.650	12.48	12.43	12.38	12.33	12.29
23.900	12.24	12.19	12.16	(N/A)	(N/A)

## Centennial Site

Subsection: Addition Summary  
Label: O-1

Return Event: 10 years  
Storm Event: Idaho Maryland NC 10-yr

### Summary for Hydrograph Addition at 'O-1'

	Upstream Link	Upstream Node
Outlet-1		PO-1

### Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft <sup>3</sup> /s)
Flow (From)	Outlet-1	28.027	8.350	45.14
Flow (In)	O-1	28.027	8.350	45.14

## Centennial Site

Subsection: Addition Summary  
Label: O-1

Return Event: 10 years  
Storm Event: Idaho Maryland NC 10-yr

### Summary for Hydrograph Addition at 'O-1'

Upstream Link                      Upstream Node  
<Catchment to Outflow Node>      CM-1

### Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft <sup>3</sup> /s)
Flow (From)	CM-1	24.300	8.000	72.44
Flow (In)	O-1	24.300	8.000	72.44

## Centennial Site

Subsection: Addition Summary  
Label: O-1

Return Event: 100 years  
Storm Event: Idaho Maryland NC 100-yr

### Summary for Hydrograph Addition at 'O-1'

	Upstream Link	Upstream Node
Outlet-1		PO-1

### Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft <sup>3</sup> /s)
Flow (From)	Outlet-1	43.107	8.300	75.75
Flow (In)	O-1	43.107	8.300	75.75

## Centennial Site

Subsection: Addition Summary  
Label: O-1

Return Event: 100 years  
Storm Event: Idaho Maryland NC 100-yr

### Summary for Hydrograph Addition at 'O-1'

Upstream Link                      Upstream Node  
<Catchment to Outflow Node>      CM-1

### Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft <sup>3</sup> /s)
Flow (From)	CM-1	39.469	8.000	121.02
Flow (In)	O-1	39.469	8.000	121.02

## Centennial Site

Subsection: Time vs. Elevation  
 Label: PO-1 (OUT)

Return Event: 10 years  
 Storm Event: Idaho Maryland NC 10-yr

### Time vs. Elevation (ft)

**Output Time increment = 0.050 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
0.000	2,495.00	2,495.00	2,495.00	2,495.00	2,495.00
0.250	2,495.00	2,495.00	2,495.00	2,495.00	2,495.00
0.500	2,495.00	2,495.00	2,495.00	2,495.00	2,495.00
0.750	2,495.00	2,495.00	2,495.00	2,495.00	2,495.00
1.000	2,495.00	2,495.00	2,495.00	2,495.00	2,495.00
1.250	2,495.00	2,495.00	2,495.00	2,495.00	2,495.00
1.500	2,495.00	2,495.00	2,495.00	2,495.00	2,495.00
1.750	2,495.00	2,495.00	2,495.00	2,495.00	2,495.00
2.000	2,495.00	2,495.00	2,495.00	2,495.00	2,495.01
2.250	2,495.01	2,495.02	2,495.03	2,495.04	2,495.05
2.500	2,495.06	2,495.07	2,495.08	2,495.10	2,495.11
2.750	2,495.13	2,495.15	2,495.16	2,495.18	2,495.20
3.000	2,495.22	2,495.24	2,495.26	2,495.29	2,495.31
3.250	2,495.33	2,495.36	2,495.38	2,495.40	2,495.43
3.500	2,495.46	2,495.48	2,495.51	2,495.54	2,495.57
3.750	2,495.59	2,495.62	2,495.65	2,495.68	2,495.70
4.000	2,495.73	2,495.76	2,495.78	2,495.81	2,495.84
4.250	2,495.86	2,495.89	2,495.91	2,495.94	2,495.97
4.500	2,495.99	2,496.02	2,496.04	2,496.07	2,496.09
4.750	2,496.11	2,496.14	2,496.16	2,496.18	2,496.21
5.000	2,496.23	2,496.26	2,496.28	2,496.30	2,496.33
5.250	2,496.36	2,496.38	2,496.41	2,496.43	2,496.46
5.500	2,496.48	2,496.51	2,496.53	2,496.56	2,496.58
5.750	2,496.60	2,496.63	2,496.65	2,496.68	2,496.70
6.000	2,496.73	2,496.75	2,496.78	2,496.81	2,496.84
6.250	2,496.88	2,496.91	2,496.95	2,496.98	2,497.02
6.500	2,497.05	2,497.08	2,497.11	2,497.13	2,497.16
6.750	2,497.18	2,497.20	2,497.22	2,497.24	2,497.27
7.000	2,497.30	2,497.33	2,497.36	2,497.39	2,497.43
7.250	2,497.48	2,497.52	2,497.58	2,497.63	2,497.69
7.500	2,497.76	2,497.84	2,497.98	2,498.18	2,498.45
7.750	2,498.74	2,499.06	2,499.37	2,499.68	2,499.98
8.000	2,500.26	2,500.52	2,500.73	2,500.88	2,500.97
8.250	2,501.03	2,501.06	2,501.07	2,501.07	2,501.04
8.500	2,501.01	2,500.96	2,500.92	2,500.87	2,500.82
8.750	2,500.78	2,500.73	2,500.68	2,500.62	2,500.56
9.000	2,500.50	2,500.44	2,500.37	2,500.30	2,500.23
9.250	2,500.16	2,500.08	2,500.01	2,499.93	2,499.85
9.500	2,499.77	2,499.69	2,499.62	2,499.54	2,499.47
9.750	2,499.40	2,499.34	2,499.27	2,499.21	2,499.14
10.000	2,499.08	2,499.02	2,498.96	2,498.90	2,498.84

## Centennial Site

Subsection: Time vs. Elevation  
 Label: PO-1 (OUT)

Return Event: 10 years  
 Storm Event: Idaho Maryland NC 10-yr

### Time vs. Elevation (ft)

**Output Time increment = 0.050 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Elevation (ft)				
10.250	2,498.78	2,498.73	2,498.67	2,498.62	2,498.57
10.500	2,498.52	2,498.47	2,498.42	2,498.37	2,498.33
10.750	2,498.29	2,498.25	2,498.21	2,498.18	2,498.14
11.000	2,498.10	2,498.07	2,498.04	2,498.00	2,497.97
11.250	2,497.94	2,497.91	2,497.88	2,497.85	2,497.82
11.500	2,497.79	2,497.76	2,497.73	2,497.70	2,497.68
11.750	2,497.65	2,497.62	2,497.60	2,497.57	2,497.55
12.000	2,497.52	2,497.50	2,497.48	2,497.46	2,497.44
12.250	2,497.42	2,497.41	2,497.39	2,497.38	2,497.37
12.500	2,497.36	2,497.35	2,497.34	2,497.33	2,497.32
12.750	2,497.30	2,497.29	2,497.28	2,497.27	2,497.26
13.000	2,497.25	2,497.24	2,497.23	2,497.22	2,497.22
13.250	2,497.21	2,497.21	2,497.20	2,497.19	2,497.19
13.500	2,497.18	2,497.17	2,497.17	2,497.16	2,497.15
13.750	2,497.14	2,497.14	2,497.13	2,497.12	2,497.12
14.000	2,497.11	2,497.10	2,497.10	2,497.09	2,497.09
14.250	2,497.08	2,497.08	2,497.07	2,497.07	2,497.06
14.500	2,497.06	2,497.06	2,497.05	2,497.05	2,497.04
14.750	2,497.04	2,497.04	2,497.03	2,497.03	2,497.02
15.000	2,497.02	2,497.02	2,497.01	2,497.01	2,497.01
15.250	2,497.00	2,497.00	2,497.00	2,496.99	2,496.99
15.500	2,496.99	2,496.98	2,496.98	2,496.98	2,496.97
15.750	2,496.97	2,496.97	2,496.96	2,496.96	2,496.96
16.000	2,496.95	2,496.95	2,496.95	2,496.94	2,496.94
16.250	2,496.94	2,496.93	2,496.93	2,496.93	2,496.92
16.500	2,496.92	2,496.92	2,496.91	2,496.91	2,496.91
16.750	2,496.90	2,496.90	2,496.90	2,496.89	2,496.89
17.000	2,496.89	2,496.89	2,496.88	2,496.88	2,496.88
17.250	2,496.87	2,496.87	2,496.87	2,496.86	2,496.86
17.500	2,496.86	2,496.85	2,496.85	2,496.85	2,496.84
17.750	2,496.84	2,496.84	2,496.83	2,496.83	2,496.83
18.000	2,496.82	2,496.82	2,496.82	2,496.82	2,496.81
18.250	2,496.81	2,496.81	2,496.80	2,496.80	2,496.80
18.500	2,496.79	2,496.79	2,496.79	2,496.78	2,496.78
18.750	2,496.78	2,496.77	2,496.77	2,496.77	2,496.76
19.000	2,496.76	2,496.76	2,496.75	2,496.75	2,496.75
19.250	2,496.74	2,496.74	2,496.74	2,496.74	2,496.73
19.500	2,496.73	2,496.73	2,496.72	2,496.72	2,496.72
19.750	2,496.71	2,496.71	2,496.71	2,496.70	2,496.70
20.000	2,496.70	2,496.69	2,496.69	2,496.69	2,496.68
20.250	2,496.68	2,496.68	2,496.67	2,496.67	2,496.67

## Centennial Site

Subsection: Time vs. Elevation  
 Label: PO-1 (OUT)

Return Event: 10 years  
 Storm Event: Idaho Maryland NC 10-yr

### Time vs. Elevation (ft)

**Output Time increment = 0.050 hours**

**Time on left represents time for first value in each row.**

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
20.500	2,496.66	2,496.66	2,496.66	2,496.65	2,496.65
20.750	2,496.65	2,496.64	2,496.64	2,496.64	2,496.63
21.000	2,496.63	2,496.63	2,496.62	2,496.62	2,496.62
21.250	2,496.61	2,496.61	2,496.61	2,496.60	2,496.60
21.500	2,496.60	2,496.59	2,496.59	2,496.59	2,496.59
21.750	2,496.58	2,496.58	2,496.58	2,496.57	2,496.57
22.000	2,496.57	2,496.56	2,496.56	2,496.56	2,496.55
22.250	2,496.55	2,496.55	2,496.54	2,496.54	2,496.54
22.500	2,496.53	2,496.53	2,496.53	2,496.52	2,496.52
22.750	2,496.52	2,496.51	2,496.51	2,496.51	2,496.50
23.000	2,496.50	2,496.50	2,496.49	2,496.49	2,496.49
23.250	2,496.48	2,496.48	2,496.48	2,496.47	2,496.47
23.500	2,496.47	2,496.46	2,496.46	2,496.45	2,496.45
23.750	2,496.45	2,496.44	2,496.44	2,496.44	2,496.43
24.000	2,496.43	(N/A)	(N/A)	(N/A)	(N/A)

## Centennial Site

Subsection: Time vs. Elevation  
 Label: PO-1 (OUT)

Return Event: 100 years  
 Storm Event: Idaho Maryland NC 100-yr

### Time vs. Elevation (ft)

**Output Time increment = 0.050 hours**

**Time on left represents time for first value in each row.**

Time (hours)	Elevation (ft)				
0.000	2,495.00	2,495.00	2,495.00	2,495.00	2,495.00
0.250	2,495.00	2,495.00	2,495.00	2,495.00	2,495.00
0.500	2,495.00	2,495.00	2,495.00	2,495.00	2,495.00
0.750	2,495.00	2,495.00	2,495.00	2,495.00	2,495.00
1.000	2,495.00	2,495.00	2,495.00	2,495.00	2,495.00
1.250	2,495.00	2,495.00	2,495.00	2,495.00	2,495.00
1.500	2,495.00	2,495.00	2,495.00	2,495.00	2,495.01
1.750	2,495.02	2,495.03	2,495.04	2,495.05	2,495.07
2.000	2,495.09	2,495.11	2,495.13	2,495.15	2,495.18
2.250	2,495.21	2,495.24	2,495.27	2,495.30	2,495.34
2.500	2,495.38	2,495.41	2,495.45	2,495.49	2,495.53
2.750	2,495.57	2,495.61	2,495.65	2,495.68	2,495.72
3.000	2,495.76	2,495.79	2,495.83	2,495.86	2,495.90
3.250	2,495.93	2,495.97	2,496.00	2,496.03	2,496.06
3.500	2,496.09	2,496.12	2,496.15	2,496.18	2,496.22
3.750	2,496.25	2,496.28	2,496.31	2,496.34	2,496.37
4.000	2,496.40	2,496.43	2,496.46	2,496.49	2,496.52
4.250	2,496.54	2,496.57	2,496.60	2,496.62	2,496.65
4.500	2,496.68	2,496.70	2,496.73	2,496.76	2,496.78
4.750	2,496.81	2,496.84	2,496.87	2,496.90	2,496.93
5.000	2,496.96	2,496.99	2,497.02	2,497.05	2,497.08
5.250	2,497.12	2,497.15	2,497.19	2,497.22	2,497.26
5.500	2,497.29	2,497.33	2,497.37	2,497.40	2,497.43
5.750	2,497.47	2,497.50	2,497.53	2,497.57	2,497.60
6.000	2,497.64	2,497.68	2,497.72	2,497.77	2,497.81
6.250	2,497.86	2,497.92	2,497.97	2,498.02	2,498.07
6.500	2,498.12	2,498.17	2,498.21	2,498.25	2,498.29
6.750	2,498.32	2,498.35	2,498.38	2,498.42	2,498.46
7.000	2,498.50	2,498.54	2,498.59	2,498.64	2,498.70
7.250	2,498.77	2,498.84	2,498.92	2,499.01	2,499.10
7.500	2,499.20	2,499.32	2,499.52	2,499.82	2,500.20
7.750	2,500.63	2,501.07	2,501.52	2,501.96	2,502.38
8.000	2,502.78	2,503.12	2,503.39	2,503.56	2,503.65
8.250	2,503.70	2,503.70	2,503.68	2,503.64	2,503.58
8.500	2,503.51	2,503.44	2,503.36	2,503.30	2,503.24
8.750	2,503.18	2,503.13	2,503.07	2,503.01	2,502.96
9.000	2,502.90	2,502.83	2,502.77	2,502.70	2,502.63
9.250	2,502.56	2,502.49	2,502.41	2,502.33	2,502.26
9.500	2,502.17	2,502.09	2,502.01	2,501.93	2,501.85
9.750	2,501.77	2,501.69	2,501.62	2,501.54	2,501.47
10.000	2,501.39	2,501.31	2,501.24	2,501.16	2,501.08

## Centennial Site

Subsection: Time vs. Elevation  
 Label: PO-1 (OUT)

Return Event: 100 years  
 Storm Event: Idaho Maryland NC 100-yr

### Time vs. Elevation (ft)

**Output Time increment = 0.050 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
10.250	2,501.01	2,500.93	2,500.85	2,500.78	2,500.70
10.500	2,500.63	2,500.56	2,500.49	2,500.42	2,500.35
10.750	2,500.29	2,500.23	2,500.17	2,500.11	2,500.05
11.000	2,499.99	2,499.93	2,499.87	2,499.81	2,499.75
11.250	2,499.70	2,499.64	2,499.59	2,499.53	2,499.48
11.500	2,499.42	2,499.37	2,499.32	2,499.27	2,499.21
11.750	2,499.16	2,499.11	2,499.06	2,499.01	2,498.96
12.000	2,498.92	2,498.87	2,498.83	2,498.79	2,498.75
12.250	2,498.71	2,498.68	2,498.64	2,498.61	2,498.58
12.500	2,498.56	2,498.53	2,498.51	2,498.48	2,498.46
12.750	2,498.43	2,498.40	2,498.37	2,498.35	2,498.32
13.000	2,498.30	2,498.28	2,498.26	2,498.24	2,498.22
13.250	2,498.21	2,498.19	2,498.18	2,498.16	2,498.15
13.500	2,498.13	2,498.12	2,498.10	2,498.08	2,498.07
13.750	2,498.05	2,498.04	2,498.02	2,498.01	2,497.99
14.000	2,497.98	2,497.96	2,497.95	2,497.94	2,497.93
14.250	2,497.92	2,497.90	2,497.90	2,497.89	2,497.88
14.500	2,497.87	2,497.86	2,497.85	2,497.84	2,497.83
14.750	2,497.82	2,497.82	2,497.81	2,497.80	2,497.79
15.000	2,497.79	2,497.78	2,497.77	2,497.76	2,497.76
15.250	2,497.75	2,497.74	2,497.74	2,497.73	2,497.73
15.500	2,497.72	2,497.71	2,497.71	2,497.70	2,497.69
15.750	2,497.69	2,497.68	2,497.68	2,497.67	2,497.66
16.000	2,497.66	2,497.65	2,497.65	2,497.64	2,497.64
16.250	2,497.63	2,497.62	2,497.62	2,497.61	2,497.61
16.500	2,497.60	2,497.60	2,497.59	2,497.58	2,497.58
16.750	2,497.57	2,497.57	2,497.56	2,497.56	2,497.55
17.000	2,497.55	2,497.54	2,497.54	2,497.53	2,497.53
17.250	2,497.52	2,497.51	2,497.51	2,497.50	2,497.50
17.500	2,497.49	2,497.49	2,497.48	2,497.48	2,497.47
17.750	2,497.47	2,497.46	2,497.46	2,497.45	2,497.45
18.000	2,497.44	2,497.43	2,497.43	2,497.42	2,497.42
18.250	2,497.41	2,497.41	2,497.40	2,497.40	2,497.39
18.500	2,497.39	2,497.38	2,497.38	2,497.37	2,497.37
18.750	2,497.36	2,497.36	2,497.35	2,497.35	2,497.34
19.000	2,497.34	2,497.33	2,497.33	2,497.32	2,497.32
19.250	2,497.31	2,497.31	2,497.30	2,497.30	2,497.29
19.500	2,497.29	2,497.28	2,497.28	2,497.27	2,497.27
19.750	2,497.26	2,497.26	2,497.25	2,497.25	2,497.24
20.000	2,497.24	2,497.23	2,497.23	2,497.22	2,497.22
20.250	2,497.21	2,497.21	2,497.20	2,497.20	2,497.19

## Centennial Site

Subsection: Time vs. Elevation  
 Label: PO-1 (OUT)

Return Event: 100 years  
 Storm Event: Idaho Maryland NC 100-yr

### Time vs. Elevation (ft)

**Output Time increment = 0.050 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
20.500	2,497.19	2,497.18	2,497.18	2,497.17	2,497.17
20.750	2,497.16	2,497.16	2,497.15	2,497.15	2,497.14
21.000	2,497.14	2,497.13	2,497.13	2,497.12	2,497.12
21.250	2,497.11	2,497.11	2,497.10	2,497.10	2,497.09
21.500	2,497.09	2,497.08	2,497.08	2,497.07	2,497.07
21.750	2,497.06	2,497.06	2,497.05	2,497.05	2,497.04
22.000	2,497.04	2,497.03	2,497.03	2,497.02	2,497.02
22.250	2,497.01	2,497.01	2,497.00	2,497.00	2,496.99
22.500	2,496.98	2,496.98	2,496.97	2,496.97	2,496.96
22.750	2,496.96	2,496.95	2,496.95	2,496.94	2,496.94
23.000	2,496.93	2,496.93	2,496.92	2,496.92	2,496.91
23.250	2,496.91	2,496.90	2,496.90	2,496.89	2,496.89
23.500	2,496.88	2,496.88	2,496.87	2,496.87	2,496.86
23.750	2,496.86	2,496.85	2,496.85	2,496.84	2,496.84
24.000	2,496.83	(N/A)	(N/A)	(N/A)	(N/A)

## Centennial Site

Subsection: Time vs. Volume  
 Label: PO-1

Return Event: 10 years  
 Storm Event: Idaho Maryland NC 10-yr

### Time vs. Volume (ac-ft)

**Output Time increment = 0.050 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)
0.000	0.000	0.000	0.000	0.000	0.000
0.250	0.000	0.000	0.000	0.000	0.000
0.500	0.000	0.000	0.000	0.000	0.000
0.750	0.000	0.000	0.000	0.000	0.000
1.000	0.000	0.000	0.000	0.000	0.000
1.250	0.000	0.000	0.000	0.000	0.000
1.500	0.000	0.000	0.000	0.000	0.000
1.750	0.000	0.000	0.000	0.000	0.000
2.000	0.000	0.000	0.001	0.002	0.004
2.250	0.007	0.010	0.014	0.018	0.023
2.500	0.029	0.035	0.042	0.050	0.058
2.750	0.066	0.075	0.084	0.094	0.104
3.000	0.114	0.125	0.137	0.148	0.160
3.250	0.172	0.185	0.197	0.211	0.224
3.500	0.238	0.253	0.267	0.282	0.297
3.750	0.311	0.326	0.341	0.356	0.371
4.000	0.386	0.401	0.415	0.430	0.444
4.250	0.459	0.473	0.487	0.501	0.516
4.500	0.530	0.544	0.558	0.572	0.585
4.750	0.598	0.612	0.625	0.639	0.652
5.000	0.666	0.679	0.693	0.707	0.722
5.250	0.736	0.751	0.766	0.781	0.796
5.500	0.811	0.825	0.840	0.853	0.867
5.750	0.881	0.894	0.908	0.922	0.937
6.000	0.952	0.968	0.984	1.003	1.022
6.250	1.042	1.062	1.083	1.104	1.124
6.500	1.143	1.162	1.180	1.195	1.209
6.750	1.222	1.235	1.248	1.262	1.277
7.000	1.293	1.311	1.331	1.353	1.378
7.250	1.405	1.434	1.466	1.501	1.539
7.500	1.581	1.634	1.719	1.850	2.024
7.750	2.221	2.434	2.652	2.871	3.087
8.000	3.293	3.487	3.646	3.761	3.838
8.250	3.884	3.908	3.915	3.909	3.891
8.500	3.864	3.829	3.791	3.756	3.721
8.750	3.685	3.648	3.609	3.567	3.523
9.000	3.477	3.428	3.377	3.325	3.272
9.250	3.218	3.163	3.108	3.051	2.994
9.500	2.937	2.881	2.827	2.775	2.726
9.750	2.677	2.629	2.583	2.539	2.495
10.000	2.453	2.411	2.370	2.329	2.289

## Centennial Site

Subsection: Time vs. Volume  
Label: PO-1

Return Event: 10 years  
Storm Event: Idaho Maryland NC 10-yr

### Time vs. Volume (ac-ft)

**Output Time increment = 0.050 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Volume (ac-ft)				
10.250	2.249	2.211	2.174	2.138	2.103
10.500	2.070	2.037	2.005	1.976	1.948
10.750	1.921	1.896	1.871	1.847	1.824
11.000	1.801	1.779	1.757	1.736	1.715
11.250	1.695	1.675	1.655	1.636	1.617
11.500	1.599	1.581	1.564	1.546	1.529
11.750	1.512	1.495	1.479	1.463	1.448
12.000	1.434	1.420	1.407	1.394	1.383
12.250	1.372	1.362	1.353	1.345	1.337
12.500	1.331	1.325	1.319	1.313	1.306
12.750	1.298	1.291	1.284	1.277	1.271
13.000	1.264	1.258	1.253	1.249	1.246
13.250	1.242	1.239	1.236	1.232	1.228
13.500	1.224	1.219	1.215	1.211	1.206
13.750	1.201	1.197	1.193	1.188	1.184
14.000	1.180	1.176	1.173	1.169	1.166
14.250	1.163	1.161	1.158	1.155	1.153
14.500	1.150	1.148	1.146	1.143	1.141
14.750	1.138	1.136	1.134	1.132	1.129
15.000	1.127	1.125	1.123	1.121	1.119
15.250	1.116	1.114	1.112	1.110	1.108
15.500	1.106	1.104	1.102	1.100	1.097
15.750	1.095	1.093	1.092	1.090	1.088
16.000	1.086	1.084	1.082	1.080	1.078
16.250	1.076	1.074	1.072	1.070	1.068
16.500	1.066	1.064	1.063	1.061	1.059
16.750	1.057	1.055	1.053	1.051	1.049
17.000	1.048	1.046	1.044	1.042	1.040
17.250	1.038	1.036	1.034	1.032	1.030
17.500	1.029	1.027	1.025	1.023	1.021
17.750	1.019	1.018	1.016	1.014	1.012
18.000	1.010	1.008	1.006	1.004	1.002
18.250	1.000	0.999	0.997	0.995	0.993
18.500	0.991	0.989	0.987	0.985	0.984
18.750	0.982	0.980	0.978	0.976	0.974
19.000	0.972	0.970	0.968	0.967	0.965
19.250	0.963	0.961	0.959	0.957	0.955
19.500	0.953	0.951	0.949	0.948	0.946
19.750	0.944	0.942	0.940	0.938	0.936
20.000	0.934	0.932	0.930	0.929	0.927
20.250	0.925	0.923	0.921	0.919	0.917

## Centennial Site

Subsection: Time vs. Volume

Label: PO-1

Return Event: 10 years

Storm Event: Idaho Maryland NC 10-yr

### Time vs. Volume (ac-ft)

Output Time increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)
20.500	0.915	0.913	0.911	0.909	0.907
20.750	0.905	0.904	0.902	0.900	0.898
21.000	0.896	0.894	0.892	0.890	0.888
21.250	0.886	0.885	0.883	0.881	0.879
21.500	0.877	0.875	0.873	0.871	0.869
21.750	0.867	0.865	0.863	0.861	0.860
22.000	0.858	0.856	0.854	0.852	0.850
22.250	0.848	0.846	0.844	0.842	0.840
22.500	0.838	0.836	0.835	0.833	0.831
22.750	0.829	0.827	0.825	0.823	0.821
23.000	0.819	0.817	0.815	0.813	0.811
23.250	0.809	0.807	0.805	0.803	0.801
23.500	0.799	0.797	0.796	0.794	0.792
23.750	0.790	0.788	0.786	0.784	0.782
24.000	0.780	(N/A)	(N/A)	(N/A)	(N/A)

## Centennial Site

Subsection: Time vs. Volume  
 Label: PO-1

Return Event: 100 years  
 Storm Event: Idaho Maryland NC 100-yr

### Time vs. Volume (ac-ft)

**Output Time increment = 0.050 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)
0.000	0.000	0.000	0.000	0.000	0.000
0.250	0.000	0.000	0.000	0.000	0.000
0.500	0.000	0.000	0.000	0.000	0.000
0.750	0.000	0.000	0.000	0.000	0.000
1.000	0.000	0.000	0.000	0.000	0.000
1.250	0.000	0.000	0.000	0.000	0.000
1.500	0.000	0.000	0.001	0.003	0.005
1.750	0.009	0.014	0.020	0.027	0.035
2.000	0.044	0.055	0.066	0.079	0.093
2.250	0.107	0.123	0.140	0.157	0.176
2.500	0.195	0.215	0.236	0.257	0.278
2.750	0.299	0.320	0.340	0.361	0.381
3.000	0.401	0.421	0.440	0.460	0.479
3.250	0.497	0.516	0.535	0.552	0.570
3.500	0.587	0.604	0.621	0.639	0.656
3.750	0.674	0.692	0.710	0.728	0.745
4.000	0.763	0.780	0.797	0.814	0.830
4.250	0.845	0.860	0.876	0.891	0.907
4.500	0.922	0.938	0.954	0.970	0.986
4.750	1.002	1.019	1.036	1.053	1.071
5.000	1.089	1.107	1.126	1.145	1.165
5.250	1.185	1.206	1.228	1.249	1.271
5.500	1.293	1.315	1.336	1.357	1.378
5.750	1.398	1.419	1.440	1.461	1.483
6.000	1.506	1.530	1.557	1.585	1.616
6.250	1.648	1.681	1.714	1.747	1.779
6.500	1.811	1.842	1.871	1.896	1.919
6.750	1.940	1.961	1.983	2.006	2.031
7.000	2.058	2.087	2.119	2.155	2.194
7.250	2.238	2.287	2.341	2.400	2.463
7.500	2.533	2.620	2.757	2.970	3.250
7.750	3.571	3.916	4.272	4.631	4.984
8.000	5.323	5.629	5.867	6.023	6.108
8.250	6.147	6.152	6.133	6.095	6.043
8.500	5.981	5.912	5.845	5.785	5.731
8.750	5.681	5.631	5.582	5.532	5.480
9.000	5.426	5.370	5.313	5.254	5.194
9.250	5.134	5.073	5.009	4.943	4.875
9.500	4.807	4.737	4.669	4.602	4.537
9.750	4.473	4.410	4.349	4.288	4.226
10.000	4.165	4.104	4.043	3.983	3.923

## Centennial Site

Subsection: Time vs. Volume

Return Event: 100 years

Label: PO-1

Storm Event: Idaho Maryland NC 100-yr

### Time vs. Volume (ac-ft)

Output Time increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)
10.250	3.863	3.803	3.743	3.685	3.628
10.500	3.572	3.518	3.465	3.414	3.365
10.750	3.317	3.270	3.225	3.180	3.137
11.000	3.093	3.050	3.007	2.965	2.924
11.250	2.883	2.844	2.805	2.767	2.729
11.500	2.690	2.653	2.616	2.579	2.543
11.750	2.507	2.472	2.438	2.405	2.372
12.000	2.340	2.309	2.280	2.252	2.225
12.250	2.200	2.177	2.155	2.134	2.115
12.500	2.097	2.081	2.065	2.048	2.030
12.750	2.012	1.994	1.977	1.960	1.944
13.000	1.928	1.913	1.900	1.889	1.878
13.250	1.868	1.859	1.849	1.839	1.829
13.500	1.818	1.808	1.798	1.787	1.777
13.750	1.767	1.757	1.747	1.737	1.728
14.000	1.719	1.710	1.701	1.694	1.687
14.250	1.680	1.673	1.667	1.661	1.655
14.500	1.649	1.643	1.638	1.633	1.627
14.750	1.622	1.617	1.612	1.607	1.603
15.000	1.598	1.593	1.589	1.585	1.580
15.250	1.576	1.572	1.568	1.564	1.560
15.500	1.556	1.552	1.548	1.544	1.540
15.750	1.536	1.532	1.529	1.525	1.521
16.000	1.518	1.514	1.510	1.507	1.503
16.250	1.500	1.496	1.493	1.489	1.486
16.500	1.482	1.479	1.475	1.472	1.468
16.750	1.465	1.462	1.458	1.455	1.452
17.000	1.448	1.445	1.442	1.438	1.435
17.250	1.432	1.428	1.425	1.421	1.418
17.500	1.415	1.411	1.408	1.405	1.401
17.750	1.398	1.395	1.392	1.388	1.385
18.000	1.382	1.379	1.375	1.372	1.369
18.250	1.366	1.363	1.359	1.356	1.353
18.500	1.350	1.347	1.344	1.341	1.338
18.750	1.334	1.331	1.328	1.325	1.322
19.000	1.319	1.316	1.313	1.310	1.307
19.250	1.303	1.300	1.297	1.294	1.291
19.500	1.288	1.285	1.282	1.279	1.276
19.750	1.273	1.270	1.267	1.264	1.260
20.000	1.257	1.254	1.251	1.248	1.245
20.250	1.242	1.239	1.236	1.233	1.230

## Centennial Site

Subsection: Time vs. Volume

Return Event: 100 years

Label: PO-1

Storm Event: Idaho Maryland NC 100-yr

### Time vs. Volume (ac-ft)

Output Time increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)
20.500	1.227	1.224	1.221	1.218	1.215
20.750	1.212	1.209	1.206	1.203	1.200
21.000	1.197	1.194	1.191	1.187	1.184
21.250	1.181	1.178	1.175	1.172	1.169
21.500	1.166	1.163	1.160	1.157	1.154
21.750	1.151	1.148	1.145	1.142	1.139
22.000	1.136	1.133	1.130	1.127	1.124
22.250	1.121	1.118	1.115	1.111	1.108
22.500	1.105	1.102	1.099	1.096	1.093
22.750	1.090	1.087	1.084	1.081	1.078
23.000	1.075	1.072	1.069	1.066	1.063
23.250	1.060	1.057	1.054	1.051	1.048
23.500	1.045	1.042	1.039	1.036	1.033
23.750	1.031	1.028	1.025	1.022	1.019
24.000	1.016	(N/A)	(N/A)	(N/A)	(N/A)

## Centennial Site

Subsection: Elevation-Area Volume Curve

Return Event: 10 years

Label: PO-1

Storm Event: Idaho Maryland NC 10-yr

Elevation (ft)	Planimeter (ft <sup>2</sup> )	Area (acres)	A1+A2+sqr (A1*A2) (acres)	Volume (ac-ft)	Volume (Total) (ac-ft)
2,495.00	0.0	0.510	0.000	0.000	0.000
2,496.00	0.0	0.560	1.604	0.535	0.535
2,498.00	0.0	0.640	1.799	1.199	1.734
2,500.00	0.0	0.730	2.054	1.369	3.103
2,502.00	0.0	0.830	2.338	1.559	4.662
2,504.00	0.0	0.940	2.653	1.769	6.431
2,506.00	0.0	1.050	2.983	1.989	8.420
2,508.00	0.0	1.170	3.328	2.219	10.639
2,510.00	0.0	1.310	3.718	2.479	13.117

## Centennial Site

Subsection: Volume Equations  
Label: PO-1

Return Event: 10 years  
Storm Event: Idaho Maryland NC 10-yr

### Pond Volume Equations

**\* Incremental volume computed by the Conic Method for Reservoir Volumes.**

$$\text{Volume} = (1/3) * (\text{EL2} - \text{EL1}) * (\text{Area1} + \text{Area2} + \text{sqr}(\text{Area1} * \text{Area2}))$$

where:	EL1, EL2	Lower and upper elevations of the increment
	Area1, Area2	Areas computed for EL1, EL2, respectively
	Volume	Incremental volume between EL1 and EL2

## Centennial Site

Subsection: Elevation-Area Volume Curve

Return Event: 100 years

Label: PO-1

Storm Event: Idaho Maryland NC 100-yr

Elevation (ft)	Planimeter (ft <sup>2</sup> )	Area (acres)	A1+A2+sqr (A1*A2) (acres)	Volume (ac-ft)	Volume (Total) (ac-ft)
2,495.00	0.0	0.510	0.000	0.000	0.000
2,496.00	0.0	0.560	1.604	0.535	0.535
2,498.00	0.0	0.640	1.799	1.199	1.734
2,500.00	0.0	0.730	2.054	1.369	3.103
2,502.00	0.0	0.830	2.338	1.559	4.662
2,504.00	0.0	0.940	2.653	1.769	6.431
2,506.00	0.0	1.050	2.983	1.989	8.420
2,508.00	0.0	1.170	3.328	2.219	10.639
2,510.00	0.0	1.310	3.718	2.479	13.117

## Centennial Site

Subsection: Volume Equations

Return Event: 100 years

Label: PO-1

Storm Event: Idaho Maryland NC 100-yr

### Pond Volume Equations

**\* Incremental volume computed by the Conic Method for Reservoir Volumes.**

$$\text{Volume} = (1/3) * (\text{EL2} - \text{EL1}) * (\text{Area1} + \text{Area2} + \text{sqr}(\text{Area1} * \text{Area2}))$$

where:	EL1, EL2	Lower and upper elevations of the increment
	Area1, Area2	Areas computed for EL1, EL2, respectively
	Volume	Incremental volume between EL1 and EL2

## Centennial Site

Subsection: Outlet Input Data  
 Label: Composite Outlet Structure - 1

Return Event: 10 years  
 Storm Event: Idaho Maryland NC 10-yr

Requested Pond Water Surface Elevations	
Minimum (Headwater)	2,495.00 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	2,510.00 ft

### Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Circular	Orifice - 2	Forward	Culvert - 1	2,502.50	2,510.00
Stand Pipe	Riser - 1	Forward	Culvert - 1	2,505.00	2,510.00
Orifice-Circular	Orifice - 1	Forward	Culvert - 1	2,495.00	2,510.00
Culvert-Circular	Culvert - 1	Forward	TW	2,495.00	2,510.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

## Centennial Site

Subsection: Outlet Input Data  
 Label: Composite Outlet Structure - 1

Return Event: 10 years  
 Storm Event: Idaho Maryland NC 10-yr

Structure ID: Culvert - 1	
Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	48.0 in
Length	170.00 ft
Length (Computed Barrel)	170.07 ft
Slope (Computed)	0.029 ft/ft
<b>Outlet Control Data</b>	
Manning's n	0.024
Ke	0.500
Kb	0.017
Kr	0.000
Convergence Tolerance	0.00 ft
<b>Inlet Control Data</b>	
Equation Form	Form 1
K	0.0078
M	2.0000
C	0.0379
Y	0.6900
T1 ratio (HW/D)	1.121
T2 ratio (HW/D)	1.282
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.  
 Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,  
 interpolate between flows at T1 & T2...

T1 Elevation	2,499.48 ft	T1 Flow	87.96 ft <sup>3</sup> /s
T2 Elevation	2,500.13 ft	T2 Flow	100.53 ft <sup>3</sup> /s

## Centennial Site

Subsection: Outlet Input Data

Return Event: 10 years

Label: Composite Outlet Structure - 1

Storm Event: Idaho Maryland NC 10-yr

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Structure ID: Riser - 1  
Structure Type: Stand Pipe

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Number of Openings	1
Elevation	2,505.00 ft
Diameter	60.0 in
Orifice Area	19.6 ft <sup>2</sup>
Orifice Coefficient	0.600
Weir Length	15.71 ft
Weir Coefficient	3.00 (ft <sup>0.5</sup> )/s
K Reverse	1.000
Manning's n	0.000
Kev, Charged Riser	0.000
Weir Submergence	False
Orifice H to crest	False

---

---

Structure ID: Orifice - 1  
Structure Type: Orifice-Circular

---

Number of Openings	6
Elevation	2,495.00 ft
Orifice Diameter	13.0 in
Orifice Coefficient	0.600

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---

Structure ID: Orifice - 2  
Structure Type: Orifice-Circular

---

Number of Openings	6
Elevation	2,502.50 ft
Orifice Diameter	13.0 in
Orifice Coefficient	0.600

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Structure ID: TW  
Structure Type: TW Setup, DS Channel

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Tailwater Type	Free Outfall
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Convergence Tolerances

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Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft

## Centennial Site

Subsection: Outlet Input Data  
Label: Composite Outlet Structure - 1

Return Event: 10 years  
Storm Event: Idaho Maryland NC 10-yr

Convergence Tolerances	
Flow Tolerance (Minimum)	0.001 ft <sup>3</sup> /s
Flow Tolerance (Maximum)	10.000 ft <sup>3</sup> /s

## Centennial Site

Subsection: Individual Outlet Curves  
 Label: Composite Outlet Structure - 1

Return Event: 10 years  
 Storm Event: Idaho Maryland NC 10-yr

RATING TABLE FOR ONE OUTLET TYPE  
 Structure ID = Culvert - 1 (Culvert-Circular)

Mannings open channel maximum capacity: 143.53 ft<sup>3</sup>/s  
 Upstream ID = Orifice - 2, Riser - 1, Orifice - 1  
 Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Device Flow (ft <sup>3</sup> /s)	(into) Headwater Hydraulic Grade Line (ft)	Converge Downstream Hydraulic Grade Line (ft)	Next Downstream Hydraulic Grade Line (ft)	Downstream Hydraulic Grade Line Error (ft)	Convergence Error (ft <sup>3</sup> /s)	Downstream Channel Tailwater (ft)	Tailwater Error (ft)
2,495.00	0.00	0.00	0.00	Free Outfall	0.00	0.00	(N/A)	0.00
2,495.50	1.14	2,495.46	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
2,496.00	4.52	2,495.93	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
2,496.50	9.51	2,496.37	Free Outfall	Free Outfall	0.00	0.01	(N/A)	0.00
2,497.00	14.40	2,496.71	Free Outfall	Free Outfall	0.00	0.01	(N/A)	0.00
2,497.50	19.09	2,496.98	Free Outfall	Free Outfall	0.00	0.01	(N/A)	0.00
2,498.00	23.50	2,497.22	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
2,498.50	27.60	2,497.43	Free Outfall	Free Outfall	0.00	0.01	(N/A)	0.00
2,499.00	31.43	2,497.60	Free Outfall	Free Outfall	0.00	0.02	(N/A)	0.00
2,499.50	35.02	2,497.77	Free Outfall	Free Outfall	0.00	0.03	(N/A)	0.00
2,500.00	38.44	2,497.92	Free Outfall	Free Outfall	0.00	0.02	(N/A)	0.00
2,500.50	41.63	2,498.05	Free Outfall	Free Outfall	0.00	0.02	(N/A)	0.00
2,501.00	44.71	2,498.18	Free Outfall	Free Outfall	0.00	0.01	(N/A)	0.00
2,501.50	47.60	2,498.30	Free Outfall	Free Outfall	0.00	0.04	(N/A)	0.00
2,502.00	50.41	2,498.41	Free Outfall	Free Outfall	0.00	0.03	(N/A)	0.00
2,502.50	53.09	2,498.52	Free Outfall	Free Outfall	0.00	0.04	(N/A)	0.00
2,503.00	59.55	2,498.77	Free Outfall	Free Outfall	0.00	0.05	(N/A)	0.00
2,503.50	71.66	2,499.22	Free Outfall	Free Outfall	0.00	0.02	(N/A)	0.00
2,504.00	81.88	2,499.60	Free Outfall	Free Outfall	0.00	0.04	(N/A)	0.00
2,504.50	89.37	2,499.87	Free Outfall	Free Outfall	0.00	0.05	(N/A)	0.00
2,505.00	95.99	2,500.12	Free Outfall	Free Outfall	0.00	0.08	(N/A)	0.00
2,505.50	115.54	2,500.90	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
2,506.00	142.31	2,502.56	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
2,506.50	158.98	2,504.65	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
2,507.00	171.52	2,506.48	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
2,507.50	176.46	2,507.24	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
2,508.00	180.68	2,507.90	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
2,508.50	184.35	2,508.48	Free Outfall	Free Outfall	0.00	0.00	(N/A)	0.00
2,509.00	187.55	2,509.00	Free Outfall	Free Outfall	0.00	1.46	(N/A)	0.00
2,509.50	190.62	2,509.50	Free Outfall	Free Outfall	0.00	9.86	(N/A)	0.00
2,510.00	193.63	2,510.00	Free Outfall	Free Outfall	0.00	17.68	(N/A)	0.00

Message

WS below an invert; no flow.

## Centennial Site

Subsection: Individual Outlet Curves  
Label: Composite Outlet Structure - 1

Return Event: 10 years  
Storm Event: Idaho Maryland NC 10-yr

### RATING TABLE FOR ONE OUTLET TYPE Structure ID = Culvert - 1 (Culvert-Circular)

Mannings open channel maximum capacity: 143.53 ft<sup>3</sup>/s  
Upstream ID = Orifice - 2, Riser - 1, Orifice - 1  
Downstream ID = Tailwater (Pond Outfall)

#### Message

CRIT.DEPTH CONTROL Vh= .104ft Dcr= .306ft CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL Vh= .212ft Dcr= .614ft CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL Vh= .316ft Dcr= .898ft CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL Vh= .397ft Dcr= 1.111ft CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL Vh= .466ft Dcr= 1.285ft CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL Vh= .526ft Dcr= 1.431ft CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL Vh= .580ft Dcr= 1.556ft CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL Vh= .627ft Dcr= 1.664ft CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL Vh= .671ft Dcr= 1.761ft CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL Vh= .712ft Dcr= 1.849ft CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL Vh= .750ft Dcr= 1.928ft CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL Vh= .786ft Dcr= 2.001ft CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL Vh= .820ft Dcr= 2.068ft CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL Vh= .853ft Dcr= 2.131ft CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL Vh= .884ft Dcr= 2.189ft CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL Vh= .960ft Dcr= 2.325ft CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL Vh= 1.106ft Dcr= 2.560ft CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL Vh= 1.236ft Dcr= 2.742ft CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL Vh= 1.336ft Dcr= 2.866ft CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL Vh= 1.430ft Dcr= 2.970ft CRIT.DEPTH Hev= .00ft

## Centennial Site

Subsection: Individual Outlet Curves  
Label: Composite Outlet Structure - 1

Return Event: 10 years  
Storm Event: Idaho Maryland NC 10-yr

### RATING TABLE FOR ONE OUTLET TYPE Structure ID = Culvert - 1 (Culvert-Circular)

Mannings open channel maximum capacity: 143.53 ft<sup>3</sup>/s  
Upstream ID = Orifice - 2, Riser - 1, Orifice - 1  
Downstream ID = Tailwater (Pond Outfall)

#### Message

INLET CONTROL... Submerged: HW =5.90
INLET CONTROL... Submerged: HW =7.56
FULL FLOW...Lfull=155.21ft Vh=2.487ft HL=10.212ft Hev= .00ft
FULL FLOW...Lfull=163.66ft Vh=2.895ft HL=12.296ft Hev= .00ft
FULL FLOW...Lfull=165.34ft Vh=3.064ft HL=13.102ft Hev= .00ft
FULL FLOW...Lfull=166.32ft Vh=3.213ft HL=13.788ft Hev= .00ft
FULL FLOW...Lfull=166.85ft Vh=3.345ft HL=14.384ft Hev= .00ft
FULL FLOW...Lfull=167.48ft Vh=3.462ft HL=14.924ft Hev= .00ft
FULL FLOW...Lfull=167.73ft Vh=3.576ft HL=15.431ft Hev= .00ft
FULL FLOW...Lfull=167.96ft Vh=3.690ft HL=15.938ft Hev= .00ft

## Centennial Site

Subsection: Individual Outlet Curves  
 Label: Composite Outlet Structure - 1

Return Event: 10 years  
 Storm Event: Idaho Maryland NC 10-yr

**RATING TABLE FOR ONE OUTLET TYPE**  
 Structure ID = Riser - 1 (Stand Pipe)

Upstream ID = (Pond Water Surface)  
 Downstream ID = Culvert - 1 (Culvert-Circular)

Water Surface Elevation (ft)	Device Flow (ft <sup>3</sup> /s)	(into) Headwater Hydraulic Grade Line (ft)	Converge Downstream Hydraulic Grade Line (ft)	Next Downstream Hydraulic Grade Line (ft)	Downstream Hydraulic Grade Line Error (ft)	Convergence Error (ft <sup>3</sup> /s)	Downstream Channel Tailwater (ft)	Tailwater Error (ft)
2,495.00	0.00	0.00	0.00	0.00	0.00	0.00	(N/A)	0.00
2,495.50	0.00	0.00	0.00	2,495.46	0.00	0.00	(N/A)	0.00
2,496.00	0.00	0.00	0.00	2,495.93	0.00	0.00	(N/A)	0.00
2,496.50	0.00	0.00	0.00	2,496.37	0.00	0.00	(N/A)	0.00
2,497.00	0.00	0.00	0.00	2,496.71	0.00	0.00	(N/A)	0.00
2,497.50	0.00	0.00	0.00	2,496.98	0.00	0.00	(N/A)	0.00
2,498.00	0.00	0.00	0.00	2,497.22	0.00	0.00	(N/A)	0.00
2,498.50	0.00	0.00	0.00	2,497.43	0.00	0.00	(N/A)	0.00
2,499.00	0.00	0.00	0.00	2,497.60	0.00	0.00	(N/A)	0.00
2,499.50	0.00	0.00	0.00	2,497.77	0.00	0.00	(N/A)	0.00
2,500.00	0.00	0.00	0.00	2,497.92	0.00	0.00	(N/A)	0.00
2,500.50	0.00	0.00	0.00	2,498.05	0.00	0.00	(N/A)	0.00
2,501.00	0.00	0.00	0.00	2,498.18	0.00	0.00	(N/A)	0.00
2,501.50	0.00	0.00	0.00	2,498.30	0.00	0.00	(N/A)	0.00
2,502.00	0.00	0.00	0.00	2,498.41	0.00	0.00	(N/A)	0.00
2,502.50	0.00	0.00	0.00	2,498.52	0.00	0.00	(N/A)	0.00
2,503.00	0.00	0.00	0.00	2,498.77	0.00	0.00	(N/A)	0.00
2,503.50	0.00	0.00	0.00	2,499.22	0.00	0.00	(N/A)	0.00
2,504.00	0.00	0.00	0.00	2,499.60	0.00	0.00	(N/A)	0.00
2,504.50	0.00	0.00	0.00	2,499.87	0.00	0.00	(N/A)	0.00
2,505.00	0.00	0.00	0.00	2,500.12	0.00	0.00	(N/A)	0.00
2,505.50	16.66	2,505.50	Free Outfall	2,500.90	0.00	0.00	(N/A)	0.00
2,506.00	47.12	2,506.00	Free Outfall	2,502.56	0.00	0.00	(N/A)	0.00
2,506.50	86.57	2,506.50	Free Outfall	2,504.65	0.00	0.00	(N/A)	0.00
2,507.00	133.29	2,507.00	2,506.48	2,506.48	0.00	0.00	(N/A)	0.00
2,507.50	149.42	2,507.50	2,507.24	2,507.24	0.00	0.00	(N/A)	0.00
2,508.00	163.69	2,508.00	2,507.90	2,507.90	0.00	0.00	(N/A)	0.00
2,508.50	176.80	2,508.50	2,508.48	2,508.48	0.00	0.00	(N/A)	0.00
2,509.00	189.01	2,509.00	2,509.00	2,509.00	0.00	0.00	(N/A)	0.00
2,509.50	200.47	2,509.50	2,509.50	2,509.50	0.00	0.00	(N/A)	0.00
2,510.00	211.32	2,510.00	2,510.00	2,510.00	0.00	0.00	(N/A)	0.00

Message

WS below an invert; no flow.  
 WS below an invert; no flow.  
 WS below an invert; no flow.

## Centennial Site

Subsection: Individual Outlet Curves  
Label: Composite Outlet Structure - 1

Return Event: 10 years  
Storm Event: Idaho Maryland NC 10-yr

### RATING TABLE FOR ONE OUTLET TYPE Structure ID = Riser - 1 (Stand Pipe)

Upstream ID = (Pond Water Surface)  
Downstream ID = Culvert - 1 (Culvert-Circular)

#### Message

WS below an invert; no flow.  
Weir: H =0.5ft  
Weir: H =1ft  
Weir: H =1.5ft  
FULLY CHARGED RISER: ADJUSTED TO  
WEIR: H =2ft  
FULLY CHARGED RISER: Orifice  
Equation Control to Crest; H=2.50  
FULLY CHARGED RISER: Orifice  
Equation Control to Crest; H=3.00  
FULLY CHARGED RISER: Orifice  
Equation Control to Crest; H=3.50  
FULLY CHARGED RISER: Orifice  
Equation Control to Crest; H=4.00  
FULLY CHARGED RISER: Orifice  
Equation Control to Crest; H=4.50  
FULLY CHARGED RISER: Orifice  
Equation Control to Crest; H=5.00

## Centennial Site

Subsection: Individual Outlet Curves  
 Label: Composite Outlet Structure - 1

Return Event: 10 years  
 Storm Event: Idaho Maryland NC 10-yr

RATING TABLE FOR ONE OUTLET TYPE  
 Structure ID = Orifice - 1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)  
 Downstream ID = Culvert - 1 (Culvert-Circular)

Water Surface Elevation (ft)	Device Flow (ft <sup>3</sup> /s)	(into) Headwater Hydraulic Grade Line (ft)	Converge Downstream Hydraulic Grade Line (ft)	Next Downstream Hydraulic Grade Line (ft)	Downstream Hydraulic Grade Line Error (ft)	Convergence Error (ft <sup>3</sup> /s)	Downstream Channel Tailwater (ft)	Tailwater Error (ft)
2,495.00	0.00	0.00	0.00	0.00	0.00	0.00	(N/A)	0.00
2,495.50	1.22	2,495.50	2,495.46	2,495.46	0.00	0.00	(N/A)	0.00
2,496.00	4.68	2,496.00	2,495.93	2,495.93	0.00	0.00	(N/A)	0.00
2,496.50	9.51	2,496.50	2,496.37	2,496.37	0.00	0.00	(N/A)	0.00
2,497.00	14.41	2,497.00	2,496.71	2,496.71	0.00	0.00	(N/A)	0.00
2,497.50	19.11	2,497.50	2,496.98	2,496.98	0.00	0.00	(N/A)	0.00
2,498.00	23.50	2,498.00	2,497.22	2,497.22	0.00	0.00	(N/A)	0.00
2,498.50	27.60	2,498.50	2,497.43	2,497.43	0.00	0.00	(N/A)	0.00
2,499.00	31.44	2,499.00	2,497.60	2,497.60	0.00	0.00	(N/A)	0.00
2,499.50	35.04	2,499.50	2,497.77	2,497.77	0.00	0.00	(N/A)	0.00
2,500.00	38.42	2,500.00	2,497.92	2,497.92	0.00	0.00	(N/A)	0.00
2,500.50	41.65	2,500.50	2,498.05	2,498.05	0.00	0.00	(N/A)	0.00
2,501.00	44.71	2,501.00	2,498.18	2,498.18	0.00	0.00	(N/A)	0.00
2,501.50	47.64	2,501.50	2,498.30	2,498.30	0.00	0.00	(N/A)	0.00
2,502.00	50.44	2,502.00	2,498.41	2,498.41	0.00	0.00	(N/A)	0.00
2,502.50	53.13	2,502.50	2,498.52	2,498.52	0.00	0.00	(N/A)	0.00
2,503.00	54.78	2,503.00	2,498.77	2,498.77	0.00	0.00	(N/A)	0.00
2,503.50	55.08	2,503.50	2,499.22	2,499.22	0.00	0.00	(N/A)	0.00
2,504.00	55.87	2,504.00	2,499.60	2,499.60	0.00	0.00	(N/A)	0.00
2,504.50	57.27	2,504.50	2,499.87	2,499.87	0.00	0.00	(N/A)	0.00
2,505.00	58.82	2,505.00	2,500.12	2,500.12	0.00	0.00	(N/A)	0.00
2,505.50	57.06	2,505.50	2,500.90	2,500.90	0.00	0.00	(N/A)	0.00
2,506.00	49.36	2,506.00	2,502.56	2,502.56	0.00	0.00	(N/A)	0.00
2,506.50	36.21	2,506.50	2,504.65	2,504.65	0.00	0.00	(N/A)	0.00
2,507.00	19.12	2,507.00	2,506.48	2,506.48	0.00	0.00	(N/A)	0.00
2,507.50	13.52	2,507.50	2,507.24	2,507.24	0.00	0.00	(N/A)	0.00
2,508.00	8.50	2,508.00	2,507.90	2,507.90	0.00	0.00	(N/A)	0.00
2,508.50	3.78	2,508.50	2,508.48	2,508.48	0.00	0.00	(N/A)	0.00
2,509.00	0.00	2,509.00	2,509.00	2,509.00	0.00	0.00	(N/A)	0.00
2,509.50	0.00	2,509.50	2,509.50	2,509.50	0.00	0.00	(N/A)	0.00
2,510.00	0.00	2,510.00	2,510.00	2,510.00	0.00	0.00	(N/A)	0.00

Message

WS below an invert; no flow.  
 BACKWATER CONTROL.. Vh= .038ft  
 hwdI= .461ft Lbw= .0ft Hev= .00ft

## Centennial Site

Subsection: Individual Outlet Curves  
Label: Composite Outlet Structure - 1

Return Event: 10 years  
Storm Event: Idaho Maryland NC 10-yr

RATING TABLE FOR ONE OUTLET TYPE  
Structure ID = Orifice - 1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)  
Downstream ID = Culvert - 1 (Culvert-Circular)

### Message

BACKWATER CONTROL.. Vh= .068ft  
hwDi= .931ft Lbw= .0ft Hev= .00ft

H =.13

H =.29

H =.52

H =.78

H =1.07

H =1.40

H =1.73

H =2.08

H =2.45

H =2.82

H =3.20

H =3.59

H =3.98

H =4.23

H =4.28

H =4.40

H =4.63

H =4.88

H =4.60

H =3.44

H =1.85

H =.52

H =.26

H =.10

H =.02

FLOW PRECEDENCE SET TO  
DOWNSTREAM CONTROLLING  
STRUCTURE

FLOW PRECEDENCE SET TO  
DOWNSTREAM CONTROLLING  
STRUCTURE

FLOW PRECEDENCE SET TO  
DOWNSTREAM CONTROLLING  
STRUCTURE

## Centennial Site

Subsection: Individual Outlet Curves  
 Label: Composite Outlet Structure - 1

Return Event: 10 years  
 Storm Event: Idaho Maryland NC 10-yr

RATING TABLE FOR ONE OUTLET TYPE  
 Structure ID = Orifice - 2 (Orifice-Circular)

Upstream ID = (Pond Water Surface)  
 Downstream ID = Culvert - 1 (Culvert-Circular)

Water Surface Elevation (ft)	Device Flow (ft <sup>3</sup> /s)	(into) Headwater Hydraulic Grade Line (ft)	Converge Downstream Hydraulic Grade Line (ft)	Next Downstream Hydraulic Grade Line (ft)	Downstream Hydraulic Grade Line Error (ft)	Convergence Error (ft <sup>3</sup> /s)	Downstream Channel Tailwater (ft)	Tailwater Error (ft)
2,495.00	0.00	0.00	0.00	0.00	0.00	0.00	(N/A)	0.00
2,495.50	0.00	0.00	0.00	2,495.46	0.00	0.00	(N/A)	0.00
2,496.00	0.00	0.00	0.00	2,495.93	0.00	0.00	(N/A)	0.00
2,496.50	0.00	0.00	0.00	2,496.37	0.00	0.00	(N/A)	0.00
2,497.00	0.00	0.00	0.00	2,496.71	0.00	0.00	(N/A)	0.00
2,497.50	0.00	0.00	0.00	2,496.98	0.00	0.00	(N/A)	0.00
2,498.00	0.00	0.00	0.00	2,497.22	0.00	0.00	(N/A)	0.00
2,498.50	0.00	0.00	0.00	2,497.43	0.00	0.00	(N/A)	0.00
2,499.00	0.00	0.00	0.00	2,497.60	0.00	0.00	(N/A)	0.00
2,499.50	0.00	0.00	0.00	2,497.77	0.00	0.00	(N/A)	0.00
2,500.00	0.00	0.00	0.00	2,497.92	0.00	0.00	(N/A)	0.00
2,500.50	0.00	0.00	0.00	2,498.05	0.00	0.00	(N/A)	0.00
2,501.00	0.00	0.00	0.00	2,498.18	0.00	0.00	(N/A)	0.00
2,501.50	0.00	0.00	0.00	2,498.30	0.00	0.00	(N/A)	0.00
2,502.00	0.00	0.00	0.00	2,498.41	0.00	0.00	(N/A)	0.00
2,502.50	0.00	0.00	0.00	2,498.52	0.00	0.00	(N/A)	0.00
2,503.00	4.82	2,503.00	Free Outfall	2,498.77	0.00	0.00	(N/A)	0.00
2,503.50	16.61	2,503.50	Free Outfall	2,499.22	0.00	0.00	(N/A)	0.00
2,504.00	26.06	2,504.00	Free Outfall	2,499.60	0.00	0.00	(N/A)	0.00
2,504.50	32.14	2,504.50	Free Outfall	2,499.87	0.00	0.00	(N/A)	0.00
2,505.00	37.25	2,505.00	Free Outfall	2,500.12	0.00	0.00	(N/A)	0.00
2,505.50	41.74	2,505.50	Free Outfall	2,500.90	0.00	0.00	(N/A)	0.00
2,506.00	45.78	2,506.00	2,502.56	2,502.56	0.00	0.00	(N/A)	0.00
2,506.50	36.21	2,506.50	2,504.65	2,504.65	0.00	0.00	(N/A)	0.00
2,507.00	19.12	2,507.00	2,506.48	2,506.48	0.00	0.00	(N/A)	0.00
2,507.50	13.52	2,507.50	2,507.24	2,507.24	0.00	0.00	(N/A)	0.00
2,508.00	8.50	2,508.00	2,507.90	2,507.90	0.00	0.00	(N/A)	0.00
2,508.50	3.78	2,508.50	2,508.48	2,508.48	0.00	0.00	(N/A)	0.00
2,509.00	0.00	2,509.00	2,509.00	2,509.00	0.00	0.00	(N/A)	0.00
2,509.50	0.00	2,509.50	2,509.50	2,509.50	0.00	0.00	(N/A)	0.00
2,510.00	0.00	2,510.00	2,510.00	2,510.00	0.00	0.00	(N/A)	0.00

Message

WS below an invert; no flow.  
 WS below an invert; no flow.  
 WS below an invert; no flow.

## Centennial Site

Subsection: Individual Outlet Curves  
Label: Composite Outlet Structure - 1

Return Event: 10 years  
Storm Event: Idaho Maryland NC 10-yr

RATING TABLE FOR ONE OUTLET TYPE  
Structure ID = Orifice - 2 (Orifice-Circular)

Upstream ID = (Pond Water Surface)  
Downstream ID = Culvert - 1 (Culvert-Circular)

### Message

WS below an invert; no flow.  
CRIT.DEPTH CONTROL Vh= .134ft  
Dcr= .366ft CRIT.DEPTH Hev= .00ft  
CRIT.DEPTH CONTROL Vh= .302ft  
Dcr= .698ft CRIT.DEPTH Hev= .00ft  
H =.96  
H =1.46  
H =1.96  
H =2.46  
H =2.96  
H =1.85  
H =.52  
H =.26  
H =.10  
H =.02  
FLOW PRECEDENCE SET TO  
DOWNSTREAM CONTROLLING  
STRUCTURE  
FLOW PRECEDENCE SET TO  
DOWNSTREAM CONTROLLING  
STRUCTURE  
FLOW PRECEDENCE SET TO  
DOWNSTREAM CONTROLLING  
STRUCTURE

## Centennial Site

Subsection: Composite Rating Curve  
 Label: Composite Outlet Structure - 1

Return Event: 10 years  
 Storm Event: Idaho Maryland NC 10-yr

### Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft <sup>3</sup> /s)	Tailwater Elevation (ft)	Convergence Error (ft)
2,495.00	0.00	(N/A)	0.00
2,495.50	1.18	(N/A)	0.00
2,496.00	4.60	(N/A)	0.00
2,496.50	9.51	(N/A)	0.00
2,497.00	14.40	(N/A)	0.00
2,497.50	19.09	(N/A)	0.00
2,498.00	23.50	(N/A)	0.00
2,498.50	27.60	(N/A)	0.00
2,499.00	31.43	(N/A)	0.00
2,499.50	35.02	(N/A)	0.00
2,500.00	38.44	(N/A)	0.00
2,500.50	41.63	(N/A)	0.00
2,501.00	44.71	(N/A)	0.00
2,501.50	47.60	(N/A)	0.00
2,502.00	50.41	(N/A)	0.00
2,502.50	53.09	(N/A)	0.00
2,503.00	59.55	(N/A)	0.00
2,503.50	71.66	(N/A)	0.00
2,504.00	81.88	(N/A)	0.00
2,504.50	89.37	(N/A)	0.00
2,505.00	95.99	(N/A)	0.00
2,505.50	115.46	(N/A)	0.00
2,506.00	142.27	(N/A)	0.00
2,506.50	158.98	(N/A)	0.00
2,507.00	171.52	(N/A)	0.00
2,507.50	176.46	(N/A)	0.00
2,508.00	180.68	(N/A)	0.00
2,508.50	184.35	(N/A)	0.00
2,509.00	187.55	(N/A)	0.00
2,509.50	190.62	(N/A)	0.00
2,510.00	193.63	(N/A)	0.00

#### Contributing Structures

(no Q: Orifice - 2,Riser - 1,Orifice - 1,Culvert - 1)  
 Orifice - 1,Culvert - 1 (no Q: Orifice - 2,Riser - 1)  
 Orifice - 1,Culvert - 1 (no Q: Orifice - 2,Riser - 1)  
 Orifice - 1,Culvert - 1 (no Q: Orifice - 2,Riser - 1)  
 Orifice - 1,Culvert - 1 (no Q: Orifice - 2,Riser - 1)

## Centennial Site

Subsection: Composite Rating Curve  
Label: Composite Outlet Structure - 1

Return Event: 10 years  
Storm Event: Idaho Maryland NC 10-yr

### Composite Outflow Summary

#### Contributing Structures

Orifice - 1,Culvert - 1 (no Q: Orifice - 2,Riser - 1)  
Orifice - 1,Culvert - 1 (no Q: Orifice - 2,Riser - 1)  
Orifice - 1,Culvert - 1 (no Q: Orifice - 2,Riser - 1)  
Orifice - 1,Culvert - 1 (no Q: Orifice - 2,Riser - 1)  
Orifice - 1,Culvert - 1 (no Q: Orifice - 2,Riser - 1)  
Orifice - 1,Culvert - 1 (no Q: Orifice - 2,Riser - 1)  
Orifice - 1,Culvert - 1 (no Q: Orifice - 2,Riser - 1)  
Orifice - 1,Culvert - 1 (no Q: Orifice - 2,Riser - 1)  
Orifice - 1,Culvert - 1 (no Q: Orifice - 2,Riser - 1)  
Orifice - 1,Culvert - 1 (no Q: Orifice - 2,Riser - 1)  
Orifice - 1,Culvert - 1 (no Q: Orifice - 2,Riser - 1)  
Orifice - 2,Orifice - 1,Culvert - 1 (no Q: Riser - 1)  
Orifice - 2,Orifice - 1,Culvert - 1 (no Q: Riser - 1)  
Orifice - 2,Orifice - 1,Culvert - 1 (no Q: Riser - 1)  
Orifice - 2,Orifice - 1,Culvert - 1 (no Q: Riser - 1)  
Orifice - 2,Orifice - 1,Culvert - 1 (no Q: Riser - 1)  
Orifice - 2,Riser - 1,Orifice - 1,Culvert - 1  
Orifice - 2,Riser - 1,Orifice - 1,Culvert - 1  
Orifice - 2,Riser - 1,Orifice - 1,Culvert - 1  
Orifice - 2,Riser - 1,Orifice - 1,Culvert - 1  
Orifice - 2,Riser - 1,Orifice - 1,Culvert - 1  
Orifice - 2,Riser - 1,Orifice - 1,Culvert - 1

## Centennial Site

Subsection: Composite Rating Curve  
Label: Composite Outlet Structure - 1

Return Event: 10 years  
Storm Event: Idaho Maryland NC 10-yr

### Composite Outflow Summary

#### Contributing Structures

Riser - 1,Culvert - 1 (no Q: Orifice -  
2,Orifice - 1)

Riser - 1,Culvert - 1 (no Q: Orifice -  
2,Orifice - 1)

Riser - 1,Culvert - 1 (no Q: Orifice -  
2,Orifice - 1)

## Centennial Site

Subsection: Outlet Input Data

Return Event: 100 years

Label: Composite Outlet Structure - 1

Storm Event: Idaho Maryland NC 100-yr

Requested Pond Water Surface Elevations	
Minimum (Headwater)	2,495.00 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	2,510.00 ft

### Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Circular	Orifice - 2	Forward	Culvert - 1	2,502.50	2,510.00
Stand Pipe	Riser - 1	Forward	Culvert - 1	2,505.00	2,510.00
Orifice-Circular	Orifice - 1	Forward	Culvert - 1	2,495.00	2,510.00
Culvert-Circular	Culvert - 1	Forward	TW	2,495.00	2,510.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

## Centennial Site

Subsection: Outlet Input Data  
 Label: Composite Outlet Structure - 1

Return Event: 100 years  
 Storm Event: Idaho Maryland NC 100-yr

Structure ID: Culvert - 1	
Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	48.0 in
Length	170.00 ft
Length (Computed Barrel)	170.07 ft
Slope (Computed)	0.029 ft/ft
<b>Outlet Control Data</b>	
Manning's n	0.024
Ke	0.500
Kb	0.017
Kr	0.000
Convergence Tolerance	0.00 ft
<b>Inlet Control Data</b>	
Equation Form	Form 1
K	0.0078
M	2.0000
C	0.0379
Y	0.6900
T1 ratio (HW/D)	1.121
T2 ratio (HW/D)	1.282
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.

Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control, interpolate between flows at T1 & T2...

T1 Elevation	2,499.48 ft	T1 Flow	87.96 ft <sup>3</sup> /s
T2 Elevation	2,500.13 ft	T2 Flow	100.53 ft <sup>3</sup> /s

## Centennial Site

Subsection: Outlet Input Data

Return Event: 100 years

Label: Composite Outlet Structure - 1

Storm Event: Idaho Maryland NC 100-yr

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Structure ID: Riser - 1	
Structure Type: Stand Pipe	
Number of Openings	1
Elevation	2,505.00 ft
Diameter	60.0 in
Orifice Area	19.6 ft <sup>2</sup>
Orifice Coefficient	0.600
Weir Length	15.71 ft
Weir Coefficient	3.00 (ft <sup>0.5</sup> )/s
K Reverse	1.000
Manning's n	0.000
Kev, Charged Riser	0.000
Weir Submergence	False
Orifice H to crest	False

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Structure ID: Orifice - 1	
Structure Type: Orifice-Circular	
Number of Openings	6
Elevation	2,495.00 ft
Orifice Diameter	13.0 in
Orifice Coefficient	0.600

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Structure ID: Orifice - 2	
Structure Type: Orifice-Circular	
Number of Openings	6
Elevation	2,502.50 ft
Orifice Diameter	13.0 in
Orifice Coefficient	0.600

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Structure ID: TW	
Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall

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Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft

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## Centennial Site

Subsection: Outlet Input Data

Return Event: 100 years

Label: Composite Outlet Structure - 1

Storm Event: Idaho Maryland NC 100-yr

Convergence Tolerances	
Flow Tolerance (Minimum)	0.001 ft <sup>3</sup> /s
Flow Tolerance (Maximum)	10.000 ft <sup>3</sup> /s

## Centennial Site

Subsection: Individual Outlet Curves  
Label: Composite Outlet Structure - 1

Return Event: 100 years  
Storm Event: Idaho Maryland NC 100-yr

RATING TABLE FOR ONE OUTLET TYPE  
Structure ID = ()

-----  
Upstream ID =  
Downstream ID =

Water Surface Elevation (ft)	Flow (ft <sup>3</sup> /s)	Tailwater Elevation (ft)	Convergence Error (ft)
Contributing Structures			

## Centennial Site

Subsection: Individual Outlet Curves  
Label: Composite Outlet Structure - 1

Return Event: 100 years  
Storm Event: Idaho Maryland NC 100-yr

### RATING TABLE FOR ONE OUTLET TYPE Structure ID = ( )

Upstream ID =  
Downstream ID =

Water Surface Elevation (ft)	Flow (ft <sup>3</sup> /s)	Tailwater Elevation (ft)	Convergence Error (ft)
Contributing Structures			

## Centennial Site

Subsection: Individual Outlet Curves  
Label: Composite Outlet Structure - 1

Return Event: 100 years  
Storm Event: Idaho Maryland NC 100-yr

### RATING TABLE FOR ONE OUTLET TYPE Structure ID = ( )

Upstream ID =  
Downstream ID =

Water Surface Elevation (ft) Contributing Structures	Flow (ft <sup>3</sup> /s)	Tailwater Elevation (ft)	Convergence Error (ft)
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## Centennial Site

Subsection: Individual Outlet Curves  
Label: Composite Outlet Structure - 1

Return Event: 100 years  
Storm Event: Idaho Maryland NC 100-yr

RATING TABLE FOR ONE OUTLET TYPE  
Structure ID = ( )

Upstream ID =  
Downstream ID =

Water Surface Elevation (ft)	Flow (ft <sup>3</sup> /s)	Tailwater Elevation (ft)	Convergence Error (ft)
Contributing Structures			

## Centennial Site

Subsection: Composite Rating Curve  
 Label: Composite Outlet Structure - 1

Return Event: 100 years  
 Storm Event: Idaho Maryland NC 100-yr

### Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft <sup>3</sup> /s)	Tailwater Elevation (ft)	Convergence Error (ft)
2,495.00	0.00	(N/A)	0.00
2,495.50	1.18	(N/A)	0.00
2,496.00	4.60	(N/A)	0.00
2,496.50	9.51	(N/A)	0.00
2,497.00	14.40	(N/A)	0.00
2,497.50	19.09	(N/A)	0.00
2,498.00	23.50	(N/A)	0.00
2,498.50	27.60	(N/A)	0.00
2,499.00	31.43	(N/A)	0.00
2,499.50	35.02	(N/A)	0.00
2,500.00	38.44	(N/A)	0.00
2,500.50	41.63	(N/A)	0.00
2,501.00	44.71	(N/A)	0.00
2,501.50	47.60	(N/A)	0.00
2,502.00	50.41	(N/A)	0.00
2,502.50	53.09	(N/A)	0.00
2,503.00	59.55	(N/A)	0.00
2,503.50	71.64	(N/A)	0.00
2,504.00	81.86	(N/A)	0.00
2,504.50	89.37	(N/A)	0.00
2,505.00	96.02	(N/A)	0.00
2,505.50	115.46	(N/A)	0.00
2,506.00	142.27	(N/A)	0.00
2,506.50	158.98	(N/A)	0.00
2,507.00	171.52	(N/A)	0.00
2,507.50	176.46	(N/A)	0.00
2,508.00	180.68	(N/A)	0.00
2,508.50	184.35	(N/A)	0.00
2,509.00	187.55	(N/A)	0.00
2,509.50	190.62	(N/A)	0.00
2,510.00	193.63	(N/A)	0.00

#### Contributing Structures

(no Q: Orifice - 2,Riser - 1,Orifice - 1,Culvert - 1)  
 Orifice - 1,Culvert - 1 (no Q: Orifice - 2,Riser - 1)  
 Orifice - 1,Culvert - 1 (no Q: Orifice - 2,Riser - 1)  
 Orifice - 1,Culvert - 1 (no Q: Orifice - 2,Riser - 1)  
 Orifice - 1,Culvert - 1 (no Q: Orifice - 2,Riser - 1)

## Centennial Site

Subsection: Composite Rating Curve  
Label: Composite Outlet Structure - 1

Return Event: 100 years  
Storm Event: Idaho Maryland NC 100-yr

### Composite Outflow Summary

#### Contributing Structures

Orifice - 1,Culvert - 1 (no Q: Orifice - 2,Riser - 1)  
Orifice - 1,Culvert - 1 (no Q: Orifice - 2,Riser - 1)  
Orifice - 1,Culvert - 1 (no Q: Orifice - 2,Riser - 1)  
Orifice - 1,Culvert - 1 (no Q: Orifice - 2,Riser - 1)  
Orifice - 1,Culvert - 1 (no Q: Orifice - 2,Riser - 1)  
Orifice - 1,Culvert - 1 (no Q: Orifice - 2,Riser - 1)  
Orifice - 1,Culvert - 1 (no Q: Orifice - 2,Riser - 1)  
Orifice - 1,Culvert - 1 (no Q: Orifice - 2,Riser - 1)  
Orifice - 1,Culvert - 1 (no Q: Orifice - 2,Riser - 1)  
Orifice - 1,Culvert - 1 (no Q: Orifice - 2,Riser - 1)  
Orifice - 1,Culvert - 1 (no Q: Orifice - 2,Riser - 1)  
Orifice - 2,Orifice - 1,Culvert - 1 (no Q: Riser - 1)  
Orifice - 2,Orifice - 1,Culvert - 1 (no Q: Riser - 1)  
Orifice - 2,Orifice - 1,Culvert - 1 (no Q: Riser - 1)  
Orifice - 2,Orifice - 1,Culvert - 1 (no Q: Riser - 1)  
Orifice - 2,Orifice - 1,Culvert - 1 (no Q: Riser - 1)  
Orifice - 2,Riser - 1,Orifice - 1,Culvert - 1  
Orifice - 2,Riser - 1,Orifice - 1,Culvert - 1  
Orifice - 2,Riser - 1,Orifice - 1,Culvert - 1  
Orifice - 2,Riser - 1,Orifice - 1,Culvert - 1  
Orifice - 2,Riser - 1,Orifice - 1,Culvert - 1  
Orifice - 2,Riser - 1,Orifice - 1,Culvert - 1  
Orifice - 2,Riser - 1,Orifice - 1,Culvert - 1

## Centennial Site

Subsection: Composite Rating Curve  
Label: Composite Outlet Structure - 1

Return Event: 100 years  
Storm Event: Idaho Maryland NC 100-yr

### Composite Outflow Summary

#### Contributing Structures

Riser - 1,Culvert - 1 (no Q: Orifice - 2,Orifice - 1)
Riser - 1,Culvert - 1 (no Q: Orifice - 2,Orifice - 1)
Riser - 1,Culvert - 1 (no Q: Orifice - 2,Orifice - 1)

## Centennial Site

Subsection: Diverted Hydrograph  
Label: Outlet-1

Return Event: 10 years  
Storm Event: Idaho Maryland NC 10-yr

Peak Discharge	45.14 ft <sup>3</sup> /s
Time to Peak	8.350 hours
Hydrograph Volume	28.027 ac-ft

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
2.000	0.00	0.00	0.00	0.01	0.02
2.250	0.03	0.05	0.06	0.08	0.11
2.500	0.13	0.16	0.20	0.23	0.27
2.750	0.30	0.34	0.39	0.43	0.48
3.000	0.52	0.57	0.63	0.68	0.73
3.250	0.78	0.84	0.90	0.96	1.02
3.500	1.08	1.14	1.26	1.45	1.63
3.750	1.82	2.01	2.20	2.38	2.57
4.000	2.76	2.94	3.13	3.31	3.49
4.250	3.66	3.84	4.02	4.19	4.37
4.500	4.54	4.77	5.01	5.24	5.48
4.750	5.71	5.94	6.18	6.41	6.64
5.000	6.87	7.11	7.35	7.59	7.84
5.250	8.09	8.34	8.59	8.85	9.10
5.500	9.35	9.60	9.84	10.07	10.30
5.750	10.53	10.76	10.99	11.23	11.47
6.000	11.72	11.98	12.26	12.56	12.88
6.250	13.21	13.55	13.89	14.22	14.55
6.500	14.85	15.15	15.42	15.66	15.87
6.750	16.07	16.27	16.47	16.69	16.92
7.000	17.18	17.45	17.76	18.10	18.47
7.250	18.88	19.31	19.75	20.25	20.79
7.500	21.38	22.12	23.29	24.98	27.16
7.750	29.46	31.83	34.08	36.24	38.29
8.000	40.09	41.74	43.02	43.95	44.56
8.250	44.91	45.09	45.14	45.09	44.96
8.500	44.76	44.48	44.19	43.90	43.63
8.750	43.34	43.04	42.72	42.39	42.03
9.000	41.65	41.24	40.81	40.36	39.90
9.250	39.44	38.96	38.48	37.95	37.41
9.500	36.87	36.34	35.82	35.32	34.83
9.750	34.33	33.85	33.38	32.92	32.46
10.000	32.02	31.59	31.14	30.67	30.22
10.250	29.78	29.34	28.92	28.51	28.11
10.500	27.72	27.32	26.93	26.56	26.21
10.750	25.88	25.56	25.24	24.94	24.65
11.000	24.36	24.08	23.80	23.53	23.24

## Centennial Site

Subsection: Diverted Hydrograph  
Label: Outlet-1

Return Event: 10 years  
Storm Event: Idaho Maryland NC 10-yr

**HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)**  
**Output Time Increment = 0.050 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Flow (ft <sup>3</sup> /s)				
11.250	22.96	22.68	22.41	22.14	21.88
11.500	21.63	21.38	21.13	20.89	20.64
11.750	20.40	20.17	19.94	19.72	19.51
12.000	19.31	19.11	18.91	18.72	18.54
12.250	18.38	18.22	18.08	17.96	17.85
12.500	17.75	17.66	17.57	17.47	17.37
12.750	17.25	17.14	17.03	16.93	16.82
13.000	16.73	16.63	16.56	16.49	16.44
13.250	16.39	16.34	16.28	16.23	16.17
13.500	16.10	16.03	15.97	15.90	15.83
13.750	15.76	15.69	15.62	15.55	15.49
14.000	15.42	15.36	15.31	15.26	15.21
14.250	15.17	15.12	15.08	15.04	15.00
14.500	14.96	14.92	14.89	14.85	14.81
14.750	14.78	14.74	14.70	14.67	14.63
15.000	14.60	14.56	14.53	14.50	14.46
15.250	14.43	14.40	14.36	14.33	14.29
15.500	14.26	14.23	14.19	14.16	14.12
15.750	14.09	14.06	14.03	13.99	13.96
16.000	13.93	13.90	13.87	13.83	13.80
16.250	13.77	13.74	13.71	13.68	13.64
16.500	13.61	13.58	13.55	13.52	13.49
16.750	13.46	13.43	13.40	13.36	13.33
17.000	13.30	13.27	13.24	13.21	13.18
17.250	13.15	13.12	13.09	13.05	13.02
17.500	12.99	12.96	12.93	12.90	12.87
17.750	12.84	12.81	12.78	12.75	12.72
18.000	12.68	12.65	12.62	12.59	12.56
18.250	12.53	12.50	12.47	12.44	12.40
18.500	12.37	12.34	12.31	12.28	12.25
18.750	12.22	12.18	12.15	12.12	12.09
19.000	12.06	12.03	12.00	11.96	11.93
19.250	11.90	11.87	11.84	11.81	11.78
19.500	11.74	11.71	11.68	11.65	11.62
19.750	11.59	11.56	11.52	11.49	11.46
20.000	11.43	11.39	11.36	11.33	11.30
20.250	11.27	11.24	11.21	11.17	11.14
20.500	11.11	11.08	11.04	11.01	10.98
20.750	10.95	10.92	10.88	10.85	10.82
21.000	10.79	10.76	10.73	10.69	10.66
21.250	10.63	10.60	10.56	10.53	10.50
21.500	10.47	10.44	10.40	10.37	10.34

## Centennial Site

Subsection: Diverted Hydrograph  
Label: Outlet-1

Return Event: 10 years  
Storm Event: Idaho Maryland NC 10-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
21.750	10.31	10.27	10.24	10.21	10.18
22.000	10.15	10.11	10.08	10.05	10.02
22.250	9.98	9.95	9.92	9.89	9.85
22.500	9.82	9.79	9.76	9.72	9.69
22.750	9.66	9.63	9.60	9.56	9.53
23.000	9.50	9.46	9.43	9.39	9.36
23.250	9.33	9.29	9.26	9.23	9.20
23.500	9.16	9.13	9.10	9.06	9.03
23.750	9.00	8.96	8.93	8.90	8.86
24.000	8.83	(N/A)	(N/A)	(N/A)	(N/A)

## Centennial Site

Subsection: Diverted Hydrograph  
Label: Outlet-1

Return Event: 100 years  
Storm Event: Idaho Maryland NC 100-yr

Peak Discharge	75.75 ft <sup>3</sup> /s
Time to Peak	8.300 hours
Hydrograph Volume	43.107 ac-ft

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
1.550	0.00	0.00	0.01	0.02	0.04
1.800	0.06	0.09	0.12	0.16	0.21
2.050	0.25	0.31	0.36	0.43	0.49
2.300	0.56	0.64	0.72	0.80	0.89
2.550	0.98	1.07	1.17	1.40	1.67
2.800	1.93	2.19	2.44	2.70	2.95
3.050	3.20	3.44	3.68	3.91	4.14
3.300	4.37	4.60	4.91	5.21	5.51
3.550	5.81	6.10	6.41	6.71	7.02
3.800	7.33	7.63	7.94	8.24	8.54
4.050	8.83	9.12	9.40	9.67	9.93
4.300	10.19	10.45	10.71	10.97	11.23
4.550	11.49	11.75	12.02	12.29	12.56
4.800	12.83	13.11	13.40	13.69	13.98
5.050	14.28	14.58	14.88	15.19	15.51
5.300	15.83	16.16	16.50	16.83	17.17
5.550	17.50	17.83	18.15	18.47	18.78
5.800	19.10	19.39	19.69	20.00	20.33
6.050	20.67	21.03	21.43	21.86	22.31
6.300	22.76	23.22	23.66	24.07	24.48
6.550	24.88	25.25	25.56	25.85	26.11
6.800	26.38	26.65	26.94	27.25	27.58
7.050	27.92	28.29	28.70	29.15	29.65
7.300	30.20	30.81	31.47	32.13	32.85
7.550	33.75	35.15	37.18	39.71	42.42
7.800	45.14	47.73	50.20	52.47	56.68
8.050	62.54	68.96	72.87	74.78	75.63
8.300	75.75	75.32	74.48	73.32	71.93
8.550	70.15	68.36	66.76	65.33	63.96
8.800	62.61	61.27	59.91	58.99	58.20
9.050	57.37	56.52	55.65	54.75	53.85
9.300	53.02	52.62	52.21	51.78	51.34
9.550	50.90	50.46	50.00	49.56	49.12
9.800	48.69	48.26	47.84	47.40	46.96
10.050	46.52	46.08	45.64	45.20	44.76
10.300	44.28	43.81	43.34	42.88	42.43
10.550	41.99	41.56	41.12	40.70	40.29

## Centennial Site

Subsection: Diverted Hydrograph  
Label: Outlet-1

Return Event: 100 years  
Storm Event: Idaho Maryland NC 100-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
10.800	39.89	39.50	39.11	38.73	38.35
11.050	37.94	37.53	37.14	36.75	36.36
11.300	35.98	35.61	35.24	34.86	34.47
11.550	34.09	33.71	33.33	32.96	32.58
11.800	32.22	31.86	31.52	31.15	30.80
12.050	30.45	30.12	29.81	29.50	29.22
12.300	28.95	28.70	28.46	28.24	28.04
12.550	27.85	27.67	27.46	27.23	27.01
12.800	26.79	26.57	26.36	26.16	25.96
13.050	25.78	25.61	25.47	25.34	25.21
13.300	25.09	24.96	24.84	24.71	24.58
13.550	24.44	24.31	24.18	24.05	23.92
13.800	23.79	23.66	23.54	23.41	23.29
14.050	23.16	23.05	22.94	22.84	22.75
14.300	22.66	22.57	22.49	22.41	22.33
14.550	22.25	22.17	22.10	22.02	21.95
14.800	21.88	21.81	21.75	21.68	21.61
15.050	21.55	21.49	21.43	21.37	21.31
15.300	21.25	21.19	21.14	21.08	21.02
15.550	20.96	20.91	20.85	20.80	20.75
15.800	20.69	20.64	20.59	20.54	20.49
16.050	20.44	20.39	20.34	20.28	20.23
16.300	20.18	20.13	20.09	20.04	19.99
16.550	19.94	19.89	19.84	19.79	19.74
16.800	19.70	19.65	19.60	19.55	19.51
17.050	19.46	19.41	19.36	19.32	19.27
17.300	19.22	19.17	19.13	19.08	19.03
17.550	18.98	18.93	18.88	18.83	18.78
17.800	18.73	18.68	18.63	18.58	18.53
18.050	18.48	18.43	18.38	18.33	18.28
18.300	18.23	18.19	18.14	18.09	18.05
18.550	18.00	17.95	17.90	17.85	17.80
18.800	17.76	17.71	17.66	17.61	17.57
19.050	17.52	17.47	17.42	17.38	17.33
19.300	17.28	17.24	17.19	17.14	17.10
19.550	17.05	17.00	16.96	16.91	16.86
19.800	16.81	16.77	16.72	16.67	16.62
20.050	16.58	16.53	16.48	16.44	16.39
20.300	16.34	16.30	16.25	16.20	16.15
20.550	16.11	16.06	16.01	15.96	15.91
20.800	15.87	15.82	15.78	15.73	15.68
21.050	15.64	15.59	15.54	15.49	15.44

## Centennial Site

Subsection: Diverted Hydrograph  
Label: Outlet-1

Return Event: 100 years  
Storm Event: Idaho Maryland NC 100-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
21.300	15.40	15.35	15.30	15.26	15.21
21.550	15.16	15.11	15.07	15.02	14.97
21.800	14.92	14.88	14.83	14.78	14.74
22.050	14.69	14.64	14.59	14.55	14.50
22.300	14.45	14.40	14.35	14.30	14.25
22.550	14.20	14.15	14.10	14.05	14.00
22.800	13.95	13.90	13.85	13.80	13.75
23.050	13.70	13.65	13.60	13.55	13.51
23.300	13.46	13.41	13.36	13.32	13.27
23.550	13.22	13.17	13.12	13.07	13.02
23.800	12.98	12.93	12.88	12.83	12.78

## Centennial Site

Subsection: Elevation-Volume-Flow Table (Pond)  
 Label: PO-1

Return Event: 10 years  
 Storm Event: Idaho Maryland NC 10-yr

Infiltration	
Infiltration Method (Computed)	No Infiltration
Initial Conditions	
Elevation (Water Surface, Initial)	2,495.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft <sup>3</sup> /s
Flow (Initial Infiltration)	0.00 ft <sup>3</sup> /s
Flow (Initial, Total)	0.00 ft <sup>3</sup> /s
Time Increment	0.050 hours

Elevation (ft)	Outflow (ft <sup>3</sup> /s)	Storage (ac-ft)	Area (acres)	Infiltration (ft <sup>3</sup> /s)	Flow (Total) (ft <sup>3</sup> /s)	2S/t + O (ft <sup>3</sup> /s)
2,495.00	0.00	0.000	0.510	0.00	0.00	0.00
2,495.50	1.18	0.261	0.535	0.00	1.18	127.58
2,496.00	4.60	0.535	0.560	0.00	4.60	263.45
2,496.50	9.51	0.820	0.579	0.00	9.51	406.22
2,497.00	14.40	1.114	0.599	0.00	14.40	553.75
2,497.50	19.09	1.419	0.619	0.00	19.09	705.91
2,498.00	23.50	1.734	0.640	0.00	23.50	862.71
2,498.50	27.60	2.059	0.662	0.00	27.60	1,024.35
2,499.00	31.43	2.396	0.684	0.00	31.43	1,191.05
2,499.50	35.02	2.744	0.707	0.00	35.02	1,362.97
2,500.00	38.44	3.103	0.730	0.00	38.44	1,540.25
2,500.50	41.63	3.474	0.754	0.00	41.63	1,723.05
2,501.00	44.71	3.857	0.779	0.00	44.71	1,911.69
2,501.50	47.60	4.253	0.804	0.00	47.60	2,106.18
2,502.00	50.41	4.662	0.830	0.00	50.41	2,306.75
2,502.50	53.09	5.084	0.857	0.00	53.09	2,513.53
2,503.00	59.55	5.519	0.884	0.00	59.55	2,730.65
2,503.50	71.66	5.968	0.912	0.00	71.66	2,960.07
2,504.00	81.88	6.431	0.940	0.00	81.88	3,194.35
2,504.50	89.37	6.907	0.967	0.00	89.37	3,432.57
2,505.00	95.99	7.398	0.994	0.00	95.99	3,676.48
2,505.50	115.46	7.902	1.022	0.00	115.46	3,939.90
2,506.00	142.27	8.420	1.050	0.00	142.27	4,217.40
2,506.50	158.98	8.952	1.079	0.00	158.98	4,491.77
2,507.00	171.52	9.499	1.109	0.00	171.52	4,769.11
2,507.50	176.46	10.061	1.139	0.00	176.46	5,046.13
2,508.00	180.68	10.639	1.170	0.00	180.68	5,329.77
2,508.50	184.35	11.232	1.204	0.00	184.35	5,620.72
2,509.00	187.55	11.843	1.239	0.00	187.55	5,919.54

## Centennial Site

Subsection: Elevation-Volume-Flow Table (Pond)

Return Event: 10 years

Label: PO-1

Storm Event: Idaho Maryland NC 10-yr

Elevation (ft)	Outflow (ft <sup>3</sup> /s)	Storage (ac-ft)	Area (acres)	Infiltration (ft <sup>3</sup> /s)	Flow (Total) (ft <sup>3</sup> /s)	2S/t + O (ft <sup>3</sup> /s)
2,509.50	190.62	12.471	1.274	0.00	190.62	6,226.71
2,510.00	193.63	13.117	1.310	0.00	193.63	6,542.41

## Centennial Site

Subsection: Elevation-Volume-Flow Table (Pond)  
 Label: PO-1

Return Event: 100 years  
 Storm Event: Idaho Maryland NC 100-yr

Infiltration	
Infiltration Method (Computed)	No Infiltration
Initial Conditions	
Elevation (Water Surface, Initial)	2,495.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft <sup>3</sup> /s
Flow (Initial Infiltration)	0.00 ft <sup>3</sup> /s
Flow (Initial, Total)	0.00 ft <sup>3</sup> /s
Time Increment	0.050 hours

Elevation (ft)	Outflow (ft <sup>3</sup> /s)	Storage (ac-ft)	Area (acres)	Infiltration (ft <sup>3</sup> /s)	Flow (Total) (ft <sup>3</sup> /s)	2S/t + O (ft <sup>3</sup> /s)
2,495.00	0.00	0.000	0.510	0.00	0.00	0.00
2,495.50	1.18	0.261	0.535	0.00	1.18	127.58
2,496.00	4.60	0.535	0.560	0.00	4.60	263.45
2,496.50	9.51	0.820	0.579	0.00	9.51	406.22
2,497.00	14.40	1.114	0.599	0.00	14.40	553.75
2,497.50	19.09	1.419	0.619	0.00	19.09	705.91
2,498.00	23.50	1.734	0.640	0.00	23.50	862.71
2,498.50	27.60	2.059	0.662	0.00	27.60	1,024.35
2,499.00	31.43	2.396	0.684	0.00	31.43	1,191.05
2,499.50	35.02	2.744	0.707	0.00	35.02	1,362.97
2,500.00	38.44	3.103	0.730	0.00	38.44	1,540.25
2,500.50	41.63	3.474	0.754	0.00	41.63	1,723.05
2,501.00	44.71	3.857	0.779	0.00	44.71	1,911.69
2,501.50	47.60	4.253	0.804	0.00	47.60	2,106.18
2,502.00	50.41	4.662	0.830	0.00	50.41	2,306.75
2,502.50	53.09	5.084	0.857	0.00	53.09	2,513.53
2,503.00	59.55	5.519	0.884	0.00	59.55	2,730.65
2,503.50	71.64	5.968	0.912	0.00	71.64	2,960.04
2,504.00	81.86	6.431	0.940	0.00	81.86	3,194.33
2,504.50	89.37	6.907	0.967	0.00	89.37	3,432.56
2,505.00	96.02	7.398	0.994	0.00	96.02	3,676.51
2,505.50	115.46	7.902	1.022	0.00	115.46	3,939.90
2,506.00	142.27	8.420	1.050	0.00	142.27	4,217.40
2,506.50	158.98	8.952	1.079	0.00	158.98	4,491.77
2,507.00	171.52	9.499	1.109	0.00	171.52	4,769.11
2,507.50	176.46	10.061	1.139	0.00	176.46	5,046.13
2,508.00	180.68	10.639	1.170	0.00	180.68	5,329.77
2,508.50	184.35	11.232	1.204	0.00	184.35	5,620.72
2,509.00	187.55	11.843	1.239	0.00	187.55	5,919.54

## Centennial Site

Subsection: Elevation-Volume-Flow Table (Pond)  
Label: PO-1

Return Event: 100 years  
Storm Event: Idaho Maryland NC 100-yr

Elevation (ft)	Outflow (ft <sup>3</sup> /s)	Storage (ac-ft)	Area (acres)	Infiltration (ft <sup>3</sup> /s)	Flow (Total) (ft <sup>3</sup> /s)	2S/t + O (ft <sup>3</sup> /s)
2,509.50	190.62	12.471	1.274	0.00	190.62	6,226.71
2,510.00	193.63	13.117	1.310	0.00	193.63	6,542.41

## Centennial Site

Subsection: Level Pool Pond Routing Summary  
 Label: PO-1 (IN)

Return Event: 10 years  
 Storm Event: Idaho Maryland NC 10-yr

Infiltration			
Infiltration Method (Computed)	No Infiltration		
Initial Conditions			
Elevation (Water Surface, Initial)	2,495.00 ft		
Volume (Initial)	0.000 ac-ft		
Flow (Initial Outlet)	0.00 ft <sup>3</sup> /s		
Flow (Initial Infiltration)	0.00 ft <sup>3</sup> /s		
Flow (Initial, Total)	0.00 ft <sup>3</sup> /s		
Time Increment	0.050 hours		
Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	89.68 ft <sup>3</sup> /s	Time to Peak (Flow, In)	7.950 hours
Flow (Peak Outlet)	45.14 ft <sup>3</sup> /s	Time to Peak (Flow, Outlet)	8.350 hours
Peak Conditions			
Elevation (Water Surface, Peak)	2,501.07 ft		
Volume (Peak)	3.915 ac-ft		
Mass Balance (ac-ft)			
Volume (Initial)	0.000 ac-ft		
Volume (Total Inflow)	28.807 ac-ft		
Volume (Total Infiltration)	0.000 ac-ft		
Volume (Total Outlet Outflow)	28.027 ac-ft		
Volume (Retained)	0.744 ac-ft		
Volume (Unrouted)	-0.036 ac-ft		
Error (Mass Balance)	0.1 %		

## Centennial Site

Subsection: Level Pool Pond Routing Summary  
 Label: PO-1 (IN)

Return Event: 100 years  
 Storm Event: Idaho Maryland NC 100-yr

Infiltration			
Infiltration Method (Computed)	No Infiltration		
Initial Conditions			
Elevation (Water Surface, Initial)	2,495.00 ft		
Volume (Initial)	0.000 ac-ft		
Flow (Initial Outlet)	0.00 ft <sup>3</sup> /s		
Flow (Initial Infiltration)	0.00 ft <sup>3</sup> /s		
Flow (Initial, Total)	0.00 ft <sup>3</sup> /s		
Time Increment	0.050 hours		
Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	137.41 ft <sup>3</sup> /s	Time to Peak (Flow, In)	7.950 hours
Flow (Peak Outlet)	75.75 ft <sup>3</sup> /s	Time to Peak (Flow, Outlet)	8.300 hours
Peak Conditions			
Elevation (Water Surface, Peak)	2,503.70 ft		
Volume (Peak)	6.152 ac-ft		
Mass Balance (ac-ft)			
Volume (Initial)	0.000 ac-ft		
Volume (Total Inflow)	44.124 ac-ft		
Volume (Total Infiltration)	0.000 ac-ft		
Volume (Total Outlet Outflow)	43.107 ac-ft		
Volume (Retained)	0.965 ac-ft		
Volume (Unrouted)	-0.052 ac-ft		
Error (Mass Balance)	0.1 %		

## Centennial Site

Subsection: Pond Routed Hydrograph (total out)  
 Label: PO-1 (OUT)

Return Event: 10 years  
 Storm Event: Idaho Maryland NC 10-yr

Peak Discharge	45.14 ft <sup>3</sup> /s
Time to Peak	8.350 hours
Hydrograph Volume	28.027 ac-ft

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
2.000	0.00	0.00	0.00	0.01	0.02
2.250	0.03	0.05	0.06	0.08	0.11
2.500	0.13	0.16	0.20	0.23	0.27
2.750	0.30	0.34	0.39	0.43	0.48
3.000	0.52	0.57	0.63	0.68	0.73
3.250	0.78	0.84	0.90	0.96	1.02
3.500	1.08	1.14	1.26	1.45	1.63
3.750	1.82	2.01	2.20	2.38	2.57
4.000	2.76	2.94	3.13	3.31	3.49
4.250	3.66	3.84	4.02	4.19	4.37
4.500	4.54	4.77	5.01	5.24	5.48
4.750	5.71	5.94	6.18	6.41	6.64
5.000	6.87	7.11	7.35	7.59	7.84
5.250	8.09	8.34	8.59	8.85	9.10
5.500	9.35	9.60	9.84	10.07	10.30
5.750	10.53	10.76	10.99	11.23	11.47
6.000	11.72	11.98	12.26	12.56	12.88
6.250	13.21	13.55	13.89	14.22	14.55
6.500	14.85	15.15	15.42	15.66	15.87
6.750	16.07	16.27	16.47	16.69	16.92
7.000	17.18	17.45	17.76	18.10	18.47
7.250	18.88	19.31	19.75	20.25	20.79
7.500	21.38	22.12	23.29	24.98	27.16
7.750	29.46	31.83	34.08	36.24	38.29
8.000	40.09	41.74	43.02	43.95	44.56
8.250	44.91	45.09	45.14	45.09	44.96
8.500	44.76	44.48	44.19	43.90	43.63
8.750	43.34	43.04	42.72	42.39	42.03
9.000	41.65	41.24	40.81	40.36	39.90
9.250	39.44	38.96	38.48	37.95	37.41
9.500	36.87	36.34	35.82	35.32	34.83
9.750	34.33	33.85	33.38	32.92	32.46
10.000	32.02	31.59	31.14	30.67	30.22
10.250	29.78	29.34	28.92	28.51	28.11
10.500	27.72	27.32	26.93	26.56	26.21
10.750	25.88	25.56	25.24	24.94	24.65
11.000	24.36	24.08	23.80	23.53	23.24

## Centennial Site

Subsection: Pond Routed Hydrograph (total out)  
 Label: PO-1 (OUT)

Return Event: 10 years  
 Storm Event: Idaho Maryland NC 10-yr

**HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)**  
**Output Time Increment = 0.050 hours**  
**Time on left represents time for first value in each row.**

Time (hours)	Flow (ft <sup>3</sup> /s)				
11.250	22.96	22.68	22.41	22.14	21.88
11.500	21.63	21.38	21.13	20.89	20.64
11.750	20.40	20.17	19.94	19.72	19.51
12.000	19.31	19.11	18.91	18.72	18.54
12.250	18.38	18.22	18.08	17.96	17.85
12.500	17.75	17.66	17.57	17.47	17.37
12.750	17.25	17.14	17.03	16.93	16.82
13.000	16.73	16.63	16.56	16.49	16.44
13.250	16.39	16.34	16.28	16.23	16.17
13.500	16.10	16.03	15.97	15.90	15.83
13.750	15.76	15.69	15.62	15.55	15.49
14.000	15.42	15.36	15.31	15.26	15.21
14.250	15.17	15.12	15.08	15.04	15.00
14.500	14.96	14.92	14.89	14.85	14.81
14.750	14.78	14.74	14.70	14.67	14.63
15.000	14.60	14.56	14.53	14.50	14.46
15.250	14.43	14.40	14.36	14.33	14.29
15.500	14.26	14.23	14.19	14.16	14.12
15.750	14.09	14.06	14.03	13.99	13.96
16.000	13.93	13.90	13.87	13.83	13.80
16.250	13.77	13.74	13.71	13.68	13.64
16.500	13.61	13.58	13.55	13.52	13.49
16.750	13.46	13.43	13.40	13.36	13.33
17.000	13.30	13.27	13.24	13.21	13.18
17.250	13.15	13.12	13.09	13.05	13.02
17.500	12.99	12.96	12.93	12.90	12.87
17.750	12.84	12.81	12.78	12.75	12.72
18.000	12.68	12.65	12.62	12.59	12.56
18.250	12.53	12.50	12.47	12.44	12.40
18.500	12.37	12.34	12.31	12.28	12.25
18.750	12.22	12.18	12.15	12.12	12.09
19.000	12.06	12.03	12.00	11.96	11.93
19.250	11.90	11.87	11.84	11.81	11.78
19.500	11.74	11.71	11.68	11.65	11.62
19.750	11.59	11.56	11.52	11.49	11.46
20.000	11.43	11.39	11.36	11.33	11.30
20.250	11.27	11.24	11.21	11.17	11.14
20.500	11.11	11.08	11.04	11.01	10.98
20.750	10.95	10.92	10.88	10.85	10.82
21.000	10.79	10.76	10.73	10.69	10.66
21.250	10.63	10.60	10.56	10.53	10.50
21.500	10.47	10.44	10.40	10.37	10.34

### Centennial Site

Subsection: Pond Routed Hydrograph (total out)  
Label: PO-1 (OUT)

Return Event: 10 years  
Storm Event: Idaho Maryland NC 10-yr

#### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
21.750	10.31	10.27	10.24	10.21	10.18
22.000	10.15	10.11	10.08	10.05	10.02
22.250	9.98	9.95	9.92	9.89	9.85
22.500	9.82	9.79	9.76	9.72	9.69
22.750	9.66	9.63	9.60	9.56	9.53
23.000	9.50	9.46	9.43	9.39	9.36
23.250	9.33	9.29	9.26	9.23	9.20
23.500	9.16	9.13	9.10	9.06	9.03
23.750	9.00	8.96	8.93	8.90	8.86
24.000	8.83	(N/A)	(N/A)	(N/A)	(N/A)

## Centennial Site

Subsection: Pond Routed Hydrograph (total out)  
 Label: PO-1 (OUT)

Return Event: 100 years  
 Storm Event: Idaho Maryland NC 100-yr

Peak Discharge	75.75 ft <sup>3</sup> /s
Time to Peak	8.300 hours
Hydrograph Volume	43.107 ac-ft

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
1.550	0.00	0.00	0.01	0.02	0.04
1.800	0.06	0.09	0.12	0.16	0.21
2.050	0.25	0.31	0.36	0.43	0.49
2.300	0.56	0.64	0.72	0.80	0.89
2.550	0.98	1.07	1.17	1.40	1.67
2.800	1.93	2.19	2.44	2.70	2.95
3.050	3.20	3.44	3.68	3.91	4.14
3.300	4.37	4.60	4.91	5.21	5.51
3.550	5.81	6.10	6.41	6.71	7.02
3.800	7.33	7.63	7.94	8.24	8.54
4.050	8.83	9.12	9.40	9.67	9.93
4.300	10.19	10.45	10.71	10.97	11.23
4.550	11.49	11.75	12.02	12.29	12.56
4.800	12.83	13.11	13.40	13.69	13.98
5.050	14.28	14.58	14.88	15.19	15.51
5.300	15.83	16.16	16.50	16.83	17.17
5.550	17.50	17.83	18.15	18.47	18.78
5.800	19.10	19.39	19.69	20.00	20.33
6.050	20.67	21.03	21.43	21.86	22.31
6.300	22.76	23.22	23.66	24.07	24.48
6.550	24.88	25.25	25.56	25.85	26.11
6.800	26.38	26.65	26.94	27.25	27.58
7.050	27.92	28.29	28.70	29.15	29.65
7.300	30.20	30.81	31.47	32.13	32.85
7.550	33.75	35.15	37.18	39.71	42.42
7.800	45.14	47.73	50.20	52.47	56.68
8.050	62.54	68.96	72.87	74.78	75.63
8.300	75.75	75.32	74.48	73.32	71.93
8.550	70.15	68.36	66.76	65.33	63.96
8.800	62.61	61.27	59.91	58.99	58.20
9.050	57.37	56.52	55.65	54.75	53.85
9.300	53.02	52.62	52.21	51.78	51.34
9.550	50.90	50.46	50.00	49.56	49.12
9.800	48.69	48.26	47.84	47.40	46.96
10.050	46.52	46.08	45.64	45.20	44.76
10.300	44.28	43.81	43.34	42.88	42.43
10.550	41.99	41.56	41.12	40.70	40.29

## Centennial Site

Subsection: Pond Routed Hydrograph (total out)  
 Label: PO-1 (OUT)

Return Event: 100 years  
 Storm Event: Idaho Maryland NC 100-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
10.800	39.89	39.50	39.11	38.73	38.35
11.050	37.94	37.53	37.14	36.75	36.36
11.300	35.98	35.61	35.24	34.86	34.47
11.550	34.09	33.71	33.33	32.96	32.58
11.800	32.22	31.86	31.52	31.15	30.80
12.050	30.45	30.12	29.81	29.50	29.22
12.300	28.95	28.70	28.46	28.24	28.04
12.550	27.85	27.67	27.46	27.23	27.01
12.800	26.79	26.57	26.36	26.16	25.96
13.050	25.78	25.61	25.47	25.34	25.21
13.300	25.09	24.96	24.84	24.71	24.58
13.550	24.44	24.31	24.18	24.05	23.92
13.800	23.79	23.66	23.54	23.41	23.29
14.050	23.16	23.05	22.94	22.84	22.75
14.300	22.66	22.57	22.49	22.41	22.33
14.550	22.25	22.17	22.10	22.02	21.95
14.800	21.88	21.81	21.75	21.68	21.61
15.050	21.55	21.49	21.43	21.37	21.31
15.300	21.25	21.19	21.14	21.08	21.02
15.550	20.96	20.91	20.85	20.80	20.75
15.800	20.69	20.64	20.59	20.54	20.49
16.050	20.44	20.39	20.34	20.28	20.23
16.300	20.18	20.13	20.09	20.04	19.99
16.550	19.94	19.89	19.84	19.79	19.74
16.800	19.70	19.65	19.60	19.55	19.51
17.050	19.46	19.41	19.36	19.32	19.27
17.300	19.22	19.17	19.13	19.08	19.03
17.550	18.98	18.93	18.88	18.83	18.78
17.800	18.73	18.68	18.63	18.58	18.53
18.050	18.48	18.43	18.38	18.33	18.28
18.300	18.23	18.19	18.14	18.09	18.05
18.550	18.00	17.95	17.90	17.85	17.80
18.800	17.76	17.71	17.66	17.61	17.57
19.050	17.52	17.47	17.42	17.38	17.33
19.300	17.28	17.24	17.19	17.14	17.10
19.550	17.05	17.00	16.96	16.91	16.86
19.800	16.81	16.77	16.72	16.67	16.62
20.050	16.58	16.53	16.48	16.44	16.39
20.300	16.34	16.30	16.25	16.20	16.15
20.550	16.11	16.06	16.01	15.96	15.91
20.800	15.87	15.82	15.78	15.73	15.68
21.050	15.64	15.59	15.54	15.49	15.44

## Centennial Site

Subsection: Pond Routed Hydrograph (total out)  
Label: PO-1 (OUT)

Return Event: 100 years  
Storm Event: Idaho Maryland NC 100-yr

### HYDROGRAPH ORDINATES (ft<sup>3</sup>/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft <sup>3</sup> /s)				
21.300	15.40	15.35	15.30	15.26	15.21
21.550	15.16	15.11	15.07	15.02	14.97
21.800	14.92	14.88	14.83	14.78	14.74
22.050	14.69	14.64	14.59	14.55	14.50
22.300	14.45	14.40	14.35	14.30	14.25
22.550	14.20	14.15	14.10	14.05	14.00
22.800	13.95	13.90	13.85	13.80	13.75
23.050	13.70	13.65	13.60	13.55	13.51
23.300	13.46	13.41	13.36	13.32	13.27
23.550	13.22	13.17	13.12	13.07	13.02
23.800	12.98	12.93	12.88	12.83	12.78

## Centennial Site

Subsection: Pond Inflow Summary  
Label: PO-1 (IN)

Return Event: 10 years  
Storm Event: Idaho Maryland NC 10-yr

### Summary for Hydrograph Addition at 'PO-1'

Upstream Link                      Upstream Node  
<Catchment to Outflow Node>      CM-1

### Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft <sup>3</sup> /s)
Flow (From)	CM-1	28.807	7.950	89.68
Flow (In)	PO-1	28.807	7.950	89.68

## Centennial Site

Subsection: Pond Inflow Summary  
Label: PO-1 (IN)

Return Event: 100 years  
Storm Event: Idaho Maryland NC 100-yr

### Summary for Hydrograph Addition at 'PO-1'

Upstream Link                      Upstream Node  
<Catchment to Outflow Node>      CM-1

### Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft <sup>3</sup> /s)
Flow (From)	CM-1	44.124	7.950	137.41
Flow (In)	PO-1	44.124	7.950	137.41

## Centennial Site

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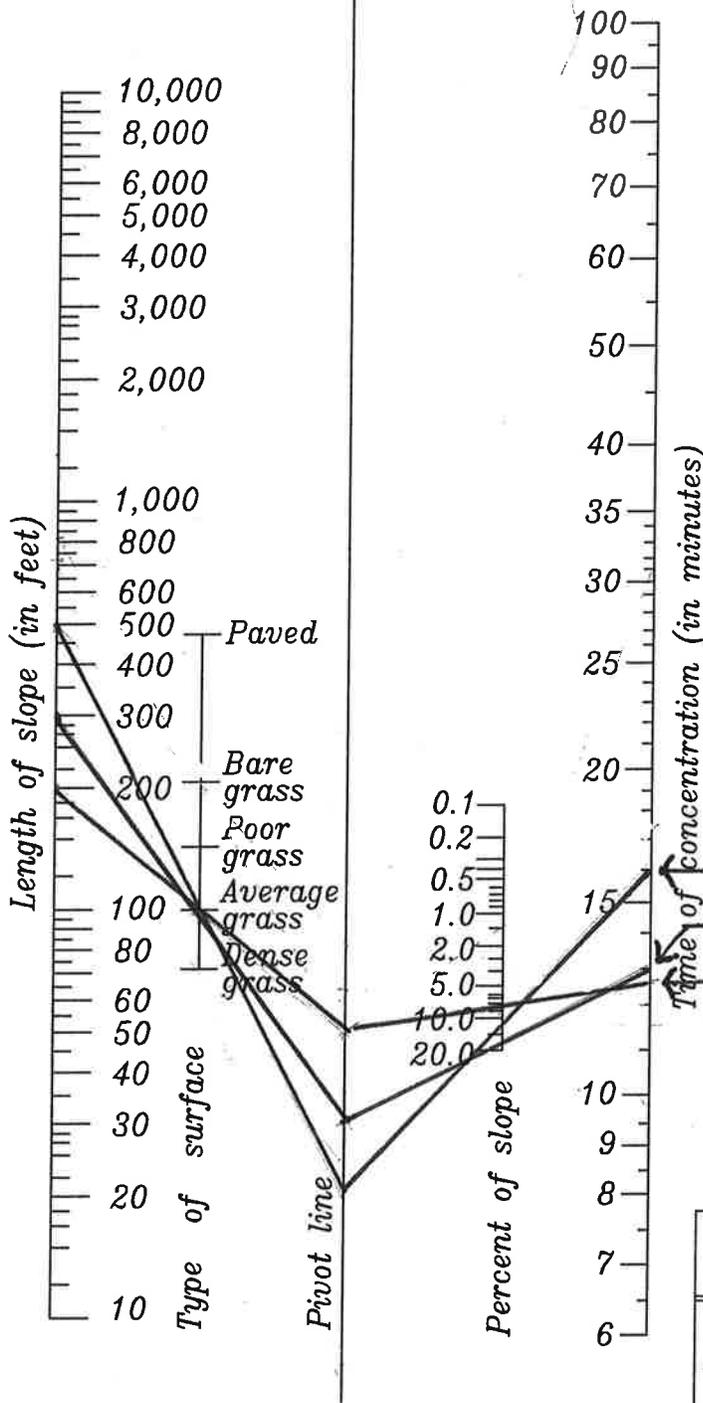
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# APPENDICES



COUNTY OF NEVADA  
 DEPARTMENT OF TRANSPORTATION  
 LOCAL RURAL ROAD SYSTEM

TIME OF CONCENTRATION  
 SHEET FLOW



Approved by:  
 John W. Rumsey 5-10-95  
 Senior Civil Engineer Date

STANDARD  
 DRAWING  
 D-8

**VELOCITIES IN GUTTERS, CHANNELS & EXISTING DRAINAGE CHANNELS  
FOR GIVEN SLOPE**

<i>Slope</i>	<i>Velocity</i>	<i>Slope</i>	<i>Velocity</i>
0.5%	= 1.7' / Sec	8.0	= 6.6
1.0	= 2.3	.5	= 6.9
1.5	= 3.0	9.0	= 7.2
2.0	= 3.4	.5	= 7.5
2.5	= 3.8	10.0	= 7.8
3.0	= 4.2	.5	= 8.0
3.5	= 4.4	11.0	= 8.2
4.0	= 4.6	.5	= 8.5
.5	= 4.8	12.0	= 8.7
5.0	= 5.0	.5	= 8.9
.5	= 5.2	13.0	= 9.1
6.0	= 5.4	.5	= 9.3
.5	= 5.7	14.0	= 9.6
7.0	= 6.0	.5	= 9.8
.5	= 6.3	15.0	= 10.0

*NOTE: The velocities shown hereon are to be used only for the purpose of calculating Tc, Time of Concentration.*



COUNTY OF NEVADA DEPARTMENT OF TRANSPORTATION	
LOCAL RURAL ROAD SYSTEM	
VELOCITIES IN GUTTERS & CHANNELS	
Approved by: <i>John W. Rumsey</i> 5-10-95 Senior Civil Engineer	STANDARD DRAWING D-9
Date	



**NEVADA COUNTY DESIGN STORM (INTENSITY)**  
**10 YEAR STORM DURATION IN MINUTES FOR NEVADA COUNTY**

Mean Annual Precipitation Inches	Intensity in inches per hour									
	5	10	15	30	60	120	180	360	720	1440
	1hr	2Hr	3Hr	6Hr	12Hr	24Hr				
20	1.57	1.15	.96	.70	.51	.38	.31	.23	.17	.12
22	1.68	1.23	1.03	.75	.55	.40	.34	.25	.18	.13
24	1.80	1.31	1.10	.80	.59	.43	.36	.26	.19	.14
26	1.91	1.40	1.17	.85	.62	.46	.38	.28	.20	.15
28	2.02	1.48	1.23	.90	.66	.48	.40	.30	.22	.16
30	2.14	1.57	1.30	.95	.70	.51	.43	.31	.23	.17
32	2.25	1.65	1.37	1.01	.74	.54	.45	.33	.24	.18
34	2.37	1.73	1.44	1.06	.77	.57	.47	.35	.25	.19
36	2.48	1.82	1.51	1.11	.81	.59	.49	.36	.27	.19
38	2.59	1.90	1.58	1.16	.85	.62	.52	.38	.28	.20
40	2.71	1.98	1.65	1.21	.89	.65	.54	.40	.29	.21
42	2.82	2.07	1.72	1.26	.92	.68	.56	.41	.30	.22
44	2.94	2.15	1.79	1.31	.96	.70	.59	.43	.31	.23
46	3.05	2.23	1.86	1.36	1.00	.73	.61	.45	.33	.24
48	3.17	2.32	1.93	1.41	1.03	.76	.63	.46	.34	.25
50	3.28	2.40	2.00	1.46	1.07	.78	.65	.48	.35	.26
52	3.39	2.48	2.07	1.52	1.11	.81	.68	.50	.36	.27
54	3.51	2.57	2.14	1.57	1.15	.84	.70	.51	.37	.27
56	3.62	2.65	2.21	1.62	1.18	.87	.72	.53	.39	.28
58	3.74	2.73	2.28	1.67	1.22	.89	.74	.55	.40	.29
60	3.85	2.82	2.35	1.72	1.26	.92	.77	.56	.41	.30
62	3.96	2.90	2.42	1.77	1.30	.95	.79	.58	.42	.31
64	4.08	2.98	2.49	1.82	1.33	.98	.81	.60	.44	.32
66	4.19	3.07	2.56	1.87	1.37	1.00	.84	.61	.45	.33
68	4.31	3.15	2.63	1.92	1.41	1.03	.86	.63	.46	.34
70	4.42	3.24	2.70	1.97	1.44	1.06	.88	.65	.47	.35
72	4.53	3.32	2.77	2.02	1.48	1.08	.90	.66	.48	.35
74	4.65	3.40	2.84	2.08	1.52	1.11	.93	.68	.50	.36
76	4.76	3.49	2.90	2.13	1.56	1.14	.95	.70	.51	.37
78	4.88	3.57	2.97	2.18	1.59	1.17	.97	.71	.52	.38
80	4.99	3.65	3.04	2.23	1.63	1.19	.99	.73	.53	.39



COUNTY OF NEVADA DEPARTMENT OF TRANSPORTATION DRAINAGE DETAIL 10 YEAR STORM DURATION IN MINUTES FOR NEVADA COUNTY	
Approved by: <i>John W. Rumsey</i> 5-11-95 Senior Civil Engineer	STANDARD DRAWING D-11
Date	

NEVADA COUNTY DESIGN STORM (INTENSITY)  
100 YEAR STORM DURATION IN MINUTES FOR NEVADA COUNTY

Mean Annual Precipitation Inches	Intensity in inches per hour									
	5	10	15	30	60 1hr	120 2hr	180 3hr	360 6hr	720 12hr	1440 24hr
20	2.22	1.63	1.36	.99	.73	.53	.44	.32	.24	.17
22	2.39	1.75	1.46	1.07	.78	.57	.48	.35	.25	.19
24	2.55	1.86	1.55	1.14	.83	.61	.51	.37	.27	.20
26	2.71	1.98	1.65	1.21	.89	.65	.54	.40	.29	.21
28	2.87	2.10	1.75	1.28	.94	.69	.57	.42	.31	.22
30	3.03	2.22	1.85	1.35	.99	.73	.60	.44	.32	.24
32	3.19	2.34	1.95	1.43	1.04	.76	.64	.47	.34	.25
34	3.36	2.46	2.05	1.50	1.10	.80	.67	.49	.36	.26
36	3.52	2.58	2.15	1.57	1.15	.84	.70	.51	.38	.28
38	3.68	2.69	2.24	1.64	1.20	.88	.73	.54	.39	.29
40	3.84	2.81	2.34	1.72	1.26	.92	.77	.56	.41	.30
42	4.00	2.93	2.44	1.79	1.31	.96	.80	.58	.43	.31
44	4.17	3.05	2.54	1.86	1.36	1.00	.83	.61	.45	.33
46	4.33	3.17	2.64	1.93	1.41	1.04	.86	.63	.46	.34
48	4.49	3.29	2.74	2.00	1.47	1.07	.89	.66	.48	.35
50	4.65	3.40	2.84	2.08	1.52	1.11	.93	.68	.50	.36
52	4.81	3.52	2.94	2.15	1.57	1.15	.96	.70	.51	.38
54	4.97	3.64	3.03	2.22	1.63	1.19	.99	.73	.53	.39
56	5.14	3.76	3.13	2.29	1.68	1.23	1.02	.75	.55	.40
58	5.30	3.88	3.23	2.37	1.73	1.27	1.06	.77	.57	.41
60	5.46	4.00	3.33	2.44	1.78	1.31	1.09	.80	.58	.43
62	5.62	4.12	3.43	2.51	1.84	1.35	1.12	.82	.60	.44
64	5.78	4.23	3.53	2.58	1.89	1.38	1.15	.84	.62	.45
66	5.94	4.35	3.63	2.65	1.94	1.42	1.19	.87	.64	.46
68	6.11	4.47	3.72	2.73	2.00	1.46	1.22	.89	.65	.48
70	6.27	4.59	3.82	2.80	2.05	1.50	1.25	.91	.67	.49
72	6.43	4.71	3.92	2.87	2.10	1.54	1.28	.94	.69	.50
74	6.59	4.83	4.02	2.94	2.15	1.58	1.31	.96	.70	.52
76	6.75	4.94	4.12	3.02	2.21	1.62	1.35	.99	.72	.53
78	6.92	5.06	4.22	3.09	2.26	1.65	1.38	1.01	.74	.54
80	7.08	5.18	4.32	3.16	2.31	1.69	1.41	1.03	.76	.55



COUNTY OF NEVADA DEPARTMENT OF TRANSPORTATION	
DRAINAGE DETAIL 100 YEAR STORM DURATION IN MINUTES FOR NEVADA COUNTY	
Approved by: <i>John W. Rumsey</i> 5-11-95	STANDARD DRAWING D-12
Senior Civil Engineer      Date	

NEVADA COUNTY DESIGN STORM (DEPTH)  
10 YEAR STORM DURATION IN MINUTES FOR NEVADA COUNTY

Mean Annual Precipitation Inches	Design Storm Depth in inches									
	5	10	15	30	60	120	180	360	720	1440
	1hr	2Hr	3Hr	6Hr	12Hr	24Hr				
20	.13	.19	.24	.35	.51	.75	.94	1.37	2.01	2.94
22	.14	.21	.26	.38	.55	.81	1.01	1.47	2.16	3.16
24	.15	.22	.27	.40	.59	.86	1.07	1.57	2.30	3.37
26	.16	.23	.29	.43	.62	.91	1.14	1.67	2.45	3.59
28	.17	.25	.31	.45	.66	.97	1.21	1.77	2.60	3.80
30	.18	.26	.33	.48	.70	1.02	1.28	1.87	2.74	4.01
32	.19	.27	.34	.50	.74	1.08	1.35	1.97	2.89	4.23
34	.20	.29	.36	.53	.77	1.13	1.42	2.07	3.03	4.44
36	.21	.30	.38	.55	.81	1.19	1.48	2.17	3.18	4.66
38	.22	.32	.40	.58	.85	1.24	1.55	2.27	3.33	4.87
40	.23	.33	.41	.60	.89	1.30	1.62	2.37	3.47	5.08
42	.24	.34	.43	.63	.92	1.35	1.69	2.47	3.62	5.30
44	.24	.36	.45	.66	.96	1.41	1.76	2.57	3.77	5.51
46	.25	.37	.47	.68	1.00	1.46	1.82	2.67	3.91	5.73
48	.26	.39	.48	.71	1.03	1.51	1.89	2.77	4.06	5.94
50	.27	.40	.50	.73	1.07	1.57	1.96	2.87	4.20	6.16
52	.28	.41	.52	.76	1.11	1.62	2.03	2.97	4.35	6.37
54	.29	.43	.53	.78	1.15	1.68	2.10	3.07	4.50	6.58
56	.30	.44	.55	.81	1.18	1.73	2.17	3.17	4.64	6.80
58	.31	.46	.57	.83	1.22	1.79	2.23	3.27	4.79	7.01
60	.32	.47	.59	.86	1.26	1.84	2.30	3.37	4.94	7.23
62	.33	.48	.60	.88	1.30	1.90	2.37	3.47	5.08	7.44
64	.34	.50	.62	.91	1.33	1.95	2.44	3.57	5.23	7.65
66	.35	.51	.64	.94	1.37	2.01	2.51	3.67	5.37	7.87
68	.36	.53	.66	.96	1.41	2.06	2.58	3.77	5.52	8.08
70	.37	.54	.67	.99	1.44	2.12	2.64	3.87	5.67	8.30
72	.38	.55	.69	1.01	1.48	2.17	2.71	3.97	5.81	8.51
74	.39	.57	.71	1.04	1.52	2.22	2.78	4.07	5.96	8.72
76	.40	.58	.73	1.06	1.56	2.28	2.85	4.17	6.11	8.94
78	.41	.59	.74	1.09	1.59	2.33	2.92	4.27	6.25	9.15
80	.42	.61	.76	1.11	1.63	2.39	2.98	4.37	6.40	9.37



COUNTY OF NEVADA  
DEPARTMENT OF TRANSPORTATION

DRAINAGE DETAIL

10 YEAR STORM DURATION IN  
MINUTES FOR NEVADA COUNTY

Approved by:

*John W. Rumsey* 5-11-95

Senior Civil Engineer Date

STANDARD  
DRAWING

D-13

## NEVADA COUNTY DESIGN STORM (DEPTH)

### 100 YEAR STORM DURATION IN MINUTES FOR NEVADA COUNTY

Mean Annual Precipitation Inches	5	10	15	30	60 1hr	120 2hr	180 3hr	360 6hr	720 12hr	1440 24hr
<i>Design Storm depth in inches</i>										
20	.19	.27	.34	.50	.73	1.06	1.33	1.95	2.85	4.17
22	.20	.29	.36	.53	.78	1.14	1.43	2.09	3.06	4.48
24	.21	.31	.39	.57	.83	1.22	1.52	2.23	3.27	4.78
26	.23	.33	.41	.60	.89	1.30	1.62	2.37	3.47	5.09
28	.24	.35	.44	.64	.94	1.37	1.72	2.51	3.68	5.39
30	.25	.37	.46	.68	.99	1.45	1.81	2.66	3.89	5.69
32	.27	.39	.49	.71	1.04	1.53	1.91	2.80	4.10	6.00
34	.28	.41	.51	.75	1.10	1.61	2.01	2.94	4.30	6.30
36	.29	.43	.54	.79	1.15	1.68	2.10	3.08	4.51	6.60
38	.31	.45	.56	.82	1.20	1.76	2.20	3.22	4.72	6.91
40	.32	.47	.59	.86	1.26	1.84	2.30	3.36	4.93	7.21
42	.33	.49	.61	.89	1.31	1.92	2.39	3.51	5.13	7.51
44	.35	.51	.64	.93	1.36	1.99	2.49	3.65	5.34	7.82
46	.36	.53	.66	.97	1.41	2.07	2.59	3.79	5.55	8.12
48	.37	.55	.68	1.00	1.47	2.15	2.68	3.93	5.76	8.43
50	.39	.57	.71	1.04	1.52	2.23	2.78	4.07	5.96	8.73
52	.40	.59	.73	1.07	1.57	2.30	2.88	4.21	6.17	9.03
54	.41	.61	.76	1.11	1.63	2.38	2.98	4.36	6.38	9.34
56	.43	.63	.78	1.15	1.68	2.46	3.07	4.50	6.58	9.64
58	.44	.65	.81	1.18	1.73	2.54	3.17	4.64	6.79	9.94
60	.45	.67	.83	1.22	1.78	2.61	3.27	4.78	7.00	10.25
62	.47	.69	.86	1.25	1.84	2.69	3.36	4.92	7.21	10.55
64	.48	.71	.88	1.29	1.89	2.77	3.46	5.06	7.41	10.86
66	.50	.73	.91	1.33	1.94	2.84	3.56	5.21	7.62	11.16
68	.51	.75	.93	1.36	2.00	2.92	3.65	5.35	7.83	11.46
70	.52	.76	.96	1.40	2.05	3.00	3.75	5.49	8.04	11.77
72	.54	.78	.98	1.44	2.10	3.08	3.85	5.63	8.24	12.07
74	.55	.80	1.01	1.47	2.15	3.15	3.94	5.77	8.45	12.37
76	.56	.82	1.03	1.51	2.21	3.23	4.04	5.91	8.66	12.68
78	.58	.84	1.05	1.54	2.26	3.31	4.14	6.06	8.87	12.98
80	.59	.86	1.08	1.58	2.31	3.39	4.23	6.20	9.07	13.28



COUNTY OF NEVADA DEPARTMENT OF TRANSPORTATION	
DRAINAGE DETAIL	
100 YEAR STORM DURATION IN MINUTES FOR NEVADA COUNTY	
Approved by: <i>John W. Rumsey</i> 5-11-95	STANDARD DRAWING
Senior Civil engineer      Date	D-14

**TABLE FOR ESTIMATING "C" IN RATIONAL FORMULA**  
**UNIMPROVED AREAS**

CONDITION	EXTREME	HIGH	MODERATE	LOW
Slope	.36 - .28 Above 30%	.28 - .15 30% - 10%	.15 - .10 10% - 5%	.10 - .05 5% - 0
Surface permeability	.20 - .15 Bare rock or very thin soil	.15 - .07 Impervious clays shallow soils	.07 - .04 Deep pervious loam, sandy loam	.03 Deep sand, volcanic ash
Vegetation	.20 - .15 None or very sparse	.15 - .07 Less than 20% covered with substantial growth	.07 - .04 About 50% covered with heavy growth	.03 90% covered with heavy growth, deep hummus layer
Surface	.20 - .15 Smooth soil, slick rock drainage flow continuous	.15 - .07 Roughened soil or rocks	.07 - .04 Drainage flow interrupted many ponds, lakes & marshes	.03 Drainage flow arrested many ponds, lakes & marshes

**IMPROVED AREAS**

Surface	C
Roof surfaces	.95
A.C. or P.C.C. pavement, patios, driveways, streets, sidewalks.....	.90
Landscaped areas.....	.25
Gravel walks, roadways.....	.30

EXAMPLE: Unimproved	EXAMPLE: Improved
20% slope.....	.22
Well drained soil.....	.05
Fair cover.....	.07
No ponds.....	.08
	<u>C = .42</u>

$C = (15 \times .95) + (50 \times .90) + (35 \times .25) = 0.68$      $C = 0.68$

100 acres



COUNTY OF NEVADA  
DEPARTMENT OF TRANSPORTATION

DRAINAGE DETAILS

**VALUES FOR ESTIMATING  
COEFFICIENT  
OF RUNOFF "C"**

Approved by: John W. Rumsey 5-11-95    Date D-15  
Senior Civil Engineer

LAND USE DESCRIPTION	HYDROLOGIC SOIL GROUP			
	A	B	C	D
Cultivated land: <sup>①</sup> without conservation treatment	72	81	88	91
with conservation treatment	62	71	78	81
Pasture or range land: poor condition	68	79	86	89
good condition	39	61	74	80
Meadow: good condition	30	58	71	78
Wood or Forest land: thin stand, poor cover, no mulch	45	66	77	83
good cover <sup>②</sup>	25	55	70	77
Open spaces, lawns, parks, golf courses, cemeteries, etc.				
good condition: grass cover on 75% or more of the area	39	61	74	80
fair condition: grass cover on 50% to 75% of the area	49	69	79	84
Commercial and business areas (85% impervious)	89	92	94	95
Industrial districts (72% impervious)	81	88	91	93
Residential: <sup>③</sup>				
Average lot size				
1/8 acre or less				
Average % Impervious <sup>④</sup>				
65	77	85	90	92
1/4 acre	61	75	83	87
1/3 acre	57	72	81	86
1/2 acre	54	70	80	85
1 acre	51	68	79	84
Paved parking lots, roofs, driveways, etc.	98	98	98	98
Streets and roads:				
paved with curbs and storm sewers	98	98	98	98
gravel	76	85	89	91
dirt	72	82	87	89

① For a more detailed description of agricultural land use curve numbers refer to National Engineering Handbook, Section 4, Hydrology, Chapter 9, August 1972.

② Good cover is protected from grazing and litter and brush cover soil.

③ Curve numbers are computed assuming the runoff from the house and driveway is directed towards the street with a minimum of roof water directed to lawns where additional infiltration could occur.

④ The remaining pervious areas (lawn) are considered to be in good pasture condition for these curve numbers.



COUNTY OF NEVADA  
DEPARTMENT OF TRANSPORTATION

RUNOFF CURVE NUMBERS

Approved by:

John W. Rumsey 5-11-95

Senior Civil Engineer

Date

STANDARD  
DRAWING

D-16

Table 7-3. For Determining the Vertical Distance  $\bar{y}$  below the Water Surface to the Center of Gravity of a Cross Section of a Trapezoidal Channel

Let  $\frac{\text{depth of water}}{\text{bottom width of channel}} = \frac{D}{b}$  and  $C_2 = \text{tabulated value}$ . Then  $\bar{y} = C_2 D$ .

$\frac{D}{b}$	Side slopes of channel, ratio of horizontal to vertical									
	$\frac{1}{8}-1$	$\frac{1}{4}-1$	$\frac{1}{2}-1$	$\frac{3}{4}-1$	1-1	$1\frac{1}{2}-1$	2-1	$2\frac{1}{2}-1$	3-1	4-1
0.05	.499	.498	.496	.494	.492	.488	.485	.481	.478	.472
.1	.498	.496	.492	.488	.485	.478	.469	.467	.462	.452
.15	.497	.494	.488	.483	.478	.469	.455	.448	.438	.426
.2	.496	.492	.485	.478	.472	.462	.444	.436	.429	.417
.25	.495	.490	.481	.474	.467	.455	.444	.436	.429	.417
.3	.494	.488	.478	.469	.462	.448	.438	.429	.421	.409
.35	.493	.487	.475	.465	.457	.443	.431	.422	.415	.403
.4	.492	.485	.472	.462	.452	.438	.426	.417	.409	.397
.45	.491	.483	.469	.458	.448	.433	.421	.412	.404	.393
.5	.490	.481	.467	.455	.444	.429	.417	.407	.400	.389
.6	.488	.478	.462	.448	.438	.421	.409	.400	.393	.382
.7	.487	.475	.457	.443	.431	.415	.403	.394	.387	.377
.8	.485	.472	.452	.438	.426	.409	.397	.389	.382	.373
.9	.483	.469	.448	.433	.421	.404	.393	.385	.378	.370
1.0	.481	.467	.444	.429	.417	.400	.389	.381	.375	.367
1.1	.480	.464	.441	.425	.413	.396	.385	.378	.372	.364
1.2	.478	.462	.438	.421	.409	.393	.382	.375	.370	.362
1.3	.477	.459	.434	.418	.406	.390	.380	.373	.367	.360
1.4	.475	.457	.431	.415	.403	.387	.377	.370	.365	.359
1.5	.474	.455	.429	.412	.400	.385	.375	.368	.364	.357
1.6	.472	.452	.426	.409	.397	.382	.373	.367	.362	.356
1.7	.471	.450	.423	.407	.395	.380	.371	.365	.361	.355
1.8	.469	.448	.421	.404	.393	.378	.370	.364	.359	.354
1.9	.468	.446	.419	.402	.391	.377	.368	.362	.358	.353
2.0	.467	.444	.417	.400	.389	.375	.367	.361	.357	.352

Table 7-4. For Determining the Area  $a$  of the Cross Section of a Circular Conduit Flowing Part Full

Let  $\frac{\text{depth of water}}{\text{diameter of channel}} = \frac{D}{d}$  and  $C_a = \text{the tabulated value}$ . Then  $a = C_a d^2$ .

$\frac{D}{d}$	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.0	.0000	.0013	.0037	.0069	.0105	.0147	.0192	.0242	.0294	.0350
.1	.0409	.0470	.0534	.0600	.0668	.0739	.0811	.0885	.0961	.1039
.2	.1118	.1199	.1281	.1365	.1449	.1535	.1623	.1711	.1800	.1890
.3	.1982	.2074	.2167	.2260	.2355	.2450	.2546	.2642	.2739	.2836
.4	.2934	.3032	.3130	.3229	.3328	.3428	.3527	.3627	.3727	.3827
.5	.393	.403	.413	.423	.433	.443	.453	.462	.472	.482
.6	.492	.502	.512	.521	.531	.540	.550	.559	.569	.578
.7	.587	.596	.605	.614	.623	.632	.640	.649	.657	.666
.8	.674	.681	.689	.697	.704	.712	.719	.725	.732	.738
.9	.745	.750	.756	.761	.766	.771	.775	.779	.782	.784

Table 7-5. For Determining the Hydraulic Radius  $r$  of the Cross Section of a Circular Conduit Flowing Part Full

Let  $\frac{\text{depth of water}}{\text{diameter of channel}} = \frac{D}{d}$  and  $C_r = \text{the tabulated value}$ . Then  $r = C_r d$ .

$\frac{D}{d}$	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.0	.0000	.0013	.0037	.0069	.0105	.0147	.0192	.0242	.0294	.0350
.1	.0409	.0470	.0534	.0600	.0668	.0739	.0811	.0885	.0961	.1039
.2	.1118	.1199	.1281	.1365	.1449	.1535	.1623	.1711	.1800	.1890
.3	.1982	.2074	.2167	.2260	.2355	.2450	.2546	.2642	.2739	.2836
.4	.2934	.3032	.3130	.3229	.3328	.3428	.3527	.3627	.3727	.3827
.5	.393	.403	.413	.423	.433	.443	.453	.462	.472	.482
.6	.492	.502	.512	.521	.531	.540	.550	.559	.569	.578
.7	.587	.596	.605	.614	.623	.632	.640	.649	.657	.666
.8	.674	.681	.689	.697	.704	.712	.719	.725	.732	.738
.9	.745	.750	.756	.761	.766	.771	.775	.779	.782	.784

AREA  
F

K<sub>c</sub> K<sub>v</sub> K<sub>f</sub> K<sub>t</sub>

X<sup>3/2</sup> X<sup>3/2</sup> CRITICAL SLANT CRITICAL SLANT (K<sub>v</sub>)<sup>2</sup> K<sub>v</sub> K<sub>t</sub> K<sub>f</sub> 10.000 X<sup>3/2</sup>

AREA  
F

K<sub>c</sub> K<sub>t</sub> K<sub>v</sub>

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Table 7-13. Values of *K* for Circular Channels in the Formula

$$Q = \frac{K}{n} D^{5/3} s^{1/2}$$

*D* = depth of water *d* = diameter of channel

$\frac{D}{d}$	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.0		15.02	10.56	8.57	7.38	6.55	5.95	5.47	5.08	4.76
.1	4.49	4.25	4.04	3.86	3.69	3.54	3.41	3.28	3.17	3.06
.2	2.96	2.87	2.79	2.71	2.63	2.56	2.49	2.42	2.36	2.30
.3	2.25	2.20	2.14	2.09	2.05	2.00	1.96	1.92	1.87	1.84
.4	1.80	1.76	1.72	1.69	1.66	1.62	1.59	1.56	1.53	1.50
.5	1.470	1.442	1.415	1.388	1.362	1.336	1.311	1.286	1.262	1.238
.6	1.215	1.192	1.170	1.148	1.126	1.105	1.084	1.064	1.043	1.023
.7	1.004	.984	.965	.947	.928	.910	.891	.874	.856	.838
.8	.821	.804	.787	.770	.753	.736	.720	.703	.687	.670
.9	.654	.637	.621	.604	.588	.571	.555	.535	.516	.496
1.0	.463									

Table 7-14. Values of *K'* for Circular Channels in the Formula

$$Q = \frac{K'}{n} d^{5/3} s^{1/2}$$

*D* = depth of water *d* = diameter of channel

$\frac{D}{d}$	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.0		.00007	.00031	.00074	.00138	.00222	.00328	.00455	.00604	.00775
.1	.00967	.0118	.0142	.0167	.0195	.0225	.0257	.0291	.0327	.0366
.2	.0406	.0448	.0492	.0537	.0585	.0634	.0686	.0738	.0793	.0849
.3	.0907	.0966	.1027	.1089	.1153	.1218	.1284	.1352	.1420	.1490
.4	.1561	.1633	.1705	.1779	.1854	.1929	.2005	.2082	.2160	.2238
.5	.232	.239	.247	.255	.263	.271	.279	.287	.295	.303
.6	.311	.319	.327	.335	.343	.350	.358	.366	.373	.380
.7	.388	.395	.402	.409	.416	.422	.429	.435	.441	.447
.8	.453	.458	.463	.468	.473	.477	.481	.485	.488	.491
.9	.494	.496	.497	.498	.498	.498	.496	.494	.489	.483
1.0	.463									

STEADY UNIFORM FLOW IN OPEN CHANNELS 7-65

Table 7-15. Values of *K* for Parabolic Channels in the Formula

$$Q = \frac{K}{n} D^{5/3} s^{1/2}$$

*D* = depth of water *T* = top width of channel

$\frac{D}{T}$	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.0		75.59	37.77	25.16	18.85	15.05	12.52	10.71	9.35	8.28
.1	7.43	6.73	6.15	5.65	5.23	4.86	4.53	4.24	3.99	3.76
.2	3.55	3.36	3.19	3.04	2.89	2.76	2.64	2.52	2.42	2.32
.3	2.226	2.140	2.059	1.984	1.912	1.845	1.782	1.722	1.665	1.611
.4	1.560	1.511	1.465	1.421	1.379	1.339	1.301	1.265	1.230	1.197
.5	1.165	1.134	1.105	1.077	1.050	1.024	.999	.975	.952	.929
.6	.908	.887	.867	.848	.829	.811	.794	.777	.761	.745
.7	.730	.715	.701	.687	.674	.661	.648	.636	.624	.613
.8	.601	.590	.580	.570	.560	.550	.540	.531	.522	.514
.9	.505	.497	.489	.481	.473	.466	.458	.451	.444	.438
1.0	.431									

Table 7-16. Values of *K'* for Parabolic Channels in the Formula

$$Q = \frac{K'}{n} T^{5/3} s^{1/2}$$

*D* = depth of water *T* = top width of channel

$\frac{D}{T}$	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.0		.00036	.00111	.00219	.00353	.00511	.00691	.00891	.01110	.01347
.1	.0160	.0187	.0215	.0245	.0276	.0308	.0342	.0376	.0412	.0448
.2	.0486	.0524	.0563	.0603	.0643	.0684	.0726	.0768	.0811	.0854
.3	.0898	.0942	.0987	.1032	.1077	.1123	.1168	.1215	.1261	.1308
.4	.1355	.1402	.1450	.1497	.1545	.1593	.1641	.1689	.1737	.1786
.5	.183	.188	.193	.198	.203	.208	.213	.218	.223	.228
.6	.232	.237	.242	.247	.252	.257	.262	.267	.272	.277
.7	.282	.287	.292	.297	.302	.307	.312	.317	.322	.327
.8	.332	.337	.342	.347	.352	.357	.361	.366	.371	.376
.9	.381	.386	.391	.396	.401	.406	.411	.416	.421	.426
1.0	.431									

X<sub>3/8</sub>

X<sub>3/8</sub>

CRITICAL DEPTH

CRITICAL SLOPE

CHANNEL ENTRANCE

HYDRAULIC JUMP

COMPOSITE CHANNELS

K<sub>c</sub>

10.000

X<sub>3/8</sub>



SCALE: 1" = 200'  
CONTOUR INTERVAL: 2'  
**RAZ**

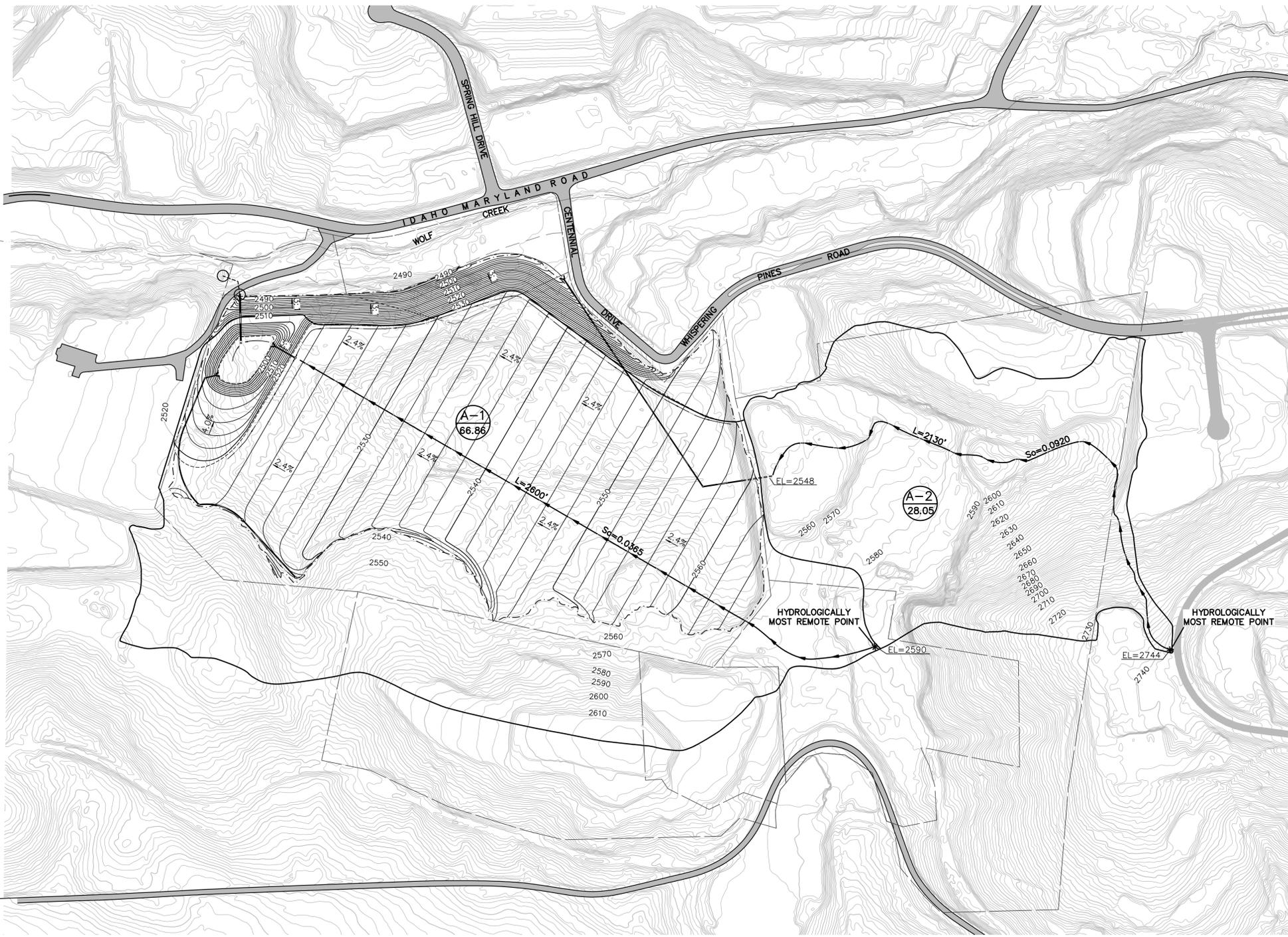
**LEGEND:**

-  DRAINAGE SUBAREA BOUNDARY
-  EXISTING CONTOUR W/ ELEVATION
-  PROPERTY LINE
-  DRAINAGE SUBAREA DESIGNATION  
ACREAGE OF SUBAREA

REVISION:	DATE:	DESCRIPTION:

CENTENNIAL SITE  
**RISE GRASS VALLEY INC.**  
SEC. 26, T.16N., R.8E., M.D.M.  
NEVADA COUNTY , CALIFORNIA

**HYDROLOGY MAP  
PRE-DEVELOPMENT**



SCALE: 1" = 200'  
CONTOUR INTERVAL: 2'

LEGEND:

-  DRAINAGE SUBAREA BOUNDARY
-  EXISTING CONTOUR W/ ELEVATION
-  PROPOSED CONTOUR W/ ELEVATION
-  PROPOSED DAYLIGHT LINE
-  PROPOSED FLOWLINE OF CONCRETE V-DITCH
-  PROPERTY LINE
-  PROPOSED STORM DRAIN LINE
-  PROPOSED STORM DRAIN INLET
-  PROPOSED STORM DRAIN MANHOLE
-  DRAINAGE SUBAREA DESIGNATION
-  ACREAGE OF SUBAREA

REVISION:	DATE:	DESCRIPTION:

CENTENNIAL SITE  
**RISE GRASS VALLEY INC.**  
SEC. 26, T.16N., R.8E., M.D.M.  
NEVADA COUNTY , CALIFORNIA

HYDROLOGY MAP  
POST-DEVELOPMENT



 ZOH  
SCALE: 1" = 200'  
CONTOUR INTERVAL: 2'

REVISION:	DATE:	DESCRIPTION:

BRUNSWICK SITE  
**RISE GRASS VALLEY INC.**  
 SEC. 31, T.16N., R.9E., M.D.M.  
 NEVADA COUNTY , CALIFORNIA

HYDROLOGY MAP  
 PRE-DEVELOPMENT

**H-3**

- LEGEND:**
-  DRAINAGE SUBAREA BOUNDARY
  -  EXISTING CONTOUR W/ ELEVATION
  -  PROPERTY LINE
  -  DRAINAGE SUBAREA DESIGNATION  
ACREAGE OF SUBAREA



**ZOH**  
SCALE: 1" = 200'  
CONTOUR INTERVAL: 2'

**LEGEND:**

-  DRAINAGE SUBAREA BOUNDARY
-  EXISTING CONTOUR W/ ELEVATION
-  PROPOSED CONTOUR W/ ELEVATION
-  PROPOSED DAYLIGHT LINE
-  PROPOSED FLOWLINE OF CONCRETE V-DITCH
-  PROPERTY LINE
-  PROPOSED STORM DRAIN LINE
-  PROPOSED STORM DRAIN INLET
-  PROPOSED STORM DRAIN MANHOLE
-  DRAINAGE SUBAREA DESIGNATION
-  ACREAGE OF SUBAREA

REVISION:	DATE:	DESCRIPTION:

BRUNSWICK SITE  
**RISE GRASS VALLEY INC.**  
SEC. 31, T.16N., R.9E., M.D.M.  
NEVADA COUNTY , CALIFORNIA

**HYDROLOGY MAP  
POST-DEVELOPMENT**

