# Attachment 2

# Schematic Surface Water Management Plan

Written by: Sowmya Bulusu / Alexander Maestre Date: 12/07/06 Reviewed by: Ganesh Gopalakrishnan Date: 12/13/06

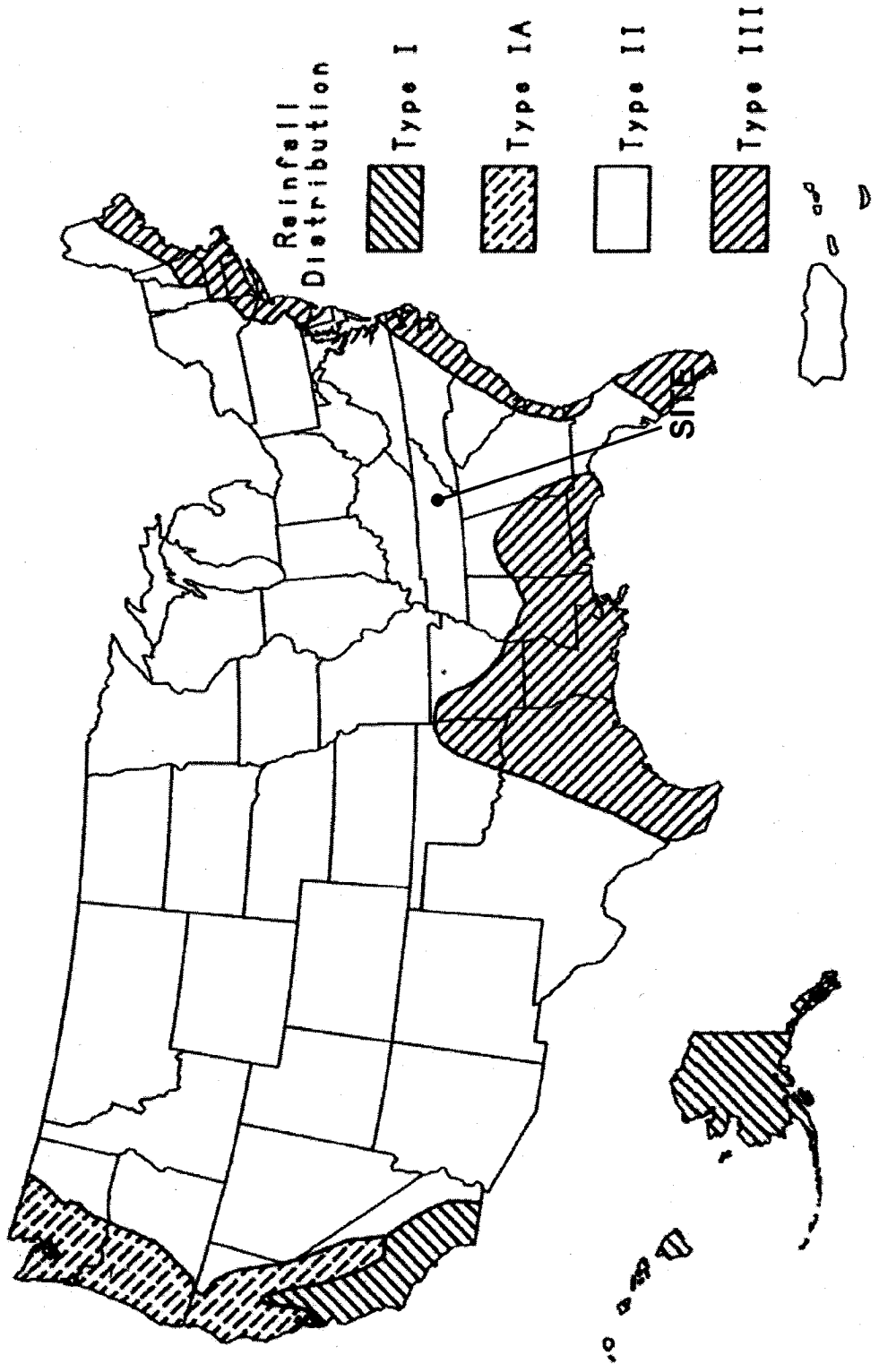
Client: TVA Project: Kingston Fossil Plant Gypsum Disposal Facility Project/Proposal No.: GR3731 Task No.: 06

# Attachment 3A

# Rainfall Distribution

Written by: Sowmya Bulusu / Alexander Maestre Date: 12/07/06 Reviewed by: Ganesh Gopalakrishnan Date: 12/13/06

Client: TVA Project: Kingston Fossil Plant Gypsum Disposal Facility Project/Proposal No.: GR3731 Task No.: 06



Written by: Sowmya Bulusu / Alexander Maestre Date: 12/07/06 Reviewed by: Ganesh Gopalakrishnan Date: 12/13/06

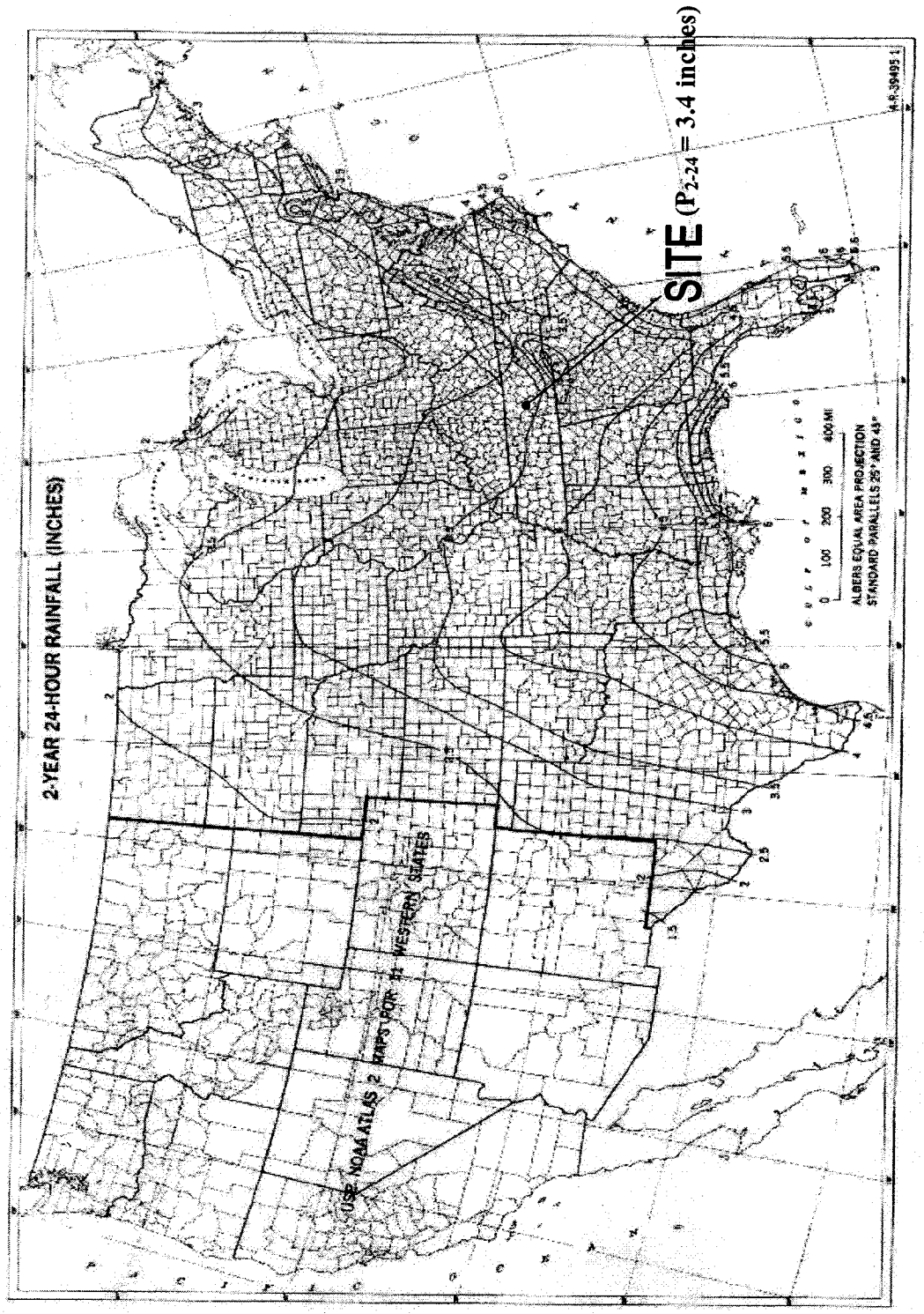
Client: TVA Project: Kingston Fossil Plant Gypsum Disposal Facility Project/Proposal No.: GR3731 Task No.: 06

# Attachment 3B

# Rainfall Depths

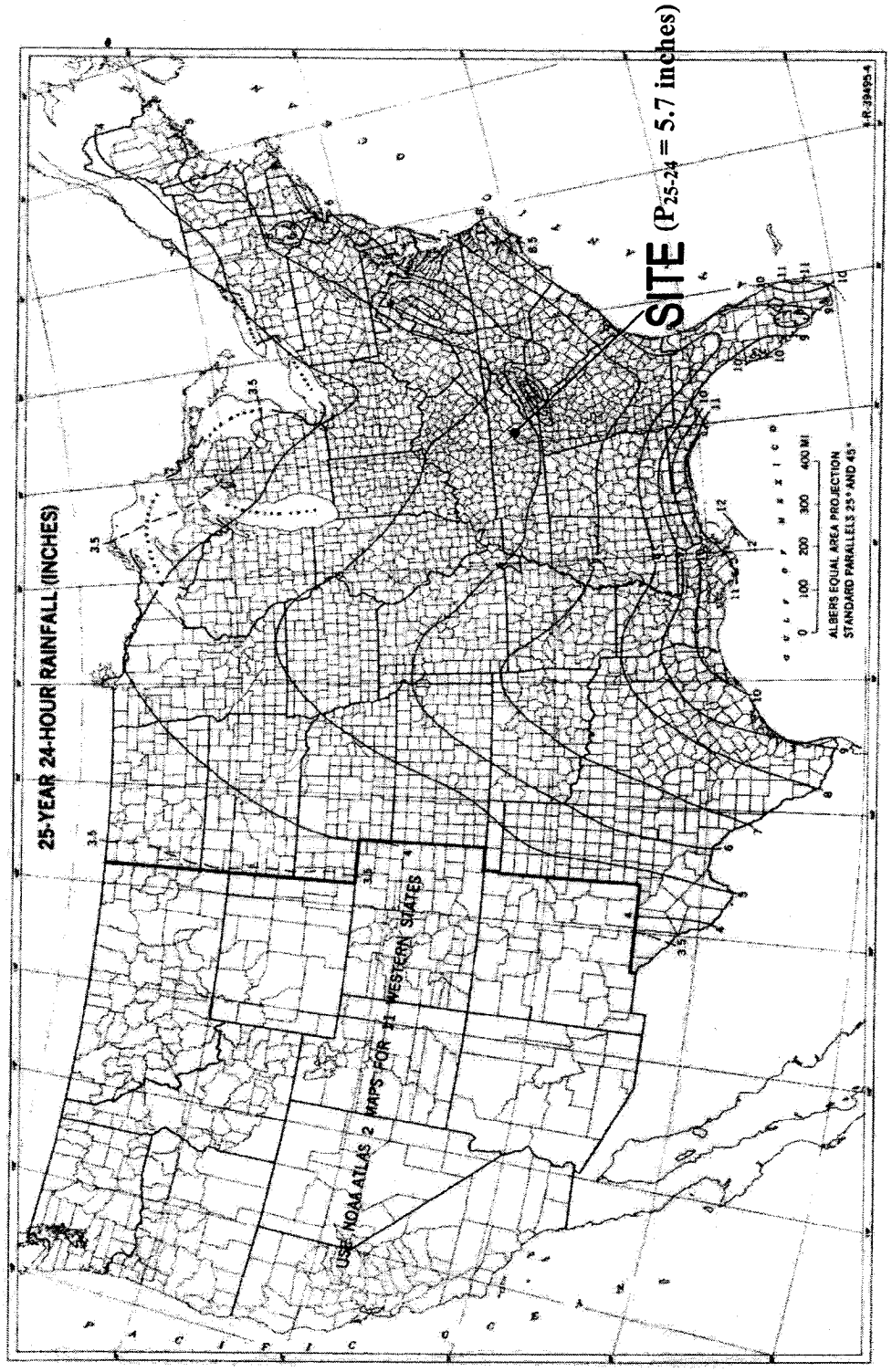
Written by: Sowmya Bulusu / Alexander Maestre Date: 12/07/06 Reviewed by: Ganesh Gopalakrishnan Date: 12/13/06

Client: TVA Project: Kingston Fossil Plant Gypsum Disposal Facility Project/Proposal No.: GR3731 Task No.: 06



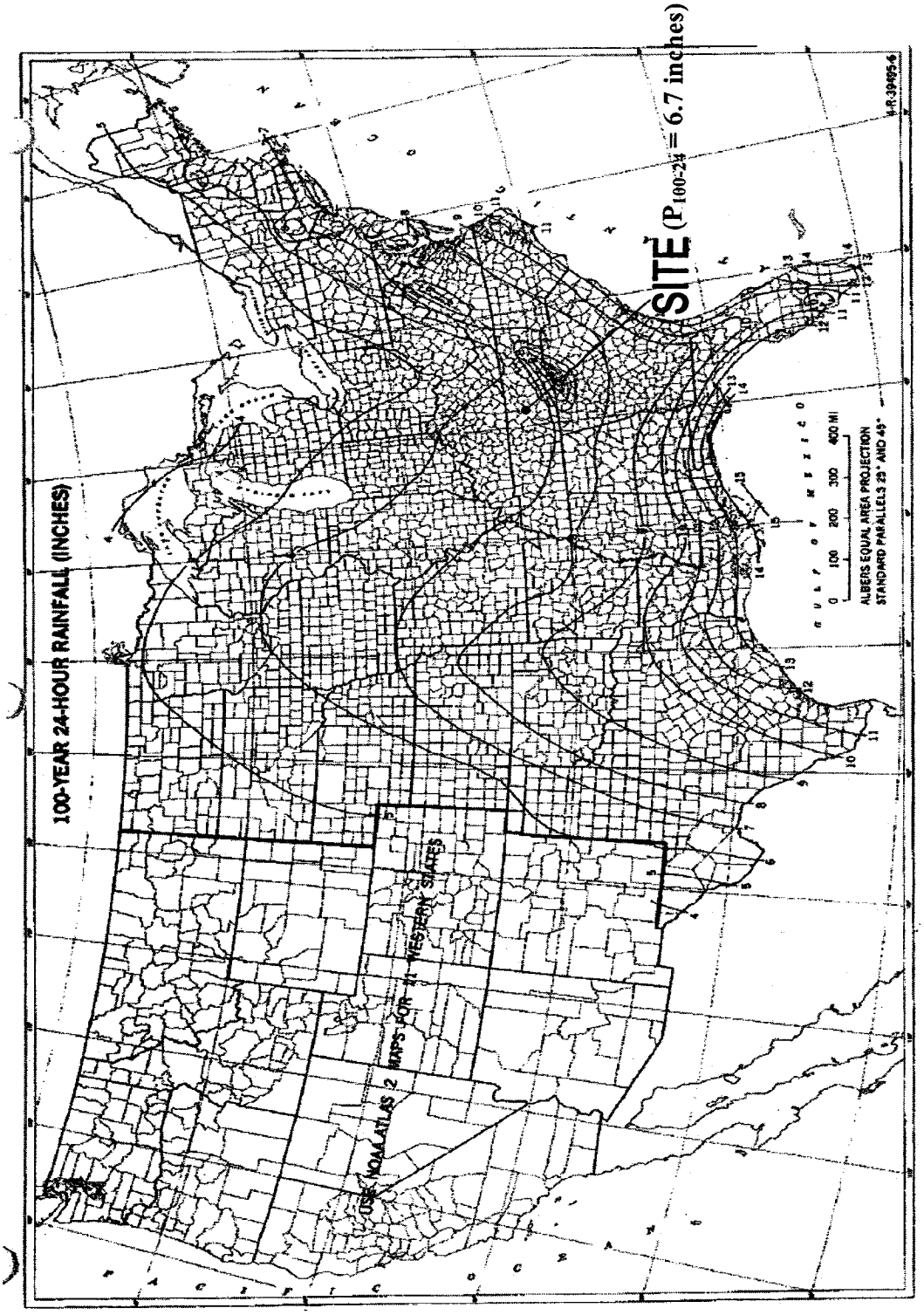
Written by: Sowmya Bulusu / Alexander Maestre Date: 12/07/06 Reviewed by: Ganesh Gopalakrishnan Date: 12/13/06

Client: TVA Project: Kingston Fossil Plant Gypsum Disposal Facility Project/Proposal No.: GR3731 Task No.: 06



Written by: Sowmya Bulusu / Alexander Maestre Date: 12/07/06 Reviewed by: Ganesh Gopalakrishnan Date: 12/13/06

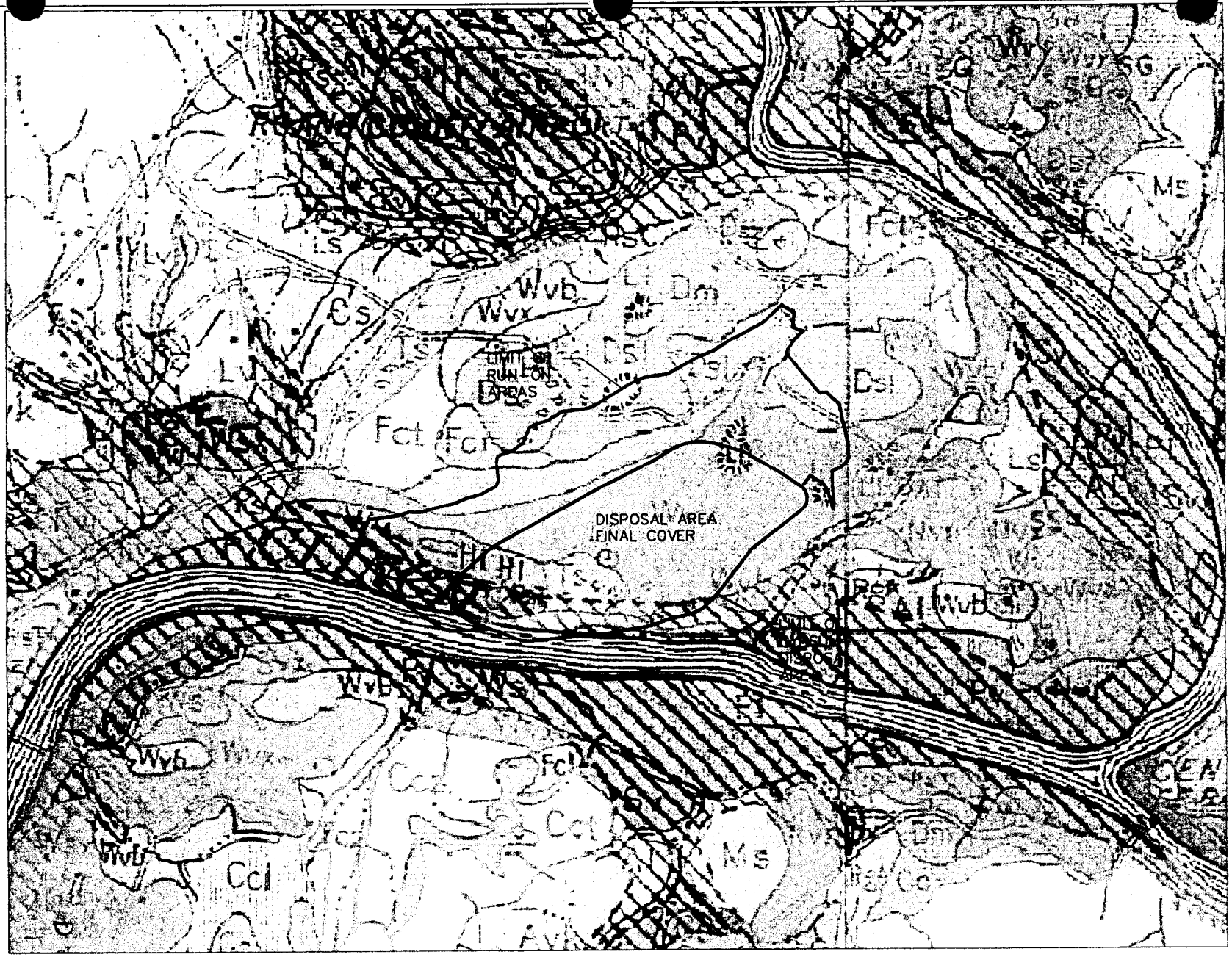
Client: TVA Project: Kingston Fossil Plant Gypsum Disposal Facility Project/Proposal No.: GR3731 Task No.: 06



# Attachment 4

# Hydrologic Soil Groups

**Source:** Natural Resources Conservation Service (NRCS) Web Soil Survey [http://websoilsurvey.nrcs.usda.gov/app/]




REGIONAL SOILS MAP FOR THE VICINITY OF THE SITE

NOTES:

1. THE SOIL MAP SHOWN ON THIS DRAWING IS OBTAINED FROM THE REPORT TITLED "SOIL SURVEY, ROANE COUNTY, TENNESSEE", BY USDA BUREAU OF PLANT INDUSTRY, SERIES 1936, NO. 15, ISSUED MAY 1942.
2. THE LIMITS OF DISPOSAL AREA , AND RUN-ON AREAS ARE DELINEATED APPROXIMATELY AND NOT TO SCALE.

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## TABLE 1. MAJOR TYPES OF SOILS FOR RUN-ON AREAS IN THE SOIL MAP

| Soil Unit [1] | Soil Unit Description [1] | Hydrologic Soil Group [2] |
|---|---|---|
| Dm | Dewey Silt Loam | B |
| Ds | Dewey Silt Clay Loam | B |
| Dsl | Dewey Silt Clay Loam, Hilly Phase | B |
| Fcr | Fullerton Cherty Silt Loam, Eroded Phase | B |
| Hl | Huntington Silt Loam | B |
| Wv | Waynesboro Very Fine Sandy Loam | B |
| Wvx | Waynesboro Very Fine Sandy Loam, Slope Phase | B |

Notes:
(1) Map Symbols and Map Soil Unit Names for the soil survey area obtained from the report titled "Soil Survey, Roane County, Tennessee", by USDA Bureau of Plant Industry, Series 1936, No. 15, Issued May 1942.
(2) Hydrologic Soil Groups for the soil groups obtained from SCS [1986], and http://www.aces.edu/department/aawm/ALSoilHydroGroups.pdf.

# Attachment 5

# Curve Number

Written by: Sowmya Bulusu / Alexander Maestre Date: 12/07/06 Reviewed by: Ganesh Gopalakrishnan Date: 12/13/06

Client: TVA Project: Kingston Fossil Plant Gypsum Disposal Facility Project/Proposal No.: GR3731 Task No.: 06

**Table 2-2a** Runoff curve numbers for urban areas [1]

| Cover description: Cover type and hydrologic condition | Average percent impervious area [2] | Curve numbers for hydrologic soil group: A | B | C | D | |
|---|---|---|---|---|---|---|
| *Fully developed urban areas (vegetation established)* | | | | | | |
| Open space (lawns, parks, golf courses, cemeteries, etc.) [3]: | | | | | | |
| Poor condition (grass cover < 50%) | | 68 | 79 | 86 | 89 | |
| Fair condition (grass cover 50% to 75%) | | 49 | 69 | 79 | 84 | |
| Good condition (grass cover > 75%) | | 39 | 61 | 74 | 80 | Final Cover |
| Impervious areas: | | | | | | |
| Paved parking lots, roofs, driveways, etc. (excluding right-of-way) | | 98 | 98 | 98 | 98 | Roads |
| Streets and roads: | | | | | | |
| Paved; curbs and storm sewers (excluding right-of-way) | | 98 | 98 | 98 | 98 | |
| Paved; open ditches (including right-of-way) | | 83 | 89 | 92 | 93 | |
| Gravel (including right-of-way) | | 76 | 85 | 89 | 91 | |
| Dirt (including right-of-way) | | 72 | 82 | 87 | 89 | |
| Western desert urban areas: | | | | | | |
| Natural desert landscaping (pervious areas only) [4] | | 63 | 77 | 85 | 88 | |
| Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders) | | 96 | 96 | 96 | 96 | |
| Urban districts: | | | | | | |
| Commercial and business | 85 | 89 | 92 | 94 | 95 | |
| Industrial | 72 | 81 | 88 | 91 | 93 | |
| Residential districts by average lot size: | | | | | | |
| 1/8 acre or less (town houses) | 65 | 77 | 85 | 90 | 92 | |
| 1/4 acre | 38 | 61 | 75 | 83 | 87 | |
| 1/3 acre | 30 | 57 | 72 | 81 | 86 | |
| 1/2 acre | 25 | 54 | 70 | 80 | 85 | |
| 1 acre | 20 | 51 | 68 | 79 | 84 | |
| 2 acres | 12 | 46 | 65 | 77 | 82 | |
| *Developing urban areas* | | | | | | |
| Newly graded areas (pervious areas only, no vegetation) [5] | | 77 | 86 | 91 | 94 | |
| Idle lands (CN's are determined using cover types similar to those in table 2-2c). | | | | | | |

[1] Average runoff condition, and $I_a = 0.2S$.

[2] The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.

[3] CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

[4] Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

[5] Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

**Table 2-2c** Runoff curve numbers for other agricultural lands [1]

| Cover description | | Curve numbers for hydrologic soil group | | | |
|---|---|---|---|---|---|
| Cover type | Hydrologic condition | A | B | C | D |
| Pasture, grassland, or range—continuous forage for grazing. [2] | Poor | 68 | 79 | 86 | 89 |
| | Fair | 49 | 69 | 79 | 84 |
| | Good | 39 | 61 | 74 | 80 |
| Meadow—continuous grass, protected from grazing and generally mowed for hay. | — | 30 | 58 | 71 | 78 |
| Brush—brush-weed-grass mixture with brush the major element. [3] | Poor | 48 | 67 | 77 | 83 |
| | Fair | 35 | 56 | 70 | 77 |
| | Good | 30 [4] | 48 | 65 | 73 |
| Woods—grass combination (orchard or tree farm). [5] | Poor | 57 | 73 | 82 | 86 |
| | Fair | 43 | 65 | 76 | 82 |
| | Good | 32 | 58 | 72 | 79 |
| Woods. [6] | Poor | 45 | 66 | 77 | 83 |
| | Fair | 36 | 60 | 73 | 79 |
| | Good | 30 [4] | 55 | 70 | 77 |
| Farmsteads—buildings, lanes, driveways, and surrounding lots. | — | 59 | 74 | 82 | 86 |

Run-on Areas

1 Average runoff condition, and $I_a = 0.2S$.

2 *Poor:* <50%) ground cover or heavily grazed with no mulch.
*Fair:* 50 to 75% ground cover and not heavily grazed.
*Good:* > 75% ground cover and lightly or only occasionally grazed.

3 *Poor:* <50% ground cover.
*Fair:* 50 to 75% ground cover.
*Good:* >75% ground cover.

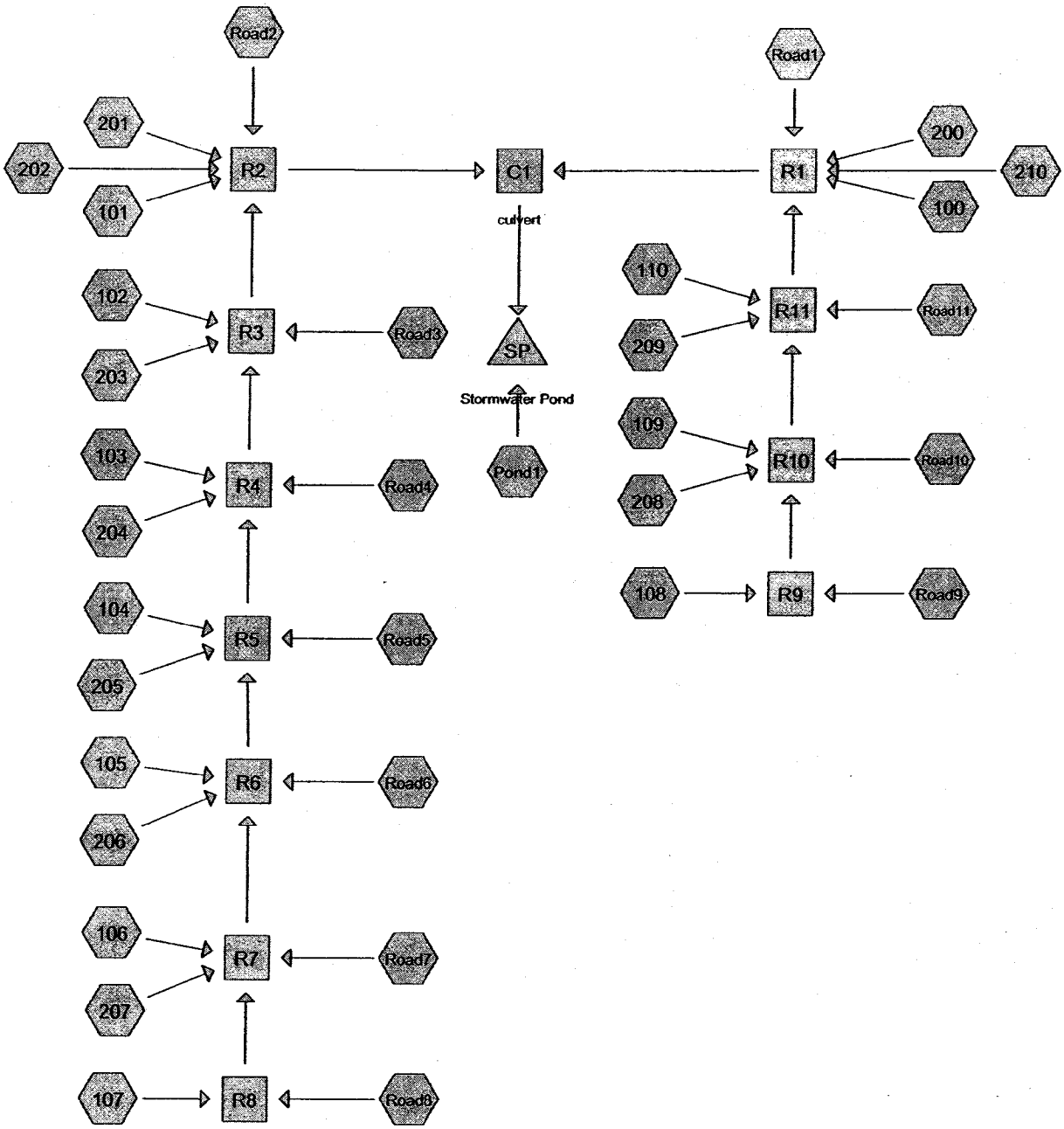
4 Actual curve number is less than 30; use CN = 30 for runoff computations.

5 CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.

6 *Poor:* Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.
*Fair:* Woods are grazed but not burned, and some forest litter covers the soil.
*Good:* Woods are protected from grazing, and litter and brush adequately cover the soil.

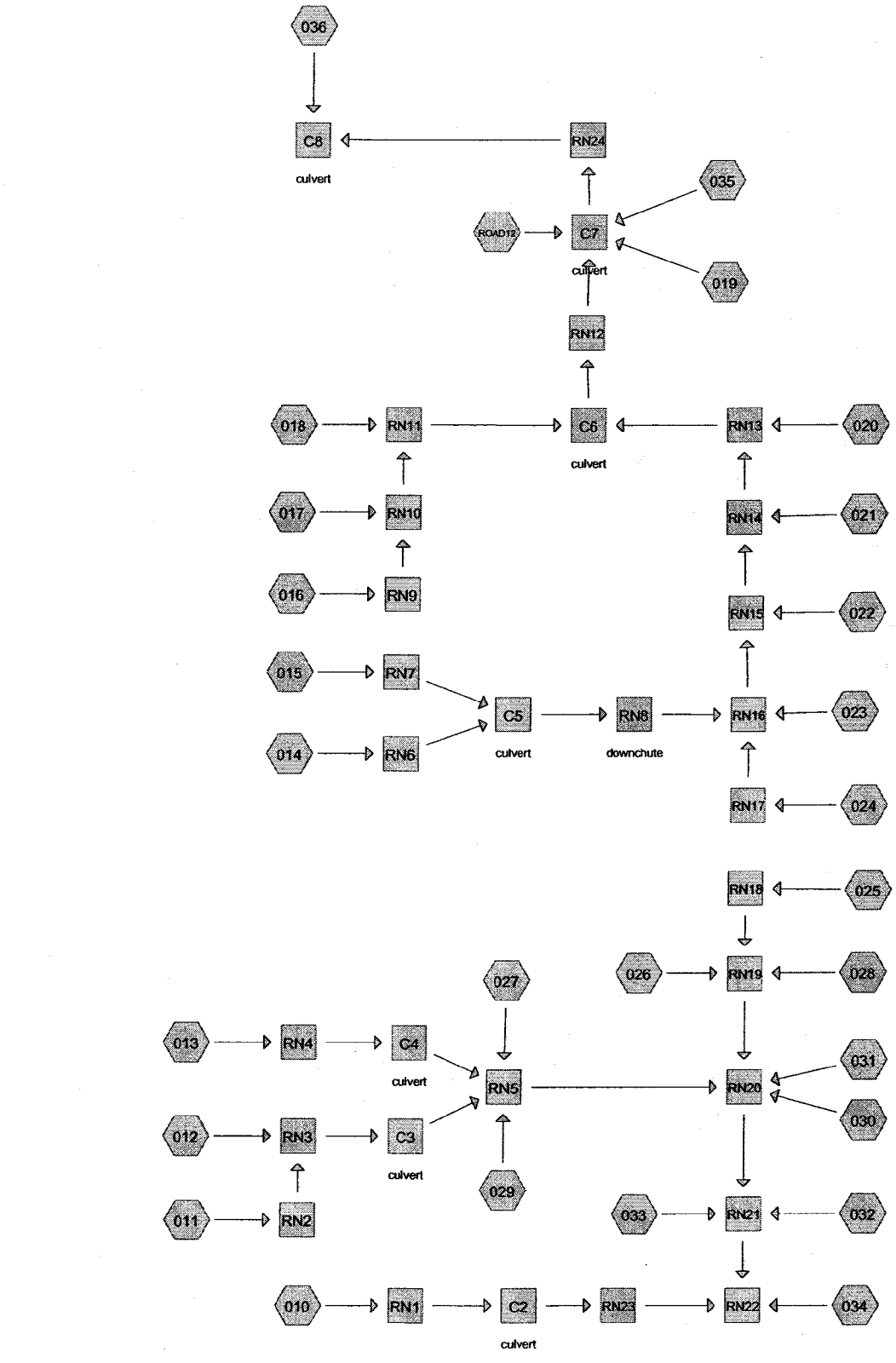
# Attachment 6

# Nodal Network Diagrams




Subcat Reach Pond Link

**Drainage Diagram for Disposal Area Cover System**
Prepared by GeoSyntec Consultants 5/10/2006
HydroCAD® 7.10 s/n 000929 © 2005 HydroCAD Software Solutions LLC




**Drainage Diagram for Run-On Areas AM 120706**
Prepared by Geosyntec Consultants 12/18/2006
HydroCAD® 7.10 s/n 003933 © 2005 HydroCAD Software Solutions LLC

# Attachment 7

# Properties of Subareas

## METHODOLOGY

The Time of concentration (Tc) is generally defined as the time required for a drop of water to travel from the most hydrologically remote point in the subcatchment to the point of collection. Tc for each subarea was calculated as the travel time along the assumed longest flow path within the subarea. The assumed longest flow paths for each subarea are shown on the figure "Post-Development Watershed Delineation" in Attachment 2.

Along each assumed flow path, the flow was subdivided into various segments based on flow type (i.e., sheet flow, shallow concentrated flow, ditch flow and culvert/pipe flow). The length and longitudinal slope for each flow type were estimated. The travel time for each segment was calculated based on methods appropriate for each flow type. The travel time along the flow path was calculated as the sum of the travel times for individual segments. The calculations of travel time assumed flow paths are shown in the following tables.

The curve number (CN) and Tc for each subarea were used as input parameters for modeling using computer program HydroCAD.