

# MEMPHIS STONE AND GRAVEL CO.

ESTABLISHED 1910

HIGHWAY CONTRACTOR • AGGREGATE PRODUCER

GENERAL OFFICES  
P.O. BOX 1683  
MEMPHIS, TN 38101

August 7, 2007

Mr. Don Owens  
NPDES Program Manager  
TDEC Mining Section  
3711 Middlebrook Pike, Suite 220  
Knoxville, TN 37921-6538

**RE: NPDES Application  
Memphis Stone and Gravel Company  
Atoka Aggregate Facility  
Proposed NPDES Permit TN0079821**

Dear Don:

Memphis Stone and Gravel Company (MS&G) submits this letter in response to your comments described in a letter dated July 24, 2007 (certified mail 70062760000283240584). Outlined below are your specific comments and following them are our responses.

The location of Monitoring Point 001 within Process Basin 3 is inconsistently shown on the *Drainage Management Plan Maps* for Phases 1, 2, and 3. In Phase 1, the outfall is in the northeast corner, in Phase 2 it's in the southeast corner, and then in Phase 3 it is shown to the east of the northeast corner of the basin. Please explain why the outfall changes locations or revise the maps to show the outfall in the same place.

The inconsistent location of Monitoring Point 001 was an oversight when the maps were redrawn for the revised application. DMP-001 should remain at the same location for the life of the project. New Drainage Management Plan Maps for Phases 1, 2, and 3 are enclosed.

The *Drainage Management Plan Maps* show the direction of treatment water as it circulates through the process basins. Water circulates by gravity flow from Basins 1 to 2 and Basins 2 to 3, while water is pumped from Basin 4 to Basin 1 and from Basin 3 to the Pumping Pond. Please describe the size and placement (with reference to the stream) of the pipe connecting Basin 4 to Basin 1 and Basin 3 to the Pumping Pond. Also provide a pipe maintenance plan for preventing leaks from impacting the stream.

During the first 6-9 months of production, plant *discharge* water will be pumped from the plant site across the stream in two independent pipelines. One pipe will discharge process water from the primary plant and the pipe will be ~16 inches in diameter. The other pipe will discharge process water from the secondary plant and will be ~10 inches in diameter. These pipes will be sized according to the maximum pumping rates expected at the plant site, which is a function of distance and head pressure. At this time we anticipate a maximum pumping distance of 1500 feet with about 40 feet of hydraulic head. We anticipate wasting very little sand, which will lessen the pumping burden, but this is subject to change according to the economics of the materials produced. Consequently, the design pumping capacity will likely be oversized for most of the project. Both pipes will be together when crossing the stream and the crossing will be located along the conveyor road which crosses the stream near its center. The pipes will discharge on the southeastern side of Basin 1.

Following the mining of MS&G Area A (6 to 9 months) Basin 4 will come on-line and discharge water will be directed to it and it will become the initial settling basin. The process water will then be directed to Basin 1 by a portable high capacity pump (see enclosed example) through *one* pipe, which will likely be in the 12 to 16 inch range. Note that this water will have very little coarse particles and will be easier to pump than at initial startup. We anticipate the crossing point to be very close to that illustrated by the Process Flow Line on the Drainage Management Plan Map, but it could be shifted according to the streams geometry.

*Return* “clean” water will be pumped from Basin 3 back to the pumping pond (with a similar high capacity pump) for the life of the project. Water from Basin 3 is essentially clean enough to reuse and will be pumped to the pumping pond for temporary storage prior to restarting the cycle. The location where the pipe crosses the stream will be along the conveyor road.

As part of its pipe management program, MS&G has developed several preventative maintenance measures to prevent pipe failures. Pipes are inspected for leaks on a daily basis by plant personnel. Depending on the degree coarse particles are being pumped, pipes are rotated 12 to 18 months 90 degrees then replaced every 6 to 8 years. The discharge pipes will be placed in either a culvert, tray or trench where it crosses the stream to provide it with a secondary means of containment. Pipe segments are usually 160 feet long and any joints will be approximately 50 to 80 feet from the stream.

The application states that water from Stormwater Basin 001 will be pumped to the Process Basins. However, even though treated water from this basin will be pumped to the process plant, a monitoring point should be added at the emergency spillway in the instance there is a discharge. Please revise the EPA form 2D, the water flow diagram, drainage plan narrative, and maps as necessary to include this new discharge monitoring point.

MS&G will create a temporary DMP at the emergency spillway at Stormwater Basin 001. The DMP will be SW-00A. The appropriate revisions to EPA form 2D, the water flow diagram, narrative, and maps have been made and are enclosed.

Describe how the streams in the middle area and the western end of the site will be protected from initial construction of basins and general mining activity, (i.e. vegetated buffer zone on either side of the stream or maintaining forested cover along the stream banks).

An undisturbed buffer, 50 feet wide, will be maintained at these locations except where crossings are required as allowed by the ARAPs. Note: The word "western" described above should have read "eastern" as per discussion with Ms. Kristen Gettelfinger of TDEC.

On either the Site Drainage Maps or the Location Map, more clearly label the process plant site, and Areas A, B, C, etc., within each of the different land areas (Crum, Smith, and MS&G).

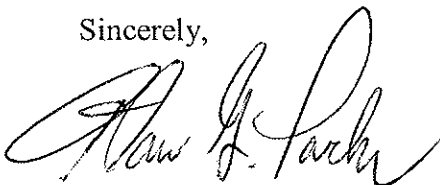
A new location map illustrating these areas is enclosed.

Enclosed with this correspondence, is the General Permit for Alteration of a Wet Weather Conveyance. Please note that while the permit does not require notification, it does have some terms and conditions that must be followed.

Alterations of the wet weather conveyances will meet the conditions of the general permit.

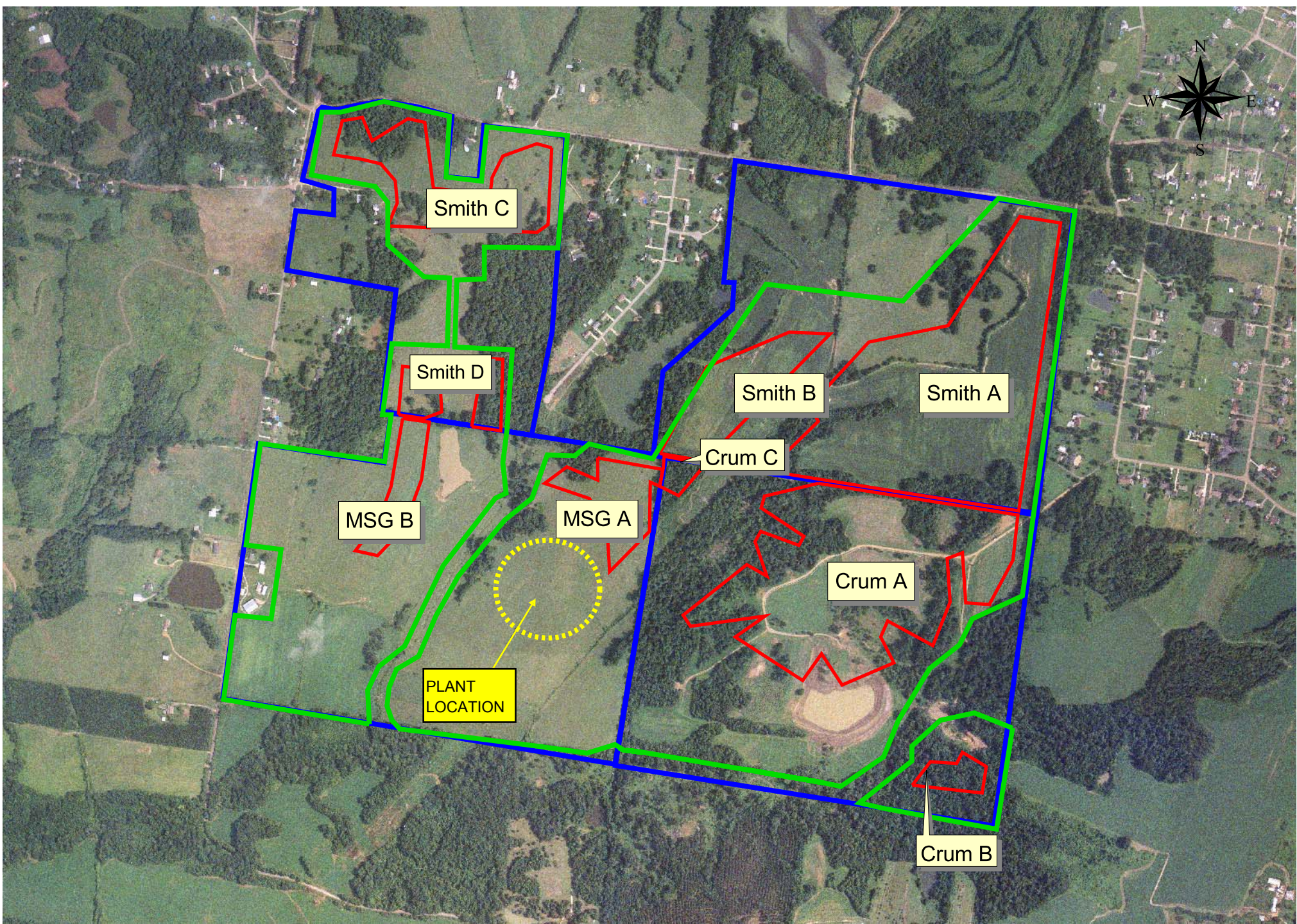
Please contact Bill Kelley or me if you have additional questions or comments at (901) 774-7874 or email at [alan.parks@msgravel.com](mailto:alan.parks@msgravel.com).

Sincerely,



Alan Parks  
Memphis Stone and Gravel Company

Enclosure



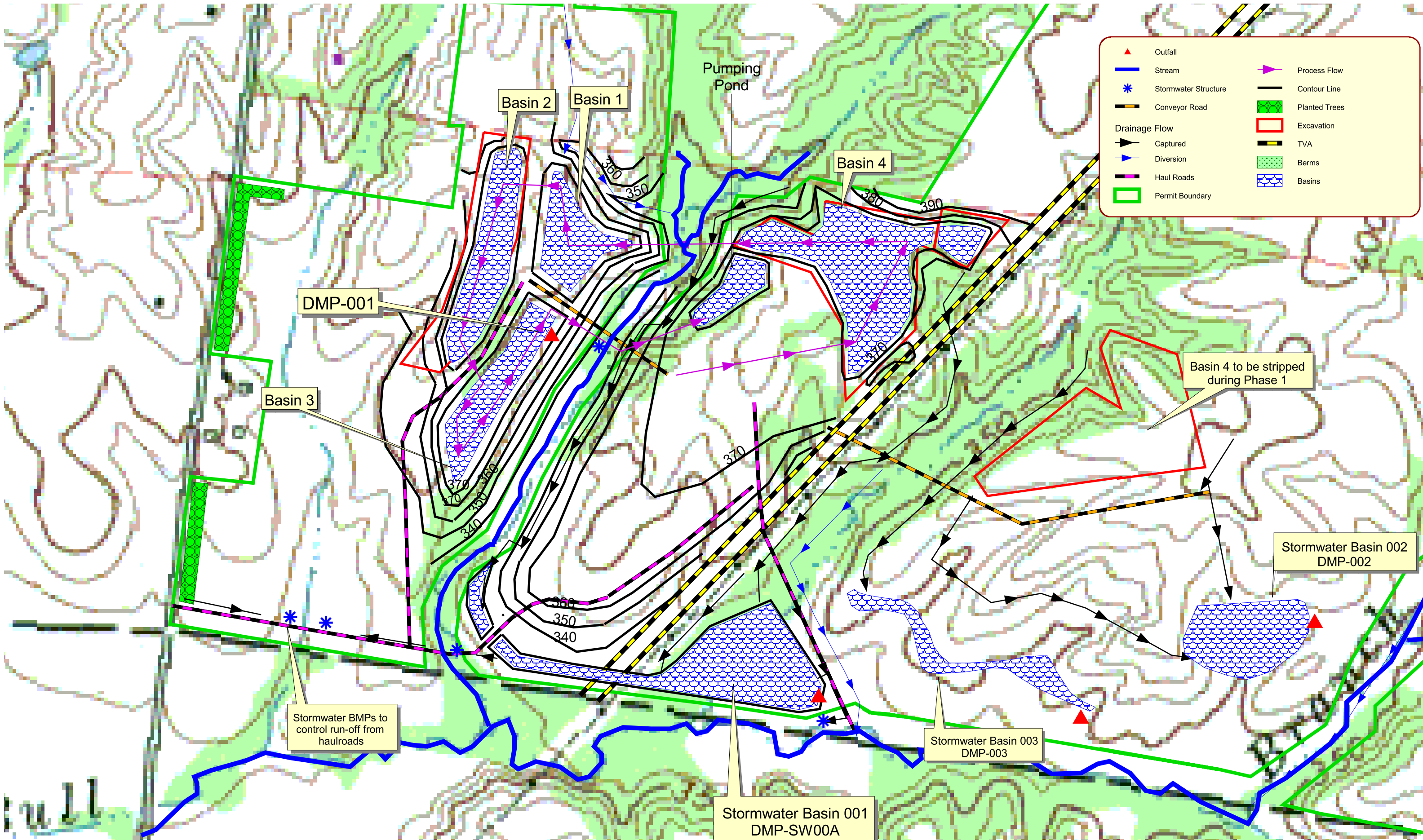
500 0 500 1000 1500 2000 2500 Feet



1:12000

-  Permit Boundary
-  Reserve Boundary
-  Property Boundary

Memphis Stone & Gravel Company  
Mine Area Identification Map  
Atoka Aggregate Facility  
NPDES Application  
Tipton County, TN  
March 1, 2007 AGP



- |                      |                      |  |               |
|----------------------|----------------------|--|---------------|
|                      | Outfall              |  | Process Flow  |
|                      | Stream               |  | Contour Line  |
|                      | Stormwater Structure |  | Planted Trees |
|                      | Conveyor Road        |  | Excavation    |
| <b>Drainage Flow</b> |                      |  | TVA           |
|                      | Captured             |  | Berms         |
|                      | Diversion            |  | Basins        |
|                      | Haul Roads           |  |               |
|                      | Permit Boundary      |  |               |

DMP-001

Basin 3

Basin 2

Basin 1

Pumping Pond

Basin 4

Basin 4 to be stripped during Phase 1

Stormwater Basin 002  
DMP-002

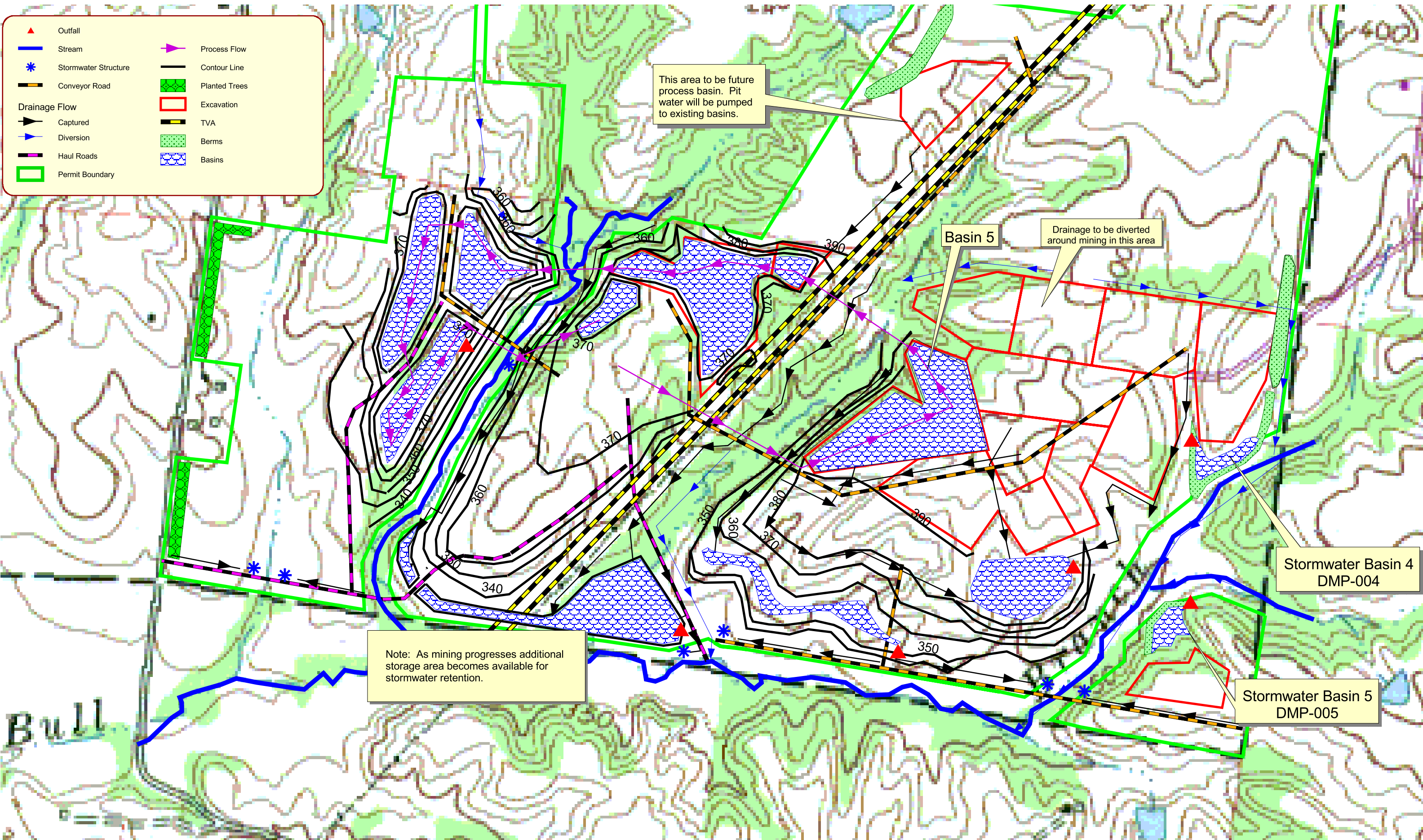
Stormwater BMPs to control run-off from haulroads

Stormwater Basin 001  
DMP-SW00A

Stormwater Basin 003  
DMP-003

400 0 400 Feet  
1:4800

- ▲ Outfall
- Stream
- \* Stormwater Structure
- Conveyor Road
- Drainage Flow
- ▲ Captured
- ▲ Diversion
- Haul Roads
- Permit Boundary
- Process Flow
- Contour Line
- Planted Trees
- Excavation
- TVA
- Berms
- Basins



This area to be future process basin. Pit water will be pumped to existing basins.

Basin 5

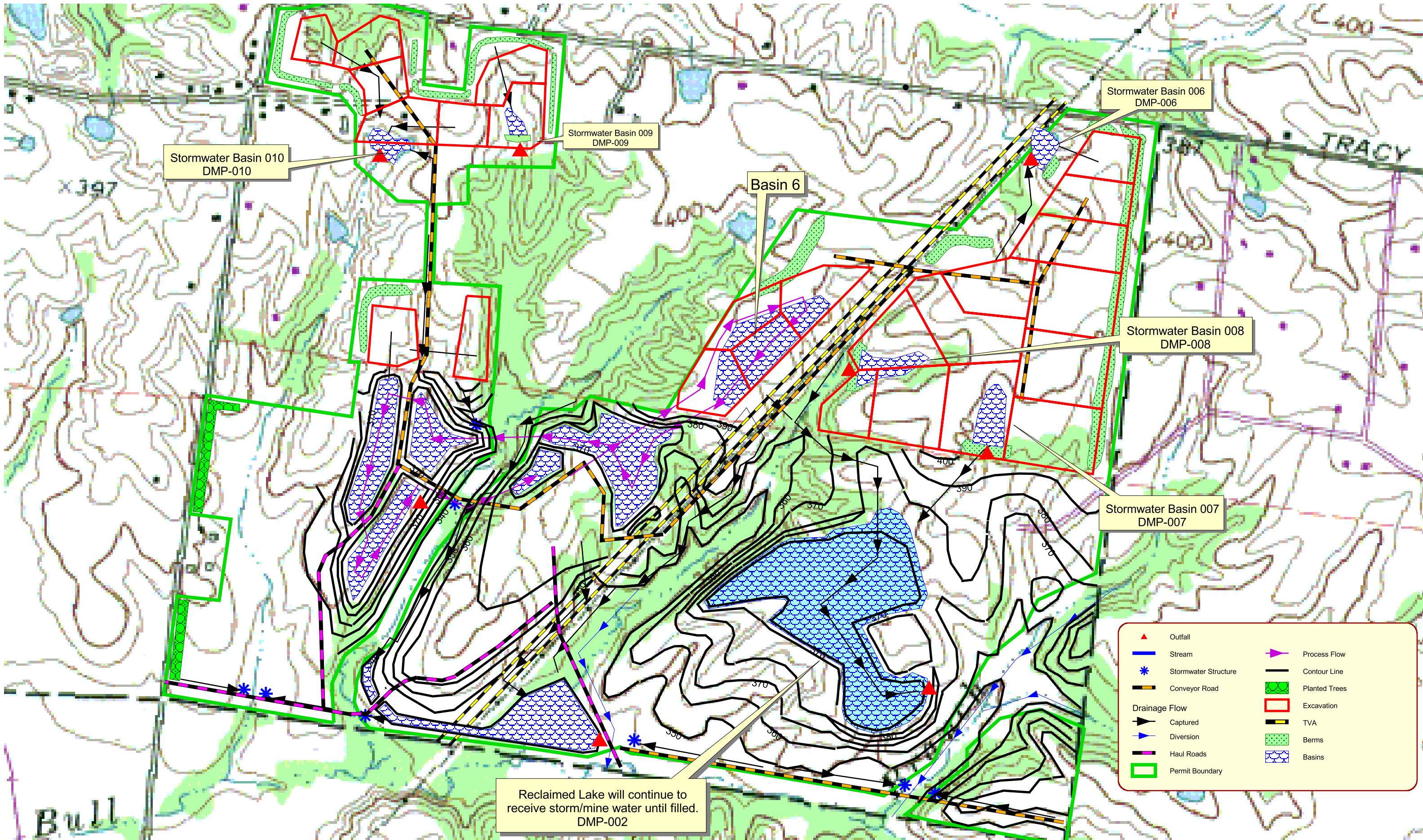
Drainage to be diverted around mining in this area

Stormwater Basin 4  
DMP-004

Note: As mining progresses additional storage area becomes available for stormwater retention.

Stormwater Basin 5  
DMP-005

500 0 500 Feet  
1:6000



Stormwater Basin 010  
DMP-010

Stormwater Basin 009  
DMP-009

Basin 6

Stormwater Basin 006  
DMP-006

Stormwater Basin 008  
DMP-008

Stormwater Basin 007  
DMP-007

Reclaimed Lake will continue to  
receive storm/mine water until filled.  
DMP-002

- |  |                      |  |               |
|--|----------------------|--|---------------|
|  | Outfall              |  | Process Flow  |
|  | Stream               |  | Contour Line  |
|  | Stormwater Structure |  | Planted Trees |
|  | Conveyor Road        |  | Excavation    |
|  | Captured             |  | TVA           |
|  | Diversion            |  | Berms         |
|  | Haul Roads           |  | Basins        |
|  | Permit Boundary      |  |               |

600 0 600 Feet  
1:7200

Corporate Office: One Floodgate Road, Bridgeport, NJ 08014 · voice 856-467-3636 · fax 856-467-4841

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# CD400M Dri-Prime® Pumps

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Pipe, Hose, Fittings

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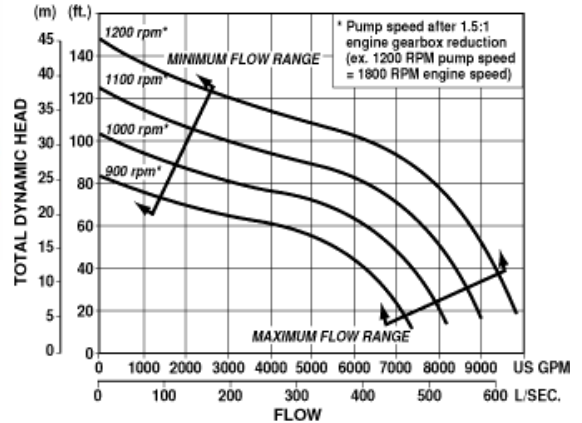
### REQUEST INFORMATION



Godwin's CD400M Dri-Prime is an 18" x 16" (450mm x 400mm) centrifugal trash pump perfect for your biggest jobs. Offering flows to 10,000 gallons per minute (631 l/sec.), discharge heads to 150' (46 meters), and solids handling to 5" (125mm) in diameter, the CD400M moves large volumes of water and provides the ease of automatic priming to 28 feet (8.5 meters). For intermittent flows, the double high pressure mechanical seal means the CD400M can run dry indefinitely without damage. And the underslung discharge flange makes pump connections easy and efficient. When your job calls for both high volume and high head, the Godwin CD400M is the pump that does it all.

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Form <b>2D</b> NPDES		<b>New Sources and New Dischargers</b> <b>Application for Permit to Discharge Process Wastewater</b>
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**I. Outfall Location**

For this outfall, list the latitude and longitude, and name of the receiving water(s)

Outfall Number (list)	Latitude			Longitude			Receiving Water (name)
	Deg	Min	Sec	Deg	Min	Sec	
001	35	23	52.39	89	47	34.65	Unnamed tributary of Bull Branch
002	35	23	38.94	89	46	56.15	Unnamed tributary of Bull Branch
003	35	23	34.30	89	47	09.21	Unnamed tributary of Bull Branch
004	35	23	46.71	89	46	48.79	Unnamed tributary of Bull Branch
005	35	23	37.73	89	46	48.24	Unnamed tributary of Bull Branch
006	35	24	15.97	89	46	49.37	Unnamed tributary of Big Branch
007	35	23	55.56	89	46	52.06	Unnamed tributary of Bull Branch
008	35	24	0.93	89	47	03.89	Unnamed tributary of Bull Branch
009	35	24	26.81	89	47	32.84	Unnamed tributary of Bull Branch
010	35	24	14.47	89	47	44.04	Unnamed tributary of Bull Branch
SW00A	35	23	34.35	89	47	21.93	Unnamed tributary of Bull Branch

**II. Discharge Date** (When do you expect to begin discharging?)  
1/1/10

**III. Flows, Sources of Pollution, and Treatment Technologies**

A. For each outfall, provide a description of (1) all operations contributing wastewater to the effluent, including process wastewater, sanitary wastewater, cooling water, and stormwater runoff; (2) the average flow contributed by each operation; and (3) the treatment received by the wastewater. Continue on additional sheets if necessary.

Outfall Number	1. Operations Contributing Flow (list)	2. Average Flow (include units)	3. Treatment (Description of list Codes from Table 2D-1)
001	Material processing, stormwater, mine dewatering	40 cuft/min	1G and 1U
002	Stormwater and mine dewatering	40 cuft/min	1G and 1U
003	Stormwater and mine dewatering	40 cuft/min	1G and 1U
004	Stormwater and mine dewatering	40 cuft/min	1G and 1U
005	Stormwater and mine dewatering	40 cuft/min	1G and 1U
006	Stormwater and mine dewatering	40 cuft/min	1G and 1U
007	Stormwater and mine dewatering	40 cuft/min	1G and 1U
008	Stormwater and mine dewatering	40 cuft/min	1G and 1U
009	Stormwater and mine dewatering	40 cuft/min	1G and 1U
010	Stormwater and mine dewatering	40 cuft/min	1G and 1U
SW00A	Stormwater and mine dewatering	40 cuft/min	1G and 1U

B. Attach a line drawing showing the water flow through the facility. Indicate sources of intake water, operations contributing wastewater to the effluent, and treatment units labeled to correspond to the more detailed descriptions in Item III-A. Construct a water balance on the line drawing by showing average flows between intakes, operations, treatment units, and outfalls. If a water balance cannot be determined (e.g., for certain mining activities), provide a pictorial description of the nature and amount of any sources of water and any collection or treatment measures.

C. Except for storm runoff, leaks, or spills, will any of the discharges described in Item III-A be intermittent or seasonal?

Yes (complete the following table)       No (go to Item IV)

Outfall Number	1. Frequency		2. Flow		c. Duration (in days)
	a. Days Per Week (specify average)	b. Months Per Year (specify average)	a. Maximum Daily Flow Rate (in mgd)	b. Maximum Total Volume (specify with units)	
<b>001</b>	<b>2</b>	<b>6</b>	<b>1</b>	<b>12,000,000</b>	<b>12</b>
<b>002 through 010 and SW00A</b>	<b>1</b>	<b>3</b>	<b>0.40</b>	<b>g 300,000 g</b>	<b>1</b>

**IV. Production**

If there is an applicable production-based effluent guideline or NSPS, for each outfall list the estimated level of production (projection of actual production level, not designed), expressed in the terms and units used in the applicable effluent guideline or NSPS, for each of the first 3 years of operation. If production is likely to vary, you may also submit alternative estimates (attach a separate sheet).

Year	a. Quantity Per Day	b. Units of Measure	c. Operation, Product, Material, etc (specify)
			<b>Not Applicable</b>



C. Use the space below to list any of the pollutants listed in Table 2D-3 of the instructions which you know or have reason to believe will be discharged from any outfall. For every pollutant you list, briefly describe the reasons you believe it will be present.

1. Pollutant	2. Reason for Discharge
<b>None believed present</b>	

**VI. Engineering Report on Wastewater Treatment**

A. If there is any technical evaluation concerning your wastewater treatment, including engineering reports or pilot plant studies, check the appropriate box below.

Report Available       No Report

B. Provide the name and location of any existing plant(s) which, to the best of your knowledge, resembles this production facility with respect to production processes, wastewater constituents, or wastewater treatments.

Name <b>Memphis Stone &amp; Gravel Company          North Plant Facility- Area 1 and Area 7</b>	Location <b>See attached DMR</b>
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**VII. Other Information (Optional)**

Use the space below to expand upon any of the above questions or to bring to the attention of the reviewer any other information you feel should be considered in establishing permit limitations for the proposed facility. Attach additional sheets if necessary.

**VIII. Certification**

*I Certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.*

A. Name and Official Title (type or print)

**Alan Parks**

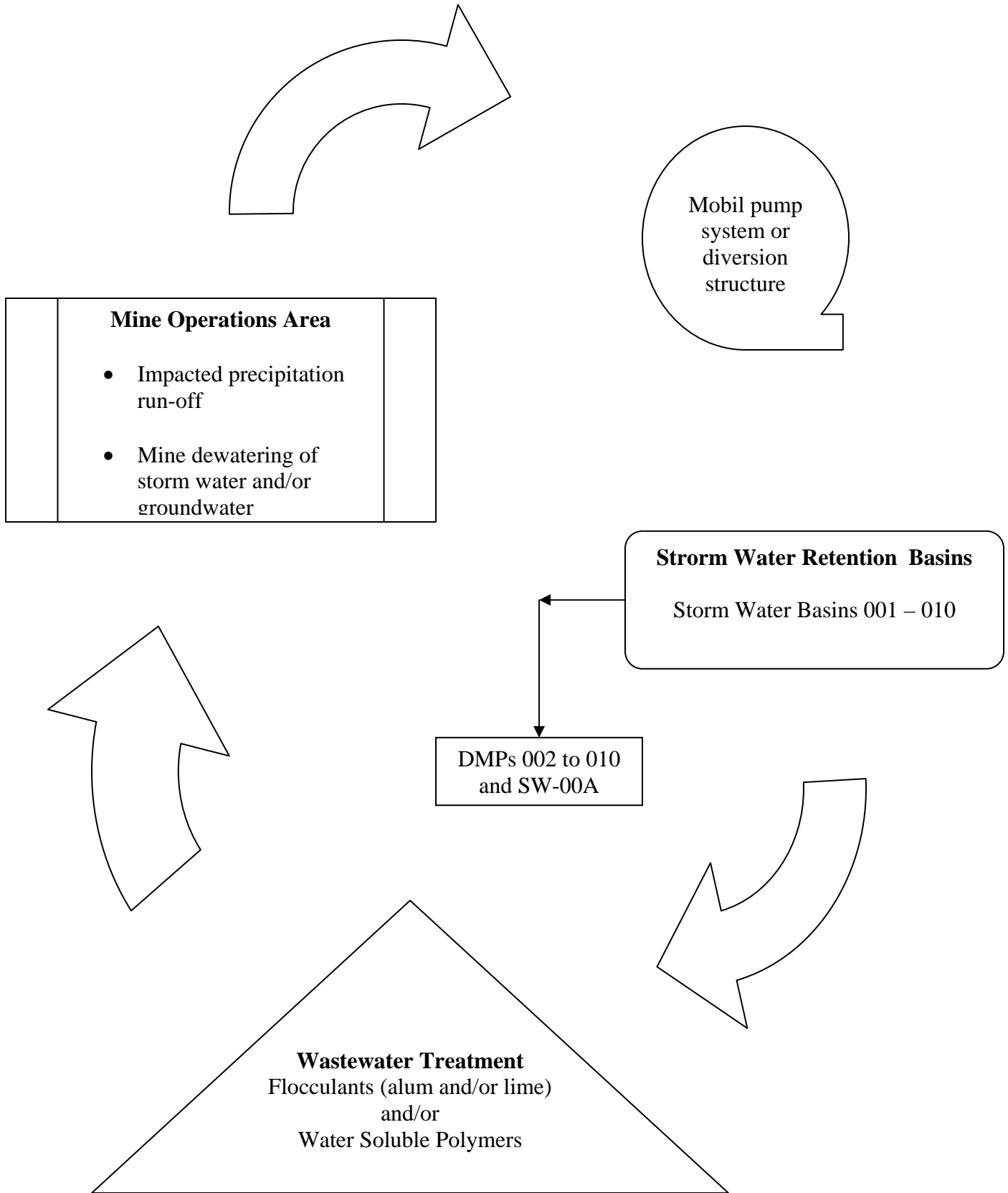
B. Phone No.

**(901) 774-7874**

C. Signature

D. Date Signed

**Line Schematic Diagram of Treatment System  
Stormwater Basins 001 to 010  
Memphis Stone and Gravel Company**



**Memphis Stone & Gravel Company**  
**Atoka Aggregate Facility**  
**Operations and Drainage Plan**  
**August 6, 2007 rev.**

**LOCATION**

Memphis Stone & Gravel Company  
560 Bethel Road  
Town of Atoka  
Tipton County, Tennessee  
Latitude: 35<sup>0</sup> 23' 52.39"  
Longitude: 89<sup>0</sup> 47' 34.65"

**PROJECT SUMMARY**

Memphis Stone & Gravel Company owns 179.73 acres, known locally as the Van Cleave Farm, in the southern part of Atoka city limits. The property is located on the east side of Bethel Road and is adjacent to the Tipton County and Shelby County border. Additionally Memphis Stone & Gravel Company has leased 339 acres on two adjacent properties (Crum and Smith properties). Memphis Stone & Gravel Company has obtained approval from the Town of Atoka to construct and operate an aggregate wash plant and to mine sand and gravel on properties owned and/or leased as described in this application (see Location Map, Appendix A).

An estimated 10 million tons of wash sand and gravel and 1 million tons of clay gravel will be processed at this facility. This is based on current reserve inventory. Sand and gravel mining operations will be conducted on three different parcels, but processing operations will be done at the Memphis Stone & Gravel Co. property. The attached maps illustrate the proposed locations.

Description of materials:

Anticipated Schedule

- |  |  |
|--|--|
| <ul style="list-style-type: none"><li>• Thickness of overburden= 25 ft.<br/>(Topsoil will be stockpiled<br/>for use during reclamation)</li><li>• Thickness of useable material = 25 ft.</li><li>• Total depth of excavation= 50 ft.</li><li>• Estimated annual production ~1,000,000<br/>tons</li></ul> | <ul style="list-style-type: none"><li>• Complete Permitting: Fall 2007</li><li>• Begin clearing: Fall 2010</li><li>• Finish Construction: Summer 2011</li><li>• Begin mining: Summer 2011</li><li>• Complete mining: 2022</li><li>• Begin reclamation: 2011</li><li>• Complete reclamation: 2025</li></ul> |
|--|--|

The total number of acres to be disturbed;

- 494 acres permitted, estimated disturbed area includes the following:
  - 182 acres to be mined (includes ~25 acres for water management)
  - ~30 acres plant site
  - ~15 acres haul/conveyor roads
  - ~10 acres berm area
  - ~10 acres storm water retention ponds (permanent)
  - ~5 acres storm water detention ponds (temporary)

**Memphis Stone & Gravel Company**  
**Atoka Aggregate Facility**  
**Operations and Drainage Plan**  
August 6, 2007

- ~15 acres constructed basins for water management
- ~15 acres for clay gravel storage
- ~15 acres miscellaneous storage area

## **MINING PROCEDURE AND ENVIRONMENTAL ANALYSIS**

Principle operations can be divided into 1) stripping, 2) mining, 3) processing, 4) sales and 5) reclamation. Stripping overburden is generally accomplished using scrapers, excavators and trucks, or a dragline. A hydraulic excavator (appx. 5 cubic yard) will be used to mine the sand and gravel. One to two front-end loaders will be used to feed the raw product to a conveyor system, which will transport the material to a wash-plant for processing. Haul roads and conveyor roads are identified on the Operations Maps.

Although reclamation is identified as the fifth step above, the bulk of the reclamation activity is done concurrently with stripping operations. As one pit is stripped the overburden is hauled to the previously stripped and mined pit. This is the most efficient process, as you do not want to “rehandle” overburden. Final grading follows and the site is stabilized with vegetation.

Pit run materials are processed by a stationary wash plant using water at ~5000 to 7000 gallons per minute to clean and separate the sand from the rock. A ten inch well will be installed to supply the process with fresh water. This process water is then directed to a series of sedimentation basins, which allows deposition of suspended sediment to occur. The process water, along with all captured stormwater run-off, is then recycled in the system. Furthermore, most precipitation run-off on the plant site is captured and used for process water. A water well is drilled to establish and then supplement the water source. The processed materials are separated into five basic products: 1) concrete sand, 2) masonry sand, 3) pea gravel, 4) size #57 gravel ( $\frac{1}{4}$  inch to  $\frac{3}{4}$  inch), and 5) oversize (+2 inch). The materials are then marketed primarily for construction aggregate. The finished products are loaded onto trucks using front-end loaders. Trucks are weighed and ticketed prior to them leaving the property. Clay gravel is stripped and stockpiled near the pit prior to mining the wash material. Clay gravel will normally not be conveyed; instead it is trucked in an “unprocessed” state directly to the job site.

This development is divided into four phases which has an operational life of 10 to 15 years. There will be a total of 11 discharge monitoring points (DMPs) associated with the project. Below is an outline of the activities of each phase.

### **Phase I**

- Grade plant site, general plant construction activity. MSG Area B will be mined and the material will be used to build most of plant site and haul roads.
- Build primary haul road into plant site
- Re-route drainage system and install temporary erosion control structures (e.g., check dams, silt fence, etc).

**Memphis Stone & Gravel Company**  
**Atoka Aggregate Facility**  
**Operations and Drainage Plan**  
August 6, 2007

- Construct process basin 1, 2, 3 and pumping pond
- Construct storm water basins 1 for plant site drainage
- Strip/Mine MSG Area A and Crum Area C (on plant site)
- Construct process basin 4
- Construct conveyor road to Crum Area A
- Construct storm water basin 2 and 3
- Strip first pit on Crum Area A (i.e., process basin 5). Overburden will be placed on southwest side of property to fill low lying areas.
- Mine Crum Area A, Pit 1
- Build Berm at Smith Area B

**Drainage Notes:**

- Outfall (DMP) 001 will be at Basin 3
- Outfall (DMP) SW00A will be at Stormwater Basin 001's emergency spillway
- Outfalls 002 and 003 will be constructed basins on Crum and will receive only storm/pit water S
- Check dams and/or small detention basins will be built to treat run-off from haul roads if necessary
- Plant site drainage routed to stormwater basins 001 will be pumped back to process basin 3.

**Phase II**

- Construct Process Basin 5
- Stormwater basins 004 (DMP-004) and 005 (DMP-005)
- Mine Crum Area A
- Construct Haul Road/Conveyor Road to Crum Area B
- Build conveyor road to Smith Area B
- Strip Smith Area B, pit 1 (Basin 6)
- Complete mining and reclamation on Crum Area A, B, and C.

**Drainage Notes:**

- Outfalls 001, 002, 003, 004, 005
- Modify drainage on Smith property, just east of TVA, to divert drainage water into Crum reclaimed lake to facilitate filling.

**Phase III**

- Disconnect Crum property from process flow
- Mine out Smith Area B
- Build conveyor road to Smith Area A, pit 1

**Memphis Stone & Gravel Company**  
**Atoka Aggregate Facility**  
**Operations and Drainage Plan**  
August 6, 2007

- Construct Process Basin 6
- Build conveyor road to Smith Area C
- Strip Smith Area C, Pit 1
- Complete mining and reclamation on Smith Area A
- Complete mining and reclamation on Smith Area C
- Complete mining and reclamation on Smith Area D

Drainage Notes:

- Outfalls 001, 002, 006, 007, 008, 009, 010

**Phase IV**

- Disconnect Smith from process flow
- Complete reclamation on all mined area
- Reclaim plant site (tentative)

Mined material is a naturally wet product and very little dust is generated by the actual mining activity. Occasionally, the haul roads will dry out and contribute to fugitive dust. Memphis Stone & Gravel Company uses water trucks to spray water on haul roads when conditions warrant. Wheel wash equipment and paved exit points are also used to control dust and material track-out onto public roads.

Memphis Stone & Gravel Company uses a variety of operational practices to help control noise. In most instances, operational areas are isolated with soil berms to help buffer noise and reduce our visibility to the public. Material stockpiles placed between operations and perimeters also reduce noise levels considerably. Memphis Stone & Gravel Company has begun using innovative MSHA approved backup alarms that eliminate “beep-beep” sounds from conventional alarms by using a different alarm sound frequency which quickly dissipates as it moves away from the alarm.

**EROSION CONTROL**

Memphis Stone & Gravel Company follows the practices described in the Tennessee Department of Environment and Conservation’s *Erosion and Sediment Control Handbook*, Second Edition, 2002, for environmental compliance. Erosion and sedimentation control is accomplished using a variety of engineering controls and practices including the following techniques/controls:

- Settling Ponds
- Diversion Berms
- Drainage Ditches

**Memphis Stone & Gravel Company**  
**Atoka Aggregate Facility**  
**Operations and Drainage Plan**  
August 6, 2007

- Terraced Slopes
- Temporary/permanent Seeding
- Silt Fence
- Check dams
- Temporary cover using mulch or seeding with grasses

**RECLAMATION AND REVEGETATION PLAN**

All topsoil is segregated from other less fertile parts of the overburden strata. Topsoil is stockpiled as berms around operational areas until it can be returned to promote re-vegetation. The berms are temporarily seeded with grass or mulched to reduce soil erosion. All high-walls are reduced to blend with the approximate original contour. Slopes are reduced to a gradient no steeper than 3 foot horizontal to 1 foot vertical (3:1).

The general plan for re-vegetation is to reestablish grass cover as quickly as possible following disturbance. This is accomplished by grading slopes then drilling in grass seed. Seeded areas are normally protected with temporary covering (e.g., blown hay, mulch) to reduce detachment during precipitation events. In some areas turf reinforced matting (TRM) may be used when ground conditions warrant. Seeded slopes will often be crimped. All discharge points will be reinforced using TRM or hard armor methods (e.g., rip rap).

Seeding for permanent re-vegetation should consist of the following characteristics:

<b>Seeding Dates</b>	<b>Grass Seed Variety</b>	<b>Percentages</b>
February 1 to July 1	Kentucky 31 Fescue Korean Lespedeza English Rye	80% 15% 5%
June 1 to August 15	Kentucky 31 Fescue English Rye Korean Lespedeza German Millet	55% 20% 15% 10%
April 15 to August 15	Bermuda (hulled) Annual Lespedeza	70% 30%
August 1 to December 1	Kentucky 31 Fescue English Rye White Clover	70% 20% 10%
February 1 to December 1	Kentucky 31 Fescue Crown Vetch English Rye	70% 25% 5%

Lime / Fertilizer Rates will generally be applied as follows:

**Memphis Stone & Gravel Company**  
**Atoka Aggregate Facility**  
**Operations and Drainage Plan**  
August 6, 2007

Initial planting-		For successive years prior to 100% release-
Lime:	3 tons/acre	Fertilizer (13/13/13): 300 lbs/acre
Fertilizer (13/13/13):	600 lbs/acre	(as needed)

Established permanent vegetative cover will be mowed twice per year in May and September. As areas are mined a lake will be formed to compensate for the mined material. Generally, a water body 20 to 30 percent of the mined area will be developed. These lakes will be designed to be supportive of aquatic habitat and/or recreational use. Examples of reclaimed areas can be found at Memphis Stone & Gravel Company's website [www.msgravel.com](http://www.msgravel.com).

## **DRAINAGE PLAN**

This drainage analysis is based on calculations derived from *WinTR-55 Small Watershed Hydrology*, Release 1.0, August 2003. The design calculations presented below are based on structures completed at the end of the phase (post development) and generally assume the maximum exposure to erosion potential (i.e., after disturbance) with little predicted vegetative cover. However, reclamation and revegetation is concurrent to mining, therefore, curve numbers should improve as mining progresses inside each drainage area. It should be noted that much of the drainage flow will be managed using pumps and/or temporary diversions, which will be changing constantly to accommodate mining activity. Because of this factor, time of concentrations values were very conservatively estimated and will likely be longer than predicted in most cases.

Appendix A contains maps of each phase of the development and identifies all outfalls (001-010 and SW00A). Appendix B contains printouts from the WinTR-55 program. Appendix C contains a description of the open channel and supporting calculations proposed for the outfalls associated with the project. The standard channel design planned for the project can accommodate a subcritical flow rate up to 189 cubic feet per second (cfs) with a flow cross sectional area of 32 square feet. Below is an analysis of each structure and outfall planned for the project.

### **Phase 1**

#### Process Basins

A series of process basins will be constructed during Phase 1 to treat/reuse process water. At start-up, four cells will be constructed (basin 1, basin 2, basin 3, and the pumping pond). Material from the first area mined (i.e., basin 2) will be used to base in the plant site, build much of the road system, and remaining portions will be stockpiled for later use as road base materials. At this point the processing system will have the basin capacity to mine the first materials for washed product (i.e., Basin 4). At the end of Phase 1, a total of five cells will make up the system. These basins will be connected by open ditches and/or high capacity pumps to form one

**Memphis Stone & Gravel Company**  
**Atoka Aggregate Facility**  
**Operations and Drainage Plan**  
August 6, 2007

continuous hydraulic unit. Process water flows by gravity or by the pumps from one cell to another and is pumped to the plant for reuse. Excess water will be discharged at DMP-001 at the basin 3 through a discharge pipe controlled by a gate valve. Additionally, one stormwater retention basin will be constructed to collect precipitation draining from the plant site. Stormwater will be pumped to the process basins by a high volume dredge pump. Below is a summary of the site hydrology at the end of Phase 1 which contributes to the process.

*DMP-001*

Watershed Area- 83.5 Acres

Inflow Runoff (10 year/24 hour precipitation event)- 4.4 in.

Required "Dry" Storage Volume- (10 year/24 hour precipitation event) = 34.4 ac-ft.

Basins will consist of about 16.1 acres of surface water. The mined out basins will average ~30-40 feet deep. Constructed basins will average ~20 feet deep. At least 2.5 feet of free-board will be maintained below the emergency outlet structure. This will provide approximately 40 ac-ft. of storage capacity. Storage capacity will be maintained by a pipe and gate valve system. The discharge device will be activated as needed to maintain the required free board. Discharge from the outfall will be channeled along conveyor belt and riprap to reduce erosion potential. Discharge will be monitored at this point for compliance with discharge limits.

An emergency spillway will be constructed at basin to drain the storage system in the event its design capacity is exceeded. The spillway will be a weir type outlet approximately 8 feet wide. The weir will be lined with an adequate amount of hard armor and directed to a trapezoidal open channel. The open channel will be stabilized with heavy sodding and/or turf reinforced matting. The design specifications for the open channel are described in Appendix C. The peak flow draining through the weir during a 10 year/24 hour storm is ~33 cubic feet per second at 1.26 ft deep (i.e., flow area of 10.1 square feet). The peak flow draining through the weir during a 25 year/24 hour storm is ~40 cubic feet per second at 1.44 ft deep (i.e., flow area of 11.2 square feet).

Stormwater Basin 1

Watershed Area- 59.1 Acres

Inflow Runoff (10 year/24 hour precipitation event)- 3.9 in.

Required "Dry" Storage Volume- (10 year/24 hour precipitation event) = 19.1 ac-ft.

Design Basin Volume- ~30 ac-ft. (~35% of basin volume for sediment retention)

This stormwater basin will capture runoff from the plant site. Water will be pumped to the process basins and reused/treated. An emergency spillway will be constructed to drain the basin in the event its design capacity is exceeded. The spillway will be a weir type outlet approximately 8 feet wide. The weir will be lined with adequate amount of hard armor and directed to a trapezoidal open channel. The open channel will be stabilized with heavy sodding

**Memphis Stone & Gravel Company**  
**Atoka Aggregate Facility**  
**Operations and Drainage Plan**  
August 6, 2007

and/or turf reinforced matting. The design specifications for the open channel are described in Appendix C. The peak flow draining through the weir during a 10 year/24 hour storm is ~48 cubic feet per second at 1.63 ft deep (i.e., flow area of 13 square feet). The peak flow draining through the weir during a 25 year/24 hour storm is ~60 cubic feet per second at 1.9 ft deep (i.e., flow area of 15.2 square feet).

Stormwater Basin 2

*DMP-002*

Watershed Area- 39.6 Acres

Inflow Runoff (10 year/24 hour precipitation event)- 4.0 in.

Required "Dry" Storage Volume- (10 year/24 hour precipitation event) = 13.2 ac-ft.

Design Basin Volume- ~30 ac-ft. (~50% of basin volume for sediment retention)

This stormwater basin will capture runoff from disturbed areas caused during stripping activity. Water will be captured by diversion ditches and routed to the basin. The basin will have approximately 3 acres of surface water and be 10 to 15 feet deep. Approximately half the storage volume will maintain a permanent pool of water. "Dry" storage capacity will be maintained by a siphon system. The siphon will be activated as needed to maintain desired free board. Discharge from the siphon will be channeled along conveyor belt and/or riprap to reduce erosion potential to DMP-002. Discharge will be monitored at this point for compliance with discharge limits.

An emergency spillway will be constructed to drain the basin in the event its design capacity is exceeded. The spillway will be a weir type outlet approximately 8 feet wide. The weir will be lined with adequate amount of hard armor and directed to a trapezoidal open channel. The open channel will be stabilized with heavy sodding and/or turf reinforced matting. The design specifications for the open channel are described in Appendix C. The peak flow draining through the weir during a 10 year/24 hour storm is ~59 cubic feet per second at 1.9 ft deep (i.e., flow area of 15.2 square feet). The peak flow draining through the weir during a 25 year/24 hour storm is ~75 cubic feet per second at 2.2 ft deep (i.e., flow area of 17.6 square feet).

Stormwater Basin 3

*DMP-003*

Watershed Area- 19.9 Acres

Inflow Runoff (10 year/24 hour precipitation event)- 3.7 in.

Required "Dry" Storage Volume- (10 year/24 hour precipitation event) = 6.1 ac-ft.

Design Basin Volume- ~10 ac-ft. (~40% of basin volume for sediment retention)

This stormwater basin will capture runoff from disturbed areas caused during stripping activity. The area above the structure will be filled with soil and quickly vegetated, thereby significantly

**Memphis Stone & Gravel Company**  
**Atoka Aggregate Facility**  
**Operations and Drainage Plan**  
August 6, 2007

reducing the sediment inflow. Water will be directed down shallow conveyances to the basin. The basin will have approximately 1.5 acres of surface water and be about 7 feet deep. Approximately half the storage volume will maintain a permanent pool of water. "Dry" storage capacity will be maintained by a siphon system. The siphon will be activated as needed to maintain desired free board. Discharge from the siphon will be channeled along conveyor belt and/or riprap to reduce erosion potential to DMP-003. Discharge will be monitored at this point for compliance with discharge limits.

An emergency spillway will be constructed to drain the basin in the event its design capacity is exceeded. The spillway will be a weir type outlet approximately 8 feet wide. The weir will be lined with adequate amount of hard armor and directed to a trapezoidal open channel. The open channel will be stabilized with heavy sodding and/or turf reinforced matting. The design specifications for the open channel are described in Appendix C. The peak flow draining through the weir during a 10 year/24 hour storm is ~47 cubic feet per second at 1.6 ft deep (i.e., flow area of 12.8 square feet). The peak flow draining through the weir during a 25 year/24 hour storm is ~56 cubic feet per second at 1.8 ft deep (i.e., flow area of 14.4 square feet).

## **Phase 2**

### Process Basins

The first area mined on the Crum property will be added to the processing system. At the end of Phase 2, a total of six cells will make up the system. The basin added during Phase 2 will be connected to the other basins by high capacity pump(s). The 10 year/24 hour run-off draining into the process system will be increased approximately 14 ac-ft. during Phase 2. Once flow is transferred to the plant site basins, water management is essentially the same as during Phase 1. Excess water will be discharged at DMP-001 at the pumping pond. Note: The design calculations assume the most area which could be draining into the basin at any one point in time.

#### *DMP-001*

Watershed Area- 131.6 Acres

Inflow Runoff (10 year/24 hour precipitation event)- 4.2 in.

Required "Dry" Storage Volume- (10 year/24 hour precipitation event) = 46 ac-ft.

Note: Basins will consist of about 24.5 acres of surface water. At least 2 feet of free-board will be maintained below the emergency outlet structure(s). This will provide approximately 49 ac-ft. of storage capacity. Storage capacity will be maintained by a pipe and gate valve system. The discharge device will be activated as needed to maintain the required free board. Discharge from the outfall will be channeled along conveyor belt and riprap to reduce erosion potential. Discharge will be monitored at this point for compliance with discharge limits.

**Memphis Stone & Gravel Company**  
**Atoka Aggregate Facility**  
**Operations and Drainage Plan**  
August 6, 2007

An emergency spillway will be constructed at basin to drain the storage system in the event its design capacity is exceeded. The spillway will be a weir type outlet approximately 8 feet wide. The weir will be lined with an adequate amount of hard armor and directed to a trapezoidal open channel. The open channel will be stabilized with heavy sodding and/or turf reinforced matting. The design specifications for the open channel are described in Appendix C. The peak flow draining through the weir during a 10 year/24 hour storm is ~31 cubic feet per second at 1.2 ft deep (i.e., flow area of 9.6 square feet). The peak flow draining through the weir during a 25 year/24 hour storm is ~38 cubic feet per second at 1.38 ft deep (i.e., flow area of 11 square feet).

Stormwater Basin 4

*DMP-004*

Watershed Area- 13.8 Acres

Inflow Runoff (10 year/24 hour precipitation event)- 4.0 in.

Required "Dry" Storage Volume- (10 year/24 hour precipitation event) = 4.6 ac-ft.

Design Basin Volume- ~7.5 ac-ft. (~40% of basin volume for sediment retention)

This stormwater basin will capture runoff from disturbed areas caused during stripping activity associated with the box cut in this area. Water collected in the pit will be pumped to this structure. The area above the structure will be filled with soil and quickly vegetated, thereby significantly reducing the sediment inflow. Water will be directed down a shallow conveyances to the basin. The basin will have approximately 0.5 acres of surface water and be about 15 feet deep. Part of the basin will be excavated below existing grade. The storage volume will maintain a permanent pool of water. "Dry" storage capacity will be maintained by a siphon system. The siphon will be activated as needed to maintain desired free board. Discharge from the siphon will be channeled along conveyor belt and/or riprap to reduce erosion potential to DMP-004. Discharge will be monitored at this point for compliance with discharge limits.

An emergency spillway will be constructed to drain the basin in the event its design capacity is exceeded. The spillway will be a weir type outlet approximately 8 feet wide. The weir will be lined with adequate amount of hard armor and directed to a trapezoidal open channel. The open channel will be stabilized with heavy sodding and/or turf reinforced matting. The design specifications for the open channel are described in Appendix C. The peak flow draining through the weir during a 10 year/24 hour storm is ~59 cubic feet per second at 1.9 ft deep (i.e., flow area of 15.2 square feet). The peak flow draining through the weir during a 25 year/24 hour storm is ~71.28 cubic feet per second at 2.13 ft deep (i.e., flow area of 17 square feet).

Stormwater Basin 5

*DMP-005*

Watershed Area- 7.9 Acres

Inflow Runoff (10 year/24 hour precipitation event)- 3.8 in.

Required "Dry" Storage Volume- (10 year/24 hour precipitation event) = 2.5 ac-ft.

**Memphis Stone & Gravel Company**  
**Atoka Aggregate Facility**  
**Operations and Drainage Plan**  
August 6, 2007

Design Basin Volume- ~5 ac-ft. (~50% of basin volume for sediment retention)

This stormwater basin will capture runoff from disturbed areas caused during stripping activity. Water accumulating in the pit will be pumped to the structure. The basin will have approximately 0.5 acres of surface water and be about 10 feet deep. Part of the basin will be excavated below existing grade. Approximately half the storage volume will maintain a permanent pool of water. "Dry" storage capacity will be maintained by a siphon system. The siphon will be activated as needed to maintain desired free board. Discharge from the siphon will be channeled along conveyor belt and/or riprap to reduce erosion potential to DMP-005. Discharge will be monitored at this point for compliance with discharge limits.

An emergency spillway will be constructed to drain the basin in the event its design capacity is exceeded. The spillway will be a weir type outlet approximately 8 feet wide. The weir will be lined with adequate amount of hard armor and directed to a trapezoidal open channel. The open channel will be stabilized with heavy sodding and/or turf reinforced matting. The design specifications for the open channel are described in Appendix C. The peak flow draining through the weir during a 10 year/24 hour storm is ~32 cubic feet per second at 1.23 ft deep (i.e., flow area of 9.8 square feet). The peak flow draining through the weir during a 25 year/24 hour storm is ~38 cubic feet per second at 1.38 ft deep (i.e., flow area of 11 square feet).

### **Phase 3**

#### Process Basins

The first area mined on the Smith property (i.e., basin 6) will be added to the process and basin 5 (Crum Property) will be disconnected from the process. At the end of Phase 3, a total of six cells will make up the system. The basin added during Phase 3 will be connected to the other basins by high capacity pump(s). Once flow is transferred to the plant site basins, water management is essentially the same as during Phase 2. Excess water will be discharged at DMP-001. Note: The design calculations assume the most area which could be draining into the basin at any point in time.

#### *DMP-001*

Watershed Area- 125.8 Acres

Inflow Runoff (10 year/24 hour precipitation event)- 4.5 in.

Required "Dry" Storage Volume- (10 year/24 hour precipitation event) = 46.8 ac-ft.

Note: Basins will consist of about 22 acres of surface water. At least 2.3 feet of free-board will be maintained below the emergency outlet structure(s). This will provide approximately 50 ac-ft. of storage capacity. Storage capacity will be maintained by a pipe and gate valve system. The discharge device will be activated as needed to maintain the required free board. Discharge from the outfall will be channeled along conveyor belt and riprap to reduce erosion potential. Discharge will be monitored at this point for compliance with discharge limits.

**Memphis Stone & Gravel Company**  
**Atoka Aggregate Facility**  
**Operations and Drainage Plan**  
August 6, 2007

An emergency spillway will be constructed at basin to drain the storage system in the event its design capacity is exceeded. The spillway will be a weir type outlet approximately 8 feet wide. The weir will be lined with an adequate amount of hard armor and directed to a trapezoidal open channel. The open channel will be stabilized with heavy sodding and/or turf reinforced matting. The design specifications for the open channel are described in Appendix C. The peak flow draining through the weir during a 10 year/24 hour storm is ~34 cubic feet per second at 1.3 ft deep (i.e., flow area of 10.4 square feet). The peak flow draining through the weir during a 25 year/24 hour storm is ~42 cubic feet per second at 1.5 ft deep (i.e., flow area of 12 square feet).

At the beginning of Phase 3 surface water will be diverted to the reclaimed lake on the Crum Property until it is filled. During this time Outfall DMP-002 will be monitored.

Stormwater Basin 6

*DMP-006*

Watershed Area- 21 Acres

Inflow Runoff (10 year/24 hour precipitation event)- 4.0 in.

Required "Dry" Storage Volume- (10 year/24 hour precipitation event) = 7.0 ac-ft.

Design Basin Volume- ~9 ac-ft. (~20% of basin volume for sediment retention)

This stormwater basin will capture runoff from disturbed areas caused during stripping activity. Water accumulating in the pit will be pumped to the structure. The basin will have approximately 0.75 acres of surface water and be about 12 feet deep. Part of the basin will be excavated. The basin will have a permanent pool of water. "Dry" storage capacity will be maintained by a siphon system. The siphon will be activated as needed to maintain desired free board. Discharge from the siphon will be channeled along conveyor belt and/or riprap to reduce erosion potential to DMP-006. Discharge will be monitored at this point for compliance with discharge limits.

An emergency spillway will be constructed to drain the basin in the event its design capacity is exceeded. The spillway will be a weir type outlet approximately 8 feet wide. The weir will be lined with adequate amount of hard armor and directed to a trapezoidal open channel. The open channel will be stabilized with heavy sodding and/or turf reinforced matting. The design specifications for the open channel are described in Appendix C. The peak flow draining through the weir during a 10 year/24 hour storm is ~83 cubic feet per second at 2.31 ft deep (i.e., flow area of 18.5 square feet). The peak flow draining through the weir during a 25 year/24 hour storm is ~99 cubic feet per second at 2.6 ft deep (i.e., flow area of 21 square feet).

Stormwater Basin 7

*DMP-007*

Watershed Area- 23.3 Acres

**Memphis Stone & Gravel Company**  
**Atoka Aggregate Facility**  
**Operations and Drainage Plan**  
August 6, 2007

Inflow Runoff (10 year/24 hour precipitation event)- 3.9 in.  
Required “Dry” Storage Volume- (10 year/24 hour precipitation event) = 7.6 ac-ft.  
Design Basin Volume- ~12 ac-ft. (~40% of basin volume for sediment retention)

This stormwater basin will capture runoff from disturbed areas caused during stripping activity. Water accumulating in the pit will be pumped to the structure. The basin will have approximately 1.5 acres of surface water and be about 8 feet deep. Part of the basin will be excavated. The basin will have a permanent pool of water. “Dry” storage capacity will be maintained by a siphon system. The siphon will be activated as needed to maintain desired free board. Discharge from the siphon will be channeled along conveyor belt and/or riprap to reduce erosion potential to DMP-007. Discharge will be monitored at this point for compliance with discharge limits.

An emergency spillway will be constructed to drain the basin in the event its design capacity is exceeded. The spillway will be a weir type outlet approximately 8 feet wide. The weir will be lined with adequate amount of hard armor and directed to a trapezoidal open channel. The open channel will be stabilized with heavy sodding and/or turf reinforced matting. The design specifications for the open channel are described in Appendix C. The peak flow draining through the weir during a 10 year/24 hour storm is ~54 cubic feet per second at 1.77 ft deep (i.e., flow area of 14 square feet). The peak flow draining through the weir during a 25 year/24 hour storm is ~65 cubic feet per second at 2.02 ft deep (i.e., flow area of 16 square feet).

Stormwater Basin 8

*DMP-008*

Watershed Area- 22.3 Acres  
Inflow Runoff (10 year/24 hour precipitation event)- 4.0 in.  
Required “Dry” Storage Volume- (10 year/24 hour precipitation event) = 7.3 ac-ft.  
Design Basin Volume- ~12 ac-ft. (~40% of basin volume for sediment retention)

Note: The design characteristics for Stormwater Basin 9 are almost identical to Stormwater Basin 8 and will therefore have similar discharge characteristics. Stormwater Basin 9 will discharge at DMP-008.

Stormwater Basin 9

*DMP-009*

Watershed Area- 10 Acres  
Inflow Runoff (10 year/24 hour precipitation event)- 4.0 in.  
Required “Dry” Storage Volume- (10 year/24 hour precipitation event) = 3.3 ac-ft.  
Design Basin Volume- ~5 ac-ft. (~40% of basin volume for sediment retention)

**Memphis Stone & Gravel Company**  
**Atoka Aggregate Facility**  
**Operations and Drainage Plan**  
August 6, 2007

This stormwater basin will capture runoff from disturbed areas caused during stripping activity. Water accumulating in the pit will be pumped to the structure. The basin will have approximately 0.4 acres of surface water and be about 12 feet deep. Part of the basin will be excavated. The basin will have a permanent pool of water. "Dry" storage capacity will be maintained by a siphon system. The siphon will be activated as needed to maintain desired free board. Discharge from the siphon will be channeled along conveyor belt and/or riprap to reduce erosion potential to DMP-009. Discharge will be monitored at this point for compliance with discharge limits.

An emergency spillway will be constructed to drain the basin in the event its design capacity is exceeded. The spillway will be a weir type outlet approximately 8 feet wide. The weir will be lined with adequate amount of hard armor and directed to a trapezoidal open channel. The open channel will be stabilized with heavy sodding and/or turf reinforced matting. The design specifications for the open channel are described in Appendix C. The peak flow draining through the weir during a 10 year/24 hour storm is ~46 cubic feet per second at 1.57 ft deep (i.e., flow area of 13 square feet). The peak flow draining through the weir during a 25 year/24 hour storm is ~53 cubic feet per second at 1.75 ft deep (i.e., flow area of 14 square feet).

Stormwater Basin 10

*DMP-010*

Watershed Area- 19 Acres

Inflow Runoff (10 year/24 hour precipitation event)- 4.0 in.

Required "Dry" Storage Volume- (10 year/24 hour precipitation event) = 6.3 ac-ft.

Design Basin Volume- ~10 ac-ft. (~40% of basin volume for sediment retention)

This stormwater basin will capture runoff from disturbed areas caused during stripping activity. Water accumulating in the pit will be pumped to the structure. The basin will have approximately 1acre of surface water and be about 10 feet deep. Part of the basin will be excavated. The basin will have a permanent pool of water. "Dry" storage capacity will be maintained by a siphon system. The siphon will be activated as needed to maintain desired free board. Discharge from the siphon will be channeled along conveyor belt and/or riprap to reduce erosion potential to DMP-010. Discharge will be monitored at this point for compliance with discharge limits.

An emergency spillway will be constructed to drain the basin in the event its design capacity is exceeded. The spillway will be a weir type outlet approximately 8 feet wide. The weir will be lined with adequate amount of hard armor and directed to a trapezoidal open channel. The open channel will be stabilized with heavy sodding and/or turf reinforced matting. The design specifications for the open channel are described in Appendix C. The peak flow draining through the weir during a 10 year/24 hour storm is ~59 cubic feet per second at 1.9 ft deep (i.e., flow area of 15 square feet). The peak flow draining through the weir during a 25 year/24 hour storm is ~73 cubic feet per second at 2.16 ft deep (i.e., flow area of 17 square feet).