

**BORAL CONSTRUCTION MATERIALS, LLC**

**(DRAFT)**  
**SITE SPECIFIC WATER MANAGEMENT &  
CONSERVATION PLAN (SSWMCP)  
SUMMARY**

Prepared For:

**BCM  
DAVIS QUARRY  
11131 E. Colbert Rd.  
Davis, OK 73030**

Prepared By:



**CC ENVIRONMENTAL, LLC.  
PO Box 1292  
Norman, Oklahoma 73070**

Plan Updated:

**DECEMBER 28, 2012**



## 1.0 INTRODUCTION

Boral Construction Materials Oklahoma, LLC (BCM) operates a limestone quarry in Murray County near the town of Davis. The facility, referred to as the Davis Quarry or Roger/Chambless Mine, is permitted by the Oklahoma Department of Mines (ODM) (LE-1669). The quarry is an actively producing mine with a portion of the facility overlying a sensitive sole source groundwater basin. According to 82 O.S. §1020.2(C)(1), this facility meets the definition of an exempt mine. BCM is only obligated to adhere to the requirements applicable to an exempt mine and reserves the right to adjust the plan accordingly.

This document is a summary of the Site Specific Water Management and Conservation Plan (SSWMCP) adopted by BCM. The SSWMCP was prepared following the draft guidance released by Oklahoma Water Resources Board (OWRB) staff on November 15, 2012 (OAC 785:30-15) and generally follows a previous format developed as part of the rule making process (circa April 2012). BCM will implement the SSWMCP<sup>1</sup> on January 1, 2012 and will update, change and reevaluate the plan as new information and data are collected and as the draft rules evolve. This document is subject to change independent of outside review. The actual procedures and methodologies employed during a reporting period will be documented in the quarterly and/or annual reports.

2013

## 2.0 ELEMENTS OF A SITE-SPECIFIC WATER MANAGEMENT & CONSERVATION PLAN

### 2.1 Characterization of Area (Plot Plan)

The information associated with this element of the plan is illustrated on Figures 1 & 2. The locations are generally depicted with respect to size and accuracy.

- A. Location of the mining pit
- B. Location of the processing facilities
- C. Location and characterization of collection, settling and retention impoundments

### 2.2 Facility Layout (Water Flow Diagram<sup>2</sup>)

The information associated with this element is illustrated on Figures 1 & 2. Please note that the amount of water and flow rate would be determined as information is collected as part of the monitoring program.

- A. Water collection, settling and retention impoundments
  - See Figures 1 & 2
- B. Direction of all major water flow between the impoundments
  - See Figure 2
- C. All groundwater, mine pit water, and stream water diversion points
  - No industrial or mining ground water wells are proposed at this time.
  - See Figure 2 for the location of the domestic use ground water well as defined by 82 O.S. §1020.3.
  - See Figure 2 for the location of mine pit water collection areas. Water will be pumped from two sumps (subject to change) within the mine quarry area.
  - No stream water diversion points are proposed at this time.

<sup>1</sup> Subject only to the requirements of an exempt mine.

<sup>2</sup> Information and locations are subject to change



- D. All stream water augmentation points
  - See Figure 2 for the location of the proposed stream augmentation point. One location is anticipated at this time but other points or different locations may be used depending on downstream needs.
- E. All groundwater recharge points
  - See Figure 2 (subject to confirmation)
- F. Locations and planned quantities of all points of consumptive use
  - Water will be used for a variety purposes within the boundary of the facility. Consumptive uses will be estimated and reported on Table 1 as part of the quarter and annual reporting requirements.

### 2.3 Water Budget<sup>3</sup> (Anticipated Flows Into & Out of the Mine Site)

Refer to Figure 3 for a depiction of the following information:

- A. Water flow entry and exit points
- B. Groundwater
- C. Mine pit water
- D. Stream water
- E. Precipitation runoff
- F. Evaporation, and
- G. Augmentation

### 2.4 Water Rights Information

At this time, BCM does not hold any OWRB surface or ground water permits. The domestic ground water well is exempt (per 82 O.S. §1020.3) from permitting and considered *de minimis*.

- A. Permit or Application Number: NA
- B. Entity Name: NA
- C. Permitted Amount: NA
- D. Dedicated Acres: NA

### 2.5 Consumptive Use of Pit Water (Table 1)

As the monitoring plan is implemented, the consumptive use of pit ground water will be estimated/measured. Values will be added to Table 1 (draft OAC 785:30-15 Appendix C) and updated to reflect actual site values.

This section specifically addresses OAC 785:30-15-7 of the proposed rules, but is not subject to “approval” by the OWRB at this time. Also, information will not necessarily be measured on a daily basis. Values may be collected on a less frequent basis and extrapolated to reflect daily values.

---

<sup>3</sup> Actual volumes and flow rates will be determined and updated as needed or required



Table 1: Water Balance Reporting Table

PIT GROUNDWATER VOLUME		VALUES
1	Total volume of water pumped from the producing mine pit(s)	0
2	Volume of precipitation that falls onto the surface of water in the producing mining pit(s)	0
3	Portion of total precipitation that flows over the land surface that drains into the mine pit water	0
4	Other non-pit waters pumped from the producing mine pit	0
5	Add lines 2 through 4	0
6	<b>Pit Groundwater Volume (Line 1 minus Line 5)</b>	<b>00</b>
DEFINED ELEMENTS OF CONSUMPTIVE USE		
7	Volume of pit groundwater that is driven off (by drying) the mined material transported off the mine site	0
8	Volume of pit groundwater that is carried away with the mined material transported off the mining site (shipped)	0
9	Volume of pit groundwater that evaporates from the producing mine pit, process water ponds, and lined ponds (Excluding structures used for augmentation)	0
10	Volume of pit groundwater that is used for other beneficial uses off the mine site	0
11	<b>Defined Elements of Consumptive Use of Pit Groundwater (Add Lines 7 through 10)</b>	<b>00</b>
PIT GROUNDWATER BALANCE		
12	Line 6 minus Line 11	0
13	<b>Groundwater Augmentation:</b> Volume of pit groundwater returned to the groundwater basin or subbasin	0
14	<b>Stream Augmentation:</b> Volume of pit groundwater discharged to a definite stream, during flow conditions that are less than or equal to 50% exceedance or median historic flows	0
15	<b>Precipitation &amp; Run-off:</b> Volume of precipitation and surface run-off into a recharge pit or holding pond used for augmentation	0
16	<b>Additional Discharge</b> Volume of pit groundwater discharged to a definite stream, not meeting stream augmentation credit criteria	0
17	<b>Recycled Pit Groundwater</b> Volume of pit groundwater returned to a mine pit or holding basin (not included on lines 7 through 10)	0
18	<b>Other Non-Consumptive Losses</b> Including pit groundwater returned to the land surface from which surface runoff flows into a mine pit, and other losses (not included in lines 7 through 10)	0
19	Add lines 13 through 18	0
20	<b>Other Consumptive Use (adjusted) (Line 12 minus Line 19)</b>	<b>00</b>
TOTAL REPORTED CONSUMPTIVE USE OF PIT		
21	<b>Total Net Reported Consumptive Use: (Line 11 plus Line 20)</b>	<b>00</b>



### 3.0 MONITORING & MEASUREMENT SUMMARY

BCM will measure or reasonably estimate ground water and/or surface water volumes entering the mine quarry pit sump as well as measure the amount of water diverted from the pit sump(s). BCM will also measure or monitor consumptive use, stream and ground water augmentation, precipitation, evaporation, hydrology data, and/or other sources and diversions of water when applicable. This section is a summary of how the various measurements may be done. Please note that the methods described may change as needed or required. A description of the methods actually used during a reporting period will be included in the quarterly and/or annual reports.

#### 3.1 Definitions

For clarification purposes (subject to change with the final rules) the following definitions were adopted:

- A. **Pit Water<sup>4</sup>:** Water captured or accumulated in a quarry pit sump, which may consist of ground water, surface water runoff, and/or precipitation from direct interception.
- B. **Diverted Pit Water:** Pit Water pumped out of the quarry pit sump.
- C. **Consumptive Use of Pit Water:** As defined by 82 O.S. §1020.2 (F)

#### 3.2 Measuring Diverted Pit Water

Water that accumulates or collects in a quarry pit sump in excessive quantities will be pumped to another pond or impoundment or may be discharged off site. The amount of Diverted Pit Water will be estimated by direct measurement and/or by calculation (e.g., operating hours of the pump multiplied by its rated capacity). All equipment will be installed, calibrated and maintained according to manufacturer's recommendations and specifications.

#### 3.3 Measuring & Calculating Pit Water Components

The total Pit Water volume will be estimated based on the measurement or reasonable estimation of the Diverted Pit Water plus any calculated evaporation losses from the wetted surface of the sump. In order to determine what portion of the Pit Water is actual ground water, the various components need to be calculated. Each component is discussed below.

- A. **Evaporation Component:** The volume of water lost via evaporation will be calculated by monitoring evaporation and the wetted surface area of the pit sumps. At this time there are two (2) sumps in the quarry area. The average surface area has been determined for each. Evaporation data will be obtained from the Sulphur, OK Mesonet station and adjusted per Appendix C of OAC 785:30-15 (draft dated 11/15/2012) (<http://www.mesonet.org>). The volume will be calculated by multiplying the sump surface area by the amount/depth of evaporation.
- B. **Surface Water Component:** The surface water fraction will be estimated by calculating runoff using accepted engineering models and/or calculations (per Appendix "C" of OAC 785:30-15 draft dated 11/15/2012). At this time, the SCS runoff model will be used to predict storm event runoff based on precipitation. The runoff is measured to predict what portion of the storm water accumulates in the pit sump. The model is adjusted for the actual drainage basin characteristics (e.g., surface area, soil type and group, land use, etc.). The facility is broken into sub drainage

<sup>4</sup> This definition is different than OAC 785:30-15-2 draft dated 11/15/2012, but more accurately reflects the definition adopted by the OWRB work group tasked with developing the rules. The "final" rule definition of Pit Water will be adopted in this plan.

basins and site specific runoff coefficients are applied within each watershed. Precipitation will be measured on site and/or obtained from the Sulphur, OK Mesonet station (per Appendix "C" of OAC 785:30-15 draft dated 11/15/2012) (<http://www.mesonet.org>).

- C. **Precipitation Component:** The precipitation fraction of Pit Water will be measured by determining the amount of water that is contributed by direct interception into the quarry pit sump. At this time there are two (2) sumps in the quarry area. The average surface area has been determined for each. Precipitation is measured on site and/or obtained from the Sulphur, OK Mesonet station (per Appendix "C" of OAC 785:30-15 draft dated 11/15/2012) (<http://www.mesonet.org>). The volume will be calculated by multiplying the sump surface area by the amount/depth of precipitation.
- D. **Ground Water Component:** The ground water fraction will be estimated by subtracting direct interception and surface water runoff volumes from the total volume of Diverted Pit Water while accounting for evaporation. (Subject to Appendix "C" of OAC 785:30-15 draft dated 11/15/2012.)

### 3.4 Measuring Consumptive Use of Pit Water

If applicable, the fraction of Pit Water-Ground Water consumptively used will be calculated. The amount of water will be determined based on the defined consumptive uses (82 O.S. §1020.2 (F)) and the guidance provided in OAC 785:30-15 (draft dated 11/15/2012).

### 3.5 Measuring Water Diverted From a Stream or Pond

At this time water is not pumped from a stream or pond. If the situation changes, then BCM will obtain the proper permits, make the necessary notifications and would meter or otherwise estimate flow.

### 3.6 Measuring Groundwater Pumped From Water Wells

At this time water is not pumped from a ground water well other than for domestic purposes. The ground water well associated with facility scale house/office is an exempt well per 82 O.S. §1020.3. If the situation changes, then BCM will obtain the proper permits, make the necessary notifications, and would meter or otherwise estimate flow.

### 3.7 Measuring Water Discharged to a Stream

If Pit Water is pumped to a stream or to a pond that discharges, the volume of Diverted Pit Water will be estimated by direct measurement and/or by calculation (e.g., operating hours of the pump multiplied by its rated capacity). Hydrology records may be kept in order to qualify for stream augmentation credits. (Subject to OAC 785:30-15-5(a) draft dated 11/15/2012.) All equipment will be installed, calibrated and maintained according to manufacturer's recommendations and specifications.

### 3.8 Measuring Water Recharged to the Aquifer

Aquifer recharge via stream or ground water augmentation will be documented. Currently, there is some uncertainty on how to qualify for augmentation credit in the draft rules. However, until final rules are adopted, BCM will collect the necessary information to comply with OAC 785:30-15-5(a) for stream water and OAC 785:30-15-5(b) for ground water augmentation (draft rules dated 11/15/2012).



### **3.9 Precipitation at the Mine Site**

Precipitation is measured on site using a rain gauge and recorded daily (when the facility is operating). However, as a check and in order to fill in data gaps, precipitation information will be obtained from the Sulphur, OK Mesonet station (per Appendix C of OAC 785:30-15 draft dated 11/15/2012) (<http://www.mesonet.org>). Other Mesonet sites may be used to better estimate precipitation.

### **3.10 Evaporation From All Surface Water**

Evaporation from surface water ponds and impoundments that receive Pit Water-Ground Water will be calculated following the guidelines developed by the OWRB (per Appendix C of OAC 785:30-15 draft dated 11/15/2012). (Evaporation calculation methods for the quarry pit sump are described above.)

### **3.11 Water Obtained from Other Sources**

At this time, BCM does not anticipate obtaining water from other sources. However, BCM reserves the right to pursue and obtain water from any and all legally permissible sources.

## **4.0 REPORTING**

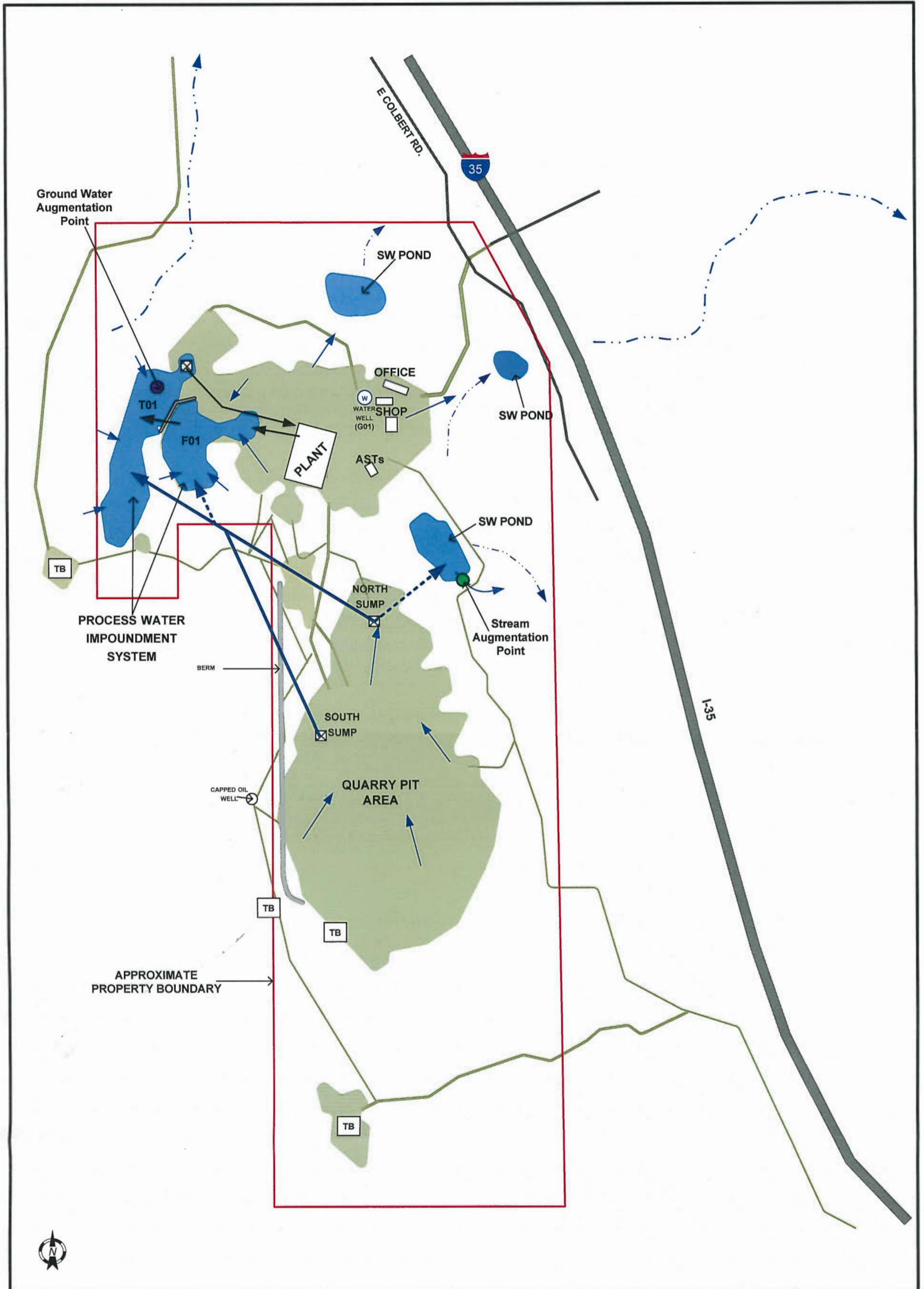
As required by 82 O.S. §1020.2(E)(1), BCM will adhere to the schedule for quarterly and annual reporting. BCM will report the required information for an exempt mine. Also, any changes to the site maps or calculation methodologies would be included in the report. The report would follow an acceptable format readily readable by the OWRB.



Aerial Source: Google Earth 2012

<p>→ Process Water</p>		<p>Boral Construction Materials Oklahoma, LLC DAVIS QUARRY</p>			<p>SSW MCP Aerial Site Diagram Figure <b>1</b></p>
<p>Note: The diagram is partially diagrammatic; exact dimension will vary from those shown above. Not to scale.</p>	<p>AJC/DDS</p>	<p>12/28/12</p>	<p>FINAL</p>		<p><b>1</b></p>





**COMMENTS**

- Property Boundary
- Process Water Flow
- Storm Water Flow
- Potential Storm Water Flow
- Stream Flow
- Tank Battery TB



Boral Construction Materials of Oklahoma, LLC  
DAVIS QUARRY

AJC/DDS

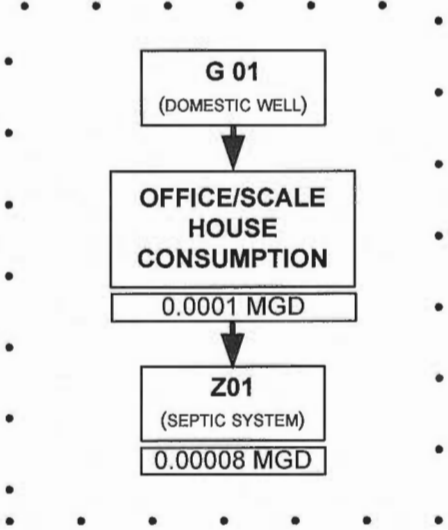
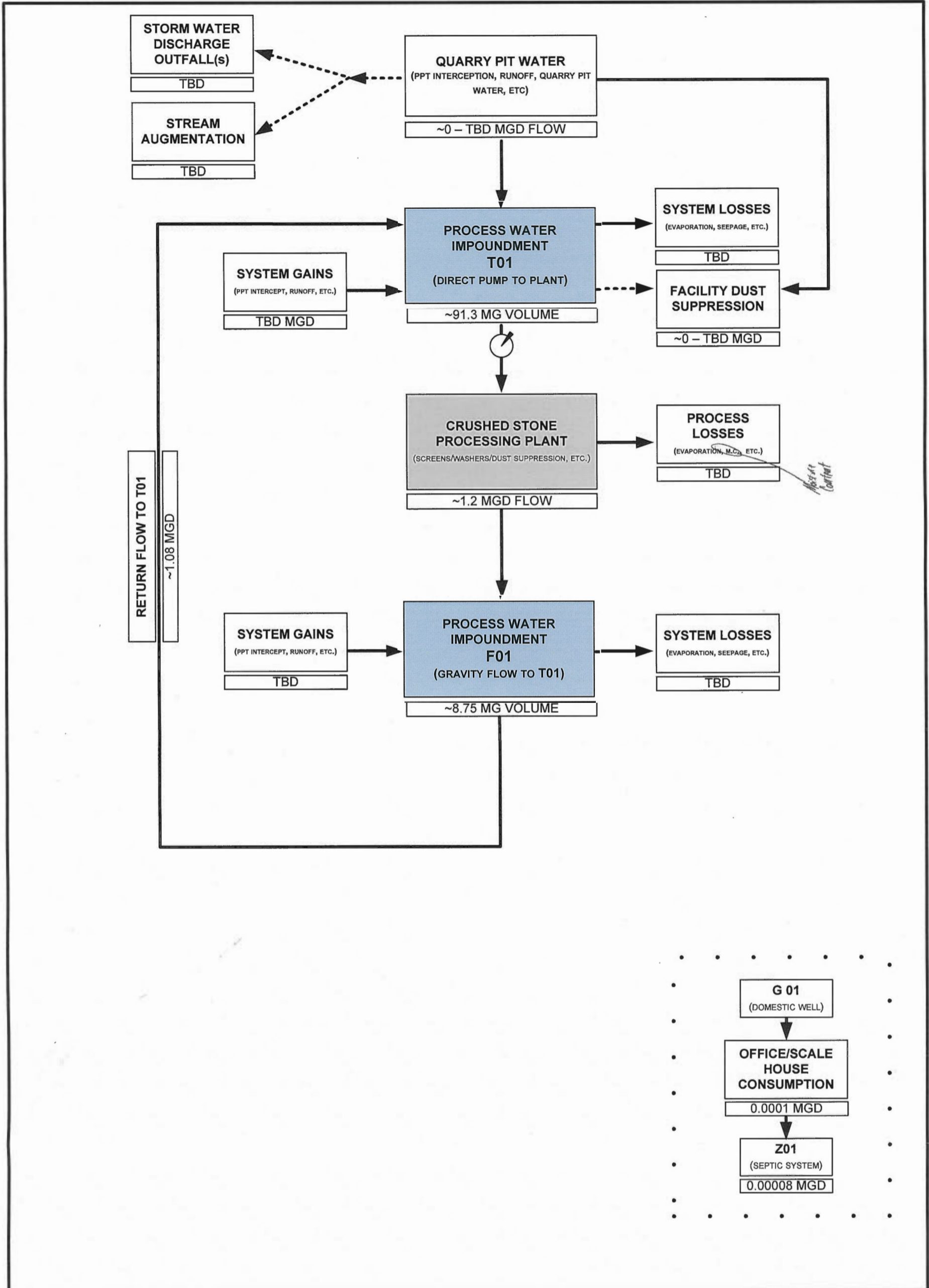
12/28/12

FINAL



SSWMCP  
Plot Plan/  
Site Diagram

Figure  
2



**COMMENTS**

- ALL VALUES ARE ESTIMATED & APPROXIMATE (1.5x10<sup>6</sup> TONS/YR)
- FLOWS ARE CALENDAR DAYS
- POTENTIAL FLOW PATH
- TYPICAL FLOW PATH

		Boral Construction Materials of Oklahoma, LLC Murray County, OK DAVIS QUARRY	
AJC/DDS	12/28/12	FINAL	

**SSWMCP  
Water Balance &  
Flow Schematic**

**Figure  
3**