COLORADO
Division of Reclamation, Mining and Safety
Department of Natural Resources

May 28, 2024

Mr. Phillip Courtney
Martin Marietta Materials, Inc.
1627 Cole Boulevard, Suite 200
Lakewood, CO 80401

Re: Thunderbird Sand and Gravel, File No. M-2023-032, 112 Construction Materials Reclamation Permit Application, Adequacy Review No. 2

Dear Mr. Courtney:

The Division of Reclamation, Mining and Safety (Division) has completed its review of your March 25, 2024 response to our Preliminary Adequacy Review of the 112 Construction Materials Reclamation Permit Application submitted for Thunderbird Sand and Gravel in Pueblo County. The current decision date for the application is set for May 30, 2024.

The Division's review consisted of comparing the application content with the requirements of the Mineral Rules and Regulations of the Colorado Mined Land Reclamation Board for the Extraction of Construction Materials. The Division has identified the following adequacy items in the application which require clarification or additional information:

Rule 6.4 Specific Exhibit Requirements – 112c Reclamation Operation

Rule 6.4.3 Exhibit C – Pre-mining and Mining Plan Map(s) of Affected Lands

1. Exhibit C-1, C-2, and F-1 maps should clearly indicate the proposed permit boundary. The legend displays a thick dashed line to represent the permit boundary, but this line is not utilized on the maps.

Exhibit C2 Map:

2. The map indicates screening berms as "Overburden or Topsoil," but stockpiles must be assigned as one or the other. Please designate separate overburden and topsoil stockpiles on the map.

3. Exhibit D under "Processing", describes pipelines that will move water from Thunderbird Lake to siltation ponds and back into Thunderbird Lake. The location of these pipelines need to be shown on the Mining Plan Map.

4. Please identify dewatering discharge points indicated in Exhibit G section (c) on to the Mining Plan Map.

5. Product stockpiles are proposed near the plant area within the proposed Phase 3 area. Is this the only location where the product will be stored?

6. Please indicate on the map where processing fines will be stored.

7. Please commit to providing the Division with a copy of the discharge permit once obtained from CDPHE, Water Quality Control Division.

8. Please indicate the approximate location(s) of the "series of siltation ponds" proposed to occur within the processing area per Exhibit D.

9. Please indicate the area(s) that will be used for material stockpiling (not including topsoil or overburden).

10. Please show any infrastructure (e.g., pipelines, ditches) proposed for conveying water from the wash plant to the siltation ponds.

Rule 6.4.4 Exhibit D – Mining Plan

11. Please ensure that the proposed maximum disturbed area is clarified and consistent throughout the application. In the revised Exhibit D, the applicant initially states that the proposed maximum disturbed area is 131 acres. However, in response to item #10, they propose that the maximum disturbed area be set equal to the affected area, which is 543.5 acres. Additionally, in response to item #27, the applicant states that the proposed maximum disturbed area is 223 acres. It's essential to have a clear and consistent proposal for the maximum disturbed area at any time, and it must correlate with the cost estimate.

12. The applicant proposes setting the affected area equal to the permit area, 543.5 acres, even though the proposed mining and reclamation plans only call for disturbing the western half of the permit area. Please be advised, if the operation later decides to mine the eastern half of the permit area, an Amendment would most likely need to be submitted given this change would have a significant effect on the mining and reclamation plans proposed in this application.

13. Exhibit D, under "Processing," describes pipelines that will transport water from Thunderbird Lake to siltation ponds and back into Thunderbird Lake. The location of these pipelines needs to be shown on the Mining Plan Map.

14. Please commit to submitting the as-built construction drawings for each slurry wall enclosure within 90 days of completion. Note that any significant deviation from the approved plans and/or maps would require a Technical Revision to update the permit accordingly.

15. Please describe where fines will be stored and what will be done with them.

16. The applicant commits to retaining 1.3 times more overburden than required for reclamation on site, and any overburden in excess of this amount may be sold. Please be advised, if at any time, the Division determines that the amount of overburden stored on site is not enough to complete reclamation as per the approved plan, the permit and the required financial warranty will need to be revised to address this issue. This may lead to a significant increase in the required financial warranty to acquire the additional backfill material needed.

17. The applicant is proposing to mine 200 feet from the river bank during the non-flood season of September 30 through April 1, then backfilling the pit to at least 400 feet from the river bank by the succeeding April 1st. Please be advised, this proposal is not consistent with the Division's Floodplain Protection Standards for Sand and Gravel Pits Adjacent to Rivers and Perennial Streams, issued in February 2024 (Floodplain Protection Standards). The applicant must commit to mining no more than 400 feet from the river at all times throughout the life of mine, or provide designs for appropriate bank stabilization measures and inlet/outlet structures for the reservoirs which would allow the operation to mine closer than 400 feet from the river (see Table 1 of the Division's Floodplain Protection Standards). Please commit to one of these options and revise the application accordingly. If the applicant is unable to provide the required flood control structure designs in this application, the applicant can commit to submitting this information later in a Technical Revision. However, in this application, the applicant must commit to a minimum 400-foot mining setback from the river bank until such revision is approved.

18. Please provide a detailed stormwater management plan for the site which ensures the river and the Excelsior Ditch will not be impacted by the operation (e.g, sedimentation). This plan should include an inspection and maintenance plan for all proposed sediment ponds and stormwater ditches. The Division understands that other agencies may also require a stormwater management plan for the proposed operation, but this does not preclude the need to submit one to our agency.

19. Please provide more details on the proposed crossing of the Excelsior Ditch. The applicant must commit to a plan (e.g., culvert or bridge). If this plan changes in the future, it can be changed through a Technical Revision submittal. Additionally, a sketch showing a closer view of the proposed crossing would be helpful.

20. Please clarify the planned use of the proposed stockpile area located north of the Excelsior Ditch. According to the Exhibit C-2 map, this area will only be used for "topsoil and overburden". Will this area also be used for product stockpiles? Please update the Exhibit C-2 map accordingly.

Rule 6.4.5 Exhibit E – Reclamation Plan

21. The Division understands that stormwater management may change once a CDPS Discharge Permit is obtained, however, all stormwater management methods still need to be described in the application. Please describe in further detail how stormwater will be managed, including but not limited to diversions, methods, and general location of any diversion structures/features. This plan can be provided in Exhibit D or Exhibit G. In this exhibit, please describe how any proposed stormwater structures/features will be reclaimed.

22. Will the culvert/bridge to cross Excelsior Ditch remain or be removed? If removed, what are the dimensions of this structure? Please provide a detailed reclamation plan for the proposed ditch crossing.

23. The applicant states that noxious weeds will be controlled by any combination of cultural, mechanical, biological, or chemical measures. Given the location of the site adjacent to multiple water resources, if chemical measures are pursued for weed management, please commit to using only aquatic safe chemicals.

Rule 6.4.6 Exhibit F – Reclamation Plan Map

24. What is the average depth of overburden to be replaced in flat areas for reclamation, if any?

25. Please identify any stormwater structures that will be reclaimed.

Rule 6.4.7 Exhibit G – Water Information

26. The Division understands the applicant will be applying for a permit to discharge water from the site to the river, and that the specific discharge point(s) will be determined at that time. Please acknowledge that any discharge points and related infrastructure associated with the operation must occur within the approved affected area.

27. Please provide a detailed description of all existing and proposed groundwater monitoring wells and a detailed reclamation plan for abandoning these wells. Additionally, please ensure the cost estimate includes costs for reclaiming these wells.

28. The Division has the following items regarding the applicant's proposed groundwater monitoring plan:

    a. Please commit to collecting a minimum of quarterly baseline water level and water quality data from all proposed monitoring wells prior to commencing with the operation.

    b. Please commit to submitting a Technical Revision prior to mining which includes all baseline data, an evaluation of the results, comparing site water quality data with Water Quality Control Commission's Regulation No. 41 Interim Narrative Standards, proposed numeric protection levels for the compliance well(s), and any proposed changes to the monitoring plan (e.g., analytes sampled, sampling frequency). Note, the operation must continue monitoring groundwater no less than semi-annually throughout the life of mine.

    c. The applicant is proposing to install 3 additional monitoring wells at the site. Please commit to submitting the final well completion reports to the Division within 60 days of installation of these wells. Additionally, if the location of the installed wells changes from what is shown on the maps approved with this application, please commit to submitting a Technical Revision to update the maps accordingly.

Rule 6.4.8 Exhibit H – Wildlife Information

29. The applicant has agreed not to disturb any wetlands at the site until they have obtained a Jurisdictional Determination (JD) and/or the necessary permits from the U.S. Army Corps of Engineers (USACE). Please confirm this commitment to include not disturbing any wetlands at the site until the Division has received evidence that this activity is in compliance with USACE. This evidence may include a copy of the JD and/or any required permit approvals from USACE.

Rule 6.4.12 Exhibit L – Reclamation Costs

30. Please provide the approximate dimensions for all proposed structures that will require demolition and/or removal for reclamation (e.g., wash plant, shop, scale, scale house, culverts, roads). Only providing estimated volumes for these structures in the cost estimate is not sufficient. The Division must have sufficient information on these structures to confirm the estimated volumes.

31. The anticipated equipment used to accomplish these tasks should be included in the cost estimate for the Division to accurately assess the reclamation costs. Please include the equipment type as well (Dozer D8, D10, etc.)

32. If the applicant chooses to install bank stabilization and inlet/outlet structures on the reservoirs in order to mine closer than 400 feet to the river, please ensure costs for installing these structures are included in the cost estimate.

33. The applicant is proposing to use two separate seed mixtures for revegetation, including an upland seed mixture and a wetland seed mixture. Please provide an estimated total acreage that will be seeded with each mixture.

34. What is the type and rate of mulch to be used in the revegetation tasks (tons/acre)?

35. Please provide sources for volume estimates (area x depth).

Rule 6.4.19 Exhibit S – Permanent Man-made Structures

36. The applicant has provided copies of the Request for Structure Agreement letters, dated August 7, 2023, which were sent to the five structure owners identified in the application. The Division has the following items regarding the attempted structure agreements:

    a. The Notary for Permit Applicant section is not filled out and notarized by the applicant on any of the five structure agreement forms that were sent to the structure owners. This section must be fully executed by the applicant in order for the Division to consider the structure agreement as having been attempted. Please revise the structure agreement forms accordingly and submit copies of the revised forms sent to the structure owners.

    b. The structures listed in the structure agreement forms submitted to Meadowbrook MHP LLC, Pueblo County Public Works Department, and Premier Auto Body Repair LLC do not correlate with the structures listed on the Exhibit C-1 map. For example, the agreement form submitted to Meadowbrook MHP LLC lists “trailer homes, streets”, while the Exhibit C-1 map lists “paved roads, fence, unknown structure, garage”. Please revise the structure agreement forms accordingly and submit copies of the revised forms sent to the structure owners.

    c. Please provide proof of delivery for all (revised) attempted structure agreements, which may be in the form of return receipts of a Certified Mailing or proof of personal service.

    d. To date, no fully executed structure agreements have been provided for any of the non-applicant owned structures located on or within 200 feet of the proposed affected lands. Please be advised, for any structures proposed to be relocated, removed, or otherwise impacted by the operation, the applicant must provide a fully executed agreement with the structure owner. This includes the Excelsior Ditch, for which the applicant is

proposing to install a crossing for the mine operation. The agreement must include an acknowledgement by the structure owner of the proposed impacts to their structure(s).

37. In order for the Division to approve this application, the applicant must provide a signed and notarized agreement with the owner of the Excelsior Ditch acknowledging their acceptance of the operation's proposed impacts to their structure (i.e., crossing) and acceptance of either the proposed reclamation plan or a proposal to leave the crossing in place for reclamation.

38. Please be advised that structure agreements for the overhead electric structures, Excelsior Ditch, and Baxter Road must be filled out and notarized prior to permit approval.

Additional Items:

39. In the response for item 82, it's stated that the applicant does not plan to conduct a Class III Cultural survey, but the response here claims they will conduct a survey. Please clarify whether Martin Marietta will conduct a Class III Cultural survey, and if so, include it in Exhibit M.

40. Per Rule 1.6.2(1)(e), the applicant shall mail or personally serve a copy of the newspaper publication required by Rule 1.6.2(1)(d) immediately after the first publication to all owners of record of the surface and mineral rights of the affected land, and the owners of record of all land surface within 200 feet of the boundary of the affected lands. The applicant has provided a copy of a letter dated October 6, 2023 that was sent to the owners of record, as well as Certified Mail receipts for the mailings. In comparing the Certified Mail receipts provided to the Exhibit C-1 map, the Division was unable to find Certified Mail receipts for the following adjacent surface owners of record: Loren Shepard, Andrew and Mell Smithour, or Wynona Sullivan. Please provide proof that these three landowners received the required notice.

41. Please review and respond to the adequacy items provided by Rob Zuber, DRMS (see enclosed letter, dated March 29, 2024).

42. Please review and respond to the adequacy items provided by Eric Scott, DRMS (see enclosed letter, dated April 5, 2024).

43. Please review and respond to the adequacy items provided by Zach Trujillo, DRMS (see enclosed letter, dated April 16, 2024).

Please be advised that the approved extended decision date is May 30, 2024. If you are unable to satisfactorily address the comments in this review before the decision date, it will be your responsibility to request an extension of the review period. If there are outstanding issues that have not been adequately addressed prior to the end of the review period, and no extension has been requested, the Division may deny this application.

If you require additional information, or have questions or concerns, please feel free to contact me by phone at (303) 866-3567, ext. 8147, or by email at joel.renfro@state.co.us.
Sincerely,

Joel Renfro
Environmental Protection Specialist

Encl(s):
Adequacy review letter from Rob Zuber, DRMS, dated March 29, 2024
Adequacy review letter from Eric Scott, DRMS, dated April 5, 2024
Adequacy review letter from Zach Trujillo, DRMS, dated April 16, 2024
Division's Floodplain Protection Standards for Sand and Gravel Pits Adjacent to Rivers and Perennial Streams

Cc:
Amy Eschberger, DRMS
Eric Scott, DRMS
Zach Trujillo, DRMS
Rob Zuber, DRMS

COLORADO
Division of Reclamation, Mining and Safety
Department of Natural Resources

Memorandum

To: Joel Renfro, DRMS
From: Rob Zuber, DRMS
Cc: Amy Eschberger
Date: March 29, 2024
Subject: 112c Application for Thunderbird Sand and Gravel (File No. M-2023-032), Review of Surface Water Control and Protection of the Hydrologic Balance, Response to applicant's adequacy review

I reviewed the applicant's response letter submitted for Thunderbird Sand and Gravel, and I have the following comments. The numbers below correspond to my original adequacy letter from November 30, 2023.

1. Regarding water bodies within the permit boundary, no additional response is required. The following is additional information for the record.

    - Excelsior Ditch – an 80-foot buffer is proposed, and a structural analysis has been provided by Civil Resources, LLC. (I will defer to Zach Trujillo's review of the Geotechnical Stability Analysis to determine if this has been done sufficiently.) Also, as far as I can see in the records for this application, a signed and notarized structural agreement with the Arkansas Groundwater and Reservoir Association (the owner of this ditch) has not yet been obtained.
    - Thunderbird Lake – it is owned by the applicant and will be used for fresh water in the processing operations.
    - Two unnamed ponds – they are owned by the applicant and are not significant.

2. The applicant plans to mine within 200 feet of the Arkansas River during non-flood months (October - March) and then backfill this mined area by April 1 each year. Per the Division's adequacy letter of November 30, 2023, the applicant needs to provide a detailed analysis of flow in the river during the worst-case conditions of the proposed mining and reclamation scenarios. This analysis must sufficiently demonstrate that the proposed pit banks during mining and after reclamation will not be significantly eroded by the runoff event. This should be done using the appropriate hydrology and hydraulics model(s). For example, the U.S. Army Corps of Engineers HEC-RAS and HEC-HMS models could be used for this analysis. The following provides more details on "worst-case conditions":

- During mining, when a portion of the pit is 200 feet from the riverbank, assess the possible damage from a large event during spring runoff conditions. The hydrologic analysis should provide details regarding the calculation of the quantity of flow for this scenario.

- After reclamation, when the area south of the pits is reclaimed rather than undisturbed land, assess the possible damage from a 100-year event. The change in the soil conditions for the reclaimed area between 200 and 400 feet from the river should be accounted for in this scenario.

COLORADO
Division of Reclamation, Mining and Safety
Department of Natural Resources

To: Joel Renfro
From: Eric Scott
Date: April 5, 2024
Re: **Summary of First Adequacy Response Questions/Issues for Thunderbird Sand and Gravel (M2023-032) Exhibit G Review**

This review was conducted based on the applicant's first adequacy review responses, and limited to issues related to compliance with applicable groundwater standards and minimization of impacts to the hydrologic balance with respect to groundwater. The comments provided in this memo are intended for DRMS internal use only, and intended to assist the DRMS site specialist in determining if additional information is needed from the applicant. Please feel free to let me know if you have any questions, or would like to discuss any of these items further.

1) The existing unlined groundwater ponds (in addition to Thunderbird Lake) referred to in several places in the application need to be identified on the existing conditions/mining plan/reclamation maps as well as the figure provided with Ex G. Adequately addressed

2) Locations/existence of wells listed and/or shown in Exhibit G should be field verified if possible and included on the appropriate figures. All wells within the proposed permit or within 200' (minimum) should be shown on the existing conditions map. Well construction information for all existing wells located within the permit and within 200'of the permit should be provided if available. Does the applicant now own all wells shown within the proposed permit area? Adequately addressed

3) No groundwater level, flow direction, or groundwater quality data has been provided, despite several wells shown within or near the proposed permit. Is any historic GW level or quality data available that could be considered in a "baseline" data analysis? Will any of the existing wells on site be utilized for groundwater monitoring, and if so, what are the construction details. Adequately addressed – additional baseline data to be collected.

4) Based on the proximity to the Arkansas River, and the several areas of exposed groundwater currently located within or near the permit, DRMS expects the depth to static groundwater to be very shallow (<5 feet b.g.s.) with a flow direction largely parallel to the river. However, no GW level data has been provided to document depth to GW or GW flow direction for the proposed permit area. In addition, no groundwater modelling has been done to estimate predicted impacts to GW flow or elevations due to dewatering during mining, or resulting from the installation of the proposed lined cells in close proximity to the river. No designs for a French drain or other means of minimizing impacts to the prevailing hydrologic balance (groundwater levels, or irrigation return flow timing) from the lined cells have been provided. The general statement that minimal mounding and shadowing of a few feet is expected is insufficient.

   DRMS will require a modelling demonstration to predict and illustrate the maximum groundwater drawdown impacts from dewatering during mining, potential impacts to nearby wells, as well as any post-mining mounding and shadowing impacts due to the construction of impermeable or low permeability mine cells. The model should provide GW drawdown/mounding contour maps

based on, and verified against all available site setting and geologic information, current and historic water level data, and the predicted size and location of mining cells

Unless sufficient demonstration can be made that they will not be not required, designs for French drains or other means of maintaining groundwater flow levels and timing around the lined cells should be required to mitigate impacts to the prevailing hydrologic balance. These measures should be approved prior to, and installed concurrently with, the proposed slurry walls.

The applicant has provided no modeling data to illustrate the potential impacts due to the proposed slurry walls, and no designs or commitment to install French drains, or any other measures, to minimize/mitigate impacts to the prevailing hydrologic balance from mounding or shadowing.

Granted, based on the proposed activity and current site setting, I would say that the chances of adverse off-site impacts are minimal, however, I still feel that they should provide us with something.

All that has been provided at this time is a statement that "the applicant commits to submitting as a Technical Revision any revisions required to minimize impacts to the prevailing hydrologic balance, including the design of any underdrains, if the analysis of groundwater levels shows that they are necessary." What is the "analysis of groundwater levels" that is being proposed and how will it be determined if underdrains (or other) will be required? I would suggest that, at a minimum, trigger levels for groundwater mounding should be established. This could be something as simple as notifying DRMS if measured groundwater elevations are within 2' of ground surface for more than 2 consecutive months and conducting further evaluation, or something similar.

5) The application as submitted is inconsistent in stating when the slurry walls will be installed relative to mining of the cells to be lined. The applicant must commit to the timing of installation of the proposed slurry walls (prior to, or after mining of the cell) and make sure the application is consistent throughout. (The fact that the slurry walls are shown as completed partially within backfill along the river would seem to indicate that they are intended to be installed after mining and backfill has been completed). DRMS should consider bonding for backfill to two feet above static water level for areas of exposed groundwater until slurry walls are installed and provisionally approved by SEO. Adequately addressed

6) The application as submitted indicates that the proposed cells will be mined to within 200' of the riverbank, then backfilled to a minimum of 400' from the riverbank (presumably to avoid the requirement for installation of flood control measures such as pit-wall armoring or inlet/outlet structures, which should be discussed with the DRMS Surface Water group). The reclamation plan shows the slurry wall for the lined cells to be installed within and across this minimum of 200' wide backfill area located on the south sides of the lined cells.
What will the backfill material requirements and installation/compaction process and criteria be for these areas? What QA/QC will be conducted and submitted to verify that this fill material is competent for the purposes of installing a slurry wall? (Consultation with the DRMS

Geotechnical group is advised for this item as well as to determine if a stability assessment for this area will be required.) Adequately addressed

7) Specific criteria and conditions need to be established for the proposed mining and backfill activity within 200' of the river bank. For example: "No more than "X" feet excavation will be allowed within 200' of the river prior to backfill; all excavation and backfill within 200' of the river will take place outside of flood season between the months of "x" and "y"; and no excavated area(s) within 200' of the river will remain un-backfilled for more than one flood season". The provided mining plan should be updated accordingly. Adequately addressed

8) No baseline water level data, groundwater flow direction, or groundwater quality data have been provided with the application. The applicant will need to commit to not exposing groundwater until at least 5 consecutive quarters of baseline groundwater level and analytical data have been provided to the Division for review. Well permit and SWSP will also need to be obtained prior to GW exposure. Adequately addressed, however, I would strongly suggest that both downgradient MW's 4 and 5 be designated by DRMS as compliance wells.

9) The provided mitigation plan states that "in the event of a well owner compliant within 600' of the affected area" the permittee will submit a report to DRMS within 30 days. DRMS does not restrict the radius of impact to 600' and therefore will require the permittee to commit to reporting any complaints by well owners to DRMS within 48 hrs or less. In the event that a well owner reports that their well has become unusable, the permittee will be required to implement mitigation measures immediately (as soon as practically possible). The permittee will be required to initiate an investigation into the complaint immediately, and submit the results, as well as any proposed remediation or rationale for discontinuing mitigation, to DRMS for evaluation within 30 days. Page G-7, second paragraph – text reading "within 600 feet of the permit boundary" needs to be removed as it conflicts with another correction for Item 9 which has been included on Page G-8 immediately above Table G-1

10) The provided Groundwater Sampling and Analysis Plan is incomplete/inconsistent. For example, the Groundwater Quality Monitoring Plan provided states that "Operations at the site will take place inside of lined cells…" however the mining plan seems to contradict this at this time. The provided Mitigation Plan also states that "Martin Marietta intends to install monitoring wells at the site prior to exposing groundwater" however, no information as to the number and locations of these wells is given – only the location of a single proposed compliance well. It is likely that based on the proximity to the river, and location of the unlined excavations proposed, that additional compliance point(s) will be required.

    The provided Groundwater Sampling and Analysis Plan, and the information it currently contains, should be re-submitted in accordance with the "DRMS Groundwater Monitoring Sampling and Analysis Plan Guidance for Construction Materials and Hard Rock Sites" dated September 2023, along with the additional specific information required by that document. If the applicant believes that a requirement or topic within the guidance document is not applicable to this site, a rationale for not including it should be provided. A PDF copy of the September 2023 Guidance Document has been included with these comments.

No information has been provided to detail the sampling methods proposed for collection of baseline and compliance monitoring data, as required by Section 4 Sampling Methods of the DRMS Groundwater Monitoring Sampling and Analysis Plan Guidance for Construction Materials and Hard Rock Sites. The applicant will need to provide information detailing their proposed sampling protocols.

The applicant will need to specify how the baseline and ongoing water level and analytical data will be reported to DRMS as outlined in Section 3 of the DRMS Guidance document. (I'd suggest that all baseline data be required as a TR as specified in Item 11, and subsequent monitoring data be made part of the annual report unless exceedances/issues are observed in the monitoring data)

11) All baseline water level data, water quality data, as well as any proposed modifications to the analyte list, sampling intervals, or Table Value Standards benchmark values should be submitted to DRMS as a subsequent TR for review and approval. Adequately addressed in response summary letter

As always, more information/clarification may be required as additional information is submitted during the application review process.

COLORADO
Division of Reclamation, Mining and Safety
Department of Natural Resources

Date: **April 16, 2024**

To: **Joel Renfro**

CC: **Amy Eschberger**

From: **Zach Trujillo**

RE: **Thunderbird Sand and Gravel Application, DRMS File No. M-2023-006**
Exhibit S - Stability Report Review

Joel,

As requested, I have reviewed the responses from Martin Marietta Materials, Inc. (MMM) to my adequacy comments in my Interoffice Memo (Memo) dated November 30, 2023, regarding the Thunderbird Sand and Gravel (Mine) application. MMM has provided one response to the adequacy items found in the Memo. This memo specifically addresses the updates to the proposed Exhibit S along with the Mine's responses. For more information regarding the Division's previous reviews of the Report, please refer to the Division's discussed memos from Zach Trujillo to Joel Renfro. Questions and comments regarding the Report to ensure all Rules and Requirements are satisfied will be summarized at the end of this memo.

Summary – Division Comments and/or Questions – November 30, 2023

The following is a summary of the Division's comments/questions discussed in Division's Memo dated November 30, 2023:

1. *Please have MMM provide the borehole drill logs that were discussed and used within CR's Report as well as their location in relation to the Mine for the Division's review.*

2. *Please have MMM provided the DWR well data used in CR's Report and stability analyses for the Division's review.*

3. *Please have CR ensure that the slurry wall is accurately reflected in the slope stability models, specifically within "Phase 3 Cell with slurry wall" (GALENA file – Thunderbird Mine/Excelsior Ditch) for both static and seismic conditions.*

4. *Please have CR provide additional rational regarding the second Sand and Gravel profile included in the Phase 3 Cell with slurry wall" (GALENA file – Thunderbird Mine/Excelsior Ditch) GALENA Models.*

5. *Please have CR provide updated GALENA analyses along with the associated resulting FOS as necessary based upon the comments above.*

1313 Sherman Street, Room 215, Denver, CO 80203 P 303.866.3567 F 303.832.8106 http://mining.state.co.us
Jared S. Polis, Governor | Dan Gibbs, Executive Director | Michael Cunningham, Director

MMM has provided the following response:

- *The borehole drill logs were provided in Exhibit I of the application. The location of each hole is considered confidential, but all were within the permit boundary. The attached revised stability analysis accurately reflects the conditions with a slurry wall keyed 4-feet into the bedrock. The analysis showed the FOS remained the same for each structure. In addition, a closer structure was identified. This structure is a power line on the east side of Baxter Road. Analyses indicate all structures within 200 feet of the mine will be stable.*

The following items are responses and/or additional discussions associated to the Division's comments noted above and MMM's provided response:

1. The Division understands that the borehole locations are sensitive information, and the Operator requests they remain confidential. However, for the Division to ensure the boreholes are representative of the information provided in the proposed Appendix S as well within the permitted boundary, the locations need to be provided for the Division's review.

   Per Rule 1.3(3)(a), "[a]n Operator may mark "CONFIDENTIAL' information supplied in a permit application disclosing the location, size, or nature of the deposit or depth and thickness of the deposit and thickness and type of overburden to be removed. Confidential information so marked shall not be available to the public until the mining operation is terminated, unless the Operator gives a written consent on company letterhead and signed by an authorized agent of the company to release all or any part of the information.

   Please provided the Division with the location of the boreholes that were discussed within the proposed Exhibit S for the Division's review. If necessary, the Operator may mark the information as "CONFIDENTIAL" per Rule 1.3(3).

2. This item is no longer warranted. DWR well information was also noted and discussed under Eric Scott's (Division) adequacy memo in greater discussion. **No additional comments or responses are necessary.**

3. New GALENA files have been provided with updated profiles that provide additional clarity regarding the slurry wall. **This item has been satisfied.**

4. New GLAENA files have been provided with updated profiles removing the second Sand and Gravel profile included in the Phase 3 Cell with slurry wall" (GALENA file – Thunderbird Mine/Excelsior Ditch) GALENA Models. **This item has been satisfied.**

5. As noted in the previous two Items, updated slope stability models with the use of GALENA slope stability software have been provided for both static and seismic conditions. As noted in MMM's responses, a new Critical Structure was identified, and an associated geotechnical analysis was also provided with the updated Exhibit S. Per Section 30 of the Policies of the Mined Land Reclamation Board (Section 30), for generalized, assumed, or single test measurements for critical structures, the minimum recommended Factors of Safety (FOS) is 1.5 for static conditions and 1.3 for seismic conditions. All provided slope stability analyses and the resulting FOS have meet or exceeded all minimum requirements of Section 30. **This item has been satisfied.**

This concludes my review for the requested Exhibit S and geotechnical stability analysis conducted by Civil Resources, LLC on behalf of Martin Marietta Materials, Inc. regarding the proposed 112c application for the Thunderbird Sand and Gravel (Mine). If you have any questions or comments, feel free to reach out.

Sincerely,

Zach Trujillo
Environmental Protection Specialist
(303) 866-3567 ext. 8164
Zach.Trujillo@state.co.us

COLORADO
Division of Reclamation, Mining and Safety
Department of Natural Resources

Floodplain Protection Standards for Sand and Gravel Pits Adjacent to Rivers and Perennial Streams

February 2024

Introduction

Sand and gravel are necessary commodities for construction that must be mined where they exist. Many gravel deposits exist in the floodplains of rivers and streams. Historically, gravel was extracted directly from streams and rivers via in-stream mining methods. Today, floodplain mining (occurring adjacent to the main channel of a river or stream) is considered a safer and less impactful method of extracting this material.

However, floodplain mining can cause significant impacts to the surface water environment and associated infrastructure if its risks are not properly addressed. Mining operations that occur within or adjacent to floodplains have the potential to significantly impact the prevailing hydrologic balance of affected land within the boundary of a mine site, as well as the surrounding area. These operations also have the potential to cause significant damage off-site during flood events. One common example of this is when a river or stream cuts through an adjacent pit during a flood event (referred to as "stream capture"), which can lead to off-site impacts to river water diversions and other structures.

Potential damage from mining within or adjacent to floodplains can include:

- Damage to property and infrastructure
- Reduction in water quantity for water users
- Degradation of water quality for water users
- Destruction of riparian vegetation and habitat
- Short- and long-term changes to channel morphology and river behavior
- Cumulative impacts from multiple mines in a floodplain

To limit these impacts, the Colorado State Legislature and the Mined Land Reclamation Board (MLRB) have promulgated the following Statutes and Rules (citations in References section) pertaining to the extraction of construction materials.

- C.R.S. 34-32.5-116(4)(c):

  > An operator shall demonstrate that . . . all affected areas to be reclaimed as part of the approved application will not result in any unauthorized release of pollutants to the surface drainage system.

- C.R.S. 34-32.5-116(4)(h) and Rule 3.1.6(1):

  > Disturbances to the prevailing hydrologic balance of the affected land and of the surrounding area and to the quantity or quality of water in surface and groundwater systems, both during and after the mining operation and during reclamation, shall be minimized.

- C.R.S. 34-32.5-116(4)(i):

  > Areas outside of the affected land shall be protected from slides or damage occurring during the mining operation and reclamation.

- Rule 3.1.5(3):

  > All grading shall be done in a manner to control erosion and siltation of the affected lands, to protect areas outside the affected land from slides and other damage.

- C.R.S. 34-32.5-116(4)(j) and Rule 3.1.6(3):

  > All surface areas of the affected land . . . shall be stabilized and protected so as to effectively control erosion.

- Rules 6.3.3(l) and 6.3.4(1)(e):

  > [The operator must] . . . describe what measures will be taken to minimize disturbance to the hydrologic balance, prevent off-site damage, and provide for a stable configuration of the reclaimed area consistent with the proposed future land use.

The Division of Reclamation, Mining and Safety (Division) is the implementing agency to enforce the Legislative Statutes and the MLRB's Rules through permitting actions, inspections, and enforcement.

This document is intended to provide guidance related to floodplain protection for sand and gravel pits located adjacent to rivers and perennial streams. The guidance presented in this document sets the standard for review of new permit applications and for applications submitted to revise existing permits or expand mining operations into the floodplain of a river or perennial stream.

The Division will be working with operators of existing permits on a case-by-case basis to determine what permit revisions, if any, are needed to comply with these standards.

The standards below are largely based on review of guidelines developed for the Mile High Flood District (MHFD; formerly the Urban Drainage and Flood Control District), which oversees floodplain management in the Denver Metropolitan area: *"Technical Review Guidelines for Gravel Mining and Water Storage Activities Within or Adjacent to 100-Year Floodplains."* (This document is heretofore referred to as the MHFD Guidelines.) The MHFD is considered a national leader in stormwater and floodplain management, and their guidelines are broadly accepted. The Division has determined that the principles of the MHFD Guidelines are based on sound engineering, professional judgment, and decades of experience in floodplain management, and it is appropriate to apply these principles to sites located outside of the MHFD boundaries.

The Division has extensive experience regulating sand and gravel pits in floodplains, and significant lessons were learned after the extensive flooding that occurred in 2013 and 2015. Currently, approximately 25 percent of Division permits are located within a 100-year floodplain.

The extent of damage that can be caused by mined pits subjected to river flooding is illustrated in the Google Earth aerial imagery presented in Appendix A.

While this guidance document pertains to mining operations located within 400 feet of a river or perennial stream, all mining operations are responsible for preventing off-site impacts, including operations located more than 400 feet from a river or perennial stream. Accordingly, based on the details of a particular floodplain mining operation proposal, the Division may require additional or more stringent protection measures than what is presented below in this guidance document. For example, more stringent measures may be implemented for applications proposing new pits in an area with multiple existing pits, as these sites are at a higher risk of causing significant flood damage.

Standards for New Applications

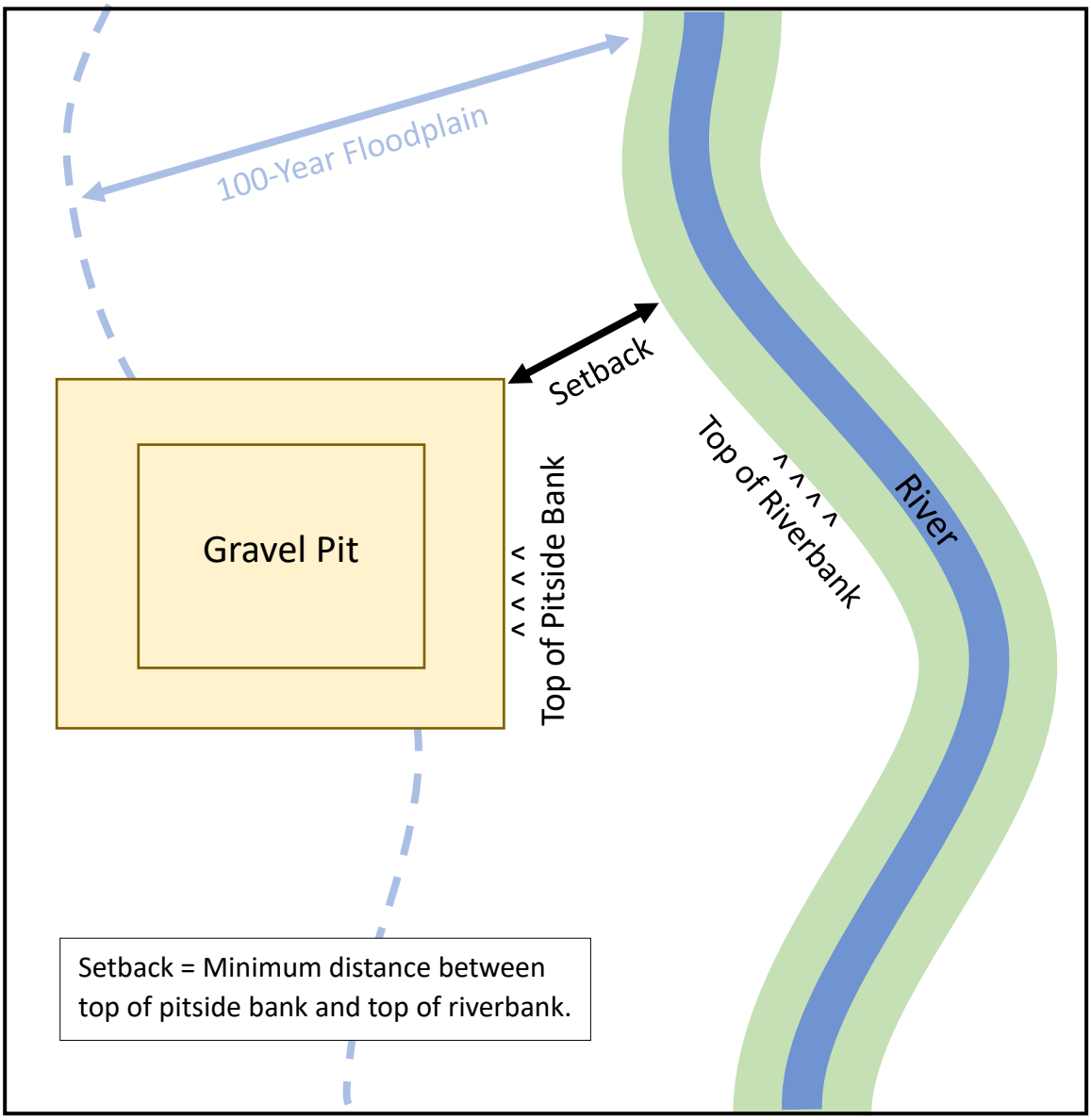
For a new permit application or an application to revise an existing operation to include a new pit adjacent to a river or perennial stream, the Division will require that one of the following options (or a combination thereof) be performed by the Applicant as part of their submittal to the Division:

1) Propose an appropriate mining setback from the banks of the river or stream. The standard setbacks presented in Table 1 below are based on the MHFD Guidelines. *Note that in the scenario where no pitside bank or riverbank protection is provided, the standard setback from the river or stream is 400 feet.* See Figure 1 below with sketch showing how setback is measured.

Table 1 - Standard Setbacks from River (Based on MHFD Guidelines)

Area Stabilized	**Minimum Setback (feet)**
None	400
Pitside Bank Only (armoring internal to the pit)	300
Riverbank Only (armoring external to the pit)	250
Riverbank and Pitside Bank	150

Figure 1 - Sketch Showing How Setback from River is Measured



2) Provide detailed designs of proposed structures (e.g., riprap, grouted boulders, side-channel spillways) to be installed on pitside banks and/or riverbanks to allow flood waters to safely flow in and out of the pit during the 100-year flood event while minimizing significant erosion of the banks. The design for these structures must be based on guidelines from a recognized authority and/or a detailed hydrology and hydraulics analysis. Guidelines could be stabilization measures presented in the MHFD Guidelines, bank protection designs presented in county drainage criteria manuals, or other applicable documents. Detailed analysis could include a hydrology and hydraulics model.

Note that in the scenario (in Table 1) where both pitside bank and riverbank protection is provided, the standard setback from the river or stream is 150 feet.

3) Provide a detailed analysis of the 100-year flow in the river or stream during the worst-case conditions of the proposed mining and reclamation scenarios. This analysis must sufficiently demonstrate that the proposed pit banks during mining and after reclamation will not be significantly eroded by the flood event. This could be done using appropriate hydrology and hydraulics models. Examples of acceptable models include the Hydrologic Modeling System (HMS) and River Analysis System (RAS) developed by the U.S. Army Corps of Engineers (USACE) Hydrologic Engineering Center (HEC). These models are commonly referred to as HEC-HMS and HEC-RAS. Links to information on these models are provided in the References section of this report.

If another regulating agency or local city or county government has developed more protective standards than those presented in this guidance document, such standards shall supersede those set by the Division. These standards would also need to be incorporated into the mine permit approved by the Division.

Upon request, the Division is available for consultation during development of an application that proposes a sand or gravel operation adjacent to a river or perennial stream.

For proposals to install riverbank protection, Applicants should be aware that additional requirements may be imposed by local governments, State agencies, and/or the U.S. Army Corps of Engineers.

References

Colorado Land Reclamation Act for the Extraction of Construction Materials, C.R.S. 34-32.5 §. Available at: https://drive.google.com/file/d/1nWs3Y_2wm8fp4eApFjUhZC2IyHxKKCM8/view

Colorado Mined Land Reclamation Board. Mineral Rules and Regulations of the Colorado Mined Land Reclamation Board for the Extraction of Construction Materials (2019). Available at: https://drive.google.com/file/d/1l5U8fOVjQ7VyB3GC7DGv6Gkczz7PwuRl/view

U.S. Army Corps of Engineers. Hydrologic Engineering Center's Hydrologic Modeling System (HEC-HMS). Information available at: https://www.hec.usace.army.mil/software/hec-hms/

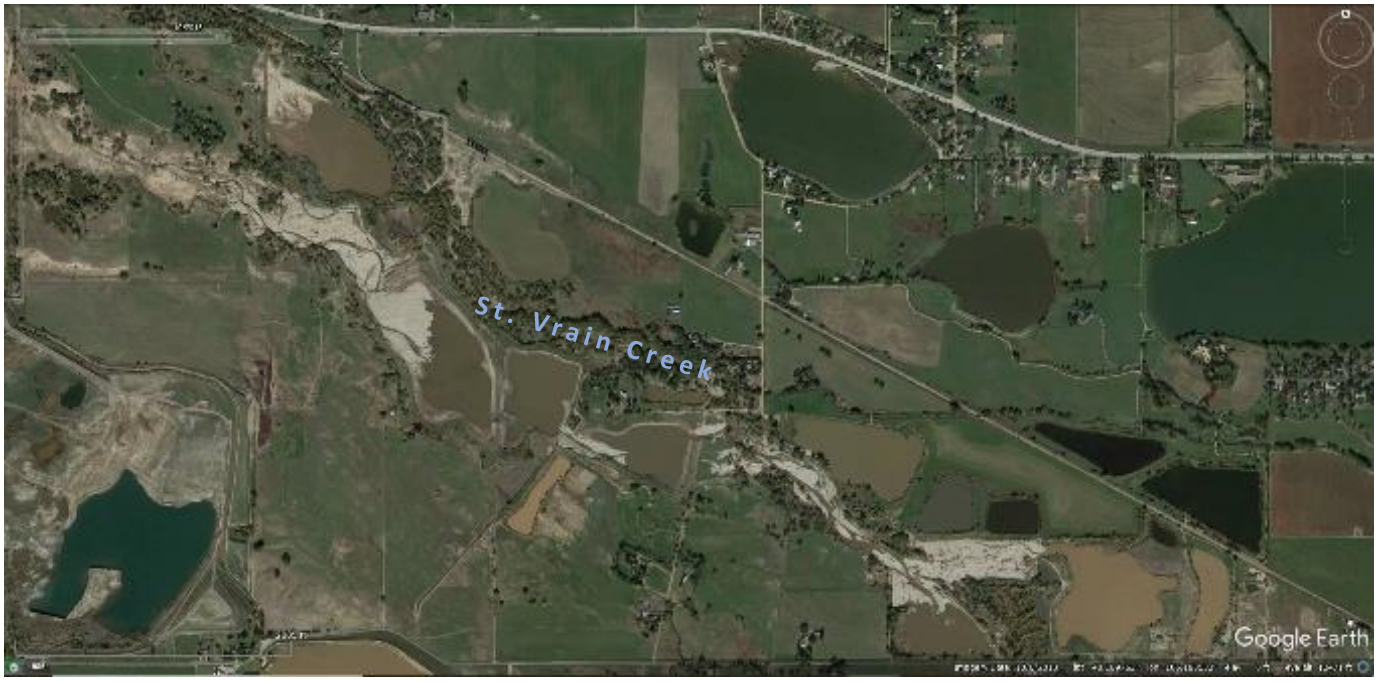
U.S. Army Corps of Engineers. Hydrologic Engineering Center's River Analysis System (HEC-RAS). Information available at: https://www.hec.usace.army.mil/software/hec-ras/

Wright Water Engineers, Inc. Technical Review Guidelines for Gravel Mining and Water Storage Activities Within or Adjacent to 100-Year Floodplains (2013, January). Available at: https://mhfd.org/wp-content/uploads/2019/12/Technical_Review_Guidelines_for_Gravel_Mining_and_Water_Storage_Activities_2013.pdf

APPENDIX A

Google Earth Aerial Imagery Showing Before (1A) and After (1B) Conditions in Boulder County After the 2013 Flood (Multiple Permits).

1A



1B

Google Earth Aerial Imagery Showing Before (2A) and After (2B) Conditions in Larimer County After the 2013 Flood (Single Permit).

2A

2B