



Watermark Engineering, Inc.

DATE: February 3, 2020

TO: Matt Keasling
Dan Ramos

FROM: Patrick Stiehr, PE

RE: Applicability of MRIC Drainage Study (2015) for Aggie Research Campus
Development Project



OVERVIEW

The Mace Ranch Innovation Center (MRIC) was in the development process in early 2015. The project covered 212 acres east of Mace Boulevard and north of County Road 32A. During the development and review process, a mixed-use alternative (MRIC-MU) was added. The project was put on hold later in 2015.

Development activity has since restarted at the MRIC site except for two notable changes. The new development, identified as the Aggie Research Campus, will be 25 acres smaller because the northwest corner (City of Davis property) has been removed. The second less significant change is that a housing element has been added. The housing is similar to the mixed-use alternative presented in 2015.

Watermark Engineering, Inc. prepared the drainage study for MRIC and subsequently added a second drainage study for the mixed-use alternative. The studies were very similar in the configuration of drainage facilities, and design criteria were the same. The differences were minor due to configuration changes of the land use and minor changes to the location and size of the proposed drainage facilities.

PURPOSE

The purpose of this document is to provide a discussion of the similarities between the 2015 project and the current project in relation to drainage. In addition, the 2015 drainage study provides sufficient information for the Aggie Research Campus (ARC) to move forward with environmental documents.

It is noted here that the 2015 drainage study was complete, but it was not considered a design level document. The reason is that there would be numerous small design decisions that had not been completed. The configuration and sizing of the drainage had been established but were going to be refined as more of the development details were finalized.

There are six main drainage concerns that were addressed in the 2015 study. A discussion of each of the concerns follows with information that supports that the 2015 study is also applicable to the proposed ARC.

Regulatory Floodplain

The 2015 study indicated that the project area is not within the FEMA regulatory floodplain. There are no changes to that information, and the information is applicable to the ARC.

Local Flooding

The onsite drainage facilities are planned to drain impervious areas to roadside shallow ditches and landscaped gentle swales that release runoff to local detention areas. The actual layout will undoubtedly change, but the concept remains and is applicable to the ARC.

Most of the local runoff will be managed along surface facilities with minimal use of storm drain piping. The details and configuration of the drainage facilities for the ARC will be designed based on the concepts presented in the 2015 study.

Water Quality

The approach to water quality will not change with the relatively minor land use changes. Infiltration and water quality requirements are similar for both ARC and the original MRIC. The surface facilities will be resized and designed to meet current standards.

Upstream Impacts

The modeling analysis within the 2015 study demonstrated that upstream water levels would not increase as a result of the proposed MRIC development. No significant changes to the proposed drainage facilities are proposed or expected for the ARC. As development details become available, the existing modeling and analysis will be updated to confirm no upstream impacts. This is the same approach that was planned for the MRIC in 2015.

Downstream Impacts – Conveyance

The 2015 study included onsite detention areas to attenuate peak runoff from the site to meet design capacity criteria in the downstream receiving channel. There is less area proposed for the ARC, but the site will have an overall higher percentage of imperviousness. Less area means less runoff, but greater imperviousness increases both peak and volume of runoff.

The effects of these two changes will be incorporated into the drainage model, and the size and configuration of the detention and conveyance facilities will be modified to attenuate flows leaving the site to acceptable levels with no impact to downstream conveyance facilities.

Downstream Impacts – Increased Runoff

This issue has a long history as a result of a lawsuit by downstream landowners that claimed the Mace Ranch development increased flooding on the agricultural lands. The Mace Ranch development included the installation of an oversized new outfall into the Yolo Bypass as mitigation. As a result, in most years, there is comparative less flooding on the ag properties just west of the Yolo Bypass levee. However, that was not sufficient.

To account for the increased runoff from the impervious portions of MRIC, two mitigation measures were presented in the 2015 study. The first was a replacement storage option where a field could be lowered to store the incremental increased runoff volume. The recommended field was the southeastern parcel adjacent to the Yolo Bypass levee and the drainage channel, although another nearby field would work. The plan was to lower the field a foot or two by first removing the topsoil and then lowering the field and moving the dirt out of the floodplain, and finally putting the topsoil back in place for continued farming.

The second proposed mitigation measure was to install a small permanent or portable pump to be used when the bypass water level is higher than the ponding level in the adjacent land-side fields. This measure was less attractive because of the ongoing effort needed to ensure the facility is fully functional when needed, which would only average about once every three to five years.

Note that either measure would have a benefit-cost ratio of much less than one. However, either measure meets the goal of no increased ponding depth because of the increased runoff from development.

The same approach would be used for the ARC if necessary. The only difference would be the net volume change, based on less developed area but with more imperviousness.

SUMMARY

There are no significant changes to the land use or the proposed drainage facilities from the 2015 MRIC development to today's ARC planned development. The differences are in the details that are not yet known, similar to when the MRIC project was halted.

There will be more details to revise because of the smaller footprint and greater imperviousness. However, the conceptual level details presented in the 2015 study are applicable to the ARC project.

In my professional opinion, there are no significant differences between the MRIC project and the ARC project that would materially or significantly impact the drainage facilities as set forth in the 2015 study.



Watermark Engineering, Inc.

DATE: February 10, 2020

TO: Nick Pappani

FROM: Patrick Stiehr, PE

RE: Applicability of MRIC Drainage Study (2015) for Aggie Research Campus Development Project – Supplemental Professional Opinion Letter



Dear Mr. Pappani,

This supplemental memorandum provides additional information and clarification pertaining to the “Applicability of MRIC Drainage Study (2015) for Aggie Research Campus Development Project” memorandum that was submitted on February 4, 2020. The issues addressed in this document respond specifically to questions that were raised in a public comment on the scope of your environmental analysis of the Aggie Research Campus (ARC), which you subsequently posed to me.

I believe that these questions pertaining to changed impacts and/or changed mitigations were addressed in the analysis previously provided; specifically, in the SUMMARY section and shown below:

There are no significant changes to the land use or the proposed drainage facilities from the 2015 MRIC development to today’s ARC planned development...

...

[A] preliminary comparison of the former and proposed project differences indicate the conceptual level details presented in the 2015 study are applicable to the ARC project.

...

In my professional opinion, there are no significant differences between the MRIC project and the ARC project that would materially or significantly impact the drainage facilities as set forth in the 2015 study.

In response to your email, I have made some additional calculations and made additional model runs using the dynamic hydrologic and hydraulic model that was used in the original analysis. The modeling analysis is comprehensive and accurate but note that there are many design details that will be further refined as the project moves through the design process. This additional effort has added support and strengthens my professional opinion that the drainage analysis from the MRIC mixed-use alternative (MRIC-MU) and the proposed mitigations are applicable to ARC without the need for revision at this stage of the development.

The following includes a statement of, and responses to, the specific inquiries posed:

1. *Provide a qualitative assessment of the implications of the ARC land use changes, i.e. less acreage proposed for the ARC but an overall higher percentage of imperviousness, upon the increase in the rate and amount of runoff volume.*

RESPONSE: Based on a preliminary comparison of the proposed site design, there is a decrease of about 12% in area, and an estimated 11% increase in imperviousness. These two parameters can't be combined directly but the net effect will be a small decrease in the overall peak flow and volume. The estimated 100-year peak unit runoff from the proposed ARC site is about 1.8 cfs per acre compared to about 1.7 cfs per acre for the prior project. The increase over the 187 acre ARC site would be about 19 cfs. However, there are 25 less acres for the ARC project which means total peak flow would be decreased by about 42 cfs (25 acres x 1.7 cfs per acre). The net decrease of peak flow is expected to be between 10 and 30 cfs, though exact decreases will be determined at later stages of the development refinement.

The volume is expected to be slightly less based on similar assumptions and calculations. The increase volume of runoff will be about four acre-feet because of the expected increase of imperviousness. The reduction of 25 acres will decrease the runoff volume about five acre-feet. The runoff volume will remain in the range of 44-45 acre feet. There is little or no difference in runoff volume between the MRIC-MU project and the ARC project.

2. *Would the amount of runoff be expected to be more or less than originally estimated?*

RESPONSE: The response is the same as above. The overall change will be minor. The degree of modification to the drainage facilities resulting from the change from MRIC-MU to ARC is not atypical of changes that occur in most development projects as the drainage study goes from conceptual to design level.

3. *Is it anticipated that the on-site attenuation facilities could continue to be adequately sized such that the amount of flow leaving the site will not exceed the original design capacity flow of MDC (260 cfs – see pg. 4.9-24 of the EIR)?*

RESPONSE: The comparison between ARC and MRIC-MU indicates that downstream maximum flow criteria will not be exceeded; i.e. the flow leaving the site will not exceed 260 cfs.

4. *Is the off-site storage pond, analyzed as approx. 100-acres in the MRIC-MU analysis, appropriately sized?*

RESPONSE: Because the volume and rate of flow are expected to be similar or less with ARC compared to MRIC-MU, the 100-acres previously identified will continue to be adequate. However, just to be clear, even if the project-level design analysis determines that there will be an increase in volume, the changed volume might require less than 0.1 foot of greater depth, but would not require additional acreage. Furthermore, it is worth noting that the off-site storage pond is only one of several available options to address increased volume downstream; the ponding could also be addressed with a temporary or permanent pump, or other mitigation deemed appropriate by the City.