Exhibit I

to Development Agreement

Stormwater Management Plan

(Stormwater Management and Flood Control Analysis)

VERAMENDI

Stormwater Management & Flood Control Analysis

May 2012

VERAMENDI

Stormwater Management & Flood Control Analysis

5-15-12

STATE OF TEXAS
DENNIS R. RION
67109
LICENSED
PROFESSIONAL ENGINEER

5-15-2012

STATE OF TEXAS
TROY M. DORMAN
92722
LICENSED
PROFESSIONAL ENGINEER

May 2012

PAPE-DAWSON ENGINEERS

TABLE OF CONTENTS

EXHIBITS

APPENDICES

EXECUTIVE SUMMARY

The Veramendi development consists of approximately ±2,427 acres of currently undeveloped land. The majority of the site drains to Blieders Creek which outfalls into the Comal River. In accordance with the City of New Braunfels (CNB) regulations, the detention will be required to mitigate for the increase in stormwater runoff as a result of the proposed development. Several detention options were analyzed and the results of each alternative were provided to the CNB as the Word Borchers Ranch Stormwater Management Report in March 2011.

After coordination with the CNB it was determined that the options presented in the report would be limited to Option A and Option B, which consist of establishing a dam in Tributary 1 to Blieders Creek. The Option A dam would provide the required mitigation per CNB, while Option B would serve as a regional detention facility by maximizing the reduction in flow by over-detaining within the Veramendi site.

The content of this report reflect several major changes to the analysis presented in the March 2011 report:

(1) The Pre-Project conditions are based on a corrected effective model after finding that the Effective FEMA model had curve numbers that were incorrectly calculated
(2) Post-Project Conditions reflect land use plan 5C
(3) The top of dam elevation has been established based on the spillway design
(4) As of May, 3, 2011, the CNB requires for the 2-year and 25-year storm events to be analyzed as opposed to only the 10-year and 100-year as presented in the March 2011 report. Therefore, the principal spillways (outlets) of the dams were modified to meet the additional requirements and consequently, the size of the dams were slightly increased.

As a result of these changes, Option A will provide a 19% reduction in the 100-year flows by decreasing the flow in Blieders Creek from 7,898 cfs to 6,409 cfs. Option B will provide a 24 % reduction in the 100-year AC flows by decreasing the flow in Blieders Creek from 7,898 cfs to 5,999 cfs.

OVERVIEW

The Veramendi site is located on Loop 337 in Comal County, Texas. River Road transects the site, which connects Loops 337, to the south, with Hueco Springs Road to the north. The Veramendi tract is within the City of New Braunfels ETJ, other than that part of the tract which immediately adjoins Loop 337, which is within City limits. The land is currently undeveloped and Pape-Dawson Engineers, Inc. was retained to conduct a Stormwater Management and Flood Control Analysis. This analysis is part of the overall planning effort for the Veramendi development.

SCOPE

The following tasks were completed and are presented in this report:

- Document the existing storm water flow concentration points and flood impact areas on the site
- Prepare preliminary total acreage of land necessary for detention to comply with the City of New Braunfels and Comal County Ordinances
- Provide a commentary regarding the likely impacts of flooding on the proposed development and recommendations for mitigation measures to reduce the impacts of flooding
- Prepare a summary memo outlining the steps necessary to develop a regional storm water facility and receive approval from local, state and federal agencies
- Provide advice regarding city and state flood management controls and regulations

Several meetings with the City of New Braunfels brought up additional concerns and the scope of this project was expanded to include the following:

- Prepare a cost/benefit analysis for onsite regional detention option (referred to as Option B)
- Complete a field visit of properties along Lakeview Avenue to estimate finished floor elevations of the 7 residential properties that flooded during the June 2010 storm identified by City personnel

- Provide a feasibility assessment including evidence of historic flow paths for diverting flood flows from Blieders Creek into the Guadalupe River near Lakeview Drive
- Evaluate the benefit of the proposed onsite Dam Option B for regional detention with fully developed conditions of the entire upstream Blieders Creek watershed
- Provide recommendations for "green" infrastructure options for stormwater management including, filter strips, wet ponds, sedimentation basins, and overall integrated stormwater quality and quantity management.

DESIGN FLOWS

The development of the Veramendi site will increase peak flows in Blieders Creek. The increase in peak flows is a result of the impervious cover associated with the development which prevents stormwater from infiltrating the soils thus creating more stormwater runoff.

The City of New Braunfels requires on-site detention in order to mitigate for the increase in stormwater runoff. Per the current City of New Braunfels regulations, detention facilities are to be designed so that the Post-Project 10-year storm and the 100-year storm flows do not exceed the pre-project flows. As of May 3, 2011, the CNB requires the 2-year and the 25-year storm events to also be mitigated; therefore, those storms were also evaluated in this report.

The existing stormwater flows per the 2009 Flood Insurance Study (FIS) for Comal County are based on watersheds shown in Exhibit 1. As shown in this Exhibit, the Veramendi site is within a total of 13 watersheds of which 8 drain to Blieders Creek and the remaining 5 drain to the Guadalupe River. The majority of the Veramendi site drains to Blieders Creek, which traverses the subject property, then crosses River Road and Loop 337, and ultimately merges with Comal Springs. In Exhibit 1, the watersheds draining to Blieders Creek have labels that start with the letters "BC" and flow combination points have labels beginning with "BCJ".

To determine the impact of development, the Effective FEMA hydrologic model for Blieders Creek was obtained from the City of New Braunfels. The curve numbers of the effective model were corrected to reflect the land use summary tables of the FEMA H&H Analysis: Milestone 2 prepared as part of the DFIRM process. In addition to the update of the Blieders Creek curve numbers, the lag times of the Comal River watersheds did not match those presented in the aforementioned FEMA H&H Analysis report. This updated model will be referred to as the Corrected Effective model and will reflect the pre-project conditions. Therefore, any increase in stormwater flows will have to be mitigated to be less than or equal to the corrected effective flows. The land use reflecting the pre-project conditions of the watersheds is provided as Attachment 1. A digital copy of the FEMA H&H Analysis report is provided in Appendix G for reference.

Based on the configuration of the FEMA hydrologic model, the flow concentration points downstream of the Veramendi site are junctions BCJ200, BCJ210, BCJ220, and BCJ240. The junction that reflects the full impact of Vermandi development is BCJ220 since watershed BC220 is the most downstream watershed impacted by the development. Junction BCJ220 represents the flow in Blieders Creek at Loop 337, which is 7,379 cfs for the 100-year storm event under pre-project conditions. The most downstream junction of Blieders Creek is BCJ240, which has a flow of 7,898 cfs for the 100-year storm event. The flows at these junctions are of significant importance due to the fact that the development of the Veramendi site cannot result in any increases in peak discharge in Blieders Creek. Therefore, the detention analysis performed will be based on the flow at these two junctions as well as at the Comal River junction CRJ010, which has a flow of 8,193 cfs for the 100-year storm event. Please note that the flow at junctions BCJ200 and BCJ210 cannot be increased and were also considered in the detention analysis.

Per Land Plan 5C Summary Table (dated July 2011), included as Appendix A, the Corrected Effective hydrologic model was updated to determine the impact the development of the site would have on Blieders Creek. This model is referred to as the Post-Project model and is based on increasing the curve number for the watersheds within the Veramendi site that drain to

Blieders Creek. A comparison of the pre-project and post-project curve numbers is provided as Attachment 2.

In general, development will decrease the time of concentration of a watershed since a paved surface does not allow stormwater to infiltrate the soils. The time of concentration is based on three components: overland flow, shallow concentrated flow, and channel flow. Unless major channelization improvements are proposed, the overland flow component is most significantly affected by the development of a watershed. Of the watersheds within the Veramendi site, the watersheds with overland flowpaths that will be impacted by the development drain to the existing Blieders Dam and will have buffers along the lows as shown in Appendix A. Furthermore, the presence of water quality ponds throughout the site will further impact the time of concentration of the watershed.

To quantify the impact that the development will have on the time of concentration of the affected watersheds, the largest watersheds within the Veramendi site were evaluated: BC160, BC170, BC180 and BC190. The flowpaths of these watersheds were delineated so that the overland flow would begin within the Veramendi tract. The pre-project time of concentration was calculated by limiting the overland flow to 300 feet and using a minimum overland time of concentration based on Table 5-3 of the CNB Drainage and Erosion Control Design Manual. The shallow and concentrated flow in accordance with TR-55. The post-project time of concentration was based on limiting the overland flow to a typical residential lot depth between 120 and 150 feet. The shallow flow length was subsequently adjusted to maintain the same channel flow length as in pre-project conditions.

This analysis showed that for three out of the four watersheds, the calculated pre-project time of concentration is higher than that calculated in the Effective model and that the post-project time of concentration was generally very close to the values used in the Effective model as shown in the table below.

Table 1: Time of Concentration Comparison

Time of Concentration [mins]	BC160	BC170	BC180	BC190
Effective Model	22.1	44.7	43.5	48.2
Pre-Project	33.6	44.1	48.7	56
Post-Project	26.9	39	44	40.7

Therefore, the time of concentration was not adjusted in the Post-Project hydrologic analysis. The detailed time of concentration calculations for these four watersheds are provided as Attachment 3.

The Post-Project hydrologic model was thereby created by using the same lag times as those in the corrected effective model and updating the curve numbers based on the land provided in Land Plan 5C. The Post-Project model revealed that the peak flow in Blieders Creek would increase from 7,379 cfs to 8,051 cfs at BCJ220, from 7,898 cfs to 8,674 cfs at BCJ240, and from 8,193 cfs to 8,548 cfs at CRJ010 for the 100-year storm event. In accordance with the City of New Braunfels regulations, there can be no increase in peak flow and therefore detention is required.

DETENTION ANALYSIS

Without on-site detention, the development of the Veramendi site will cause an increase in Blieders Creek peak flows as well as in the Comal River. Detention can take the form of small on-site ponds for each developed tract or larger regional dams to mitigate for entire watersheds.

In 2002, CHM2Hill prepared a Stormwater Master Plan (SWMP) for the City of New Braunfels which proposed the construction of a regional detention facility on Tributary 1 to Blieders Creek located on the western tract of the Veramendi site within watershed BC190which is within watershed BC190. The report indicated that the facility would decrease the FEMA effective peak flows from 7,456 cfs to 5,808 cfs for the 100-year storm event at BCJ240 (Klingemann

Street). However, this reduced flow of 5,808 cfs is based on the existing undeveloped conditions of the Veramendi site and per the City of New Braunfels Drainage Manual; detention design and analysis must be based on developed (post-project) conditions. Please note that the SWMP report has slightly different flows than those in the FEMA hydrologic model for junctions BCJ220 and BCJ240. The City of New Braunfels was contacted to determine whether they knew the source of the discrepancy; however, they were unaware and could not determine the cause of the different results.

As part of this report, the Effective FEMA model has been corrected to reflect the correct curve numbers and is therefore no longer the base model for the analysis presented in this report. A summary of the differences between the flows presented in the SWMP report, the flows in the Effective FEMA model and the flow in the Corrected Effective model are provided below.

Table 2: Blieders Creek 100-year Peak Flows Existing Conditions

Blieders Creek 100-year Peak Flows [cfs]	2002 SWMP Study	Effective FEMA Hydrologic Model	Corrected Effective Model (Pre-Project)
Loop 337, Junction BCJ220	7,025	7,029	7,379
Klingemann Street, Junction BCJ240	7,456	7,461	7,898

A summary of the pre-project, post-project, and the reduced flows per the regional detention facility proposed in the 2002 SWMP Study, is provided as Table 3.

Table 3: Blieders Creek 100-year Peak Flows

Blieders Creek Hydrologic Junction	Corrected Effective (Pre-Project) [cfs]	Post-Project per Land Plan 5C [cfs]	Reduced Flows in 2002 SWMP Study [cfs]
Loop 337, Junction BCJ220	7,379	8,051	4,986
Klingemann Street, Junction BCJ240	7,898	8,674	5,808
Comal River, Junction CRJ010	8,193	8,548	Not Available

A series of options were analyzed to determine the size of detention ponds needed to either maintain or reduce the pre-project peak flows in Blieders Creek. These options included a series of dams along Tributary 1 to Blieders Creek, a Dam within the mainstream of Blieders creek and a dam within watershed BC170. After the analysis of these options, it was determined that the optimal location for a dam is within watershed BC190 as presented in the 2002 SWMP Study report. Therefore, the dam presented in the 2002 SWMP Study report will be pursued as past of the Veramendi development.

The proposed dam can either provide the necessary detention to mitigate post-project flows back to the corrected effective flows or it can serve as a regional detention pond that can overdetain to decrease flows downstream more than required.

The option to only provide detention to mitigate Veramendi's increased flow for the four storm events (100-year, 25-year, 10-year, and 2-year) is referred to as Dam Option A. The option to provide additional detention to provide more of a benefit to the downstream properties is referred to as Dam Option B and considered to be a regional detention facility. Note that the Option B dam is based on the City's required design criteria and specifications for the dam in accordance with the Development Agreement and not a TCEQ requirement.

In accordance with the City of New Braunfels Drainage and Erosion Control manual, the dam is required to have a minimum freeboard of two feet above the spillway design flood elevation. As

previously mentioned, the proposed dams will be required to pass the full PMF event, which was determined to be the 1-hour storm duration. For both of the options presented in this report, the spillway was modeled at the elevation of the peak elevation of the 100-year storm event and the length was established by allowing approximately 2 feet of head above the spillway elevation.

The parameters associated with the Option A and Option B dams are provided below and shown graphically as Exhibit 2A and 2B, respectively.

Dam Option A Parameters:

Surface Area:	33 acres
100-Year Water Surface Elevation:	708.7 feet
Spillway Elevation:	708.7 feet
Spillway Length:	550 feet
PMF Peak Elevation:	711.8 feet
Bottom Elevation:	688 feet
Top of Dam Elevation:	712.8 feet
Depth:	24.8 feet

Results: This dam would reduce the Blieders Creek 100-year storm peak flow at BCJ220 to 5,947 cfs and at BCJ240 to 6,409 cfs. Please note that the flow of 6,409 cfs is much less than the pre-project flow of 7,898 cfs for the 100-year storm because without this excess reduction, the peak flow in the Comal River increases. This appears to be attributed to the delayed peak of the Blieders Creek watershed combining with the peak flow of the Comal River watershed. Furthermore, the need to provide mitigation for the 2-year storm requires additional storage. A summary of the flow reduction for the storm events analyzed is presented below.

Option B Proposed Dam Parameters:

Surface Area:	50 acres
100 Year Water Surface Elevation:	717 feet

Spillway Elevation:	717 feet
Spillway Length:	300 feet
PMF Peak Elevation:	719.8 feet
Bottom Elevation:	688 feet
Top of Dam Elevation:	720.8 feet
Depth:	32.8 feet

Results**:** This pond would reduce the Blieders Creek 100-year storm peak flow at BCJ220 to 5,073 cfs and at BCJ240 to 5,999 cfs. Due to the increase in impervious cover associated with the development of the Veramendi site, the target flow established by the 2002 SWMP Study was not obtained. This results from the increased flow in watersheds BC170, BC175, BC175, BC180, BC200, BC210 and BC220. Furthermore, the 2002 SWMP study is based on the FEMA effective model which included errors thereby invalidating the results presented in that study.

The area and top elevations shown in Exhibits 2A and 2B are based on having 1 foot of freeboard between the PMF peak elevation and the top of pond. The elevation-area data used for these ponds was based on the 1-foot LIDAR topography data collected for the site and is provided below as Table 4.

Table 4: Elevation-Area Table for Proposed Dams

Elevation [feet]	Area [acres]
688	0.0
690	0.87
695	4.19
700	10.59
705	19.44
708	25.6
710	28.53
714	39.83
715	41.99
720	54.79
725	65.60

Detention for the eastern tract (eastern tract) was also analyzed and resulted in a total of 5 smaller ponds with an estimated depth of 8 feet as shown in Exhibit 3. The design of these detention ponds is based on the watershed areas that would be captured by the pond. There are about 100-acres of land including some that is not developable, along the Guadalupe River that cannot be captured as shown in Exhibit 3. Because it is neither feasible nor practical to provide detention for this area, we recommend that the development agreement between the City of New Braunfels and the Veramendi site developer include an exception for the detention of this area. This exception should be based on the fact that the Guadalupe River has a peak flow of 84,223 cfs and the stormwater runoff generated from the 100 acres is insignificant relative to this large flow.

LIKELY IMPACTS OF FLOODING

Extreme rainfall events are very common in the City of New Braunfels. Below is a summary of the extreme rainfall events that occurred in June 2010 and those included in the 2009 Flood Insurance Study (FIS) for Comal County.

- June 9th 2010: 11.30 inches of rain in a 24-hour period (Source: CoCoRaHS)
- July 2002: 5 to 35 inches of rain. For the first time since its construction the Canyon Lake Dam's emergency spillway was active (Source: 2009 Comal County FIS)
- October 17th 1998: 15 inches of rain. Bleider's Dam spared residents above Landa Park (Source: 2009 Comal County FIS)
- May 11th 1972: 12 inches of rain between 8:40 pm and 9:40 pm. 60,800 cfs flood peak from Bleider's Creek (Source: 2009 Comal County FIS)

The most recent extreme storm event occurred on June 9th, 2010 and NexRAD reported a total of 8 inches of rain within a 3 hour time period. This rainfall intensity exceeds the 3-hour 100-year storm of 6.23 inches as defined by the City of New Braunfels. Furthermore, high-water marks throughout the site were surveyed by Pape-Dawson Engineers, Inc. and indicated a flood depth approximately 2 feet higher than the 2009 100-year FEMA floodplain.

BLIEDERS DAM BREACH ANALYSIS

The Veramendi site is downstream of the existing Blieders Creek Dam. In 2010, Comal County prepared a dam breach analysis to determine the areas that would be flooded if Blieders Dam were to fail. Based on this analysis, approximately 684 of the 1,756 acres of the western tract and approximately ½ an acre of the 673 acres in the eastern tract would flood. The limits of the flooding as a result of the breach analysis are provided as Exhibit 4. The Comal County Assistant Engineer has provided us with the methodology and calculations associated with this dam breach analysis. The method used is a Simplified Dam Breach, which does not require a detailed hydrology and hydraulic analysis. Therefore, Pape-Dawson Engineers, Inc. undertook

an independent more detailed analysis to take advantage of the more detailed site topography and available FEMA hydrology model. The Comal County Assistant Engineer informed us that if we perform a more detailed study, the results can be submitted to TCEQ and may amend the breach zone presented in Exhibit 4.

A preliminary dam breach analysis was prepared based on the TCEQ guidance manual. The cross sections used in the Blieders Creek effective model were extended so that the probable maximum flood would be contained within the cross sections.

The Probable Maximum Precipitation was obtained from HMR52 and the following depths were interpolated for the 11.5 square mile drainage area to Blieders Creek Dam. The following precipitation depths were used to develop hyetographs for each storm duration, which were then added to the HEC-HMS hydrology model to determine which duration resulted in the highest peak inflow to Blieders Dam. It was determined that the 6-hour storm would be the critical storm duration for Blieders Dam. Therefore, this storm was used for the analysis of the dam breach.

Table 5: Probable Maximum Precipitation

Storm Duration	Probable Maximum Precipitation [inches]	Peak Inflow to Blieders Dam [cfs]
1 hour	15.7	61,134
2 hours	20.1	60,166
3 hours	24.5	58,134
6 hours	31.5	61,282
12 hours	38	49,248
1 day	46	33,299
2 days	51.4	20,410
3 days	57.5	15,234

The results of the dam breach analysis are provided in Exhibit 5. As shown in this exhibit, approximately 400 acres would be removed from the breach zone if this analysis is incorporated into the TCEQ emergency action plan for Blieders Dam.

CITY OF NEW BRAUNFELS PLANNED IMPROVEMENTS

As previously mentioned, the City of New Braunfels SWMP prepared by CHM2Hill in 2002 documented a number of improvements that would alleviate flooding and reduce the number of low water crossings in the Blieders Creek watershed.

There are no proposed improvements (storm drain and road crossing upgrades) within the Veramendi site as part of the New Braunfels Master Plan; however, there are recommended improvements downstream of the site along River Road. These consist of upgrading low water crossings to pass the 25-year design storm and may benefit the site by decreasing water surface elevations by 0.25 feet but this impact is insignificant. The recommended improvements are:

- River Road between Loop 337 and Rock Road, install 20-12'x6' Box Culverts
- River Road and Access Road near Lakeview Street, install 10-10'x10' Box Culverts
- Lakeview Street Crossing, install 11-10'x10' Box Culverts

Our review of the City of New Braunfels Capital Improvement Plan revealed that there are currently $300,000 allocated to the design of the regional detention facility proposed by CHM2Hill and presented in this report. This budget was allocated for fiscal year (FY) 2009-2010 with $3.86 million allocated in FY 2012-2013 for construction.

SITE VISIT FINDINGS

A site visit was performed to document the current condition of the downstream areas that receive runoff from the site. We observed watermarks and debris that were as high as three feet against the fence along the southeastern boundary. It appears that as a result of the buildup of debris, the flow leaving the site is not as concentrated as it would be with cleared drainage paths.

Once the site is developed, the adjacent properties will receive more concentrated discharge than they are accustomed to unless measures are taken to spread the water to the natural flow path. Detention will be required to mitigate for any increased flows resulting from channel modification or impervious cover. However, detention produces a longer hydrograph with more erosive forces which can still cause downstream channel stability issues. Infiltration, retention or onsite reuse of stormwater are options to mitigate potential downstream impacts.

River Road is a two lane rural road section with roadside ditches and few intersection streets or driveways. We located two sets of culverts that appear to be dual 2-feet reinforced concrete pipes. Approximately 100-acres of the site within watershed BC180 drain to River Road and either sheet flow over the road or flow along the road and into the aforementioned culverts. Although a detailed analysis has not been performed to determine the capacity of the culverts, it is very likely that that the culverts are undersized. Therefore, additional consideration will have to be given to how the development impacts River Road. Given that crossings at River Road downstream of the site are low water crossings, as mentioned in the previous section of this report, it is very likely that the culvert crossing adjacent to the site is also a low water crossing and without proper upgrades will only become worse as a result of this development. A photo of this crossing, along with photos of the debris buildup along the property is presented in Appendix F.

FULLY DEVELOPED CONDITIONS

In order to evaluate the benefit that proposed dams will have once the Blieders Creek watersheds are fully developed, the curve numbers in the hydrology model were updated to reflect possible future conditions land use. This land use was received from the City of New Braunfels and is included as Exhibit 6. A comparison of the flows for Effective and Future Conditions Land Use for the Blieders Creek watershed are presented in Table 7. Since the Effective Curve numbers are based on a study performed in 2003, several of the watersheds have a significant increase in curve numbers due to the development that has occurred between 2003 and the present. Results of the reduction in flow provided by the detention options are provided below. Please note that

the future conditions curve numbers for watersheds BC190 and BC170 were not increased from the post-project conditions since the majority of the watersheds are within the Veramendi site and the areas that are not within the site are already developed.

Table 6: Comparison of Pre-Project and Future Conditions 100-year Flows

100-year Flow [cfs]	Corrected Effective (Pre-Project)	Post-Project with Proposed Dam Option B	Future Conditions with Proposed Dam Option B
Blieders Creek (BCJ240)	7,898	5,999	6,383
Comal River (CRJ010)	8,193	7,338	7,726
Comal New Channel	1,390	1,320	1,352
Comal Old Channel	6,879	6,063	6,444

As shown in Table 6, even with future development, Dam Option B will result in peak flow discharges less than those in the Corrected Effective model for Blieders Creek, the Comal River, and the Comal Channels.

COST/BENEFIT ANALYSIS

The purpose of the proposed Dam Option B is to serve as a regional stormwater facility that would benefit the areas downstream of the watershed. In particular, the City of New Braunfels is interested in alleviating flooding of the houses along Comal Springs as well as reducing the amount of sediment buildup in Landa Park. Lastly, the SWMP prepared by CHM2Hill proposed box culverts at three Blieders Creek low water crossings to convey the 25-year storm event. The implementation of either one of the dam options does not allow for a reduction in the number of culverts needed to convey the flow. The benefits that the proposed dam will provide with respect to the aforementioned issues are summarized below and quantified with a cost.

Table 7: Cost and Benefits of Stormwater Improvements

Proposed Stormwater Improvement	Cost	Benefits
Proposed Dam Option A	$2,000,000	▪ Reduces 100-year flow at Blieders Creek by 19% at Klingemann Street (BCJ240) ▪ Reduces 25-year flow at Blieders Creek by 13% at Klingemann Street (BCJ240) ▪ Average water surface elevation decrease downstream of Lakeview – 0.70 for 100-year storm event ▪ Provides sediment removal
Proposed Dam Option B	$4,000,000	▪ Reduces 100-year flow at Blieders Creek by 24% at Klingemann Street (BCJ240) ▪ Reduces 25-year flow at Blieders Creek by 19% at Klingemann Street (BCJ240) ▪ Average water surface elevation decrease downstream of Lakeview = 1.07 feet for 100-year storm event ▪ Provides sediment removal

The proposed Dam Option B reduces the 25-year storm discharge from 5,331 cfs to 4,626 cfs. at hydrologic junction BCJ240 Despite the decrease in flow, the number of box culverts needed at the three low water crossings cannot be reduced. Please note that this average is based on hydraulic cross sections 14420 through 8260.

Table 8: Average Water Surface Elevation Decrease Downstream of Lakeview Road

Storm Event	Corrected Effective flow at BCJ240 [cfs]	Post-Project with Proposed Dam Option A flow at BCJ240 [cfs]	Option A average decrease in Water Surface Elevation [feet]	Post-Project with Proposed Dam Option B flow at BCJ240 [cfs]	Option B Average decrease in Water Surface Elevation [feet]
2-year	1,231	1,084	0.23	969	0.43
10-year	3,900	3,407	0.25	3,073	0.94
25-year	5,331	4,626	0.31	4,334	0.82
100-year	7,898	6,409	0.70	5,999	1.07

DOWNSTREAM IMPACT

The City of New Braunfels received reports pertaining to flooding as a result of the June 9th, 2010 storm event. The lots with reported flooding are shown in Exhibit 8 and are evaluated below. These lots were visited on December 15, 2010 and finished floor elevations were estimated relative to the road elevations. The estimated finished floor elevation is also shown to determine the depth of flooding. Based on the estimated finished floor elevation of the homes in this area, neither one of the proposed dam options will provide sufficient detention to remove any of the seven homes from the 100-year floodplain. Please note that the analysis is based on the estimated finished floor elevations of the structures and survey data is needed to certify that the homes will not be inundated by the 100-year storm event.

The corresponding water surface elevation for each hydraulic cross section shown on Exhibit 8 is included as Attachment 8 and 9.

IMPACT OF DRY COMAL RIVER AND COMAL RIVER

There has been concern pertaining to the impact that the Dry Comal River and Comal River could have on Blieders Creek. This concern is based on the fact that Blieders Creek discharges into the Comal River and then into the Dry Comal River. Since the water surface elevation of the Dry Comal River is higher than the Comal Old Channel and the Comal New Channel water surface elevations, there is a backwater effect in the channels.

Under current conditions, the low flow of the Comal River is diverted to the new channel and through the falls at the Wurstfest grounds. At high flow conditions water flows out of the lake into the old channel and through the golf course. There is a significant drop within the old channel that physically prevents a backwater impact to Blieders Creek from the Comal River. Higher flow in Dry Comal Creek could result in less discharge through the new channel which would be offset by increased flow through the old channel. However, since increases in water surface elevations are not allowed in the City of New Braunfels the Dry Comal River should not have water surface elevations higher than the existing conditions; therefore there should be no

future negative impact to Blieders Creek from future development. In addition, Comal County is currently constructing a large regional detention facility on Dry Comal Creek that will further reduce flows below the FEMA effective flow of 42,698 cfs.

GREEN INFRASTRUCTURE

The City of New Braunfels is encouraging the use of "green infrastructure" to incorporate into stormwater management plans. A description of the available options is summarized below in Table 9.

Table 9: Permanent Best Management Practices and Stormwater Credits for Stormwater Management

Permanent BMPS	Does it remove 80% TSS	Is it in the TCEQ TGM	Does it provide treatment other than 80% TSS removal?	Is it cost effective?
Vegetative Filter Strip	Yes	Yes	Yes - Nutrient Removal	Yes
Extended Detention Pond	No	Yes	Yes - Nutrient Removal	Yes
Bioretention	Yes	Yes	Yes - Nutrient Removal	Yes
Infiltration	Yes	No	Yes - All Nutrient & metals	Yes
Sand Filters	Yes	Yes	Yes - Nutrient Removal	Yes
Wet Basins	Yes	Yes	Yes - Nutrient Removal	Maybe
Constructed Wetlands	Yes	Yes	Yes - All Nutrient & metals	Maybe
Retention/Irrigation	Yes	Yes	Yes - All Nutrient & metals	Yes if water is needed
Stormwater Credits				
Porous Pavement	Variable	Yes	Yes - Sorption, Nutrients	Maybe
Rainwater Harvesting	Yes	No	Yes - Removal of washoff	Yes
Soil Amendment and conservation landscaping	Yes	No	No	Yes
Roof-top Disconnection	Yes	No	No	Yes
Natural Area Preservation	Yes	Yes	No	Yes

Vegetative filter strips can be used in the drainage areas that cannot be captured along the banks of the Guadalupe River and any other areas that will not be captured by a detention pond.

Bioretention, infiltration, sand filters and wet basins can all be incorporated into the pond options presented in this report by modifying outlet structures; however, retention options over the Edwards Aquifer Recharge Zone will have to be operated in accordance with TCEQ regulations regarding the length of time stormwater can remain in a pond.

CONCLUSIONS AND RECOMMENDATIONS

Although the FEMA floodplain on Blieders Creek was recently updated using detailed study methods, the storm events in the vicinity of the City of New Braunfels are known to result in water surface elevations higher than those produced by the 100-year storm event as defined by FEMA. Therefore, it is recommended to be very conservative when establishing building finished floor elevation and not to base them solely on the 100-year base flood elevations. We recommend a minimum of 2 feet of freeboard between the finished floor and the 100-year floodplain elevation.

The City of New Braunfels recognizes that the construction of a regional detention facility within the Veramendi site could improve flooding conditions for downstream interests. Our detention analysis shows that even with the proposed development for the Veramendi site, the construction of either one of the proposed dam within watershed BC190 will reduce flows downstream of the site. The City of New Braunfels City Engineer has communicated to us that a regional detention facility has never been constructed by the City and therefore meeting with the appropriate City and County Officials would have to take place in order to determine the steps, requirements, and finances pertaining to the construction of such a facility. In addition to City and County approvals, the detention facility will have to be reviewed and approved by TCEQ. The submittal to TCEQ will require a dam breach analysis to determine the impacts of flooding due to failure of the dam. Since the detention options presented in this report all have storage less than 1,000 acre-feet, heights less than 40 feet, and their failure will impact habitable structures downstream of the site, TCEQ will classify the structure as a “Small High Hazard” dam. This classification means that the spillway of the dam will have to pass the full PMF.

Our site visit revealed that the presence of vegetation and tree debris (i.e. tree branches and leaves) serve as an obstruction and impediment to flow leaving the Veramendi site. Although the detention ponds will be provided to make sure that the peak flows are not increased offsite, adjacent lots may be adversely impacted by concentrated discharges. The areas with flow leaving the site need to be designed so that there is no concentrated flow discharging into an adjacent lot and if possible directed away from the adjacent lots.

Our downstream analysis of Blieders and Comal Creek revealed that the 24% reduction in the 100-year flow associated with the implementation of Option B will result in an average water surface elevation decrease of 1.07 feet, but this decrease is still not enough to remove problem areas identified by the City of New Braunfels from the 100-year floodplain. The implementation of Option A will result in similar results with a 19% reduction in the 100-year flow and an average water surface elevation decrease of 0.7 feet.

Furthermore, the finished floor elevations of the homes shown in Exhibit 8 are estimated based on their height above the road elevation and the road elevations were obtained from 2-foot contour topography. Therefore, in order to establish whether the options presented in this report will definitely alleviate flooding, a professional survey of the finished floor elevations of the homes as well as survey shots of the elevations in the creek are needed. This will ensure that the water surface elevations of the creek and the homes are accurate and referenced to the same datum.

Finally, there are multiple opportunities to incorporate stormwater quality BMPs into the design of the detention ponds and site plans for this development. In coordination with the landscape architect, the BMPs can be integrated into park settings and greenbelts to enhance the aesthetic of the site while providing reduction of runoff and protection of downstream sensitive features.

Table 10: Summary of 100-year Storm Event Flows* [cfs]

Creek Name	Hydrologic Node	Corrected Effective (Pre-Project)	Post-Project	Post-Project with Proposed Dam Option A	Post-Project with Proposed Dam Option B	Future Conditions with Proposed Dam Option B
Blieders Creek Dam Outflow	SCS Dam 3 Out	2,894	2,899	2,899	2,899	4,229
Blieders Creek (downstream of Proposed Dam)	BCJ190	6,638	7,311	5,425	4,540	4,653
Blieders Creek	BCJ240	7,898	8,674	6,409	5,999	6,383
Comal River	CRJ010	8,193	8,548	7,693	7,338	7,726
Comal New Channel	Landa Park Outflow	1,390	1,412	1,350	1,320	1,353
Comal Old Channel	Landa Park Diversion	6,879	7,141	6,414	6,063	6,450

*100-year Storm Event used in the Effective FEMA hydrology is based on a frequency storm with a storm area of 10 miles.

ATTACHMENTS

ATTACHMENT 1

Blieders Creek Watershed Land Use

Attachment 1 -Blieders Creek Watershed Land Use (Source: FEMA H&H Analysis: Milestone 2-Hydrology Phase)

Land Use Class*	Hydrologic Soil Group	CN	BC010	BC020	BC030	BC040	BC050	BC060	BC070	BC080	BC090	BC100	BC110	BC120	BC130	BC140	BC145	BC150	BC160	BC170	BC175	BC180	BC190	BC200	BC210	BC220	BC230	BC240	BC245	Total
C1	C	92	5	0	0	0	7.7	0	12.4	5.5	4.5	0	0	0	0	0	0	0	0	0	0	0	8.3	0	0	0	0	0	0	43.3
C1	Total	---	5	0	0	0	7.7	0	12.4	5.5	4.5	0	0	0	0	0	0	0	0	0	0	0	8.3	0	0	0	0	0	0	43.3
C3	A	88	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.5	0	0	0.6	3.1
C3	B	91	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	9.7	0	0	0.8	10.8
C3	C	94	0	0	0	0	0	0	1.8	0	11.7	0	0	0	0	0	0	0	0	0	0	0	52.4	0	0	0	0	0	0	65.8
C3	D	95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.9	0	13.5	0	0	0.8	19.2
C3	Total	---	0	0	0	0	0	0	1.8	0	11.7	0	0	0	0	0	0	0	0	0	0	0	52.4	5.2	0	25.7	0	0	2.2	99
C4	C	93	11.3	0	0	10.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21.6
C4	D	94	0	9.6	9.5	67.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	86.5
C4	Total	---	11.3	9.6	9.5	77.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	108.1
M1	A	73	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10.4	10.5
M1	B	83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.6	28	29.5
M1	C	87	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M1	D	90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32.1	4.2	36.2
M1	Total	---	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33.6	42.6	76.3
O1	A	49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	0	4.8	0	6.5	4.4	16.7
O1	B	69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	8.9	0	3.4	5.6	27.9
O1	C	79	0	0	0	0	0	0	53.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.5	10.8	10	0	0	83.7
O1	D	84	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20.3	0	1.6	5.8	75.6
O1	Total	---	0	0	0	0	0	0	101.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11.1	9.5	44.9	10	11.4	15.7	203.9
O2	A	43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.5	0	0.7	0	0	2.3	11.5
O2	B	62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	0	3.3	0	0	0	0	4.3	8.4
O2	C	75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	3.7	0.5	0	0	0	0	0	0	0	5
O2	D	81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12.7	47.6	99.1	0.4	19.5	0.6	9	0	0	11.1	200
O2	Total	---	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13.4	51.3	100.4	0.4	31.3	0.6	9.7	0	0	17.7	224.9
O3	B	78	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1
O3	C	85	6.9	44.1	0	0	0	0.9	59.4	0.5	0	0	0.6	0	8.2	1.3	0	38.5	38.1	25.4	11.6	4.8	0	0	0	0	0	0	0	240.2
O3	D	89	16.3	225.3	0	131.3	1.2	35	43.2	0	0	0	0	0	33.8	171.4	50.4	271.3	68.5	2.4	3.7	22.7	0	0	0	0	0	0	0	1076.6
O3	Total	---	23.2	269.3	0	131.3	1.2	35.9	102.5	0.5	0	0	0.6	0	42	173.8	50.4	309.8	106.6	27.7	15.4	27.5	0	0	0	0	0	0	0	1318
O4	C	75	0	0	0	0	0	0	1.3	80.5	6	2.7	0	228	0	100.2	0	0	7.7	252.2	0	94.9	445	0	0	0	0.6	0	0	1219.1
O4	D	81	0	0	0	0	0	0	0	6.5	14.1	36.9	0	40.1	0	4.2	0	0	0.6	4.3	0	34.8	6.9	0	0	0	0	0	0	148.9
O4	Total	---	0	0	0	0	0	0	1.3	87	20.1	39.7	0	268.2	0	104.4	0	0	8.2	256.9	0	129.8	451.9	0	0	0	0.6	0	0	1368
R1	A	61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.1	0	0	0	0	0	3.1
R1	B	75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0.1
R1	C	83	43.6	4.2	55.8	14.3	56.1	0.6	163.3	28.3	60.9	0.4	0	0	0	0	0	0	0	28.6	0	0	12.7	0	28.9	0	0	0	0	497.7
R1	D	87	0	122.4	79	42.4	12.3	2	3.8	11.4	19.4	3.1	0	0	0	0	0	0	0	1.9	0	0	0	14.3	76.5	0.1	0	0	0	388.5
R1	Total	---	43.6	126.6	134.3	56.7	68.4	2.6	167.1	39.7	80.2	3.5	0	0	0	0	0	0	0	30.5	0	0	12.7	17.5	105.3	0.1	0	0	0	889.4
R2	B	85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R2	C	90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	121.3	1.7	0	123
R2	D	92	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19.4	8.4	12.8	40.6
R2	Total	---	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	140.7	10.1	12.8	163.6
R3	B	89	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.3
R3	C	92	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0.1
R3	D	94	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24.4	0	24.4
R3	Total	---	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	24.7	0	24.8
R4	C	77	0	0	0	0	0	0	0.2	35.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35.4
R4	Total	---	0	0	0	0	0	0	0.2	35.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35.4
R5	C	75	0	0	0	0	0	0	0	0	0	0	14.2	212	0	1.2	0	10.1	0	0	0	0	0	0	0	0	0	0	0	237.5
R5	D	81	0	0	0	0	0	0	0	0	0	0	0	452.4	55.6	1.3	179.4	12.1	0	0	0	0	0	0	0	0	0	0	0	700.9
R5	Total	---	0	0	0	0	0	0	0	0	0	0	14.2	664.4	55.6	2.6	179.4	22.2	0	0	0	0	0	0	0	0	0	0	0	938.4
TH	C	92	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.1	0	0	9.1
TH	Total	---	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.1	0	0	9.1
W1	A	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.4	0	0	0	0	0	2.4
W1	B	60	0	0	0	0	0	0	0	0	0	0	0	0	0	54.4	0	0	0	0	0	0.3	0	20.1	0	0	0	0	0	74.8
W1	C	73	71.3	5.8	0.8	0.3	39.5	181.5	124.9	21.7	0	57.4	75.5	64.3	40	208.2	28.6	99.6	92.7	37.3	45	109.3	13.9	0	64.9	0	26.4	10.7	0	1419.7
W1	D	79	21.1	132.5	7	11.8	120.2	109.9	10.1	0	0	63.3	22.5	436.3	344.5	869	108.4	164.1	48.1	35.5	11.3	183.6	220.4	40.7	58.4	14.3	39.6	40.6	0.4	3113.6
W1	Total	---	92.4	138.4	7.8	12.1	159.7	291.4	135	21.7	0	120.7	98	500.6	384.5	1131.6	137	263.8	140.8	72.8	56.3	293.2	234.3	63.2	123.4	14.3	66	51.3	0.4	4610.4
ZH	C	87	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10.4	0	0	10.4
ZH	D	90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.8	5.8
ZH	Total	---	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10.4	0	5.8	16.3
		Total Acreage	175.5	543.9	151.6	277.8	237.0	329.9	521.6	189.6	116.5	163.9	112.8	1,433.2	482.1	1,412.4	366.8	595.8	255.6	401.3	123.0	550.9	760.0	128.3	238.8	94.7	236.9	131.1	97.2	10,128.9
		Sum of Acres *CN	14,038.7	46,590.9	13,008.8	24,799.6	18,920.9	25,346.9	42,359.5	14,747.7	9,848.4	12,685.2	8,405.0	112,054.1	38,344.3	110,615.0	29,668.4	49,390.5	20,528.1	30,791.1	9,626.1	42,973.9	59,135.9	9,325.6	19,204.6	7,690.4	20,343.6	10,943.9	7,747.8	809,173.2
		CN Values	80.0	85.7	85.8	89.3	79.8	76.8	81.2	77.8	84.5	77.4	74.5	78.2	79.5	78.3	80.9	82.9	80.3	76.7	78.3	78.0	77.8	72.7	80.4	81.2	85.9	83.5	79.7	79.9
*Land Use Abbreviations	C1	C3	C4	M1	O1	O2	O3	O4	R1	R2	R3	R4	R5	TH	W1	ZH														
Landuse Description	Neighborhood business	General business	Resort commercial and PUD	Light Industry	Open Space in Town	Stream Buffers	Agriculture	Rangeland	Single Family Residential	Single and Two-Family Residential	Multi-family Residential	Estate Residential	Large Lot Residential	Townhouses	Woods	Zero lot line homes														

ATTACHMENT 2

Pre-Project & Post-Project Curve Numbers

Attachment 2 -Pre-Project and Post-Project Curve Numbers

Hydrologic Basin	Effective DFIRM	Corrected Effective (Pre-Project)	Post-Project
BC010	80	80	80.0
BC020	85.7	85.7	85.7
BC030	85.5	85.8	85.8
BC040	89.3	89.3	89.3
BC050	76.9	79.8	79.8
BC060	76.8	76.8	76.8
BC070	78.7	81.2	81.2
BC080	75.9	77.8	77.8
BC090	71.9	84.5	84.5
BC100	77.4	77.4	79.0
BC110	74.5	74.5	74.6
BC120	78.2	78.2	78.2
BC130	79.5	79.5	79.5
BC140	78.3	78.3	78.3
BC145	80.9	80.9	80.9
BC150	82.9	82.9	82.9
BC160	80.3	80.3	80.0
BC170	76.8	76.7	84.2
BC175	78.3	78.3	82.0
BC180	78	78	82.9
BC190	70.3	77.8	88.6
BC200	72.6	72.7	77.6
BC210	80.4	80.4	84.5
BC220	69.6	81.2	81.7
BC230	85.9	85.9	85.9
BC240	83.3	83.5	83.3
BC245	78.4	79.7	78.4
CR010	82.6	82.6	82.6
CR020	85.4	85.4	85.4
CR030	83	83	83
CR040	81.3	81.3	81.3
CR050	86.4	86.4	86.4
CR060	77.8	77.8	77.8

Sub-watershed within the WBR site

ATTACHMENT 3

Time of Concentration Comparison

Attachment 3: Time of Concentration Comparison

Basin	BC160 Existing	BC160 Post-Project	BC170 Existing	BC170 Post-Project	BC180 Existing	BC180 Post-Project	BC190 Existing	BC190 Post-Project
Drainage Area (acres)	256	256	401	401	551	551	760	760
Drainage Area (mi^2)	0.40	0.40	0.63	0.63	0.86	0.86	1.19	1.19
Overland Flow Length	200	150	300	120	300	150	300	150
Shallow Flow Length	714	450	408	300	426	450	1,020	450
Channel Flow Length	2928	3242	7473.5	7762	8280	8406	9433	10153.3
Total Flow Length (ft)	3,842	3,842	8,182	8,182	9,006	9,006	10,753	10,753
Overland Flow High	836	836	845.7	845.7	774	774	822.4	822.4
Overland Flow Low	827	831	835	840	770	772	816	819
Change in Elevation (ft)	9	5	10.7	5.7	4	2	6.4	3.4
Shallow High	827	831	835	840	770	772	816	819
Shallow Low	805	805	815	815	755	756	803	804
Change in Elevation (ft)	22	26	20	25	15	16	13	15
Channel High	805	805	815	815	755	756	803	804
Channel Low	738	739	710	710	670	671	667	667
Change in Elevation (ft)	67	66	105	105	85	85	136	137
Overland Flow Slope	0.045	0.033	0.036	0.048	0.013	0.013	0.021	0.023
Shallow Flow Slope	0.031	0.058	0.049	0.083	0.035	0.036	0.013	0.033
Channel Flow Slope	0.023	0.020	0.014	0.014	0.010	0.010	0.014	0.013
Overland Flow Mannings N	0.10	0.10	0.10	0.02	0.10	0.02	0.10	0.02
2-yr, 24-hour Rainfall	3.52	3.52	3.52	3.52	3.52	3.52	3.52	3.52
Shallow Flow Cover	Unpaved	Paved	Unpaved	Paved	Unpaved	Paved	Unpaved	Paved
Shallow Flow Velocity (ft/s)	2.8	4.9	3.6	5.9	3.0	3.8	1.8	3.7
Channel Flow Velocity (ft/s)								
Overland Flowtime (min)	20	15	20	15	20	15	20	10
Shallow flowtime (min)	4.2	1.5	1.9	0.9	2.3	2.0	9.3	2.0
Channel flowtime (min)	9.4	10.4	22.2	23.1	26.3	26.7	26.6	28.7
t_c calculations (min)	33.6	26.9	44.1	39.0	48.7	43.7	56.0	40.7
Lag time (min)	20.15	16.16	26.49	23.37	29.21	26.22	33.59	24.42
Lag time (hr)	0.34	0.27	0.44	0.39	0.49	0.44	0.56	0.41

ATTACHMENT 4

Future Conditions Curve Numbers

Attachment 4 -Future Conditions Curve Numbers

Hydrologic Basin	Corrected Effective (Pre-Project)	Post-Project	Future Conditions
BC010	80	80.0	88
BC020	85.7	85.7	88
BC030	85.8	85.8	85.5
BC040	89.3	89.3	92
BC050	79.8	79.8	84
BC060	76.8	76.8	79
BC070	81.2	81.2	82
BC080	77.8	77.8	89
BC090	84.5	84.5	91
BC100	77.4	79.0	87
BC110	74.5	74.6	77
BC120	78.2	78.2	86
BC130	79.5	79.5	88
BC140	78.3	78.3	87
BC145	80.9	80.9	86
BC150	82.9	82.9	84
BC160	80.3	80.0	83
BC170	76.7	84.2	84.2
BC175	78.3	82.0	82
BC180	78	82.9	90
BC190	77.8	88.9	88.9
BC200	72.7	77.6	91
BC210	80.4	84.5	84.5
BC220	81.2	81.7	92
BC230	85.9	85.9	91
BC240	83.5	83.3	93
BC245	79.7	78.4	90

Sub-watershed within the WBR site

ATTACHMENT 5

Blieders Creek Hydraulic Model Flows

Attachment 5 -Blieders Creek Hydraulic Model Flows*

Hydrologic Node	HEC-RAS Reach	1% AC (100-YR) flows					4% AC (25-YR) flows				10% AC (10-YR) flows				50% AC (2-YR) flows			
		Effective	Corrected Effective	Post-Project	Post-Project with Proposed Dam Option A	Post-Project with Proposed Dam Option B	Corrected Effective	Post-Project	Post-Project with Proposed Dam Option A	Post-Project with Proposed Dam Option B	Corrected Effective	Post-Project	Post-Project with Proposed Dam Option A	Post-Project with Proposed Dam Option B	Corrected Effective	Post-Project	Post-Project with Proposed Dam Option A	Post-Project with Proposed Dam Option B
1/2 BC030	53097	419	420	420	420	420	327	327	327	327	257	257	257	257	116	116	116	116
BC030	52695	838	841	841	841	841	654	654	654	654	514	514	514	514	232	232	232	232
BCJ020	50472	3,719	3,721	3,721	3,721	3,721	2,886	2,886	2,886	2,886	2,265	4,226	2,265	2,265	1,013	1,013	1,013	1,013
BCJ040	48630	4,755	4,480	4,480	4,480	4,480	3,434	3,434	3,434	3,434	2,691	4,457	2,691	2,691	1,146	1,146	1,146	1,146
BCJ041	47940	5,505	5,989	5,989	5,989	5,989	4,584	4,584	4,584	4,584	3,603	3,603	3,603	3,603	1,547	1,547	1,547	1,547
BCJ050	45502	6,192	6,823	6,823	6,823	6,823	5,178	5,178	5,178	5,178	3,946	3,946	3,946	3,946	1,635	1,635	1,635	1,635
BCJ060	40750	6,782	7,279	7,279	7,279	7,279	5,501	5,501	5,501	5,501	4,179	4,179	4,179	4,179	882	882	882	882
SCS Dam 3 in	38316	21,159	21,787	21,794	21,792	21,794	15,863	15,871	15,869	15,869	11,835	11,843	11,841	11,843	3,184	3,186	3,185	3,186
SCS Dam 3 out	37441	2,873	2,894	2,899	2,899	2,899	126	126	126	126	117	117	117	117	94	94	94	94
SCS 3 Dam out*	33090	2,873	2,894	2,899	2,899	2,899	126	126	126	126	117	117	117	117	94	94	94	94
BCJ175	31590	3,023	3,042	3,053	3,053	3,053	1,718	1,855	1,933	1,933	1,251	1,389	1,467	1,467	437	552	600	623
BCJ180	25990	3,804	3,847	4,165	4,165	4,165	2,610	2,797	2,953	2,953	1,828	2,008	2,163	2,163	486	607	706	733
BCJ190	23020	6,249	6,638	7,311	5,425	4,540	4,488	5,066	3,994	3,206	3,177	3,690	3,031	2,338	1,106	1,550	886	786
BCJ210	18970	6,849	7,265	7,955	5,864	4,982	4,871	5,488	4,278	3,491	3,563	4,154	3,214	2,524	1,214	1,705	999	893
BCJ220	17830	6,963	7,379	8,051	5,947	5,073	4,984	5,569	4,331	3,544	3,652	4,226	3,250	2,556	1,254	1,762	1,034	923
BCJ240	15680	7,306	7,898	8,674	6,409	5,999	5,331	5,921	4,626	4,334	3,900	4,457	3,407	3,132	1,231	1,781	1,088	969
BCJ245	13480	7,445	7,321	8,023	5,906	5,107	4,919	5,503	4,286	3,538	3,528	4,086	3,194	2,522	1,106	1,613	956	843
CRJ010	8580	8,126	8,193	8,548	7,693	7,338	5,758	6,328	5,462	5,069	4,197	4,786	3,826	3,647	1,236	1,809	1,148	1,032
CRR050	8260	1,385	1,389	1,411	1,348	1,317	1,196	1,240	1,169	1,129	1,012	1,091	963	936	576	663	569	550
CRR040	8078	6,823	6,331	6,557	6,001	5,446	4,467	4,914	4,013	3,679	3,064	3,530	2,802	2,588	431	685	447	368

*Location of flow changes based on pages 3-18 and 3-19 of FEMA Hydrologic & Hydraulic Analyses Milestone No. 3 Submittal

ATTACHMENT 6

Opinion of Probable Cost for Proposed Dam Option A

Attachment 6 -Opinion of Probable Cost for Proposed Dam Option A

ITEM NO.	DESCRIPTION	UNIT	QTY	UNIT PRICE	AMOUNT
1.	Clearing	AC	4	$1,200.00	$4,800
2.	Fill Material (Top of Dam at 708.7')	CY	30,000	$2.50	$75,000
3.	Embankment	CY	30,000	$16.00	$480,000
4.	Excavation	CY	7,500	$5.00	$37,500
5.	Seeding	SY	16,000	$1.00	$16,000
6.	Spillway-Excavation	CY	1,500	$10.00	$15,000
7.	Inlet Structure	CY	100	$666.00	$66,600
8.	Concrete for Outlet Structures	CY	25	$666.00	$16,650
9.	Utility Coordination	LS	1	$450,000.00	$450,000
10.	Mobilization			11%	$127,771
11.	Insurance and Bond			3%	$34,847
12.	Preparation of Right of Way			4%	$46,462
13.	Engineering			15%	$174,233
14.	Contingency			25%	$386,215
Estimated Cost of Dam:					$1,931,077

ATTACHMENT 7

Opinion of Probable Cost for Proposed Dam Option B

Attachment 7 -Opinion of Probable Cost for Proposed Dam Option B

ITEM NO.	DESCRIPTION	UNIT	QTY	UNIT PRICE	AMOUNT
1.	Clearing	AC	7	$1,200.00	$7,800
2.	Fill Material (Top of Dam at 720.8')	CY	70,000	$2.50	$175,000
3.	Embankment	CY	70,000	$16.00	$1,120,000
4.	Excavation	CY	15,687	$5.00	$78,435
5.	Seeding	SY	29,320	$1.00	$29,320
6.	Spillway-Excavation	CY	55,000	$10.00	$550,000
7.	Inlet Structure	CY	55	$666.00	$36,630
8.	Concrete for Outlet Structures	CY	20	$666.00	$13,320
9.	12" Diameter RCP Storm Drain	LF	200	$40.00	$8,000
10.	Utility Coordination	LS	1	$450,000.00	$450,000
11.	Mobilization			11%	$271,536
12.	Insurance and Bond			3%	$74,055
13.	Preparation of Right of Way			4%	$98,740
14.	Engineering			15%	$370,276
15.	Contingency			25%	$820,778
Estimated Cost of Dam:					$4,103,890

ATTACHMENT 8

Comparison of Water Surface Elevations downstream of Lakeview Road with Option A

Attachment 8 -Comparison of Water Surface Elevations Downstream of Lakeview Road with Proposed Dam Option A				
Hydraulic Cross Section	Scenario	1% AC Flow [cfs]	Water Surface Elevation [feet]	Change in Water Surface Elevation [feet]
14420	Corrected Effect	7,898	638.86	-1.14
	Post-Project 1%	6,409	637.72	
14370	Corrected Effect	7,898	638.74	-1.14
	Post-Project 1%	6,409	637.60	
14320	Corrected Effect	7,898	637.82	-1.01
	Post-Project 1%	6,409	636.81	
14217	Corrected Effect	7,898	637.19	-0.97
	Post-Project 1%	6,409	636.22	
13880	Corrected Effect	7,898	635.66	-0.92
	Post-Project 1%	6,409	634.74	
13517	Corrected Effect	7,898	633.77	-0.68
	Post-Project 1%	6,409	633.09	
13480	Corrected Effect	7,321	633.54	-0.62
	Post-Project 1%	5,906	632.92	
13445		Culvert		
13410	Corrected Effect	7,321	633.76	-0.85
	Post-Project 1%	5,906	632.91	
13409	Corrected Effect	7,321	633.56	-0.84
	Post-Project 1%	5,906	632.72	
13000	Corrected Effect	7,321	633.03	-0.84
	Post-Project 1%	5,906	632.19	
12560	Corrected Effect	7,321	632.35	-0.95
	Post-Project 1%	5,906	631.4	
12120	Corrected Effect	7,321	630.90	-0.88
	Post-Project 1%	5,906	630.02	
11800	Corrected Effect	7,321	630.01	-0.77
	Post-Project 1%	5,906	629.24	
11450	Corrected Effect	7,321	629.18	-0.73
	Post-Project 1%	5,423	628.45	

Hydraulic Cross Section	Scenario	1% AC Flow [cfs]	Water Surface Elevation [feet]	Change in Water Surface Elevation [feet]
11090	Corrected Effect	7,321	628.90	-0.73
	Post-Project 1%	5,906	628.17	
10750	Corrected Effect	7,321	628.52	-0.68
	Post-Project 1%	5,906	627.84	
10310	Corrected Effect	7,321	627.75	-0.58
	Post-Project 1%	5,906	627.17	
10150	Corrected Effect	7,321	627.28	-0.52
	Post-Project 1%	5,906	626.76	
9910	Corrected Effect	7,321	626.57	-0.40
	Post-Project 1%	5,906	626.17	
9600	Corrected Effect	7,321	626.17	-0.33
	Post-Project 1%	5,906	625.84	
9340	Corrected Effect	7,321	626.00	-0.29
	Post-Project 1%	5,906	625.71	
8580	Corrected Effect	8,193	623.47	-0.09
	Post-Project 1%	7,693	623.38	
8260	Corrected Effect	1,389	623.54	-0.13
	Post-Project 1%	1,348	623.41	
Average Decrease [feet]				0.7

ATTACHMENT 9

Comparison of Water Surface Elevations Downstream of Lakeview Road with Option B

Attachment 9 -Comparison of Water Surface Elevations Downstream of Lakeview Road with Proposed Dam Option B

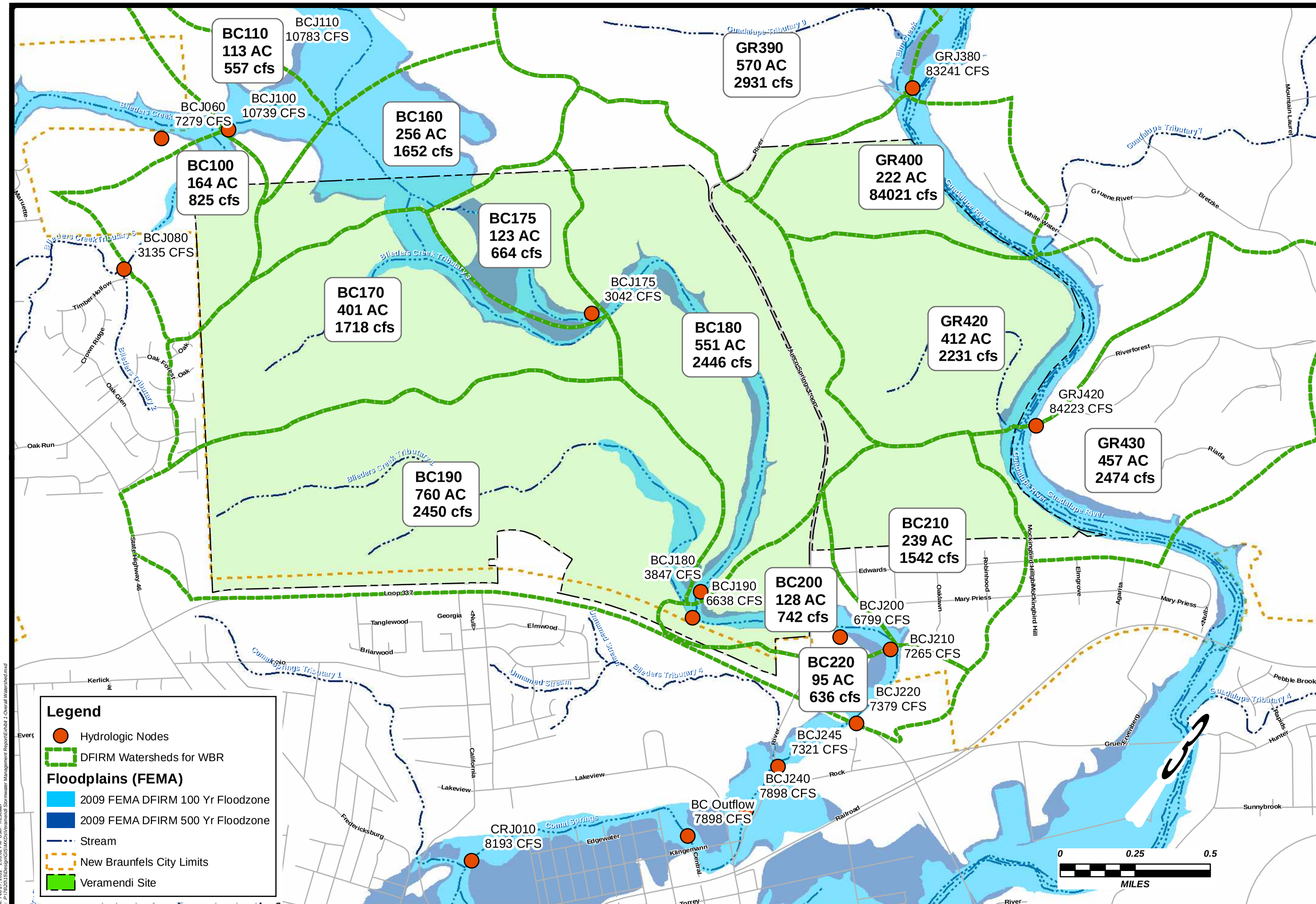
Hydraulic Cross Section	Scenario	1% AC Flow [cfs]	Water Surface Elevation [feet]	Change in Water Surface Elevation [feet]
14420	Corrected Effect	7,898	638.86	-1.55
	Post-Project 1%	5,999	637.31	
14370	Corrected Effect	7,898	638.74	-1.54
	Post-Project 1%	5,999	637.20	
14320	Corrected Effect	7,898	637.82	-1.38
	Post-Project 1%	5,999	636.44	
14217	Corrected Effect	7,898	637.19	-1.31
	Post-Project 1%	5,999	635.88	
13880	Corrected Effect	7,898	635.66	-1.26
	Post-Project 1%	5,999	634.40	
13517	Corrected Effect	7,898	633.77	-1.11
	Post-Project 1%	5,999	632.66	
13480	Corrected Effect	7,321	633.54	-0.91
	Post-Project 1%	5,107	632.63	
13,445.00		Culvert		
13410	Corrected Effect	7,321	633.76	-1.40
	Post-Project 1%	5,107	632.36	
13409	Corrected Effect	7,321	633.56	-1.37
	Post-Project 1%	5,107	632.19	
13000	Corrected Effect	7,321	633.03	-1.36
	Post-Project 1%	5,107	631.67	
12560	Corrected Effect	7,321	632.35	-1.55
	Post-Project 1%	5,107	630.80	
12120	Corrected Effect	7,321	630.90	-1.43
	Post-Project 1%	5,107	629.47	
11800	Corrected Effect	7,321	630.01	-1.25
	Post-Project 1%	5,107	628.76	
11450	Corrected Effect	7,321	629.18	-1.19
	Post-Project 1%	5,107	627.99	

Hydraulic Cross Section	Scenario	1% AC Flow [cfs]	Water Surface Elevation [feet]	Change in Water Surface Elevation [feet]
11090	Corrected Effect	7,321	628.90	-1.18
	Post-Project 1%	5,107	627.72	
10750	Corrected Effect	7,321	628.52	-1.10
	Post-Project 1%	5,107	627.42	
10310	Corrected Effect	7,321	627.75	-0.95
	Post-Project 1%	5,107	626.80	
10150	Corrected Effect	7,321	627.28	-0.85
	Post-Project 1%	5,107	626.43	
9910	Corrected Effect	7,321	626.57	-0.65
	Post-Project 1%	5,107	625.92	
9600	Corrected Effect	7,321	626.17	-0.54
	Post-Project 1%	5,107	625.63	
9340	Corrected Effect	7,321	626.00	-0.49
	Post-Project 1%	5,107	625.51	
8580	Corrected Effect	8,193	623.47	-0.14
	Post-Project 1%	7,338	623.33	
8260	Corrected Effect	1,389	623.54	-0.15
	Post-Project 1%	1,317	623.39	
Average Decrease [feet]				1.07

EXHIBITS

EXHIBIT 1

Overall Watershed Map



REVISIONS:

PAPE-DAWSON ENGINEERS

555 EAST RAMSEY | SAN ANTONIO, TEXAS 78216 | PHONE: 210.375.9000 FAX: 210.375.9010

TEXAS BOARD OF PROFESSIONAL ENGINEERS, FIRM REGISTRATION # 470

VERAMENDI

OVERALL WATERSHED MAP
CORRECTED EFFECTIVE HYDROLOGY

JOB NO. 7620-15

DATE FEB. 2012

DESIGNER RE

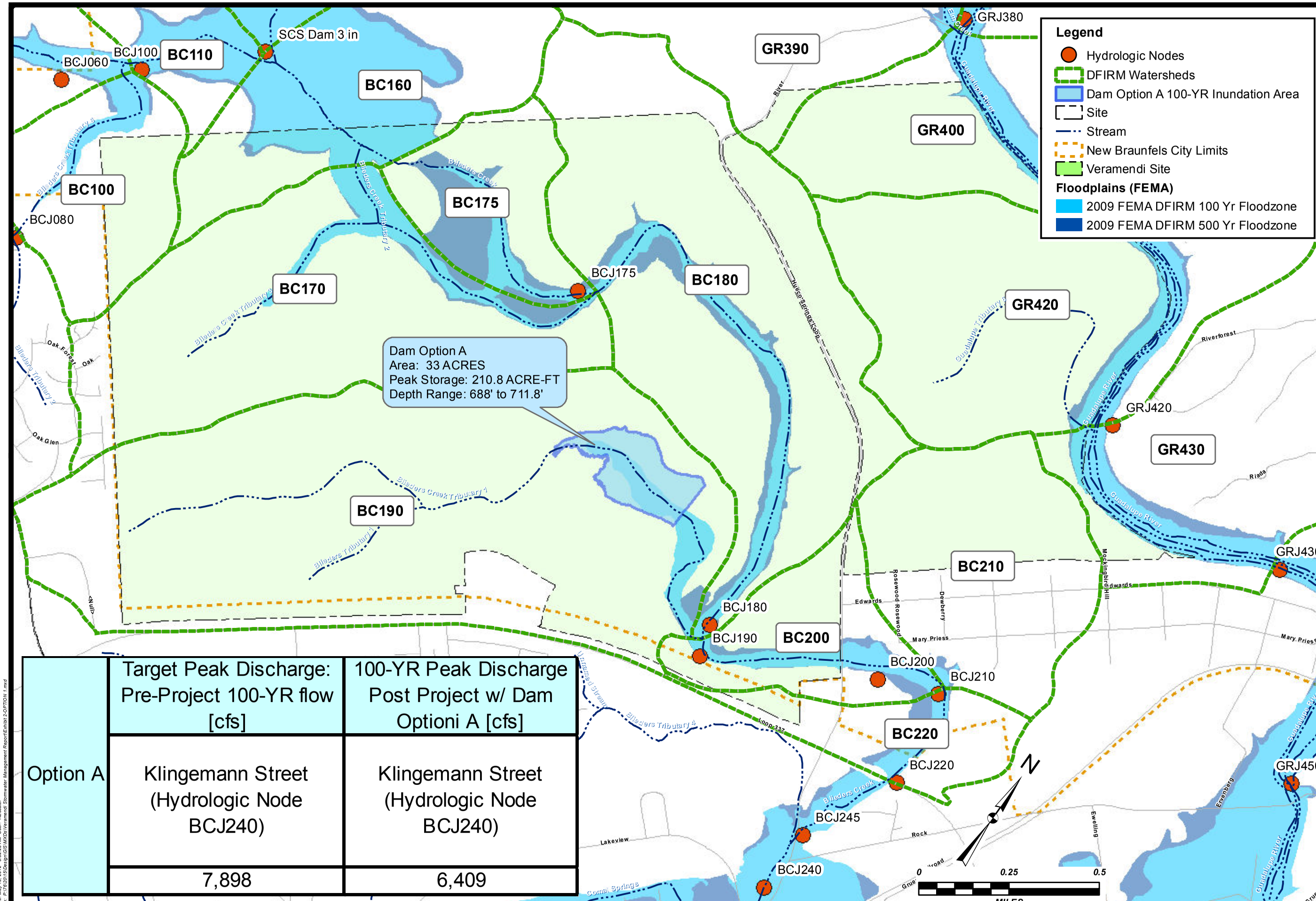
CHECKED TMD DRAWN RE

SHEET EXHIBIT 1

Date: Feb 27, 2012 - 1:03:02 PM User: REscalal
File: P:\7620\15\Design\Schematics\Hydrology and Stormwater Management Report\Exhibit 1-Overall Watershed.mxd

EXHIBIT 2A

Overall Watershed Map with Proposed Dam Option A



	Target Peak Discharge: Pre-Project 100-YR flow [cfs]	100-YR Peak Discharge Post Project w/ Dam Optioni A [cfs]
Option A	Klingemann Street (Hydrologic Node BCJ240)	Klingemann Street (Hydrologic Node BCJ240)
	7,898	6,409

REVISIONS:

PAPE-DAWSON ENGINEERS

555 EAST RAMSEY | SAN ANTONIO, TEXAS 78216 | PHONE: 210.375.9000 FAX: 210.375.9010

TEXAS BOARD OF PROFESSIONAL ENGINEERS, FIRM REGISTRATION # 470

VERAMENDI
OVERALL WATERSHED MAP
DAM OPTION A

JOB NO. 7620-15

DATE MAY 2012

DESIGNER RE

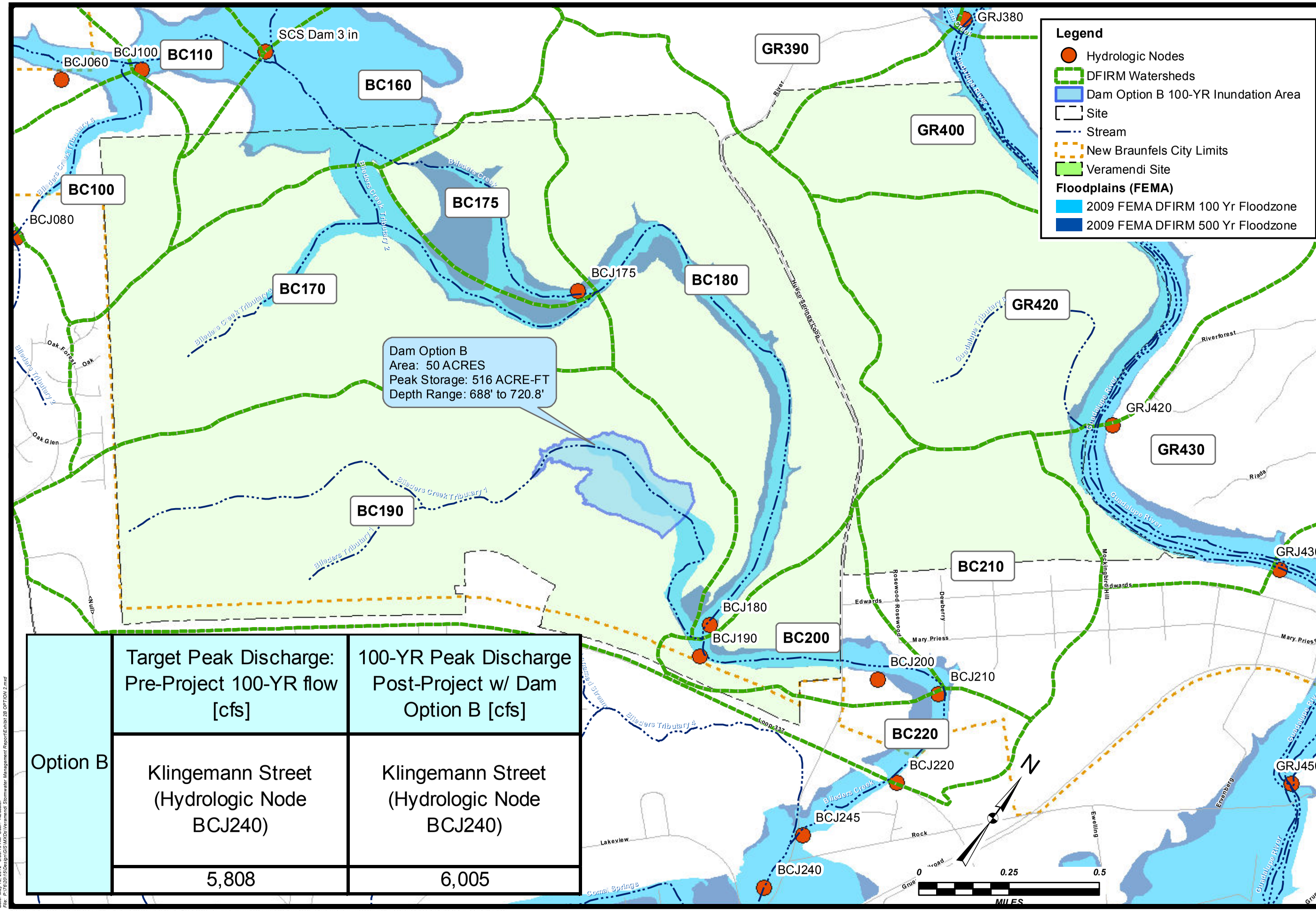
CHECKED TMD DRAWN RE

SHEET EXHIBIT 2A

Date: May 15, 2012 8:32:25 AM User: RE cadd
File: P:\Proj\Veramendi\Veramendi Stormwater Management Report\Exhibit 2-OPTION 1.mxd

EXHIBIT 2B

Overall Watershed Map with Proposed Dam Option B



	Target Peak Discharge: Pre-Project 100-YR flow [cfs]	100-YR Peak Discharge Post-Project w/ Dam Option B [cfs]
Option B	Klingemann Street (Hydrologic Node BCJ240)	Klingemann Street (Hydrologic Node BCJ240)
	5,808	6,005

REVISIONS:

PAPE-DAWSON ENGINEERS
555 EAST RAMSEY | SAN ANTONIO, TEXAS 78216 | PHONE: 210.375.9000 FAX: 210.375.9010
TEXAS BOARD OF PROFESSIONAL ENGINEERS, FIRM REGISTRATION # 470

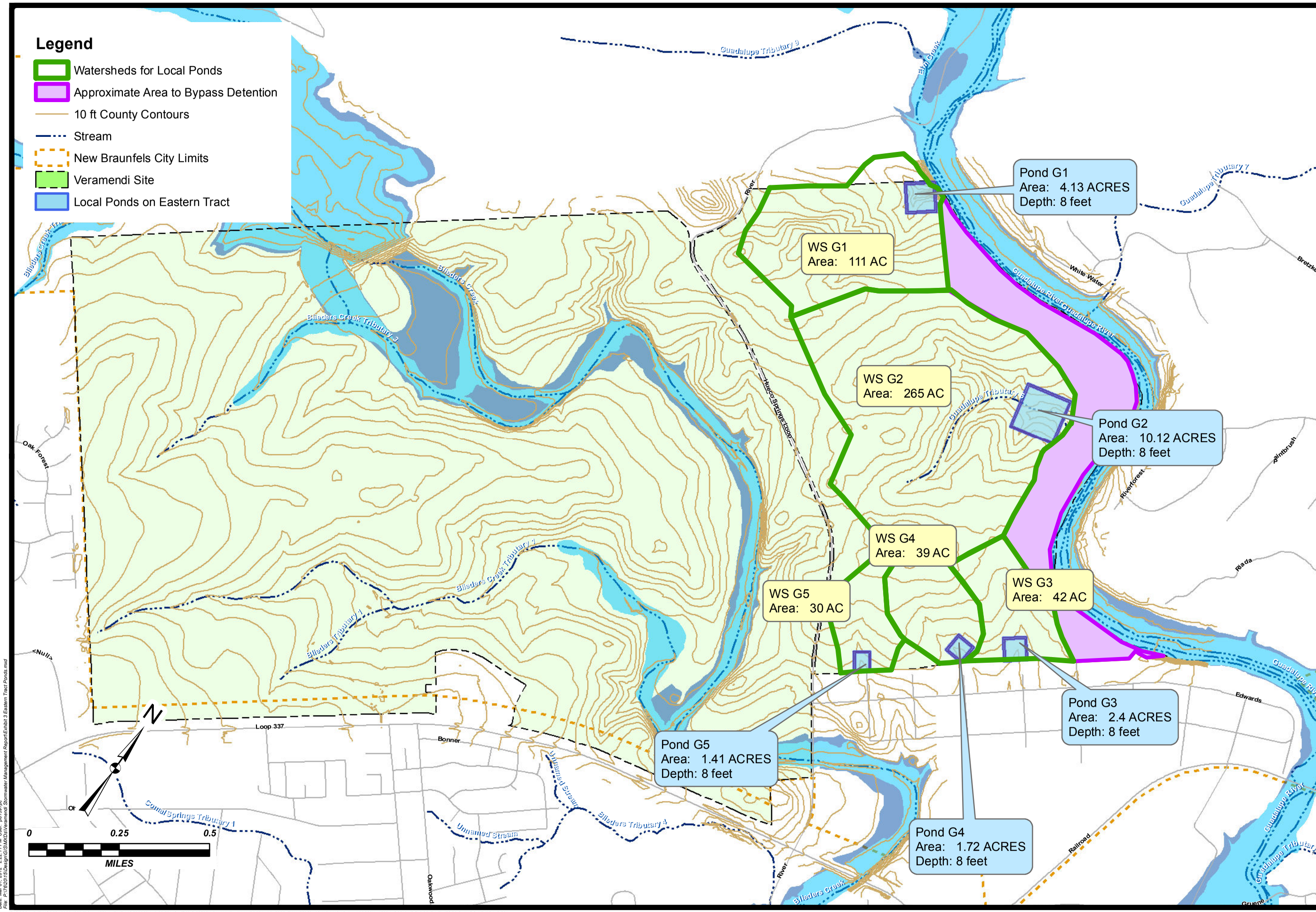
VERAMENDI
OVERALL WATERSHED MAP DAM OPTION B

JOB NO. 7620-15
DATE MAY 2012
DESIGNER RE
CHECKED TMD DRAWN RE
SHEET EXHIBIT 2B

Date: May 15, 2012 8:38:19 AM User: REscalier
File: P:\Projects\projects\Veramendi\Stormwater Management Report\Exhibit 2B OPTION 2.mxd

EXHIBIT 3

Overall Watershed Map with Local Detention Pond



REVISIONS:

PAPE-DAWSON ENGINEERS

555 EAST RAMSEY | SAN ANTONIO, TEXAS 78216 | PHONE: 210.375.9000 FAX: 210.375.9010

TEXAS BOARD OF PROFESSIONAL ENGINEERS, FIRM REGISTRATION # 470

VERAMENDI

OVERALL WATERSHED MAP LOCAL DETENTION PONDS

JOB NO. 7620-15

DATE FEB. 2012

DESIGNER RE

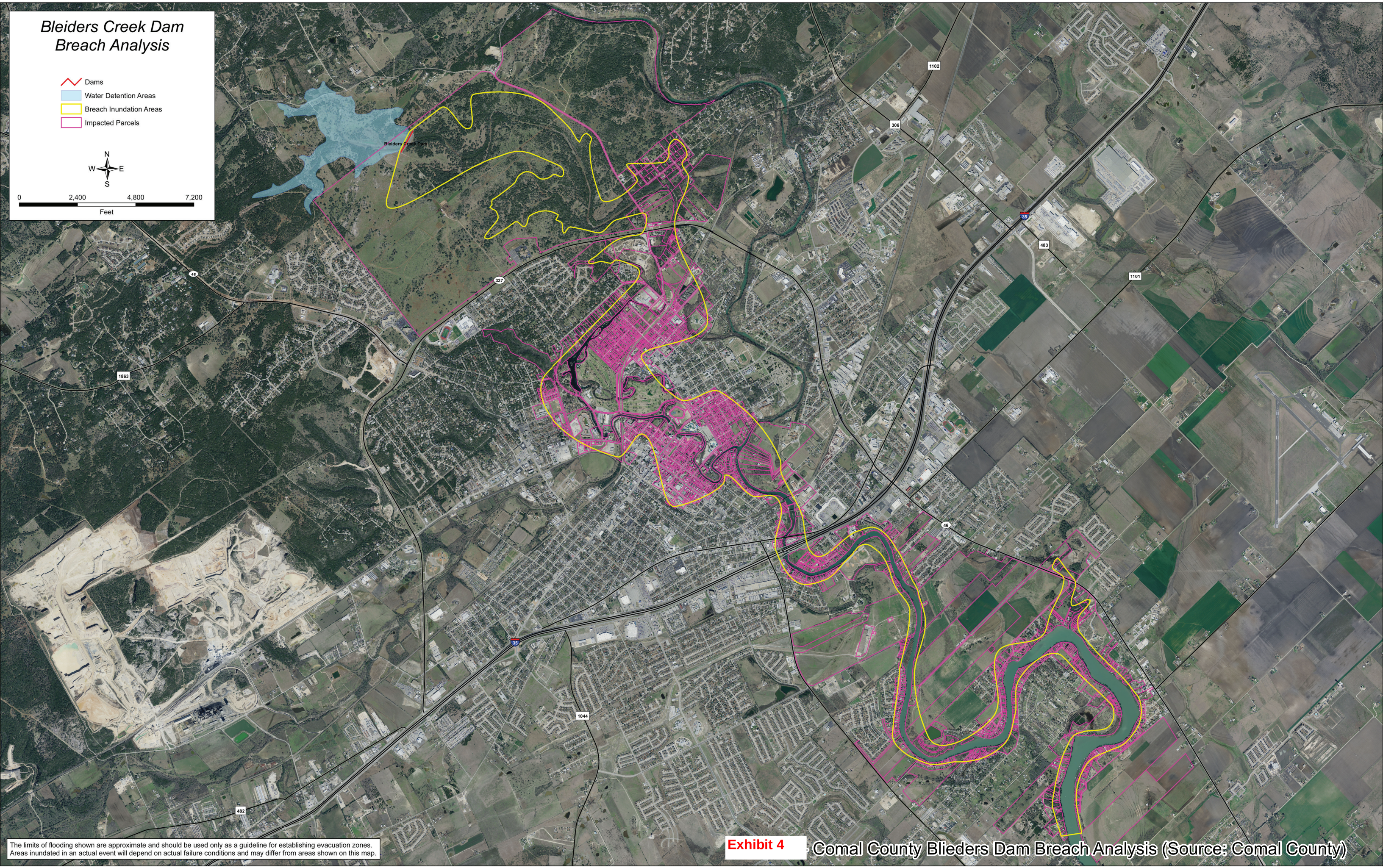
CHECKED TMD DRAWN RE

SHEET EXHIBIT 3

Date: Mar 01, 2012 2:22:11 PM User: pd1597pc
File: P:\Projects\Design\Blieders\Veramendi Stormwater Management Report\Exhibit 3 Eastern Tract Ponds.mxd

EXHIBIT 4

Comal County Blieders Dam Breach Analysis



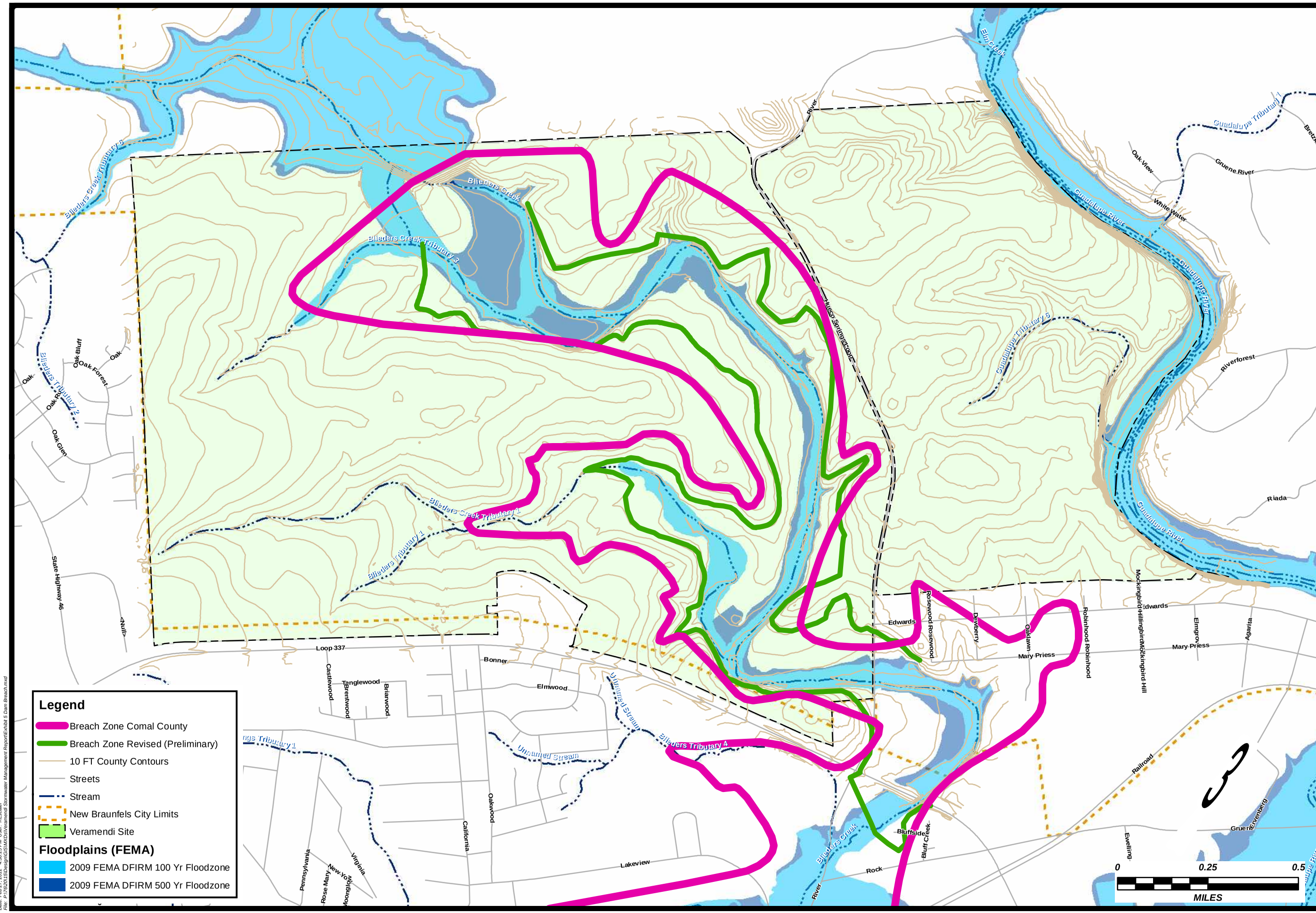
The limits of flooding shown are approximate and should be used only as a guideline for establishing evacuation zones. Areas inundated in an actual event will depend on actual failure conditions and may differ from areas shown on this map.

Exhibit 4

Comal County Blieders Dam Breach Analysis (Source: Comal County)

EXHIBIT 5

Blieders Dam Breach Analysis



REVISIONS:

PAPE-DAWSON ENGINEERS

555 EAST RAMSEY | SAN ANTONIO, TEXAS 78216 | PHONE: 210.375.9000 FAX: 210.375.9010

TEXAS BOARD OF PROFESSIONAL ENGINEERS, FIRM REGISTRATION # 470

VERAMENDI

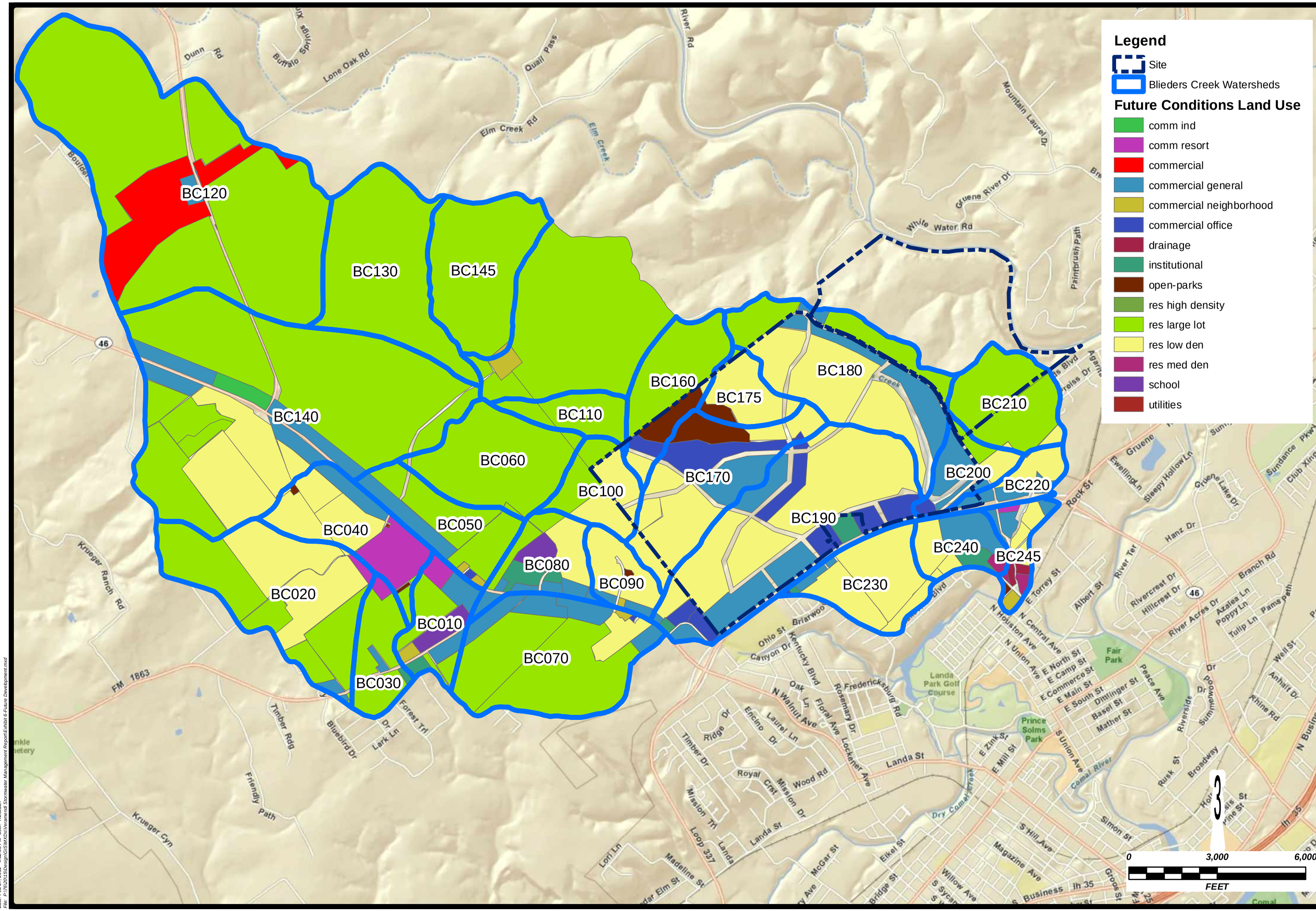
BLIEDERS DAM BREACH ANALYSIS
REVISED BREACH ZONE (PRELIMINARY)

JOB NO.	7620-15
DATE	FEB. 2012
DESIGNER	RE
CHECKED TMD	DRAWN RE
SHEET	EX 5

Date: Feb 27, 2012 - 4:30:25 PM User: REscalal
File: P:\7600-Designs\7620-Veramendi\Stormwater Management Report\Exhibit 5 Dam Breach.mxd

EXHIBIT 6

Future Conditions Land Use Map



REVISIONS:

PAPE-DAWSON ENGINEERS
555 EAST RAMSEY | SAN ANTONIO, TEXAS 78216 | PHONE: 210.375.9000 FAX: 210.375.9010
TEXAS BOARD OF PROFESSIONAL ENGINEERS, FIRM REGISTRATION # 470

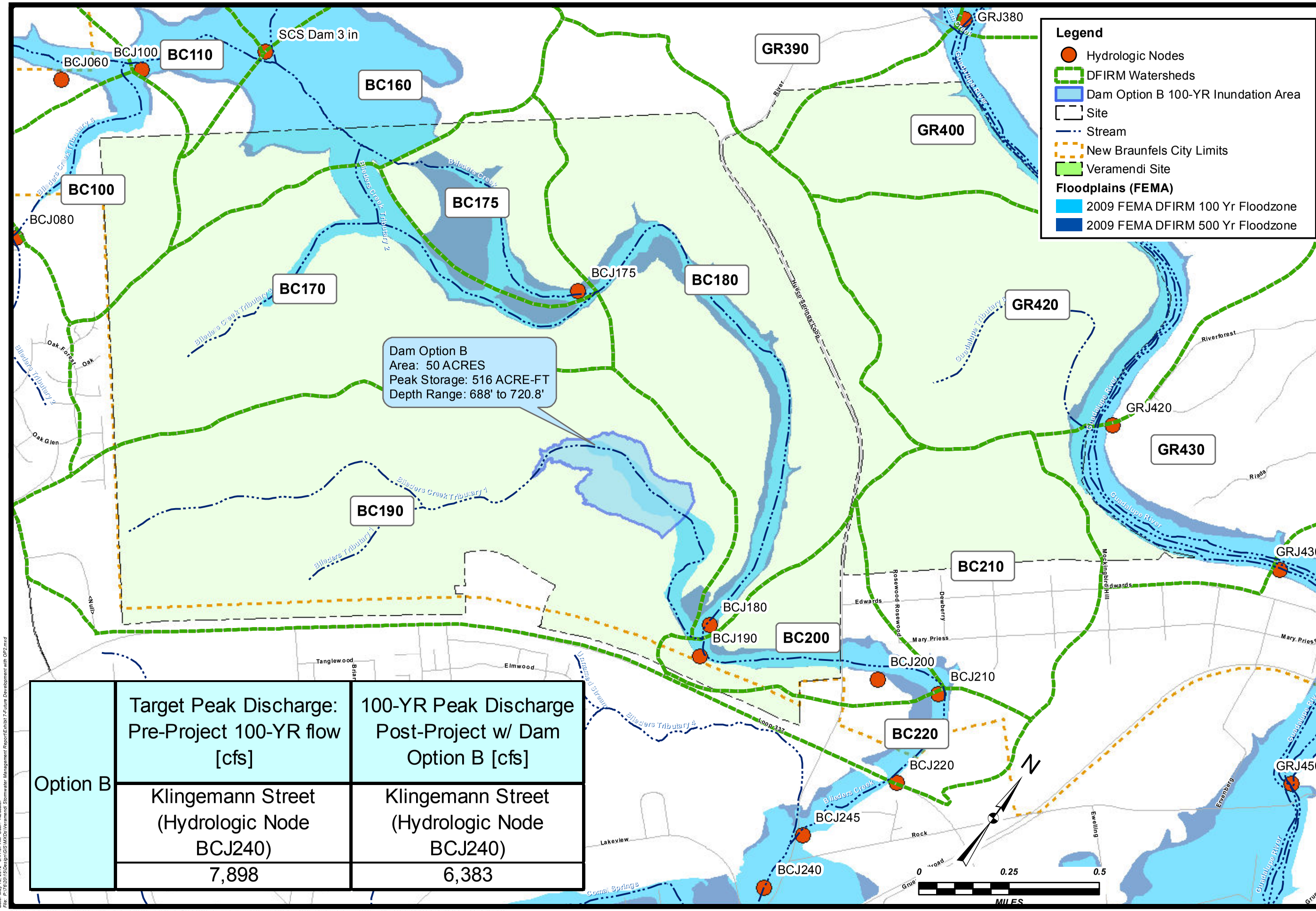
VERAMENDI
BLIEDERS CREEK WATERSHED
FUTURE CONDITIONS LANDUSE

JOB NO. 7620-15
DATE FEB. 2012
DESIGNER RE
CHECKED TMD DRAWN RE
SHEET EX 6

Date: Feb 27, 2012 4:32:05 PM User: REscalir
File: P:\2012\Designs\BCM\Veramendi Stormwater Management Report\Exhibit 6-Future Development.mxd

EXHIBIT 7

Future Conditions with Proposed Dam Option B



Option B	Target Peak Discharge: Pre-Project 100-YR flow [cfs]	100-YR Peak Discharge Post-Project w/ Dam Option B [cfs]
	Klingemann Street (Hydrologic Node BCJ240)	Klingemann Street (Hydrologic Node BCJ240)
	7,898	6,383

REVISIONS:

PAPE-DAWSON ENGINEERS
555 EAST RAMSEY | SAN ANTONIO, TEXAS 78216 | PHONE: 210.375.9000 FAX: 210.375.9010
TEXAS BOARD OF PROFESSIONAL ENGINEERS, FIRM REGISTRATION # 470

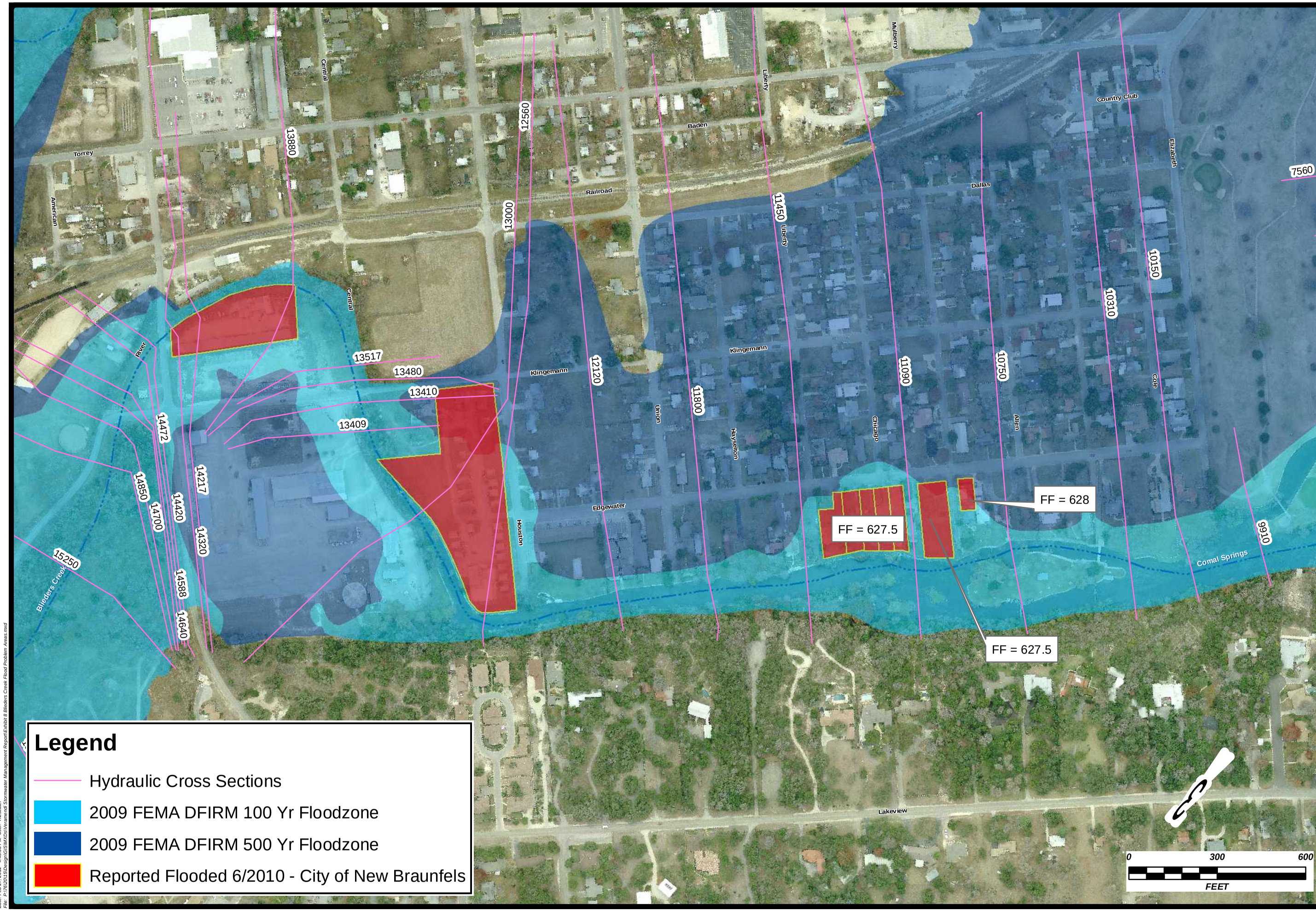
VERAMENDI
OVERALL WATERSHED MAP
FUTURE CONDITIONS & DAM OPTION B

JOB NO. 7620-15
DATE MAY 2012
DESIGNER RE
CHECKED TMD DRAWN RE
SHEET EXHIBIT 7

Date: May 15, 2012 8:41:37 AM User: REsaller
File: P:\Projects\projects\Veramendi\Stormwater Management Report\Exhibit 7-Future Development with OP2.mxd

EXHIBIT 8

Blieders Creek Flood Problem Areas



REVISIONS:

PAPE-DAWSON ENGINEERS

555 EAST RAMSEY | SAN ANTONIO, TEXAS 78216 | PHONE: 210.375.9000 FAX: 210.375.9010

TEXAS BOARD OF PROFESSIONAL ENGINEERS, FIRM REGISTRATION # 470

VERAMENDI

City of New Braunfels Flood Problem Areas
New Braunfels, TX

JOB NO.	7620-15
DATE	FEB 2012
DESIGNER	RE
CHECKED TMD	DRAWN RE
SHEET	EX 8

Date: Feb 27, 2012 4:45:03 PM User: REscalbi
File: P:\2007\Designers\Murphy\Veramendi Stormwater Management Report\Exhibit 8 Bleiders Creek Flood Problem Areas.mxd

APPENDICES

APPENDIX A

Vision Plan 5C Land Plan

REVISED LAND USE PLAN 5C

Precinct	Dwelling Yield Estimate	Commercial Floorspace Estimate	Other Non Res Floorspace	
	(dw)	(square feet)	(other use, square feet, total rooms/students)	
1	59	330000	-	-
2	191	—	University/Institution	80,000
3	205	130000	-	-
4	343	—	-	-
5	153	—	-	-
6	225	—	-	-
7	37	130000	-	-
8	55	235000	-	-
9	—	428000	Hotel	180 room
10	—	400000	-	-
11	—	732000	-	-
12	149	—	-	-
13	399	—	-	-
14	242	—	School	900 students
15	289	35000	Community Fac.	20,000
16	273	—	-	-
17	99	—	-	-
18	211	—	-	-
19	158	—		
20	170	—		
21	—	280000		
22	35	—	School	900 students
23	90	75000		
24	217	—	Community Fac.	20,000
25	308	—		
26	59	—	Resort	300 room
27	465	—		
28	116	—		
29	427	—		
30	274	—		
31	168	—		
32	247	—		
TOTAL:	5665	2775000		

Land Use Area	Low Density		High Density		Town Centre		Total Residential	
Total Acreage	1192.1		55.1		5.0		1252.2	
Average Density	3.8		20.3		11.8		4.5	
Product Types	dwellings	% Mix	dwellings	% Mix	dwellings	% Mix	dwellings	% Mix
3 St. MU Apt/Unit - Base.	—		—		59	100%	59	1%
3 St. Apt/Unit. - No Base.	—		324	29%	—		324	6%
3 St. Apt/Unit - Base.	195	4%	795	71%	—		989	17%
Townhome	250	6%	—		—		250	4%
Row House	421	9%	—		—		421	7%
Duplex	51	1%	—		—		51	1%
Live/Work	287	6%	—		—		287	5%
Low SFD 1	1047	23%	—		—		1047	18%
Low SFD 2	779	17%	—		—		779	14%
Mid SFD 1	688	15%	—		—		688	12%
Mid SFD 2	422	9%	—		—		422	7%
High SFD 1	167	4%	—		—		167	3%
High SFD 2	182	4%	—		—		182	3%
	4488	100%	1119	100%	59	100%	5666	100%

Yield & Population Projection:
The projections are based on a development footprint derived from preliminary studies and advice
The projections and other outputs derived from them are mathematically generated

The projection is preliminary and is subject to an approximate tolerance of +/- 5%

The projection is based on the below assumptions which should be considered when reviewing the preliminary land use plan
Subject to detail design and ongoing studies to verfiy development extents, infrastructure and traffic studies.
Subject to relevant State and Local Government approvals
Preliminary flora & fauna, stormwater, infrastructure and geotechical studies were provided.
No traffic modelling or economic demand studies were provided.
Floorspace estimates have not been referenced to an economic demand study and are based on predominately surface parking as a design assumption.
Land areas indicated do not incorporate potential setbacks and buffers to Karst Features

Roads:
25-27% of Net Residential Land is identified for local road network, subject to concept design verification.
Trunk Roads identified are subject to confirmation by a traffic study and are not included in the local road network perecentages identified above

Park:
Allocated Sport & Recreation Parks are based on prelimi, subject to confirmation with City of New Braunfels

Stormwater:
3% of Net Residential Areas & Employment Land are utilised for stormwater quantity and quality, subject to engineering and stormwater management plan
Balance Stormwater requirements are facilitated in Water Course, Recreation & Sports Open Space
Water bodies indicated are preliminary, subject to engineering and hydraulic studies.

Education:
Education campuses shown are preliminary, location, size and feasability subject to ongoing studies.

word borchers ranch

Scale 1":500' / 1:6000 @ ANSI E I **July** 2011 I **Project No** 21983_87

RPS
RPS Australia East Pty Ltd
ACN 140 292 762
ABN 44 140 292 762
Suite 18 / 455 Brunswick St
PO Box 1509
Fortitude Valley QLD 4006
T +61 7 3124 9300
F +61 7 3124 9399
W rpsgroup.com.au

APPENDIX B

Hydrologic Report for Corrective Effective (Pre-Project) Conditions

Project: Veramendi
Simulation Run: 1% Veramendi Corrected Effective
Basin Model: Blieders Creek Corrected Eff
Meteorologic Model: 100-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
BC010	0.2740	996.1	01Jan1950, 12:20	8.46
BC020	0.8500	2880.9	01Jan1950, 12:25	9.19
BC030	0.2380	840.5	01Jan1950, 12:25	9.21
BC040	0.4340	1546.3	01Jan1950, 12:25	9.65
BC050	0.3700	1260.4	01Jan1950, 12:20	8.43
BC060	0.5150	1537.3	01Jan1950, 12:25	8.02
BC070	0.8150	2189.8	01Jan1950, 12:35	8.58
BC080	0.2960	982.4	01Jan1950, 12:20	8.16
BC090	0.1820	674.7	01Jan1950, 12:20	9.05
BC100	0.2560	825.2	01Jan1950, 12:25	8.11
BC110	0.1760	556.7	01Jan1950, 12:20	7.72
BC120	2.2390	4028.1	01Jan1950, 13:00	8.11
BC130	0.7530	2142.0	01Jan1950, 12:30	8.37
BC140	2.2070	4418.1	01Jan1950, 12:50	8.15
BC145	0.5730	2201.0	01Jan1950, 12:20	8.59
BC150	0.9310	2806.6	01Jan1950, 12:30	8.82
BC160	0.4000	1652.0	01Jan1950, 12:15	8.51
BC170	0.6270	1718.4	01Jan1950, 12:30	8.00
BC175	0.1920	663.5	01Jan1950, 12:20	8.23
BC180	0.8610	2449.5	01Jan1950, 12:30	8.17
BC190	1.1870	3156.5	01Jan1950, 12:30	8.14
BC200	0.2000	742.4	01Jan1950, 12:15	7.49
BC210	0.3730	1542.3	01Jan1950, 12:15	8.53
BC220	0.1480	754.6	01Jan1950, 12:10	8.64
BC230	0.3700	1491.9	01Jan1950, 12:20	9.24
BC240	0.2050	794.9	01Jan1950, 12:20	8.92
BC245	0.1520	517.1	01Jan1950, 12:20	8.42
BCJ020	1.0880	3721.4	01Jan1950, 12:25	9.19
BCJ040	1.3620	4480.1	01Jan1950, 12:30	9.03
BCJ041	1.7960	5989.1	01Jan1950, 12:25	9.18
BCJ050	2.1660	6822.5	01Jan1950, 12:35	9.02
BCJ060	2.6810	7278.7	01Jan1950, 12:50	8.53
BCJ080	1.2930	3135.3	01Jan1950, 12:35	8.53

Project: Veramendi
Simulation Run: 1% Veramendi Corrected Effective
Basin Model: Blieders Creek Corrected Eff
Meteorologic Model: 100-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
BCJ100	4.2300	10739.0	01Jan1950, 12:50	8.49
BCJ110	6.8790	10782.8	01Jan1950, 13:05	8.21
BCJ130	5.7720	9622.5	01Jan1950, 12:55	8.19
BCJ175	12.3280	3041.6	01Jan1950, 16:20	2.79
BCJ180	13.1890	3847.1	01Jan1950, 12:50	3.03
BCJ190	14.3760	6638.1	01Jan1950, 12:40	3.45
BCJ200	14.5760	6799.0	01Jan1950, 12:45	3.46
BCJ210	14.9490	7265.1	01Jan1950, 12:45	3.58
BCJ220	15.0970	7378.5	01Jan1950, 12:45	3.62
BCJ240	15.8240	7898.4	01Jan1950, 13:00	3.79
BCJ245	15.2490	7320.9	01Jan1950, 13:05	3.59
BC Outflow	15.8240	7898.4	01Jan1950, 13:00	3.79
BCR040	1.0880	3689.0	01Jan1950, 12:30	9.17
BCR050	1.7960	5889.8	01Jan1950, 12:35	9.15
BCR060	2.1660	6421.9	01Jan1950, 12:50	8.65
BCR080	0.8150	2163.8	01Jan1950, 12:45	8.54
BCR100	1.2930	3105.8	01Jan1950, 12:45	8.49
BCR130	2.2390	4012.1	01Jan1950, 13:15	8.06
BCR150	5.7720	9563.6	01Jan1950, 13:15	8.12
BCR175	11.5090	2889.6	01Jan1950, 16:20	2.41
BCR180	12.3280	3037.5	01Jan1950, 16:45	2.67
BCR200	14.3760	6601.4	01Jan1950, 12:50	3.40
BCR220	14.9490	7252.3	01Jan1950, 12:50	3.57
BCR240	0.3700	1486.3	01Jan1950, 12:25	9.21
BCR245	15.0970	7180.6	01Jan1950, 13:05	3.54
CR010	0.3129	1325.9	01Jan1950, 12:15	8.81
CR020	0.6356	2300.7	01Jan1950, 12:20	9.16
CR030	0.1764	750.6	01Jan1950, 12:15	8.87
CR040	0.5238	1736.8	01Jan1950, 12:25	8.62
CR050	0.6141	1766.9	01Jan1950, 12:35	9.26
CR060	0.1031	448.3	01Jan1950, 12:15	8.19
CRJ010	16.7725	8193.1	01Jan1950, 13:15	4.01
CRJ050	17.5630	3028.2	01Jan1950, 12:35	1.43

Project: Veramendi
Simulation Run: 1% Veramendi Corrected Effective
Basin Model: Blieders Creek Corrected Eff
Meteorologic Model: 100-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
CRJ060	18.1899	7933.6	01Jan1950, 14:05	4.19
CRR010	15.8240	7576.9	01Jan1950, 13:30	3.70
CRR030	16.7725	8172.3	01Jan1950, 13:20	3.96
CRR040	0.0000	6330.5	01Jan1950, 14:45	
CRR050	16.9489	1389.0	01Jan1950, 13:25	1.15
CRR060	17.5630	2980.3	01Jan1950, 12:45	1.42
Landa Park	16.9489	1389.6	01Jan1950, 13:20	1.16
SCS Dam 3 in	11.5090	21786.9	01Jan1950, 12:50	8.32
SCS Dam 3 out	11.5090	2893.5	01Jan1950, 16:05	2.50

Project: Veramendi
Simulation Run: 2% Veramendi Corrected Effective
Basin Model: Blieders Creek Corrected Eff
Meteorologic Model: 50-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
BC010	0.2740	898.3	01Jan1950, 12:20	7.02
BC020	0.8500	2625.5	01Jan1950, 12:25	7.72
BC030	0.2380	767.4	01Jan1950, 12:25	7.74
BC040	0.4340	1420.5	01Jan1950, 12:25	8.17
BC050	0.3700	1133.2	01Jan1950, 12:20	6.99
BC060	0.5150	1367.8	01Jan1950, 12:25	6.61
BC070	0.8150	1962.2	01Jan1950, 12:35	7.14
BC080	0.2960	878.3	01Jan1950, 12:20	6.74
BC090	0.1820	614.7	01Jan1950, 12:20	7.58
BC100	0.2560	738.0	01Jan1950, 12:25	6.69
BC110	0.1760	492.8	01Jan1950, 12:20	6.33
BC120	2.2390	3530.1	01Jan1950, 13:00	6.70
BC130	0.7530	1915.8	01Jan1950, 12:30	6.94
BC140	2.2070	3888.9	01Jan1950, 12:55	6.74
BC145	0.5730	1994.1	01Jan1950, 12:20	7.14
BC150	0.9310	2534.3	01Jan1950, 12:30	7.36
BC160	0.4000	1493.5	01Jan1950, 12:15	7.07
BC170	0.6270	1524.8	01Jan1950, 12:30	6.59
BC175	0.1920	594.8	01Jan1950, 12:20	6.81
BC180	0.8610	2183.8	01Jan1950, 12:30	6.75
BC190	1.1870	2805.6	01Jan1950, 12:35	6.72
BC200	0.2000	656.4	01Jan1950, 12:15	6.11
BC210	0.3730	1394.7	01Jan1950, 12:15	7.08
BC220	0.1480	684.6	01Jan1950, 12:10	7.19
BC230	0.3700	1367.0	01Jan1950, 12:20	7.76
BC240	0.2050	724.0	01Jan1950, 12:20	7.46
BC245	0.1520	464.8	01Jan1950, 12:20	6.98
BCJ020	1.0880	3392.8	01Jan1950, 12:25	7.73
BCJ040	1.3620	4074.7	01Jan1950, 12:30	7.57
BCJ041	1.7960	5429.8	01Jan1950, 12:25	7.71
BCJ050	2.1660	6144.5	01Jan1950, 12:35	7.57
BCJ060	2.6810	6525.7	01Jan1950, 12:50	7.14
BCJ080	1.2930	2778.6	01Jan1950, 12:35	7.09

Project: Veramendi
Simulation Run: 2% Veramendi Corrected Effective
Basin Model: Blieders Creek Corrected Eff
Meteorologic Model: 50-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
BCJ100	4.2300	9594.4	01Jan1950, 12:50	7.09
BCJ110	6.8790	9348.2	01Jan1950, 13:05	6.80
BCJ130	5.7720	8376.7	01Jan1950, 12:55	6.78
BCJ175	12.3280	2112.1	01Jan1950, 12:25	1.42
BCJ180	13.1890	3325.9	01Jan1950, 12:50	1.68
BCJ190	14.3760	5748.4	01Jan1950, 12:40	2.09
BCJ200	14.5760	5880.3	01Jan1950, 12:50	2.10
BCJ210	14.9490	6243.0	01Jan1950, 12:45	2.23
BCJ220	15.0970	6351.6	01Jan1950, 12:50	2.26
BCJ240	15.8240	6624.3	01Jan1950, 13:05	2.44
BCJ245	15.2490	6180.9	01Jan1950, 13:10	2.25
BC Outflow	15.8240	6624.3	01Jan1950, 13:05	2.44
BCR040	1.0880	3363.8	01Jan1950, 12:30	7.70
BCR050	1.7960	5311.1	01Jan1950, 12:35	7.69
BCR060	2.1660	5778.3	01Jan1950, 12:50	7.27
BCR080	0.8150	1938.1	01Jan1950, 12:45	7.11
BCR100	1.2930	2748.2	01Jan1950, 12:45	7.06
BCR130	2.2390	3511.9	01Jan1950, 13:15	6.66
BCR150	5.7720	8314.3	01Jan1950, 13:15	6.72
BCR175	11.5090	1305.3	01Jan1950, 19:55	1.05
BCR180	12.3280	2021.4	01Jan1950, 12:55	1.32
BCR200	14.3760	5716.4	01Jan1950, 12:50	2.05
BCR220	14.9490	6251.8	01Jan1950, 12:50	2.21
BCR240	0.3700	1363.6	01Jan1950, 12:25	7.75
BCR245	15.0970	6075.7	01Jan1950, 13:10	2.20
CR010	0.3129	1205.7	01Jan1950, 12:15	7.36
CR020	0.6356	2097.8	01Jan1950, 12:20	7.69
CR030	0.1764	683.2	01Jan1950, 12:15	7.41
CR040	0.5238	1567.8	01Jan1950, 12:25	7.18
CR050	0.6141	1603.9	01Jan1950, 12:35	7.79
CR060	0.1031	404.3	01Jan1950, 12:15	6.76
CRJ010	16.7725	7073.9	01Jan1950, 13:15	2.66
CRJ050	17.5630	2741.5	01Jan1950, 12:35	1.17

Project: Veramendi
Simulation Run: 2% Veramendi Corrected Effective
Basin Model: Blieders Creek Corrected Eff
Meteorologic Model: 50-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
CRJ060	18.1899	7097.2	01Jan1950, 14:15	2.85
CRR010	15.8240	6566.4	01Jan1950, 13:20	2.36
CRR030	16.7725	7056.8	01Jan1950, 13:25	2.62
CRR040	0.0000	5621.4	01Jan1950, 14:25	
CRR050	16.9489	1299.1	01Jan1950, 13:25	0.93
CRR060	17.5630	2687.9	01Jan1950, 12:50	1.16
Landa Park	16.9489	1299.8	01Jan1950, 13:25	0.94
SCS Dam 3 in	11.5090	19145.8	01Jan1950, 12:50	6.92
SCS Dam 3 out	11.5090	1307.4	01Jan1950, 19:30	1.13

Project: Veramendi
Simulation Run: 4% Veramendi Corrected Effective
Basin Model: Blieders Creek Corrected Eff
Meteorologic Model: 25-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
BC010	0.2740	750.8	01Jan1950, 12:20	5.66
BC020	0.8500	2232.9	01Jan1950, 12:25	6.32
BC030	0.2380	653.5	01Jan1950, 12:25	6.34
BC040	0.4340	1220.4	01Jan1950, 12:25	6.75
BC050	0.3700	944.8	01Jan1950, 12:20	5.63
BC060	0.5150	1127.9	01Jan1950, 12:25	5.27
BC070	0.8150	1643.4	01Jan1950, 12:35	5.77
BC080	0.2960	726.9	01Jan1950, 12:20	5.40
BC090	0.1820	520.9	01Jan1950, 12:20	6.19
BC100	0.2560	611.6	01Jan1950, 12:25	5.35
BC110	0.1760	402.6	01Jan1950, 12:20	5.01
BC120	2.2390	2913.0	01Jan1950, 13:05	5.37
BC130	0.7530	1595.5	01Jan1950, 12:30	5.58
BC140	2.2070	3218.0	01Jan1950, 12:55	5.40
BC145	0.5730	1674.6	01Jan1950, 12:20	5.77
BC150	0.9310	2136.3	01Jan1950, 12:30	5.98
BC160	0.4000	1249.3	01Jan1950, 12:15	5.70
BC170	0.6270	1256.9	01Jan1950, 12:30	5.25
BC175	0.1920	493.7	01Jan1950, 12:20	5.46
BC180	0.8610	1810.2	01Jan1950, 12:30	5.41
BC190	1.1870	2324.9	01Jan1950, 12:35	5.38
BC200	0.2000	533.3	01Jan1950, 12:15	4.81
BC210	0.3730	1167.0	01Jan1950, 12:15	5.71
BC220	0.1480	574.2	01Jan1950, 12:10	5.82
BC230	0.3700	1165.5	01Jan1950, 12:20	6.36
BC240	0.2050	612.5	01Jan1950, 12:20	6.07
BC245	0.1520	387.4	01Jan1950, 12:20	5.62
BCJ020	1.0880	2886.3	01Jan1950, 12:25	6.32
BCJ040	1.3620	3434.1	01Jan1950, 12:30	6.18
BCJ041	1.7960	4584.1	01Jan1950, 12:25	6.32
BCJ050	2.1660	5177.5	01Jan1950, 12:35	6.18
BCJ060	2.6810	5501.3	01Jan1950, 12:50	5.81
BCJ080	1.2930	2302.9	01Jan1950, 12:35	5.73

Project: Veramendi
Simulation Run: 4% Veramendi Corrected Effective
Basin Model: Blieders Creek Corrected Eff
Meteorologic Model: 25-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
BCJ100	4.2300	8060.2	01Jan1950, 12:50	5.75
BCJ110	6.8790	7655.9	01Jan1950, 13:05	5.47
BCJ130	5.7720	6876.5	01Jan1950, 12:55	5.44
BCJ175	12.3280	1718.0	01Jan1950, 12:30	0.52
BCJ180	13.1890	2609.5	01Jan1950, 12:55	0.82
BCJ190	14.3760	4488.3	01Jan1950, 12:45	1.19
BCJ200	14.5760	4546.3	01Jan1950, 12:50	1.23
BCJ210	14.9490	4870.9	01Jan1950, 12:40	1.34
BCJ220	15.0970	4984.0	01Jan1950, 12:45	1.38
BCJ240	15.8240	5331.3	01Jan1950, 13:05	1.57
BCJ245	15.2490	4919.2	01Jan1950, 13:10	1.39
BC Outflow	15.8240	5331.3	01Jan1950, 13:05	1.57
BCR040	1.0880	2836.9	01Jan1950, 12:30	6.31
BCR050	1.7960	4477.5	01Jan1950, 12:35	6.29
BCR060	2.1660	4879.5	01Jan1950, 12:50	5.94
BCR080	0.8150	1624.0	01Jan1950, 12:45	5.75
BCR100	1.2930	2283.9	01Jan1950, 12:50	5.70
BCR130	2.2390	2895.0	01Jan1950, 13:15	5.34
BCR150	5.7720	6836.3	01Jan1950, 13:15	5.40
BCR175	11.5090	125.8	02Jan1950, 00:00	0.18
BCR180	12.3280	1612.0	01Jan1950, 13:00	0.50
BCR200	14.3760	4425.2	01Jan1950, 12:55	1.18
BCR220	14.9490	4887.6	01Jan1950, 12:45	1.33
BCR240	0.3700	1150.3	01Jan1950, 12:25	6.34
BCR245	15.0970	4831.3	01Jan1950, 13:10	1.35
CR010	0.3129	1016.4	01Jan1950, 12:15	5.97
CR020	0.6356	1781.7	01Jan1950, 12:20	6.29
CR030	0.1764	576.4	01Jan1950, 12:15	6.02
CR040	0.5238	1312.1	01Jan1950, 12:25	5.80
CR050	0.6141	1365.9	01Jan1950, 12:35	6.39
CR060	0.1031	336.3	01Jan1950, 12:15	5.41
CRJ010	16.7725	5758.0	01Jan1950, 13:15	1.80
CRJ050	17.5630	2272.5	01Jan1950, 12:35	0.96

Project: Veramendi
Simulation Run: 4% Veramendi Corrected Effective
Basin Model: Blieders Creek Corrected Eff
Meteorologic Model: 25-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
CRJ060	18.1899	5879.0	01Jan1950, 14:10	2.09
CRR010	15.8240	5296.5	01Jan1950, 13:20	1.54
CRR030	16.7725	5746.7	01Jan1950, 13:20	1.79
CRR040	0.0000	4468.7	01Jan1950, 14:15	
CRR050	16.9489	1195.6	01Jan1950, 13:20	0.76
CRR060	17.5630	2240.4	01Jan1950, 12:50	0.95
Landa Park	16.9489	1195.9	01Jan1950, 13:15	0.77
SCS Dam 3 in	11.5090	15863.1	01Jan1950, 12:50	5.58
SCS Dam 3 out	11.5090	126.3	02Jan1950, 00:00	0.20

Project: Veramendi
Simulation Run: 10% Veramendi Corrected Effective
Basin Model: Blieders Creek Corrected Eff
Meteorologic Model: 10-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
BC010	0.2740	570.7	01Jan1950, 12:20	4.06
BC020	0.8500	1751.5	01Jan1950, 12:25	4.67
BC030	0.2380	514.0	01Jan1950, 12:25	4.68
BC040	0.4340	975.9	01Jan1950, 12:25	5.07
BC050	0.3700	714.7	01Jan1950, 12:20	4.04
BC060	0.5150	836.6	01Jan1950, 12:25	3.72
BC070	0.8150	1253.7	01Jan1950, 12:35	4.17
BC080	0.2960	543.2	01Jan1950, 12:25	3.83
BC090	0.1820	406.1	01Jan1950, 12:20	4.54
BC100	0.2560	457.8	01Jan1950, 12:25	3.79
BC110	0.1760	295.5	01Jan1950, 12:25	3.50
BC120	2.2390	2168.6	01Jan1950, 13:05	3.82
BC130	0.7530	1204.7	01Jan1950, 12:30	4.00
BC140	2.2070	2402.5	01Jan1950, 12:55	3.85
BC145	0.5730	1284.2	01Jan1950, 12:20	4.16
BC150	0.9310	1648.9	01Jan1950, 12:30	4.36
BC160	0.4000	951.4	01Jan1950, 12:15	4.10
BC170	0.6270	931.6	01Jan1950, 12:30	3.71
BC175	0.1920	370.5	01Jan1950, 12:20	3.88
BC180	0.8610	1355.6	01Jan1950, 12:30	3.84
BC190	1.1870	1740.3	01Jan1950, 12:35	3.82
BC200	0.2000	385.5	01Jan1950, 12:15	3.32
BC210	0.3730	889.4	01Jan1950, 12:15	4.11
BC220	0.1480	440.4	01Jan1950, 12:10	4.20
BC230	0.3700	918.9	01Jan1950, 12:20	4.70
BC240	0.2050	476.1	01Jan1950, 12:20	4.44
BC245	0.1520	292.9	01Jan1950, 12:20	4.03
BCJ020	1.0880	2265.4	01Jan1950, 12:25	4.67
BCJ040	1.3620	2690.9	01Jan1950, 12:30	4.54
BCJ041	1.7960	3603.4	01Jan1950, 12:30	4.66
BCJ050	2.1660	3946.4	01Jan1950, 12:35	4.55
BCJ060	2.6810	4179.2	01Jan1950, 12:50	4.25
BCJ080	1.2930	1738.6	01Jan1950, 12:40	4.13

Project: Veramendi
Simulation Run: 10% Veramendi Corrected Effective
Basin Model: Blieders Creek Corrected Eff
Meteorologic Model: 10-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
BCJ100	4.2300	6106.6	01Jan1950, 12:50	4.18
BCJ110	6.8790	5623.8	01Jan1950, 13:10	3.91
BCJ130	5.7720	5073.8	01Jan1950, 13:00	3.88
BCJ175	12.3280	1251.4	01Jan1950, 12:30	0.40
BCJ180	13.1890	1828.4	01Jan1950, 12:55	0.60
BCJ190	14.3760	3176.7	01Jan1950, 12:30	0.87
BCJ200	14.5760	3258.5	01Jan1950, 12:45	0.89
BCJ210	14.9490	3563.4	01Jan1950, 12:40	0.97
BCJ220	15.0970	3651.9	01Jan1950, 12:45	1.00
BCJ240	15.8240	3899.5	01Jan1950, 13:00	1.14
BCJ245	15.2490	3527.7	01Jan1950, 13:05	1.01
BC Outflow	15.8240	3899.5	01Jan1950, 13:00	1.14
BCR040	1.0880	2232.6	01Jan1950, 12:30	4.66
BCR050	1.7960	3494.2	01Jan1950, 12:40	4.65
BCR060	2.1660	3761.5	01Jan1950, 12:55	4.37
BCR080	0.8150	1234.7	01Jan1950, 12:45	4.15
BCR100	1.2930	1719.2	01Jan1950, 12:50	4.11
BCR130	2.2390	2153.3	01Jan1950, 13:20	3.80
BCR150	5.7720	5031.4	01Jan1950, 13:20	3.85
BCR175	11.5090	116.7	02Jan1950, 00:00	0.16
BCR180	12.3280	1150.3	01Jan1950, 13:00	0.38
BCR200	14.3760	3138.4	01Jan1950, 12:45	0.86
BCR220	14.9490	3578.1	01Jan1950, 12:45	0.97
BCR240	0.3700	898.1	01Jan1950, 12:25	4.69
BCR245	15.0970	3451.8	01Jan1950, 13:05	0.98
CR010	0.3129	784.9	01Jan1950, 12:15	4.34
CR020	0.6356	1394.1	01Jan1950, 12:20	4.64
CR030	0.1764	446.4	01Jan1950, 12:15	4.39
CR040	0.5238	1007.8	01Jan1950, 12:25	4.19
CR050	0.6141	1074.3	01Jan1950, 12:35	4.73
CR060	0.1031	253.8	01Jan1950, 12:15	3.84
CRJ010	16.7725	4196.7	01Jan1950, 13:15	1.31
CRJ050	17.5630	1813.0	01Jan1950, 12:35	0.78

Project: Veramendi
Simulation Run: 10% Veramendi Corrected Effective
Basin Model: Blieders Creek Corrected Eff
Meteorologic Model: 10-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
CRJ060	18.1899	4267.5	01Jan1950, 14:10	1.52
CRR010	15.8240	3841.6	01Jan1950, 13:20	1.12
CRR030	16.7725	4177.2	01Jan1950, 13:20	1.30
CRR040	0.0000	3063.6	01Jan1950, 14:20	
CRR050	16.9489	1011.6	01Jan1950, 13:35	0.63
CRR060	17.5630	1779.4	01Jan1950, 12:45	0.77
Landa Park	16.9489	1020.0	01Jan1950, 13:20	0.64
SCS Dam 3 in	11.5090	11834.9	01Jan1950, 12:50	4.01
SCS Dam 3 out	11.5090	117.1	02Jan1950, 00:00	0.18

Project: Veramendi
Simulation Run: 50% Veramendi Corrected Effective
Basin Model: Blieders Creek Corrected Eff
Meteorologic Model: 2-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
BC010	0.2740	216.9	01Jan1950, 12:20	1.32
BC020	0.8500	780.5	01Jan1950, 12:25	1.71
BC030	0.2380	232.2	01Jan1950, 12:25	1.72
BC040	0.4340	479.0	01Jan1950, 12:25	2.00
BC050	0.3700	274.8	01Jan1950, 12:25	1.30
BC060	0.5150	290.2	01Jan1950, 12:30	1.12
BC070	0.8150	490.6	01Jan1950, 12:35	1.39
BC080	0.2960	196.8	01Jan1950, 12:25	1.18
BC090	0.1820	174.7	01Jan1950, 12:20	1.63
BC100	0.2560	162.1	01Jan1950, 12:25	1.16
BC110	0.1760	95.6	01Jan1950, 12:25	0.99
BC120	2.2390	764.2	01Jan1950, 13:05	1.19
BC130	0.7530	449.9	01Jan1950, 12:35	1.28
BC140	2.2070	854.5	01Jan1950, 12:55	1.20
BC145	0.5730	510.8	01Jan1950, 12:20	1.38
BC150	0.9310	681.3	01Jan1950, 12:30	1.51
BC160	0.4000	362.9	01Jan1950, 12:15	1.34
BC170	0.6270	319.6	01Jan1950, 12:35	1.11
BC175	0.1920	134.2	01Jan1950, 12:25	1.21
BC180	0.8610	482.1	01Jan1950, 12:30	1.19
BC190	1.1870	620.5	01Jan1950, 12:35	1.18
BC200	0.2000	115.0	01Jan1950, 12:20	0.90
BC210	0.3730	340.3	01Jan1950, 12:15	1.34
BC220	0.1480	172.6	01Jan1950, 12:10	1.40
BC230	0.3700	418.4	01Jan1950, 12:20	1.73
BC240	0.2050	202.1	01Jan1950, 12:20	1.55
BC245	0.1520	112.3	01Jan1950, 12:25	1.30
BCJ020	1.0880	1012.8	01Jan1950, 12:25	1.72
BCJ040	1.3620	1146.0	01Jan1950, 12:35	1.63
BCJ041	1.7960	1546.7	01Jan1950, 12:35	1.72
BCJ050	2.1660	1634.6	01Jan1950, 12:45	1.65
BCJ060	2.6810	882.0	01Jan1950, 13:35	1.50
BCJ080	1.2930	657.2	01Jan1950, 12:45	1.37

Project: Veramendi
Simulation Run: 50% Veramendi Corrected Effective
Basin Model: Blieders Creek Corrected Eff
Meteorologic Model: 2-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
BCJ100	4.2300	1295.7	01Jan1950, 13:35	1.44
BCJ110	6.8790	1885.6	01Jan1950, 13:25	1.24
BCJ130	5.7720	1728.0	01Jan1950, 13:10	1.22
BCJ175	12.3280	436.5	01Jan1950, 12:30	0.19
BCJ180	13.1890	485.8	01Jan1950, 12:35	0.24
BCJ190	14.3760	1106.3	01Jan1950, 12:35	0.32
BCJ200	14.5760	1114.1	01Jan1950, 12:50	0.32
BCJ210	14.9490	1214.0	01Jan1950, 12:45	0.34
BCJ220	15.0970	1254.0	01Jan1950, 12:50	0.35
BCJ240	15.8240	1231.1	01Jan1950, 13:15	0.40
BCJ245	15.2490	1106.0	01Jan1950, 13:15	0.35
BC Outflow	15.8240	1231.1	01Jan1950, 13:15	0.40
BCR040	1.0880	991.6	01Jan1950, 12:35	1.71
BCR050	1.7960	1481.8	01Jan1950, 12:45	1.72
BCR060	2.1660	827.5	01Jan1950, 13:35	1.60
BCR080	0.8150	484.6	01Jan1950, 12:50	1.38
BCR100	1.2930	647.1	01Jan1950, 13:00	1.36
BCR130	2.2390	757.8	01Jan1950, 13:30	1.18
BCR150	5.7720	1714.1	01Jan1950, 13:30	1.21
BCR175	11.5090	94.1	02Jan1950, 00:00	0.12
BCR180	12.3280	307.4	01Jan1950, 13:35	0.17
BCR200	14.3760	1077.9	01Jan1950, 12:50	0.31
BCR220	14.9490	1226.6	01Jan1950, 12:50	0.34
BCR240	0.3700	404.7	01Jan1950, 12:30	1.73
BCR245	15.0970	1081.9	01Jan1950, 13:15	0.34
CR010	0.3129	320.8	01Jan1950, 12:15	1.49
CR020	0.6356	620.6	01Jan1950, 12:25	1.69
CR030	0.1764	184.6	01Jan1950, 12:15	1.52
CR040	0.5238	399.6	01Jan1950, 12:25	1.40
CR050	0.6141	488.3	01Jan1950, 12:35	1.76
CR060	0.1031	92.9	01Jan1950, 12:15	1.18
CRJ010	16.7725	1235.5	01Jan1950, 13:40	0.46
CRJ050	17.5630	927.6	01Jan1950, 12:40	0.40

Project: Veramendi
Simulation Run: 50% Veramendi Corrected Effective
Basin Model: Blieders Creek Corrected Eff
Meteorologic Model: 2-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
CRJ060	18.1899	1160.1	01Jan1950, 12:45	0.53
CRR010	15.8240	1140.8	01Jan1950, 13:40	0.39
CRR030	16.7725	1176.7	01Jan1950, 13:55	0.45
CRR040	0.0000	431.2	01Jan1950, 15:40	
CRR050	16.9489	576.1	01Jan1950, 14:05	0.35
CRR060	17.5630	913.0	01Jan1950, 12:50	0.40
Landa Park	16.9489	585.0	01Jan1950, 13:50	0.35
SCS Dam 3 in	11.5090	3184.3	01Jan1950, 13:35	1.32
SCS Dam 3 out	11.5090	94.2	02Jan1950, 00:00	0.13

APPENDIX C

Hydrologic Reports for Post-Project Conditions per Land Plan 5C

Project: Veramendi
Simulation Run: 1% Veramendi 5C Post-Proj 1% AC
Basin Model: Veramendi 5C-Post Project
Meteorologic Model: 100-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
BC010	0.2740	996.1	01Jan1950, 12:20	8.46
BC020	0.8500	2880.9	01Jan1950, 12:25	9.19
BC030	0.2380	840.5	01Jan1950, 12:25	9.21
BC040	0.4340	1546.3	01Jan1950, 12:25	9.65
BC050	0.3700	1260.4	01Jan1950, 12:20	8.43
BC060	0.5150	1537.3	01Jan1950, 12:25	8.02
BC070	0.8150	2189.8	01Jan1950, 12:35	8.58
BC080	0.2960	982.4	01Jan1950, 12:20	8.16
BC090	0.1820	674.7	01Jan1950, 12:20	9.05
BC100	0.2560	842.2	01Jan1950, 12:25	8.32
BC110	0.1760	557.6	01Jan1950, 12:20	7.74
BC120	2.2390	4028.1	01Jan1950, 13:00	8.11
BC130	0.7530	2142.0	01Jan1950, 12:30	8.37
BC140	2.2070	4418.1	01Jan1950, 12:50	8.15
BC145	0.5730	2201.0	01Jan1950, 12:20	8.59
BC150	0.9310	2806.6	01Jan1950, 12:30	8.82
BC160	0.4000	1646.1	01Jan1950, 12:15	8.47
BC170	0.6270	1879.8	01Jan1950, 12:30	8.98
BC175	0.1920	693.7	01Jan1950, 12:20	8.72
BC180	0.8610	2595.5	01Jan1950, 12:30	8.82
BC190	1.1870	3542.9	01Jan1950, 12:30	9.54
BC200	0.2000	798.4	01Jan1950, 12:15	8.15
BC210	0.3730	1610.9	01Jan1950, 12:15	9.06
BC220	0.1480	758.7	01Jan1950, 12:10	8.71
BC230	0.3700	1491.9	01Jan1950, 12:20	9.24
BC240	0.2050	794.9	01Jan1950, 12:20	8.92
BC245	0.1520	517.1	01Jan1950, 12:20	8.42
BCJ020	1.0880	3721.4	01Jan1950, 12:25	9.19
BCJ040	1.3620	4480.1	01Jan1950, 12:30	9.03
BCJ041	1.7960	5989.1	01Jan1950, 12:25	9.18
BCJ050	2.1660	6822.5	01Jan1950, 12:35	9.02
BCJ060	2.6810	7278.7	01Jan1950, 12:50	8.53
BCJ080	1.2930	3135.3	01Jan1950, 12:35	8.53

Project: Veramendi
Simulation Run: 1% Veramendi 5C Post-Proj 1% AC
Basin Model: Veramendi 5C-Post Project
Meteorologic Model: 100-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
BCJ100	4.2300	10745.1	01Jan1950, 12:50	8.51
BCJ110	6.8790	10783.0	01Jan1950, 13:05	8.21
BCJ130	5.7720	9622.5	01Jan1950, 12:55	8.19
BCJ175	12.3280	3052.6	01Jan1950, 16:20	2.85
BCJ180	13.1890	4165.2	01Jan1950, 12:45	3.13
BCJ190	14.3760	7310.7	01Jan1950, 12:40	3.66
BCJ200	14.5760	7474.5	01Jan1950, 12:45	3.67
BCJ210	14.9490	7954.6	01Jan1950, 12:45	3.80
BCJ220	15.0970	8051.3	01Jan1950, 12:50	3.84
BCJ240	15.8240	8674.1	01Jan1950, 13:00	4.00
BCJ245	15.2490	8022.6	01Jan1950, 13:00	3.81
BC Outflow	15.8240	8674.1	01Jan1950, 13:00	4.00
BCR040	1.0880	3689.0	01Jan1950, 12:30	9.17
BCR050	1.7960	5889.8	01Jan1950, 12:35	9.15
BCR060	2.1660	6421.9	01Jan1950, 12:50	8.65
BCR080	0.8150	2163.8	01Jan1950, 12:45	8.54
BCR100	1.2930	3105.8	01Jan1950, 12:45	8.49
BCR130	2.2390	4012.1	01Jan1950, 13:15	8.06
BCR150	5.7720	9563.6	01Jan1950, 13:15	8.12
BCR175	11.5090	2895.4	01Jan1950, 16:20	2.41
BCR180	12.3280	3048.2	01Jan1950, 16:45	2.73
BCR200	14.3760	7253.7	01Jan1950, 12:50	3.61
BCR220	14.9490	7932.2	01Jan1950, 12:50	3.79
BCR240	0.3700	1486.3	01Jan1950, 12:25	9.21
BCR245	15.0970	7877.5	01Jan1950, 13:05	3.76
CR010	0.3129	1325.9	01Jan1950, 12:15	8.81
CR020	0.6356	2300.7	01Jan1950, 12:20	9.16
CR030	0.1764	750.6	01Jan1950, 12:15	8.87
CR040	0.5238	1736.8	01Jan1950, 12:25	8.62
CR050	0.6141	1766.9	01Jan1950, 12:35	9.26
CR060	0.1031	448.3	01Jan1950, 12:15	8.19
CRJ010	16.7725	8547.9	01Jan1950, 13:35	4.20
CRJ050	17.5630	3053.5	01Jan1950, 12:35	1.48

Project: Veramendi
Simulation Run: 1% Veramendi 5C Post-Proj 1% AC
Basin Model: Veramendi 5C-Post Project
Meteorologic Model: 100-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
CRJ060	18.1899	8108.5	01Jan1950, 14:05	4.37
CRR010	15.8240	8074.8	01Jan1950, 13:40	3.91
CRR030	16.7725	8451.4	01Jan1950, 13:45	4.16
CRR040	0.0000	6557.2	01Jan1950, 15:00	
CRR050	16.9489	1411.3	01Jan1950, 13:05	1.20
CRR060	17.5630	3008.7	01Jan1950, 12:45	1.47
Landa Park	16.9489	1412.0	01Jan1950, 13:00	1.21
SCS Dam 3 in	11.5090	21792.3	01Jan1950, 12:50	8.33
SCS Dam 3 out	11.5090	2899.3	01Jan1950, 16:05	2.51

Project: Veramendi
Simulation Run: Veramendi 5C Post-Proj 4% AC
Basin Model: Veramendi 5C-Post Project
Meteorologic Model: 25-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
BC010	0.2740	750.8	01Jan1950, 12:20	5.66
BC020	0.8500	2232.9	01Jan1950, 12:25	6.32
BC030	0.2380	653.5	01Jan1950, 12:25	6.34
BC040	0.4340	1220.4	01Jan1950, 12:25	6.75
BC050	0.3700	944.8	01Jan1950, 12:20	5.63
BC060	0.5150	1127.9	01Jan1950, 12:25	5.27
BC070	0.8150	1643.4	01Jan1950, 12:35	5.77
BC080	0.2960	726.9	01Jan1950, 12:20	5.40
BC090	0.1820	520.9	01Jan1950, 12:20	6.19
BC100	0.2560	630.5	01Jan1950, 12:25	5.54
BC110	0.1760	403.5	01Jan1950, 12:20	5.02
BC120	2.2390	2913.0	01Jan1950, 13:05	5.37
BC130	0.7530	1595.5	01Jan1950, 12:30	5.58
BC140	2.2070	3218.0	01Jan1950, 12:55	5.40
BC145	0.5730	1674.6	01Jan1950, 12:20	5.77
BC150	0.9310	2136.3	01Jan1950, 12:30	5.98
BC160	0.4000	1242.5	01Jan1950, 12:15	5.67
BC170	0.6270	1439.4	01Jan1950, 12:30	6.13
BC175	0.1920	528.1	01Jan1950, 12:20	5.89
BC180	0.8610	1975.7	01Jan1950, 12:30	5.98
BC190	1.1870	2767.4	01Jan1950, 12:30	6.65
BC200	0.2000	593.5	01Jan1950, 12:15	5.38
BC210	0.3730	1247.8	01Jan1950, 12:15	6.20
BC220	0.1480	579.1	01Jan1950, 12:10	5.87
BC230	0.3700	1165.5	01Jan1950, 12:20	6.36
BC240	0.2050	612.5	01Jan1950, 12:20	6.07
BC245	0.1520	387.4	01Jan1950, 12:20	5.62
BCJ020	1.0880	2886.3	01Jan1950, 12:25	6.32
BCJ040	1.3620	3434.1	01Jan1950, 12:30	6.18
BCJ041	1.7960	4584.1	01Jan1950, 12:25	6.32
BCJ050	2.1660	5177.5	01Jan1950, 12:35	6.18
BCJ060	2.6810	5501.3	01Jan1950, 12:50	5.81
BCJ080	1.2930	2302.9	01Jan1950, 12:35	5.73

Project: Veramendi
Simulation Run: Veramendi 5C Post-Proj 4% AC
Basin Model: Veramendi 5C-Post Project
Meteorologic Model: 25-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
BCJ100	4.2300	8066.9	01Jan1950, 12:50	5.76
BCJ110	6.8790	7656.0	01Jan1950, 13:05	5.47
BCJ130	5.7720	6876.5	01Jan1950, 12:55	5.44
BCJ175	12.3280	1933.0	01Jan1950, 12:25	0.57
BCJ180	13.1890	2952.5	01Jan1950, 12:50	0.90
BCJ190	14.3760	5306.1	01Jan1950, 12:40	1.38
BCJ200	14.5760	5396.5	01Jan1950, 12:50	1.42
BCJ210	14.9490	5716.8	01Jan1950, 12:45	1.53
BCJ220	15.0970	5803.4	01Jan1950, 12:50	1.57
BCJ240	15.8240	6107.5	01Jan1950, 13:05	1.75
BCJ245	15.2490	5695.1	01Jan1950, 13:10	1.58
BC Outflow	15.8240	6107.5	01Jan1950, 13:05	1.75
BCR040	1.0880	2836.9	01Jan1950, 12:30	6.31
BCR050	1.7960	4477.5	01Jan1950, 12:35	6.29
BCR060	2.1660	4879.5	01Jan1950, 12:50	5.94
BCR080	0.8150	1624.0	01Jan1950, 12:45	5.75
BCR100	1.2930	2283.9	01Jan1950, 12:50	5.70
BCR130	2.2390	2895.0	01Jan1950, 13:15	5.34
BCR150	5.7720	6836.3	01Jan1950, 13:15	5.40
BCR175	11.5090	125.8	02Jan1950, 00:00	0.18
BCR180	12.3280	1820.0	01Jan1950, 12:55	0.55
BCR200	14.3760	5251.4	01Jan1950, 12:50	1.36
BCR220	14.9490	5719.3	01Jan1950, 12:50	1.53
BCR240	0.3700	1150.3	01Jan1950, 12:25	6.34
BCR245	15.0970	5607.2	01Jan1950, 13:10	1.54
CR010	0.3129	1016.4	01Jan1950, 12:15	5.97
CR020	0.6356	1781.7	01Jan1950, 12:20	6.29
CR030	0.1764	576.4	01Jan1950, 12:15	6.02
CR040	0.5238	1312.1	01Jan1950, 12:25	5.80
CR050	0.6141	1365.9	01Jan1950, 12:35	6.39
CR060	0.1031	336.3	01Jan1950, 12:15	5.41
CRJ010	16.7725	6489.8	01Jan1950, 13:15	1.98
CRJ050	17.5630	2353.7	01Jan1950, 12:45	1.00

Project: Veramendi
Simulation Run: Veramendi 5C Post-Proj 4% AC
Basin Model: Veramendi 5C-Post Project
Meteorologic Model: 25-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
CRJ060	18.1899	6407.1	01Jan1950, 14:15	2.25
CRR010	15.8240	6052.6	01Jan1950, 13:20	1.73
CRR030	16.7725	6474.0	01Jan1950, 13:20	1.96
CRR040	0.0000	5035.3	01Jan1950, 14:25	
CRR050	16.9489	1252.4	01Jan1950, 13:25	0.80
CRR060	17.5630	2337.5	01Jan1950, 12:50	0.99
Landa Park	16.9489	1253.2	01Jan1950, 13:20	0.81
SCS Dam 3 in	11.5090	15869.1	01Jan1950, 12:50	5.58
SCS Dam 3 out	11.5090	126.3	02Jan1950, 00:00	0.20

Project: Veramendi
Simulation Run: Veramendi 5C Post-Proj 10% AC
Basin Model: Veramendi 5C-Post Project
Meteorologic Model: 10-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
BC010	0.2740	570.7	01Jan1950, 12:20	4.06
BC020	0.8500	1751.5	01Jan1950, 12:25	4.67
BC030	0.2380	514.0	01Jan1950, 12:25	4.68
BC040	0.4340	975.9	01Jan1950, 12:25	5.07
BC050	0.3700	714.7	01Jan1950, 12:20	4.04
BC060	0.5150	836.6	01Jan1950, 12:25	3.72
BC070	0.8150	1253.7	01Jan1950, 12:35	4.17
BC080	0.2960	543.2	01Jan1950, 12:25	3.83
BC090	0.1820	406.1	01Jan1950, 12:20	4.54
BC100	0.2560	476.8	01Jan1950, 12:25	3.95
BC110	0.1760	296.4	01Jan1950, 12:25	3.51
BC120	2.2390	2168.6	01Jan1950, 13:05	3.82
BC130	0.7530	1204.7	01Jan1950, 12:30	4.00
BC140	2.2070	2402.5	01Jan1950, 12:55	3.85
BC145	0.5730	1284.2	01Jan1950, 12:20	4.16
BC150	0.9310	1648.9	01Jan1950, 12:30	4.36
BC160	0.4000	944.5	01Jan1950, 12:15	4.07
BC170	0.6270	1118.0	01Jan1950, 12:30	4.50
BC175	0.1920	405.7	01Jan1950, 12:20	4.27
BC180	0.8610	1524.9	01Jan1950, 12:30	4.36
BC190	1.1870	2197.4	01Jan1950, 12:30	4.98
BC200	0.2000	444.2	01Jan1950, 12:15	3.82
BC210	0.3730	974.3	01Jan1950, 12:15	4.55
BC220	0.1480	445.5	01Jan1950, 12:10	4.25
BC230	0.3700	918.9	01Jan1950, 12:20	4.70
BC240	0.2050	476.1	01Jan1950, 12:20	4.44
BC245	0.1520	292.9	01Jan1950, 12:20	4.03
BCJ020	1.0880	2265.4	01Jan1950, 12:25	4.67
BCJ040	1.3620	2690.9	01Jan1950, 12:30	4.54
BCJ041	1.7960	3603.4	01Jan1950, 12:30	4.66
BCJ050	2.1660	3946.4	01Jan1950, 12:35	4.55
BCJ060	2.6810	4179.2	01Jan1950, 12:50	4.25
BCJ080	1.2930	1738.6	01Jan1950, 12:40	4.13

Project: Veramendi
Simulation Run: Veramendi 5C Post-Proj 10% AC
Basin Model: Veramendi 5C-Post Project
Meteorologic Model: 10-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
BCJ100	4.2300	6113.4	01Jan1950, 12:50	4.19
BCJ110	6.8790	5624.0	01Jan1950, 13:10	3.91
BCJ130	5.7720	5073.8	01Jan1950, 13:00	3.88
BCJ175	12.3280	1467.0	01Jan1950, 12:25	0.44
BCJ180	13.1890	2163.3	01Jan1950, 12:55	0.68
BCJ190	14.3760	3865.5	01Jan1950, 12:30	1.03
BCJ200	14.5760	3973.9	01Jan1950, 12:45	1.06
BCJ210	14.9490	4319.6	01Jan1950, 12:40	1.15
BCJ220	15.0970	4393.5	01Jan1950, 12:45	1.17
BCJ240	15.8240	4625.6	01Jan1950, 13:00	1.30
BCJ245	15.2490	4270.9	01Jan1950, 13:05	1.18
BC Outflow	15.8240	4625.6	01Jan1950, 13:00	1.30
BCR040	1.0880	2232.6	01Jan1950, 12:30	4.66
BCR050	1.7960	3494.2	01Jan1950, 12:40	4.65
BCR060	2.1660	3761.5	01Jan1950, 12:55	4.37
BCR080	0.8150	1234.7	01Jan1950, 12:45	4.15
BCR100	1.2930	1719.2	01Jan1950, 12:50	4.11
BCR130	2.2390	2153.3	01Jan1950, 13:20	3.80
BCR150	5.7720	5031.4	01Jan1950, 13:20	3.85
BCR175	11.5090	116.7	02Jan1950, 00:00	0.16
BCR180	12.3280	1370.0	01Jan1950, 13:00	0.42
BCR200	14.3760	3841.0	01Jan1950, 12:45	1.02
BCR220	14.9490	4319.3	01Jan1950, 12:45	1.14
BCR240	0.3700	898.1	01Jan1950, 12:25	4.69
BCR245	15.0970	4195.0	01Jan1950, 13:05	1.15
CR010	0.3129	784.9	01Jan1950, 12:15	4.34
CR020	0.6356	1394.1	01Jan1950, 12:20	4.64
CR030	0.1764	446.4	01Jan1950, 12:15	4.39
CR040	0.5238	1007.8	01Jan1950, 12:25	4.19
CR050	0.6141	1074.3	01Jan1950, 12:35	4.73
CR060	0.1031	253.8	01Jan1950, 12:15	3.84
CRJ010	16.7725	4941.1	01Jan1950, 13:15	1.46
CRJ050	17.5630	1847.5	01Jan1950, 12:35	0.81

Project: Veramendi
Simulation Run: Veramendi 5C Post-Proj 10% AC
Basin Model: Veramendi 5C-Post Project
Meteorologic Model: 10-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
CRJ060	18.1899	4901.9	01Jan1950, 14:15	1.67
CRR010	15.8240	4575.9	01Jan1950, 13:15	1.28
CRR030	16.7725	4927.8	01Jan1950, 13:20	1.45
CRR040	0.0000	3661.3	01Jan1950, 14:20	
CRR050	16.9489	1111.4	01Jan1950, 13:25	0.67
CRR060	17.5630	1824.9	01Jan1950, 12:50	0.81
Landa Park	16.9489	1112.8	01Jan1950, 13:20	0.68
SCS Dam 3 in	11.5090	11840.9	01Jan1950, 12:50	4.02
SCS Dam 3 out	11.5090	117.1	02Jan1950, 00:00	0.18

Project: Veramendi
Simulation Run: Veramendi 5C Post-Proj 50% AC
Basin Model: Veramendi 5C-Post Project
Meteorologic Model: 2-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
BC010	0.2740	216.9	01Jan1950, 12:20	1.32
BC020	0.8500	780.5	01Jan1950, 12:25	1.71
BC030	0.2380	232.2	01Jan1950, 12:25	1.72
BC040	0.4340	479.0	01Jan1950, 12:25	2.00
BC050	0.3700	274.8	01Jan1950, 12:25	1.30
BC060	0.5150	290.2	01Jan1950, 12:30	1.12
BC070	0.8150	490.6	01Jan1950, 12:35	1.39
BC080	0.2960	196.8	01Jan1950, 12:25	1.18
BC090	0.1820	174.7	01Jan1950, 12:20	1.63
BC100	0.2560	177.8	01Jan1950, 12:25	1.25
BC110	0.1760	96.2	01Jan1950, 12:25	1.00
BC120	2.2390	764.2	01Jan1950, 13:05	1.19
BC130	0.7530	449.9	01Jan1950, 12:35	1.28
BC140	2.2070	854.5	01Jan1950, 12:55	1.20
BC145	0.5730	510.8	01Jan1950, 12:20	1.38
BC150	0.9310	681.3	01Jan1950, 12:30	1.51
BC160	0.4000	356.9	01Jan1950, 12:15	1.32
BC170	0.6270	476.4	01Jan1950, 12:30	1.60
BC175	0.1920	162.7	01Jan1950, 12:25	1.45
BC180	0.8610	630.1	01Jan1950, 12:30	1.51
BC190	1.1870	1056.7	01Jan1950, 12:35	1.94
BC200	0.2000	155.3	01Jan1950, 12:20	1.17
BC210	0.3730	420.2	01Jan1950, 12:15	1.63
BC220	0.1480	177.2	01Jan1950, 12:10	1.43
BC230	0.3700	418.4	01Jan1950, 12:20	1.73
BC240	0.2050	202.1	01Jan1950, 12:20	1.55
BC245	0.1520	112.3	01Jan1950, 12:25	1.30
BCJ020	1.0880	1012.8	01Jan1950, 12:25	1.72
BCJ040	1.3620	1146.0	01Jan1950, 12:35	1.63
BCJ041	1.7960	1546.7	01Jan1950, 12:35	1.72
BCJ050	2.1660	1634.6	01Jan1950, 12:45	1.65
BCJ060	2.6810	882.0	01Jan1950, 13:35	1.50
BCJ080	1.2930	657.2	01Jan1950, 12:45	1.37

Project: Veramendi
Simulation Run: Veramendi 5C Post-Proj 50% AC
Basin Model: Veramendi 5C-Post Project
Meteorologic Model: 2-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
BCJ100	4.2300	1297.0	01Jan1950, 13:35	1.45
BCJ110	6.8790	1885.7	01Jan1950, 13:25	1.24
BCJ130	5.7720	1728.0	01Jan1950, 13:10	1.22
BCJ175	12.3280	622.9	01Jan1950, 12:30	0.22
BCJ180	13.1890	733.4	01Jan1950, 13:15	0.29
BCJ190	14.3760	1699.6	01Jan1950, 12:35	0.42
BCJ200	14.5760	1714.5	01Jan1950, 12:45	0.43
BCJ210	14.9490	1845.9	01Jan1950, 12:45	0.46
BCJ220	15.0970	1889.3	01Jan1950, 12:45	0.46
BCJ240	15.8240	1927.6	01Jan1950, 13:05	0.50
BCJ245	15.2490	1752.1	01Jan1950, 13:05	0.46
BC Outflow	15.8240	1927.6	01Jan1950, 13:05	0.50
BCR040	1.0880	991.6	01Jan1950, 12:35	1.71
BCR050	1.7960	1481.8	01Jan1950, 12:45	1.72
BCR060	2.1660	827.5	01Jan1950, 13:35	1.60
BCR080	0.8150	484.6	01Jan1950, 12:50	1.38
BCR100	1.2930	647.1	01Jan1950, 13:00	1.36
BCR130	2.2390	757.8	01Jan1950, 13:30	1.18
BCR150	5.7720	1714.1	01Jan1950, 13:30	1.21
BCR175	11.5090	94.2	02Jan1950, 00:00	0.12
BCR180	12.3280	525.4	01Jan1950, 13:15	0.20
BCR200	14.3760	1659.8	01Jan1950, 12:45	0.42
BCR220	14.9490	1856.4	01Jan1950, 12:45	0.45
BCR240	0.3700	404.7	01Jan1950, 12:30	1.73
BCR245	15.0970	1723.0	01Jan1950, 13:10	0.45
CR010	0.3129	320.8	01Jan1950, 12:15	1.49
CR020	0.6356	620.6	01Jan1950, 12:25	1.69
CR030	0.1764	184.6	01Jan1950, 12:15	1.52
CR040	0.5238	399.6	01Jan1950, 12:25	1.40
CR050	0.6141	488.3	01Jan1950, 12:35	1.76
CR060	0.1031	92.9	01Jan1950, 12:15	1.18
CRJ010	16.7725	1959.5	01Jan1950, 13:25	0.56
CRJ050	17.5630	932.1	01Jan1950, 12:40	0.43

Project: Veramendi
Simulation Run: Veramendi 5C Post-Proj 50% AC
Basin Model: Veramendi 5C-Post Project
Meteorologic Model: 2-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
CRJ060	18.1899	1526.7	01Jan1950, 14:45	0.62
CRR010	15.8240	1833.4	01Jan1950, 13:25	0.49
CRR030	16.7725	1922.3	01Jan1950, 13:35	0.55
CRR040	0.0000	852.5	01Jan1950, 14:45	
CRR050	16.9489	687.6	01Jan1950, 13:50	0.38
CRR060	17.5630	917.4	01Jan1950, 12:50	0.43
Landa Park	16.9489	712.4	01Jan1950, 13:35	0.38
SCS Dam 3 in	11.5090	3185.4	01Jan1950, 13:35	1.32
SCS Dam 3 out	11.5090	94.2	02Jan1950, 00:00	0.13

APPENDIX D

Hydrologic Reports for Post-Project with Proposed Dam A

Project: Veramendi
Simulation Run: 1% Veramendi 5C & Dam A
Basin Model: Veramendi 5C & Dam A rise
Meteorologic Model: 100-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
BC010	0.2740	996.1	01Jan1950, 12:20	8.46
BC020	0.8500	2880.9	01Jan1950, 12:25	9.19
BC030	0.2380	840.5	01Jan1950, 12:25	9.21
BC040	0.4340	1546.3	01Jan1950, 12:25	9.65
BC050	0.3700	1260.4	01Jan1950, 12:20	8.43
BC060	0.5150	1537.3	01Jan1950, 12:25	8.02
BC070	0.8150	2189.8	01Jan1950, 12:35	8.58
BC080	0.2960	982.4	01Jan1950, 12:20	8.16
BC090	0.1820	674.7	01Jan1950, 12:20	9.05
BC100	0.2560	842.2	01Jan1950, 12:25	8.32
BC110	0.1760	557.6	01Jan1950, 12:20	7.74
BC120	2.2390	4028.1	01Jan1950, 13:00	8.11
BC130	0.7530	2142.0	01Jan1950, 12:30	8.37
BC140	2.2070	4418.1	01Jan1950, 12:50	8.15
BC145	0.5730	2201.0	01Jan1950, 12:20	8.59
BC150	0.9310	2806.6	01Jan1950, 12:30	8.82
BC160	0.4000	1646.1	01Jan1950, 12:15	8.47
BC170	0.6270	1879.8	01Jan1950, 12:30	8.98
BC175	0.1920	693.7	01Jan1950, 12:20	8.72
BC180	0.8610	2595.5	01Jan1950, 12:30	8.82
BC190	1.0410	3114.2	01Jan1950, 12:30	9.58
BC190 DS of Pond	0.1460	426.4	01Jan1950, 12:30	9.21
BC200	0.2000	798.4	01Jan1950, 12:15	8.15
BC210	0.3730	1610.9	01Jan1950, 12:15	9.06
BC220	0.1480	758.7	01Jan1950, 12:10	8.71
BC230	0.3700	1491.9	01Jan1950, 12:20	9.24
BC240	0.2050	794.9	01Jan1950, 12:20	8.92
BC245	0.1520	517.1	01Jan1950, 12:20	8.42
BCJ020	1.0880	3721.4	01Jan1950, 12:25	9.19
BCJ040	1.3620	4480.1	01Jan1950, 12:30	9.03
BCJ041	1.7960	5989.1	01Jan1950, 12:25	9.18
BCJ050	2.1660	6822.5	01Jan1950, 12:35	9.02
BCJ060	2.6810	7278.7	01Jan1950, 12:50	8.53

Project: Veramendi
Simulation Run: 1% Veramendi 5C & Dam A
Basin Model: Veramendi 5C & Dam A-rise
Meteorologic Model: 100-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
BCJ080	1.2930	3135.3	01Jan1950, 12:35	8.53
BCJ100	4.2300	10745.1	01Jan1950, 12:50	8.51
BCJ110	6.8790	10783.0	01Jan1950, 13:05	8.21
BCJ130	5.7720	9622.5	01Jan1950, 12:55	8.19
BCJ175	12.3280	3052.6	01Jan1950, 16:20	2.85
BCJ180	13.1890	4165.2	01Jan1950, 12:45	3.13
BCJ190	14.3760	5425.4	01Jan1950, 12:45	3.62
BCJ190-A	1.1870	1264.0	01Jan1950, 12:40	9.02
BCJ200	14.5760	5517.7	01Jan1950, 12:55	3.63
BCJ210	14.9490	5863.5	01Jan1950, 12:55	3.76
BCJ220	15.0970	5946.5	01Jan1950, 13:00	3.79
BCJ240	15.8240	6408.8	01Jan1950, 12:35	3.96
BCJ245	15.2490	5906.3	01Jan1950, 13:15	3.77
BC Outflow	15.8240	6408.8	01Jan1950, 12:35	3.96
BCR040	1.0880	3689.0	01Jan1950, 12:30	9.17
BCR050	1.7960	5889.8	01Jan1950, 12:35	9.15
BCR060	2.1660	6421.9	01Jan1950, 12:50	8.65
BCR080	0.8150	2163.8	01Jan1950, 12:45	8.54
BCR100	1.2930	3105.8	01Jan1950, 12:45	8.49
BCR130	2.2390	4012.1	01Jan1950, 13:15	8.06
BCR150	5.7720	9563.6	01Jan1950, 13:15	8.12
BCR175	11.5090	2895.4	01Jan1950, 16:20	2.41
BCR180	12.3280	3048.2	01Jan1950, 16:45	2.73
BCR200	14.3760	5341.2	01Jan1950, 12:55	3.56
BCR220	14.9490	5847.8	01Jan1950, 13:00	3.75
BCR240	0.3700	1486.3	01Jan1950, 12:25	9.21
BCR245	15.0970	5795.2	01Jan1950, 13:15	3.72
CR010	0.3129	1325.9	01Jan1950, 12:15	8.81
CR020	0.6356	2300.7	01Jan1950, 12:20	9.16
CR030	0.1764	750.6	01Jan1950, 12:15	8.87
CR040	0.5238	1736.8	01Jan1950, 12:25	8.62
CR050	0.6141	1766.9	01Jan1950, 12:35	9.26
CR060	0.1031	448.3	01Jan1950, 12:15	8.19

Project: Veramendi
Simulation Run: 1% Veramendi 5C & Dam A
Basin Model: Veramendi 5C & Dam A rise
Meteorologic Model: 100-yea
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
CRJ010	16.7725	7693.2	01Jan1950, 12:45	4.16
CRJ050	17.5630	3028.0	01Jan1950, 12:35	1.47
CRJ060	18.1899	7743.5	01Jan1950, 14:05	4.33
CRR010	15.8240	6400.5	01Jan1950, 13:15	3.87
CRR030	16.7725	7602.0	01Jan1950, 12:55	4.12
CRR040	0.0000	6000.8	01Jan1950, 14:15	
CRR050	16.9489	1347.9	01Jan1950, 13:00	1.19
CRR060	17.5630	2980.6	01Jan1950, 12:45	1.46
Landa Park	16.9489	1349.8	01Jan1950, 12:55	1.20
Proposed Dam	1.0410	975.9	01Jan1950, 13:25	9.00
SCS Dam 3 in	11.5090	21792.3	01Jan1950, 12:50	8.33
SCS Dam 3 out	11.5090	2899.3	01Jan1950, 16:05	2.51

Project: Veramendi
Simulation Run: 4% Veramendi 5C & Dam A
Basin Model: Veramendi 5C & Dam A rise
Meteorologic Model: 25-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
BC120	2.2390	2913.0	01Jan1950, 13:05	5.37
BCR130	2.2390	2895.0	01Jan1950, 13:15	5.34
BC130	0.7530	1595.5	01Jan1950, 12:30	5.58
BC140	2.2070	3218.0	01Jan1950, 12:55	5.40
BC145	0.5730	1674.6	01Jan1950, 12:20	5.77
BCJ130	5.7720	6876.5	01Jan1950, 12:55	5.44
BCR150	5.7720	6836.3	01Jan1950, 13:15	5.40
BC110	0.1760	403.5	01Jan1950, 12:20	5.02
BC150	0.9310	2136.3	01Jan1950, 12:30	5.98
BCJ110	6.8790	7656.0	01Jan1950, 13:05	5.47
BC160	0.4000	1242.5	01Jan1950, 12:15	5.67
BC020	0.8500	2232.9	01Jan1950, 12:25	6.32
BC030	0.2380	653.5	01Jan1950, 12:25	6.34
BCJ020	1.0880	2886.3	01Jan1950, 12:25	6.32
BCR040	1.0880	2836.9	01Jan1950, 12:30	6.31
BC010	0.2740	750.8	01Jan1950, 12:20	5.66
BCJ040	1.3620	3434.1	01Jan1950, 12:30	6.18
BC040	0.4340	1220.4	01Jan1950, 12:25	6.75
BCJ041	1.7960	4584.1	01Jan1950, 12:25	6.32
BCR050	1.7960	4477.5	01Jan1950, 12:35	6.29
BC050	0.3700	944.8	01Jan1950, 12:20	5.63
BCJ050	2.1660	5177.5	01Jan1950, 12:35	6.18
BCR060	2.1660	4879.5	01Jan1950, 12:50	5.94
BC060	0.5150	1127.9	01Jan1950, 12:25	5.27
BCJ060	2.6810	5501.3	01Jan1950, 12:50	5.81
BC070	0.8150	1643.4	01Jan1950, 12:35	5.77
BCR080	0.8150	1624.0	01Jan1950, 12:45	5.75
BC080	0.2960	726.9	01Jan1950, 12:20	5.40
BC090	0.1820	520.9	01Jan1950, 12:20	6.19
BCJ080	1.2930	2302.9	01Jan1950, 12:35	5.73
BCR100	1.2930	2283.9	01Jan1950, 12:50	5.70
BC100	0.2560	630.5	01Jan1950, 12:25	5.54
BCJ100	4.2300	8066.9	01Jan1950, 12:50	5.76

Project: Veramendi
Simulation Run: 4% Veramendi 5C & Dam A
Basin Model: Veramendi 5C & Dam A rise
Meteorologic Model: 25-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
SCS Dam 3 in	11.5090	15869.1	01Jan1950, 12:50	5.58
SCS Dam 3 out	11.5090	126.3	02Jan1950, 00:00	0.20
BCR175	11.5090	125.8	02Jan1950, 00:00	0.18
BC170	0.6270	1439.4	01Jan1950, 12:30	6.13
BC175	0.1920	528.1	01Jan1950, 12:20	5.89
BCJ175	12.3280	1933.0	01Jan1950, 12:25	0.57
BCR180	12.3280	1820.0	01Jan1950, 12:55	0.55
BC180	0.8610	1975.7	01Jan1950, 12:30	5.98
BCJ180	13.1890	2952.5	01Jan1950, 12:50	0.90
BC190	1.0410	2435.9	01Jan1950, 12:30	6.69
Proposed Dam	1.0410	843.4	01Jan1950, 13:15	6.20
BC190 DS of Pond	0.1460	328.7	01Jan1950, 12:30	6.34
BCJ190-A	1.1870	1051.9	01Jan1950, 12:45	6.22
BCJ190	14.3760	3994.1	01Jan1950, 12:50	1.34
BCR200	14.3760	3950.6	01Jan1950, 13:00	1.32
BC200	0.2000	593.5	01Jan1950, 12:15	5.38
BCJ200	14.5760	4059.6	01Jan1950, 13:00	1.38
BC210	0.3730	1247.8	01Jan1950, 12:15	6.20
BCJ210	14.9490	4278.2	01Jan1950, 13:00	1.50
BCR220	14.9490	4263.5	01Jan1950, 13:05	1.49
BC220	0.1480	579.1	01Jan1950, 12:10	5.87
BCJ220	15.0970	4330.9	01Jan1950, 13:00	1.54
BCR245	15.0970	4215.9	01Jan1950, 13:20	1.51
BC245	0.1520	387.4	01Jan1950, 12:20	5.62
BCJ245	15.2490	4285.5	01Jan1950, 13:20	1.55
BC230	0.3700	1165.5	01Jan1950, 12:20	6.36
BCR240	0.3700	1150.3	01Jan1950, 12:25	6.34
BC240	0.2050	612.5	01Jan1950, 12:20	6.07
BCJ240	15.8240	4626.1	01Jan1950, 12:35	1.72
BC Outflow	15.8240	4626.1	01Jan1950, 12:35	1.72
CRR010	15.8240	4568.2	01Jan1950, 13:30	1.69
CR020	0.6356	1781.7	01Jan1950, 12:20	6.29
CR010	0.3129	1016.4	01Jan1950, 12:15	5.97

Project: Veramendi
Simulation Run: 4% Veramendi 5C & Dam A
Basin Model: Veramendi 5C & Dam A rise
Meteorologic Model: 25-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
CRJ010	16.7725	5461.6	01Jan1950, 12:50	1.94
CRR030	16.7725	5384.5	01Jan1950, 12:55	1.93
CR030	0.1764	576.4	01Jan1950, 12:15	6.02
Landa Park	16.9489	1171.1	01Jan1950, 12:55	0.81
CRR050	16.9489	1168.7	01Jan1950, 13:00	0.80
CR050	0.6141	1365.9	01Jan1950, 12:35	6.39
CRJ050	17.5630	2284.5	01Jan1950, 12:35	1.00
CRR060	17.5630	2253.7	01Jan1950, 12:50	0.99
CR040	0.5238	1312.1	01Jan1950, 12:25	5.80
CR060	0.1031	336.3	01Jan1950, 12:15	5.41
CRR040	0.0000	4013.3	01Jan1950, 14:05	
CRJ060	18.1899	5500.7	01Jan1950, 13:55	2.22

Project: Veramendi
Simulation Run: 10% Veramendi 5C & Dam A
Basin Model: Veramendi 5C & Dam A rise
Meteorologic Model: 10-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
BC010	0.2740	570.7	01Jan1950, 12:20	4.06
BC020	0.8500	1751.5	01Jan1950, 12:25	4.67
BC030	0.2380	514.0	01Jan1950, 12:25	4.68
BC040	0.4340	975.9	01Jan1950, 12:25	5.07
BC050	0.3700	714.7	01Jan1950, 12:20	4.04
BC060	0.5150	836.6	01Jan1950, 12:25	3.72
BC070	0.8150	1253.7	01Jan1950, 12:35	4.17
BC080	0.2960	543.2	01Jan1950, 12:25	3.83
BC090	0.1820	406.1	01Jan1950, 12:20	4.54
BC100	0.2560	476.8	01Jan1950, 12:25	3.95
BC110	0.1760	296.4	01Jan1950, 12:25	3.51
BC120	2.2390	2168.6	01Jan1950, 13:05	3.82
BC130	0.7530	1204.7	01Jan1950, 12:30	4.00
BC140	2.2070	2402.5	01Jan1950, 12:55	3.85
BC145	0.5730	1284.2	01Jan1950, 12:20	4.16
BC150	0.9310	1648.9	01Jan1950, 12:30	4.36
BC160	0.4000	944.5	01Jan1950, 12:15	4.07
BC170	0.6270	1118.0	01Jan1950, 12:30	4.50
BC175	0.1920	405.7	01Jan1950, 12:20	4.27
BC180	0.8610	1524.9	01Jan1950, 12:30	4.36
BC190	1.0410	1937.1	01Jan1950, 12:30	5.01
BC190 DS of Pond	0.1460	257.4	01Jan1950, 12:30	4.69
BC200	0.2000	444.2	01Jan1950, 12:15	3.82
BC210	0.3730	974.3	01Jan1950, 12:15	4.55
BC220	0.1480	445.5	01Jan1950, 12:10	4.25
BC230	0.3700	918.9	01Jan1950, 12:20	4.70
BC240	0.2050	476.1	01Jan1950, 12:20	4.44
BC245	0.1520	292.9	01Jan1950, 12:20	4.03
BCJ020	1.0880	2265.4	01Jan1950, 12:25	4.67
BCJ040	1.3620	2690.9	01Jan1950, 12:30	4.54
BCJ041	1.7960	3603.4	01Jan1950, 12:30	4.66
BCJ050	2.1660	3946.4	01Jan1950, 12:35	4.55
BCJ060	2.6810	4179.2	01Jan1950, 12:50	4.25

Project: Veramendi
Simulation Run: 10% Veramendi 5C & Dam A
Basin Model: Veramendi 5C & Dam A rise
Meteorologic Model: 10-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
BCJ080	1.2930	1738.6	01Jan1950, 12:40	4.13
BCJ100	4.2300	6113.4	01Jan1950, 12:50	4.19
BCJ110	6.8790	5624.0	01Jan1950, 13:10	3.91
BCJ130	5.7720	5073.8	01Jan1950, 13:00	3.88
BCJ175	12.3280	1467.0	01Jan1950, 12:25	0.44
BCJ180	13.1890	2163.3	01Jan1950, 12:55	0.68
BCJ190	14.3760	3031.2	01Jan1950, 12:55	1.00
BCJ190-A	1.1870	877.0	01Jan1950, 12:45	4.59
BCJ200	14.5760	3063.9	01Jan1950, 13:05	1.03
BCJ210	14.9490	3213.5	01Jan1950, 13:05	1.12
BCJ220	15.0970	3250.3	01Jan1950, 13:10	1.14
BCJ240	15.8240	3406.8	01Jan1950, 13:20	1.27
BCJ245	15.2490	3193.6	01Jan1950, 13:25	1.15
BC Outflow	15.8240	3406.8	01Jan1950, 13:20	1.27
BCR040	1.0880	2232.6	01Jan1950, 12:30	4.66
BCR050	1.7960	3494.2	01Jan1950, 12:40	4.65
BCR060	2.1660	3761.5	01Jan1950, 12:55	4.37
BCR080	0.8150	1234.7	01Jan1950, 12:45	4.15
BCR100	1.2930	1719.2	01Jan1950, 12:50	4.11
BCR130	2.2390	2153.3	01Jan1950, 13:20	3.80
BCR150	5.7720	5031.4	01Jan1950, 13:20	3.85
BCR175	11.5090	116.7	02Jan1950, 00:00	0.16
BCR180	12.3280	1370.0	01Jan1950, 13:00	0.42
BCR200	14.3760	2991.1	01Jan1950, 13:05	0.99
BCR220	14.9490	3206.7	01Jan1950, 13:10	1.11
BCR240	0.3700	898.1	01Jan1950, 12:25	4.69
BCR245	15.0970	3145.9	01Jan1950, 13:25	1.12
CR010	0.3129	784.9	01Jan1950, 12:15	4.34
CR020	0.6356	1394.1	01Jan1950, 12:20	4.64
CR030	0.1764	446.4	01Jan1950, 12:15	4.39
CR040	0.5238	1007.8	01Jan1950, 12:25	4.19
CR050	0.6141	1074.3	01Jan1950, 12:35	4.73
CR060	0.1031	253.8	01Jan1950, 12:15	3.84

Project: Veramendi
Simulation Run: 10% Veramendi 5C & Dam A
Basin Model: Veramendi 5C & Dam A·rise
Meteorologic Model: 10-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
CRJ010	16.7725	3825.5	01Jan1950, 12:55	1.43
CRJ050	17.5630	1824.2	01Jan1950, 12:35	0.82
CRJ060	18.1899	4128.2	01Jan1950, 13:45	1.64
CRR010	15.8240	3365.5	01Jan1950, 13:35	1.25
CRR030	16.7725	3792.0	01Jan1950, 13:05	1.42
CRR040	0.0000	2801.9	01Jan1950, 13:55	
CRR050	16.9489	962.9	01Jan1950, 13:20	0.68
CRR060	17.5630	1791.3	01Jan1950, 12:45	0.81
Landa Park	16.9489	974.6	01Jan1950, 13:05	0.68
Proposed Dam	1.0410	726.2	01Jan1950, 13:15	4.58
SCS Dam 3 in	11.5090	11840.9	01Jan1950, 12:50	4.02
SCS Dam 3 out	11.5090	117.1	02Jan1950, 00:00	0.18

Project: Veramendi
Simulation Run: 50% Veramendi 5C & Dam A
Basin Model: Veramendi 5C & Dam A rise
Meteorologic Model: 2-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
BC010	0.2740	216.9	01Jan1950, 12:20	1.32
BC020	0.8500	780.5	01Jan1950, 12:25	1.71
BC030	0.2380	232.2	01Jan1950, 12:25	1.72
BC040	0.4340	479.0	01Jan1950, 12:25	2.00
BC050	0.3700	274.8	01Jan1950, 12:25	1.30
BC060	0.5150	290.2	01Jan1950, 12:30	1.12
BC070	0.8150	490.6	01Jan1950, 12:35	1.39
BC080	0.2960	196.8	01Jan1950, 12:25	1.18
BC090	0.1820	174.7	01Jan1950, 12:20	1.63
BC100	0.2560	177.8	01Jan1950, 12:25	1.25
BC110	0.1760	96.2	01Jan1950, 12:25	1.00
BC120	2.2390	764.2	01Jan1950, 13:05	1.19
BC130	0.7530	449.9	01Jan1950, 12:35	1.28
BC140	2.2070	854.5	01Jan1950, 12:55	1.20
BC145	0.5730	510.8	01Jan1950, 12:20	1.38
BC150	0.9310	681.3	01Jan1950, 12:30	1.51
BC160	0.4000	356.9	01Jan1950, 12:15	1.32
BC170	0.6270	476.4	01Jan1950, 12:30	1.60
BC175	0.1920	162.7	01Jan1950, 12:25	1.45
BC180	0.8610	630.1	01Jan1950, 12:30	1.51
BC190	1.0410	938.1	01Jan1950, 12:35	1.97
BC190 DS of Pond	0.1460	116.3	01Jan1950, 12:35	1.73
BC200	0.2000	155.3	01Jan1950, 12:20	1.17
BC210	0.3730	420.2	01Jan1950, 12:15	1.63
BC220	0.1480	177.2	01Jan1950, 12:10	1.43
BC230	0.3700	418.4	01Jan1950, 12:20	1.73
BC240	0.2050	202.1	01Jan1950, 12:20	1.55
BC245	0.1520	112.3	01Jan1950, 12:25	1.30
BCJ020	1.0880	1012.8	01Jan1950, 12:25	1.72
BCJ040	1.3620	1146.0	01Jan1950, 12:35	1.63
BCJ041	1.7960	1546.7	01Jan1950, 12:35	1.72
BCJ050	2.1660	1634.6	01Jan1950, 12:45	1.65
BCJ060	2.6810	882.0	01Jan1950, 13:35	1.50

Project: Veramendi
Simulation Run: 50% Veramendi 5C & Dam A
Basin Model: Veramendi 5C & Dam A rise
Meteorologic Model: 2-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
BCJ080	1.2930	657.2	01Jan1950, 12:45	1.37
BCJ100	4.2300	1297.0	01Jan1950, 13:35	1.45
BCJ110	6.8790	1885.7	01Jan1950, 13:25	1.24
BCJ130	5.7720	1728.0	01Jan1950, 13:10	1.22
BCJ175	12.3280	622.9	01Jan1950, 12:30	0.22
BCJ180	13.1890	733.4	01Jan1950, 13:15	0.29
BCJ190	14.3760	1052.2	01Jan1950, 13:15	0.40
BCJ190-A	1.1870	326.0	01Jan1950, 13:00	1.68
BCJ200	14.5760	1029.2	01Jan1950, 13:30	0.40
BCJ210	14.9490	1067.6	01Jan1950, 13:30	0.43
BCJ220	15.0970	1080.2	01Jan1950, 13:35	0.44
BCJ240	15.8240	1084.4	01Jan1950, 13:50	0.48
BCJ245	15.2490	1028.3	01Jan1950, 13:50	0.44
BC Outflow	15.8240	1084.4	01Jan1950, 13:50	0.48
BCR040	1.0880	991.6	01Jan1950, 12:35	1.71
BCR050	1.7960	1481.8	01Jan1950, 12:45	1.72
BCR060	2.1660	827.5	01Jan1950, 13:35	1.60
BCR080	0.8150	484.6	01Jan1950, 12:50	1.38
BCR100	1.2930	647.1	01Jan1950, 13:00	1.36
BCR130	2.2390	757.8	01Jan1950, 13:30	1.18
BCR150	5.7720	1714.1	01Jan1950, 13:30	1.21
BCR175	11.5090	94.2	02Jan1950, 00:00	0.12
BCR180	12.3280	525.4	01Jan1950, 13:15	0.20
BCR200	14.3760	1012.4	01Jan1950, 13:30	0.39
BCR220	14.9490	1068.3	01Jan1950, 13:35	0.43
BCR240	0.3700	404.7	01Jan1950, 12:30	1.73
BCR245	15.0970	1016.7	01Jan1950, 13:50	0.43
CR010	0.3129	320.8	01Jan1950, 12:15	1.49
CR020	0.6356	620.6	01Jan1950, 12:25	1.69
CR030	0.1764	184.6	01Jan1950, 12:15	1.52
CR040	0.5238	399.6	01Jan1950, 12:25	1.40
CR050	0.6141	488.3	01Jan1950, 12:35	1.76
CR060	0.1031	92.9	01Jan1950, 12:15	1.18

Project: Veramendi
Simulation Run: 50% Veramendi 5C & Dam A
Basin Model: Veramendi 5C & Dam A rise
Meteorologic Model: 2-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
CRJ010	16.7725	1143.8	01Jan1950, 13:40	0.54
CRJ050	17.5630	931.1	01Jan1950, 12:40	0.44
CRJ060	18.1899	1163.9	01Jan1950, 12:45	0.60
CRR010	15.8240	1064.7	01Jan1950, 14:10	0.47
CRR030	16.7725	1131.2	01Jan1950, 14:00	0.53
CRR040	0.0000	503.1	01Jan1950, 15:55	
CRR050	16.9489	575.8	01Jan1950, 14:20	0.40
CRR060	17.5630	916.5	01Jan1950, 12:50	0.44
Landa Park	16.9489	577.0	01Jan1950, 14:00	0.40
Proposed Dam	1.0410	276.3	01Jan1950, 13:25	1.67
SCS Dam 3 in	11.5090	3185.4	01Jan1950, 13:35	1.32
SCS Dam 3 out	11.5090	94.2	02Jan1950, 00:00	0.13

APPENDIX E

Hydrologic Reports for Post-Project with Proposed Dam B

Project: Veramendi
Simulation Run: 1% Veramendi 5C & Dam B
Basin Model: Veramendi 5C & Dam B
Meteorologic Model: 100-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
BC010	0.2740	996.1	01Jan1950, 12:20	8.46
BC020	0.8500	2880.9	01Jan1950, 12:25	9.19
BC030	0.2380	840.5	01Jan1950, 12:25	9.21
BC040	0.4340	1546.3	01Jan1950, 12:25	9.65
BC050	0.3700	1260.4	01Jan1950, 12:20	8.43
BC060	0.5150	1537.3	01Jan1950, 12:25	8.02
BC070	0.8150	2189.8	01Jan1950, 12:35	8.58
BC080	0.2960	982.4	01Jan1950, 12:20	8.16
BC090	0.1820	674.7	01Jan1950, 12:20	9.05
BC100	0.2560	842.2	01Jan1950, 12:25	8.32
BC110	0.1760	557.6	01Jan1950, 12:20	7.74
BC120	2.2390	4028.1	01Jan1950, 13:00	8.11
BC130	0.7530	2142.0	01Jan1950, 12:30	8.37
BC140	2.2070	4418.1	01Jan1950, 12:50	8.15
BC145	0.5730	2201.0	01Jan1950, 12:20	8.59
BC150	0.9310	2806.6	01Jan1950, 12:30	8.82
BC160	0.4000	1646.1	01Jan1950, 12:15	8.47
BC170	0.6270	1879.8	01Jan1950, 12:30	8.98
BC175	0.1920	693.7	01Jan1950, 12:20	8.72
BC180	0.8610	2595.5	01Jan1950, 12:30	8.82
BC190	1.0410	3114.2	01Jan1950, 12:30	9.58
BC190 DS of Pond	0.1460	426.4	01Jan1950, 12:30	9.21
BC200	0.2000	798.4	01Jan1950, 12:15	8.15
BC210	0.3730	1610.9	01Jan1950, 12:15	9.06
BC220	0.1480	758.7	01Jan1950, 12:10	8.71
BC230	0.3700	1491.9	01Jan1950, 12:20	9.24
BC240	0.2050	794.9	01Jan1950, 12:20	8.92
BC245	0.1520	517.1	01Jan1950, 12:20	8.42
BCJ020	1.0880	3721.4	01Jan1950, 12:25	9.19
BCJ040	1.3620	4480.1	01Jan1950, 12:30	9.03
BCJ041	1.7960	5989.1	01Jan1950, 12:25	9.18
BCJ050	2.1660	6822.5	01Jan1950, 12:35	9.02
BCJ060	2.6810	7278.7	01Jan1950, 12:50	8.53

Project: Veramendi
Simulation Run: 1% Veramendi 5C & Dam B
Basin Model: Veramendi 5C & Dam B
Meteorologic Model: 100-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
BCJ080	1.2930	3135.3	01Jan1950, 12:35	8.53
BCJ100	4.2300	10745.1	01Jan1950, 12:50	8.51
BCJ110	6.8790	10783.0	01Jan1950, 13:05	8.21
BCJ130	5.7720	9622.5	01Jan1950, 12:55	8.19
BCJ175	12.3280	3052.6	01Jan1950, 16:20	2.85
BCJ180	13.1890	4165.2	01Jan1950, 12:45	3.13
BCJ190	14.3760	4539.7	01Jan1950, 12:45	2.99
BCJ190-A	1.1870	436.4	01Jan1950, 12:30	1.38
BCJ200	14.5760	4636.5	01Jan1950, 12:55	3.01
BCJ210	14.9490	4982.3	01Jan1950, 12:55	3.16
BCJ220	15.0970	5073.0	01Jan1950, 12:55	3.20
BCJ240	15.8240	6005.4	01Jan1950, 12:35	3.39
BCJ245	15.2490	5108.0	01Jan1950, 13:10	3.18
BC Outflow	15.8240	6005.4	01Jan1950, 12:35	3.39
BCR040	1.0880	3689.0	01Jan1950, 12:30	9.17
BCR050	1.7960	5889.8	01Jan1950, 12:35	9.15
BCR060	2.1660	6421.9	01Jan1950, 12:50	8.65
BCR080	0.8150	2163.8	01Jan1950, 12:45	8.54
BCR100	1.2930	3105.8	01Jan1950, 12:45	8.49
BCR130	2.2390	4012.1	01Jan1950, 13:15	8.06
BCR150	5.7720	9563.6	01Jan1950, 13:15	8.12
BCR175	11.5090	2895.4	01Jan1950, 16:20	2.41
BCR180	12.3280	3048.2	01Jan1950, 16:45	2.73
BCR200	14.3760	4460.0	01Jan1950, 12:55	2.94
BCR220	14.9490	4965.7	01Jan1950, 12:55	3.14
BCR240	0.3700	1486.3	01Jan1950, 12:25	9.21
BCR245	15.0970	4983.7	01Jan1950, 13:10	3.13
CR010	0.3129	1325.9	01Jan1950, 12:15	8.81
CR020	0.6356	2300.7	01Jan1950, 12:20	9.16
CR030	0.1764	750.6	01Jan1950, 12:15	8.87
CR040	0.5238	1736.8	01Jan1950, 12:25	8.62
CR050	0.6141	1766.9	01Jan1950, 12:35	9.26
CR060	0.1031	448.3	01Jan1950, 12:15	8.19

Project: Veramendi
Simulation Run: 1% Veramendi 5C & Dam B
Basin Model: Veramendi 5C & Dam B
Meteorologic Model: 100-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
CRJ010	16.7725	7346.1	01Jan1950, 12:45	3.63
CRJ050	17.5630	3004.8	01Jan1950, 12:35	1.40
CRJ060	18.1899	7283.3	01Jan1950, 14:00	3.85
CRR010	15.8240	5932.3	01Jan1950, 12:50	3.31
CRR030	16.7725	7211.6	01Jan1950, 12:55	3.59
CRR040	0.0000	5551.0	01Jan1950, 14:05	
CRR050	16.9489	1317.5	01Jan1950, 12:55	1.12
CRR060	17.5630	2943.8	01Jan1950, 12:45	1.39
Landa Park	16.9489	1320.3	01Jan1950, 12:50	1.13
Proposed Dam	1.0410	11.9	02Jan1950, 00:00	0.28
SCS Dam 3 in	11.5090	21792.3	01Jan1950, 12:50	8.33
SCS Dam 3 out	11.5090	2899.3	01Jan1950, 16:05	2.51

Project: Veramendi
Simulation Run: 4% Veramendi 5C & Dam B
Basin Model: Veramendi 5C & Dam B
Meteorologic Model: 25-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
BC010	0.2740	750.8	01Jan1950, 12:20	5.66
BC020	0.8500	2232.9	01Jan1950, 12:25	6.32
BC030	0.2380	653.5	01Jan1950, 12:25	6.34
BC040	0.4340	1220.4	01Jan1950, 12:25	6.75
BC050	0.3700	944.8	01Jan1950, 12:20	5.63
BC060	0.5150	1127.9	01Jan1950, 12:25	5.27
BC070	0.8150	1643.4	01Jan1950, 12:35	5.77
BC080	0.2960	726.9	01Jan1950, 12:20	5.40
BC090	0.1820	520.9	01Jan1950, 12:20	6.19
BC100	0.2560	630.5	01Jan1950, 12:25	5.54
BC110	0.1760	403.5	01Jan1950, 12:20	5.02
BC120	2.2390	2913.0	01Jan1950, 13:05	5.37
BC130	0.7530	1595.5	01Jan1950, 12:30	5.58
BC140	2.2070	3218.0	01Jan1950, 12:55	5.40
BC145	0.5730	1674.6	01Jan1950, 12:20	5.77
BC150	0.9310	2136.3	01Jan1950, 12:30	5.98
BC160	0.4000	1242.5	01Jan1950, 12:15	5.67
BC170	0.6270	1439.4	01Jan1950, 12:30	6.13
BC175	0.1920	528.1	01Jan1950, 12:20	5.89
BC180	0.8610	1975.7	01Jan1950, 12:30	5.98
BC190	1.0410	2435.9	01Jan1950, 12:30	6.69
BC190 DS of Pond	0.1460	328.7	01Jan1950, 12:30	6.34
BC200	0.2000	593.5	01Jan1950, 12:15	5.38
BC210	0.3730	1247.8	01Jan1950, 12:15	6.20
BC220	0.1480	579.1	01Jan1950, 12:10	5.87
BC230	0.3700	1165.5	01Jan1950, 12:20	6.36
BC240	0.2050	612.5	01Jan1950, 12:20	6.07
BC245	0.1520	387.4	01Jan1950, 12:20	5.62
BCJ020	1.0880	2886.3	01Jan1950, 12:25	6.32
BCJ040	1.3620	3434.1	01Jan1950, 12:30	6.18
BCJ041	1.7960	4584.1	01Jan1950, 12:25	6.32
BCJ050	2.1660	5177.5	01Jan1950, 12:35	6.18
BCJ060	2.6810	5501.3	01Jan1950, 12:50	5.81

Project: Veramendi
Simulation Run: 4% Veramendi 5C & Dam B
Basin Model: Veramendi 5C & Dam B
Meteorologic Model: 25-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
BCJ080	1.2930	2302.9	01Jan1950, 12:35	5.73
BCJ100	4.2300	8066.9	01Jan1950, 12:50	5.76
BCJ110	6.8790	7656.0	01Jan1950, 13:05	5.47
BCJ130	5.7720	6876.5	01Jan1950, 12:55	5.44
BCJ175	12.3280	1933.0	01Jan1950, 12:25	0.57
BCJ180	13.1890	2952.5	01Jan1950, 12:50	0.90
BCJ190	14.3760	3206.3	01Jan1950, 12:50	0.91
BCJ190-A	1.1870	337.9	01Jan1950, 12:30	1.00
BCJ200	14.5760	3272.0	01Jan1950, 13:00	0.96
BCJ210	14.9490	3490.6	01Jan1950, 13:00	1.09
BCJ220	15.0970	3543.9	01Jan1950, 13:00	1.13
BCJ240	15.8240	4340.6	01Jan1950, 12:35	1.34
BCJ245	15.2490	3539.3	01Jan1950, 13:15	1.15
BC Outflow	15.8240	4340.6	01Jan1950, 12:35	1.34
BCR040	1.0880	2836.9	01Jan1950, 12:30	6.31
BCR050	1.7960	4477.5	01Jan1950, 12:35	6.29
BCR060	2.1660	4879.5	01Jan1950, 12:50	5.94
BCR080	0.8150	1624.0	01Jan1950, 12:45	5.75
BCR100	1.2930	2283.9	01Jan1950, 12:50	5.70
BCR130	2.2390	2895.0	01Jan1950, 13:15	5.34
BCR150	5.7720	6836.3	01Jan1950, 13:15	5.40
BCR175	11.5090	125.8	02Jan1950, 00:00	0.18
BCR180	12.3280	1820.0	01Jan1950, 12:55	0.55
BCR200	14.3760	3163.0	01Jan1950, 13:00	0.90
BCR220	14.9490	3480.6	01Jan1950, 13:05	1.08
BCR240	0.3700	1150.3	01Jan1950, 12:25	6.34
BCR245	15.0970	3461.3	01Jan1950, 13:15	1.11
CR010	0.3129	1016.4	01Jan1950, 12:15	5.97
CR020	0.6356	1781.7	01Jan1950, 12:20	6.29
CR030	0.1764	576.4	01Jan1950, 12:15	6.02
CR040	0.5238	1312.1	01Jan1950, 12:25	5.80
CR050	0.6141	1365.9	01Jan1950, 12:35	6.39
CR060	0.1031	336.3	01Jan1950, 12:15	5.41

Project: Veramendi
Simulation Run: 4% Veramendi 5C & Dam B
Basin Model: Veramendi 5C & Dam B
Meteorologic Model: 25-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
CRJ010	16.7725	5079.3	01Jan1950, 12:50	1.59
CRJ050	17.5630	2267.3	01Jan1950, 12:35	0.93
CRJ060	18.1899	5141.4	01Jan1950, 13:55	1.90
CRR010	15.8240	4217.4	01Jan1950, 12:55	1.31
CRR030	16.7725	5030.9	01Jan1950, 12:55	1.57
CRR040	0.0000	3685.6	01Jan1950, 14:00	
CRR050	16.9489	1130.3	01Jan1950, 13:00	0.73
CRR060	17.5630	2229.3	01Jan1950, 12:45	0.92
Landa Park	16.9489	1133.7	01Jan1950, 12:55	0.74
Proposed Dam	1.0410	11.1	02Jan1950, 00:00	0.25
SCS Dam 3 in	11.5090	15869.1	01Jan1950, 12:50	5.58
SCS Dam 3 out	11.5090	126.3	02Jan1950, 00:00	0.20

Project: Veramendi
Simulation Run: 10% Veramendi 5C & Dam B
Basin Model: Veramendi 5C & Dam B
Meteorologic Model: 10-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
BC010	0.2740	570.7	01Jan1950, 12:20	4.06
BC020	0.8500	1751.5	01Jan1950, 12:25	4.67
BC030	0.2380	514.0	01Jan1950, 12:25	4.68
BC040	0.4340	975.9	01Jan1950, 12:25	5.07
BC050	0.3700	714.7	01Jan1950, 12:20	4.04
BC060	0.5150	836.6	01Jan1950, 12:25	3.72
BC070	0.8150	1253.7	01Jan1950, 12:35	4.17
BC080	0.2960	543.2	01Jan1950, 12:25	3.83
BC090	0.1820	406.1	01Jan1950, 12:20	4.54
BC100	0.2560	476.8	01Jan1950, 12:25	3.95
BC110	0.1760	296.4	01Jan1950, 12:25	3.51
BC120	2.2390	2168.6	01Jan1950, 13:05	3.82
BC130	0.7530	1204.7	01Jan1950, 12:30	4.00
BC140	2.2070	2402.5	01Jan1950, 12:55	3.85
BC145	0.5730	1284.2	01Jan1950, 12:20	4.16
BC150	0.9310	1648.9	01Jan1950, 12:30	4.36
BC160	0.4000	944.5	01Jan1950, 12:15	4.07
BC170	0.6270	1118.0	01Jan1950, 12:30	4.50
BC175	0.1920	405.7	01Jan1950, 12:20	4.27
BC180	0.8610	1524.9	01Jan1950, 12:30	4.36
BC190	1.0410	1937.1	01Jan1950, 12:30	5.01
BC190 DS of Pond	0.1460	257.4	01Jan1950, 12:30	4.69
BC200	0.2000	444.2	01Jan1950, 12:15	3.82
BC210	0.3730	974.3	01Jan1950, 12:15	4.55
BC220	0.1480	445.5	01Jan1950, 12:10	4.25
BC230	0.3700	918.9	01Jan1950, 12:20	4.70
BC240	0.2050	476.1	01Jan1950, 12:20	4.44
BC245	0.1520	292.9	01Jan1950, 12:20	4.03
BCJ020	1.0880	2265.4	01Jan1950, 12:25	4.67
BCJ040	1.3620	2690.9	01Jan1950, 12:30	4.54
BCJ041	1.7960	3603.4	01Jan1950, 12:30	4.66
BCJ050	2.1660	3946.4	01Jan1950, 12:35	4.55
BCJ060	2.6810	4179.2	01Jan1950, 12:50	4.25

Project: Veramendi
Simulation Run: 10% Veramendi 5C & Dam B
Basin Model: Veramendi 5C & Dam B
Meteorologic Model: 10-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
BCJ080	1.2930	1738.6	01Jan1950, 12:40	4.13
BCJ100	4.2300	6113.4	01Jan1950, 12:50	4.19
BCJ110	6.8790	5624.0	01Jan1950, 13:10	3.91
BCJ130	5.7720	5073.8	01Jan1950, 13:00	3.88
BCJ175	12.3280	1467.0	01Jan1950, 12:25	0.44
BCJ180	13.1890	2163.3	01Jan1950, 12:55	0.68
BCJ190	14.3760	2338.0	01Jan1950, 12:55	0.69
BCJ190-A	1.1870	266.0	01Jan1950, 12:35	0.77
BCJ200	14.5760	2374.7	01Jan1950, 13:05	0.72
BCJ210	14.9490	2524.3	01Jan1950, 13:05	0.81
BCJ220	15.0970	2555.6	01Jan1950, 13:10	0.84
BCJ240	15.8240	3132.4	01Jan1950, 12:35	0.99
BCJ245	15.2490	2521.7	01Jan1950, 13:20	0.86
BC Outflow	15.8240	3132.4	01Jan1950, 12:35	0.99
BCR040	1.0880	2232.6	01Jan1950, 12:30	4.66
BCR050	1.7960	3494.2	01Jan1950, 12:40	4.65
BCR060	2.1660	3761.5	01Jan1950, 12:55	4.37
BCR080	0.8150	1234.7	01Jan1950, 12:45	4.15
BCR100	1.2930	1719.2	01Jan1950, 12:50	4.11
BCR130	2.2390	2153.3	01Jan1950, 13:20	3.80
BCR150	5.7720	5031.4	01Jan1950, 13:20	3.85
BCR175	11.5090	116.7	02Jan1950, 00:00	0.16
BCR180	12.3280	1370.0	01Jan1950, 13:00	0.42
BCR200	14.3760	2301.9	01Jan1950, 13:05	0.68
BCR220	14.9490	2512.1	01Jan1950, 13:10	0.81
BCR240	0.3700	898.1	01Jan1950, 12:25	4.69
BCR245	15.0970	2469.0	01Jan1950, 13:20	0.83
CR010	0.3129	784.9	01Jan1950, 12:15	4.34
CR020	0.6356	1394.1	01Jan1950, 12:20	4.64
CR030	0.1764	446.4	01Jan1950, 12:15	4.39
CR040	0.5238	1007.8	01Jan1950, 12:25	4.19
CR050	0.6141	1074.3	01Jan1950, 12:35	4.73
CR060	0.1031	253.8	01Jan1950, 12:15	3.84

Project: Veramendi
Simulation Run: 10% Veramendi 5C & Dam B
Basin Model: Veramendi 5C & Dam B
Meteorologic Model: 10-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
CRJ010	16.7725	3646.6	01Jan1950, 12:55	1.17
CRJ050	17.5630	1819.2	01Jan1950, 12:35	0.75
CRJ060	18.1899	3917.6	01Jan1950, 13:40	1.40
CRR010	15.8240	3051.1	01Jan1950, 13:00	0.97
CRR030	16.7725	3602.6	01Jan1950, 13:00	1.16
CRR040	0.0000	2587.6	01Jan1950, 13:45	
CRR050	16.9489	936.0	01Jan1950, 13:15	0.61
CRR060	17.5630	1785.9	01Jan1950, 12:45	0.75
Landa Park	16.9489	952.2	01Jan1950, 13:00	0.62
Proposed Dam	1.0410	10.5	02Jan1950, 00:00	0.23
SCS Dam 3 in	11.5090	11840.9	01Jan1950, 12:50	4.02
SCS Dam 3 out	11.5090	117.1	02Jan1950, 00:00	0.18

Project: Veramendi
Simulation Run:50% Veramendi 5C & Dam B
Basin Model: Veramendi 5C & Dam B
Meteorologic Model: 2-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
BC010	0.2740	216.9	01Jan1950, 12:20	1.32
BC020	0.8500	780.5	01Jan1950, 12:25	1.71
BC030	0.2380	232.2	01Jan1950, 12:25	1.72
BC040	0.4340	479.0	01Jan1950, 12:25	2.00
BC050	0.3700	274.8	01Jan1950, 12:25	1.30
BC060	0.5150	290.2	01Jan1950, 12:30	1.12
BC070	0.8150	490.6	01Jan1950, 12:35	1.39
BC080	0.2960	196.8	01Jan1950, 12:25	1.18
BC090	0.1820	174.7	01Jan1950, 12:20	1.63
BC100	0.2560	177.8	01Jan1950, 12:25	1.25
BC110	0.1760	96.2	01Jan1950, 12:25	1.00
BC120	2.2390	764.2	01Jan1950, 13:05	1.19
BC130	0.7530	449.9	01Jan1950, 12:35	1.28
BC140	2.2070	854.5	01Jan1950, 12:55	1.20
BC145	0.5730	510.8	01Jan1950, 12:20	1.38
BC150	0.9310	681.3	01Jan1950, 12:30	1.51
BC160	0.4000	356.9	01Jan1950, 12:15	1.32
BC170	0.6270	476.4	01Jan1950, 12:30	1.60
BC175	0.1920	162.7	01Jan1950, 12:25	1.45
BC180	0.8610	630.1	01Jan1950, 12:30	1.51
BC190	1.0410	938.1	01Jan1950, 12:35	1.97
BC190 DS of Pond	0.1460	116.3	01Jan1950, 12:35	1.73
BC200	0.2000	155.3	01Jan1950, 12:20	1.17
BC210	0.3730	420.2	01Jan1950, 12:15	1.63
BC220	0.1480	177.2	01Jan1950, 12:10	1.43
BC230	0.3700	418.4	01Jan1950, 12:20	1.73
BC240	0.2050	202.1	01Jan1950, 12:20	1.55
BC245	0.1520	112.3	01Jan1950, 12:25	1.30
BCJ020	1.0880	1012.8	01Jan1950, 12:25	1.72
BCJ040	1.3620	1146.0	01Jan1950, 12:35	1.63
BCJ041	1.7960	1546.7	01Jan1950, 12:35	1.72
BCJ050	2.1660	1634.6	01Jan1950, 12:45	1.65
BCJ060	2.6810	882.0	01Jan1950, 13:35	1.50

Project: Veramendi
Simulation Run:50% Veramendi 5C & Dam B
Basin Model: Veramendi 5C & Dam B
Meteorologic Model: 2-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
BCJ080	1.2930	657.2	01Jan1950, 12:45	1.37
BCJ100	4.2300	1297.0	01Jan1950, 13:35	1.45
BCJ110	6.8790	1885.7	01Jan1950, 13:25	1.24
BCJ130	5.7720	1728.0	01Jan1950, 13:10	1.22
BCJ175	12.3280	622.9	01Jan1950, 12:30	0.22
BCJ180	13.1890	733.4	01Jan1950, 13:15	0.29
BCJ190	14.3760	785.6	01Jan1950, 13:15	0.29
BCJ190-A	1.1870	123.1	01Jan1950, 12:35	0.35
BCJ200	14.5760	786.4	01Jan1950, 12:50	0.30
BCJ210	14.9490	892.6	01Jan1950, 12:50	0.33
BCJ220	15.0970	923.4	01Jan1950, 12:55	0.34
BCJ240	15.8240	970.8	01Jan1950, 13:10	0.39
BCJ245	15.2490	843.8	01Jan1950, 13:15	0.34
BC Outflow	15.8240	970.8	01Jan1950, 13:10	0.39
BCR040	1.0880	991.6	01Jan1950, 12:35	1.71
BCR050	1.7960	1481.8	01Jan1950, 12:45	1.72
BCR060	2.1660	827.5	01Jan1950, 13:35	1.60
BCR080	0.8150	484.6	01Jan1950, 12:50	1.38
BCR100	1.2930	647.1	01Jan1950, 13:00	1.36
BCR130	2.2390	757.8	01Jan1950, 13:30	1.18
BCR150	5.7720	1714.1	01Jan1950, 13:30	1.21
BCR175	11.5090	94.2	02Jan1950, 00:00	0.12
BCR180	12.3280	525.4	01Jan1950, 13:15	0.20
BCR200	14.3760	741.7	01Jan1950, 12:50	0.28
BCR220	14.9490	898.9	01Jan1950, 12:55	0.33
BCR240	0.3700	404.7	01Jan1950, 12:30	1.73
BCR245	15.0970	819.7	01Jan1950, 13:15	0.33
CR010	0.3129	320.8	01Jan1950, 12:15	1.49
CR020	0.6356	620.6	01Jan1950, 12:25	1.69
CR030	0.1764	184.6	01Jan1950, 12:15	1.52
CR040	0.5238	399.6	01Jan1950, 12:25	1.40
CR050	0.6141	488.3	01Jan1950, 12:35	1.76
CR060	0.1031	92.9	01Jan1950, 12:15	1.18

Project: Veramendi
Simulation Run: 50% Veramendi 5C & Dam B
Basin Model: Veramendi 5C & Dam B
Meteorologic Model: 2-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
CRJ010	16.7725	1033.5	01Jan1950, 13:35	0.45
CRJ050	17.5630	929.1	01Jan1950, 12:40	0.40
CRJ060	18.1899	1161.6	01Jan1950, 12:45	0.52
CRR010	15.8240	929.8	01Jan1950, 13:35	0.38
CRR030	16.7725	1003.7	01Jan1950, 13:50	0.44
CRR040	0.0000	370.9	01Jan1950, 15:40	
CRR050	16.9489	550.1	01Jan1950, 14:00	0.35
CRR060	17.5630	914.5	01Jan1950, 12:50	0.39
Landa Park	16.9489	555.1	01Jan1950, 13:45	0.35
Proposed Dam	1.0410	8.6	02Jan1950, 00:00	0.16
SCS Dam 3 in	11.5090	3185.4	01Jan1950, 13:35	1.32
SCS Dam 3 out	11.5090	94.2	02Jan1950, 00:00	0.13

APPENDIX F

Hydrologic Reports for Future Conditions with Proposed Dam B

Project: Veramendi
Simulation Run: Blieders-100FC OPB
Basin Model: FC Blieders w/ Dam B
Meteorologic Model: 100-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
BC010	0.2740	1076.6	01Jan1950, 12:20	9.50
BC020	0.8500	2936.2	01Jan1950, 12:25	9.48
BC030	0.2380	838.4	01Jan1950, 12:25	9.17
BC040	0.4340	1571.5	01Jan1950, 12:25	9.99
BC050	0.3700	1321.3	01Jan1950, 12:20	8.98
BC060	0.5150	1583.5	01Jan1950, 12:25	8.31
BC070	0.8150	2209.7	01Jan1950, 12:35	8.69
BC080	0.2960	1103.7	01Jan1950, 12:20	9.62
BC090	0.1820	709.7	01Jan1950, 12:20	9.87
BC100	0.2560	913.1	01Jan1950, 12:25	9.36
BC110	0.1760	577.7	01Jan1950, 12:20	8.06
BC120	2.2390	4409.7	01Jan1950, 13:00	9.13
BC130	0.7530	2334.4	01Jan1950, 12:30	9.47
BC140	2.2070	4871.4	01Jan1950, 12:50	9.28
BC145	0.5730	2312.3	01Jan1950, 12:20	9.25
BC150	0.9310	2838.1	01Jan1950, 12:30	8.96
BC160	0.4000	1702.1	01Jan1950, 12:15	8.87
BC170	0.6270	1879.8	01Jan1950, 12:30	8.98
BC175	0.1920	693.7	01Jan1950, 12:20	8.72
BC180	0.8610	2756.6	01Jan1950, 12:30	9.73
BC190	1.0410	3114.2	01Jan1950, 12:30	9.58
BC190 DS of Pond	0.1460	426.4	01Jan1950, 12:30	9.21
BC200	0.2000	907.8	01Jan1950, 12:15	9.89
BC210	0.3730	1610.9	01Jan1950, 12:15	9.06
BC220	0.1480	824.1	01Jan1950, 12:10	10.03
BC230	0.3700	1545.7	01Jan1950, 12:20	9.88
BC240	0.2050	851.1	01Jan1950, 12:20	10.13
BC245	0.1520	570.7	01Jan1950, 12:20	9.75
BCJ020	1.0880	3774.6	01Jan1950, 12:25	9.42
BCJ040	1.3620	4589.9	01Jan1950, 12:30	9.41
BCJ041	1.7960	6140.1	01Jan1950, 12:25	9.55
BCJ050	2.1660	7005.8	01Jan1950, 12:35	9.43
BCJ060	2.6810	7483.4	01Jan1950, 12:50	8.91

Project: Veramendi
Simulation Run: Blieders-100FC OPB
Basin Model: FC Blieders w/ Dam B
Meteorologic Model: 100-year
Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
BCJ080	1.2930	3250.6	01Jan1950, 12:35	9.04
BCJ100	4.2300	11072.1	01Jan1950, 12:50	8.97
BCJ110	6.8790	11805.1	01Jan1950, 13:05	9.10
BCJ130	5.7720	10684.3	01Jan1950, 12:55	9.22
BCJ175	12.3280	4418.3	01Jan1950, 15:25	3.51
BCJ180	13.1890	4599.7	01Jan1950, 15:45	3.81
BCJ190	14.3760	4652.7	01Jan1950, 12:45	3.61
BCJ190-A	1.1870	436.4	01Jan1950, 12:30	1.38
BCJ200	14.5760	4765.8	01Jan1950, 12:55	3.65
BCJ210	14.9490	5113.8	01Jan1950, 12:50	3.78
BCJ220	15.0970	5226.2	01Jan1950, 12:55	3.83
BCJ240	15.8240	6383.0	01Jan1950, 12:30	4.04
BCJ245	15.2490	5290.6	01Jan1950, 13:05	3.81
BC Outflow	15.8240	6383.0	01Jan1950, 12:30	4.04
BCR040	1.0880	3742.8	01Jan1950, 12:30	9.39
BCR050	1.7960	6035.4	01Jan1950, 12:35	9.52
BCR060	2.1660	6606.1	01Jan1950, 12:50	9.05
BCR080	0.8150	2183.7	01Jan1950, 12:45	8.65
BCR100	1.2930	3222.9	01Jan1950, 12:45	9.01
BCR130	2.2390	4385.4	01Jan1950, 13:15	9.08
BCR150	5.7720	10553.6	01Jan1950, 13:10	9.16
BCR175	11.5090	4222.4	01Jan1950, 15:25	3.13
BCR180	12.3280	4407.2	01Jan1950, 15:50	3.40
BCR200	14.3760	4639.6	01Jan1950, 15:55	3.56
BCR220	14.9490	5113.9	01Jan1950, 12:55	3.77
BCR240	0.3700	1544.7	01Jan1950, 12:25	9.85
BCR245	15.0970	5152.9	01Jan1950, 13:10	3.75
CR010	0.3129	1325.9	01Jan1950, 12:15	8.81
CR020	0.6356	2300.7	01Jan1950, 12:20	9.16
CR030	0.1764	750.6	01Jan1950, 12:15	8.87
CR040	0.5238	1736.8	01Jan1950, 12:25	8.62
CR050	0.6141	1766.9	01Jan1950, 12:35	9.26
CR060	0.1031	448.3	01Jan1950, 12:15	8.19

Project: Veramendi
Simulation Run: Blieders-100FC OPB
Basin Model: FC Blieders w/ Dam B
Meteorologic Model: 100-year
Control Specifications: Control 1

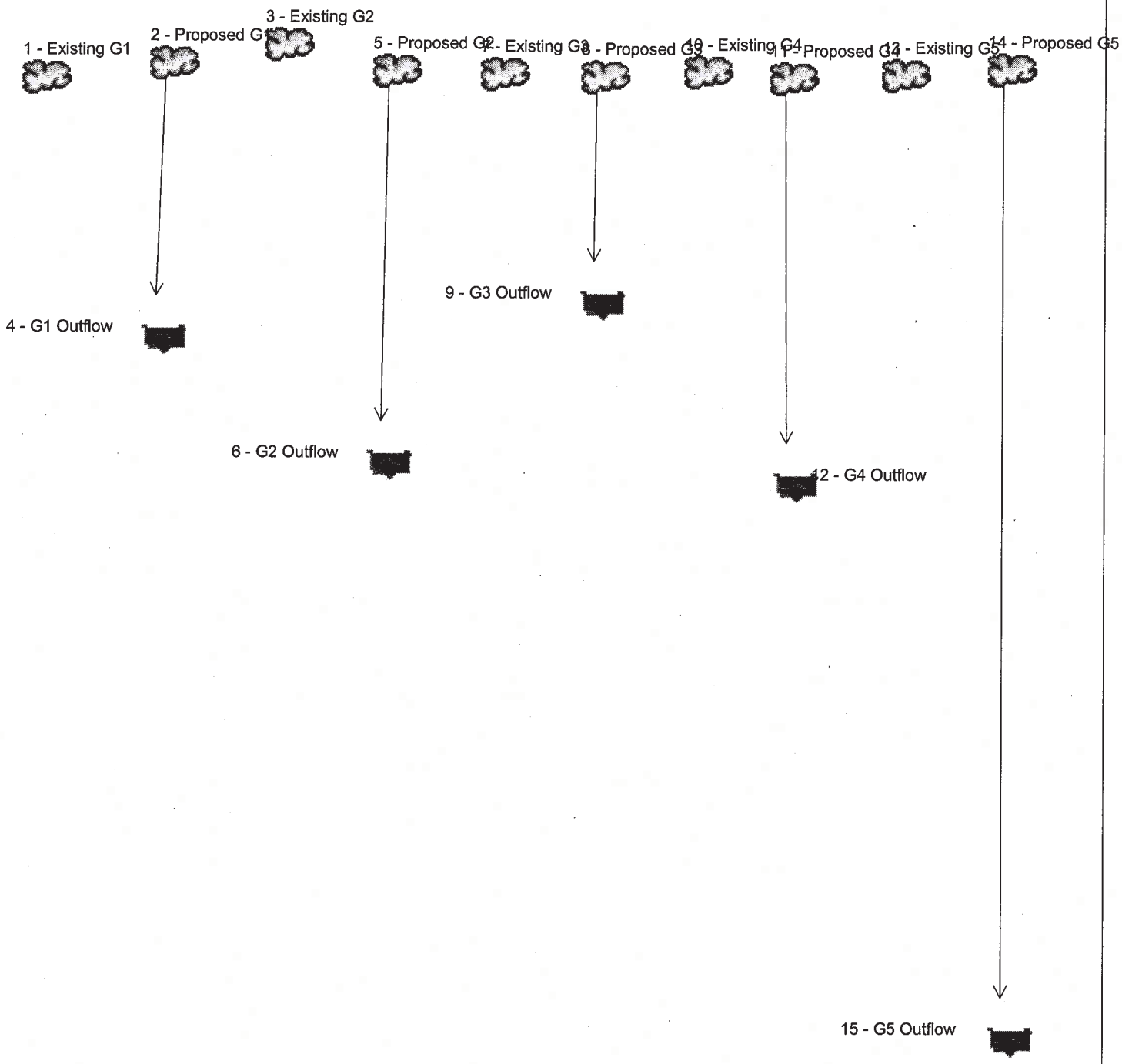
Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
CRJ010	16.7725	7726.4	01Jan1950, 12:45	4.24
CRJ050	17.5630	3031.9	01Jan1950, 12:35	1.50
CRJ060	18.1899	7610.7	01Jan1950, 14:00	4.41
CRR010	15.8240	6292.6	01Jan1950, 12:50	3.95
CRR030	16.7725	7615.2	01Jan1950, 12:50	4.19
CRR040	0.0000	5866.8	01Jan1950, 14:05	
CRR050	16.9489	1349.9	01Jan1950, 12:55	1.22
CRR060	17.5630	2984.4	01Jan1950, 12:45	1.49
Landa Park	16.9489	1352.9	01Jan1950, 12:50	1.24
Proposed Dam	1.0410	11.9	02Jan1950, 00:00	0.28
SCS Dam 3 in	11.5090	23140.0	01Jan1950, 12:50	9.05
SCS Dam 3 out	11.5090	4228.5	01Jan1950, 15:15	3.22

APPENDIX G

Hydrologic Summary for Local Pond on the Eastern Tract

Watershed Model Schematic

Hydraflow Hydrographs by Intelisolve v9.23



Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.23

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	290.02	2	740	1,514,421	----	------	------	Existing G1
2	SCS Runoff	386.58	1	740	2,109,758	----	------	------	Proposed G1
3	SCS Runoff	639.37	2	744	3,648,269	----	------	------	Existing G2
4	Reservoir	184.55	1	764	2,109,747	2	783.79	641,349	G1 Outflow
5	SCS Runoff	860.87	2	744	5,202,947	----	------	------	Proposed G2
6	Reservoir	472.22	2	768	5,202,932	5	784.08	1,735,309	G2 Outflow
7	SCS Runoff	101.45	2	738	500,077	----	------	------	Existing G3
8	SCS Runoff	157.24	2	736	822,035	----	------	------	Proposed G3
9	Reservoir	67.59	2	760	822,028	8	782.78	265,104	G3 Outflow
10	SCS Runoff	105.36	2	738	518,810	----	------	------	Existing G4
11	SCS Runoff	144.25	2	736	754,102	----	------	------	Proposed G4
12	Reservoir	74.20	2	758	754,095	11	783.06	205,185	G4 Outflow
13	SCS Runoff	78.59	2	740	410,394	----	------	------	Existing G5
14	SCS Runoff	107.58	2	738	596,517	----	------	------	Proposed G5
15	Reservoir	63.96	2	758	596,513	14	782.64	141,636	G5 Outflow

APPENDIX H
Site Visit Photos

1

Natural vegetation that serves as obstruction to flow.

2

Debris that serves as obstruction to flow.

3

Natural vegetation that serves as obstruction to flow..

4

Buildup of debris that serves as obstruction to flow.

5

Natural vegetation that serves as obstruction to flow.

6

Culvert crossing at River Road.

APPENDIX I
Digital Files