

VII. DRAINAGE FACILITIES PHASING ANALYSIS

A. DEVELOPMENT PHASING

Development within the NVSSP area is planned to occur in five phases: Phase A, Phase B, Phase C, Phase D, and Phase E. The geographic area and location of the respective phases are shown on Figure 10. Development within Phase A was further refined by the development community into two areas identified as Phase A1 and Phase A2.

These development phases provide the basis for analyzing the phasing of drainage infrastructure while meeting Sacramento County's objectives, policies, and standards.

B. PHASE A

The area of development within the NVSSP area for the initial phase is identified as Phase A1 and Phase A2 on Figure 10. For the Phase A analysis, these areas were reflected as developed with all remaining areas with the NVSSP area remaining defined as existing land use conditions. The subbasins affected by this phase of development were revised and runoff hydrographs were developed to reflect the increases in runoff associated with this development. Included in Appendix D is supporting information related to phased lag time calculations as well as the digital files for the HEC-1 and UNET models. Presented on Figure 9 are portions of the ultimate storm drain pipe system required for Phase A1 and Phase A2.

Illustrated on Figure 11 is the typical cross section of the detention basins reflecting storage for water quality and flood control.

The drainage facilities required to mitigate flooding impacts (i.e., no increases in peak creek stages or flow) in Elder Creek and Gerber Creek, resulting from developing Phase A1, are identified below and presented on Figure 9.

- **Water Quality/Detention Basin G41 with connecting weir structure to Gerber Creek and 10 cfs pump station.**
- **Drainage channel improvements consistent with the Preferred Drainage Plan on Gerber Creek from the CCTR crossing upstream to Gerber Road, adjacent to Basin G41.**
- **Improved crossing on Gerber Creek at Gerber Road just upstream of Basin G41.**

To develop Phase A2, the drainage facilities identified below are required to mitigate impacts in Elder Creek and Gerber Creek and are presented on Figure 9.

- **Water Quality/Detention Basin E24B with connecting weir structure to Elder Creek and 10 cfs pump station.**
- **Detention Basin E26 with connecting outlet pipe.**
- **Drainage channel improvements consistent with the Preferred Drainage Plan on Elder Creek from Florin Road downstream to Basin E24B.**

- **Drainage channel improvements consistent with the Preferred Drainage Plan on Gerber Creek from Waterman Road downstream to the location of Basin E24A, which will be constructed in a subsequent phase.**
- **Improved crossing on Elder Creek at CCTR.**

It is important to point out that the facilities listed above offer mitigation to develop lands within the Phase A2 areas only.

It is also important to note that the Waterman Road crossing in the Phase A1 plan is proposed at the size shown to convey flow under Ultimate Conditions. After consulting with Sacramento County staff, this crossing was evaluated for conveyance of the 10-year event without overtopping. Channel improvements are required downstream of the crossing to avoid spilling more water over Gerber Road to Unionhouse Creek. The crossing, however, does not convey the interim 100-year flow, which includes the spill flow from the Laguna Creek Basin. In the interim, the Waterman Road crossing will be overtopped from a storm event between a 10-year and 100-year event. Under Ultimate Conditions, Waterman Road is not overtopped.

Shown on Figure 9 are specific locations for each of the Phase A1 drainage facilities. In this phase, the majority of the proposed drainage facilities are consistent with the Preferred Drainage Plan facilities. The drainage facilities required during the interim that are not part of the Preferred Plan are the pump stations for Basin G41 and Basin E24A, which are required for Phase A1 and the pump stations for Basin E24B and Basin E26, which are required for Phase A2. The overflow weir structures connecting the channels to the basins are constructed at interim elevations that are higher than necessary for Stand-Alone and Ultimate Conditions. Under Stand-Alone and Ultimate Conditions, the weirs will need to be lowered.

Presented on Figure 12 and Figure 13, respectively, are the residual 100-year floodplains from implementing the respective phased drainage facilities to accommodate the planned development. Presented on Figure 14 through Figure 17 are the maximum water surface profiles along Elder Creek and Gerber Creek with the development and associated drainage facilities for the respective phases completed.

Presented on Table 1 and Table 2 is a summary of the parameters for the detention basins for Phase A1 and Phase A2, respectively.

C. PHASE B

Phase B1 is defined as the areas within the NVSSP area that are designated for development following development of Phase A1. The Phase B area is shown on Figure 10. All hydrologic and hydraulic evaluation of drainage requirements for Phase B presupposes all lands within Phase A1 are already developed.

The storm drainage pipe system required for Phase B is shown on Figure 9. No drainage facilities are required in addition to those identified for Phase A1 to mitigate the flooding impact in Elder Creek and Gerber Creek as a result of development within the Phase B area.

Presented on Figure 18 is the residual floodplain following development of Phase B, and construction of the Phase B drainage facilities. Presented on Figure 19 and Figure 20 are the maximum water surface profiles along Elder Creek and Gerber Creek with the Phase B development and associated drainage facilities completed.

Presented on Table 3 is a summary of the parameters of the detention basins for Phase B.

D. PHASE C

The area identified for development as Phase C is presented on Figure 10. The majority of the land identified as Phase C is tributary to Basin G46. All hydrologic and hydraulic analyses performed to mitigate flooding impacts for Phase C, presuppose all development identified for previous phases has occurred. The storm drain pipe system required for Phase C is shown on Figure 9.

The drainage facilities required in addition to those previously listed under Phase A1 and Phase B to mitigate the flooding impact in Elder Creek and Gerber Creek, resulting from development within the Phase C, are identified below and shown on Figure 9.

- Detention Basin G46 with connecting weir structure to Gerber Creek and 10 cfs pump station.**
- Interim overflow channel to carry spills upstream of the NVSSP plan area through to improved channels until upstream channel improvements are required.**

Presented on Figure 21 is the residual floodplain following development of Phase C, and construction of the Phase C drainage facilities. The pump station at Basin G46 is an interim facility that is not part of the Preferred Drainage Plan. The overflow weir connecting Basin G46 with Gerber Creek is constructed at an interim elevation and will need to be lowered under Ultimate Conditions. Presented on Figure 22 and Figure 23 are the maximum water surface profiles along Elder Creek and Gerber Creek, respectively, with the Phase C development and associated drainage facilities completed.

Presented on Table 4 is a summary of the detention basin parameters for Phase C.

E. PHASE D

The area identified for development as Phase D is presented on Figure 10. The majority of land included in Phase D is tributary to Basin E24A and Basin G46, which would be constructed in Phase A1 and Phase C, respectively. All hydrologic and hydraulic analyses performed to mitigate flooding impacts for Phase D, presuppose all development within previous phases has already occurred. The storm drain pipe system required for Phase D is shown on Figure 9.

It is important to note here that Phase D development and drainage impacts resulting therefrom, could be mitigated using the phasing concept using detention and interim pumping, as proposed for Phase A1, Phase B, and Phase C. It is anticipated, however, that development occurring in the earlier phases, together with development of Phase D, will generate funds sufficient to commence construction of facilities outlined in the Preferred Drainage Plan. Accordingly, in keeping with the commitment to Sacramento County to construct the Preferred Drainage Plan facilities as early as possible, the analysis for Phase D is aimed at identifying features of the Preferred Drainage Plan that result in mitigation commensurate with the impacts resulting from Phase D development.

Following the above noted approach, the drainage facilities required in addition to those previously listed under Phase A1, Phase B, and Phase C, to mitigate the flooding impact in Elder Creek and Gerber Creek as a result of development within the Phase D area, are identified below and shown on Figure 9.

- Drainage channel improvements consistent with the Preferred Drainage Plan on Elder Creek from Basin E24B, downstream to Millbrook Circle.**
- Drainage channel improvements consistent with the Preferred Drainage Plan on Gerber Creek from Waterman Road upstream to CCTR, and downstream of Basin E24A to the confluence with Elder Creek.**

- **Water quality/detention basin E24A with connecting weir structure to Gerber Creek.**
- **Improved crossing on Elder Creek at Elk Grove-Florin Road.**
- **New crossing on Gerber Creek for Passalis Lane East.**
- **New crossing on Gerber Creek for CCTR crossing.**
- **New crossing on Gerber Creek for Passalis Lane West.**
- **Portions of the water quality swales along Gerber Creek associated with isolated development during Phase D.**

All Phase D drainage facilities are permanent.

Presented on Figure 24 is the residual floodplain from implementing the respective drainage facilities to accommodate the planned development. Presented on Figure 25 and Figure 26 are the maximum water surface profile along Elder Creek and Gerber Creek with the Phase D development and associated drainage facilities completed.

Presented on Table 5 is a summary of the detention basins parameters for Phase D.

F. PHASE E

The area identified for development as Phase E, the final phase of the NVSSP area, is presented on Figure 10. The storm drain pipe system required for Phase E is shown on Figure 9.

At this point in development of the NVSSP area, it is assumed that funding is sufficient to construct the remaining elements of the Preferred Drainage Plan. Concurrently, the interim facilities constructed in Phase A1, Phase B, and Phase C, namely pump stations, would be physically removed or designated to a function only for maintenance of the water quality basin.

The Preferred Drainage Plan will be fully implemented at this phase of development. The residual floodplain, at this point, will be confined to the creek channels adjacent to and downstream of the NVSSP area for both Ultimate Conditions and Stand-Alone Conditions.

Presented on Figure 27 is the residual 100-year floodplain from implementing the respective drainage facilities to accommodate the balance of the planned development. Presented on Figure 28 and Figure 29 are the corresponding maximum water surface profiles along Elder Creek and Gerber Creek with the Phase E development and associated drainage facilities completed.

Presented on Table 6 is a summary of the detention basin parameters at Phase E, under the Stand-Alone Conditions. At the point in time when Ultimate Conditions exist, the detention basin parameters will be modified slightly, primarily with respect to weir elevations. The detention basin parameters for the Ultimate Conditions are presented on Table 7.

The spill from Laguna Creek will not be eliminated by virtue of constructing the Preferred Drainage Plan facilities. Identifying the project to eliminate the spill is not part of the scope of this work.