The regulatory strategy for wetlands is to simply try to match the pre-project surface and groundwater inputs that drive the water surface elevations in wetlands. Estimates of what should be done to match inputs require the use of a continuous flow model.

Projects shall comply with Minimum Requirement #8 and Appendix 1 H, *Wetland Protection Guidelines*. The hydrologic analysis shall use the existing land cover condition to determine the existing hydrologic conditions unless directed otherwise by a regulatory agency with jurisdiction.

Appendix 1-H, *Wetland Protection* shall be used for discharges to natural wetlands and wetlands constructed as mitigation. While it is always necessary to pre-treat stormwater prior to discharge to a wetland, there are limited circumstances where wetlands may be used for additional treatment and detention of stormwater. These situations are considered in Appendix 1-H.

Note that if selective runoff bypass is an alternative being considered to maintain the hydroperiod, the hydrologic analysis must consider the impacts of the bypassed flow. For instance, if the bypassed flow is eventually directed to a stream, the flow duration standard, Minimum Requirement #7, applies to the bypassed flow.

1.3.6 Closed Depression Analysis

Perform a closed depression analysis for a site that contains a closed depression as defined in Appendix 1-A.

This analysis applies to discharges to any low-lying areas which have no outlet, or such a limited surface outlet that in most storm events the area acts as a retention basin holding water for infiltration or evaporation (hereafter referred to as closed depression). Where the entire project site is located within a closed depression, Clark County may waive the requirement for a route for the 100-year overflow, provided the facility is sized to fully infiltrate the 100-year event and the facility does not have berms on any side.

Closed depressions generally facilitate infiltration of runoff. If there is an outflow to surface water (such as a creek), then the flow from this depression must also meet Minimum Requirement #7 for flow control. If a closed depression is classified as a wetland, then Minimum Requirement #8 for wetlands applies.

The analysis of closed depressions requires careful assessment of the existing hydrologic performance in order to evaluate the impacts a proposed project will have. An approved continuous flow model must be used for closed depression analysis and design of stormwater facilities. If a closed depression is not classified as a wetland, model the ponding area at the bottom of the closed depression as an infiltration pond using an approved continuous flow model.

1.3.6.1 Analysis and Design Criteria

The infiltration rates used in the analysis of closed depressions shall be determined according to the procedures in Book 1, Section 4.3.1.3. For closed depressions containing standing water, soil texture

tests must be performed on dry land adjacent to, and on opposite sides of the depression (as is feasible). A minimum of two tests must be performed to estimate an average surface infiltration rate. Wet-season water level fluctuations, measured using a datalogger, are also useful in estimating infiltration rates, especially if the depression currently receives runoff.

Projects proposing to modify or compensate for replacement storage in a closed depression must meet the design criteria for detention ponds as described in this section.

Method of Analysis

Closed depressions are analyzed using an approved continuous flow model. In assessing the impacts of a proposed project on the performance of a closed depression there are three cases that dictate different approaches to meeting Minimum Requirement #7. Note that where there is a flooding potential, concern about rising groundwater levels, property rights/ownership/use issues, or where the county's critical areas regulations may be violated, this analysis may not be sufficient and the county may require more stringent analysis and impose more stringent requirements.

Case 1 – No Pre-Development Overflow from Closed Depression

Using an approved continuous flow model, the 100-year storm flow from the TDA is routed into the closed depression, using only infiltration as outflow. Under this scenario, there is no overflow from the closed depression. Determine the pre-development (existing conditions) high water level. The post-development high water level, assuming full build-out of the contributing watershed, shall be no more than 0.1 feet higher than the pre-development level, unless the development has acquired ownership or discharge rights to the closed depression. Absent ownership or discharge rights, excavate additional storage volume in the closed depression (subject to all applicable requirements, for example, access rights and providing a defined overflow system) or in an upland area, as needed to achieve the development's contribution to the 0.1-foot maximum water level increase standard.

Case 2 – Pre-Development Overflow from Closed Depression

Using an approved continuous flow model, the 100-year storm flow from the TDA is routed into the closed depression, using only infiltration as outflow. Under this scenario, pre-development runoff causes overflows from closed depression. For this scenario, the performance objective can be met by excavating additional storage volume in the closed depression such that no overflows occur, subject to all applicable requirements. Alternatively, an appropriately designed flow control and overflow structure can be provided, meeting the standards of Minimum Requirement #7.

Case 3 – Pre and Post-Development Overflow from Closed Depression

The 100-year recurrence interval storm runoff from an approved continuous hydrologic model from the TDA to the closed depression is routed into the closed depression using only infiltration as outflow, and both pre-developed and developed conditions cause overflow to occur. The closed depression must then be analyzed as a detention/infiltration pond. The required performance,

therefore, is to meet the runoff duration standard specified in Minimum Requirement #7 (Book 1, Section 1.5.7), using an approved continuous flow model. This will require a control structure, emergency overflow spillway, access road, and other design criteria. Also, depending on who will maintain the system, it will require placing the closed depression in a tract dedicated to the responsible party.