# APPENDIX G: ASSUMPTIONS AND RATIONALE USED TO EVALUATE AGR PROJECT ALTERNATIVES

Each AGR project alternative was evaluated as to how well it satisfies each criterion. A scale of "low", "medium", and "high" was used to rank how well an alternative meets a criterion. The low, medium, and high rankings are characterized as follows:

Low Alternative largely does not satisfy criterion

Medium Alternative satisfies criterion, in part

High Alternative largely satisfies criterion

***Criterion 1: Maintain consistency with federal and state water quality laws and policies.***

No Action (AGR Alt 1): Alternative would maintain consistency. **HIGH**

AGR De-designation with No Vertical Boundary (AGR Alt 2): No vertical boundary to de-designation area would likely result in future potential impacts to AGR beneficial use within, adjacent to or in downgradient areas where it currently may exist; i.e., at some shallow vertical depths within the Upper Tulare Member's unconfined aquifer or down-gradient, as not all groundwater exceeds the threshold and no barrier to vertical migration of groundwater exists down-gradient of the de-designation area within the Upper Tulare Member, allowing high salinity production water to migrate down-gradient over time and potentially impact AGR designated groundwater. This would be inconsistent with federal and state water quality laws and policies. **LOW**

AGR De-designation within the Proposed Vertical Boundaries (Project Zone) using 5,000 mg/L TDS Threshold

(AGR Alt 3): Alternative would maintain consistency. **HIGH**

AGR SSOs (AGR Alt 4): Alternative would maintain consistency. **HIGH**

***Criterion 2: Protect existing and future potential beneficial uses***

No Action (AGR Alt 1): Alternative would protect existing and future potential beneficial uses as currently required by the Basin Plan. **HIGH**

AGR De-designation with No Vertical Boundary (AGR Alt 2):Alternative would likely result in future potential impacts to AGR beneficial use within, adjacent to or to down-gradient areas where it currently may exist; i.e., at some shallow vertical depths within the Upper Tulare Member's unconfined aquifer down-gradient, as not all groundwater exceeds the threshold and no barrier to vertical migration of groundwater exists down-gradient of the de-designation area within the Upper Tulare Formation, allowing high salinity production water to migrate down-gradient over time and potentially impact AGR designated groundwater. Alternative may not protect beneficial uses in the future. **LOW**

AGR De-designation within the Proposed Vertical Boundaries (Project Zone) using 5,000 mg/L TDS Threshold (AGR Alt 3): No existing use of groundwater is being made and no future use is anticipated within the proposed de-designation Project Zone. Furthermore, the Mid-Tulare Clay that denotes the upper boundary of the proposed de-designation boundary forms an impermeable hydrologic barrier to the upward

flow of groundwater from confined conditions below the clay to unconfined conditions above the clay. The low vertical conductivity of this clay layer suggests that there is very little, if any, upward flow of groundwater. This alternative would protect existing and future potential beneficial outside of the proposed de-designation boundary, especially down-gradient. **HIGH**

AGR SSOs (AGR Alt 4): Alternative would protect existing and future potential beneficial uses as currently required by the Basin Plan. **HIGH**

***Criterion 3: Maintain agricultural production in the project area.***

No Action (AGR Alt 1): Under this alternative, agricultural discharges would continue to be regulated under the ILRP and be required to comply with AGR beneficial use compliance criteria, as required under the ILRP, therefore agricultural production would remain the same as is currently being produced. **HIGH**

AGR De-designation with No Vertical Boundary (AGR Alt 2): If AGR beneficial use is no longer designated within the proposed de-designation boundary from the surface down, and since there are no existing IND or PRO uses in the project area, there are no beneficial uses to be protected. To this end, under this alternative, agricultural production could be maintained in the project area. **HIGH**

AGR De-designation within the Proposed Vertical Boundaries (Project Zone) using 5,000 mg/L TDS Threshold (AGR Alt 3): as above in AGR Alt 1. **HIGH**

AGR SSOs (AGR Alt 4): Under this alternative, agricultural discharges would not be allowed to cause or contribute to ambient groundwater quality exceeding a SSO. Discharges causing or contributing to ambient conditions exceeding a SSO and/or causing or contributing to degradation above that which is allowed in the Basin Plan would be prohibited. Thus, agriculture would need to implement additional treatment and control of its discharge to reduce its impact on groundwater or would need to reduce agricultural production in the area (i.e., fallow acreage). **LOW**

***Criterion 4: Has potential to support salt control/management.***

No Action (AGR Alt 1): The need to protect AGR beneficial use the current production water injection zone (proposed de-designation zone) and to limit degradation in the Southern Lost Hills Oilfield would preclude or significantly limit the potential import of salt from outside of the project area for disposal in the project area. **LOW**

AGR De-designation with No Vertical Boundary (AGR Alt 2): If MUN and AGR beneficial uses are no longer designated within the proposed de-designation boundary, and since there are no existing IND or PRO uses in the project area, there are no beneficial uses to be protected. To this end, additional salt from outside the project area could be imported to the project area without harming beneficial uses in the project area. However, potential exists for impacts to beneficial uses down-gradient of the project area, due to lack of a confining layer in the unconfined aquifer above the Mid-Tulare Clay within the Tulare Formation. This lack of a confining layer could allow for injected, high salinity production water from the project area to migrate down-gradient in the future to areas, where it could potentially impact beneficial uses that currently exist. Any project from outside of the project area that sought to discharge salt to the project area would need to undergo its own evaluation to determine if its discharge met all applicable federal and state water quality laws and policies. **MED**

AGR De-designation within the Proposed Vertical Boundaries (Project Zone) using 5,000 mg/L TDS Threshold (AGR Alt 3): Under this alternative, additional salt from outside the project area could be imported to the project area without harming beneficial uses in the project area, while still protecting beneficial uses down-gradient of the project area due to the presence of the Mid-Tulare Clay confining layer. **HIGH**

AGR SSOs (AGR Alt 4): MUN and AGR beneficial uses would need to be protected under this alternative, thus resulting in measures to prevent or limit groundwater degradation. The import of salt from outside of the project area for disposal in the project area would be precluded or significantly restricted. **LOW**

***Criterion 5: Technically feasible, economically viable, and reasonable action.***

No Action (AGR Alt 1): Agricultural discharges would still be required to protect MUN beneficial use as required under the ILRP, as all groundwater within the proposed de-designation boundary would still carry the MUN beneficial use designation, and Seneca would continue to retain potential Proposition 65 related liability, regardless of existing poor groundwater quality within the proposed de-designation zone that does not support MUN beneficial use. **LOW**

AGR De-designation with No Vertical Boundary (AGR Alt 2): If the AGR beneficial use is no longer designated within the proposed de-designation boundary from the surface down, and since there are no existing IND or PRO uses in the project area, there are no beneficial uses to be protected. However, due to the lack of a vertical confining layer within the unconfined aquifer of the Upper Tulare Formation, groundwater within the de-designation boundary could migrate down-gradient of the proposed de-designation zone and potentially impact groundwater that currently supports AGR and MUN beneficial uses, therefore, this alternative only partially satisfies the criterion in that the potential future impact of groundwater that currently supports the AGR and MUN beneficial uses is not reasonable. **MED**

AGR De-designation within the Proposed Vertical Boundaries (Project Zone) using 5,000 mg/L TDS Threshold (AGR Alt 3): If the AGR beneficial use is no longer designated within the proposed de-designation boundaries, and since there are no existing IND or PRO uses in the project area, there are no beneficial uses to be protected in the proposed vertical zone. Under this alternative, MUN and AGR use would still be protected in the shallow, unconfined aquifer zone and surface discharges would still be regulated under the ILRP ( for agricultural discharges) and other Central Valley Water Board programs, such as the Oil Fields Regulatory Program (for oil field related surface discharges), but Seneca would no longer retain Proposition 65 related liabilities. This alternative is considered to be feasible, economically viable, and reasonable. **HIGH**

AGR SSOs (AGR Alt 4): Under this alternative, agricultural discharges would not be allowed to cause or contribute to ambient groundwater quality exceeding a SSO. Discharges causing or contributing to ambient conditions exceeding a SSO and/or causing or contributing to degradation above that which is allowed in the Basin Plan would be prohibited. Thus, agriculture would need to implement additional treatment and control of its discharge to reduce its impact on groundwater or would need to reduce agricultural production in the area (i.e., fallow acreage). **LOW**

***Criterion 6: Scientifically supported by existing data.***

No Action (AGR Alt 1): Findings of the Revised Technical Report (RTR) show that groundwater quality, as measured by TDS, within the proposed AGR irrigation supply and livestock watering de-designation (Project Zone) boundaries exceeds 10,000 mg/L and therefore, exceeds the maximum salinity limit of 5,000 mg/L for all classes of livestock recommended by the National Research Committee of the National Academy of Science (NRC, 1974). Ambient salinity levels greatly exceed 2,000 mg/L, which is generally considered the EC threshold for use of water as an irrigation supply. Additionally, the RTR found that groundwater within the proposed AGR de-designation boundaries has not historically, is not currently, and is not anticipated to be used for irrigation supply or livestock watering in the future. Groundwater quality within the proposed AGR de-designation boundaries does not support AGR beneficial uses, and an action by the Central Valley Water Board to protect AGR beneficial uses is not scientifically supported by existing data. **LOW**

AGR De-designation with No Vertical Boundary (MUN Alt 2): Groundwater within the proposed de-designation Project Area boundary, as indicated in the RTR, ranges from 3,400 mg/L TDS to 7,000 mg/L TDS (within the Upper Tulare Member) and therefore, does not exceed the maximum salinity limit of 5,000 mg/L TDS for all classes of livestock recommended by the NRC in all areas of the Project Area. Ambient salinity levels do greatly exceed 2,000 mg/L TDS, which is generally considered the salinity threshold for use of water as an irrigation supply, however, due to the lack of a vertical confining layer within the Upper Tulare Formation, groundwater down-gradient of the proposed de-designation boundary that currently supports AGR and MUN beneficial uses could potentially be impacted by groundwater migrating from the unconfined aquifer portion of the proposed de-designation zone with no vertical boundary (within the Upper Tulare Formation) in this alternative. As there is the potential to degrade groundwater quality that currently may support the MUN beneficial use, this alternative is not scientifically supported by existing data. **LOW**

AGR De-designation within the Proposed Vertical Boundaries (Project Zone) using 5,000 mg/L TDS Threshold (AGR Alt 3): Groundwater within the proposed de-designation zone boundary (Project Zone), as indicated in the RTR, exceeds 10,000 mg/L TDS and therefore, exceeds the maximum salinity limit of 5,000 mg/L TD for all classes of livestock recommended by the NRC. Ambient EC levels greatly exceed 2,000 mg/L TDS, which is generally considered the salinity threshold for use of water as an irrigation supply. Under this alternative, MUN and AGR use would still be protected in the shallow, unconfined aquifer zone and surface discharges would still be regulated under the ILRP ( for agricultural discharges) and other Central Valley Water Board programs, such as the Oil Fields Regulatory Program (for oil field related surface discharges), but Seneca would no longer retain Proposition 65 related liabilities. Groundwater quality within the proposed horizontal and vertical AGR de-designation boundaries does not support the AGR beneficial use, and an action by the Central Valley Water Board to de-designate the AGR beneficial use within the proposed vertical de-designation boundaries is scientifically supported by existing data. **HIGH**

AGR SSOs (AGR Alt 4): The findings of the RTR show that groundwater quality, as measured by TDS, within the proposed AGR irrigation supply and livestock watering, vertical and horizontal de-designation boundaries (Project Zone) exceeds 10,000 mg/L TDS and therefore, exceeds the maximum salinity limit of 5,000 mg/L TDS for all classes of livestock watering recommended by the NRC. Ambient salinity levels greatly exceed 2,000 mg/L TDS, which is generally considered the salinity threshold for use of water as an irrigation supply. Additionally, the RTR found that groundwater within the proposed AGR de-designation boundaries has not historically, is not currently, and is not anticipated to be used for irrigation supply or livestock watering in the future. Groundwater quality within the proposed AGR de-designation vertical boundaries does not support AGR beneficial uses, and an action by the Central Valley Water Board to protect AGR beneficial uses through the establishment of SSOs is not scientifically supported by existing data. **LOW**

***Criterion 7. Support socioeconomic well-being of the project area.***

No Action (AGR Alt 1): Same response as given for Criterion 7. **LOW**

AGR De-designation with No Vertical Boundary (MUN Alt 2): Same response as given for Criterion 7. **MED**

AGR De-designation within the Proposed Vertical Boundaries (Project Zone) using 5,000 mg/L TDS Threshold (AGR Alt 3): Same response as given for Criterion 7. **HIGH**

AGR SSOs (AGR Alt 4): Same response as given for Criterion 7. **LOW**

***Criterion 8: Ease of implementation.***

No Action (AGR Alt 1): Under this alternative, Central Valley Water Board staff would regulate dischargers in the Southern Lost Hills Oilfield to protect MUN and AGR beneficial uses. This will likely lead to difficulties in the permitting process and unnecessary liabilities and expenditure of resources for the protection of beneficial uses within the proposed horizontal and vertical de-designation boundaries where there is no existing use of groundwater and there is no future anticipated use of groundwater. **LOW**

De-designation with No Vertical Boundary (AGR Alt 2): This alternative would be easy to implement as it would remove AGR beneficial use from all groundwater located within the proposed horizontal boundary (Project Area). However, not all groundwater within the Project Area within the Upper Tulare Member's aquifer exceeds the threshold limit, and due to the lack of a vertical confining layer within the Upper Tulare Member's unconfined aquifer portion of the proposed de-designation zone, it would also likely result in potential future impacts to shallow groundwater situated adjacent to or down-gradient of the project area, where AGR and MUN beneficial uses are currently supported by existing groundwater quality, and would require monitoring. **MED**

AGR De-designation within the Proposed Vertical Boundaries (Project Zone) using 5,000 mg/L TDS Threshold (AGR Alt 3): This alternative would require the least amount of effort by Central Valley Water Board staff to implement, as agricultural dischargers would still be subject to current ILRP requirements and oilfield dischargers would still be required to comply with the Oilfield General orders as currently being implemented. **HIGH**

AGR SSOs (AGR Alt 4): This alternative would require Central Valley Water Board staff to develop SSOs and a monitoring and surveillance program in the project area to evaluate if SSOs are being met. The involvement of Enforcement Division staff may also be necessary. **LOW**