Rec'd 4/6/09

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April 6, 2009

Don Reimer
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Dear Don,

Enclosed is the final review by the Colorado Natural Heritage Program (CNHP) of the Wetland, Terrestrial, and Aquatic Habitat reports submitted by the Nestle Water North America (NWNA) in accordance with the County's 1041 regulations. Since the submittal of CNHP's draft review in February, NWNA has submitted additional documents addressing many of the issues brought forth in the draft. These revised documents include: Land Management Plan, Wetland Restoration Plan, Weed Management Plan, and Wetlands Monitoring and Mitigation Plan (March 20, 2009). Based on our review of these documents, we feel that the activities defined therein bring NWNA into compliance with the County's 1041 regulations regarding impacts on natural resources in the project area. Based on literature review and potential impacts to wetland, terrestrial and aquatic habitats within the project area we have included suggestions for additional baseline survey and on-going monitoring within the project area to continue to evaluate possible impacts on the wetlands resulting from this project (see Management Recommendations in attached document).

Based on your encouragement, CNHP communicated with Dan Gregory at AECOM on February 27th 2009 prior to submission of this final review. We were also contacted by Bruce Lauerman (the NWNA hydrologist for this project) and Dr. Harold Hagen (land owner at the project site).

Thank you for the opportunity to review this proposal.

Sincerely,

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Review of Wetland and Terrestrial and Aquatic Habitat Reports for Proposed Nestle Water North America Project

Final

Submitted to:
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I. Summary of Comments

The final report is based on the review of the following Nestle Water North America (NWNA) documents received from Chaffee County in January 2009:

1. Terrestrial and Aquatic Species and Habitat
2. Appendix M-Wetlands/Riparian Areas, Floodplains and Terrestrial Vegetation-Executive Summary
3. Appendix M-Wetlands and Surface Water in Bighorn Springs Area
4. Appendix M-Pipeline Route and Loadout Facility
5. Appendix M-Wetlands in the Bighorn Springs and Ruby Mountain Springs Areas
6. Appendix M-Wetlands and Surface Waters in the Ruby Mountain Springs Area

The hydrological review and methodology are being completed by W. W. Wheeler and Associates, Inc. (2009) and others.

A. Terrestrial and Aquatic Species and Habitat

NWNA conclusions, regarding low or little impact to wildlife and their habitat are supported by the Colorado Division of Wildlife (2009a). However, several State Listed Species of Concern have been reported in nearby, comparable habitat and could potentially use the area for breeding or foraging habitat (CDOW 2009b). These species include Peregrine Falcon, Loggerhead Shrike (Partners in Flight ranking) and Juniper Titmouse (USFS ranking) Brewer's Sparrow (Audubon, PIF and USFS ranking) Northern Pygmy Owl, Virginia's warbler (Audubon ranking), Pygmy Nuthatch (USFS ranking), and Cordilleran Flycatcher (PIF ranking) (Rocky Mountain Bird Observatory 2009; Colorado Breeding Bird Atlas 2009; Partners in Flight 2009). CNHP encourages NWNA to conduct an adequate breeding bird assessment that includes both a bird census and a thorough and current literature review within the project area.

B. Wetlands/Riparian Areas, Floodplains

Numerous small wetlands emerge on the alluvial outwash terrace at the interface between the Mosquito Range (Arkansas Hills) and the Arkansas River. These wetlands are a stark contrast between xeric upland and surrounding valley floor habitat. As such they are an important component of the biodiversity of Chaffee County and provide potential habitat for a diversity of native wildlife. Analysis by NWNA consultants considers the shallow aquifer as a kind of "bathtub" with the springs as the drain in the far southern corner; however, another hypothesis is that part of the aquifer has its own hydrogeologic subsystem influenced by the sub cropping/outcropping of crystalline bedrock, the narrowing of the unconsolidated sediments (shallow aquifer) in a southern direction and the presence of the Arkansas fault system. Therefore, the effects of water extraction from the springs should be evaluated specifically in the context of the local hydrology and not only in the context of the entire aquifer as has been done by NWNA consultants (Kolm 2009). When viewed from a perspective that includes analysis of local hydrology, conclusions regarding sustainability of withdrawals *could* be different from those reached by NWNA whose analysis considered only the total aquifer area to estimate the effect of extraction on ecosystem sustainability. The County and NWNA are encouraged to consider all hydrologic scenarios.

Wetland vegetation depends on a sufficient and reliable water source. As identified in the NWNA proposal a clear and direct connection exists between the aquifer and both the Ruby Mountain and Bighorn springs/seeps and their associated wetlands. Hydrology is probably the single most important determinant of the establishment and maintenance of wetlands and even small changes in hydrology can result in significant biotic changes (Mitsch and Gosselink 2000). Draw downs, as proposed by the NWNA project, could reduce flows and may alter wetland hydroperiod.

Maintenance of wetland function and structure are dependent on hydrologic conditions, which affects species composition and richness, primary productivity, organic accumulation and nutrient cycling in wetlands (Mitsch and Gosselink 2000). The water source that sustains both palustrine and riparian wetlands at the project site are the springs and the underlying aquifer. Generally speaking palustrine wetlands are non-tidal wetlands that are supported by shallow groundwater discharge (Cowardin et al. 1977); all of the wetlands in the project area are in this category. Riparian wetlands are those palustrine wetlands adjacent to a flowing body of water that are, at least periodically, influenced by flooding. NWNA describes two "low-quality" palustrine wetlands at the Ruby Mountain Site, and at the Bighorn site one high-quality wetland, 12 moderate-quality and three low-quality wetlands (Appendix M, Wetland/riparian areas, p. 3) and provide a list of wetland communities and dominant plant species in table 1 (Appendix M, Final wetlands table).

Chaffee County 1041 regulations require a project to " Map and/or describe all floodplains, wetlands, and riparian areas to be affected by the proposed project, including a description of the types of wetlands, species composition, and biomass and a delineation of the 100-year flood event (Chaffee county 1041 submission requirements 3-302 (d) (i)). Wetland delineation and vegetation assessments were conducted to USACE standards satisfactorily. Additionally, NWNA has recently submitted a Draft Wetlands Monitoring and Mitigation Plan (March 20, 2009). The monitoring methods described in this plan are suitable for assessing the impact of water withdrawal on wetland function within the project area. Similarly, the process for assessing whether attenuation in withdrawal is necessary appears to be scientifically based. We feel that the role of CDOW in the evaluation of the results and their decision making authority in responding to mitigation needs is appropriate as described in this plan.

C. Weed Management and Re-Vegetation

Although it is not required under a 1041 permit, we encourage NWNA to consider utilizing local materials and gene stock in re-vegetating disturbed areas with native plant species. Given the relatively small amount of surface disturbance that is likely to result from this project, the cost of collecting and propagating seed from similar areas locally to use in this project would be relatively low.

D. Global Climate Change

It is important to note that consideration of climate change is not a specific 1041 requirement, but CNHP suggests that it is an important consideration for water and land managers. CNHP encourages the County and NWNA to view this proposed project in the context of the overall ecological system, including climate and surrounding geology. Ray et al. (2008) state that "Colorado temperatures have increased by approximately 2°F

between 1977 and 2006. Increasing temperatures are affecting the state's water resources and changes in the quantity and quality of water may occur due to warming even in the absence of precipitation."

Climate is a major driver of all ecosystems, especially wetlands. Climate trends in the upper Arkansas River valley show a clear and dramatic temperature increase (Ray et al. 2008). Climate trends are toward warmer winters and springs with snowmelt occurring 5 to 14 days earlier in the West, including the Arkansas River basin (Edelman 2008). In the upper Arkansas River basin there has been a clear, statistically significant trend toward earlier stream flow since 1945, which is attributed to winter and spring warming (Edelman 2008). Edelman (2008) also states that if current trends continue many mountain landscapes will endure increasingly severe summer-drought conditions.

Precipitation patterns and corresponding infiltration, recharge and discharge patterns and seasonal stream flow rate patterns will also change in a warming climate (Ray et al. 2008). Synthesis of these findings suggests a reduction in total water availability by the mid 21st century and that a warming climate increases the risk to Colorado's water supply even if precipitation remains at historical levels.

Within the NWNA project area, calculations of the percent drawdown are predicated on current aquifer recharge and spring flow characteristics. Additionally, NWNA reports indicate that aquifer recharge comes from three primary sources: direct precipitation, infiltration from drainage runoff (especially Trout Creek and Arnold Gulch), and infiltration from irrigation return flows (Appendix I, Groundwater Executive Summary, Section 3). NWNA project data indicate that spring/seep discharge quantity is dependent on sustained recharge to the aquifer. NWNA calculate that a withdrawal of 200 acre-feet/year would be equal to 1.4% -2.1% of estimated annual recharge in a normal year and as much as 5.5% in a drought year assuming precipitation and irrigation are similar to the past 10 years (Appendix I, Groundwater Executive Summary, section 3 and 11). Current climate trends show a decline in runoff with correspondingly reduced stream flows and aquifer recharge (Ray et al. 2008). Thus the percentage of drawdown from pumping *may* increase in a warming climate scenario, which thereby increases the potential for aquifer dewatering and related impacts to wetland habitat. In the interest of maintaining the wetland plant communities, any proposed development plan that impacts water resources should take into consideration global climate change.

E. Spring/Aquifer Connection

NWNA documents a direct physical connection between the springs that supply water to the wetlands and the underlying aquifer (Phase I, Hydrogeologic report, p. 4-4, 5-2, and 6-3); both the Ruby Mountain and Bighorn Springs showed a clear response to pumping. Their observations suggested that the host aquifer for Ruby Mountain and Bighorn Springs is the alluvial-outwash aquifer (Phase I, Hydrogeologic report, p. 5-2). Shallow alluvial aquifers, such as this one, transmit a reduction in groundwater levels quickly with a result that can include cessation of spring flows: For example, when Trout Creek was dammed several years ago, recharge to the aquifer was diminished and spring discharge on the Hagen property on the valley floor was significantly reduced or in some locations

ceased (Phase 1 Hydrogeologic report, p. 2-3). As indicated by the NWNA report, this condition was likely exacerbated by the existing drought.

The watershed that supplies the streams and aquifer is relatively small and in the project area the aquifer is relatively shallow (Appendix I, Groundwater Executive Summary, section 2). Additionally, the watershed's geologic characteristics result in rapid runoff and reduced storage in surface soils. These factors could indicate that the stream and associated wetland and riparian systems are less resilient to environmental changes and less able to moderate perturbations. Geologic characteristics of the watershed could result in stream flows that are highly responsive to precipitation events – with little storage capacity to absorb flows and discharge energy that would otherwise moderate flow fluctuations.

F. Livestock Grazing

The grazing and fencing practices described in the Draft Land Management Plan submitted by NWNA are appropriate for this area. As the parameters described in the Draft Land Management Plan are implemented with respect to grazing, we recommend monitoring grazing impacts as described in the plan and by utilizing data from monitoring weeds and wetlands on the property to adjust/ attenuate grazing practices to ensure that rangelands are not degraded.

G. Management Recommendations

Wetland management recommendations

1. Identify reference wetlands as described in the Wetlands Monitoring and Mitigation Plan,
2. Determine the natural hydroperiod and baseline conditions in the reference and project site wetlands,
3. Establishment of vegetation monitoring plots to quantitatively measure in detail vegetation cover, structure and species composition and their response to water withdrawal as described in the Wetlands Monitoring and Mitigation Plan,
4. Ongoing collection and synthesis of data to determine and mitigate any impacts to the wetland system as described in the Wetlands Monitoring and Mitigation Plan,
5. Monitor water level in reference and site wetlands throughout the year,
6. Maintain sufficient groundwater flow to wetlands,
7. Eradicate/manage noxious weeds and non-native plant species,
8. Re-vegetate with native plant species using the reference wetlands and undisturbed surrounding uplands as models of natural species diversity,
9. Locate any recreational trails away from and out of wetland and riparian zones; establish and harden specific fishing ingress/egress trails and install educational signage.

Bird Monitoring

1. Conduct a baseline survey of breeding birds several times during the breeding season (different species breed and display at different times during the breeding season so that a single survey can only rarely identify all species present).

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