

July 12, 2007

Mr. Thomas F. Stewart
County Manager, Lincoln County
P.O. Box 711
Carrizozo, NM 88301-0711

CERTIFIED MAIL
RETURN RECEIPT
REQUESTED

Re: Heritage Preserve At Ruidoso Subdivision

Dear Mr. Stewart:

The Water Use & Conservation/Subdivision Review Bureau of the Office of the State Engineer has reviewed the referenced subdivision proposal pursuant to the Lincoln County Subdivision Ordinance, the New Mexico Subdivision Act and the OSE Rules and Regulations Governing The Use Of Public Underground Waters For Household Or Other Domestic Use.

Based on the information provided, this office has determined that the subdivider can furnish water sufficient in quantity to fulfill the maximum annual water requirements of the subdivision, including water for indoor and outdoor domestic uses, and that the subdivider can fulfill the proposals in his disclosure statement concerning water, excepting water quality. Accordingly, a **positive** opinion is issued.

A staff memorandum providing specific comments is attached for your information. If you have any questions, please call Jerry Keller at 505-827-3845.

Sincerely,

John W. Longworth, P.E.
Water Use & Conservation/Subdivision Review Bureau Chief

Encl.

cc: OSE Water Rights Division, Roswell Office

JK:jk

MEMORANDUM
New Mexico Office of the State Engineer
Water Use and Conservation Bureau

DATE: July 12, 2007

TO: John Longworth, P.E. Water Use & Conservation Bureau Chief

FROM: Jerry Keller, Senior Water Resource Specialist

SUBJECT: Heritage Preserve At Ruidoso Subdivision in Lincoln County

SUMMARY

On June 14, July 6, and July 10, 2007 the Office of the State Engineer (OSE) received additional/revised information for the Preliminary Plat for Heritage Preserve At Ruidoso, a Type-Two Subdivision. The proposal is a request to subdivide a 1365-acre parcel into 253 residential lots ranging in size from 2.02-acres to 10.04-acres each. The proposed water supply is shared 72-12-1 domestic wells. The property is located approximately 5 miles southwest of Nogal, within Sections 17, 18, 19, 20, 29, and 30, Township 9 South, Range 13 East, NMPM.

This office issued a negative opinion by letter dated May 10, 2007 for the reason that the proposal did not satisfy the requirements of Section 17.4.C and 18.2.A of the Lincoln County Subdivision Ordinance and Section 47-6-11-F (1) of the New Mexico Subdivision Act. Please see the previous letter for specific details.

The revised water supply documents submitted to this office consist of a water budget, Disclosure Statement, Declaration of Protective Covenants, and supplemental information for the Geohydrologic Investigation Report.

The proposal was reviewed pursuant to the Lincoln County Subdivision Ordinance (Ordinance) and the New Mexico Subdivision Act (Act). The water supply proposal is in substantial compliance with the requirements of the Ordinance and the Act. Accordingly, a **positive** opinion should be issued.

WATER DEMAND ANALYSIS AND WATER CONSERVATION

Section 18.2.A of the Regulations requires that the annual water requirement for both indoor and outdoor purposes, for each parcel in a residential subdivision shall be .25 acre-feet per year, unless a detailed water demand analysis approved by the Board of County Commissioners justifies the use of a different figure. A detailed water demand analysis is contained in Item S of the Disclosure Statement.

Under Items R and S of the revised Disclosure Statement the subdivider estimates the maximum annual water requirements for indoor and outdoor use as 0.199 acre-feet per lot. The estimated indoor use of 0.168 acre-feet per annum is based on 2.34 persons per dwelling with water conserving plumbing fixtures and appliances. The previous water budget was based on 2.7

persons per dwelling unit. The revised analysis relies on the 2000 U.S. Census Bureau data for the average number of persons per household specific to Lincoln County.

As in the previous water budget, vehicle washing and evaporative coolers are not permitted. The annual outdoor demand of 0.031 acre-feet per lot is based on an area of 800 square feet of sprinkler or flood irrigated trees and shrubs and 12.8 gallons per day for one horse (3 horses per lot on 1/3 of the lots). Swimming pools are discouraged but if built must be covered to reduce evaporation. Conservation measures restrict the filling of pools with water from any and all water sources on the Preserve.

All lot owners are required to install a rainwater water harvesting and grey water recycling systems. General system requirements are included in Item T of the Disclosure Statement.

Exhibit A, Section G, of the Covenants discusses guesthouses and staff quarters. The revised water demand analysis assumes that 25% of the lots will construct a guesthouse. The revised total subdivision annual water demand of 62.81 acre-feet is based on 316 potential homes. The approach utilized may slightly over estimate the demand due to the fact that the additional water use for guesthouses includes outdoor water use for landscaping and livestock and assumes the guesthouse is fully occupied for 365 days per year.

Strict enforcement of the water use restrictions will be required to ensure that the water budget is not exceeded.

WATER AVAILABILITY ASSESSMENT

The proposed water supply for the subdivision is shared 72-12-1 domestic wells in accordance with Section 17.6 of the Regulations. The subdivider will construct the wells and the service line to each lot. A maximum of six parcels will be served by each well. The proposal contains a draft shared well agreement.

A Geohydrologic Investigation Report (GIR) was submitted with the initial proposal in accordance with the requirements of Sections 17.4.C and 17.5 of the Ordinance. The subdivider submitted additional information to address the previous OSE comments.

Based on the information provided, OSE concurs with the findings in the GIR. The subdivider is in substantial compliance with the requirements of the Ordinance and the Act. The subdivider can furnish water sufficient in quantity to fulfill the maximum annual water requirements of the subdivision, including water for indoor and outdoor domestic uses for a period of 40-years. Please see the attached memorandum for specific comments.

MEMORANDUM

**New Mexico Office of the State Engineer
Hydrology Bureau**

July 13, 2007

TO: Jerry Keller, Water Use & Conservation Bureau

THROUGH: Mike Johnson, Chief, Hydrology Bureau

FROM: Douglas Rappuhn, Hydrology Bureau *DR*

SUBJECT: Comments on Geohydrologic Investigation Report, Proposed "Heritage Preserve at Ruidoso" Subdivision - Lincoln County, NM, prepared February 2007; and materials and technical annexes provided June 2007, for Verde Heritage Ranch

The subject February 2007 Geohydrologic Investigation Report ("report") and additional materials and technical annexes provided June 2007 ("6/2007 submittal") assert 40 year supply of ground water is available to the proposed Heritage Preserve Subdivision, planned south of Nogal, Lincoln County. Review of available information indicates that wells proposed to be drilled by the subdivider and provided to the residents as shared domestic wells appear to be able to furnish water in sufficient quantity to fulfill maximum annual water requirements of the subdivision over the 40-year planning period.

Long-term project well viability appears due in large part to proposed well design that provides each well with a lengthy initial column of water.

The subject submittals and project disclosure statement were found to note:

- The subdivision will consist of 253 tracts of approximately two to ten acres each, situated on approximately 1,365 acres total.
- Average individual subdivision parcel water requirements have been recalculated at approximately 0.248 AFY each, totaling approximately 62.81 AFY for the entire subdivision.
- The subdivision water supply will be provided by the owner or lessee of each parcel as part of the shared domestic well ownership, and no part of the supply is to be obtained from surface water sources (rainwater harvesting and greywater recycling to be accounted for independent of this review).
- The aquifer developed in the Mesaverde Group sediments will be the water source for the shared domestic wells at the project.

- Proposed project wells will be constructed to fully penetrate the thickness of the aquifer developed in the Mesaverde deposits, and provide initial water columns of approximately 400-ft.
- Individual wells drilled by the homeowners will not be allowed, and no water for commercial or recreational use will be allowed.

Based on information found in the report, 6/2007 submittal, project disclosure statement, and cursory review of information on file at the OSE, the following comments, pertinent to Section 17.4.C, Lincoln County Subdivision Ordinance 2006-5 are offered.

17.4.C.1:

Informative **geologic maps, a cross-section, and descriptions** of the Mesaverde Group aquifer system were provided.

Given the regionally extensive occurrence of subsurface igneous intrusive units and the presence of mapped or unmapped faults, locally-restrictive hydrogeologic **boundaries** may exist. If extensive enough, boundaries may compartmentalize sections of the aquifer and limit subsurface recharge. Enhanced drawdown within aquifer “compartment” would result relative to equal pumping in a non-bounded aquifer.

Faults and igneous intrusions may alternately enhance local ground water flow due to subsurface rubbelization that can lead to increased unit permeability.

Simulations run for this evaluation by the subdivider and the OSE have included at least one aquifer “no-flow” boundary to increase conservatism of effects of simulated pumping.

Stated aquifer areal **recharge** rate of approximately 4% of precipitation per year (6/2007 submittal) appears reasonable, given the nature of the surface lithology and topographic relief. Local drainages may concentrate conveyance of runoff but unless fracture connection to deeper strata or lengthy surface water ponding exists, they may offer little additional local recharge due to continued run-off, evapotranspiration, and near-surface poorly-permeable strata described in many of the local Well Records. OSE Theis simulations incorporate no simulated recharge over the duration of the planning period, which increase conservatism of effects of simulated pumping.

The aquifer regionally developed in the Upper Hondo shallow Cretaceous and Tertiary geologic units (which includes the Mesaverde deposits) eventually pinches out approximately ten miles to the east, and much of the shallower ground water naturally

discharges downward to the extensive regional Permian aquifer system. Other **natural discharge** occurs in the area from springs.

Over 200 permitted domestic wells are present within an approximate three to three and a half-mile wide arc down-gradient east of the proposed project. Actual domestic diversions in this area may range from 40 to 600 acre-feet per year (AFY), depending on extent of use. Additional water rights filed in the same area include approximately 200 AFY for irrigation purposes (approximately 144 of which are associated with file SP-2490, a surface diversion on the Magado Creek, approximately three miles east of the project), approximately 15 AFY for sanitary use, approximately 18 AFY for stock use, and approximately 15 AFY for subdivision supply.

Within an approximate three to three and a half-mile long arc, north up Nogal Canyon from the proposed project some 40 or more permitted domestic wells are present. Actual domestic diversions in this area may range from 8 to 120 acre-feet per year (AFY) depending on extent of actual use. Additional water rights filed in the same area include approximately 840 AFY for irrigation purposes, approximately 400 of which are associated with surface water points of diversion.

Other water rights and use occur in close proximity to the proposed project in areas to the southwest, west and north-northwest. These areas are generally upgradient of the project, yet may see ground water declines related to proposed project pumpage.

17.4.C.2.:

Maps and a cross-section showing depth to water are provided. Report Figure 6 illustrates local **ground water gradient**, projected to the north and east from the project area.

Saturated thickness of the aquifer developed in the local Mesaverde Group deposits is noted to be at least 360-ft at project well H-3916 (report Appendix A), since water was encountered at approximately 140-ft. The report indicates other project wells planned will be designed to tap a significant thickness of this hydrogeologic unit. The region may show some variation in thickness of saturated Mesaverde deposits.

Initial static water levels from completed local wells, are presented in Well Records in report Appendix B. The water levels in many of those wells do not reflect the depth necessary to encounter the typical well's production zone, suggesting a locally-confined or semi-confined aquifer response. Some of the wells were constructed with deep screen sections to tap the deep production beds. Although more costly, a lengthy water column is typically the beneficial result of such a well design.

17.4.C.3.:

Well Records included in report Appendix B suggest a project-reasonable range of domestic well **yield** is common in the area (4 to >100 gpm short term yield). Yield associated with existing wells on project property has been shown to range between 7 and > 25 gpm during short-term testing. Wells tapping the water-bearing Mesaverde Group sediments (which underlie much of the project property and are typically characterized by low or moderate primary permeability) may reflect lower specific capacities in areas without enhanced secondary permeability, and greater drawdown in areas without good connection to underflow and recharge.

Based on review of Appendix B Well Records, it appears that adequate domestic well design, based on proper attention to hydrogeologic indicators during drilling, has often resulted in viable initial production from local domestic wells.

Site-specific test-pumping results have been submitted as part of the report, and analysis is offered regarding the disparity in results from different wells on project property tapping the aquifer developed in the Mesaverde Group. The results are interpreted to reflect variation in extent of aquifer penetrated by the wells, and condition of the well casing. Test-pumping results from the newly-drilled, fully-penetrating well H-3916 indicate high specific capacity, and aquifer transmissivity approximately an order of magnitude higher than many tested wells located in the shallow aquifer developed in Upper Hondo Basin Cretaceous-age deposits. Test-pumping results from older wells on project property indicate limitations in well design may limit their efficiency and production capability.

Given the seemingly high transmissivity indicated from H-3916 testing, other onsite test-pumping results would be valuable in establishing whether higher transmissivity may be expected across the project area. In lieu of the current availability of additional testing of fully-penetrating wells (which the disclosures note will occur), conservative simulations of aquifer response to proposed project pumping may be conducted. The OSE examined effects of use of very conservative aquifer parameters applied to subdivider's Theis simulation HPR4a. Additionally, observation well locations were simulated as the pumped wells themselves, while the simulated project diversion was pumped from only seven wells. In those simulations, sufficient water column remained in the pumped wells over the 40-year planning period to indicate the wells capable of retaining viability even when the effect of limited regional aquifer decline and dynamic drawdown were considered.

This prognosis is based on all project wells constructed to include 360-ft water columns, similar to H-3916, and essentially homogeneous aquifer contribution to the well. The Well Record provided for H-3916 does not suggest aquifer character is homogeneous, but test-pumping results of that well indicate the Well Record is in error regarding the depth and/or extent of production beds the well taps.

Other drilling in the region has and will demonstrate and clarify aquifer variability. This may be profound in western portions of the project area, where younger igneous rock is mapped as the surface geologic unit (report Figure 5). Report Figure 7 may oversimplify the subsurface relationship between sedimentary Cub Mountain and Mesaverde units, and the igneous Sierra Blanca Formation may be found to extend significantly deeper. This could result in exploring for water-bearing fractures in the poorly permeable igneous rock, and result in wells with significantly different response to pumping. The disclosure document notes (under "T. Water Delivery") that when deemed infeasible to connect an individual lot to a shared well system, subdivider will drill a well for the exclusive use of that lot. This may be necessary if low-yielding wells are encountered in the igneous units, or aquifer character varies to poorer performance within the project area.

Regional water level trends are addressed in the 6/2007 submittal, and explanation is offered regarding apparent discrepancies in earlier-reported water levels. Water level trends in the Hondo Basin have reflected a mixture of patterns, and local influences and aquifer compartmentalization may be responsible in part. The 6/2007 submittal offers perspective on a cyclicity that may exist in aquifer levels in the upper Hondo.

OSE simulations of proposed project pumping included an assumed conservative 20-ft aquifer level decline over the 40-year planning period. Given the extent of the proposed water columns for the project wells, a greater rate of regional aquifer decline could have been accommodated by the proposed wells, while remaining viable.

17.4.C.4.:

The report and 6/2007 submittal provide **40-year simulations of proposed project pumping** using the Theis analytical program. The 6/2007 submittal also includes simulation using a numerical groundwater model, partially calibrated against identified groundwater data. The OSE chose to use the Theis program to examine the project under more conservative assumptions to consider project well viability to furnish water sufficient in quantity to fulfill the maximum annual water requirements of the subdivision. Given the anticipated deep water column provided by the proposed project wells that will fully-penetrate the aquifer within the Mesaverde sediments, it appears to the OSE that such wells will remain viable over the 40-year planning period.

Should wells in any part of the project area (particularly in the western half of the tract) not fully penetrate the Mesaverde, insufficient information is available to project the required viability of the wells. Yet, use of conservative aquifer characteristics, lack of simulated recharge, assumption of a 20-ft regional aquifer decline, and assumed 10-ft dynamic drawdown in the Theis simulations, may alternately be conservative enough to incorporate the character of this portion of the ground water system into projections made.

Comment on potential impairment of existing rights by the proposed project diversion

The OSE is directed to provide Lincoln County with an opinion on whether the subdivider can furnish water sufficient in quantity to fulfill the maximum annual water requirements of the subdivision. Since it is the position of the subject subdivider to construct fully-penetrating wells apparently able to withstand the long-term effects of self-induced and regional aquifer declines, while providing the desired diversion, they place prospective buyers in a better position to withstand natural and man-induced aquifer draft than owners of some pre-existing, shallower wells, or surface water right holders.

While the OSE analysis under Lincoln County Subdivision Ordinance 2006-5 concurs with the finding of planning period viability of proposed project wells as indicated in subdivider submittals reviewed, the issue of impairment of existing water rights is beyond the scope and time constraints of this review.