

SCOPE

Santa Clarita Organization for Planning and the Environment

TO PROMOTE, PROTECT AND PRESERVE THE ENVIRONMENT, ECOLOGY
AND QUALITY OF LIFE IN THE SANTA CLARITA VALLEY

POST OFFICE BOX 1182, SANTA CLARITA, CA 91386



8-24-09

Attn: Donald Bedford
Re: Newhall EIR/EIS
California Dept. of Fish and Game
4949 Viewridge Ave.
San Diego, CA 92123

Attn: Aaron Allen
Re: Newhall EIR/EIS
US Army Corp of Engineers
2151 Alessandro Dr. Suite110
Ventura, CA 93001

Via email to: newhallranch@dfg.ca.gov

Aaron.O.Allen@usace.army.mil

Dear Sirs:

Santa Clarita Organization for Planning and the Environment is a California non-profit corporation founded in 1987 to monitor planning and conservation issues that affect the Santa Clarita Valley. We have sought protection for the Santa Clara River, its tributaries and floodplain for many years because we believe the community will be best served by leaving these resources in as natural a state as possible. A natural river system enhances ground water quality and ground water recharge, provides habitat for wildlife and recreational opportunities for families and children.

We urge you to consider these important beneficial qualities of a natural waterway as you evaluate the impacts of this project.

We hereby include by reference all comments made by other organizations that express concerns over the impacts of this project.

BACKGROUND

In 1998, the EIR/EIS for Newhall Land and Farming's, euphemistically entitled "Natural River Management Plan" 404 Permit was certified. This plan comprised some 59 projects along fifteen miles of the Santa Clara River that passed through the center of Santa Clarita and up San Francisquito Creek. It was supposed to be a new "comprehensive" permit that would protect the many endangered species along the river as development occurred. It allowed development in the floodplain of the Santa Clara River and San Francisquito Creek to move forward and enabled the elimination of the County's "Significant Ecological Area" designations in those reaches of the river, and in Bouquet Creek, San Francisquito Creek and Castaic Creek.

In the opinion of many, the “ Natural River Management Plan” has not worked well to protect species and the river.

For instance, to protect endangered bird species, Newhall Land’s “Natural River Management Plan” prohibited construction in the breeding season. Biologists were supposed to survey for nesting birds to make sure they were not disturbed by construction activities when nesting was taking place. Instead “noisemakers” were erected in prime habitat locations that emitted piercing tones to keep the birds away. Luckily a local bird enthusiast, Teresa Savaikie, noticed them, and US Fish and Wildlife demanded that they be removed.

Endangered or threatened birds and fish have virtually disappeared from the Natural River Plan Management area. No three spined unarmored stickleback can be seen and the arroyo chub died as tributaries were drained and channeled. The arroyo toad has disappeared and no one has seen a long eared jackrabbit in quite some time. Where are the pond turtles that used to frequent the banks of Castaic Creek? What happened to the Spade Foot toads in the wetlands next to what is now the Riverpark project that was supposed to be a mitigation wetland for the West Creek Project?

The “Oxbow Pond” in San Francisquito Creek that local conservationists were unable to save, was supposed to be “restored. It is still just a mound of dirt

Instead of the magnificent habitat that it once was, the river is now fraught with off road vehicle riders that create noise, dust and destruction.

Soil cement bank stabilization did not work as predicted in some areas and banks collapsed in high water events (this occurred near the Jefferson apartments on the Santa Clara River and along San Francisquito Creek near the Valencia II development.)

The 1998 Plan was approved for a twenty-year period and was supposed to create the safeguard of five-year periodic reviews to ensure that it was functioning as predicted. These five-year reviews were the only reason that the environmental community did not pursue legal remedies against a plan that appeared unable to carry out its charge of protecting fragile habitat and species on the brink. However, the reviews were not performed as expected, so even this final safeguard failed. Trapping and removing black eared jackrabbits and Spadefoot toads area while destroying their habitat as was conducted in the Riverpark area and in San Francisquito Creek did not save them.

All of these issues are easily verifiable with information currently in possession of the California Fish and Game Department and the Army Corps of Engineers. We include this information by reference in our comments.

Conclusion and Recommendations

The area now proposed for this new 404 permit is in an even more sensitive area of the river west of I-5 for the Newhall Ranch project. It is an area that was designated as critical habitat for the Least Bell’s Vireo. Biologists have also noted populations of three-spined stickleback

fish, arroyo toad, pond turtles and the rare San Fernando Valley Spine flower (that Newhall Land previously tried to illegally destroy) in this area. This plan would once again enable the destruction of a County designated Significant Ecological area and allow building in the floodplain.

With thousands of housing units already permitted but unbuilt in the Santa Clarita Valley, pads in the nearby Riverpark project and West Creek standing empty and a looming water crisis, this project does not seem to meet threshold requirements for Federal or State approval.

However, should the permitting agencies wish to proceed with such an approval we request the following:

- A survey of the success rate of mitigation for Newhall Land's 1998 404 permit.
- A survey of endangered and threatened species within the 1998 404 permit area to determine their survival rate and thus, how protective that plan was of the various bird, reptile, amphibian and aquatic species.
- No new additional permits should be granted until all required mitigation, including wetland restoration, is completed for the previous 404 permit
- A fund must be set up to hire an independent biologist to track mitigation requirements and ensure they are met.
- Violations should automatically incur an immediate "stop work" order until restitution is provided (this is already a standard condition of the County's Oak Tree permit)
- A five-year *public* review period should be required. At each five year period the developer and agencies must provide a list of all required mitigation and note whether or not it has been completed, and a recent biological survey to determine whether species are protected by the permit. No further work should occur if mitigation is not completed and species have disappeared.
- Off road vehicle use in the river must be banned and a funding mechanism for enforcement created
- No automatic Plan amendments should be granted. Public review must be required for all proposed amendments.
- A greater set back that protects a larger area of the floodplain must be required
- Due to Newhall Land's current tenuous financial situation and the current problems in the housing market, bonding must be required to ensure that promised mitigations will be funded.

BIOLOGY

Please explain how a "take" permit can be issued for CESA species such as the white-tailed kite and three-spined unarmored stickleback, both present on the project site. It is our understanding that no take is allowed for CESA species.

Wildlife Corridors

Due to the intense wildfires we are suffering in this area and will continue to suffer due to global warming, wildlife corridors must be available and numerous, so that animals have both an escape route and a way to move to new forage.

Access to the river for animals must be ensured so that they can reach a source of water.

4.8 TRAFFIC

Page 4.8-31 of the traffic section states:

“The geographic distribution of trips to and from the Project area are shown in **Figure 4.8-12**, Project Distribution Patterns, which shows the percent of Project trips on each major roadway serving the Project area. As expected, there is a high orientation to the VCC area adjacent to the Specific Plan area with 12 percent of the trips attracted there. East of the I-5, trips disperse into areas such as Valencia Industrial Center and the Town Center area.”

These statements seem to erroneously imply that most people who live in the Specific Plan or Entrada will work in nearby commercial or industrial centers. In fact, that is not the traffic model generated by two income families who must both travel to a job in order to pay the mortgage. Modeling traffic patterns in the west San Fernando Valley where the 101 freeway is now congested in both directions might make a more accurate traffic prediction. In spite of the nearby Warner job Center, people are obviously still driving elsewhere for employment.

The traffic section fails to discuss the serious impacts of this project on the North San Fernando Valley where people already travel and will continue to travel for jobs. While acknowledging that indeed impacts will occur, no modeling is done for traffic to the LA area and no mitigation is provided.

Further, increased traffic generated by projects outside the area was not modeled. This includes the proposed Tejon Ranch project and increased container traffic moving up the I-5 from the Port of Los Angeles.

Climate Change¹

The DEIR/EIS admits that neither the Newhall Specific Plan nor the Valencia Commerce Center addressed greenhouse gas (GHG) generation during their project approval processes. Since this document represents the next administrative permit, it is appropriate and required to address this issue now.

The DEIR should estimate average trip length and average fuel efficiency of the vehicles and then calculate their carbon dioxide emissions. The EPA has many different tools available for calculating emissions.

¹ See attached Appendix A beginning at page 18 for an in depth discussion of effects of Climate Change

They are available at:

<http://yosemite.epa.gov/oar/globalwarming.nsf/content/ResourceCenterToolsCalculators.html> ; *see also* http://pubs.wri.org/pubs_description.cfm?PubID=3756 (which contains calculators for CO₂ emissions from fuel used for heating and transportation, CO₂ emissions from purchased electricity, CO₂ emissions from business travel by air, train, bus and car, and CO₂ emissions from employee commuting).

Calculation of the project's greenhouse gas emissions is the first step to then analyzing and mitigating them.

Climate Change Mitigation

The project could include mitigation for these impacts. The Governor has recognized, "mitigation efforts will be necessary to reduce greenhouse gas emissions and adaptation efforts will be necessary to prepare Californians for the consequences of global warming." Executive Order S-3-05, June 1, 2005. Increased public transportation, increased support of alternative fuels and technologies, the purchase of carbon offsets (or mitigation "credits"), installation of electric vehicle charging stations, and other affirmative steps to reduce the transportation impacts of CO₂, could be considered as potential mitigation projects. These are real, achievable and available mitigation measures that could be considered when the DEIR analyzes the project's greenhouse gas emissions and their impact on climate change.

There are many avoidance and mitigation measures available to the applicant. Adopting these measures will benefit the environment, take the state closer to meeting its greenhouse gas emissions reduction targets, and demonstrate responsible development. These measures may also save the applicant and future residents of the project money. Measures to minimize greenhouse gas emissions include:

- Following the U.S. Green Building Council's LEED (Leadership in Energy and Environmental Design) or comparable standards for energy- and resource-efficient building during pre-design, design, construction, operations and management. *See* <http://www.usgbc.org> and links; Alameda County 2005
- Minimizing and recycling construction-related waste
- Using salvaged and recycled-content materials for building, hard surfaces, and non-plant landscaping materials
- Maximizing water conservation measures in homes and landscaping, using drought-tolerant plants in lieu of turf, planting shade trees
- Installing the maximum possible solar energy array on the building roofs and/or on the project site to generate solar energy for the facility
- Using passive natural cooling, solar hot water systems, and reduced pavement
- Landscaping to preserve natural vegetation and maintain watershed integrity
- Installing electric vehicle charging stations at the facility
- Constructing the most energy-efficient buildings possible, to decrease heating and cooling costs
- Utilizing the combination of construction materials with the lowest carbon footprint
- Utilizing only Energy Star heating, cooling, and lighting devices, and appliances
- Ensuring that public transportation will serve the site, by constructing bus stops or other facilities and funding the transportation agency if necessary

- After all avoidance and minimization measures have been incorporated, purchasing offset credits for the project's lifetime greenhouse gas emissions

Once all measures to avoid and minimize greenhouse gas emissions have been adopted, the project's remaining greenhouse gas emissions should be calculated, and offsets purchased to mitigate for them. There are many options for purchasing carbon offsets (or credits), including but not limited to the following:

- The Chicago Climate Exchange (<http://www.chicagoclimatex.com/>)
- Climate Care (<http://www.climatecare.org/>)
- My Climate (<http://www.myclimate.org/>)
- Climate Friendly (<http://www.climatefriendly.com/>)
- The Carbon Neutral Company (<http://www.carbonneutral.com/>)
- The Climate Trust (<http://www.climatetrust.org/>)
- Renewable Choice Energy (<http://www.renewablechoice.com/m/index.php>)

Conclusion and Recommendations

A new traffic model must be constructed that accurately depicts the full range of trips to and from outside the area, as well as cumulative traffic trips generated by other projects.

A calculation of GHG emissions for the project must be formulated. Additional, updated mitigation measures must be listed in this document.

4.3 WATER RESOURCES

The Newhall Ranch Specific Plan was approved in 2003. At that time, California was already experiencing challenging and rapidly changing statewide water supply issues. The County anticipated changed circumstances by crafting conditions of approval requiring water issues to be reviewed at each tract map approval.² Among other conditions, these include the following³

- SP-4.11-5 (requires annexation to the Valencia Water Company prior to issuance of building permits)
- SP-4.11-6 (requires confirmation of adequate water supply when submitting tentative tract map applications)
- SP-4.11-7 (requires review of recycled water uses)
- SP-4.11-8 (requires the applicants of future subdivisions to finance expansion costs of extending water service)

The EIR/EIS jurisdictional decision requires that impacts of the total project be reviewed in order to obtain the Clean Water Act 404 permit and California Fish and Game Streambed Alteration Agreement.

² EIR/EIS p. 4.3-4

³ EIR/EIS p. 4.3-3

In spite of the monumental changes in water supply circumstances that have occurred over the ensuing six years since the approval of the Specific Plan, the water section of the EIR/EIS wrongly begins with the Specific Plan finding that adequate water supply exists for this project.

Changed Circumstances

Because the California Environmental Quality Act requires review of substantially changed circumstances at the next administrative hearing, and the EIR/EIS is the next administrative hearing, this document must address whether an adequate water supply for this project exists.

The changed circumstances include:

- The Santa Clarita Sanitation Districts failure to meet the Clean Water Act Total Maximum Daily Load (TMDL) standard for chloride of 100mg/l in the Santa Clara River as a result mainly of the sharp and continuing increase in the use of imported State Water Project (SWP) water.

This failure resulted in the stakeholder development of a comprehensive compromise plan⁴ to achieve compliance. Without the immediate construction of the Newhall Ranch Water Reclamation Plant, approved as an RO (reverse osmosis salt removal system) facility, the additional imported Nickels water will add to this load. Apparently there are no plans to build this plant for the first phases of Newhall Ranch. Nor does it appear that the additional unreviewed 1725 units proposed for the Entrada project will be served by a new RO sanitation facility.

We believe that the DEIR/EIS must discuss this potential inability to comply with the Clean Water Act.

Elimination of brine effluent from the RO (reverse osmosis) sanitation process must also be discussed. There is no brine line from Santa Clarita to the ocean. Therefore this facility must either be built at great expense (an estimate of \$50 million was purposed during hearings), the brine effluent must be trucked away, or it must be injected into local oil wells.

Newhall Ranch planned to utilize abandoned oil wells on its property for injection purposes, but no studies have been conducted on the feasibility of this proposal. A study should be conducted and mitigation measures developed to ensure that salty water would not leak from these proposed injection wells and pollute ground water.

Also, no estimate of the capacity or life of these abandoned wells exists. It is essential to calculate this capacity in order to approximate the number of years for which brine storage would be available before other more expensive methods would have to be utilized. Such an estimate could be made by obtaining production records for the proposed abandoned wells, calculating the amount of brine that will be generated on a daily basis and then calculating how long the storage capacity of the abandoned well will last. **Since Condition 4.11-8 required Newhall to pay for the cost of water expansion and treating effluent will be a**

⁴ Memorandum of Understanding for Implementation of an Alternative Water Resources Management Plan, Oct. 2008, attached

cost of that water expansion, Newhall must make and disclose these calculations in the EIR/EIS.

This compromise Plan to meet an adjusted chloride standard will direct desalinated recycled water to reduce the level of chlorides in the sanitation plant effluent as its first and primary purpose⁵, thus reducing the availability of recycled water to the Newhall Ranch Specific Plan. This impact must be disclosed and discussed in the Newhall Ranch DEIR/EIS.

Failure to comply with the comprise Plan worked out with basin stakeholders will result in the imposition of the stricter 100 ugi TMDL standard.

- Although Newhall asserts that part of its water supply will come from approximately 9000 AF of recycled water, no contract or option exists between the Sanitation District and the owners of Newhall Ranch for the purchase of recycled water. The Recycled Water Master⁶ indicates many other projects that may wish access to recycled water.

A contract currently exists between the Sanitation Districts and Castaic Lake Water Agency for only 1700 AF, part of which is now being utilized on another Newhall Land project.

- New standards and water quality requirements for water used to recharge ground water aquifers that may affect Newhall's ability to inject water for storage in the local aquifer as previously relied upon for its Aquifer Storage and Recovery (ASR) system.

Condition 4.11-14 requires water injected into ground water wells to meet Regional Water Quality Control Board standards. Requirements of the Regional Water Quality Control Board for injection wells into ground water aquifers should be discussed in the EIR/EIS. Current chloride levels in SWP water do not meet these standards. Additional pollutants in ground or surface water sources may limit water well injection.

- Numerous Federal Court Decisions and Biological Opinions aimed at protecting listed endangered fish species from extinction in the Sacramento San Joaquin Delta by reducing pumping to the State Water Project Aqueduct. These decisions have reduced the quantity of water available to all users south of the Delta.
- Recent changes in State law that would now allow the diversion of residential gray water for home landscaping purposes, thus reducing the amount of recycled water generated (this may result in no net change since it would hopefully reduce the amount of water used for home landscaping, but the issue needs to be reviewed).
- It appears that no agreement with the Department of Water Resources (DWR) to move the Kern River water purchased from the Nickels family from the Tubman turnout in Kern County to Newhall Ranch exists.⁷

A wheeling agreement must exist before water can be delivered to Newhall Ranch. It is our understanding that the WR does not make such agreements with private parties. How will

⁵ MOU of an Alternative Water Resources Management Program, Oct 2008, Page 2

⁶ Available for review only at library locations

⁷ Landmark Village DEIR, Volume VI, Appendix 4.10f, Nickels water contracts, Pages 2 and 5 of Contract between Nickels and NLF pdf pages 121,124

this water be wheeled from the Tubman outlet to the Santa Clarita Valley? If an agreement exists, it should be disclosed in the DEIR/EIS.

- The Environmental documentation for the acquisition of this firm water supply by the Nickels family described a “Kern River Restoration and Water Supply Recovery Program”.⁸

The Environmental documentation did not describe the acquisition of water for transfer out of the Kern Basin for the Newhall Ranch project. Proper environmental review must be completed prior to an actual transfer.

- Contracts for options on an additional 7,648 AF of water transfers counted as available in the Specific Plan EIR expired in 2002.

No renewals or additional contracts were disclosed in subsequent environmental documentation, nor in this EIR/EIS.

- The failure of agricultural water calculations to account for the recharge of the basin by agricultural return water and the loss of that recharge to the alluvial system as urban hardscaping occurs.⁹

Newhall Land cannot count the same amount of water as it pumped for farming, because farming water recharges the river. Irrigation “returns” account for as much as 70% of the farming water used. It does not appear that the re-charge from irrigation returns was calculated in estimates of water available from ground water pumping.

- Water wheeling projects such as increased SWP water deliveries to projects on the west branch of the State Aqueduct, including the proposed Tejon Ranch, the Nickels Water from Kern County for the Newhall Ranch, Yuba River water recently purchased by Castaic Lake Water Agency and extensive storage agreements in Kern County that will require water deliveries southward, have been negotiated or proposed subsequent to the approval of the Specific Plan.

Aqueduct capacity for cumulative wheeling agreements that affect the West Branch of the SWP aqueduct must be evaluated. Although the aqueduct itself may have adequate capacity to support these additional deliveries, bottlenecks such as the Oso pump station may not.

- Los Angeles Regional Water Quality Board passed a Resolution¹⁰ re-asserting its authority to develop policies to address the adverse impacts of hydromodification.

The EIR/EIS should describe how it plans to comply with 401 certification in light of this Resolution.

⁸ *Ibid.*, Appendix 4.10g, Nickels Water Environmental documents

⁹ Correspondence, Fox Canyon Groundwater Management District

¹⁰ RWQCB RESOLUTION NO. 2005-002, January 27, 2005 “Reiteration of Existing Authority to Regulate Hydromodifications within the Los Angeles Region, and Intent to Evaluate the Need for and Develop as Appropriate New Policy or Other Tools to Control Adverse Impacts from Hydromodification on the Water Quality and Beneficial Uses of Water Courses in the Los Angeles Region”

- A monumental bankruptcy proceeding, from which Newhall and its parent entities have now emerged as a new re-organized company, but which may still make financing for the extensive and expensive infrastructure needed for this project difficult proposition.

Specific Plan Condition 4.11-8 requires the applicants of future subdivisions to finance water expansion costs. According to news articles, Newhall emerged from bankruptcy with 90 million in cash. Estimates of costs for a new sanitation plant were around \$100 million alone. Acquisition of water transfer authority, pipes, treatment plant expansions, etc will add substantially to this cost. We believe that Newhall must disclose a financial plan detailing estimated costs and how it will pay for these capital improvements.

Specific Plan Conditions for which Information should be Provided in the DEIR/EIS

Other conditions required by the Specific Plan indicate areas of concern and provide a road map to indicate what information would be of greatest importance for evaluating this proposal. Much of the required information was however, not included or evaluated by this document.

For example:

- SP-4.11-22 (requires identification of irrigated farmland proposed to be retired in order to serve subdivisions)

Although a map of all irrigated farmland appears in the EIR, the purpose of this condition was to assure that fallowed farmland would yield that amount of water indicated in the Specific Plan. Therefore, the report required by this condition should indicate which crops are currently growing in the area proposed to be fallowed for each tract and how much water that will yield. Such a chart should be easy to compose from Newhall's farming operations.

- SP-4.11-15 (requires groundwater pumping from the Alluvial aquifer to be monitored)

Overdraft of the alluvial aquifer has been at issue for many years. While Valencia Water Co., and Newhall Land and Farming argued that the Santa Clara River was not in a state of overdraft, downstream users including United Water Conservation District and Ventura County remained skeptical and concerned. They withdrew their objections only after a Memorandum of Understanding¹¹ was signed, agreeing to ground water monitoring in which United Conservation District would participate. Ventura County was not included in that agreement and should have been.

Interestingly, the most recent report produced for this MOU was completed in April of 2009. It is not included in this document even though its production is solely a result of agreements surrounding the Specific Plan. Why was it excluded? We believe that this report must be provided to all commentors and its findings included in this analysis.

The DEIR EIS does not give an accurate view of the full extent of ground water pumping in the Upper Santa Clara Basin. For example, the ground water pumping chart on page 4.3-42 leaves off pumping by Newhall Land and Farming, and private users as disclosed in the

¹¹ MOU August 2001, Available for review only as a hard copy in Library locations in spite of the fact that it is extensively cited in the EIR/EIS (see page 4.3-123) and reviewers are referred to it for further information.

Water Supply reports in the appendices. Why is this information not in the main body of the document? This information should be included.

The local well owner's association has long complained that private pumping is underestimated in ground water documents and have expressed concern that the viability of their wells may be affected by additional pumping¹².

Further, there is considerable biological evidence that overdraft of the Santa Clara River exists, particularly in the upper reaches. The die back of vegetation away from the center of the streambed in the upper reaches is a prime indication of such overdraft as described in USGS "Sustainability of Ground Water Resources", Circular 1186¹³. **No studies exist to evaluate this impact and it is not discussed in the DEIR EIS.**

Also, no study of subsidence, another indication of groundwater overdraft has ever been conducted for the Upper Santa Clara Basin.

These omissions become even more disturbing upon reading:

Groundwater quality is a key factor in assessing the Alluvial aquifer as a municipal and agricultural water supply. In terms of the aquifer system, there is no convenient long-term record of water quality, (*i.e.*, water quality data in one or more single wells that spans several decades and continues to the present). Thus, in order to examine a long-term record of water quality in the Alluvium, individual records have been integrated from several wells completed in the same aquifer materials and in close proximity to each other to examine historical trends in general mineral groundwater quality throughout the basin. Based on these records of groundwater quality, wells within the Alluvium have experienced historical fluctuations in general mineral content, as indicated by electrical conductivity (EC), which correlates with fluctuations of individual constituents that contribute to EC. The historic water quality data indicates that, on a long-term basis, there has not been a notable trend and, specifically, there has not been a decline in water quality within the Alluvium.

Specific conductance within the Alluvium exhibits a westward gradient, corresponding with the direction of groundwater flow in the Alluvium. EC is lowest in the easternmost portion of the Basin, and highest in the west. Water quality in the Alluvium generally exhibits an inverse correlation with precipitation and streamflow, with a stronger correlation in the easternmost portion of the Basin, where groundwater levels fluctuate the most. Wet periods have produced substantial recharge of higher quality (low EC) water, and dry periods have resulted in declines in groundwater levels, with a corresponding increase in EC (and individual contributing constituents) in the deeper parts of the Alluvium."¹⁴

¹² See comment letters, Newhall Ranch Specific Plan and Landmark Village from Santa Clarita Valley Well Owners Association.

¹³ Whole document can be viewed at pubs.usgs.gov/circ/circ1186 Relevant section is "Effects of Ground water Development on Ground water Flow – Streams", see especially pg. 5 of pdf attachment

¹⁴ EIS, page 4.3-57

This statement seems to be saying that everything is fine as long as past precipitation trends continue, and that drought particularly causes a problem in the eastern portions of the basin. The discussion continues:

“Similar to the Alluvium, groundwater quality in the Saugus Formation is a key factor in assessing that aquifer as a municipal and agricultural water supply. As with groundwater level data, long-term Saugus groundwater quality data is not sufficiently extensive (few wells) to permit any basinwide analysis or assessment of pumping-related impacts on quality. As with the Alluvium, EC has been chosen as an indicator of overall water quality, and records have been combined to produce a long-term depiction of water quality. Water quality in the Saugus Formation has not historically exhibited the precipitation-related fluctuations seen in the Alluvium. Based on the historical record over the last 50 years, groundwater quality in the Saugus has exhibited a slight overall increase in EC. More recently, several wells within the Saugus Formation have exhibited an additional increase in EC similar to that seen in the Alluvium.”¹⁵

This section states that both the Saugus Aquifer and the Alluvial Aquifer are exhibiting some increase in EC indicative of ground water overdraft. However, the statement is made in such a round about way that the clear conclusion that ground water is indeed being impacted is obscured.

- SP-4.11-16 (requires agricultural groundwater to meet drinking water quality standards)

The Specific Plan requires agricultural wells used to serve the project to meet drinking water standards. The Settlement Agreement requires that those reports be provided to the petitioners.

A water quality report appears in the appendix¹⁶ but most of the data is from 2004 “pending” wells. The only recent report (2008) is for Well E-15. E-15 appears to serve current customers in the Valencia Commerce Center. Please provide the required water quality reports for the wells that will serve this project. Also, please indicate which wells will serve the project.

- SP-4.11-18 (requires preparation of annual report on Semitropic Groundwater Banking Project)

This requirement apparently has not been met since no annual report indicating yearly additions or withdrawals to the Banking Project appears anywhere in the EIR/EIS.

This is particularly important because the DEIR/EIS states:

“Sources of water that could be stored include, but are not limited to, the Nickel Water. The stored water could be extracted in dry years in amounts up to 4,950 afy. As of December 31, 2007, there is 18,828 af of water stored in the Semitropic Groundwater Storage Bank by the Specific Plan applicant for the Specific Plan.”¹⁷

¹⁵ *Ibid*, page 4.3-59-60

¹⁶ Appendix 4_3zaWell data

¹⁷ EIS,p. 4.3-37

What are these other sources? Since SWP Article 21 water has not been available for several years and may not be available due to pumping impacts to endangered fish species, it is important that potential sources be listed or that such ambiguous statements be eliminated from the DEIR/EIS.

The DEIR/EIS goes on to state that this water will only be needed when agricultural wells can no longer produce an adequate supply to provide for the project units and estimates this limit to not occur until the 21st year.

Such a statement is grossly under supported since no indication of increasing water demand of other previously approved projects in the Santa Clarita Valley is indicated on the needs timeline (Table 4.3-19). Instead, a poorly documented Tech Memo¹⁸, containing no actual unit calculations tries to make the argument that the Specific Plan will use less water than previously estimated.

In fact, the Santa Clara River is NOT an adjudicated basin. **Valencia Water Co. has no adjudicated right to any amount of water from the Santa Clara River.** Water needs elsewhere in the upper watershed may have to be supplied from Valencia's existing agricultural wells. Indeed, the one agricultural well that is currently producing, E-15, is now serving existing customers in the Commerce Center. No discussion of existing uses is included.

The most recent ground water monitoring report, released in April 2009 and NOT included in this review, stated that the current proposed increased pumping regime might not produce sufficient water supply in the easterly portions of the basin. Wells in the eastern portion already go dry during low precipitation years. Due to this problem, existing western basin housing developments, particularly those in the Valencia Service Area, may need to be supplied by these wells, while existing state water supplies are routed to the eastern reaches to support non-producing wells.

Failure to disclose these issues and the failure to include this most recent report in this document is a substantial failure of disclosure on the part of the Applicants. Since Valencia Water Co. is a wholly owned subsidiary of Newhall Land and Farming, Newhall is fully aware of this issue.

Finding of No Significant Impact

Thus the finding of **no Impact Significance** for water supply made on page 4.3-87:

“The groundwater supply for the Specific Plan post-development would not require an increase in groundwater pumping beyond the applicant's existing agricultural allocation (7,038 afy).”

¹⁸ Appendix 4.3t

is deceptively inaccurate since 1) there is no existing agricultural “allocation”, 2) the most current groundwater monitoring report is missing from the DEIR/EIS, 3) reductions in imported state water supply due to Federal Court decisions and global warming were not considered 4) accurate water demand from existing approved entitlements was not considered.

Further the ensuing statement:

“In addition, irrigation used in the Project area would increase the amount of recharge available to the Santa Clara River.”

is patently false, since 1) farming operations were already providing more substantial groundwater recharge than urban development will ever provide, 2) the farming return water was not included in calculations of the affect of ag water withdrawals on groundwater levels 3) ag water withdrawals were calculated in concurrence with an aquifer recharge program that seems no longer to be considered in the DEIR/EIS.

Last:

“Development of the Specific Plan area would significantly increase the area of irrigated landscaping on currently undeveloped land, which would serve to increase the amount of recharge to the area”

This statement supported with memos by Ludorff and Scalminini and Porcello, (both hired by Valencia Water Co. the water company owned by Newhall Land and Farming) representing the clearly absurd hypothesis that urbanization of open, natural areas results in *additional* groundwater recharge, is not supportable. Standard reference and teaching materials produced by US EPA, USGS and prior Santa Clarita Valley hydrological reports all document loss of ground water recharge from urbanization hardscaping. Further, standard LA County Flood Control manuals also calculate increased run off from urbanization. Many of us have long believed that such unsupported statements, made merely to promote a particular developer’s project, should lead decision makers to doubt the veracity of other information provided by these consultants.

Permanence of the 41,000 AF Monterey Transfer

The environmental documentation for this transfer has not been reviewed or certified as of the date of these comments. The 41,000 AF transfer was not listed as one of the permanent and completed transfers in the settlement agreement between the Planning and Conservation League, et al. and the DWR. Now, with all the additional issues surrounding SWP it is more important than ever that this CEQA document be completed before new projects rely on this water transfer.

The DEIR/EIS makes the following statement

"In Santa Clarita Organization for Planning the Environment v. County of Los Angeles (2007) 157

Cal.App.4th 149 (SCOPE II), the Second District Court of Appeal, Division Six, affirmed the trial court's decision upholding the validity of the EIR's water supply

analysis for the West Creek development project in the Santa Clarita Valley, including the EIR's assessment and reliance upon the permanent and final 41,000 afy water transfer. In applying the four principles for a CEQA analysis of future water supplies articulated by the California Supreme Court in *Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova* (2007) 40 Cal.4th 412 to the 41,000 afy transfer, the Court of Appeal concluded that the transfer is permanent and final, and that with or without the Monterey Agreement and Monterey Amendments, the transfer is valid, permanent, and final, and could be relied upon in the project EIR as part of the water supplies in the Santa Clarita Valley.”¹⁹

This statement grossly miss-represents the finding of the Court in this case²⁰. The quoted language about "final and permanent" was actually a reference in the decision to the content of the West Creek EIR, not what the Court determined. Based upon the limited record available in that case, the court merely found reasonable the EIR's speculation that the outcome of the Monterey Agreement litigation was unlikely to unwind the transfer.

Consistency with the Urban Water Management Plan

The 1725 unit Entrada project does not appear to be included in the most recent Urban Water Management Plan (2005).

Effects of Global Warming on Water Supply

While the DEIR/EIS does discuss a potential reduction in water supply due to global warming, it does not discuss the reduction in energy that such a loss of water supply will also incur.

It is estimated that as much 20% of total energy use in California is consumed to move water, particularly by the massive pumps that lift SWP water over the Tehachapi Mountains. Dams generate much of California's electricity. With less water moving through those turbines, energy output will be reduced statewide unless substitute methods of generation come on line. Such peripheral effects should be discussed.

Conclusion and Recommendations

We believe that the Specific Plan, Entrada and the VCC will significantly impact water resources in the Santa Clara Valley by both the substantial water demand of the projects themselves as well as the need to supply existing approved entitlements with the agricultural water previously proposed to be used to supply the Specific Plan.

It appears that information and documents that might show this to be the case have either been excluded from the discussion or obfuscated.

It should be re-iterated that Valencia Water Co. is the wholly owned subsidiary of the Newhall Land and Farming Company. It would be difficult for a general manager, whose job

¹⁹ EIS, pg. 4.3-68-69

²⁰ See Appendix 4.3 for a copy of the SCOPE II Decision

may obviously be subject to his ability to find an adequate water supply for his parent company's developments, may not make as thorough a disclosure of problems as an independent public resource agency.

It should be further noted that Valencia Water Co. manages many of the water reports produced for the Santa Clarita Valley, including the annual Water Report. Thus they control consultants who often are the same ones that work on Newhall Land's development documents.

Such concerns over accuracy and disclosure should be obvious to anyone after reading the extent of litigation discussed in the DEIR/EIS related to water issues in the Santa Clarita Valley.

We therefore make several recommendations towards providing a more balanced and thorough document:

- 1) Require a water analysis to be prepared by an unrelated third party chosen by, for example, the US EPA or USGS.
- 2) Wait until the most recent Water Reliability Report from the Dept. of Water Resources is released (release projected for late 2009 early 2010) so that it can be included in this document.
- 3) Re-circulate the document with all reference materials included on disc so that they are available to all reviewers.
- 4) Re-circulate the DEIR/EIS making available the Revised Water Supply Assessment for the Landmark Village Recirculated EIR, prepared by Valencia Water Company, April 2009, which was cited in the text²¹ but not included in the appendices.
- 5) Re-circulate and include the April 2009 Ground Water Monitoring Report and the Memorandum of Understanding for Implementation of an Alternative Water Resources Management Plan, Oct. 2008
- 6) Require that Ventura County a biologist representing the environmental community be included on the ground water monitoring MOU and receive their evaluation.

Thank you in advance for addressing these issues.

Sincerely,



Lynne Plambeck
President

²¹ EIR/EIS pg. 4.3-10

Attachments:

1. Appendix A (beginning on Page 18)
2. Memorandum of Understanding for Implementation of an
Alternative Water Resources Management Plan, Oct. 2008
3. Correspondence, Fox Canyon Groundwater Management District
4. RWQCB, Resolution #2005-002
5. News Articles Re: Newhall Bankruptcy, July 2009
6. Excerpt. USGS Circular 1186, 2007

APPENDIX A

Global Implications of Climate Change and Greenhouse Gas Emissions

1. Rising Global Average Temperatures

The Intergovernmental Panel on Climate Change (“IPCC”) has concluded that the global average temperature has risen by approximately $0.6^{\circ}\text{C} \pm 0.2\text{C}$ during the 20th century (IPCC 2001). There is an international scientific consensus that most of the warming observed has been caused by human activities (ACIA 2004; IPCC 2001). Carbon dioxide emissions, carbon dioxide concentrations, and temperature over the last 1,000 years are all correlated (ACIA 2004). Mean temperatures during the 20th century were the highest in 1,000 years (Albritton et al. 2001). Global climate has changed in other ways as well. For example, precipitation has increased by 0.5 to 1% per decade in the 20th century over most mid- and high latitudes of the Northern Hemisphere continents, and to a lesser degree over the tropical land areas in the Northern Hemisphere (IPCC 2001).

Global average temperature increases mask significant regional variation. Due to a number of positive feedback mechanisms, warming in the Arctic has been and will be greater and more rapid than in the rest of the world (ACIA 2004). Warming in the Arctic is in many ways a harbinger of what is to come in other areas. Changes already observed in some areas of the Arctic dwarf global averages. In extensive areas of the Arctic, air temperature over land has increased by as much as 5°C (9°F) over the 20th century (Anisimov et al. 2001).

All climate models predict significant warming in this century, with variation only as to the rate and magnitude of the projected warming (ACIA 2004). Determining the degree of future climate change requires consideration of two major factors: (1) the level of future global emissions of greenhouse gases, and (2) the response of the climate system to these emissions (“climate sensitivity”) (ACIA 2004a). Global warming will continue and accelerate if greenhouse gas emissions are not reduced.

As hard data are not available for events that have not yet occurred, the future level of society’s greenhouse gas emissions must be projected. The IPCC has produced a Special Report on Emissions Scenarios (“SRES”) (Nakićenović et al. 2000) that describes a range of possible emissions scenarios based on how societies, economies, and energy technologies may evolve, in order to study a range of possible scenarios (ACIA 2004a; Albritton et al. 2001).

Climate models make different assumptions regarding how various aspects of the climate system will respond to increased greenhouse gas concentrations and warming temperatures. These differing assumptions are expressed as “climate sensitivity,” defined as the equilibrium response of global mean temperature to doubling levels of atmospheric carbon dioxide (Stainforth et al. 2005). The IPCC (2001) used climate sensitivities of 1.3-5.8K for projections of warming from 1990-2100 (Stainforth et al. 2005).

Using the SRES emissions scenarios and the world’s leading climate models, the IPCC predicts that the global average temperature will warm between 1.4 and 5.8°C by the end of

this century. Warming will be greater in the Arctic, where the annual average temperatures will rise across the entire Arctic, with increases of approximately 3-5° C over the land areas and up to 7° C over the oceans. Winter temperatures are projected to rise even more significantly, with increases of approximately 4-7° C over land areas and approximately 7-10° C over oceans (ACIA 2004a). Year-to-year variability is also projected to be greater in the Arctic than in other regions (ACIA 2004a).

For a number of reasons, IPCC (2001) and ACIA (2004) projections may be significant underestimates of the amount and rate of warming. First, the planet is already committed to an additional 1° F warming from the excess solar energy already in our climate system, due to lag time in the climate response (Hansen 2005). Second, actual worldwide greenhouse gas emissions may be on the high end or above the range of the IPCC scenarios. All scenarios utilized by the IPCC assume that energy use will shift away from fossil fuels to a greater percentage of sustainable energy sources and that worldwide greenhouse gas emissions will begin to decline during this century (IPCC 2001). Yet the most recent energy projections show that if current policies continue, worldwide greenhouse gas emissions will be 52% higher in 2030 than they are today (IEA 2005).

Third, climate sensitivity may be substantially greater than the levels used by IPCC (2001). Results from the *climateprediction.net* experiment indicate that much larger climate sensitivities of up to 11.5K are possible (Stainforth et al. 2005). Chapin et al. (2005) studied the warming amplification caused by the expansion of shrub and tree cover in the Arctic and resulting increase in solar absorption. This amplification could be as much as two to seven times (Chapin et al. 2005), and is not accounted for in the climate models used in IPCC (2001) (Foley 2005).

Recent data on the unexpectedly fast rate of warming in the Arctic also reinforces the likelihood that the IPCC (2001) projections will need to be revised upwards. Overpeck et al. (2005) concluded that the Arctic is on a trajectory towards an ice-free summer state within this century, a state not witnessed in at least the last million years (Overpeck et al. 2005). These scientists conclude that there are few, if any processes or feedbacks within the arctic system that are capable of altering the trajectory toward this ice-free summer state. In September, 2005, scientists reported a new record Arctic sea-ice minimum for the month of September (NSIDC 2005). These scientists called the sea ice reduction “stunning” and concluded that Arctic sea ice is likely on an accelerating, long-term decline (NSIDC 2005).

2. The Impacts of Global Warming Generally

Global warming consists of more than just increases in global average temperature. In 2001 the IPCC predicted a 90-99% chance of the following weather changes:

- Higher maximum temperature and more hot days over nearly all land areas;
- Higher minimum temperatures, fewer cold days and frost days over nearly all land areas;
- Reduced diurnal temperature range over most land areas;

- Increase of heat index over land areas;
- More intense precipitation events.

Albritton et al. 2001.

The IPCC also predicted a 66-90% chance of the following:

- Increased summer continental drying and associated risk of drought;
- Increased in tropical cyclone (hurricane) peak wind intensities;
- Increase in tropical cyclone mean and peak precipitation intensities.

Albritton et al. 2001.

Greenland ice cores indicate that the climate can change very abruptly. Scientists caution that thresholds may be reached that trigger rapid and extreme climatic changes that are difficult to predict but could be devastating. Examples include the shut down of the North Atlantic thermohaline circulation, which transfers heat from the equatorial regions to the Arctic, which could plunge northern Europe into a new ice age. The more rapid melting of the Greenlandic ice sheet, once thought to be several centuries away, could trigger this impact and also result in global sea level rise of up to six meters, completely eliminating many coastal areas. As in the case of the shift to an ice-free Arctic summer, scientists warn that we may be very close to crossing thresholds of rapid climate change from which there is no return.

Increased intensity of precipitation events due to global warming has long been predicted by climate models and remains a consistent result of the most advanced modeling efforts (Cubasch and Meehl 2001). In global simulations for future climate, extreme precipitation events over North America are predicted to occur twice as often (Cubasch and Meehl 2001). The impacts of global warming, once envisioned to be experienced by future generations, are already upon us, bringing profound climactic and ecological changes, great loss of human life, and likely extinction for many of the planet's non-human species. As written recently in the New England Journal of Medicine,

Since [the release of the *Third Assessment Report* in] 2001, we've learned substantially more. The pace of atmospheric warming and the accumulation of carbon dioxide are quickening; polar and alpine ice is melting at rates not thought possible several years ago; the deep ocean is heating up, and circumpolar winds are accelerating; and warming in the lower atmosphere is retarding the repair of the protective "ozone shield" in the stratosphere.... Given the current rate of carbon dioxide build-up and the projected degree of global warming, we are entering uncharted seas.

As we survey these seas, we can see some of the health effects that may lie ahead if the increase in very extreme weather events continues. Heat waves like the one that hit Chicago in 1995, killing some 750 people and hospitalizing thousands, have become more common. Hot, humid nights, which have become more frequent with global warming, magnify the effects.

Epstein 2005.

In 2002, more than 1,000 people died in a spring heat wave in India (Gelbspan 2004). In the spring of 2003, 1,400 people died in another heat wave in India and Pakistan. Also in 2003, a summer heat wave in Europe killed between 21,000-35,000 people (Epstein 2005).

In 1998, Hurricane Mitch dropped six feet of rain on Central America in three days, and was followed by soaring incidences of malaria, dengue fever, cholera, and leptospirosis (Epstein 2005). In 2000, after rain and three cyclones hit Mozambique over a six week time period, the incidence of malaria rose by five times (Epstein 2005). In June, 2001, Houston suffered the single most expensive storm in modern history when tropical storm Allison dropped thirty-five inches of rain in one week, resulting in \$6 billion in damages (Gelbspan 2004). In November, 2001, record flooding killed more than 1,000 people in Algeria (Gelbspan 2004). Also in 2002, more than 12 million people were displaced by severe flooding in South Asia (Gelbspan 2004).

In the Eastern United States, the effect of sea level rise over the last century (primarily from thermal expansion as the oceans warm) has also exacerbated the beach erosion and flooding from modern storms that would have been less damaging in the past (Folland and Karl 2001). In August, 2005, Hurricane Katrina killed hundreds and destroyed the city of New Orleans (Epstein 2005). Katrina was quickly followed by Rita, and then Wilma, putting 2005 on track to setting a new record for hurricane season destruction.

While it may not be possible to link individual episodes to global warming, this overall pattern of increasingly violent weather is very likely linked to human-caused warming. But even more subtle, gradual changes can profoundly damage public health (Epstein 2005). During the past two decades, the prevalence of asthma in the United States has quadrupled, at least in part because of climate-related factors (Epstein 2005). Increased levels of plant pollen and soil fungi may also be involved, as experiments have shown that ragweed grown in twice the ambient levels of carbon dioxide produces 60% more pollen (Epstein 2005). High carbon dioxide levels also promote the growth and spore production of some soil fungi, and diesel particles then help to deliver these aeroallergens deep into human lungs (Epstein 2005).

Widening social inequities and changes in biodiversity caused by global warming have also contributed to the resurgence of many infectious diseases (Epstein 2005). Global warming is credited with the current spread of Lyme disease, as well as malaria, hantavirus, and West Nile virus (Epstein 2005). Floods are also frequently followed by disease clusters, as downpours can drive rodents from burrows, deposit mosquito-breeding sites, foster fungus growth in houses, and flush pathogens, nutrients, and chemicals into waterways (Epstein 2005). Droughts also weaken trees' defenses against infestations and promote wildfires, which can cause injuries, burns, respiratory illness, and deaths (Epstein 2005).

Shifting weather patterns are jeopardizing water quality and quantity in many countries, where groundwater systems are overdrawn (Epstein 2005). Most montane ice fields are

predicted to disappear during this century, further exacerbating water shortages in many areas of the world (Epstein 2005).

An even greater threat to human health comes from illnesses affecting wildlife, livestock, crops, forests, and marine organisms (Epstein 2005). One recent report found that 60% of resources examined, from fisheries to fresh water, are already in decline or being used in unsustainable ways (Epstein 2005). This is a grim prognosis indeed as global population continues to rise even as global warming accelerates.

As discussed further below, global warming will also have profound impacts on the earth's biological diversity and threatens many thousands of species. The primary prevention and mitigation of all of these climate impacts is to reduce the nation's energy use and halt the extraction, mining, transport, refining and combustion of fossil fuels (Epstein 2005). Experts believe that a substantial reduction in energy use would have innumerable health and environmental benefits along with stabilizing the climate (Epstein 2005).

3. The Impacts of Global Warming on Threatened, Endangered, Rare, and Special Status Species

The pika is a small, vegetarian relative of the rabbit, which is adapted to life on high, treeless mountain peaks. Because pikas need cold, bare habitat, it is not surprising that their numbers are plummeting all over the globe (Krajick 2004). Fossil evidence shows that pikas once ranged widely over North America but their range has contracted to a dwindling number of high peaks during the warm periods of the last 12,000 years (Krajick 2004). Alpine species like the pika are unable to shift their ranges as warming temperatures and advancing treelines, competitors, and predators impact their mountain habitat (Krajick 2004). Pikas are further limited by their metabolic adaptation to their cold habitat niche, which allows them to survive harsh winters but also causes them to die from heat exhaustion at temperatures as low as 77.9° F (25.5° C) (Krajick 2004).

American pika populations at seven of twenty-five previously recorded localities in the Great Basin of the western United States have disappeared in recent years (Beever 2003). Based on work conducted in the late 1990s, researchers documented that the average elevation of surviving pika populations was 8,310 feet, up from a pre-historic average of about 5,700 feet between 7,500 and 40,000 years ago (Beever 2003; Grayson 2005). Most recently, researchers announced in December, 2005, that at least 2 additional populations have become extinct, and the average elevation of surviving populations has increased by another 433 feet.

In the Yukon, collared pikas declined 90% between 1999 and 2000, when unprecedented midwinter snowmelts, rain, and refreezing eliminated the insulating snow and then iced over the pika's forage plants (Krajick 2004). A pika species endemic to the mountains of northwest China, discovered only in 1986, was not located in extensive surveys in 2002 and 2003 and may be extinct.

Alpine dwelling marmots which rely upon the treeless tundra to visually spot and avoid predators, are also at risk as treelines advance, providing cover for predators like wolves and cougars.

Alpine plants, which have little or no capability to shift their range to higher elevations as the climate warms, may be most at risk. One study predicts that a 3° Centigrade temperature rise over the next century will eliminate eighty percent of alpine island habitat and cause the extinction of between a third and a half of 613 known alpine plants in New Zealand (Krajick 2004).

A study of 15,148 North American vascular plants found that 7%-11% of all species (1,060 to 1,670 plants) could be entirely out of their climate envelopes with just a 5.4° F (3° C) warming, the lower limit of climate change predicted for this century by the IPCC (Morse et al. 1995). At the upper boundary of climate change predicted for this century, 10.4° F (5.8° C), the percentage of plants completely outside their envelope increases to 25-40% (Morse et al. 1995). By contrast, about 90 North American plant species are believed to have become extinct in the past two centuries (Morse et al. 1995).

Species are also at great risk because climate change can alter conditions for diseases and their vectors in a way that allows the incidence of disease to increase and spread. Global warming can exacerbate plant disease by altering the biological processes of the pathogen, host, or disease-spreading organism (Harvell et al. 2002). For example, cold winter temperatures limit disease in some areas because the cold kills pathogens. Warmer winter temperatures can decrease pathogen mortality and increase disease (Harvell et al. 2002). Warmer temperatures can also increase pathogen growth through longer growing seasons and accelerated pathogen development (Harvell et al. 2002). The most severe and least predictable disease outbreaks will likely be when climate change alters host and pathogen geographic ranges, so that pathogens introduced to new and vulnerable hosts (Harvell et al. 2002).

Climate change will also influence wildlife diseases by affecting the free-living, intermediate, or vector stages of pathogens (Harvell et al. 2002). Many vector-transmitted diseases are currently climate limited because the parasites cannot complete development before the vectors are killed by cold temperatures (Harvell et al. 2002). Well studied vector borne human diseases such as malaria, Lyme disease, tick-borne encephalitis, yellow fever, plague, and dengue fever have expanded their ranges into higher latitude areas as temperatures warm (Harvell et al. 2002).

Increased ocean temperatures also cause marine pathogen range expansions. One example is the spread of eastern oyster disease on the east coast of the United States from Long Island to Maine during a winter warming trend in which the cold-water barrier to pathogen growth was removed (Harvell et al. 2002).

A study published in *Nature* has linked the extinction of dozens of amphibian species in the tropical highland forests of Central and South America to global warming due to the creation of ideal conditions for growth of the chytrid fungus, a disease which kills frogs by growing on their skin and attacking their epidermis and teeth, as well as by releasing a toxin (Pounds et al. 2006). Seventy-four of the 110 species of brightly colored harlequin frogs of the genus *Atelopus* have disappeared in the past 20 years due to the spread of the fungus (Pounds et al. 2006). The study's lead author stated "Disease is the bullet killing frogs, but climate change is pulling the trigger" (Eilperin 2006). The golden toad (*Bufo periglenes*), endemic to the

same tropical mountain forests, was also driven extinct by climate change. These amphibian extinctions from the Monteverde Cloud Forest are one of the largest recorded vertebrate extinction events of at least the last 100 years.

Projected increases in atmospheric carbon dioxide and temperature over the next 50 years will rapidly and substantially exceed the conditions under which coral reefs have flourished over the past 500,000 years (Hughes et al. 2003). Coral reefs are already experiencing a major decline (Hughes et al. 2003). Thirty percent of reefs are already severely damaged, and sixty percent of reefs could be gone by 2030 (Hughes et al. 2003). The link between increased greenhouse gases, climate change, and regional-scale bleaching of corals, questioned by some researchers as recently as ten to twenty years ago, is now incontrovertible (Hughes et al. 2003). In the face of elevated ocean temperatures, corals “bleach” by expelling the symbiotic algae that provide them nourishment. Such bleaching events are often fatal, and as they become more frequent with global warming, threaten not just individual coral species but the entire reef ecosystem.

Corals face an additional threat from greenhouse gas emissions: increasing levels of dissolved carbon dioxide in the oceans from society’s fossil fuel use reduces the rate of calcification corals need for growth. The frequency and intensity of hurricanes is also projected to continue to increase, leading to a shorter time for recovery between damaging storm events (Hughes 2003). Two species of Caribbean coral, the elkhorn coral (*Acropora palmata*) and staghorn coral (*Acropora cervicornis*) have been listed under the Endangered Species Act, in part due to elevated ocean temperatures from global warming and ocean acidification from anthropogenic carbon dioxide emissions. U.S. Fish and Wildlife Service (USFWS) 2006.

Species in areas of the globe experiencing more rapid warming than the average, such as the Arctic, are also particularly vulnerable to climate change. The Arctic has warmed at over twice the rate of the rest of the world and has been impacted particularly early and intensely by climate change. Winter temperatures in parts of the Arctic have increased by as much as 3-4° C (5-7° F) in just the past 50 years. Over the next 100 years, under a moderate emissions scenario, annual average temperatures are projected to rise 3-5° C (5-9° F) over land and up to 7° C (13° F) over the oceans. Winter temperatures are projected to rise by 4-7° C (5-9° F) over land and 7-10° C (13-18°) over the oceans (ACIA 2004b:2).

The disproportionate regional warming is caused by several unique characteristics and feedback mechanisms in the Arctic. Chief among these is the decrease in Arctic snow and ice cover and northward expansion of boreal forests and shrubs as temperatures warm. These changes greatly decrease the amount of solar radiation reflected back into space and speed regional warming in a positive feedback loop of enormous magnitude. As temperatures go up, Arctic sea ice melts. Summer sea ice extent is already declining at up to 10% per year, and experienced a new record minimum in September 2005 (NSIDC 2005). An area of sea ice of about half a million square miles, or roughly twice the size of Texas, has been lost (NSIDC 2005). If current trends continue, the Arctic will be ice free in the summer in just a few decades. Decreases in winter sea ice extents in the Arctic have also been documented, approaching reductions of 3% per decade (Meier et al. 2005). The Arctic may already be on a trajectory towards a summer ice-free, “super interglacial” state that has not existed for at least

a million years (Overpeck et al. 2005). There appear to be no feedback processes in the Arctic system capable of altering this trajectory towards dramatically less permanent ice than at present (Overpeck et al. 2005).

The rapid warming threatens the entire Arctic web of life, including the polar bear (*Ursus maritimus*), the largest of the world's bear species and an icon of the North. Polar bears live only in the Arctic where sea ice is present for substantial portions of the year. Polar bears are the Arctic's top predator and completely dependent upon the sea ice for all of its essential behaviors. Polar bears are specialized predators of seals in ice-covered waters. Polar bears also use the sea ice to travel, to mate, and some mothers even give birth to their cubs in snow dens excavated on top of the sea ice. The polar bear's dependence on sea ice is so complete that, like whales and seals, they are classified as a marine mammal by scientists and the federal government.

Due to the overwhelming risk to polar bears caused by global warming, in February, 2005, the conservation organization Center for Biological Diversity submitted a Petition to the U.S. Fish and Wildlife Service to list polar bears as a threatened species under the Endangered Species Act. See <http://biologicaldiversity.org/swcbd/species/polarbear/petition.pdf>. In February, 2006, the Fish and Wildlife Service found that listing of polar bears "may be warranted," and the listing process is currently ongoing. 71 Fed.Reg. 6,745 (February 9, 2006).

The number and magnitude of the impacts already recorded from a 1° F increase in average global air temperature is profoundly disturbing. And the projected increase, even under moderate greenhouse gas scenarios, for this century of 2.5- 10.4° F (1.4-5.8° C) is many times the warming already experienced. Not surprisingly, the projections for the future are more disturbing still.

The leading study on the quantification of risk to biodiversity from climate change, published in 2004 in *Nature*, included over 1,100 species distributed over 20% of the earth's surface area (Thomas et al. 2004). Under a relatively high emissions scenario, 35%, under a medium emissions scenario 24%, and under a relatively low emissions scenario, 18% of the species studied would be committed to extinction by the year 2050 (Thomas et al. 2004). Extrapolating from this study to the earth as a whole reveals that over a million species may be at risk. The clear message is that immediate reductions in greenhouse gas emission may save preserve many thousands of species. It is also clear that some impacts from climate change are inevitable, and thus adaptation strategies will be an essential component of any comprehensive strategy to manage the impacts of climate change.

4. The Economic Cost of Carbon

The economic cost of greenhouse gas pollution is the estimated cost of the net impact on economies and societies of long term trends in climate conditions related to anthropogenic greenhouse gas emissions (Downing et al. 2005). The economic cost is generally expressed as the marginal cost of climate change impacts, and is usually estimated as the net present value of the impact over the next 100 years (or longer) of one additional ton of carbon

emitted to the atmosphere today, and is expressed in dollars (or other currency) per ton of carbon (tc).⁴

Estimating the economic cost of greenhouse gas pollution is a rapidly developing field, and very few studies conducted to date have included any non-market damages such as species extinction, or the risk of potential extreme weather such as hurricanes, droughts, and floods (Watkiss et al. 2005). None have included socially contingent effects, or the potential for longer-term effects and catastrophic events (Watkiss et al. 2005). This indicates that values in the literature are a sub-total of the full economic (or social) cost of greenhouse gas pollution, and therefore by definition an underestimate, though researchers cannot yet say by how much (Watkiss et al. 2005).

Researchers have concluded that \$64/tc (year 2000) is a reasonable figure for decision makers to use as a lower benchmark of the economic cost of greenhouse gas emissions (Downing et al. 2005). An upper benchmark is more difficult to deduce from the current literature but the risk of higher values for the social cost of carbon is significant (Downing et al. 2005, Watkiss et al. 2005). Decision makers should use the best available range of values displayed in Table 1.

Table 1: Economic Cost of Carbon: Values for Use in Project Appraisal (USD per ton carbon)

(Source: Adapted from Watkiss et al. 2005:ix)5

Year of Emission	Central guidance	Lower Central Estimate	Upper Central Estimate
2000	\$101	\$64	\$238
2010	\$119	\$73	\$293
2020	\$146	\$91	\$375
2030	\$183	\$119	\$475
2040	\$256	\$165	\$603