It is Feasible to Balance Profits from Land Development with Commitment to Environmental Restoration and Protection

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INTRODUCTION

Ethics of Sustainability

Many of us are familiar with a passage from the Great Law of the Iroquois Confederacy. "In our every deliberation," the representatives agreed, "we must consider our impact on the next seven generations."

The decisions of this body were made only after painstaking debate. Centuries later, many of us recognize that decisions are being made in the beautiful North Carolina mountains that ignore our own generation, much less the ones to follow.

Status of the Environment in Western North Carolina

To European settlers of the 18th century, the Great Smoky Mountains were remote, tangled and forbidding. Not impenetrable, but neither for the faint of heart. The native Cherokee didn't thrive by taming these rugged hills, but by making their own lives a celebration of the bounty all around.

After the War Between the States, the railroad crossed the Blue Ridge at last, and slowly crept into the deepest mountains. Each mile was an enormous challenge, and the Western North Carolina Railroad, a single pair of rusty steel ribbons winding tenuously westward, cost hundreds of lives. It also opened the mountains to settlement, tourism and industrial exploitation. By 1930, these mountains had been methodically and destructively logged—so much so that today, a view from any of the region's highest peaks offers not a glimpse of forest that hasn't been cut. The discovery of old growth trees is a rare find.

Now, as the mountains slowly recover from that devastation, they're facing pressure of another kind. Access by highway has improved dramatically, urban life has become less satisfying, and vacation homes are springing up in the mountains at a dizzying pace. Development stress is unprecedented, and large parcels of undivided land are becoming more and more rare. Like the logging devastation that came before, this damage has been wrought in the blink of an eye.

Thoughtless development has multiple effects. Quality of life for all living creatures, including humans, deteriorates. For people, the essence of wilderness as a source of

strength and wisdom dissolves. And, worst of all, the generations of living creatures to come are left with the results.

Since the Great Depression, our State and Federal governments have done a commendable job of collecting and protecting land in the mountains. But now, budget shortfalls on all levels of government are colliding with incredible development pressure in western North Carolina. The government struggles to maintain land currently under its care, while available lands are aggressively sub-divided.

Chaffin/Light Associates Business Philosophy

Simultaneously, many have begun to question the lack of ethics in the free-marketplace, and to doubt that the leaders of our business world are capable of accepting responsibilities equal to their rights. As successful members of the private sector, should we worry that our grandchildren might ask why we didn't provide the same sense of over-arching stewardship, of vision with a long lens that government provided nearly a century ago?

We've been successful in the business of land development. Much of that success has come through an unlikely strategy: we've pioneered low-density, conservation-based developments that aren't just sensitive to their surroundings, but flat-out protective of them. Each of our projects is anchored in an ethos of careful human stewardship of the land, and each is a commercially viable concept – as it must be. Our two latest projects, Balsam Mountain Preserve in NC and Spring Island in SC, have proven quite successful. Each is based on the premise that a small residential development on a large piece of land can ensure protection of the remainder. We call them communities within parks, not parks within communities, and we create them by turning vast parcels of our land—usually over half of any given project—to conservation land trusts, to be protected forever. A real estate transfer fee provides a perpetual funding mechanism to pay the land trust for the care of the land.

Our newest project, Buffalo Creek Preserve, in North Carolina, takes this concept to an unprecedented level. It creates a few hundred acres of carefully controlled home sites in order to protect thousands of acres of rugged and pristine backcountry. In addition, we're creating working alliances with private land trusts and institutions of higher learning across the mountain region and beyond. Fortunately, the state of North Carolina had the foresight and wisdom to create an incentive for this. Tax credits known as conservation easements help facilitate the placement of land with land trusts. There is no better state in the nation in terms of these incentives and no region more worthy of relief than these mountains.

Certainly, it would be more profitable to over-develop the land, and many of our associates in the development world are at a loss to understand why we do what we do. But our conservation partners love the concept and celebrate its success and local governments see their tax bases expanded without the need to add services. Moreover, it gives us an opportunity to fulfill what we see as an obligation—to preserve, protect and

rescue thousands of acres of mountain land. Each of our properties is a "three-legged stool," offering environmental sensitivity, economic viability and community livability. If any one of the three legs is missing, the stool cannot stand. We are private developers working with governments and not-for-profit land trusts to create environmentally sensitive, economically viable land preserves.

Yes, it's good business for us. It's also a legacy of responsibility for the future of the mountains that we call home—for our generation and all of those to come.

Balsam Mountain Preserve

Balsam Mountain Preserve is the example of our conservation-based development strategy for this e-forum.

For almost a century, Champion Paper owned and logged a 4,400 acre tract in Jackson County, North Carolina. Today 98% of that tract is forested and shows evidence of clear cutting, third and fourth growth of trees with many dominant poplars, sediment deposition in streams, and a network of over 100 miles of primary graveled roads, secondary dirt roads, and skidder roads. Over 38 miles of streams exist with 15+ miles as permanent streams with 2/3 of the watershed beginning on this tract. Adjacent to the south is the Nantahala National Forest and to the east is the 5,400 acre privately owned, Balsam Gap, Inc., which is selectively logged for timber.

Champion offered their tract to both the National Forest Service and the State of North Carolina who declined. A group of investors from Georgia bought it in 1999 amidst state agencies and environmental organizations that had hoped to purchase it. Investor plans called for 1000 homes and two or three golf courses. Then one of those investors died with a heart attack on the property and the remaining investors promptly sold it to Chaffin/Light Associates, Spring Island, SC. This tract became the Balsam Mountain Preserve in late 2000 and is dedicated to exceeding all other Chaffin/Light Associates developments in its environmental stewardship.

To direct that environmental stewardship, the Balsam Mountain Trust was created. Through education and research, the Trust will ensure the protection and preservation of the natural environment and cultural history of the Preserve. Both an interim and permanent Nature Center are planned with the interim Nature Center to open in July, 2003. The permanent Nature Center will serve as an education center in sustainable architecture. It will also serve as a database center for the local community for web reporting of plant and animal species and perhaps weather on the Preserve. Both centers will have staff naturalists and volunteers to work with school groups, garden clubs, historical societies, and other organized groups. Plans will also include a bunkhouse for scientists for research. Meanwhile several universities are involved in flora and fauna inventories of the Preserve. The Trust will also have an artist-in-residence program to promote artists and crafts people in western North Carolina.

As expected of a residential development, the Balsam Mountain Preserve members will enjoy a variety of amenities including an Arnold Palmer designed golf course, fitness center, dining hall, community garden and re-use/recycle center, stables, and a Nature Center. Amenities are located only in the first phase of development, approximately 1,480 acres. Remaining phases of the Preserve are primarily homes, a primitive campground, a few remote cabins, and no other amenities. (see map, page 10)

METHODS

No more than 350 homes can be built on the 4,400 acres and none are permitted on the highest ridges nor close to streams. Stream buffers average 100 feet along most streams. Each homestead averages two acres except for three that are four acres each and one that is eight acres. Much discussion centered on homestead placement. Should houses be clustered so that wildlife corridors were maintained? Finally, the Master Planner selected sites that were accessible by existing roads and sensitively placed considering the slope, aspect, neighbors, and habitat. Since the roads have existed for almost a hundred years, wildlife corridors can still be connected. Plus clustering the homes would have disturbed hundreds of acres in one area that has recovered from some of the deforestation.

Members, architects, landscape architects, and all contractors are given three sets of written guidelines for homes as well as amenities. Stringent design and landscape guidelines are mandatory while the sustainable guidelines are recommended. Both landscape and home design plans have to be approved by a Habitat Review Committee. The concept for the home is "not to be seen." Homes must blend into the surrounding forest including colors of the roof and exterior walls. And in reverse thinking, a maximum square footage of 4,500 square feet is permitted in a single dwelling. There is no minimum square footage. Also native plants are required for landscaping while invasives and exotics must be removed. Only part of the building envelope may be disturbed which is less than one acre. All security lights must be shielded and low to the ground. No clear-cutting is allowed in front of the homes for views. Instead limited vista pruning is permitted once the windows are framed and views selected. Even 2000-gallon cisterns for rainwater collection and storage and bear-proof garbage containers are required at each home. The District Wildlife Biologist will use the Preserve as the model for pro-active bear management as no others exist.

With the construction of amenities, homes, and less than ten miles of new roads, sediment and erosion control methods are imperative whether required by the state or not. Here are a few examples that exceed Best Management Practices (BMP) guidelines:

1. Over 20 miles of reinforced double silt fences with metal stakes are installed along the primary roads. In some cases rows of five silt fences are installed. Silt fences are also installed along dry ridges even though they are not required by the state.

2. HDPP smooth interior pipe is used for culverts instead of corrugated metal pipe which collects leaves, sticks, and debris.

3. All roads slope to the inside, and water is captured in lined ditches every 200-300 feet.

4. A series of catchments such as rip-rap check dams and lined ditches slow the water which is then dispersed into the forest with level spreaders and sediment traps.

5. All sediment basins are oversized and exceed the state's guidelines to handle a ten year storm event. Some triple catch basins are used during road construction. Stumps, root wads, and small trees are placed into a tub grinder to make mulch on site. Mulch is placed on disturbed soil daily.

6. No woody debris is burned on the property, but it is chipped and blown back onto the ground. Other trees are milled on site with the lumber to be used in construction of the amenities.

7. A Shinn System is used to mulch trees into the ground with minimal impact to the topsoil. Topsoil is cached to be reused as it contains roots and seeds of indigenous species. Embankments along roads are planted with quick growing rye grass to stabilize the roadsides.

8. A special and expensive roadside wildflower seed mix has been created to germinate over a three year period to blend in with existing indigenous species.

9. Plant rescue was initiated at disturbance sites. The road grading contractor even assisted in transplanting large shrubs, installing silt fences to miss rare species, and relocating roads to bypass other rare species.

In addition, weekly construction meetings bring in Preserve and Trust staff, contractors, and Mr. Jeff McCall, Sediment and Erosion Control Officer of Jackson County.

Although sediment and erosion control systems are required for developers, additional protection can limit the impact of future development. One method to protect land is with a conservation easement. In 2002, the North American Land Trust (NALT) placed the current conservation easement of 2,800 acres on the Preserve. However, additional acreage will be added to this easement where more than 3,000 acres of this 4,400 acre tract will be managed by the Balsam Mountain Trust, a 501 (c) (3) organization.

The Balsam Mountain Trust serves as the on-site monitor for NALT and the daily environmental conscience of the Preserve. It is funded in perpetuity by real estate transfer fees from two percent of the homestead sales, one percent of home sales, one percent of any resales, and other public contributions. The Executive Director facilitates research in the Preserve, oversees the environmental restoration program and outreach into educational institutions at all levels. A full time naturalist was recently hired to develop and conduct both natural and cultural history programs, to develop curriculum-based programs in surrounding county school systems, and to recruit and train volunteers.

Both an interim and permanent Nature Center are planned with the interim Nature Center to open in July, 2003. The permanent Nature Center will also serve as an education center in sustainable architecture. Plus an open air pavilion, an amphitheater, and restrooms are planned for the Nature Center. It will also serve as a database center for the local community for web reporting of plant and animal species and perhaps weather on the Preserve. Both centers will have staff naturalists and volunteers to work with

school groups, garden clubs, historical societies, and other organized groups. The Trust will also have an artist-in-residence program to promote artists and crafts people in western North Carolina. Plans will also include a bunk house for scientists for research. Meanwhile several universities are involved in flora and fauna inventories of the Preserve.

Scientific surveys, coordinated by the Trust are ongoing including forest types, trees, shrubs, herbaceous plants, grasses, ferns, mushrooms, mosses, liverworts, fungi, fish, benthos, birds, small and large mammals. Forest history has been documented. A geological and mining history has been completed. Archaeologists located two potential sites requiring data recovery. Artifacts will be displayed in the Nature Center. Scientific data are managed in an ArcView System.

To implement scientific findings a land management planning team was formed to guide the Trust in its land stewardship. Members include Preserve and Trust staff along with several consultants. All scientific reports are presented at these meetings so the scientists can interact with each other rather than acting independently.

Other concerns for the land management planning team include maintaining water quality and reducing any impact from construction. In January, 2002 eighteen water quality monitoring stations were installed across the 4,400 acres to establish baseline documentation and to ensure that the water quality was maintained as development proceeds. Samples were collected monthly and analyzed along with field measurements. Freeze core substrate samples were taken at each station and embeddedness characterized. Storm event samplers were also installed to provide data for worst case scenarios.

With these established water quality monitoring stations impacts can be measured, but how can the Trust be more pro-active to keep the sediment out of the streams? The Preserve and the Trust are partners with a grant with Dr. Rich McLaughlin, a soil scientist with North Carolina State University (NCSU). This project began on January 29, 2003 and was funded by EPA. The purpose is to design, install and evaluate innovative Best Management Practices (BMPs) to reduce erosion and sediment arising from disturbed mountain land areas. Specific BMPs will include the use of polyacrylamide for erosion and turbidity control, changes to sediment trap and basin design to increase efficiency, and a variety of methods of providing groundcover quickly after land disturbance. This project will implement systems that have not been tested under mountain conditions so the approach will be to design and install the systems proven elsewhere and make adjustments as needed. Streams will be sampled during storm events using a volunteer network already in place.

However, deposition is already a concern in these streams from Champion's logging practices and from the neighboring logging operation. Does technology exist to remove this deposition? In working with Dr. Greg Jennings, PE, from North Carolina State University, and Dave Braatz, of Streamside Systems, a grant has been awarded by EPA to NCSU to test new methods to remove existing sediment deposits in streams. This project began in Mya, 2003 to measure and remove excess fine sediments from two different streams, Cashie Branch and Sugarloaf Creek. Monitoring will be conducted to

determine the effectiveness of sediment removal and the improvement in water quality. This project will provide data on sediment and erosion problems associated with off-site logging practices, data on the improvement in water quality and streambed for Cashie Branch. In Sugarloaf Creek and the South Fork of Sugarloaf Creek, the specific goals are to remove and measure the quantity of fine sediments transported as bedload, and concurrently to prevent possible downstream sediment impacts arising from development and construction on or around the golf course. In Cashie Branch, this former brook trout stream has been sediment-impacted by historic logging and road-building activities. Specific goals in Cashie Branch are as follows.

1. To remove and measure the quantity of fine sediment transported as bedload;

2. To prevent the downstream transport of fine sediments into brook trout habitat restoration reaches;

3. To flush the fine sediments from the substrate of experimental reaches in order to improve available cover, to increase pool depths and available habitat for spawning, and to increase habitat diversity for macroinvertebrates.

RESULTS

1. The water quality monitoring will continue with monthly sampling. Results indicate that after one year of monitoring, water quality is good and can continue to support aquatic life. The Stream Restoration Institute of NCSU is using three streams as reference reaches for other developers. All of these water quality efforts exceed BMPs (Best Management Practices.)

2. The Preserve will serve as a demonstration site for both grants from NCSU. Whether the methods work to improve sediment/erosion control or not, the information will be shared. We strongly hope these methods will work as they will benefit the Southern Appalachians, not just western North Carolina. Also we will serve as an independent research project to test the passive bedload collectors and also the sand wand for removal of sediment deposition from streams.

3. Within 24 hours after topsoil is removed, exposed areas are covered in the mulch made on the property. Double silt fences and triple catch basins have worked well especially when one silt fence is knocked down by sediment flow. Results for the roadside wildflower seed mix are still inconclusive due to the three year germination has not occurred. The Sediment and Erosion Control Officer of Jackson County, Jeff McCall, has no open invitation to attend meetings anywhere else but here. He can listen to any updates and then tour anywhere he wants on the Preserve. Typically, the "rescued" plants are transplanted within a similar habitat on the same building site. The contractor worked with a plant rescuer to install the silt fences around endangered plants and also transplanted hundreds of shrubs with his crew and equipment.

4. Education is the key in informing everyone about a development where members can live in harmony within their surroundings, learn about the environment, and actually assist in environmental restoration. Contractors, architects, and landscape architects are

encouraged to rethink their thoughts on construction and the environment. Most respond they have never thought about the environment until they began working here.

5. The heart of this community is the Nature Center to educate members and visitors about the environment and sustainability. Current plans for the permanent Nature Center include an underground basement with a native plant roof, lumber milled on site for the building and exposed beams, geothermal flooring, tankless hot water heater, no arsenic treated lumber, recycled old barn boards for shelving, rain chains, and rain gardens. A tree house has been built using poplar bark peeled from trees cut on site along with locust posts for supports. A canopy walk should connect the tree house with the Nature Center.

6. The Balsam Mountain Trust Executive Director was hired July 16, 2001 and the Trust received the 501 (c) (3) determination letter in April, 2002. Three Board of Trustee meetings have been held. A full time Senior Naturalist was hired January 1, 2003 to help set up the interim Nature Center, to publish quarterly newsletters, to begin curriculum development in two local counties, and to form educational partnerships with the Eastern Band of the Cherokee.

7. Scientific surveys have identified over 850 species of plants and animals living on the Preserve. The surveys included 600+ species of trees, shrubs, herbaceous plants, grasses, and ferns. An initial survey of mushrooms identified 53 species and mosses and liverworts also totaled 53 species. A genetic study concluded the Preserve has the southern strain of the brook trout and over 89 genera of benthos were identified. Two breeding bird surveys along with fall and winter bird counts have totaled 87 species. Reconnaissance for a small mammal survey was completed in November, 2002. The survey will conclude in April 2003. Forest types and forest history were identified and included in three reports. Scientific data are managed in an ArcView System. A geologist provided overview of the geological history and mining history on the Preserve. Archaeologists located two potential sites requiring data recovery. Artifacts will be displayed in the Nature Center. (see internal technical reports and contacts)

8. Four land management planning meetings were held. Several areas of the Preserve will remain completely undisturbed, no houses are permitted on the highest ridges, 150 year old Northern Red Oak forest is protected along with the old birch forest, the pitch pine community will be burned to maintain it, and the forest health is monitored annually. Currently the group is working on the concept of sustainable forestry as a method to improve the third and fourth growth forests while using adjacent Gauss plots to monitor forestry efforts. A 40 acre model will be selectively cut in June, 2003. Unlike previous sustainable forestry models, the Trust is looking at the entire ecosystem instead of only tree species, enhancing biodiversity and improving forest health. It is not revenue driven. A recent sustainable forestry symposium indicated the Preserve can serve as a reference for several more scientific studies since ages of past treatments were documented by Champion Paper.

DISCUSSION AND CONCLUSION

Transferability and Instruction: Since state and federal governments are limited in their abilities to acquire and maintain land purchases, developers working with land trusts to improve land stewardship may be the significant factors in protecting large tracts of land. With such a partnership, sediment and erosion control measures and protection of water quality should be enhanced. Results from the two North Carolina State University projects, if successful, could be utilized throughout any mountainous areas while collection of fine sediment passively or removing sediment deposition from streams could be used worldwide. Current plans include workshops, seminars, web pages, and on-site tours to share technological results. Also plans include seminars for developers, realtors, bankers, and CPAs. Plus we continue to be mentors for other developers and land trusts.

Innovation: Since the Balsam Mountain Trust is funded by real estate fees (a unique concept), developers could add an environmental partner to assist them in land stewardship. Since the Trust is establishing a nature center, it can teach the local community about the environment and cultural history as well as the developer. Exceeding Best Management Practices in sediment and erosion control measures required by the state appears to be unheard of, but after a recent 100 year storm event with no serious erosion problems, overbuilding sediment basins proved to be a wise decision. Plus the two grants to test new technology could have significant impact on erosion control measures that work. Even requiring bear-proof garbage containers and 2,000 gallon cisterns of homeowners are pro-active techniques not pursued in other developments until after a conflict with bears or a water shortage or fire occurs.

Conservation Impact Factor: Buying large tracts of land and limiting development in a 4,400 acre parcel to protect 38 miles of streams is significant. Trying to improve the quality of these existing streams by removing sediment is also significant. Not developing 70% of this tract is significant as well as placing it in a conservation easement for permanent protection is also significant. Of course conservation easements are not new, but establishing a land trust partner with a developer is. It lends a daily environmental conscience to the developer.

Durability: The Trust uses a land management planning team consisting of several scientists from different disciplines to plan for the next seven generations, to look at the best use of this land and what we can offer beyond our borders. Also the Trust and an endowment have been established in perpetuity.

It's been refreshing to change the paradigm about developers. Both state and federal agencies are pleased and surprised to find a developer who wants to work with them and actually exceed Best Management Practices. The first key to the success of this project is having a team who believes in environmental stewardship and who are not greedy for huge profits. It is a small niche market of buyers. No advertising is used for this project, yet 80 of 110 homesteads have been sold in the first phase. The second key is education and innovative thinking where we inform practically everyone we meet about a development where members live on dirt roads lined with native vegetation, can learn to live in the dark, can leave snags and tree cavities for wildlife, and basically learn to live in harmony within their surroundings. Contractors, architects, and landscape architects respond they've never thought about the environment until they began working here.

People are willing to contribute to the Balsam Mountain Trust because they "feel good" about making a contribution to the environment as well as receiving tax benefits. The tax benefits can be the third key to preserving land by a developer while still making a profit. In addition the Trust will hold Habitat Workshops to educate members about this special place and how to keep protecting it as the property owners will become the land stewards working with the Trust and the local communities.

We are willing to share all of our lessons learned with other land managers, developers, bankers, schools, land trusts, the public, and our surrounding communities. Currently, we serve as mentors to a variety of developers, bankers, and land trusts as we would be negligent if we didn't share lessons learned. We believe the government will not have funding to purchase and maintain open spaces so the fourth key lies in the private developer working with conservation groups to protect land. Therefore, we hope to leave a legacy of protected land throughout western North Carolina. It will be a community effort of multiple generations.

INTERNAL TECHNICAL REPORTS AND CONTACTS:

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Ed Grand, PhD candidate, University of Tennessee, Knoxville; Mushrooms survey; herbarium collection

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Dr. Paul Davison, Bryophyte expert, University of North Alabama; Mosses/liverwort survey, herbarium

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Dr. David K. Smith, botanist, University of Tennessee, Knoxville; Mosses and liverwort survey

Dr. Steve Yurkovich, Dept. of Geosciences, Western Carolina University; Geology and mining history

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Dr. Pete Bates, Dept. of Natural Resources Management, Western Carolina University and Paul Carlson, Exec. Director, Land Trust for Little Tennessee; Sustainable forestry project

Dr. Norm Christensen, Duke University; Biodiversity studies; sustainable forestry project

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Pam and John Boaze, Biologists, Fish and Wildlife Associates; Water quality sampling and analyses

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Dr. Mike Dennis, President, Breedlove, Dennis, and Associates, Orlando, Florida: ArcView data management; fish survey; benthos survey; Trustee; Land Mgmt. team member

Breedlove, Dennis and Associates, Inc. 2001. Aquatic species survey, Balsam Mountain Preserve,

Jackson County, North Carolina. Breedlove, Dennis and Associates, Inc., Franklin, Tennessee.

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Dr. Peter Galbreath, Fish geneticist, Western Carolina University; Fish study

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Scott Loftis, Fisheries biologist, NC Wildlife Resources Commission, Balsam, NC; Fish study

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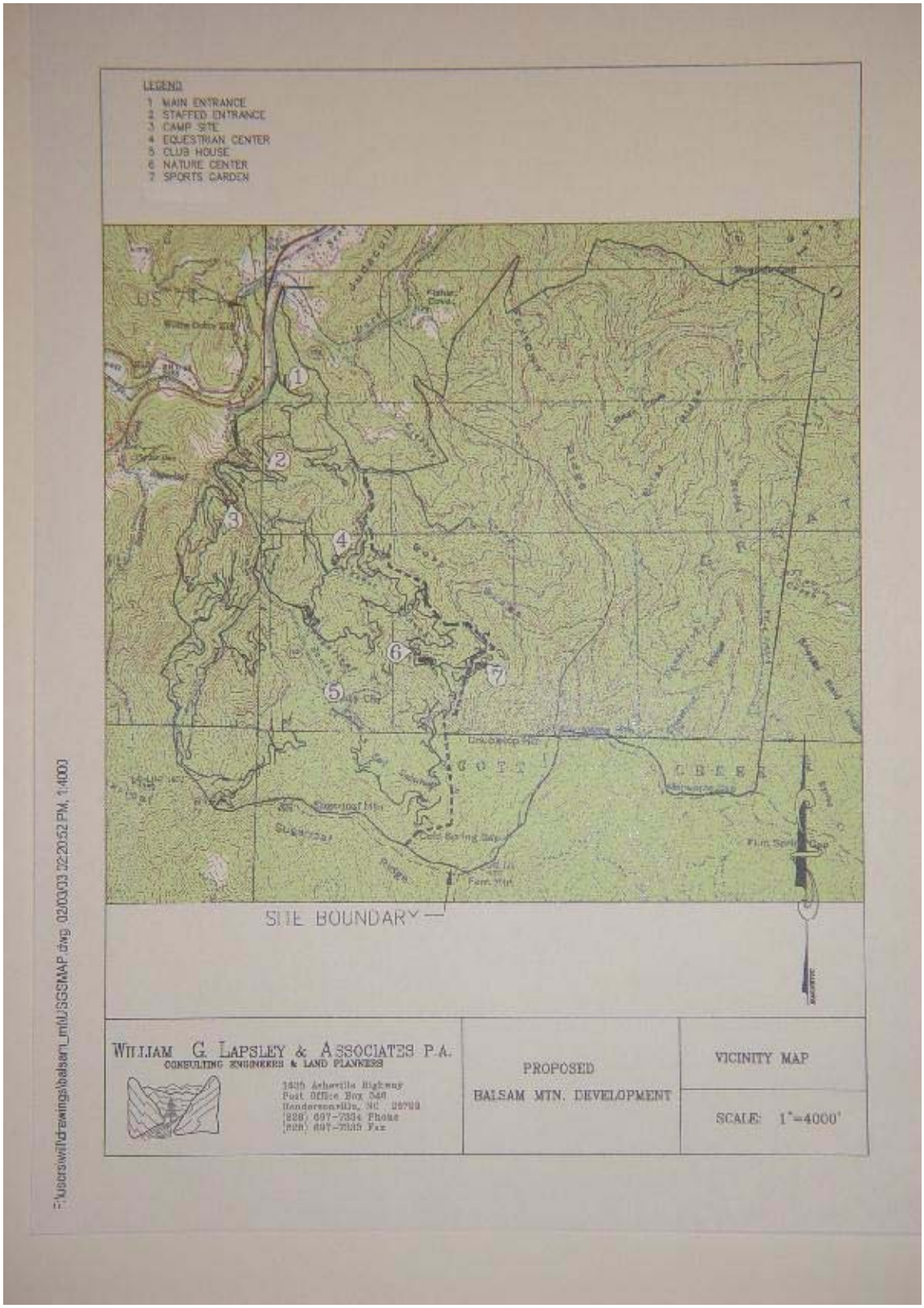
Dr. Mike Pelton, Mammalogist, University of Tennessee, Knoxville; Small mammal survey in undistirubed areas in 2003

Shannon Rabby, M.S. Candidate, Western Carolina University; Small mammal survey in disturbed areas in 2003
Paul Super, Science Coordinator, Purchase Knob, Great Smoky Mountains National Park; Informal salamander survey
Dr. Rich McLaughlin, soil scientist, North Carolina State University; Develop sediment and erosion control systems to exceed BMPs
Dr. Greg Jennings, PE, North Carolina State University; Research new technology to remove stream sediment deposition and to passively collect fine sediment in mountain streams
Dani Wise, Stream Restoration Institute, NCSU; Reference reaches using 3 streams of the Preserve for other developers
Dave Penrose, Environmental Biologist III, Division of Water Quality, Raleigh; seasonal benthic sampling and analyses with NCSU grant
Chris McGrath, Non-game specialist, NC Wildlife Resources Commission; T&E Species search
Mike Carraway, District Biologist, NC Wildlife Resources Commission; Nuisance wildlife consultant; pro-active wildlife management policies
Paul Webb, Program Director, TRC Garrow, Durham, NC; archaeology studies and data recovery
Carl Silverstein, Executive Director, Southern Appalachian Highlands Conservancy; Sustainable forestry; land trust issues
Andy Johnson, President, North American Land Trust; Conservation easement; Trustee
Jim Samsel, Architect, Samsel Architects; Sustainability Guidelines
John Exley, Master Planner, John Exley Planning; Design Guidelines
David Tuch, Landscape Architect, Equinox Environmental Planning; Landscape Guidelines and Roadside Revegetation Seed Mixes
Jeff McCall, Sediment and Erosion Control Officer, Jackson County, North Carolina

BALSAM MOUNTAIN PRESERVE MAP WITH AMENITIES



Water Quality Monitoring and New Technology Research

Monthly water quality monitoring

Freeze core substrate sampling at 18 stations

Demonstration of New Sediment Erosion Control Technology
State agencies, environmental consultants, two land trusts,
and local environmental groups

Fine sediment collector installed
Two year research project
Installed May, 2003

Benthic sampling above and below bedload collector; seasonal monitoring

Various Groups Using the Preserve

Garden Club Visit

Carolina Field Birders Christmas Bird Count

Environmental education on the Preserve

Haywood County curriculum specialists learn about the Preserve as an outdoor living classroom.

Realtors learning about a different type of development

Jackson County School Administrators and Michael Skinner, Trust Naturalist