WATSON CAVE AND DEE KOESTERING PARK: AN URBAN KARST SUCCESS STORY

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Abstract

Beginning in 2000, St. Louis caver Tom Clifton and concerned citizens of suburban Kirkwood began work to preserve from redevelopment a 3.2-ha (8-ac.) tract containing Watson Cave. The cave is located in the old Meramec Highlands Quarry, abandoned around 1900, not far from our symposium site. The tract was proposed to be rezoned for multifamily housing, eliminating an urban, reforested, private tract used for informal recreation by local residents. A citizens' group was formed, and the Open Space Council and Audubon Society were enlisted. Clifton, Tom Cravens and members of the Kirkwood-based Meramec Valley Grotto were enlisted to aid in bioinventory of the cave, which had originally been examined by Lang Brod in 1964. By 2003 sufficient funding was obtained to purchase the land as a city park. Since then, the Kirkwood Parks Board has included geological interpretation (the quarry is the type locality for the Salem geological formation) and cave management in its plan for the park. The cave was gated, but access is still permitted to qualified groups.

Key words: urban karst, karst land management, Watson Cave, Dee Koestering Park, Missouri

The Setting

Kirkwood, Missouri, is a suburb of 30,000 to St. Louis, Missouri, with middle to upper-middle-class residents. The town was established in 1853 on the Pacific Railroad and named for the railroad's chief engineer. The residents are actively involved in local government, very conscious of their history and environment, and support 121 ha (300 ac.) of parks within the city's 2,331 ha (9 mi.^{2}) area.

The disputed land lies in a portion of Kirkwood known as the "Meramec Highlands," after a turn of the twentieth century resort which existed on the site (Figure 1). The 177-ha (438-ac.) resort opened in May of 1895, and featured an imposing bluff-top hotel, with a spectacular view of the Meramec River and its valley, direct rail access, a mineral spring and bathhouse spa, boating, a Meramec River swimming beach, a store, and rental cottages. The establishment was close enough to St. Louis to draw clients for the weekend, but far enough to maintain an illusion of isolation (Baker 1995).

The specific area of concern was the site of the old Meramec Highlands Quarry (Figure 2). To develop the resort a local source of stone was required, and the quarry on the nearby hill served that purpose. The first confirmed quarrying occurred in 1891, and stone was extracted until 1903. By this time headward expansion of the quarry was limited by the presence of the rail line, and sideways development limited by topography. In the course of excavation to the west, the quarry encountered a small cave.

The quarry consists of two major Mississippian-age limestones: the medium-bedded Salem (Spergen Hill, also called Meramec bluestone locally) which is separated from the overlying, thinner-bedded St. Louis Limestone by a distinctive layer of cannonball-sized chert nodules. The Salem may be quarried in large blocks, the St. Louis is better used as crushed stone. Rumors abound that the quarry furnished stone for the St. Louis Worlds

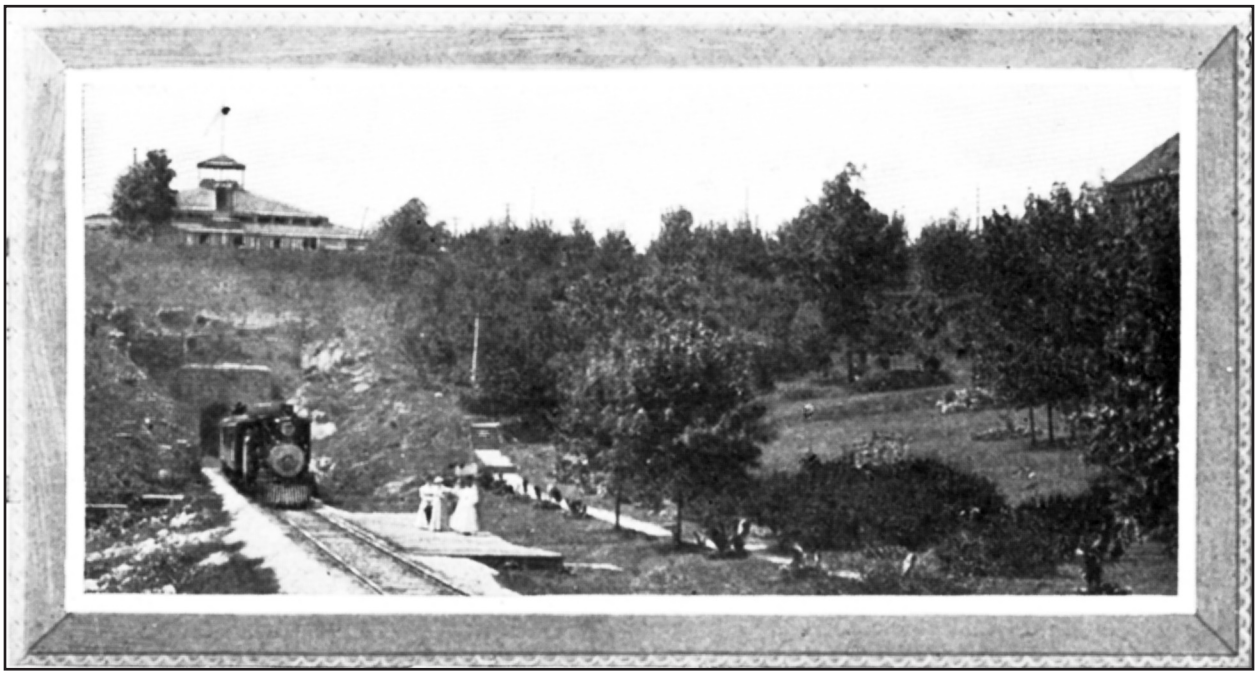

Figure 1 *The Meramec Highlands Resort was the ideal St. Louis getaway. Photo from World's Fair book, The state of Missouri, 1904.*

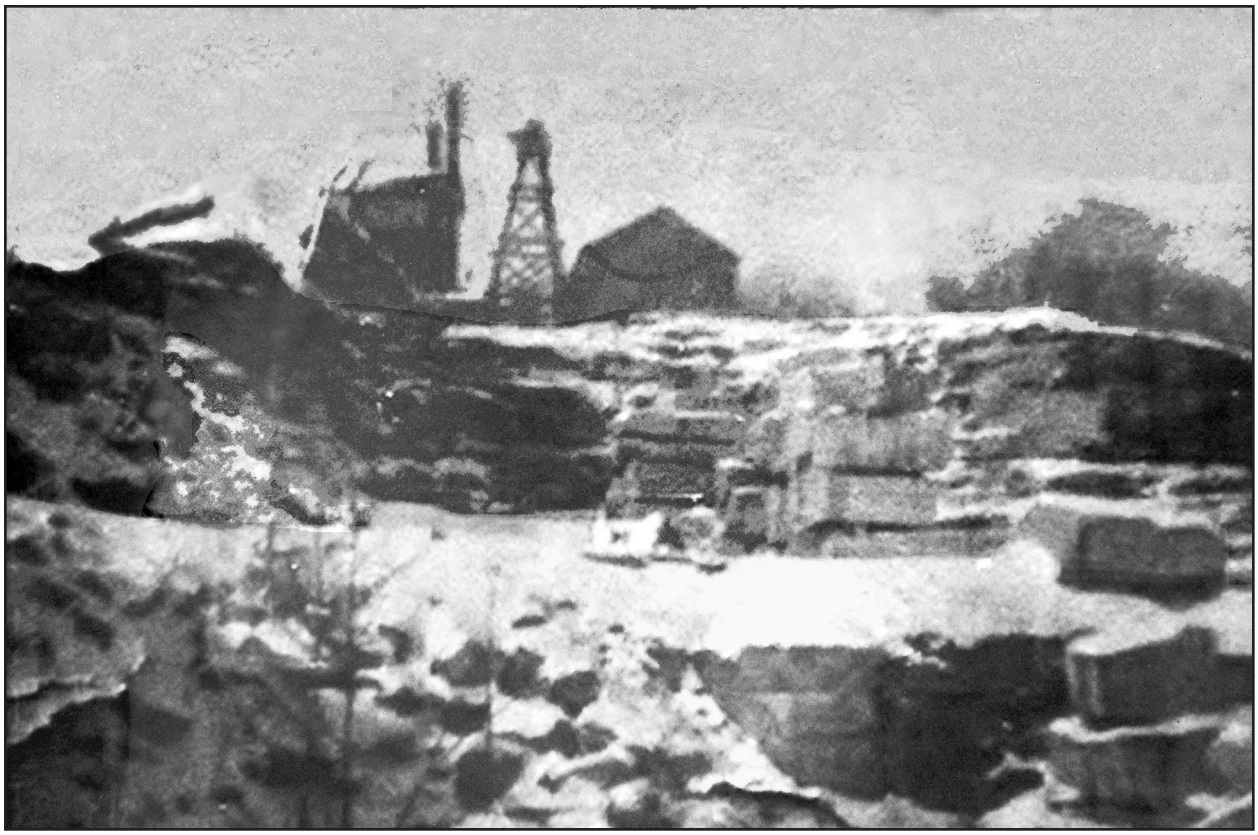

Figure 2 *Meramec Highlands Quarry operated from 1891 to 1903. The plant burned in 1916, and the property was essentially abandoned. Photo courtesy Kirkwood Parks and Recreation.*

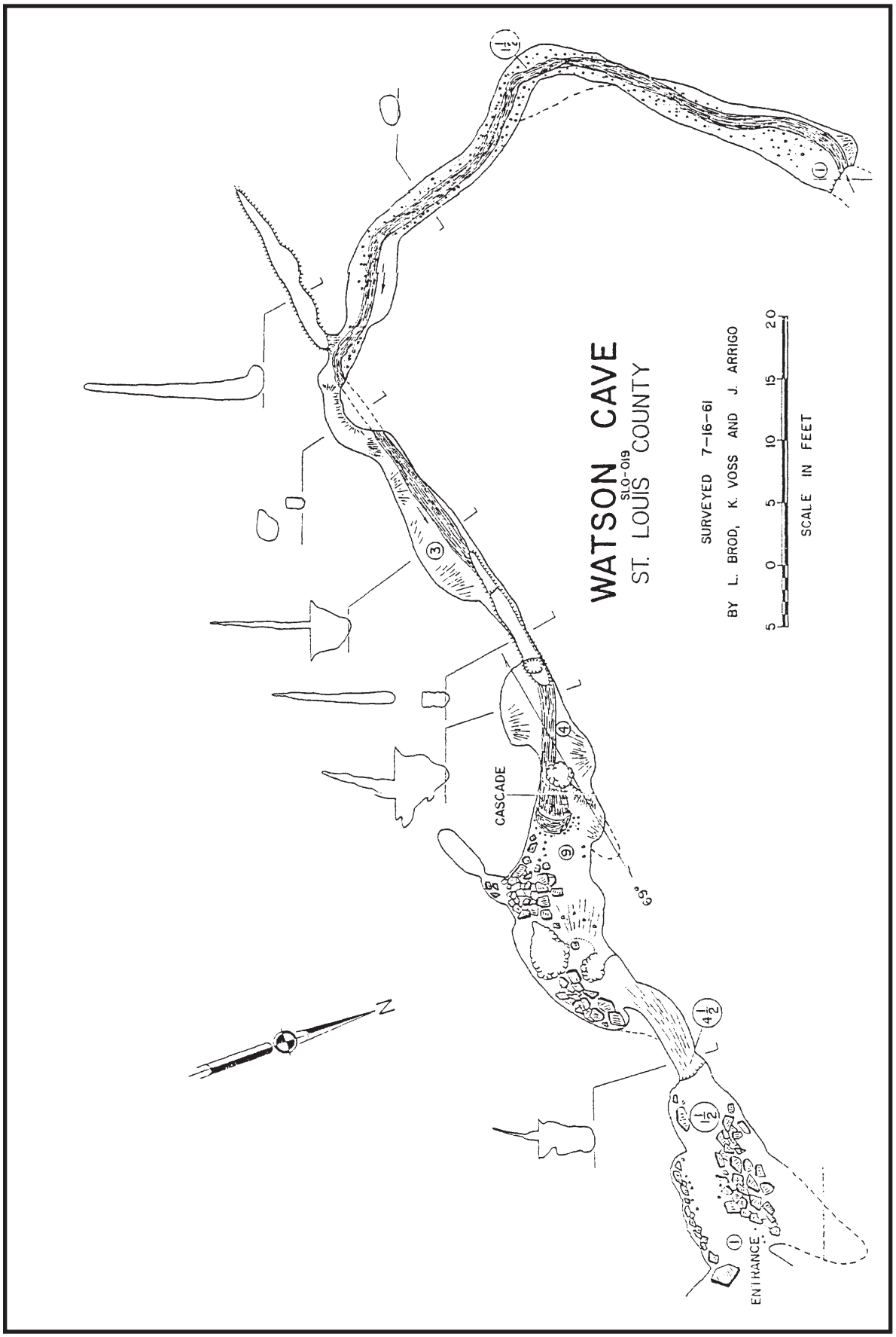

Figure 3 Watson Cave Map. Map by L. Brod and J. Arrigo.

Fair. If so, it was used only as foundation stones for temporary terra cotta constructions as no evidence remains of its use in any permanent structure in St. Louis' Forest Park. Quarry buildings burned in 1916, and for eighty years the property remained in private hands, used informally for picnicking, nature study, as "woods" by local children during the day and for partying by local teens by night (Baker 1995, Buckley and Buehler 1904).

In 1964 Lang Brod mapped Watson Cave, the small cave encountered during quarrying (Figure 3). This cave is approximately 35 m long. Ten meters

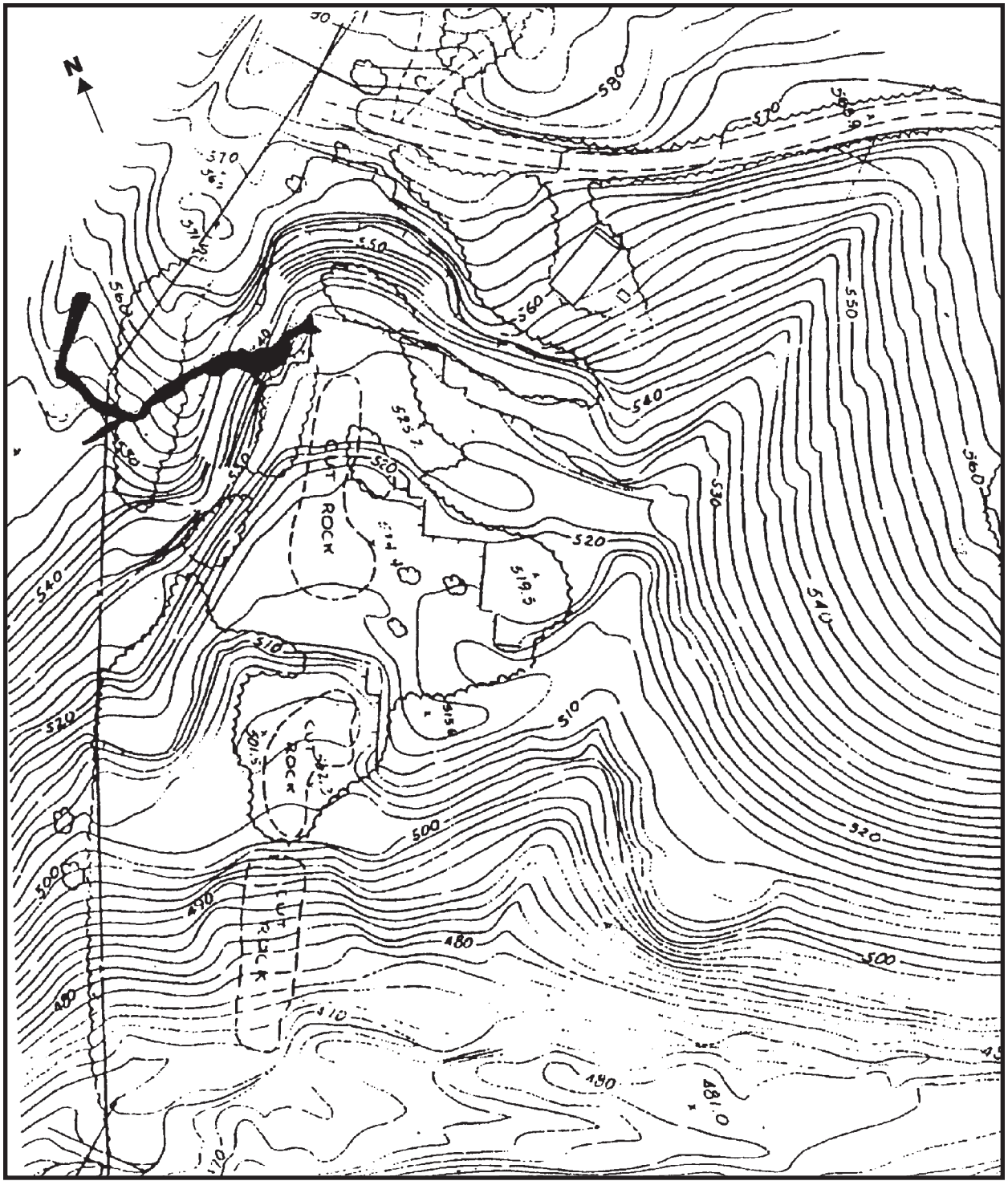

Figure 4 *Watson Cave overlay. I-270 lies just off map to the west; to the north is the Burlington–Santa Fe Railroad. Map by Tom Clifton.*

into the cave, the stream that runs the remainder of the cave sumps. Upstream of the sump, the cave continues to its terminus in a 15-cm-high passage admitting the stream. The cave is rather shallow, as indicated by the presence of tree roots. Most of the cave is developed along joints, before the sump, it is rarely over 60 cm tall, but beyond one encounters a one-meter high waterfall and passage up to almost three meters tall. The outflow of the sump is unknown. A large room, about three meters long and tall enough to sit in comfortably, exists at this point. Beyond the room, this tall passage is also extremely narrow, best described as a crevice with intermittently passable openings. Only the stream-enlarged bottom portion of the passage is sufficiently roomy enough for small adults (Brod 1964). The cave initially heads towards I-270, but turns northward, and instead pinches out (Figure 4). At approximately the elevation of Watson Cave in the northbound lane on I-270 is a concrete reinforcement structure partway up the rock wall, its purpose is unknown, but may have some relationship to a karst feature. A small, perennial stream tumbles down the property towards the Meramec River.

The Problem

In summer 2000, Miracle Design Group proposed to develop the old quarry as an 18-unit multifamily complex. The owners, Ernest and Dee Koestering, were in their 80s. They lived adjacent to, and had owned the 3.2-ha (8-ac.) quarry since 1962. The developer made the Koesterings an attractive offer—contingent on the city changing the zoning to permit multifamily development.

The Players

Ernest Koestering was a retired engineer and his wife, Dee, a homemaker. His home and the disputed site lay in a wooded part of Kirkwood, bounded on the west by I-270 and on the north by the tracks of the Burlington–Santa Fe Railroad. Because of increased suburbanization and land values, he had been approached several times, as recently as 1998, to sell the undeveloped parcel, but he had resisted, preferring the unused, forested, buffer zone between himself and the noisy interstate. Advancing age and financial consideration caused him to reluctantly consider the Miracle Design Group proposal.

A number of obstacles stood in the way of the property sale, chiefly that the property was not zoned for multifamily dwellings, and that other residents along the south side on South Signal Hill Drive, with wooded lots of 0.4 to 1.2 ha (1 to 3 acres), did not want to see a multifamily development. One of these residents, Ms. Linda Fenton, took it upon herself to make preservation of the quarry property her cause. Another neighbor, Jamie Meier, canvassed her neighbors not only to prevent the Kirkwood Planning and Zoning Commission from rezoning the property, but also to effectively lower the current zoning code to conform better to other properties in the area. Fenton also contacted Ron Coleman of the Open Space Council, a local greenspace advocacy group, for advice.

Linda Fenton was sympathetic to her neighbors, the Koesterings, and their wish to sell the quarry for a reasonable price, but equally determined to fight the housing complex, and to preserve the quarry. In order to have anything to preserve, the first step was to stop the rezoning, and the second, to find a compatible buyer for it. Her initial search for a conservation buyer failed. The property was at the same time too valuable and too worthless. Although birders had used it, an informal botanical survey only found species one would expect in an overgrown, abandoned lot.

Throughout this process, the Koesterings seemed of two minds on the quarry. Although both had a great love for the land, they entered into a preliminary contract for its sale. This made dealing with them during the entire process a sensitive issue. One respected their right to do as they pleased with the property, while at the same time encouraging them to consider conservation alternatives, and helping them find other buyers who did not propose to develop. An additional fact was that Dee Koestering's health was in constant flux during the year from August 2000 to her death in August 2001.

Among Fenton's Kirkwood acquaintances was Mr. Tom Clifton, whom she knew to be a caver with Meramec Valley Grotto. Tom enlisted the help of Tom Cravens, Meramec Valley Grotto founder, who also lived in Kirkwood, and who had corresponded with Mr. Koestering occasionally since 1970, and Jerry Vineyard, retired deputy state geologist, who had been contacted by Koestering in 1998 regard-

Figure 5 *Location of the Meramec Highlands Quarry east of I-270 in Kirkwood, Missouri.*

ing where the water in his cave stream went.

In August 2000, the Koesterings, Clifton, Fenton, a geologist, a botanist, the Mayor of Kirkwood, Mike Swoboda, and assorted neighbors visited the site to see if there were bats in the cave, especially any endangered species. None were found. Clifton was the only member of the party to enter the cave. Although they took maps of the cave and the verbal description, the others, carrying flashlights and dressed in casual outdoor wear, at least subliminally expected a large, walk-in cave, not a crawling entrance in the side of the quarry wall (Tom Clifton pers. comm.).

As trip participants discussed possible development, nine major hurdles to clear any change in zoning regulations became clear. These were:

- No sewer on property. The nearest sewer main would involve bringing sewer from across I-270. Septic systems were out of the question because of the topography and lack of topsoil over the bare bedrock.
- Water lines were available adjacent to the property, but again, laying waterlines directly on rock brought a new set of expensive engineer-

ing problems.

- I-270 had cut off the driving access to the property. A narrow, one-lane road existed along the railroad tracks, but it would have to be widened, filled and graded to be brought to code for that many residents.
- Because of the steep terrain, massive cut-and-fill would be needed to achieve anything resembling normal landscaping. Current residents were leery of the blasting needed to secure the housing units to the hillside.
- The tract is bounded by a railroad main line on the north (Figure 5). Families with children would not want to locate there, plus little could be done in terms of noise mitigation from the railroad.
- When I-270 was built alongside the Koestering's property, it consisted of two lanes north and two lanes south. The highway was now four lanes in each direction. What was once a twice-a-day noise annoyance during rush hour was now a 24/7 roar of noise. Noise mitigation would have to be done for the complex to attract suitable tenants.
- The developer planned to ask for a number of variances from city code because of the excessive cost to meet codes. The local residents were concerned that their new neighbors meet the same codes as they had to, and not be excused, in order to maintain local property values.
- The active perennial stream would have to be channelized or buried. No flow-monitoring records existed, so engineers would have to study the stream, incurring additional cost, not to mention the cost of the mitigation. The construction/engineering problems of the cave stream water (if the area over the cave were developed) were unknown.
- After meeting objections one through eight, the developer estimated that final cost of each unit to be near $800,000 under single-family zoning in order to obtain a decent return.

Although Kirkwood is reasonably well-to-do, over three-quarters of a million dollars per unit was greatly out of line even for the single-family housing with land adjacent to the property. He proposed to sell the attached-unit homes for $330,000 each, because he could double the number of units under the zoning change he sought (Tom Clifton, Linda Fenton, Jerry Vineyard, Murray Pounds pers. comm.).

The Plan

A three-fold plan enacted over the next year ensured that the property was, in the final assessment, saved in its semi-wild state. This plan consisted of (a) thwarting the proposed change of property zoning to multifamily housing based on the criteria just enumerated (b) determining actual cultural and natural resource values which existed on the property and (c) finding funding sources to acquire the property for conservation purposes.

The Results

The change of zoning from R-1 single family to 4–3 multifamily was denied on November 1, 2000, because of the efforts of Fenton and her neighborhood group. The outcome was also assisted by testimony from Clifton, information from the Missouri cave files furnished by Jerry Vineyard on the cave resources, neighborhood concern about extensive blasting and sinkhole creation in a karst area, and issues related to the surface and cave streams under a development scenario. The Missouri Cave Resources Protection Act was entered as evidence of the importance of caves into zoning hearings.

In the course of examining the site for cultural and natural artifacts and resources to preserve, a long length of original quarry chain was discovered. Later, an example of feathers and wedges were found intact in the wall—a preserved example of the mining methods used at the turn of the twentieth century. Jerry Vineyard found, in searching old books, that the quarry was a geological type locality for the Spergen Hill (Salem) Limestone, as well as the original example cited by the United States Geological Survey of the Meramecian Series of the Middle Mississippian strata in Missouri, which after the quarry was successfully saved, was used as the type locality for these ancient rocks nationwide (Lane and Brenckle 1977).

Clifton made a detailed examination of the cave on several occasions, with the intent to research water quality and biota there, including plans to gate the cave against teenage intruders—the ones who had left beer cans and other debris

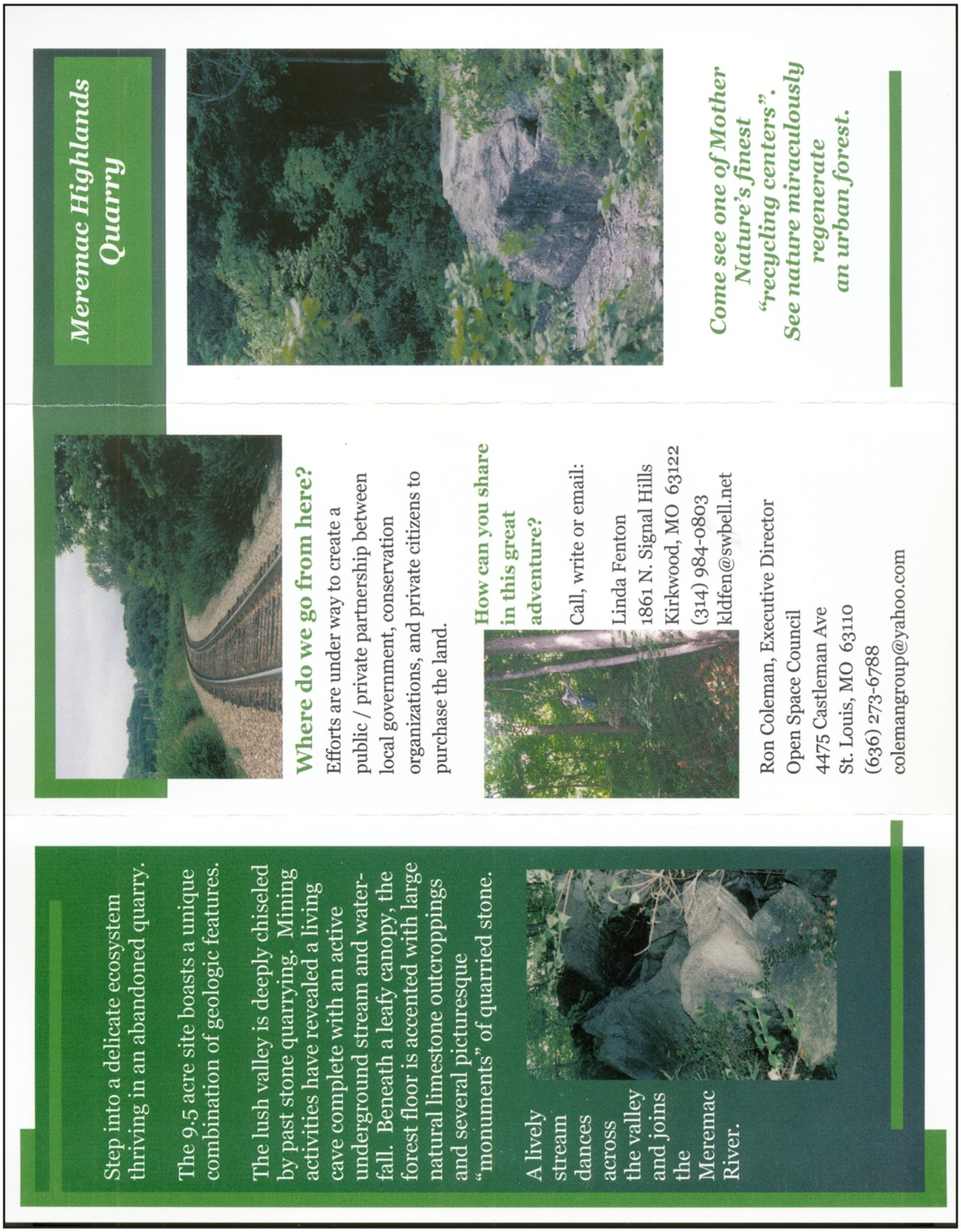

Figure 6 Brochure issued by Linda Fenton and the Open Space Council to encourage the formation of a public-private partnership.

down a passage so small a cave rescue would prove most difficult. Fenton, the local chapter of the Audubon Society, and the Webster Groves Nature Study group made extensive bird and botanical lists on the property. The property begged for preservation as a nature study area because of its essentially wild return to nature, including its use as a wildlife refuge.

Finding the Money

After the developer's attempt at rezoning

failed, Fenton turned her efforts towards raising the money necessary to buy the property for conservation. Almost immediately, a neighbor put up $40,000 in a matching grant challenge, but this was a mere 8% of the fair appraised value of the half-million dollars generally expected for the property. The Kirkwood Parks Board was interested in the property, as it was one of the few remaining "wild" parcels in the city limits, but they did not have the funding. Even though Signal Hill and the adjacent community had come together to fight the zoning change, they were not too keen on the property becoming an attractive nuisance as a public park, either because of the infrastructure needed to make it one, or the additional traffic. Many of the same issues that were used to fight the housing complex were issues of concern to the nearby residents.

Fenton consulted Ron Coleman, and they envisioned a public-private partnership where private nature study groups, and some public grant-funding would preserve the land, but still control outside access. Brochures were printed up to pursue this idea, but funding was slow in coming, as were negotiations with the Koesterings, who believed that with public funding would come increased public access and an end to their solitude.

In August 2001, Mrs. Dee Koestering took a turn for the worse, and passed away on August 21. Reportedly, she told her husband to sell the property to the city before she died. Within a few weeks after her passing he offered not only the quarry, but also the 0.6-ha (1.55-ac.) tract containing his home to the City of Kirkwood for Dee Koestering Park at Meramec Highlands Quarry (Watkins 2003).

It took until November 15 for a final deal to be struck with Mr. Koestering, and another year for preliminary assessment and basic access to the park before it could be opened to the public. Although the exact breakdown of funding for the park was available to me, just under half ($207,000) of the $575,000 purchase price came from a Federal Land and Water Conservation Grant administered by the

Figure 7 *The author with interpretive geological panels at the overlook shelter*

Missouri Department of Natural Resources for the preservation of parklands and green space (City of Kirkwood 2003, National Park Service 2003).

Figure 8 *The trail in the park is the same path picnickers have used for a hundred years.*

Conclusion

Dee Koestering Park is managed as a nature study area, and will never be "manicured" into a typical city park. Access to the park is limited to ten parking spaces at the entrance. Only those with disabilities or explicit special permission are allowed to drive down the steep, one-lane road to the inner lot. A sheltered overlook of the quarry with historical and geological interpretive panels has been erected using private funds along a paved, handicapped-accessible trail.

Those hiking into the quarry and along the creek are following the old beaten trails established by a century of informal use. Watson Cave is now gated, access is controlled through application to the Kirkwood Parks Board. The preservation of this significant site including Watson Cave would not have been possible without the cooperation of the owners, the drive of the neighbors in wishing to preserve nature, the input from the cavers in furnishing data and the involvement of both government and nongovernmental conservation groups and conservation-minded citizens.

Figure 9 *Watson Cave is now properly gated.*

Acknowledgments

I am grateful for much information that came from discussions with Tom Clifton, Linda Fenton, Jerry Vineyard, and Murray Pounds, Kirkwood Parks and Recreation Director. Tom Clifton

also provided a folder containing correspondence and contemporary news clippings intended to inform Meramec Valley Grotto, as well as papers gathered for his disposition before the Kirkwood Planning and Zoning Commission. My knowledge of the park is from personal involvement in 2000–2001 as a member of Meramec Valley Grotto, and in 2004 when I was professionally involved to make geological interpretive panels and teachers' handout materials for the park. Thanks again to Tom Clifton and Linda Fenton for that opportunity.

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