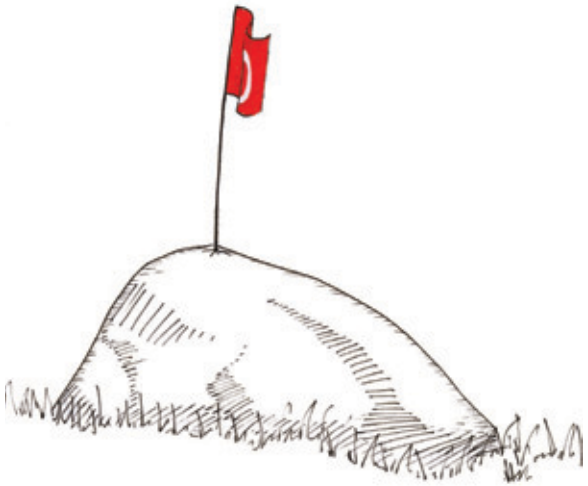


RESILIENT FORM OF THE CALIFORNIA GOLFSCAPE

LANDSCAPE ARCHITECTURE SENIOR PROJECT

ROBERT NELSON

JUNE 12TH, 2009

RESILIENT FORM

OF THE

CALIFORNIA GOLFSCAPE

A SENIOR PROJECT
PRESENTED TO THE FACULTY OF THE
LANDSCAPE ARCHITECTURE PROGRAM
UNIVERSITY OF CALIFORNIA, DAVIS
IN FULFILLMENT OF THE REQUIREMENT FOR THE DEGREE OF
BACHELORS OF SCIENCE IN LANDSCAPE ARCHITECTURE

ACCEPTED AND APPROVED BY:

Senior Project Advisor
Mark Francis
UC Davis Faculty

CommitteeMember
Mike DeVries
Golf Course Architect

Faculty Committee Member
Eric Larsen
UC Davis

Faculty Committee Member
Patsy Eubanks-Owens
UC Davis

ROBERT NELSON
JUNE 12,2009

DEDICATION

I dedicate this project to state of California and all the inspiration she has given me within her borders.

ACKNOWLEDGEMENTS

I would like to take this opportunity to thank my committee members for guidance throughout this process, and any one else that has taken time to share their wisdom with me along the way.

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

ABSTRACT

In this project I will explore the meaning of resilience as it pertains to golf course form in California. By observing various golf courses throughout the state and abroad, I have identified current challenges to golf courses seeking resilient form. With this extensive research of golf courses I intend to link the physical resilience of golf to that of the native landscape of California.

The first part of this project uses design principles to propose sustainable strategies in both the design of golf courses and management aspects that may help to establish a resilient, native form. The principles include Designing the California Landscape, Ecosystem Integration, Water in the Golfscape, Golf and Community, and Maintaining Resilience.

The second part of this project aims to demonstrate the implementation of the various design principles outlined in part one. By first analyzing existing challenges faced by San Geronimo Golf Course, I will propose alterations to its current form that will help the golf course achieve greater resilience in its local landscape.

This project is not intended to act as a "how to" for golf course construction and maintenance, as variable environmental conditions throughout the state require site-specific approaches when seeking resilient form. My intent is to promote discussion by introducing possible alternatives to the current standards of modern golf course design and maintenance that will help in establishing a more resilient form in the California golfscape.

INTRODUCTION

Resilient Form:

The ability of a golf course to retain its landscape character and functionality over an extended period of time; regenerative by nature.

The concept and meaning of resilient form came to me a few years back while in Scotland. Walking around centuries old golf courses, I marveled at how little they had changed in form over time. It became increasingly clear to me that these golf courses represented a balance between humans and nature. Respect was reciprocal, as communities were given a forum to actively recreate in the landscape, and the land was given the chance to just be itself. I realized that golf courses in my own country struggled with this type of democracy, and began to contemplate what meaning its presence would have in my home landscape.

In Scotland, people understand golf course form as ***the way it is meant to be***, and the way it's always been, even before golf courses had form. In contrast, the perception in California is that golf's current high input, oasis-like form is the ***way it has to be***. It is commonly accepted that golf can take no other physical form in California than one that implements "manifest destiny" as the driving principle in development. I believe this will ultimately lead to the undoing of most golf courses in the state, their transitory existence made possible by an unsustainable supply of water.

It is my intent with this project to begin a conversation about the way ***it is meant to be***, here in California. I want to learn how golf courses can represent our native landscape, and by fostering native form, learn how to live and play within it. This project is an exploration in the resilient form of golf courses, and is the first step in my personal quest to understand how golf can prosper in the state of California.

RESILIENT FORM OF THE CALIFORNIA GOLFSCAPE

PART ONE: PRINCIPLES OF RESILIENT FORM

DESIGNING THE CALIFORNIA LANDSCAPE

Designing Resilient Aesthetic

Resilient form of the California golfscape begins with establishing an aesthetic concept for golf courses that integrates seamlessly with the existing or surrounding landscape. Understanding and utilizing native landscape forms will help to achieve this integration, while retaining the complex ecological processes needed for a healthy, resilient landscape.

Migration of Form

Golf originated along Scotland's barren, windswept, coastline. The game developed in the unique interface between Scotland's coastal dunes and agricultural land, commonly referred to as "links land". The fine fescue turf grass growing naturally in the nutrient deficient, sandy soils, provided conditions conducive to easy ball finding and light management regimes. The purpose of the game in these times was to challenge the golfer to direct a small ball toward a defined target, avoiding the natural hazards in the landscape.

Figure 1. Early hazards at Prestwick Golf Club, Scotland

Figure 2. Natural landscape character on the Old Course at St. Andrews, Scotland.

Today, links golf courses retain the same natural character and forms reminiscent from centuries past, relying on the resilient properties of the native landscape to hold form. Great golf courses in Scotland like the Old Courses at St. Andrews (fig. 2), Royal Dornoch, and Prestwick (fig. 1) all respond to their natural

settings, engaging golfers through the strategic implementation of both natural and constructed hazards. The experience on a links golf course is like none other, attracting traveling golfers from around the world, and retaining local interest for hundreds of years.

Figure 3. Meadow Club, Marin County, Ca. Built in 1927. Restored to original form by Mike DeVries in 2003.

The California Golfscape

Similar to Scottish links land, the California landscape also attracts visitors from around the world with its unique character and stunning scenery. Pioneering golf course architects from the early 20th century like Alister MacKenzie and George C. Thomas understood the native California landscape presented opportunities for golf that are endemic to the state. The golf courses that each of these architects built in California are among the most esteemed in California, with MacKenzie's Cypress Point holding the #2 position on Golf Magazines top 100 courses in the U.S. list (Golf .com).

Figure 4. Rustic Canyon, Ventura, Ca. Natural hazards.

Figure 5. Aetna Springs, Pope Valley, Ca. Native form.

The same cannot be said for much of the rest of the California golfscape, as a strong disconnect exists between the modern golf course and California's diverse landscape mosaic. Some modern golf courses in California, such as Rustic Canyon (fig. 4) and Aetna Springs (fig. 5), have sought to reconnect to their native landscape through the use and construction of native landforms, yet golf courses like these represent a fraction of the California golfscape as a whole. Resilient form re-establishes a balance between a sense of place, and golfing playability in the California landscape.

Native form in California implies resilience, and through this resilience the California golfscape can endure as an ageless and cherished landscape, much like the links golf courses of Scotland.

Figure 6. Himalaya putting course, St. Andrews, Scotland. An 18 hole putting course for just one Pound per round.

Designing For Enjoyment

Legendary golf course architect Alister MacKenzie once said, "The ideal hole is surely one that affords the greatest pleasure to the greatest number" (MacKenzie, 88). Many golf course architects in the "Golden Age" of golf course architecture (1911-1936) understood this basic principle of golf course design, yet many modern golf courses seem more geared to providing a dramatic and penalizing test of skill than they are to providing a venue for recreational enjoyment. Resilient golf course form engages golfers of all skill levels, presenting challenging hazards for the scratch golfer, while accommodating the average golfer with easier, less demanding routes from tee to green. The key is to provide interest throughout the golf course, allowing golfers to enjoy their experience, regardless of how well they play.

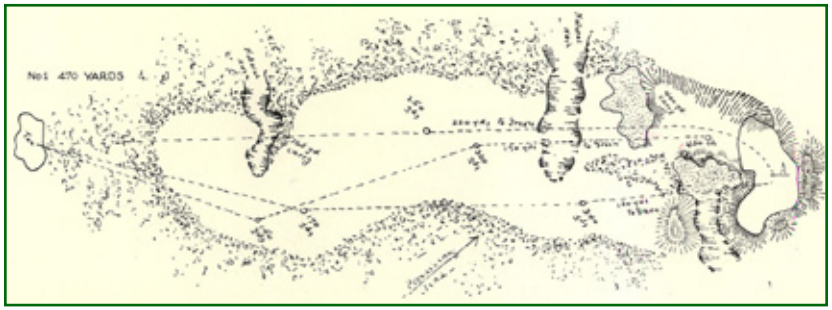


Figure 7. George C. Thomas design for the first hole at Riviera Country Club, Santa Monica. Multiple options of play are provided for golfers of all skill levels.

Figure 8. Cypress Point, Monterey. Alister MacKenzie's masterpeice circa 1929.

"I do not expect anyone will ever have the opportunity of constructing another coourse like Cypress Point, as I do not suppose anywhere in the world is there such a glorious combination of rocky coast, sand dunes, pine woods, and cypress trees."

Alister MacKenzie

The Spirit of St. Andrews

ECOSYSTEM INTEGRATION

Golf Course as Habitat

The rules of golf entail that golfers attempt to "play the ball as it lies." (USGA, 41). This rule is especially pertinent if one's ball lies in an un-maintained area, where the challenge of recovering from native vegetation is as unique to golf as the recovery from the sand bunker. Resilient golf course form requires these areas to provide the complete golfing experience.

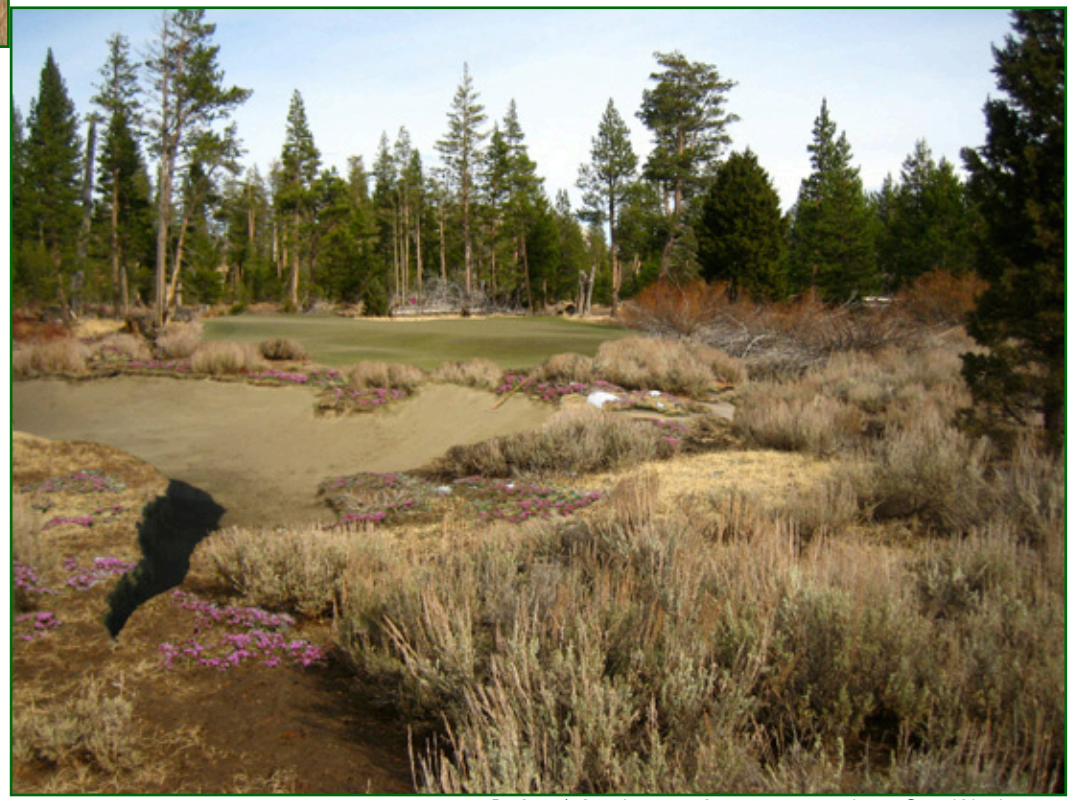
Figure 9. The Native California Landscape in Spring.

Creating wildlife habitat in the California golfscape is established through the native, resilient form of California plant communities. By planting native plants in areas deemed "environmentally sensitive", modern golf courses have made great efforts to accommodate wildlife habitat throughout their properties. In theory this practice would seem beneficial, yet if poorly planned it can lead to clear and detrimental conflicts between the land-use types.

Environmentally sensitive areas are intended to provide space on a golf courses where wildlife can exist without intrusion from the golfing population. Placing these areas in, or near, the direct line of play not only creates an over-penalizing situation for golfers, but it also places sensitive wildlife habitat in areas frequently "bombed" by wayward golf balls. To avoid this situation and create harmony between wildlife and golfers, the resilient golfscape would place these "sensitive" areas far away from conflicts with golfing activity. Ideal locations would be behind greens, tees, or any area far removed from potential contact with the errent golf shot. The traditional "native" areas, where golfers are allowed to search for their golf ball, would then become the democratic interface and buffer zone between the mowed golfing surface and areas of protected habitat.

Before

After



These images show how a minimalist approach can achieve a balanced environment on the golf course. The maintained area is only as large as it needs to be while the un-maintained areas are integrated into the hazard features.

Figure 10. Before/after images for a proposed par 3 golf hole at Lake Tahoe Golf Course

ECOSYSTEM INTEGRATION

Shrubs

One vegetation type noticibly undervalued on the modern golf course is the shrub. Many links golf courses utilize the native gorse shrub to definine space between golf holes and areas with high traffic. In return, the gorse provides penal characteristics, and aesthetic value during its spring bloom. California has many resilient native shrubs, such as coyote brush and manzanita, that would help to increase wildlife diversity, and act as an alternative to tree planting.

The Mighty Oak

There is no tree more widely distributed throughout California landscape than the Oak (*Quercus sp.*). At least 20 separate oak species are native to the state, growing in habitats ranging from the coastal bluffs, to the lower elevations of the Sierra Nevada, to the semi-arid deserts of southern California (Pavlik et al., 3). Golf course developments, like other land-uses, are drawn to the oak landscape in California. The aesthetic qualities provided by mature oak specimens have the ability to transform an uninteresting golf hole into one of scenic beauty.

Oak trees have adapted to the Mediterranean climate of California by developing special leaf and root system characteristics that minimize water loss during the hot, dry summer months (Pavlik et al., 54). Although these adaptations vary from species to species, none are very tolerant of changes in environmental conditions. Irrigated oak trees will develop what

Figure 11. Typical scene in the Oak Savanah. Marin County.

is called "Oak Root Fungus" (Armillaria mellea), and will gradually decrease in health, eventually resulting in death. For this reason alone, special care should be taken on the golf course to avoid irrigation and any disturbance within the root zone of oak trees.

Methods to reduce the negative impacts of the golf course on native oak trees include creating "native", non-irrigated zones under the full canopy of existing trees (fig. 12). If short, playable turf grass is desired below the oak canopy, the use of Creeping Red Fescue grass (festuca rubra) will allow for tight fairway conditions with no need for summer irrigation. This grass is native to many regions of California and commonly grows beneath oak canopies in the wild. In ideal conditions, the oak tree will provide the shade, soil nutrients, and soil moisture required for the Red Fescue to thrive.

By accommodating the needs of oak trees and respecting their resilient form in the golfscape, a symbiotic relationship can be reached between land-use and native ecology. The open environment beneath that of the oak tree can be beneficial to retaining the desired grasses for a golf course, while golf course maintenance can aid oak woodland structure by removing competing and detrimental undergrowth.

Figure 12. Native grasses below the oak canopy. Aetna Springs.

WATER IN THE GOLFSCAPE

Formation

No golf course in California is resistant to the processes of water on the landscape. Whether it's an existing golf course or a planned golf course development, every effort should be made to understand and utilize the natural drainage patterns on a site, avoiding conflicts with powerful and/or subtle erosive processes that may change the physical form of the golf course.

Over the last century, many golf courses have been misshaped or destroyed as a result of poor understanding of hydrologic processes in California. Eighty years ago golf courses were commonly built along the banks of mighty rivers and ephemeral arroyos. They were built along the majestic seaside bluffs and picturesque dunes that front the Pacific Ocean. Predictably, these golf courses have experienced some significant change in form in the last eighty years. The aesthetic benefits of locating golf holes in vulnerable areas blinded designers and developers to the frequent disturbances associated with these landscapes.

Figure 13. 13th green at Lakeside Golf Club before it was washed away by the Los Angeles River.

Lakeside Golf Club in Los Angeles lost one of their more dramatic greens, positioned on the banks of the Los Angeles River, when high flows altered the river channel location in 1938(fig. 13).

Watershed Management

Eighteen-hole, regulation golf courses can encompass hundreds of acres in their layouts. For a landscape at this scale, a watershed management type approach, which seeks balance between stormwater infiltration and run-off, can be more appropriate than a traditional, engineered stormwater management approach. A watershed management approach views the golf course property as one piece of the larger

watershed. Working to co-exist within that watershed without impacting existing fluvial channels ensures the least amount of alterations to natural surface flow. In areas necessitating drainage infrastructure, directing flows to an area that may facilitate inundation, such as a constructed wetland or irrigation pond, is desirable.

Streams and rivers in California encounter variable seasonal flows, usually determined by rainfall and snowmelt

Figure 14. 18th green at Wilshire C.C., Los Angeles. To protect the green, this arroyo now is lined with a rectalinear concrete liner.

quantities. The morphological characteristics of fluvial channels will change as flows increase in the winter and spring. Erosion, sediment transport, and sediment deposition, together, make up the processes of channel formation and maintenance (Leopold, 60). Golf courses with rivers or streams that interact with their properties should be aware of common behavioral patterns of existing channels. Proper planning and design can prevent the unwanted effects of seasonal and catastrophic flood events.

Many golf courses in California enjoy the serenity of sinuous streams or rivers flowing through their properties, yet most are not prepared for the form changing processes of lateral channel migration. Passive management plans, allowing natural form changing processes to occur, will help to mitigate lateral channel migrations, and valuable infrastructure (irrigation controlers, green complexes) should not be placed in areas where conflicts with channel migration are eminent. Talented golf course architects are able to design resilient golf course form by utilizing by understanding the regenerative processes common to fluvial channel maintenance, while avoiding channel migration conflicts.

Figure 15. Lake Tahoe Golf Course. Lateral channel migration threatens this green site.

GOLF AND THE COMMUNITY

Community

For decades the game of golf has struggled to remove the unfair stigma of being an exclusionary sport. From an outsiders perspective, golf can seem as an elitist activity, yet in the United States alone, 26 million people call themselves golfers, most of those being of the average, non-elitist type (Shackelford, 11). In order to achieve resilient form within the social landscapes of California, golf courses will have to learn to integrate with local communities, serving as accessible, multi-functional resources for the benefit of communities as a whole.

Figure 16. Tourists pose at St. Andrews, Scotland.

Democracy of Space

Built on public lands designated "Crown lands", most of the links golf courses in Scotland are required by law to allow pedestrian access on to their courses. In response, many courses have created defined trails designated for the outside public to safely use as they move though the golf course. As a result, local support and understanding of golf is high in their communities.

By implementing safe pedestrian corridors or open, park-like space for local citizens, California golf courses would have the opportunity to attain greater value to the social framework of local communities. This program could also benefit the business end of golf course operations by allowing for more exposure to golf, with the potential of attracting new golfers.

Affordable Access

Most golf courses in California are overpriced. The average green fee at a public golf course in the U.S. built pre-1970 is $42.70, and a public golf course built since 1990 will run

an average of $60.55 per round (Weinman). This expense has a direct relationship to the typical high costs of modern golf course construction, and excessive maintenance budgets common to American courses. Green fees are often too high for blue-collar golfers to afford, and as a result many golf courses are currently suffering from decreased play (Weinman). Implementing an alternative maintenance regime, with less emphasis on perfection and more emphasis on playability, could help to mitigate this loss by creating less overhead expense for the public golf courses. Lower green fees would result in higher participation numbers, which would in turn bring more revenue for golf courses.

A few golf courses that do not suffer from decreased play are the Municipal golf courses in San Francisco. City residents are offered green fees nearly half the price offered to non-residents. Although problems arise due to municipal mismanagement, it is this type of accessibility that will promote resilient form throughout a local community.

Figure 17. A mother and daughter during a Saturday afternoon round of golf. Reay Colf Club, Scotland.

In many cities like San Francisco, golf is not an elitist sport, but the high green fees are degrading its social resilience and making it less accessible to local communities. Providing opportunities for the non-golfing public to enjoy the natural settings of golf courses may lead to greater public awareness of the benefits of golf. Golf would not exist without people to play, and with current economic challenges forcing many people to quit playing golf because of high green fees, affordability and accessibility are two resilient traits that golf courses need to focus on. Resilient form is found through people's participation in the game of golf.

MAINTAINING RESILIENCE

Maintain Through Disturbance

Disturbance regimes have long been a dominant force in California's landscape. The most common and powerful disturbance regimes in California's history have been related to either fire or water. Plant communities have traditionally been held in check by these disruptive forces, with succession playing an important role in the short-term evolution of vegetative dominance (Perlman, 61). Some plant communities, like the native prairie, have evolved with a frequent fire disturbance regime, promoting conditions necessary for the regeneration of growth for perennial bunch grasses and annual forbs (Barbouor, 16). Other communities such as the Oak Savannah and Redwood forests benefit from frequent low burning fires that clear undergrowth and allow tree specimens to live for hundreds of years, growing to mammoth sizes. The entire landscape of California has been shaped by disturbance in one form or another, and it is through this disturbance that the landscape has developed it's inherent resilience.

Most open golfscapes can be regarded as Grasslands or Prairie. In order for the California Prairie landscape to naturally maintain its form, frequent fires must cover the landscape. These fires are low intensity fires, generally fueled by grasses and forbs alone. The native California prairie was virtually free of annual grasses, and instead consisted primarily of perennial bunchgrasses and annual forbs, such as Lupine (Barbouor, 76). The bi-annual or tri-annual introduction of fire onto the golf course would create an environment friendly to the native bunchgrasses, whose open form is most acceptable to the playability of golf courses.

Figure 19. Native perennial Bunchgrass.

A frequent fire regime would also alleviate the colonization capabilities of exotic annual grasses, burn off thatch build up,

and replenish the soil with organic and sustainable nutrients. Obviously care must be taken to ensure the safety of surrounding communities, and in most cases, special burn permits would be required.

Disturbance as a land management strategy is not a novel idea. Golf courses such as Prairie Dunes in Kansas manage their "native" areas through an annual fire regime. Native Californian people also used fire to manage the landscape for thousands of years(Barbouor, 77). In fact, much of the majestic qualities of the California landscape present when early settlers arrived in California could possibly have been as a result of a carefully planned fire regime carried out by Natives.

Figure 19. 11th hole at Pacific Dunes. Bandon, Oregon. Turf here is irrigated only where necessary.

Drought

California is in a constant state of drought. We live in an era where water resources are temporarily attainable due to the construction of dams in the last 100 years. But this water supply is not sustainable and neither is application of tens of millions of gallons of water annually to golf courses, as most courses in this state do(Shackelford, 14). We must find ways to reduce the amount of golf course area dependent on excessive water inputs. Exploring the viability of native perennial grasses may present a partial solution, but the real problem is the public perception that a golf course must always retain a green color. In California, the summer months bring dormancy across much of the landscape, with grass communities being the most visible of all. If there can be little loss in playable conditions with dormant turf grass, the cost from frequent and excessive irrigation could be eliminated by maintaining browned out turf grass. With few golf courses in California willingly trying to reduce their water consumption at this scale, the cost and benefits are yet to be fully realized. The golf courses that do seek to adhere to the climatic condition of California will surely discover a more resilient form when severe droughts set in.

MAINTAINING RESILIENCE

Water Consumption

No golf course in California is completely resilient to the effects of a severe drought. The California Department of Water Resources estimates that golf courses collectively consume approximately 476,000,000,000 gallons per year in the United States . The reality is turf grass needs water to survive, and unless golf courses go back the oiled sand greens used in the nineteenth century, they are reliant on at least some moisture input to keep desired grasses alive. Methods to reduce water consumption are many, and golf course superintendents are placing more emphasis on water resource management in recent years.

The California golfscape with native form would find resilience by softening the edges between maintained areas and "native areas". This would involve limiting regular irrigation to select areas on individual golf holes, while applying just enough water to other areas, not to keep it green, but to keep it alive. The result would be a colorful mosaic of maintained turf consisting of the greens and browns typical to the California landscape.

The following are some of the common, and not so common water management techniques to help California golf courses conserve water:

- Selecting warm season turf grasses like Bermudagrass and Buffalograss that require less water than other types of turfgrasses like Bentgrass
- Capturing stormwater and irrigation overspray for later use
- Utilizing recycled urban water resources as an alternative to potable water
- Controlling entire irrigation systems with hi-tech computer systems
- Installing moisture sensors below ground that inform a central computer of soil moisture content
- Reducing the amount of maintained turf

USGA Best management practices for Golf Course Irrigation

- Selecting low-water-use turfgrasses, groundcovers, shrubs and trees for use on the course.
- Providing adequate levels of nutrients to the turf, including a balance of potassium and nitrogen, while avoiding excessive levels of nitrogen.
- Using mulches in shrub and flower beds to reduce water evaporation losses.
- Adjusting mowing heights to the ideal levels, depending on species and seasonal water use characteristics.
- Using soil cultivation techniques such as spiking, slicing and core aerification to improve water infiltration and minimize runoff during irrigation or rainfall events.
- Improving drainage where needed to produce a healthier turf with better root systems that can draw moisture from a larger volume of soil.
- Limiting cart traffic to minimize turf wear and limit soil compaction.
- Cycling irrigation sessions to ensure good infiltration and minimize runoff.
- Root pruning trees near critical turf areas to prevent tree root competition with the turf for moisture and nutrients.

(USGA)

RESILIENT FORM OF THE CALIFORNIA GOLFSCAPE

PART ONE: APPLICATION OF RESILIENT FORM

SAN GERONIMO GOLF COURSE: ANALYSIS

San Geronimo Golf Course is a public golf facility located in the San Geronimo Valley of Marin County. The final golf course design by renowned Golf Course Architect Vernon McCann, it opened in 1965 as the first phase of an ambitious development plan. Initially intended to bring thousands of new residents to this small valley west of the San Francisco Bay Area, today the golf course benefits from beautiful surrounding scenery afforded by the lack development. In the late 1980's, the golf course closed due to escalating costs of irrigation water during a drought period. The golf course re-opened a few years later, getting a facelift from Golf Course Architect Robert Muir Graves. San Geronimo golf course is one of the more popular golf courses in Marin County, yet future drought conditions could test its overall resilience. The local community places great value on the golf course as the expansiveness of the golf course has protected a large amount of land in the valley from development.

Figure 20. Marin County, Ca.

Figure 21. San Geronimo Golf Course

Figure 22. Meadow-like landscape on current front nine.

Figure 23. Valley Oaks frame the golf holes along San Geronimo Creek

Figure 24. The golf course recieves more than 30 inches of rain annually.

Figure 25. The current parking lot. This area would be better utilized incorporated into the golf course layout.

Figure 26. Coastal Miwok Depiction.

The Coast Miwok once lived on this same property along the banks of San Geronimo Creek. Renovations to the golf course in the early nineties uncovered artifacts from a historic village site, halting further earth moving and bringing a heightened cultural awareness to the local population of San Geronimo. Currently there is no effort to inform golf course users of the indigenous cultural heritage of the area.

The major existing features of the golf course include:

- Mature Riparian vegetation along both San Geronimo Creek and Larsen Creek
- Specimen Old Growth Valley Oak and Live Oak trees
- Topography creates intimacy on the current back nine
- Meadow landscape on current front nine provides for an interactive atmosphere
- Close interaction with creek network
- The adjacent Roy's Redwoods open space
- Large rocks on site; one that defines the grounds in front of clubhouse
- Clubhouse located in prominent location

Figure 27. Larsen Creek.

Figure 28. Topography creating intimate green sites on the current back nine.

Negative aspects of current golf course form:

- Grounds around clubhouse contain too many vehicle circulation routes and does not reflect the atmosphere desired for such a visible location on a golf course
- Location of the parking lot eliminates valuable land for the golf course
- Maintenance facility is in poor condition, too close to S.G. creek, and misuses valuable space on the property
- Many of the smaller creeks and rills have been placed in culverts, eliminating Salmon spawning habitat
- Irrigation ponds are overused and aesthetically irrelevant
- Golf course architecture does not respond to native landscape
- Course lacks drama and interest
- Water supply is contingent on availability through MMWD
- All of the existing Valley oaks are abused through poor irrigation practices and excessive traffic from golf carts

Figure 29. Green site along San Geronimo Creek. Note the mark left on the tree trunk left by poor irrigation practices.

- Many exotic and non-native trees degrade the overall aesthetic of the golf course
- Current front nine impacted by highway traffic noise

ANALYSIS: OPPORTUNITIES AND CONSTRAINTS

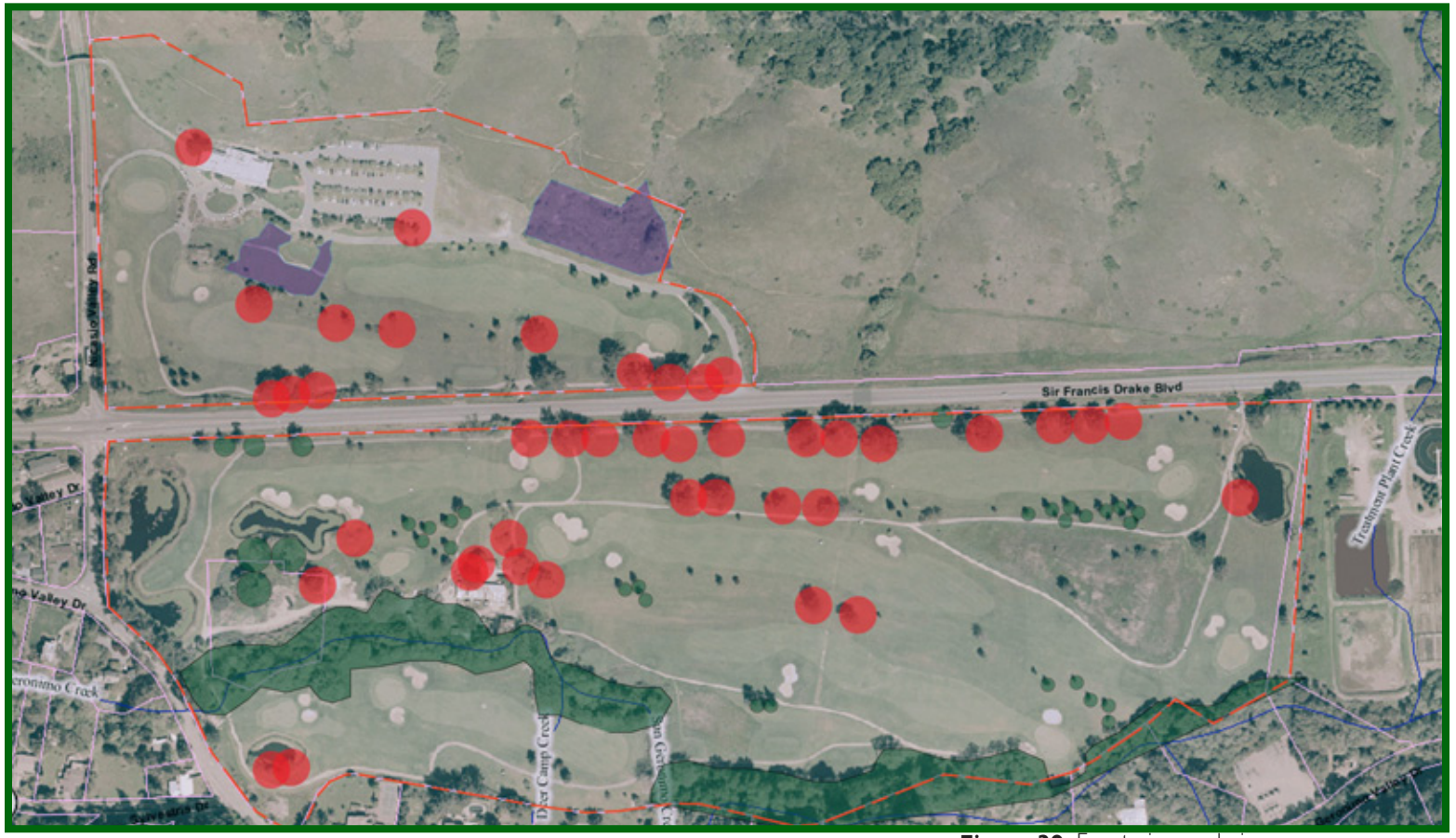


Figure 30. Front nine analysis.

Undesirable Trees

Desirable Trees

Existing Shrubs

Existing Riparian Vegetation

Property Boundry

Figure 31. Back nine analysis.

Undesirable Trees

Desirable Trees

Existing Shrubs

Existing Riparian Vegetation

Property Boundry

SAN GERONIMO GOLF COURSE

SAN GERONIMO, CA.

SAN GERONIMO GOLF COURSE: ROUTING CONCEPT

Figure 32. Routing Plan

APPLICATION OF RESILIENT FORM

As a valuable asset to both the local community and the golfing community in Marin County, my design intent is to reshape the entire golf course property into a more democratic, enjoyable, and resilient golfscape. In my design concept, I have reorganized the infrastructure on the property, bringing more definition to the clubhouse, while grouping the maintenance facility and parking lot into an area underutilized by the current configuration. The new irrigation ponds would be fed by a proposed wastewater treatment facility and would incorporate the use of a bio-remediation wetland system to further clean the water for irrigation use. Creek channels will be restored, and native plant materials will help to define the golf course vegetative aesthetic. There are many changes proposed within this design concept, yet with a phased, minimalist approach, each could be carried out at a lower cost than most golf course developments.

SAN GERONIMO GOLF COURSE

-FRONT NINE-

FRONT NINE		
HOLE	YDS	PAR
1	499	5
2	334	4
3	408	4
4	320	4
5	192	3
6	178	3
7	434	4
8	510	5
9	342	4
OUT	3217	36

Figure 33. Proposed front nine routing design

Promoting Native Form

The third hole plays past a majestic valley oak and over the toe of the hillside beyond. These before and after images depict how the golf course could look in spring when the native wildflowers are in bloom. Reducing the maintained turf and promoting the growth of the native bunchgrasses in the un-maintained area will increase the native aesthetic and help to save the huge oak tree from further cultural damage.

Figure 34. Existing 13th hole. Poor native aesthetic.- Before.

Figure 35. After- Proposed new 3rd hole with restored prairie and native aesthetic.

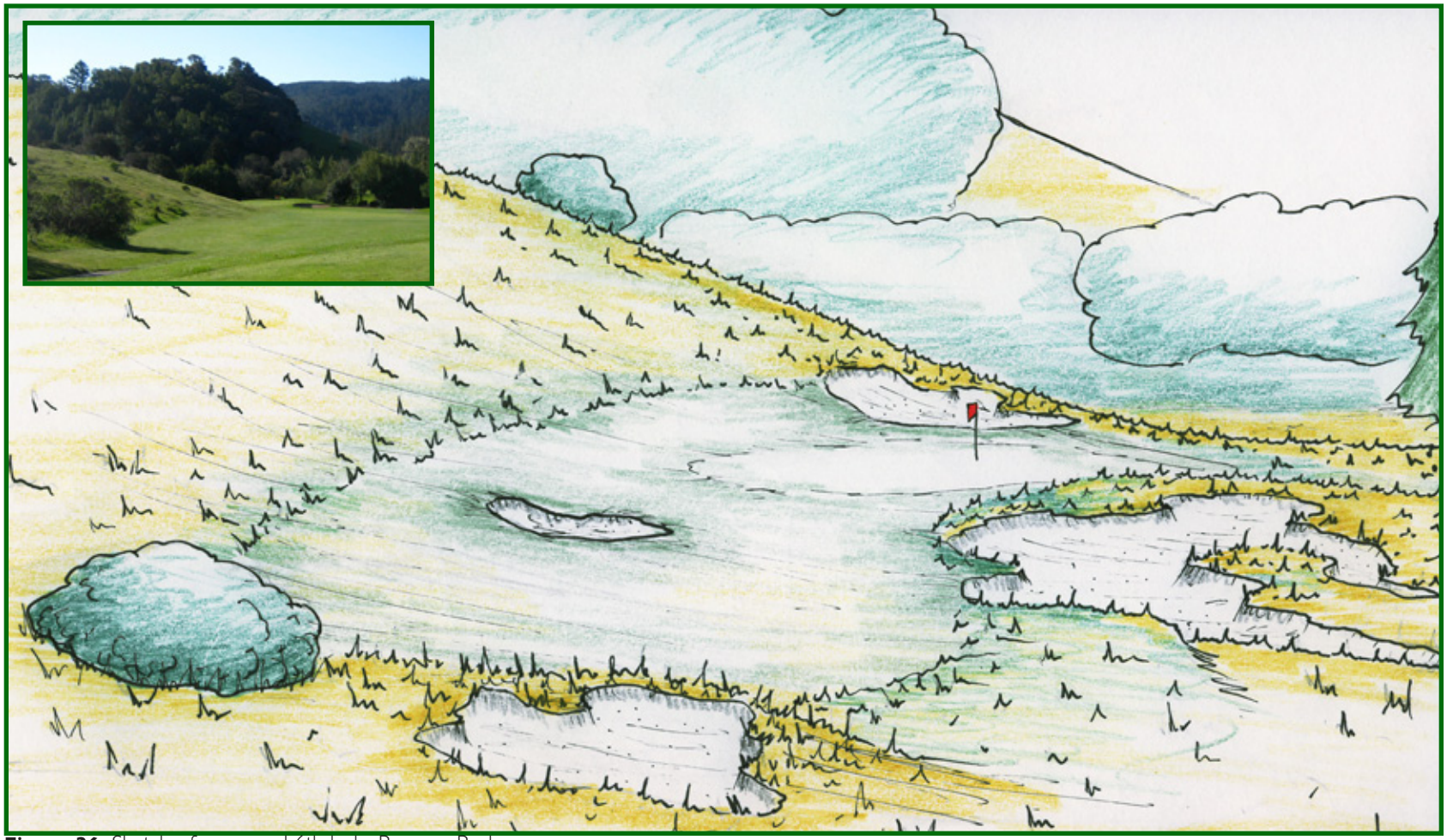


Figure 36. Sketch of proposed 6th hole. Reverse Redan.

Figure 37. Sketch of proposed 7th hole. A small creek runs in front of this green, blending into the constructed bunkers. The green site would shift to the right of the current green.

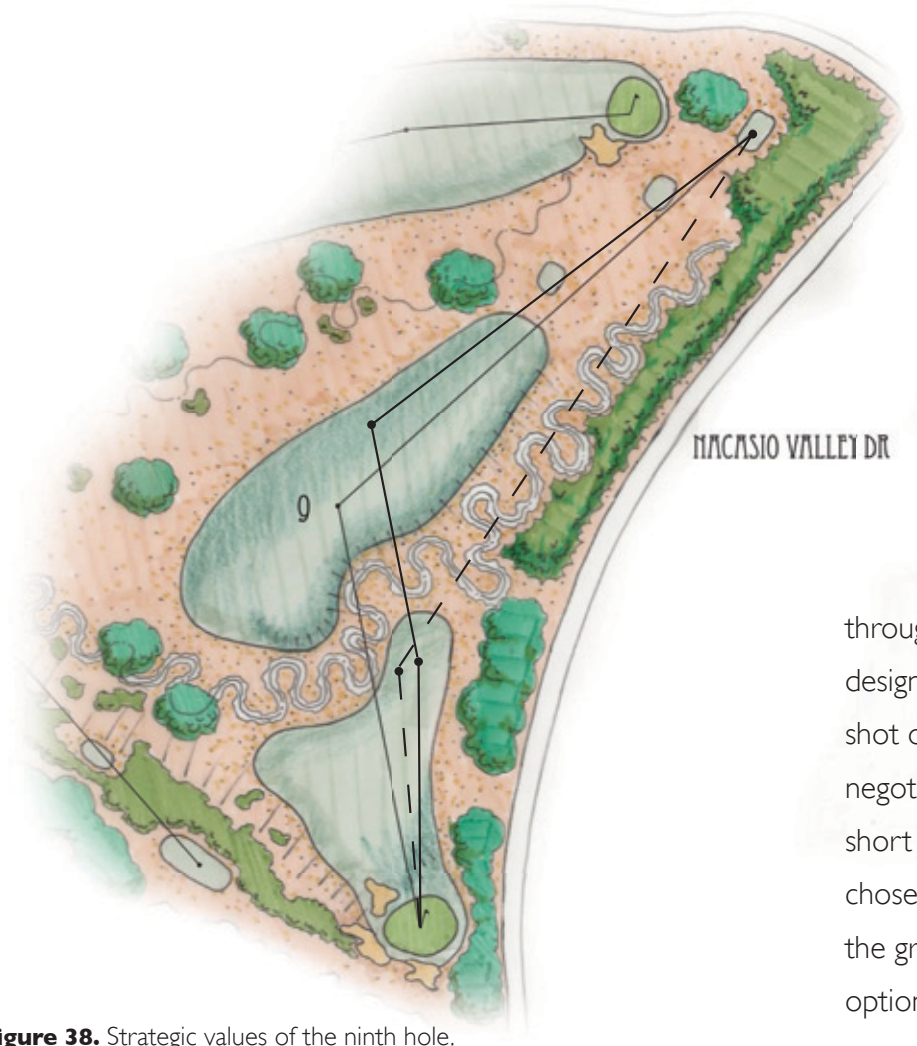


Figure 38. Strategic values of the ninth hole.

Figure 39. Existing 18th hole with irrigation pond- Before.

Strategy of the Ninth Hole

Resilient form requires optimal engagement throughout a round of golf. The proposed ninth hole is designed to tempt the longer hitting golfers to hit their tee shot over the newly restored Larsen Creek. By successfully negotiating this hazard the golfer will be left with just a short pitch to the green. If they are unsuccessful, or they chose not to challenge the hazard, their approach shot into the green will be no closer than 130 yards. By presenting options like these throughout the round, a golf course design engages the player while facilitating a memorable game of golf.

Figure 40. After- Proposed restoration of Larsen Creek on new 9th hole.

SAN GERONIMO GOLF COURSE

-BACK NINE-

BACK NINE		
HOLE	YDS	PAR
10	380	4
11	503	5
12	322	4
13	471	5
14	132	3
15	385	4
16	230	3
17	415	4
18	335	4
BACK	3173	36
TOTAL	6390	72

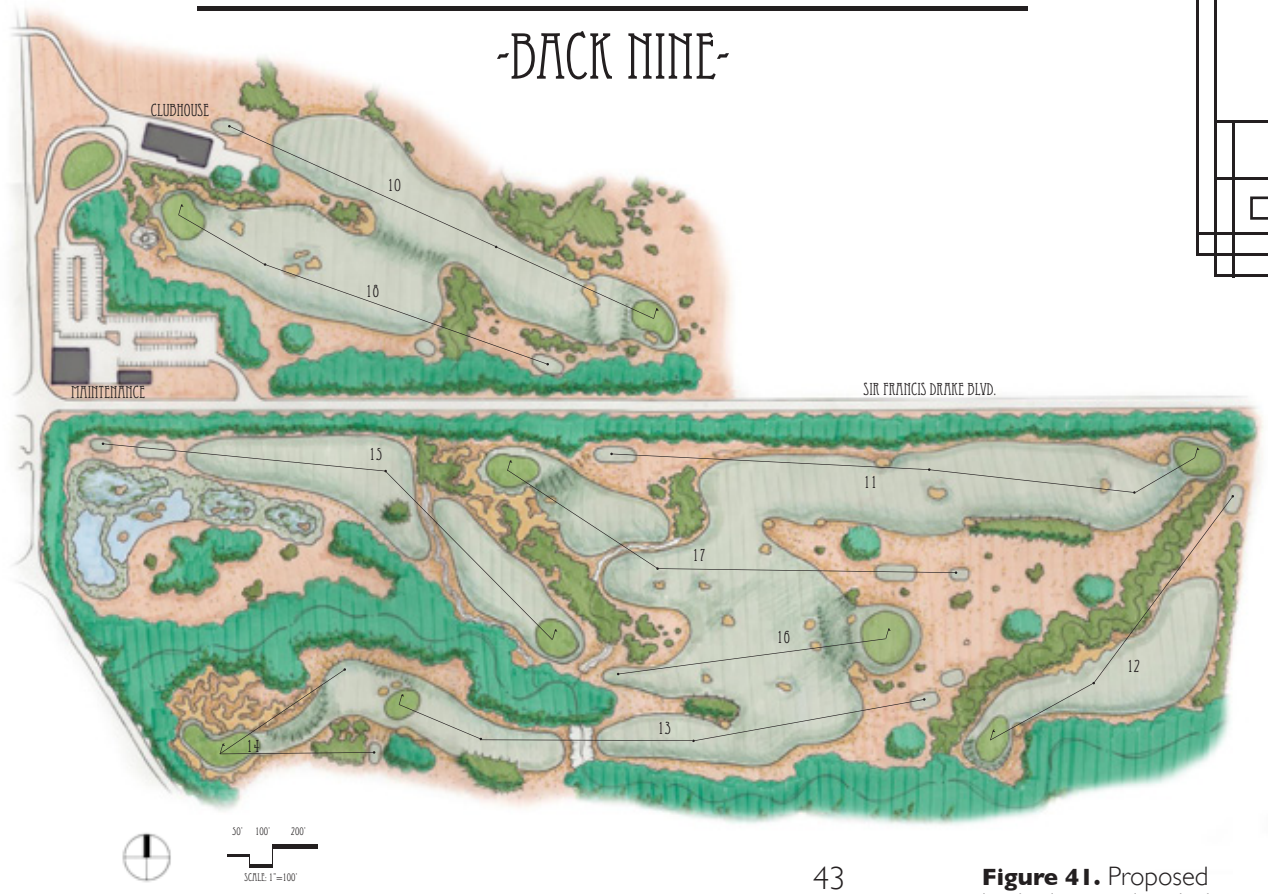


Figure 41. Proposed back nine routing design

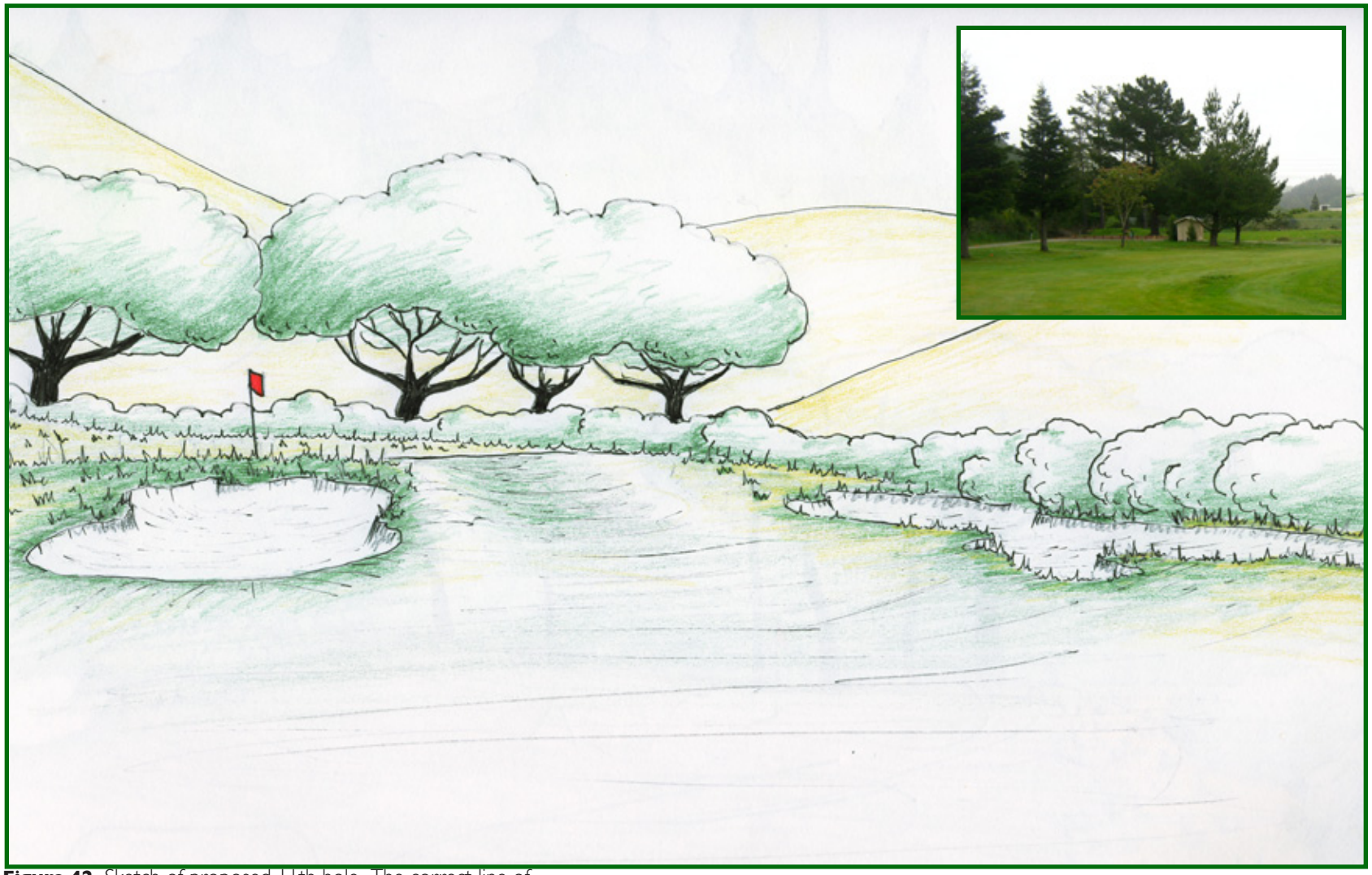


Figure 42. Sketch of proposed 11th hole. The correct line of entry is needed for this par 5 green.

Figure 43. Sketch of proposed 13th hole. Natural landforms.

Miwok Community Park

Moving the maintenance facility north Sir Francis Drake Blvd. will allow for the area along San Geronimo Creek to be reserved as sensitive habitat and a community park. The proposed community park would center on the cultural and natural history of the San Geronimo Valley and would be accessible to public during daylight hours.

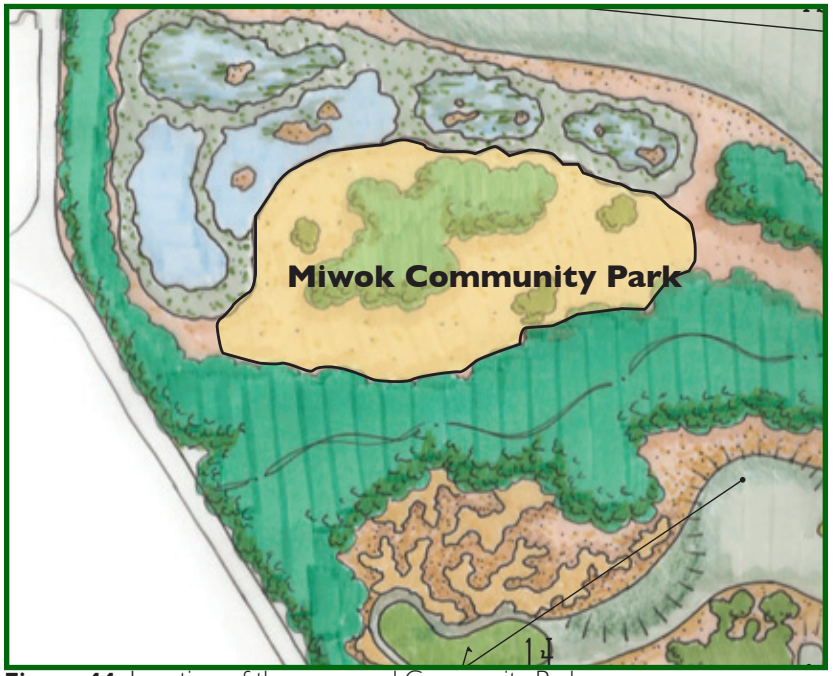


Figure 44. Location of the proposed Community Park.

Figure 45. Proposed Miwok Community Park.

A Worthy Finishing Hole

Removing the circular driveway from in front of the clubhouse and pulling the slope back towards the clubhouse allows the space directly below the clubhouse to be utilized in the golf course layout. In my design the 18th green would be placed in this amphitheater-like location, where dramatic finishes can be fully observed from the elevated clubhouse. This move will increase the golf atmosphere missing in its current form, and make for a more memorable final hole.

Figure 46. Existing first tee- Before.

Figure 47. Proposed 18th green with clubhouse overlooking.

CONCLUSION

Resilient form is attained through an interconnection between a golf course, its native environment, and the people who play it. The strength of this relationship correlates directly to the resiliency of the golfscape. Golf courses here in California suffer from the notion that their current form is ***the way it has to be***. They rely on technology as their lifeboat, seldom understanding the long-term impacts of their ignorance. Without native, resilient form golf courses will fade away, representing a failed era in the cultural history of California. We cannot let this be the fate of such a valuable cultural asset.

It is time we let our local landscapes speak, much like they do in Scotland, conforming our golf courses to the ecology of native California. We owe it to our land and to ourselves to seek this resilient form. It is the way ***it is meant to be***.

GLOSSARY

Golden Age of Golf Course Architecture: A period from 1911 to 1936 when golf course design in America was thought to be at its best.

Golfscape: The golf course, golfers, and game of golf.

Resilient Form: The ability of a golf course to retain its landscape character and functionality over an extended period of time; regenerative by nature.

BIBLIOGRAPHY

Barbour, Michael, et al. California's Changing Landscapes. Sacramento. California Native Plant Society. 1993

"Golf Magazine's Top 100 Courses in the US." Golf.com. 10 May 2009. http://search.golf.com/top-courses-and-resorts/top-100-us-courses-2007.html

Leopold, Luna. Water, Rivers, and Creeks. Sausalito. University Science Books.1997

MacKenzie, Alister. The Spirit of St. Andrews. New Jersey. John Wiley & Sons, Inc. 1995

Pavlik, Bruce M., et al. Oaks of California. Los Olivos. Cachuma Press. 1991

Perlman, Dan L. et al. Practical Ecology for Planners, Developers, and Citizens. Washington DC. Island Press. 2005

Shackelford, Geoff. The Future of Golf. Canada. Sasquatch Books. 2005

Snow, James T. "Water Conservation on Golf Courses." National Director USGA, Green Section. 15 May 2009. http://www.usga.org/turf/articles/environment/water/water conservation.html

USGA. The Rules Of Golf. Far Hills. United States Golf Association. 2005

Weinman, Sam. "The cost of public golf". Yahoo! Sports. 5 may 2009. http://sports.yahoo.com/golf/pga/news?slug=ys-swpublic061108&prov=yhoo&type=lgns

Zoldoske, D.F. "Improving Golf Course Irrigation Uniformity: A California Case Study". California Department of Water Resources. Fresno. 2003