

GOLF COURSE PLANNING ISSUES AND GUIDELINES FOR THE
LOWER MAINLAND

by

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Abstract

Interest in golf and golf course developments has increased considerably in recent years. The reason for this growth is threefold: babyboomers are now making golf the game of choice; women, who in the past were only allowed to play at restricted times or even banned entirely, can now play at almost any time, and presently account for approximately 50 percent (once only 10 percent) of all new golfers; and young people are beginning to take a keen interest in the game. Today, about 200,000 golfers are playing on approximately 85 golfing facilities within the Lower Mainland. By 2011, it is estimated that 318,000 golfers will be playing on 119 golf courses. With a projected demand of an additional 34 golf courses over the next 15 years, locating suitable golf course development sites may be difficult, as local and provincial authorities are cautious about these 150 acre land uses that cause many land use and environmental conflicts.

Golf course developers are commonly confronted with seven main concerns from the public and local government when a new development is proposed. The most heavily scrutinized of these concerns is the loss of agricultural land, the loss of wildlife habitat, and the amounts of chemicals used on golf courses. These are followed by increased water consumption levels, errant golf balls causing injury or damage, unwanted urban growth following these recreational developments, and lost recreational opportunities to non-golfers in the community. To varying degrees, these concerns can stall the golf course planning process, or even cause a municipality to reject an application.

The golf course concerns were assessed in this thesis to discern how significant the issues are, and how planners and developers throughout North America are addressing them. The analysis is based on information gathered from public meetings, interviews, municipal planning reports, a general literature review and a case study. The result of the analysis is a set of planning guidelines designed to promote better golf courses. If the planning guidelines outlined in this thesis are

followed, future and existing courses can become functional, environmentally sensitive and aesthetic land uses, characterized by:

- sites that do not conflict with an Official Community Plan;
- land fill sites reclaimed into a working recreational land use with native vegetation and wildlife;
- chemical turf care management plans;
- comprehensive construction plans to protect against erosion and plant damage;
- protection zones for sensitive on-site habitats;
- mixtures of native turf grass, plants, shrubs, and trees within the site;
- nearby secondary sewage treatment plant to provide effluent for irrigation;
- drainage systems that feed excess water into retention ponds for re-use;
- designs that provide park and recreation space (where feasible) within the site;
- proper setbacks or buffering spaces between the playing areas and nearby housing (where applicable);
- multi-teed target-style golf course design layout for all skill levels.

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To my wife Lisa and her loving support.

Chapter 1 - An Introduction to Golf Course Development

A growing interest in the game of golf has encouraged developers to supply British Columbia's Lower Mainland with more golf courses, despite heated opposition from environmental and agricultural interest groups. Many golf courses have been designed without adequately contemplating environmental and land use issues, such as habitat and watershed protection. Such oversights by developers and regulatory agencies initiated this research into golf course planning. This thesis identifies the golf course development problems or concerns, analyzes and evaluates the concerns, and from the knowledge gained, constructs a set of golf course development guidelines for existing and future courses to use in providing a better land use.

1.1 Historical Background

Golf has been a recreational passion for many years, but it is only in recent decades that golf blossomed into a sport available for everyone within the community. Golf began in Scotland over 500 years ago:

Games similar to golf have been played in Europe since the Middle Ages. But it was Scotland that a pastime using a club, a ball and a hole developed, over a period of 500 years or more, into the game we know today as golf. In this time span, the playing fields of the game evolved into what are today called golf courses (Cornish and Whitten, 1981, 16).

The "playing fields," as they were termed, were on rolling sand dunes by the ocean or river estuaries. These courses provided a limited amount of grass for fairways with the holes made naturally by rabbits. The most prominent present-day golf course dating back to the early years is the St. Andrews Golf Club in Scotland, established around 1414 (Cornish and Whitten, 1981, 16).

From Scotland, the game of golf made its way across the Atlantic Ocean to North America in the 18th century.

Golf was known in America as early as 1779, and a golf club was founded in Charleston, South Carolina, in 1786. By 1876 there were five in Canada: at Montreal, Quebec, Toronto, Brantford and Niagara-on-the-Lake (Cornish and Whitten, 1981, 28).

North Americans became intrigued with golf and the popularity of the game grew rapidly. The number of golf courses in the United States by the end of the 19th century increased substantially, from over 80 courses in 1896, to 982 by 1900, with at least one in each of the forty-five states (Cornish and Whitten, 1981, 44). In this century the popularity of the game of golf and, hence, golf course development, has fluctuated. After very little growth during the Korean War, golf course development grew from 100 new golf courses a year during the 1950's, to 400 a year in the 1960's (Cornish and Whitten, 1981, 98). From the 1960's to the early 1980's the growth had been quite steady. But in the last ten years or so the interest in golf has skyrocketed. Here are some facts from the United States:

- from 1986 to 1990, the number of golf courses in the U.S. went from 9,600 to 12,800 (up over 33%);
- in 1993 about 12 percent of the U.S. population over age 12 played golf on approximately 13,951 courses;
- from 1985 to 1990, the number of rounds played annually per player increased 17.6%;
- given that an average golf course is 124 to 180 acres in size, the U.S. (as of 1993) has approximately 1.6 to 2.3 million acres dedicated to golf courses (Harker, Evans, Evans, Harker, 1993, 2).

These facts demonstrate how quickly the game has caught on in the United States. The Canadian experience has been very similar. A survey conducted by the Royal Canadian Golf Association (RCGA) discovered that four million Canadians played golf at least once in 1991 (Cruickshank, 1996, 78). It is predicted that this number will rise to over five million when a 1996 RCGA golfers survey is completed in the summer (Cruickshank, 1996, 29). Throughout Canada there are presently about 1800 golf courses (Johnston, 1996, 20) consuming about 300,000

acres of land. Golf courses have become a fixture within the urban network. A 250 square kilometer area within Ontario was covered by 534 golf courses by 1990, with 40 to 50 new courses proposed in the early 1990's (Tiner, 1992, 38).

What has spawned the recent interest and growth in golf, and why is the demand to play this sport continuing to increase? There are two main factors. Golf was once seen as a sport for men; women were not allowed on golf courses or only at restricted times. This has since changed as women, most over 40 and working outside the home, now enjoy unrestricted play and presently account for approximately 52 percent of all new golfers (Haslam, 1994, 13). Golf has also become available to the average person. Golf was once seen as a privileged sport for only those who could afford to play on the often private, limited courses available. Market competition among golf course owners brought the price down to an affordable level, making the game available to more people. In the United States for example, approximately 78 percent of rounds played were on public courses in 1993 (USGA, 1994, 4). In Canada, a comparable 80 percent in 1995 (Cruickshank, 1996, 31).

1.2 Golf Course Industry Economics

The golf industry's contribution to the provincial economy has been significant. In British Columbia, the golf industry represents 15 percent of the recreation market, and is a sizable industry when compared to some of the top traditional British Columbia industries (International Sports Inc., 1993, 1). Within the golf industry there are golf merchandising and lessons, golf course and residential developments, and tourism spin-offs to transportation operators, hotels, and restaurants.¹ The size and sustainability of the golf industry is of course directly related to the number of people who are interested in the sport. At present, the demand for golf throughout North America has never been higher.

¹ A foursome of golfers may fly to a golf resort, stay and eat at a local hotel, play a few rounds of golf, purchase various articles of golf clothing and equipment, and bring home a few gifts.

There were 475,000² golfers over the age of twelve in British Columbia in 1995. This number of golfers continues to grow at approximately 5.3 percent annually (Argyle et. al., 1991, 4). This represents roughly 15 percent of the population. The revenues from fees can be significant. In British Columbia, assuming 475,000 golfers playing 15 rounds per year and paying green fees of \$37.50³, the golf course alone, not counting the other revenue sources, would have produced \$267,187,500 in gross fee revenues in 1994. Additional revenues generated by the pro-shop, restaurant and bar sales, and destination golf resorts such as Whistler, also impact community businesses significantly. In Vancouver, the city owned Fraserview Golf Course with its 83,705 rounds of golf played per year produces over \$1.4 million in fee revenues. The money generated contributes substantially to the City of Vancouver, helping to pay for city infrastructures and services. Golf courses yield large revenues given the current number of players and rounds-per-year played.

Golf is a recreation activity in the B.C. economy that is likely to increase in the future. In the Lower Mainland about 223,000 people will play golf in 1996 (Argyle et al., 1991, 4). Southwestern British Columbia, with its relatively warm year-round climate, has become a retirement destination for many people, and retirees generally raise the area's average rounds played per year.⁴ In the Vancouver Metropolitan Area, for example, the overall population increased by 16% from 1,380,729 in 1986 to 1,602,502 in 1991 (Statistics Canada, 1986 and 1991). But during this same 1986 to 1991 period, the number of people in the 35 to 44 year range went up 28%, while in the 45 to 54 age group the numbers went up 24% (Statistics Canada, 1986 and 1991). The recent increase in these two age groups is due an aging population. With more people entering the "golfing stage"

² Argyle et al. (1991, 3) states over 13% of population and Haslam (1994, 8) states 450,000 golfers.

³ The average number of rounds of golf played per individual is approximately 15. In the Lower Mainland, the average green fee for an 18-hole golf course is approximately \$40 (Langara \$30, UBC \$45, and Meadow Gardens \$50). Courses outside of the Lower Mainland have green fees in the \$35 range (Eaglecrest \$28, Trickle Creek \$35, and Olympic View \$40).

⁴ Studies have shown that people over 40 play more rounds of golf than the average player (Argyle et al., 1991, 3 and Haslam, 1994, 13).

of their lives, demand may increase to perhaps 20 rounds-per-year per individual. By the year 2011, in the Lower Mainland alone, approximately 318,000 people or 16 percent of the population will be playing golf (Argyle et al., 1991, 4). The existing golf courses will be unable to supply the forecasted demand of over 6 million rounds of golf.

In a study for the Greater Vancouver Regional District (66 golf courses were already existing at the time of the 1990 study), researchers estimated that from 1991 to 2011, 53 additional golf courses (or 2.5 per year) will be required to meet the forecasted demand (Argyle et al., 1991, 5). Where will these golf courses be located and how will they be developed? Finding appropriate sites within the various municipal jurisdictions may be difficult. Golf course developers and local planning departments have not always seen eye to eye in locating suitable golf course sites, especially where arable farm land or sensitive wildlife habitat is present.

1.3 Land Use and Environmental Planning Impacts

Golf courses constructed before the mid-1970s were designed for the game itself. Rarely would there be a residential or other land use component associated with the development of golf courses. If there was a residential component, it would have been designed around the periphery of the course, or on nearby parcels of land. In today's market, housing is required to make a golf course development financially feasible in most cases. However, with housing around the playing areas, some problems regarding safety have occurred. Environmental restrictions and guidelines for golf course developments in the last 20 years have also changed. In the past, environmental impact assessments were limited mainly to industrial developments, not recreational land uses. As a result, golf courses were developed on wetlands, mature forest land, or agricultural land, with minimal differences in design or format. The design of golf courses has changed over the past two decades as a result, going from courses designed in any location desired, with

inconsequential environmental restrictions, to designs that must accommodate stringent environmental guidelines.

A golf course utilizes approximately 150 acres of land, the equivalent space needed for 600 single-family housing units at 4 per acre. The investment return from 600 housing units would be much greater in a growing urban region than that of a golf course development.⁵ Golf course developers, as a result, must look for cheaper land under a non-residential zoning to develop golf courses successfully. Agricultural land was thought to be the answer by some developers, but conflicts with the Agricultural Land Reserve (ALR) arose. Locating 150 or more acres of land remains difficult, and with ALR areas often off-limits, additional sources of revenue such as housing are often required. The golf course is an amenity to the homeowners, with fronting lots having a price premium of 50 to 100% over basic non-view lots (Savoie and Watson, 1993) (McElyea, Anderson, Krekorian, 1991). Realizing the financial return from premium lots and faster market absorption rates due to the attraction of a golf course to potential buyers, the golf development becomes financially attractive.

Locating suitable economic sites for golf courses may be one hurdle, but the rising awareness and protection of the environment has become an even higher hurdle. Local, provincial, and federal agencies are now requiring environmental impact assessments for golf courses. From 1979 to 1989, there was an average of 2.6 Environmental Assessment Reviews completed by federal agencies within British Columbia. But from 1989 to 1993, the yearly average jumped to 20 per year (Millikin, 1994, 36). Environmental impact assessments and other considerations are making it harder for developers to find suitable sites for development. A golf course development, for example, proposed on a 175 acre site may have ravines, streams, lakes, swamps and steep hills limiting the amount of land that can be developed. When all environmental guidelines and standards are reviewed, there may be only 110 acres of land on which to design a golf course,

⁵ The capitalized value of the stream of money generated from green fees and memberships is not comparable to selling 600 individual lots on the open market.

not enough to accommodate a standard 18-hole golf course. Since the ravines can no longer be filled, the hills flattened, or the streams diverted, golf course developers are avoiding environmentally sensitive areas.

Until only recently, governments and the general public have used the biophysical environment, such as trees for houses and fish for food, without much thought or concern for ecological sustainability. Planners must protect and regulate the development of sensitive biophysical environments just as they regulate the built environment.

Planning has always afforded protection to some habitats and other places of scientific interest and a measure of control has been available in areas of particular scenic value. The time has now come for a great extension of these principles. Care and protection of the natural environment should be of equal importance to that given to buildings and places (Dean, 1990, 11).

Local governments, when preparing their local community plans, must consider the sensitive environmental areas within local jurisdictions. Such locations should be protected if possible, as many areas are too sensitive to allow any form of development, including golf courses. However, adjacent to sensitive environmental areas, golf courses can be used as a buffer between protected parks and urban areas, or even between conflicting land uses such as agricultural and residential. Golf courses, when located and planned diligently, are one of those land uses that can provide buffering and some forms of small scale habitat protection and green space within an urban environment.

We should be looking [for] the protection of rich natural habitats throughout all areas, including the cities. The planning system should have an important role in the 'greening' of urban areas - the establishment of a system of open spaces from the city centre into the countryside. Techniques based on ecological survey, protection and management, should be an integral part of our planning system (Dean, 1990, 16).

Ecological criteria for judging golf development projects are finding their way into the approval process. While planning departments throughout the Lower Mainland

may be aware of some of the possibilities that golf courses can offer a community, they need to recognize other wide-ranging planning options and management characteristics that can be incorporated into a new or existing golf course.

1.4 Summary

The game of golf has evolved into a major industry. In 1994, British Columbia had green fee and membership revenues estimated at over \$267,000,000. In 1996, the revenues for the Lower Mainland are estimated to be over 50% of provincial total, or about \$160,000,000.

With approximately 78 golf courses operating in the Lower Mainland in 1995, and with the demand forecast of 318,000 golfers in 2011, it is estimated that roughly 41 additional courses will be required. Those 41 new golf courses will consume about 6150 acres of land. With a continuing shortage of available land in the Lower Mainland, locating and developing future golf courses while maintaining land use and environmental planning principles will be difficult. In analyzing past and present golf course development trends throughout North America, this thesis will examine the primary concerns or opposition this land use encounters. The research gathered will form a basis for formulating a set of golf course planning guidelines to minimize, as much as possible, impacts of future golf course developments to existing land areas. This thesis will determine the best standards or practices available to address all golf course development concerns. The result will be a set of guidelines that promote a conforming and acceptable land use for such developments.

Chapter 2 describes the various stakeholder concerns about golf course developments. Research into these concerns reveals seven main potential problems, ranging from habitat loss and agricultural conflicts, to water storage depletion. This chapter will analyze and evaluate each of the seven issues.

In Chapter 3, Boundary Shores, a case study, is used to obtain a local perspective on the complex and controversial aspects of golf course planning. The case study provides an in-depth view of golf course development, confirming and

providing additional information to the analysis in Chapter 2. The case study provides us with further lessons on how to plan golf course developments. Chapter 4 will offer a number of golf course development guidelines for achieving a sustainable, environmentally sensitive land use. These standards involve protected areas, the use of native plants, setback distances and buffer trees for the housing component, water conservation, and limited chemical use.

Chapter 2 - The Primary Concerns Regarding Golf Courses

The research into this area identified seven concerns associated with golf course developments.⁶ These concerns have been raised by public citizens, interest groups, or government agencies. Any one of these concerns can make a golf course proposal very controversial. Specifically, a golf course:

1. may consume productive agricultural land and cause potential conflicts with the agricultural community;
2. may encourage unwanted urban growth into regions with low population densities and minimal municipal services, creating an unanticipated demand for infrastructure and other services;
3. may cause damage to the site's existing ecology and landscape features;
4. may in actuality be "green waste" rather than "green space," as a golf course development is privately operated for a limited few, with little opportunity for enjoyment by the general community;
5. may be a safety hazard to nearby buildings or people because of errant golf balls;
6. may put pressure on local water supplies; and
7. may cause habitat and water contamination because of chemical turf care applications.

⁶The seven concerns about golf course developments were derived from various articles from newspapers, environmental groups and the golf industry, to obtain general perspectives on golf courses throughout North America. Public hearings and planning reports were the sources used to obtain site specific examples in the Lower Mainland.

2.1 Golf Courses Are Detrimental To The ALR⁷

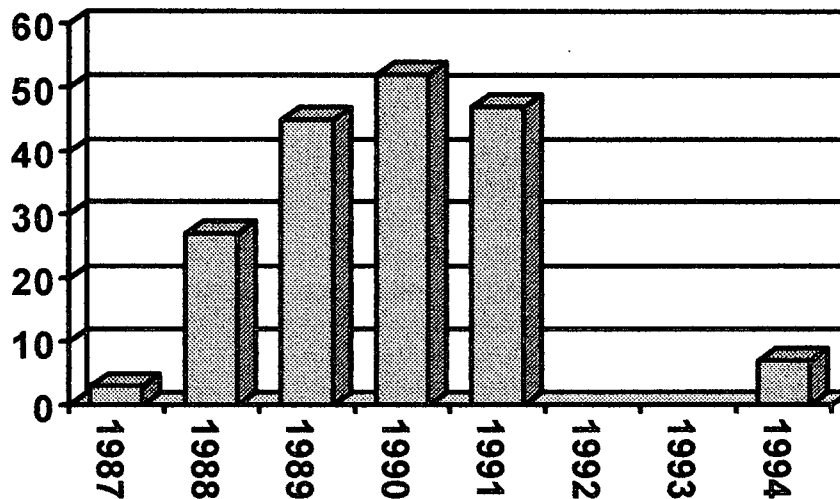
Historically, the development of golf courses within the Agricultural Land Reserve (ALR) has been difficult. From 1978 to 1988, golf courses as a land use were heavily restricted within the ALR. The approval to develop on any parcel of the ALR could only be given by the Agricultural Land Commission (ALC), mandated to protect the welfare of the agricultural community. The ALC was very strict in allowing golf facilities within the ALR. During the 1978 to 1988 time period, the ALC reviewed only 24 applications for golf facilities (including driving ranges) in the Lower Mainland, and gave 10 approval (Argyle et al., 1991, 9-10). The ALR, nevertheless, remained attractive to golf course developers, as the large ALR lot parcels were easy to assemble and quite cheap to purchase compared to non-ALR land. Then, in 1988, a Provincial Order-in-Council made golf courses an allowable or unconditional use within the ALR. Realizing that the Order-in-Council may be short-lived, golf course developers worked quickly to obtain approval.

The recent activity (and controversy) involving new golf course construction in B.C. has been as a result of the access to (and therefore loss of) agricultural land which was reasonably cheap and more importantly, relatively easy to assemble (i.e. there were a limited number of landowners to deal with) (International Sports Inc., 1993, 3).

Before the Order-in-Council was enacted, the ALC reviewed an average of 4.8 golf course facility applications over two year periods prior to 1988. This changed drastically from 1988 to 1990, with the ALC suddenly besieged with 56 golf course facility applications (Argyle et al., 1991, 10), a rise of nearly 1200 percent. The province-wide statistics are illustrated in Graph 2.1.

⁷Concern raised by The Agricultural Land Commission, British Columbia Farmer's Institute, concerned environmental groups including the Sierra Club, the Langley Field Naturalists, and local governments.

**Graph 2.1 - Applications Received by the
ALC (ALC, 1994, I-8 & ALC, 1995).**



The ALC was unable to review all of the proposals due to staff and time constraints (a review time of two years was not uncommon). In 1991, with the government reversal of the Order-in-Council allowing golf courses as an unconditional use within the ALR, a large number of golf course proposals in the approval process were affected. All proposals that had not received third reading would be rejected. Nevertheless, the three year window of opportunity allowed 115 golf courses in the ALR throughout British Columbia, satisfying the short-term demand for golf in many municipalities. The 181 golf course applications affected by the 1991 ALR Moratorium are outlined below:

- 41 courses were exempted as the ALC found the newly constructed golf courses could not be reverted back to an agricultural use;
- 32 courses were exempted as the ALC found the land to have limited impact on the agricultural community;
- 42 courses were exempted as they had received third reading;
- a total of 115 courses (63.5%) were allowed out of the 181 applications;

- 60 courses were canceled because they had not received third reading;
- 6 courses were canceled by the applicant;
- a total of 66 courses (36.5%) were canceled out of the 181 applications (ALC, 1992, Brief).

However, those 115 golf courses consumed about 17,000 acres of the ALR. Some of the lost ALR land included the most fertile land in B.C. The loss of agricultural land to developments like golf courses could not continue. In 1990 the chairperson of the ALC cautioned Delta Council about golf courses proposed beside agricultural land in a letter addressed to Delta Council.

It is suggested that greater emphasis could be placed on the role and importance within an agricultural area of the actual land subject to a golf course proposal. This would include consideration of how critical the land's loss would be not only in terms of its existing or potential agricultural production but also the broader implications of destabilizing the agricultural community.

Despite appearances of a continued "rural" atmosphere, a golf course represents a major, long term and fundamental land use change for any municipality. Changes of this magnitude justify care being taken in their consideration (I.D. Paton, 1990).

The loss of viable agricultural land to golf courses, it is feared, will increase food imports, put pressure on the existing ALR to increase productivity within a shrinking land base, and potentially de-stabilize farming areas as traffic and other urban activities interfere with daily operation. Since the 1991 moratorium, developers have found it much harder to develop within the ALR. In spite of the moratorium, however, golf course applications in some areas of the Province are still received by the ALC.

When regulating and evaluating golf courses, those who oppose them say some of the proponents erroneously view them as a rural or agricultural use. Although a golf course is mainly grass and vegetation with a few small ponds has a rural appeal, it is still an urban land use. Some adverse urban effects are an increase in traffic on the narrow rural roads (hampering tractor movement), discarded golf equipment (carts and umbrellas) thrown into adjacent farm land

causing damage to agricultural equipment, golf balls shot out-of-bounds striking and injuring farm animals, and the possibility of residential development near or bordering the ALR (creating increased development pressure that may destabilize the agricultural community). A District of Surrey Planning and Development Services report on golf courses, highlights the conflict between golf courses and the ALR.

In the ALR, they [golf courses] permanently remove good agricultural land from food production, erode the agricultural nature of the area, introduce farm/non-farm conflicts, and can be used to tempt governments to approve other "ancillary" non-farm uses such as residential, commercial and resort uses that would further erode the ALR (1990, i).

Sierra Club representative Mark Massara stated that golf courses "permanently convert agricultural land" (GCMS, 1996, 24). Some golf course developers have argued that golf courses do not pose a threat to agricultural land as they can be reverted back into productive agricultural land. This transformation seems very unlikely. Primarily, bank financing and invested capital into the golf course development would not be fully realized or recovered. Transforming an investment that has not yet seen a full return of investment into another investment that is even longer term, would be impractical. Changing a golf course into a farm would not make economic sense from the developers' perspective.

Some people are of the opinion that golf courses can be easily reverted to farmland. This is a fallacy. Millions of dollars are needed to establish golf courses and their amenities. Golf courses cannot be realistically converted to farmland. When [an individual] attempted to do so, he found that the costs were prohibitive (Pearce, Letter, 1992).

With the potentially negative ALR implications that may be caused by golf course developments, the ALC continues to enforce strict regulations on golf course proposals, not allowing such proposals within the ALR if soil classes are

below 5 or even 6 (previously 4), or if traditional farming communities are nearby, to prevent agricultural destabilization (Blackwell, 1995).⁸

With only 7 golf course applications received by the ALC within the entire province during 1994, developers are now very wary of the ALC's strict requirements. As a result, golf course developments within the ALR have been minimal in recent years. When the rare golf course proposal is approved within a non-traditional farming location with poor agricultural potential, six ALC requirements must be met by the applicant as a condition for approval:

1. The site must have fencing to restrict access and perimeter ditching to deal with drainage.
2. Vegetation screening to act as a protective buffer.
3. No soil from the site can be removed from the site, and the landscaping of the site must be done with existing soils.
4. No soil material can be imported onto the site with the exception of sand layering for greens and tees, and clubhouse and parking construction.
5. A restrictive covenant (section 17 of the ALC Act) must be in place or registered on the property that states the land can only be used for a golf course or for agricultural purposes.
6. A Letter of Credit (amount depends on project, but normally ranges from \$60,000 to \$105,000) in trust to the ALC to ensure the above points are in place, which will be assessed five years after initial construction (Miller, 1990, Letter).

These requirements act to nullify as much as possible the negative impacts to the agricultural community. The Letter of Credit given to the ALC from the developer ensures that if the development proposal somehow fails, the money can be used for agricultural rehabilitation purposes.

Good or fertile agricultural land is an essential element of sustainable growth. The relatively new ALR development regulations, coupled with the lessons learned before 1991, help the ALC preserve agriculturally productive land

⁸ A soil class of 1 has the best agricultural capability, while a class of 7 has the worst.

today and into the future. At present, the argument that golf courses consume good agricultural land is invalid. Given the ALC's position in recent years, future golf course proposals accepted within the ALR will be rare, isolated occurrences.

2.2 Golf Courses Cause Unwanted Urban Growth⁹

Golf courses as a land use are normally well received, but when placed into areas not designated for urban growth, such as rural areas, unwanted growth consequences can occur. When a golf course development is proposed at the outer regions of a municipal jurisdiction, it attracts residential and service uses that move out to adjacent land parcels. The local government may not be able to support the increased infrastructure required to service new growth, such as the transportation networks, sewer mains and sewage treatment facilities, water mains and water supplies, and electrical services. Of concern to many residents is an increase in traffic on local collector roads, causing a change in local ambiance from quiet and peaceful, to busy and potentially unsafe. Mark Massara of the Sierra Club is a representative of those who are concerned about golf courses causing unwanted growth.

Apart from the direct and cumulative effects associated with the courses themselves is the fact that golf courses so effectively usher in urban development and infrastructure to rural and remote areas. Like a garden attracts weeds, golf courses [become] host to housing development, schools, shopping malls and associated infrastructures of roads, water, power and sewer (GCMS, 1996, 26).

Perhaps shopping malls and schools are not a direct consequence of golf courses, but urban development does seem to follow this recreational land use.

Another controversial outcome of a new golf course development is an increase in property taxes to the surrounding land owners as a result of increased land values. In most cases, the increased land values are viewed favourably by

⁹ Concern raised by citizens and public interest groups such as the Sierra Club.

residents. However, sudden increases in property taxes may put pressure on adjacent property owners to sell. As an example, from 1989 to 1991 the assessed property values of homes by five golf courses rose by more than 265%, while the Lower Mainland average was 51% (Argyle et al., 1991, 84). Thus, a new amenity development may force land owners to sell.

At the Vicwood public meeting in Langley, many of these development concerns were raised. Some of the local citizens voiced their opposition to the Vicwood golf course and residential development proposed at the foot of 200 Street because:

- it would lead to an increase in traffic and speeding violations;
- it would mean an increase in taxes to pay for water and sewer construction past existing residents' properties;
- it would more than double the local population;
- it would lead to commercial land uses moving in off 200 Street to serve the new development;
- it would encourage urban sprawl;
- it would lead to increased property taxes which one homeowner said he would be unable to afford;
- it would mean a drastic lifestyle change, as the area will lose its rural appeal (Langley File #RZ 91-02, June 20, 1991).

In response to the concern over increased pressures on existing municipal infrastructures, local governments have for years mandated that golf course developers absorb the costs for municipal infrastructure improvements within or adjacent to the proposed site. Some of these infrastructure improvements may include the widening of an adjacent local road, or the construction of an access road into the site. Water and sanitary sewer lines may also require upgrading. If the golf course has a residential component, then more infrastructure improvements would be required. The developers today are now responsible for development cost charges (DCC's) to pay for municipal public works related to the project. For residential developments they can range from \$2000 a unit to \$15,000

per unit depending on site location and magnitude of the city service upgrades required (DNV, File #6516). For golf courses without a residential component, the DCC is eliminated and the developer is required to make infrastructure improvements as a condition of approval. With prudent DCC's or approval conditions, the cost of a new golf course development would be nominal to the community tax payer. Doug Roxborough, Project Manager at the Belmont Golf Course in Langley, mentioned some of the development requirements and benefits to the Township:

- a \$200,000 quarter mile road upgrade;
- a \$9 million recreational development;
- yearly municipal property taxes for the parcel rose from \$5,000 as vacant land to \$84,000 at course operation in 1994;
- 30 full-time and part-time jobs are created between May and October (this will increase when clubhouse facilities are completed);
- a "nice viewscape entrance into Fort Langley with the grass, trees and lakes" of the golf course (Interview, October, 1995).

When dealing with unwanted growth concerns Mr. Roxborough stated, "growth is inevitable, in whatever form it may be in, and it is the planning departments' responsibility to manage it through community supported guidelines and regulations" (Interview, October, 1995). Golf courses, an amenity that people desire to live beside, tend to raise property values as buyers push up housing prices. Many people like the value of their residence to increase, while others use it as a source of opposition. This opposition takes the form of a no-growth concept, or a NIMBY (Not-In-My-Back-Yard) attitude. Other terms that label such a no-growth philosophy are LULU's (Locally Unwanted Land Use), CAVE's (Citizens Against Virtually Everything), and BANANA's (Building Absolutely Nothing Anywhere Near Anything) (U.L.I., 1992, 144-45). If a proposed golf course fits into the Official Community Plan or other regulatory criteria, and NIMBY attitudes continue, then it is up to the regulating government to discern the course of action.

If legitimate concessions and fair-minded community relations can't erase opposition, it may be because the opposition isn't the kind that *can* be properly satisfied or *should* be catered to. When remaining opposition is blatantly rooted in "politically incorrect" thinking, politicians are [likely] to ignore the remaining antiproject protests (U.L.I., 1992, 143).

Most golf developments in the past have been supported by the community. The results of a North Vancouver District sponsored questionnaire on the Northlands golf development, showing the majority of the respondents supported the project, are that:

- 72% of respondents strongly supported the project;
- 17% opposed the golf course;
- 61% felt the golf course would be an asset to the District;
- 16% felt the golf course would not be an asset (DNV, 1992, 5).

2.3 Golf Courses Destroy Habitats and Landscapes¹⁰

With a shrinking urban land area to build upon in the Lower Mainland, golf course developers have moved into sensitive environmental areas, often developing within sensitive wildlife habitat. Too often course designers have not taken into account the ramifications of course construction on the existing habitats. Few of the sites have been enhanced with hedgerow along the outer edges of the playing area to offer food and cover for the different bird species. In 1990, approximately 9900 acres of land had already been consumed by golf courses. Though there are exceptions, many sensitive habitat zones have been overrun or heavily damaged as a result. With the expectation of approximately 119 golf courses in the Lower Mainland by the year 2011, an additional 7950 acres of land could be consumed.

¹⁰ Concern raised by The Ministry of Lands, Parks, and Environment, The Canadian Wildlife Service, local governments, and public interest groups such as the Boundary Bay Conservation Committee and the Sierra Club.

Planners must locate the new golf courses in appropriate areas, preventing habitat fragmentation and preserving sensitive ecosystems.

The construction and operation of golf courses can damage wildlife habitat. Prohibiting or even disrupting daily migration or feeding patterns of certain species should not occur. Habitat fragmentation can affect a wide range of wildlife, from deer to small salamanders. Golf course construction activities are the most destructive. In the construction of a new golf course, there are four main stages: the initial clearing and contouring of the site; soil importation and stabilization; turf grass and vegetation planting; and irrigation and turf maintenance (using fertilizers and sometimes pesticides) of daily operation. Initial construction in particular adversely impacts existing habitats.

As with any other type of urban development, golf course construction impacts wildlife. Initial site preparation, with heavy machinery and change of vegetation to a turfgrass monoculture, profoundly alters the area, causing an exodus of wildlife. Depending on the season and region of the country, nesting sites and breeding grounds are destroyed. Feeding areas are altered (Balogh and Walker, 1992, 470).

Habitat damage occurs any time the landscape is modified and cleared, but if appropriate construction techniques or standards are not in place to deal with the existing environmental conditions of the site, then more serious problems can occur. Take, for example, the Constance Creek Golf Development in the Province of Ontario:

A nine-kilometre-long meandering tributary of the Ottawa River, Constance Creek provides about 400 hectares of continuous habitat for an abundance of waterfowl, river otters, rare red-shouldered hawks, black trens and blue-spotted salamanders in the mature hardwood swamp along its borders. However, where the creek flows through the golf course, three metres of fill, reinforced by a rock barrier, have been added to the banks to lift the greens above flood level. With only a very narrow band of swamp on the opposite side of the creek, the intrusion effectively severs the wetland corridor, say naturalists. "It cuts through all of the habitat bands of the riverine ecosystem," says Phil Reilly, chairman of the Wetland Preservation Group of West Carleton. "All of the normal cover and habitat has been removed."

Even with the rest of the course above the wetlands, adds Reilly, a buffer is needed to protect wildlife from pesticides, fertilizers and the golfers themselves (Tiner, 1992, 39).

Constance Creek is a good example of the how "golf developments [tend to] destroy ecosystems and valuable habitat" (GCMS, 1996, 24).

The impacts of golf course developments can be major or minor depending on the environmental attributes of the site. Existing wetlands, streams and lakes, and vibrant habitat zones are the most vulnerable, but unique landscape features of the site are often lost, such as interesting outcroppings of bedrock and other unique geological features that are often covered over or broken down. The natural contours of the site are re-shaped to suit the demands of the course designer. Some feel that unique habitat zones and interesting geological features are best left alone for environmental sustainability and for future generations of people to enjoy (Ours To Preserve, BBCC, 1992).

The reason why golf course developers sometimes propose new developments in environmentally sensitive and unique locations is because people enjoy playing golf beside a natural waterfall or on a gentle alpine slope. Unfortunately, some of the golf course developers, such as the one who developed Constance Creek, were insensitive to existing conditions, causing environmental degradation by heavily damaging sensitive wetland and riverside ecosystems. This development and others like it led to public outcries that prompted government investigations into the effects of golf course developments on the environment, resulting in new government regulations for the protection of local wildlife. Today, protecting sensitive habitats has become a major part of the review process.

Developers now must provide a habitat impact evaluation prepared by environmental scientists. According to Sylvia von Schuckmann of the B.C. Ministry of Environment, Lands, & Parks, an EIA for the Morgan Creek golf course in Surrey proving the location to be acceptable was a major part of the reason why the development was approved.

The developer provided comprehensive site assessment and environmental planning for the project. The site assessment team included an agrologist, water/marine biologist, wildlife biologist, and a geo-hydrological specialist. The assessment was expensive, but assisted in supporting the development application. It helped answer community and government concerns about the development (Schuckmann, 1994, 33-34).

Background field work is required to fully understand the complexities of a potential site. A Constraints and Limitations Map and a map of Existing Conditions can be used to accurately document and help predict potential ecological threats. An Existing Conditions survey for golf courses would:

- Show all waterbodies.
- Show all watersheds.
- Show all wetlands.
- Show the 100-year floodplain.
- Show slopes differentiated as less than 10%, 11-19%, and greater than 20%.
- Show existing land cover (forest and grass).
- Show the location of rare or unique plant and wildlife (Baltimore County, 1989, 1).

The Existing Conditions study provides the groundwork for the Environmental Impact Assessment. The general characteristics of an Environmental Impact Assessment include:

- The objective of the development proposal.
- An analysis of the existing site, along with what portions of the site would be affected.
- A description of what the site would look like in the future if the proposal was not developed.
- The negative or positive outcomes the development proposal may have on the environment.

- The mitigating options that may be necessary to remedy the negative effects on the environment.
- Outline a turf care plan to monitor all chemical applications and other such impacts during golf course construction and operation.
- Outline a public information agenda (Government of Newfoundland and Labrador, 1991, 8).

These two techniques would help to prevent a Constance Creek debacle from occurring again.

The environmental assessment provides local governments with a better understanding on how to preserve sensitive environmental areas. Proposed sites are now analyzed by biologists to determine the various specie types, and secondly, to determine the correct habitat requirements for specie sustainability.

Species selection - The site analysis will have identified protected species for which habitat preservation and management is required as well as plants and animals likely to occupy the postdevelopment site. To further simplify species selection, planners can identify site-appropriate guilds. A guild is a group of species that shares a common habitat resource [such as cavity nesters, mammals, and insects]. Designers can plan the appropriate habitat for a diverse guild of species to inhabit the golf course development.

Analysis of Species Requirements - The life cycle of wildlife species requires suitable feeding, breeding, nesting, and resting opportunities juxtaposed in time and space. Planners evaluate the site's suitability to sustain populations of target species (Smart, Spencer, Calvo and Peacock, 1993, 18).

The types of species along with specific sustainability requirements offer the before and after impacts of a proposed golf course.

On the controversy over the possible negative impacts to existing habitats due to inappropriate golf course locations, Mr. Brian Clark, Manager of Planning and Assessment for the Ministry of Environment, Lands and Parks, stated that:

The real answer is regional land use planning that identifies the available land left and allocates a portion of it to golf courses. When you run out of the allocated land, that's it, and don't ask for more. The smart ones are not even trying to develop in areas where wildlife

compensation is difficult on site (i.e. a golf course on a mountain side could actually benefit wildlife but everyone wants to build on duck habitat). The next big step I'm waiting for is for someone to take a look at the sport and realize the grass doesn't have to be green, the fairways don't have to take up the entire course and underbrush is actually a nice thing to have. In other words someone with a little imagination will get a lot farther [in the approval process] than those pushing the generic, environmentally friendly (according to the press releases) designs of Palmer, Nicklaus and Trevino (Fax Interview, 1994).

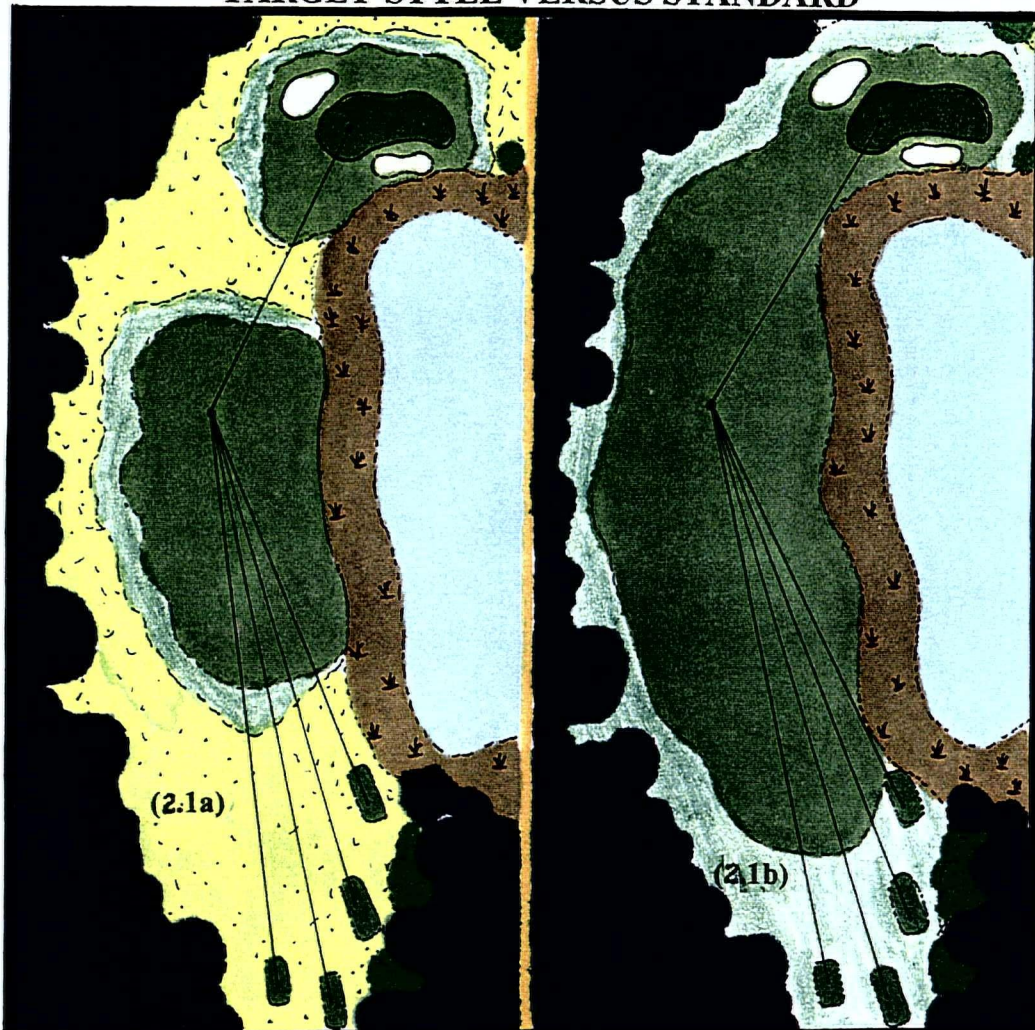
A GVRD regional golf plan, for example, could designate the areas to get an "x" amount of golf courses per year, along with the locations where they would be best suited. While some areas may be saturated with golf courses, other municipalities may have an insufficient supply. A regional plan would serve to balance the supply of golf courses throughout the Lower Mainland.

From the general to the particular, Clark's comments on more natural areas could also be incorporated within such a plan. One such option to minimize habitat impacts would be the widespread use of hedgerow, which can be found within the target-style golf course design (see Illustration 2.1).¹¹ Natural vegetation in hedgerows are proven to be much more productive to wildlife than manicured tree habitats cleared of all ground-level vegetation.

The difference between hedgerow and tree habitats was due to the clearing of underbrush at tree bases. From the golfers perspective, minimal vegetation makes it easier to locate stray balls. The removal of ground vegetation, from the perspective of a bird feeding on the surface, means the elimination of a place to retreat from predators or from perceived threats such as passing golfers. On the courses we visited, those with both the highest numbers of bird species and also the greatest numbers of birds (excluding those found on water) had extensive areas of unmaintained vegetation (Moul and Elliot, 1992, 46).

¹¹ Hedgerow is "defined as all areas of trees, shrubs or brush where the understory of vegetation receives no maintenance and is allowed to grow naturally" (Moul and Elliot, 1992, 9).

ILLUSTRATION 2.1 -- GOLF COURSE DESIGN TARGET-STYLE VERSUS STANDARD



Both of the above illustrations present an identical par-4 fairway, with **2.1a** depicting the target-style golf course design and **2.1b** showing the regular or standard design. There are a number of observations to be made in comparing the two styles.

- The fairway area (shaded dark green) in the target-style design is half that of the regular design.
- The secondary rough area (shaded light green) in the target-style design is about 10 % of the total secondary rough area in the regular design.
- The primary rough area (shaded yellow), or native fescues, consumes a large percentage of the land in the target-style design, while it is completely absent in the other design.
- The target-style design minimizes the amount of turf that is managed, thereby lessening mowing, irrigation and chemical use costs. The larger fescue areas offer a better wildlife transition zone between the short turf and the nearby hedgerow.

Fescues are often placed in the primary rough to buffer the hedgerow and wildlife. While this is regularly practiced in other areas, the West Coast climate can make our native fescues too thick and thatchy for small animal movements, as well as making it difficult to locate errant golf balls. As a result, the best options for small wildlife, plant diversity, and golfers, are loose bunches of grass and plants (Ciekot, 1996, 108). Using fescues and hedgerow within the target-style golf course design has now become acceptable and popular among developers to prevent or minimize habitat and environmental impacts. In the target-style design, approximately 70 percent of the golf course consists of rough and non-playing areas like hedgerow, allowing adequate wildlife habitat opportunities (USGA, 1994, 2). The target-style design incorporates strategic target areas that the players aim for, with the area between the playing areas left as fescue, or natural rough.

Proper golf course locations, along with design modifications, can reduce the negative impacts to the environment. When sensitive areas are set-aside, such areas should be carefully buffered with a transition area of vegetation, water, or rock, so the protected area remains undisturbed and healthy. Habitat enhancement is also becoming popular after construction. The Meadow Gardens Golf Course in Pitt Meadows created a network of ponds with planted bull-rushes in and around the water's edge. The result is a natural looking and flourishing pond that is used by native birds. Another example of habitat consideration is the recently completed Nicklaus North Golf Course, in Whistler, where:

- 50 percent of the course was protected or re-vegetated;
- native fescues were used to allow small animal movements or corridors;
- over 100 bird houses were located throughout the course;
- over 2,000 trees were planted;
- 15 brush piles have been erected;
- tree snags were retained or kept on site;
- and various types of aquatic plants were planted (Burns, 1995, 36).

The Meadow Gardens and Nicklaus North examples show how developers and planners can be more sensitive to the existing environment with the restoration of

on-site habitats. The best option is to have diverse habitats preserved rather than enhanced, because they are not only less costly, but more likely to succeed.

Habitat protection is almost always less expensive than enhancement and has the highest chance of success. Natural habitats are self sustaining with minimal maintenance cost. With careful planning and follow-up monitoring, enhancement can also be successful but generally costs more than protecting the original habitat (Schuckmann, 1994, 30).

Another concern is that golf course construction practices may damage or erase the intentions of a good design. Erosion is a primary concern, especially when fish habitats are nearby. Practices used today to prevent erosion are silt fencing, drainage systems, and storm water retention ponds. Environmental laws have been introduced to prevent careless construction practices. As a result, the hiring of reputable golf course construction companies and experienced golf course superintendents has become mandatory.

The location of golf courses create the largest potential conflicts with existing habitats, but the design and construction stages are also crucial in creating an environmentally sensible golf course. Habitat awareness is now a major part of the planning process. Developers, regulating agencies and local governments are making sure that old development practices that damage sensitive habitat areas are not used.

2.4 Golf Courses Are Green Waste, Not Green Space¹²

This concern is based on the presumption that golf courses are not true green spaces. Green space or open space is an area that may be park land or agricultural land, consisting of foliage and grass. Park land, whether municipal, provincial, or federal, is universally perceived as open space and available to all within the community to enjoy. Golf courses, however, provide only limited access to the public. Also, although they do contain foliage and turf, golf courses

¹² Concern raised by citizens and public interest groups such as Earthfirst.

are heavily manicured by mowers and heavily treated with chemicals. The areas under trees are cleared of all vegetation; a major loss of wildlife habitat. Don Cuddy, regional ecologist with the Ministry of Natural Resources in Ontario, states:

There's quite intensive landscaping done with golf courses. What happens is that you get a municipal planner who looks at golf courses as green space, as open space. They have no knowledge of the natural environment (Tiner, 1992, 42).

While Cuddy's perspective does not apply to all municipal planners, it does reflect the viewpoint of some in the profession. The argument that golf courses are "green waste" rather than "green space" has been marked by heated debate. A letter received from the environmental group, Earthfirst, just after Council in the District of North Vancouver approved the Northlands development highlights this debate, "Six to one. Just like that you [Council] voted to transform the wilderness at the base of Mt. Seymour into a chemical infested, scar-upon-the-land golf course" (DNV, 1994, Letter). While blunt, this particular response reflects the view of many who oppose golf course developments. The natural ecology of a site is indeed shaped and changed into manicured turf with the occasional tree left for strategic purposes. Though golf course turf is emerald green in colour, it is the only aspect that defines it as a park or green space. The natural features of a site are modified to suit the requirements of the golf course design. Golf course superintendents control what is grown on the site at all times, creating a monitored and unnatural landscape. It is far from being classified as a 'natural park'. The article titled Regional Green Spaces Examined mentioned that many of the Lower Mainland landscapes are becoming fantasy theme parks that are "fake" and "unauthentic" (McHugh, 1991, 17). Some feel that golf courses fall within this category.

The concern that golf courses as green space are really a manipulation of nature has not been well substantiated. While the landscape is modified during course construction and manicured during operation, there are many protected

areas within the golf course that are allowed to flourish. Public parks, on the other hand, are heavily manicured with mowers in order to allow easy public access. Agricultural areas, which are considered green spaces, are also heavily cultivated. In response to the desire of certain interest groups seeking undisturbed and protected natural areas within the Lower Mainland, the province has designated a percentage of environmentally sensitive and unique areas as Provincial Parks. The golf course developer is therefore under no moral or legal obligation to accommodate the desires of these interest groups. Despite this reality, a golf course developer will receive good public recognition if the golf course is as appealing as possible. In keeping with the current trend towards environmental awareness and outdoor recreation, golf course developers are increasingly creating environmentally sensitive golf courses (often less "manipulated" than city parks or agricultural land).

Another concern about golf courses is that the space is only available to the golfers or members themselves. The community can only view the green space from the golf course perimeters, as they are not allowed to walk freely within the site.

A golf course [has] a low throughput or usage by the public on a daily basis (e.g. maximum 300 golf rounds per day). Traditionally, golf courses have not been developed as multi-use facilities to encourage non-golfing members of the public to share in the usage of the facilities (International Sports Inc., 1993, 3).

Part of the problem is that planners choose to call golf courses green space when in fact they are often a privately owned and operated recreational use. Nonetheless, golf courses remain a valuable green space within the urban setting. Golf courses provide a visual green space and a form of exercise to those who play the game.

To illustrate, it has been shown that:

- walking on golf courses is an outdoor exercise that improves physical health (an 18-hole course covers about four miles);

- mental health improves, as studies obtained by the U.S. Golf Association, show that patients recover faster when exposed to pleasant outdoor scenes such as turf, trees and open space;
- employees of businesses located beside well-designed landscaping and turf have a better all-round job attitude (USGA, 1994, 3).

The opportunity for exercise, along with the aesthetic benefits, is very helpful in providing community well-being. The green space is utilized by golfers while providing a visually appealing amenity to the adjacent land users. It is rare to have a large green space within an urban area.

At a public meeting held to discuss the now existing Belmont Golf Course, three respondents expressed that the golf course is a form of green space. They forwarded the idea that:

- the golf course would enlarge the green belt in Fort Langley;
- the course would provide a nice park-like setting, and a break from the normal urban residential pattern;
- a golf course is as close to a green belt as possible in that area (Langley File #RZ-89-55).

While golf courses are perceived as visual green spaces, and thus “visually accessible” to anyone, the new development trend is to enhance this public accessibility by adding community bike or walking trails, such as the one circling around the Langara Golf Course in Vancouver. However, the community should realize that golf courses are typically a privately sponsored land use. While golf courses augment community green space, ultimately it is the responsibility of local jurisdictions to provide the community with accessible and useable green space amenities.

2.5 Safety Hazards On Golf Courses¹³

Golf balls are a potential safety hazard to golfers and bystanders, and can damage vehicles or buildings. A golf ball hitting someone can fracture and cause

¹³ Concern raised by public interest groups, local governments, and government agencies.

severe bruising and swelling. A ball striking someone on the head can be lethal. Indeed, the speed and trajectory of a golf ball is dangerous.

The developer must realize that golf, like most active sports, can be dangerous. A golf ball travels at about 250 miles per hour, or 370 feet per second, exceeding the speed of pellets fired from air rifles (Firth, 1990, 16).

The average golfer hits many wayward shots. Even the best golfers on the Professional Golf Association Tour sometimes hit errant shots. A ball struck incorrectly on a windy day can land as much as 65 yards off a fairway. When golf courses are in urban areas, the probability of someone or something outside the golf course property being struck increases.¹⁴ Nevertheless, some developers still fail to provide adequate setbacks and buffers. The result is a decline in golf course playability and inadequate safety buffers.

Developers have long known that golf frontage is second only to water frontage in creating value for residential developers. To maximize the economic rewards of combining golf and housing, many developers strive to locate as close as possible. By squeezing development closer to the course, a developer often is able to increase the overall number of residential units. When more housing makes a significant difference to the feasibility of a development, the developer will strongly pressure the golf architect and land planner to minimize setbacks. However, conflicts often occur when housing borders on golf courses (Firth, 1990, 16).

The Eaglecrest Golf Course in Qualicum Beach on Vancouver Island and the Riverside Golf Course in Fairmont Hot Springs, are examples of crowded residential-golf developments.¹⁵ Houses are placed much too close to the playing areas, with some located about 15 yards from the edge of the fairway. What can

¹⁴ If a ball is hit 250 yards in the air with a 40 yard slice, coupled with a left to right cross wind that sends it an additional 25 yards further to the right, then the shot is suddenly 65 yards off target (Martin, 1994).

¹⁵ At one hole at Eaglecrest, a house is located on the inward corner of a sharp dog-leg. The result is that players, attempting to shorten the hole by playing over the corner, and subsequently the house, will hit many shots into the homeowners property. Crowding can be extremely dangerous, as this particular house is struck with golf balls almost every day.

happen when golf courses are placed too close to adjacent uses is related by the occupant of a house bordering the Eaglecrest Golf Course. She said she experienced the following mishaps over a one year period;

- while gardening in her yard, a ball hit her forearm when she covered her head to avoid being hit (she now wears a hard-hat outdoors);
- a ball bounced off her rear driveway and struck her dog in the chin;
- a ball broke a side window facing the tee-box;
- a ball struck and dented her new car while it was parked in the rear driveway;
- "Balls hit the house quite regularly, especially on weekends. It's quite unsettling to be entertaining in your living room when it happens," she said (Clarke, 1995, A-17).

Safety on golf courses for players and bystanders is a concern. While course designers can plan for appropriate setbacks between fairways and other land uses, golf balls may still land in unanticipated areas. However, such cases are rare and deemed acceptable if appropriate distances and buffers such as trees are in place. Houses built close to the inward, hole-side of a curved or dog-legged fairway are no longer acceptable. Golfers, in an attempt to shorten the distance of the hole by shooting over the corner, often hit these houses.

As a result of past setback distance and buffering mistakes, proper buffering has now become a priority to local regulators. At the Fairwinds Golf Course in Nanoose Bay, on Vancouver Island, there are a number of fairways that have adjacent housing buffered by evergreens. The trees offer an excellent barrier to protect the houses from errant shots. Golf course views can still be obtained by providing long but slanted view corridors through the trees that face the direction of the fairway toward the green and not the tee-box. The trees make the houses difficult to see by the golfers on the tee-box or along the fairway. Trees provide privacy for homeowners and prevents house damage. Trees are now incorporated into the development to prevent houses from being hit, and as a natural and

aesthetic barrier, and, for the golfer, to nullify the psychological aspect of viewing the houses and thereby affecting the shot.

Appropriate setbacks or distances from residential foundations to the golf fairway, along with proper buffering, is necessary in providing homeowner safety.

2.6 Golf Course Irrigation Depletes Water Supplies¹⁶

Depending on the geographical location of a golf course, large amounts of water may be required to keep the turf green and healthy. Although the West Coast does receive a large amount of rain, during dry summer weather high domestic water consumption may lead to water shortages. Golf courses, as a result, should attempt to use alternative water sources or not be developed at all. The vast majority of courses use ponds, streams, or wells for irrigation. However, as water sources come under pressure from high use rates, well and stream sources may run low. Golf courses consist of large areas of very short turf, which dry out and die very quickly in hot, dry weather. Depending on turf length, golf course greens sometimes require water twice a day in the hot months.

One of the concerns about the recently developed Morningstar International Golf Course at French Creek, on Vancouver Island, was its potential impact on existing ground water resources that were already strained by high domestic use during the summer months. In this case, the concern was solved by using effluent water from a nearby sewage treatment plant for course irrigation. From June to September in 1993, Morningstar was piped 70,361 m³ or 15,498,017 gallons of effluent water from the sewage treatment plant, with the peak use in July, being 40,368 m³ (Knickle, 1994).

The irrigation required for golf courses may deplete existing water sources such as streams, irrigation ditches and wells - especially if alternative sources such as effluent are unavailable. If one golf course consumes 15 million gallons of

¹⁶ Concern raised by local governments, concerned citizens, the British Columbia Water Branch, and the GVRD.

water in one summer, what will the water implications be if there are 120 golf courses within the Lower Mainland in the near future?

Golf courses do consume large amounts of water to maintain good plant health. To satisfy irrigation requirements, most golf courses contain ponds - played as water hazards - that are fed by precipitation and creeks, or wells to retain water levels. However, while golf courses do use a large amount of water during the summer, golf course operators are seeking innovative irrigation measures to minimize impacts on local water sources.

To adequately irrigate golf course fairways, new and highly efficient water sprinklers that monitor the amount, direction, and irrigation times, are providing another step toward water control. Hiers (1995, 40) and Jewell (1994, 127) mention the benefits of the Toro Network 8000, while Tolson (1993, 40) discusses the benefits of the Rainbird Maxi V irrigation system. These systems that are now used are extremely efficient - though costly - with site specific heads that spray at full or part-circle radii. This new technology provides golf course operators with target specific irrigation with little-to-no waste. New golf course fairways are now designed like a shallow bowl, with the slope allowing the sprinkler water - or rainwater - to filter toward the middle of the fairway and into the drainage system (Chillibeck, Interview, 1994). The water is then fed back into the water retention ponds and recycled. Since the drainage trickles toward the centre of the fairway, the by-product of a slightly bowl-shaped fairway means the central turf will be green and healthy (the Westwood Plateau Golf Course in Coquitlam has incorporated the bowl-type design on many holes). The Nicklaus North Course in Whistler, which has approximately 20 miles of piping, uses its extensive drainage system to capture as much water as possible (Burns, 1995, 36). The Nicklaus North system is used to collect 90 percent of all drainage water for irrigation, control water levels of six ponds, and filter out particulates and other substances when storm water becomes excessive, leading to discharge (Burns, 1995, 36-37).

Another water recycling strategy, as mentioned, is Morningstar's use of secondary sewage effluent. This form of irrigation has a number of attractions:

- the effluent is relatively inexpensive - the Morningstar Golf Course on Vancouver Island paid up-front for the construction of the piping from the sewage plant to the course (about 1 kilometre), so aside from a small monthly maintenance fee, the effluent itself is free;
- rather than having the effluent piped out into the ocean or river, the turf grass acts as another filter - the chemical properties within the effluent are dissipated in the thatch; and
- the effluent is a constant irrigation source - unlike many other water sources.

The possible downside in using effluent is the amount of chemicals, salinity, potential odour, and bacteria in the effluent. Fortunately, the effluent for Morningstar comes from residential and light commercial uses, so industrial wastes and other chemicals are absent. The effluent is constantly monitored by the Water Management Branch. With the option of using effluent for irrigation, a large scale effluent irrigation system could be established within the Lower Mainland. The Monterey Peninsula in California has constructed a \$35 million (publicly and privately financed) water reclamation system with eight public and private golf courses, along with local community recreation sites, on the effluent irrigation system (Pollard and Horton, 1994, 14). Each course uses approximately 300,000 gallons of effluent a day from the municipal sewage treatment plant, with the community fields consuming a great deal as well (Pollard and Horton, 1994, 14).

Water monitoring is very important not only for health reasons, but to ensure that effluent impurities do not turn the turf yellow (Hayes et. al. 2, 1990, 943-946). On the other hand, the nutrients in the effluent may be absorbed by the turf and improve its health (Bishop, 1990, 28) (Hayes et. al. 2, 1990, 943-946). The possible negative impacts comes from the bacteria or chemicals within the effluent that may enter nearby groundwater or surface water, but this is negligible, as drinking water standards have yet to be compromised (Hayes et. al. 1, 1990, 939-43). Unfortunately, a golf course must be quite close to a sewage treatment

facility to be able to link into the facility; otherwise, the cost is prohibitive. Also, the effluent water must meet government health regulations and turf needs. Nevertheless, with the cooperation of the municipalities, the government agencies and the developer, effluent is an option that is used to reduce the impact on municipal water sources.

Target-style golf course designs, with the considerably less playing areas compared to the regular courses, is another alternative developers are using to reduce water consumption.

Because water is increasingly becoming a more valuable resource, golf courses are seeking new and innovative ways to decrease water usage. Local regulators, developers, and the community should ensure that water conservation is mandated for each golf course.

2.7 Turf Care Chemicals Contaminate Habitats and Water Sources¹⁷

The chemicals used on golf courses to improve or promote turf growth can produce health hazards for the environment as the chemicals slowly accumulate and concentrate in water tables and wildlife habitats. When pesticides, for example, are applied, very little comes in contact with the targeted organism. Two toxicologists, Pimentel and Levitan, state, "Most of what is applied enters the environment, contaminating the soil, water, and air and perhaps poisoning or adversely affecting non-target organisms" (1988, 2). The main threats are to water sources (including underground) and vegetation and wildlife - particularly birds. Although incidence of wildlife death or injury through turf care chemical application is rare, it does occur. In cases where chemical contamination occurs through spills or over-application, the results may be sudden.

¹⁷ Concern raised by The Ministry of Land, Parks, and Environment, the Canadian Wildlife Service, the British Columbia Water Branch, local governments, and various wildlife and environmental groups. The technical aspects of this subject requires a longer analysis than the other sections of this chapter.

A full description of a poisoning event was recorded. The golf course was sprayed with 8.6 a.i./ha of a 500 EC formulation [diazinon]. The intent was actually to apply 4 Kg a.i./ha but an error was made in preparing the spray solution. In any case, the resulting application was still within the range allowed on the label. The fairways were treated with a boom-style sprayer driven at a speed of 5-6 km/h and application at a pressure of 280 kilopascals.

The fairway on which the Canada Geese appeared was sprayed at 1300 hrs and immediately irrigated for one hour with 12 to 25 mm of water. Approximately 25-30 Canada Geese were seen grazing the fairways and the first casualties were picked up approximately 3.5 hours after application.

Surviving geese exhibited the following signs: ataxia and neck swaying, flopping to the ground, foaming at the mouth and passing blood in stools. The analytical results and the gross and microscopic findings strongly support the view that the death of [the] geese was caused by diazinon ingestion (Frank et al., 1992, 854).

The use of diazinon and related chemicals can have substantial impacts on bird and animal populations that feed or move across golf courses. If a golf course is located in or by a vibrant bird habitat, the use of turf care chemicals should be carefully monitored or even prohibited.

Chemicals leaching into sub-soils and groundwater, or chemical runoff into surface waters is also of great concern. In Cape Cod, a famous pesticide study was conducted to review the groundwater qualities beneath some of the areas local golf courses. Although the study discovered that underground contamination from pesticides was negligible, it did raise a concern about the use of nitrogen based fertilizers. Also, some questions about the geological features below golf courses in other areas arose, because chemicals can move through the ground much faster if fissures, for example, are present.

“The chemicals [pesticides] being applied weren’t moving down into the water in quantities to raise any concern over water quality.... But that may not be applicable to other areas. Bedrock and limestone that have fractures or fissures can allow movement directly into the aquifer.” Experts, in fact, warn against pesticide use in any areas with exposed bedrock. In addition, the Cape Cod Study found fertilizer chemicals exceeding up to three times the federal drinking-water standards and about six times the local county guidelines in some

samples. Unlike most pesticides, which break down rapidly or are readily absorbed by soil particles within two feet of the surface, says Nickerson, nitrate-nitrogen fertilizers are very soluble in water. "We concluded that fertilizers could pose a threat to water quality in the aquifer," says Nickerson. "It's resulted in a closer review of golf course proposals and monitoring requirements" (Tiner, 1992, 42).

Golf course proposals have caused controversy when the site chosen is located beside sensitive water bodies such as wetlands with seasonal levels rising or falling depending on rainfall, making the land a marsh, and aquifers, where water has seeped and collected over time into porous rock and gravel deposits under the surface. These two water sources are the most susceptible to chemical contamination because of slow water movement. The shallower the aquifer, the more susceptible it will be to contamination. Turf care chemicals used by golf courses over time will leach into these important water sources and may even damage or destroy the existing sensitive biological communities. Chemical contamination of fish is a big concern. Important spawning sources need to be protected. Furthermore, chemicals move up the food chain. They stay within the fish's body, accumulate, and are passed on to a predator or human. Golf course developments proposed in sensitive and diverse habitat areas should therefore be given very careful consideration.

In response to some of these concerns, only about 5% of the golf course, the tees and greens, receive fairly large chemical dosages or applications (Cook, 1991, 14). This neutralizes the perceived notion by some groups that golf courses - in their entirety - are nothing more than dumping grounds for chemicals to maintain the emerald green turf. Nonetheless, to monitor the types of chemicals used by golf course operators throughout the golf course, the Canadian Wildlife Service (CWS) sent 75 questionnaires throughout British Columbia to ascertain which chemicals were being used on provincial golf courses. The CWS learned from the 36 respondents to the survey that:

- 35 courses used fungicides, with courses in the Lower Mainland using Benomyl to treat Pink Snow Mould;

- 34 courses used fertilizers, with some of them using a mixture of fertilizer plus fungicides and herbicides;
- 26 courses used herbicides to control broadleaf weeds on turf and along cart paths, and around trees; and
- 13 courses used insecticides or pesticides, with Carbaryl and Diazinon being used the most, with the later sometimes used to control insects in trees (5 courses) (Moul and Elliot, 1992, 33-36);

How are these chemicals received by the land? When pesticide chemicals are applied to the golf course, they are dispersed by the six factors of adsorption, volatilization, photodecomposition, conversion, absorption, and degradation.

Adsorption. Adsorption is the binding of a chemical to the surface of plants or soil. This binding phenomenon is influenced by a number of factors: the nature of the surface, moisture, pH and the various physical and chemical properties of the chemical that has been applied.

Volatilization. Volatility - the state of being volatile, or readily vaporized. Pesticide volatilization increases with high air movement and low relative humidity.

Photodecomposition of Pesticides. Sunlight transformation [is a noteworthy] environmental fate for pesticides, especially for those that are applied to the surface of plants and soils, a practice that is quite common on golf courses. The transformation brought about by the exposure of a pesticide to sunlight generally alters the chemical properties of the pesticide to the extent that it is less toxic and more susceptible for further environmental degradation by other chemical and microbial processes.

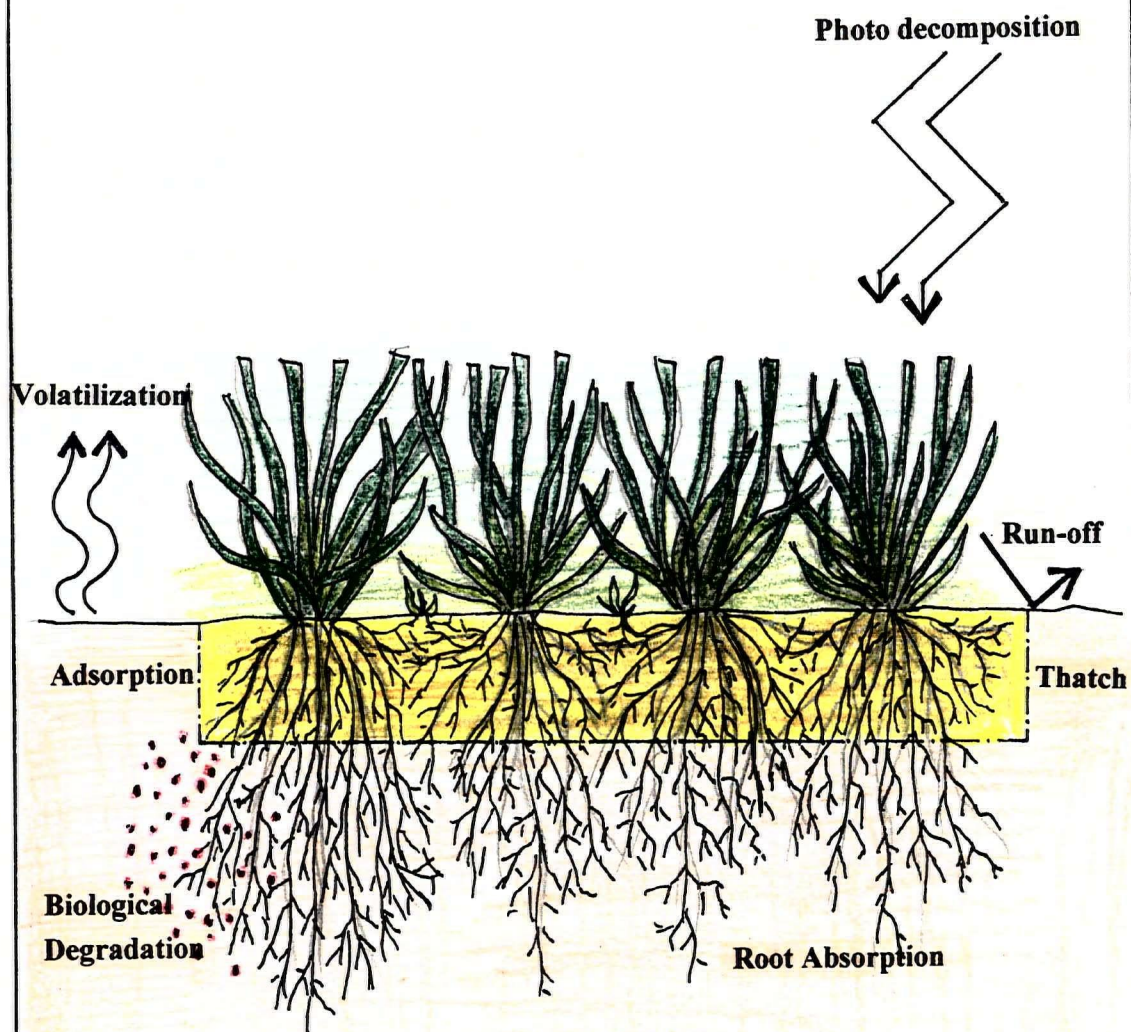
Chemical Conversion. The hydrolysis of chemicals [occurs when] pesticides [are] applied to land and water. Most chemical conversions occur in aquatic environments.

Absorption. The movement of pesticides into plants and, to a much lesser extent, into soil-borne organisms is referred to as absorption. Once absorbed most pesticides are [slowly broken down within the plant].

Biological Degradation. Much of the natural degradation of pesticides occurs because of the action of the microbiological population in the soil and thatch (Watschke, 1990, 22-24).

How turf care chemicals are broken down or dispersed by these six environmental processes is shown in Illustration 2.2.

ILLUSTRATION 2.2
THE FATE OF PESTICIDES APPLIED TO GOLF COURSES



(Adopted from Watschke, 1990, 22)

Chemicals are predominantly dissipated in the first few inches of the turf thatch. The turf thatch or root system largely prevents the movement of chemicals downward. Since the thatch absorbs and restricts the movement of water, turf care chemicals rarely leach or run-off into other regions of the site.

Several research studies have demonstrated that a well-maintained, dense turf area can reduce runoff to near zero. This is due in large part to the fact that a turfgrass area has tremendous potential to absorb precipitation. It has been estimated that a 150-acre golf course has the capacity to absorb 12 million gallons of water during a heavy (3-inch) rainstorm. The velocity of overland flow of water across a dense turfgrass stand is sufficiently slow that, under most conditions, the vast majority of water will infiltrate into the turf/thatch/soil profile before it can move horizontally from the site. Studies conducted in Rhode Island [U.S.A] revealed that during a two-year period, overland runoff from lawn-type turf (3 percent slope) occurred on only two occasions, and both resulted from unusual climatic conditions [of snow and a 5-inch rainfall] (Cooper, 1990, 12).

A golf course can retain large amounts of water, consequently preventing chemical particles within the water from moving down and off the site. However, this is only the case on mature and established turf. For new golf courses, the potential for run-off rises dramatically. Watschke states, "Chemicals....tightly bound to soil that is eroded and carried by runoff have a relatively high pollution potential" (1990, 24) Yet, with sound construction standards and a strategically placed drainage system to collect excess water in retention ponds, chemicals that bind to the soil or water will remain on-site.

The leaching of chemicals into underground water sources has been another area of concern. Tests have been conducted to see if pesticide and fertilizer levels can be found in groundwater. The Cape Cod study raised the need for geological studies for fractures and fissures before chemical application, along with concerns for nitrogen fertilizers. While comprehensive ground studies are now a requirement, ways to diminish nitrogen contamination can be answered by using delayed or slow-release nitrogen. Despite these new practices, the Cape Cod water

samples underneath several golf courses discovered that groundwater contamination was far less than some expected:

- seven golf course pesticides used were never detected;
- two pesticides were detected, but lower than 6% of the Health Advisory Level (HAL) standard;
- 3 herbicides were detected (once each out of 70 samples) and 1 fungicide, but were less than 20% of the HAL (Cohen, 1990, 32-34).

Another study was completed in Florida and revealed that pesticides found under the golf courses were minimal, that agriculture creates more of a threat to groundwater, and that chemical spills are likely the main cause of groundwater contamination (Kahler, 1990, 46). Despite these results, golf course operators realize that some of the past turf care chemicals, along with how they were applied, were not environmentally sensitive. With the emphasis now on chemical reduction, knowledge of agronomy has become essential. States Belmont Project Manager Doug Roxborough, "Today, a superintendent must have proper knowledge of agronomy and have a license to administer chemicals. Turf care maintenance has now become a science" (Interview, October, 1995).

The new environmentally sensitive direction for golf courses is perhaps best displayed by Squaw Creek in California, where the course was built over a major aquifer. The condition of approval was that no fungicides, insecticides or herbicides could be used, with the exception being only small doses of slow-release nitrogen fertilizer (Jewell, 1994, 126). In order to accommodate these demands and still provide a healthy turf, numerous strategies and safeguards were implemented. The water samples analyzed to date show that water entering the site leave it within good drinking water standards (Jewell, 1994, 126-128). The success of Squaw Creek is proof that golf courses can and are moving away from intensive chemical use and leaning toward more natural maintenance practices. Golfers viewed beautifully groomed emerald grass on television (PGA Tour) and expect their local golf courses to look the same. This viewpoint is changing, however, with golfers now only expecting well maintained tees and greens (5% of

the course) with fairways and rough areas of average quality (Martin, 1994) (Roxborough, 1995). This compromise is a direct result of increasing environmental awareness.

2.8 Summary

Agricultural concerns, in particular ALR issues, were quite prominent and controversial during the late 1980s and early 1990s. The 1991 golf course moratorium within the ALR was a major policy change. Golf course developments allowed within the ALR are now rare, isolated occurrences. Furthermore, the ALC development guidelines designed specifically for golf courses are such that the land will maintain its rural capabilities "in perpetuity."

Unwanted Growth issues appear when golf course are proposed in outlying areas. NIMBY (not-in-my-back-yard) attitudes, or social biases, tend to surface with the threat of increased property taxes - a result of infrastructure strains and increased property values. Many people oppose new developments as the familiar composition of the neighbourhood or community would likely change. Overall, golf courses can be viewed as a recreational land use that provides jobs and tax dollars for the community.

The potential loss or damage of wildlife habitats to golf courses has become one of the most scrutinized aspects of new proposals. The Canadian Wildlife Service and the Ministry of Environment monitor and advise local jurisdictions on potential impacts and remedial options if applicable. Knowledge about habitat enhancement and protection in golf course development, if applied, makes negative impacts to wildlife minimal.

There is a need for appropriate safety measures in preventing golf balls from landing in adjacent land areas. Through design, some golf developments are better than others in preventing injury or damage to adjacent property. In reviewing the well-designed golf courses, the use of adequate setbacks and tree buffering are the primary ways to limit personal injury or property damage.

In urban areas, golf courses provide a 150 acre "green belt" of tree, bush and grass. There is a new push on providing more community access to the site - aside from the clubhouse - with public trails and small parks, if such areas can be designed into the site to allow increased public access.

Water conservation has become very important due to the large number of urban uses competing for limited water supplies. Through the use of target-style layouts, high tech sprinklers and water systems, along with superior drainage practices, water conservation has never been better. Other sources of water, such as treated sewage effluent, can provide an excellent alternative water source for course irrigation.

Chemical contamination concerns have proven to be somewhat exaggerated. Tests have shown that chemical runoff and leaching are not as substantial as first thought. The chemicals are primarily dispersed and broken down firstly by the turf thatch, and secondly by other elements such as photodecomposition and conversion. By these processes, chemical contamination to non-target areas is minimized. Nevertheless, chemical usage should and has become heavily controlled in recent years. Some chemicals are now prohibited and general chemical application to turf has been reduced.

In the last five to ten years the golf course development industry has changed construction and operation practices in providing more environmentally sensitive and sustainable golf courses. As a result of these recent changes, five well-known environmental groups, including the Sierra Club, are changing their viewpoints about golf courses toward a more positive outlook (GCMS, 1996, 22-40).

Chapter 3 - The Boundary Shores Case Study

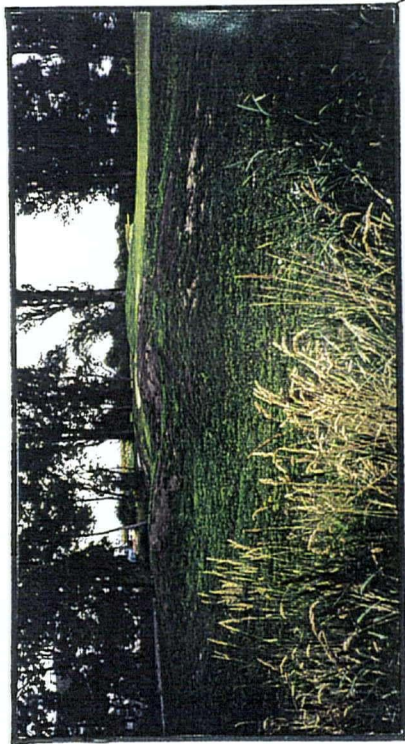
The Boundary Shores Golf Course Development is a showcase of the many golf course development concerns that have been raised throughout British Columbia. The Boundary Shores proposal was reluctantly approved by the Corporation of Delta in 1994 after a six year review, with the last three of those years spent in the Provincial and Federal Courts. With the absence of scientifically objective reports on site specific issues such as wildlife, Delta Council grappled with various stakeholders and their own location guidelines in evaluating the appropriate location and type of golf course to be developed. Delta was also unprepared for the flux of proposals within the ALR stemming from the provincial land use policy change that allowed golf courses within those designated areas.

Boundary Shores offers valuable insights into the concerns surrounding golf course developments. This chapter examines the influences the golf course development concerns had on the Boundary Shores development.

3.1 The Loss of Agricultural Land

The first area of concern was that the entire site was within the ALR. The ALC determined that the soil class ranged from 2 to 3, and that the site was within traditional farming areas (ALC File #27-0-88-22258, 1989). Today, on these two facts alone the proposal would have been rejected. The loss of good soils found to be of class 2 or 3 to a golf course within traditional farming areas is a significant agricultural loss to the community. The land uses adjacent to Boundary Shores are depicted in Illustration 3.1. The loss of good ALR land in a prime location was also a concern to interest groups such as the BBCC (Boundary Bay Conservation Committee). BBCC representative Dr. Mary Tait stated, "The urban areas were way, way distant, and this golf course [has been] put right along the edge of the Bay, between the farmland and this spectacular wildlife habitat. Of course all the cars, as well as the servicing, will have to come down from the urban areas through the ALR and further disrupt the agricultural community" (Interview, 1994). The

ILLUSTRATION 3.1 - LAND USE AREAS ADJACENT TO BOUNDARY SHORES



VIEW OF FARM TO NORTH OF SITE OFF 72ND STREET.



VIEW OF AGRICULTURAL AREA (FARM) FROM 72ND STREET



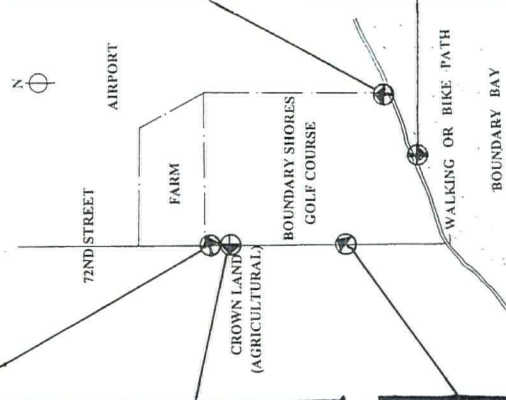
VIEW OF 72ND STREET.



VIEW FROM SOUTHEASTERN CORNER OF SITE SHOWING AIRPORT AND OLD-FIELD HABITAT TO NORTH AND EAST OF SITE.



VIEW FROM WALKING PATH SOUTH TO BOUNDARY BAY.



location of Boundary Shores also went against Delta's 1988 Golf Course Locational Guidelines In The ALR, which stated, "...under no circumstances will random location of golf courses be permitted in agricultural or active farming areas" (Delta Planning P-88-02, 1988, 3). Boundary Shores appears to be a "random location" in a traditional farming area.

An irrigation plan funded by the developer to increase water availability to adjacent farming areas lessened the negative impact of the new golf course on the ALR. Nevertheless, the location of Boundary Shores within an agricultural area was inappropriate and unmitigable. This case study confirms the conflict between good agricultural land and the desire to locate and develop golf courses within the ALR. The Provincial Moratorium in 1991 to prevent developments like Boundary Shores from occurring again was justified.

3.2 Municipal Infrastructure Improvements

To accommodate municipal infrastructure issues, the Corporation of Delta required the developer to upgrade existing roads and services to 72nd Street. Some of these upgrades include street widening for left turn bays and an overall increase in traffic. A further condition of approval was to extend a new water main and a sanitary sewer forcemain. The use of the Development Cost Charge confirms how municipalities construct or update community infrastructures with little or no cost to the general public.

3.3 The Loss of Wildlife Habitat

The second area of concern was habitat loss. The primary concern of the Canadian Wildlife Service was the loss of old-field habitat (impacting voles and raptors) that provided food and cover for migratory waterfowl and shorebirds (Wetmore, Letter, 1990). The Ministry of Environment and the Canadian Wildlife Service were of the opinion that Boundary Shores would be damaging the sensitive existing and seasonal bird populations around Boundary Bay.

Boundary Shores and the surrounding habitats are of critical importance to a wide variety of wildlife populations. The area is important internationally as a key link in the Pacific Flyway, and both nationally and locally as a vital wintering and nesting area for raptors and many other species.

The location of the present golf course proposal at 72nd Street [Boundary Shores] is situated within a larger area identified as having the greatest abundance and diversity of birds including raptors, in all of Boundary Bay and surrounding Lower Mainland areas according to recent studies (Letter to Jim LeMaistre, Delta, 1990).

With the major concerns raised by government agencies about the possible impacts of the proposed development on such a sensitive location, it would have been expected that a full environmental impact assessment would have been conducted. This was not the case. The environmental assessment requested by Delta turned out to be only a short environmental review of existing conditions and possible impacts without adequate scientific data or interpretations provided by the Hatfields Environmental Consulting group. This left the government agencies and the Delta planning department struggling to evaluate the possible impacts. As a result, opinions on habitat impacts varied from group to group. The Ministry of Environment produced a number of Boundary Bay Area Studies in 1993. The report stated that even in 1993, two years after Delta Council had initially approved Boundary Shores, thorough habitat studies of Boundary Bay were still incomplete.

At present, the ability of regulatory personnel to objectively prepare and review environmental impact assessments for proposed developments in the Boundary Bay area is limited by the lack of a comprehensive site-specific database and habitat inventory. Consequently, the management decisions may be based on incomplete information or delayed while more data is collected (Acres International, 1993, Section 8-4).

This confirms earlier statements in this thesis for the need of comprehensive and thorough site and area studies before decisions are implemented. Clearly, Delta

Council approved a golf course within a sensitive and vibrant habitat location with little knowledge of the potential impacts.

Despite the limited site data, the Ministry of Environment and the proponent, along with Delta planning, arranged for a number of environmentally sensitive measures to be incorporated within the design. There is little doubt that the requirements of the development agreement aided the proponent toward a development approval. The key wildlife components negotiated and written within the development agreement include the following:

- proper golf course landscaping to mitigate old-field habitat, waterfowl and shorebird habitat (developer deposited \$514,000 to Delta which will be returned in six years when all landscaping features are complete);
- the golf course will be maintained in "perpetuity" as a links-style course;
- no safety netting will be used unless it can be proved to be a non-hazard to wildlife;
- pesticide use is to be closely monitored and recorded (three controversial pesticides are prohibited);
- Delta's Environmental Control Officer will report annually on landscaping, habitat conditions, pesticide use, and water and soil quality;
- the establishment of the Habitat Compensation Trust Fund, totaling \$531,720, for wildlife habitat conservation;
- and enforcement powers that can lead to revoking the Boundary Shores business license if deficiencies prove to be severe enough (Land Titles File #9275.1406, 1990, 7-12).

Within the landscaping and wildlife agreements, a vegetation plan was established to reduce the substantial loss of food and cover opportunities for native wildlife. A full range of native plant and grass types were designed within the course. The vegetation plan highlights are as follows:

- the playing areas will be planted with a seed mix of *bluegrass*, *bent grass* and *perennial rye* to reduce sensitivities to disease;

- a transition zone located by the secondary rough will consist of a number of seeds including *Climax timothy*, *Redtop*, *Perennial ryegrass*, *Fescue*, *Alsike clover* and *Red clover* that would eventually become old-field grass and attract wildlife;
- trees, consisting of evergreens such as *Western red cedar*, *Shore pine*, *Douglas-fir* and *Hemlock* or deciduous trees such as *Birch*, *Alder*, *Mountain ash* and *Pacific Crabapple*, will be planted as a safety measure near the road and around certain areas of the golf course; and
- as many native fescues and shrubs will be incorporated within the design as possible, using shrubbery such as *Elder*, *Hawthorn*, *Wild rose* and *Snowberry* (Land Titles File #9275.1406, 1990, 32-34).

The vegetation types are very helpful for not only promoting habitat food and cover, but for providing a natural safety buffer to control wayward shots.

Throughout the course of the Boundary Shores proposal, numerous groups and agencies pointed out that there were many other sites much less sensitive within Delta that could accommodate a golf course. In spite of deciding on the wrong location, Boundary Shores illustrated how developers and planners can mitigate potential habitat concerns by using course design and operation amendments incorporated within a Restrictive Covenant.¹⁸ The proponent was very cooperative in this matter, as the Restrictive Covenant was discussed and accepted by the developer (LeMaistre, Interview, March 1994).¹⁹ With the amendment to Section 215 in 1994 with Bill 28, the regulations for protecting and enhancing natural amenities on a parcel of land have increased. The definition of the natural characteristics that may be incorporated within the Covenant is clearer.

(1.3) (b) [T]hat land or a specified amenity in relation to it be protected, preserved, conserved, maintained, enhanced, restored or

¹⁸ A Restrictive Covenant under Section 215 of the *Land Titles Act* is another regulatory instrument that can be placed on the property and registered within the Land Titles Office.

¹⁹ A local jurisdiction cannot put covenants - law binding instruments - on the property owner unless the developer is in agreement with its components and, in this case, the Corporation of Delta. Otherwise, the covenant would be challenged and rejected in court.

kept in its natural or existing state in accordance with the covenant and to the extent provided in the covenant.

(1.4) For the purpose of subsection (1.3) (b), **“amenity”** includes any natural, historical, heritage, cultural, scientific, architectural, environmental, wildlife or plant life value relating to the land that is subject to the covenant (Land Titles, 1994, amendment).

Also, for monitoring and enforcement purposes, the covenant will remain on the parcel of land in perpetuity under subsection 3 of section 215. “[T]he covenant is binding on the coventor and his successors to title..”(Land Titles, 1994, 75). This would be monitored by the local municipality along with government agencies (Canadian Wildlife Service and the Ministry of Environment) to ensure the terms and conditions are upheld. As another form of municipal monitoring and enforcement, the developer can offer money to the local government, as a warranty, in the form of a Letter of Credit (the same instrument the ALC uses) to ensure agreed upon measures will be initiated and maintained (as was used in the Boundary Shores development). Boundary Shores used all aspects of the Covenant to monitor and protect wildlife and vegetation as much as possible.

3.4 Green Space Impacts

Green space or recreational opportunities within the site are negligible. The only presently used recreational use of the site is a small dyke that runs parallel to the southern boundary of the development that is used as a walking and biking trail by the community. It also provides access for the community to view wildlife along Boundary Bay. This recreational easement fell outside the Boundary Shores property, so was undisturbed.

3.5 Safety Concerns

The threat of safety hazards to the nearby parcels of land is small. Setbacks from the playing areas to the walking trail to the south, a farm to the north, and the airport to the east are sufficient to prevent injury. Yet, the setback from two of the holes running adjacent to 72nd Street to the west could have been wider. The

greens of the two holes are about 30 to 40 yards from the street. Various trees will be planted in this open field area to provide a safety buffer. Wider setback distances are being considered for new golf courses.

3.6 Irrigation Concerns

The developer was told by Delta that municipal water could not be used for golf course irrigation. A possible option was to use adjacent irrigation ditches, fed by high water tables from the Fraser River, used by area farmers. At the time, however, water could not flow into the into the 72nd Street ditch network because of blockages and elevation. The developer decided to fund a \$420,000 irrigation upgrade to obtain water for the golf course and adjacent agricultural land by constructing two lift stations and widening the ditch. During drought conditions, however, the water sources must remain steady or the golf course may lose out to the needs of nearby farmers. Obtaining suitable irrigation sources can be difficult, but this case study shows that water can be attained, and that adjacent land users can also benefit.

3.7 The Impacts of Chemical Use on The Site

Chemical use within the site will be controlled and monitored. The chemical control plan is a type of Integrated Pest Management (IPM) Plan. The aspects of the plan appear to be well thought out. The attributes of the chemical controls that are in place are highlighted in the Restrictive Covenant:

- Dursban, Diazinon and Carbofuran are three pesticides prohibited from use;
- chemicals will be used as a curative measure, rather than preventative;
- chemical will be used, stored and handled safely;
- the developer will maintain a complete and up-to-date record of chemicals used;
- water quality testing will be done to make sure drainage and discharge on and off the site are within safe standards (Land Titles File # 9275.1406, 1990, 11-13).

Once again, the Restrictive Covenant provides planners with the regulatory tool to monitor golf courses. For Boundary Shores, it lists and abolishes the three most harmful chemicals. It also confirms the requirement of evaluating and testing for negative chemical impacts on and off the site.

3.8 Summary

The Boundary Shores Development Proposal was one of the most heatedly debated and controversial golf course proposals in British Columbia. The conflict with the ALR and the vibrant habitat around Boundary Bay headed the controversy. A large group of citizens, along with some government agency officials, felt the location of the golf course could not have been worse.

Boundary Shores review process also illustrates the political tug-of-war golf courses can often become. The BBCC, in this case, became a large player in the process when it was feared that Delta Council was uncertain how to treat or evaluate the golf course proposal. "Politics impinge strongly during the selection of environmental problems for public action, during the process....of decision-making, and most of all when the relevant instruments of implementation are selected" (Boehmer-Christiansen, 1994, 70). Local government lobbyists even determined what aspects of the golf course proposal would be reviewed. Robert Ahoy, the developer, reflecting back on the Boundary Shores development, stated, "The development approval was purely political. The politics of certain groups were overwhelming" (Ahoy Interview, 1994). Lobbying is a part of the review process, and a well-rounded representation of all stakeholders will help to ensure a reasonable outcome. Three policy analysts collaborated to document three fundamental steps to ensure fair and reasonable decisions within the review process.

First, decisionmakers need to understand the technical dimensions of a [golf course] project and its likely impacts on the human and natural environments. Thus factual information must be set out clearly, with accessible distinctions made regarding the magnitude of different impacts and their likelihood.

Second, decisionmakers need to understand public concerns so they can anticipate the questions that will be asked of them and address these as part of the evaluation process. Some of these concerns will relate to the outcomes of a decision, but other concerns will relate to the process by which that decision is made, e.g.: How were agency priorities set?

Third, decisionmakers need to be able to defend their choices within existing institutional and political frameworks. Involving stakeholders' values in a meaningful way requires a sharing of power that will increase credibility with the public..(Gregory et. al., 1992, 69).

The technical information provided for the Boundary Shores planning review was deficient, resulting in ill-informed decisions. Therefore, the final decision by Delta Council to allow the golf course was not justified to many stakeholders. The lesson learned is that public and government agency concerns about a site must be analyzed and evaluated by environmental, planning, and engineering experts. Timely environmental impact assessments, reports, and other relevant information are needed by all stakeholders so that rational decisions can be made.

Another important lesson is that the location of a golf course is very important (see Illustration 3.2). Various enhancement or mitigative measures, however, can soften some of the negative aspects of a golf course if the location is inappropriate. Nonetheless, no matter how many mitigative options are pursued, the end result could still be damaging to the existing environment. Jim LeMaistre of Delta Planning underscores the difficulty, "The developer went a long way to accommodate the Ministry of Environment and the Canadian Wildlife Service in the design of the site. The design in the end was very accommodating to the environment and a good course design overall, but unfortunately it is just located in the wrong place" (March 14, 1994).

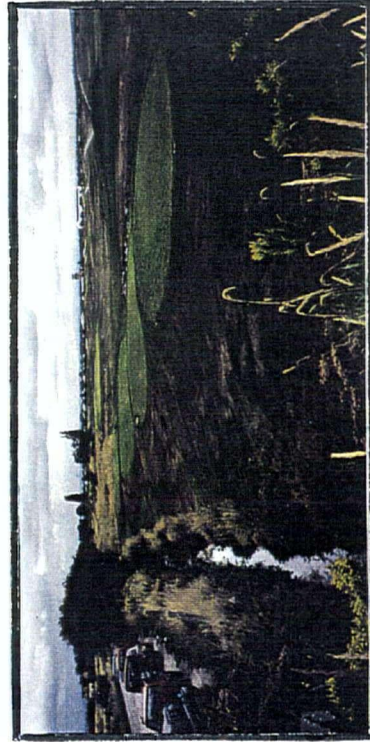
ILLUSTRATION 3.2 - BOUNDARY SHORES SITE VISIT



VIEW FROM 72ND STREET AT NORTHWESTERN CORNER OF SITE.



VIEW FROM 72ND STREET LOOKING OVER GOLF COURSE.



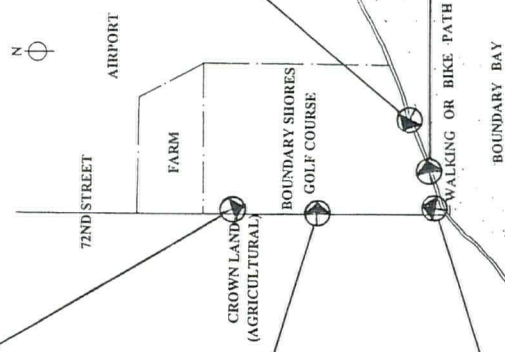
VIEW FROM 72ND STREET AT SOUTHWESTERN CORNER OF SITE.



VIEW FROM WALKING TRAIL AT SOUTHERN PORTION OF THE SITE.



VIEW FROM WALKING TRAIL AT SOUTHERN PORTION OF THE SITE.

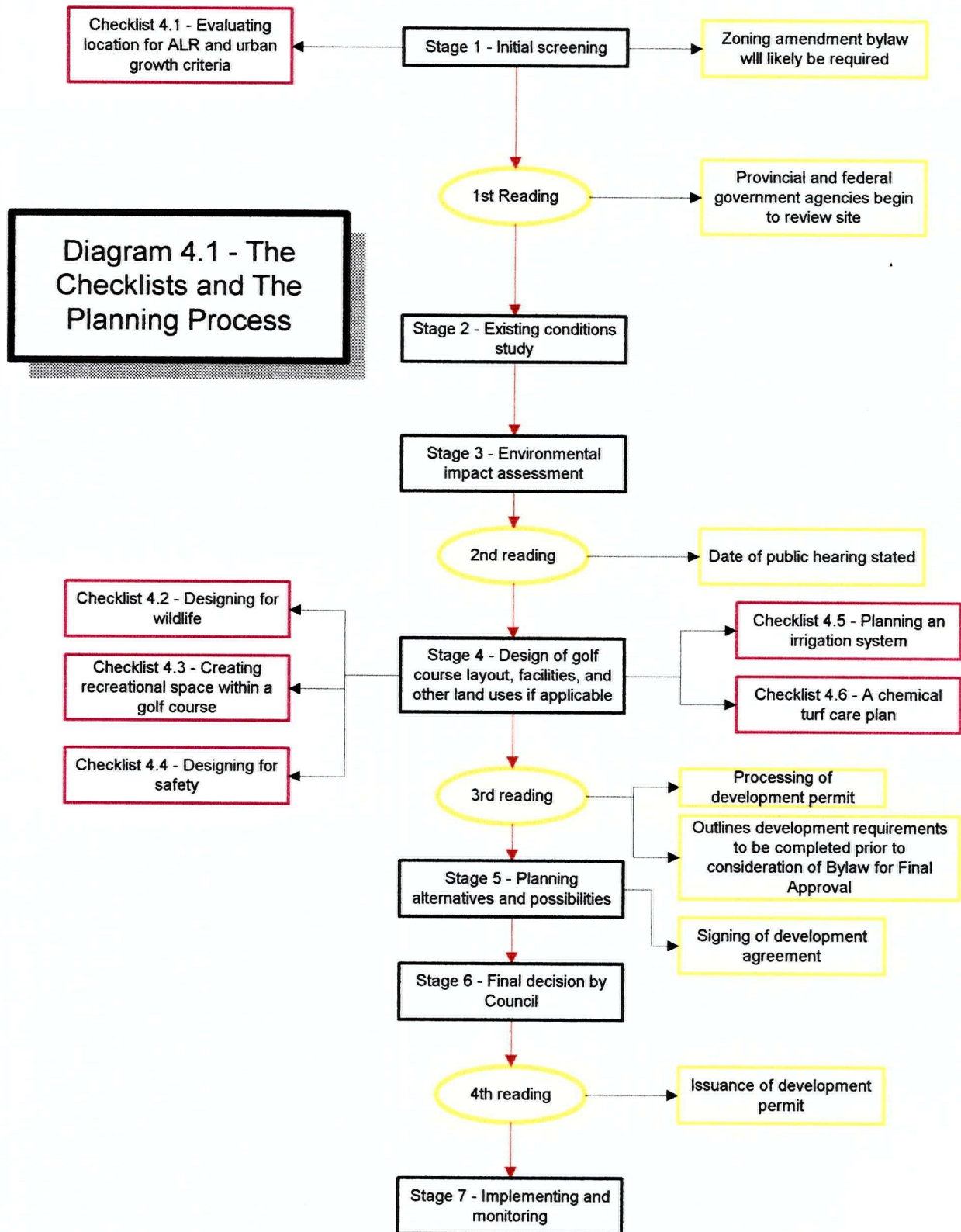


Chapter 4 - Planning Guidelines To Promote Better Golf Courses

In this chapter attention shifts from the analysis of golf course development to a discussion on golf course planning guidelines for proposed and existing courses. These guidelines are derived from the earlier analysis, case study findings, and guidelines used in other successful new or existing golf courses. The guidelines for planning golf courses specifically deal with each of the seven concerns discussed in Chapter 2. The guidelines look at the places to build, the ideal ways to design, and the best methods available to construct and operate a golf course. Each concern is addressed separately by section.

As a practical guide or template to facilitate the evaluation of a golf course proposal, relevant guidelines are placed within a specifically formatted checklist found at the beginning of each section. The purpose and design of the checklists are to provide planners with a useful and practical tool to use in the golf course review process. The potential development impacts a proposal may have on an existing site can be documented within the "Comments" box of each checklist. In addition, planners can highlight or mark down the appropriate guidelines to implement in off-setting or mitigating development concerns. The checklists deal with the main pre-development guidelines for stakeholder consideration during the evaluation process.

The different checklists are used at different stages of the approval process. Diagram 4.1 - The Checklists and The Planning Process (there are seven general stages), highlight the stage where planners are to initiate or use each checklist. *Checklist 4.1 - Evaluating location for ALR and urban growth criteria*, is initiated at stage 1. The checklist is designed to protect the ALR and promote desirable growth areas. The design guidelines that serve to protect sustainable wildlife habitats, produce additional recreational opportunities, encourage non-hazardous golf courses, prevent chemical contamination, and conserve water resources, are covered in *Checklist 4.2 - Designing for wildlife*, *Checklist 4.3 - Creating*



recreational space within a golf course, Checklist 4.4 - Designing for safety, Checklist 4.5 - Planning an irrigation system, and Checklist 4.6 - A chemical turf care plan, and are initiated at stage 4.

Proposals that follow the golf course planning guidelines will mitigate, limit, or even eliminate the seven potential development controversies.

4.1 Evaluating Location

Refer to **Checklists 4.1 - Evaluating location for ALR and urban growth criteria.**

4.1.1 ALR Criteria

Guideline 1 - correct location. Golf courses may be allowed in areas where the soil class is 6 or higher, the landscape is undulating with ravines and slopes, and the land is away from traditional farming areas.

Guideline 2 - appropriate buffering. Golf courses, in general, should act as a buffer to smooth or ease the land use conflicts between the agricultural and residential or commercial land use areas. If their proposed site borders adjacent ALR parcels, developers must allow a buffer easement along the property line. The buffering should comprise a suitable fence along the property line and a ten metre easement with trees and other vegetation placed between the playing areas and the fence.

4.1.2 Desirable Urban Growth

Guideline 1 - use regional planning. Golf courses may cause growth pressures as urban activities move in to support the recreational amenity. This is acceptable if the location of the golf course is appropriate. However, problems can occur if a golf course proposal conflicts with community objectives. The conflict may come from an environmental concern if sensitive habitat is lost, a transportation concern if vehicular access is required through a rural area, or a land use concern if a radical rezoning application is required. A regional plan identifying appropriate golf course locations in growth areas will promote

Checklist 4.1 - Evaluating location for ALR and urban growth criteria

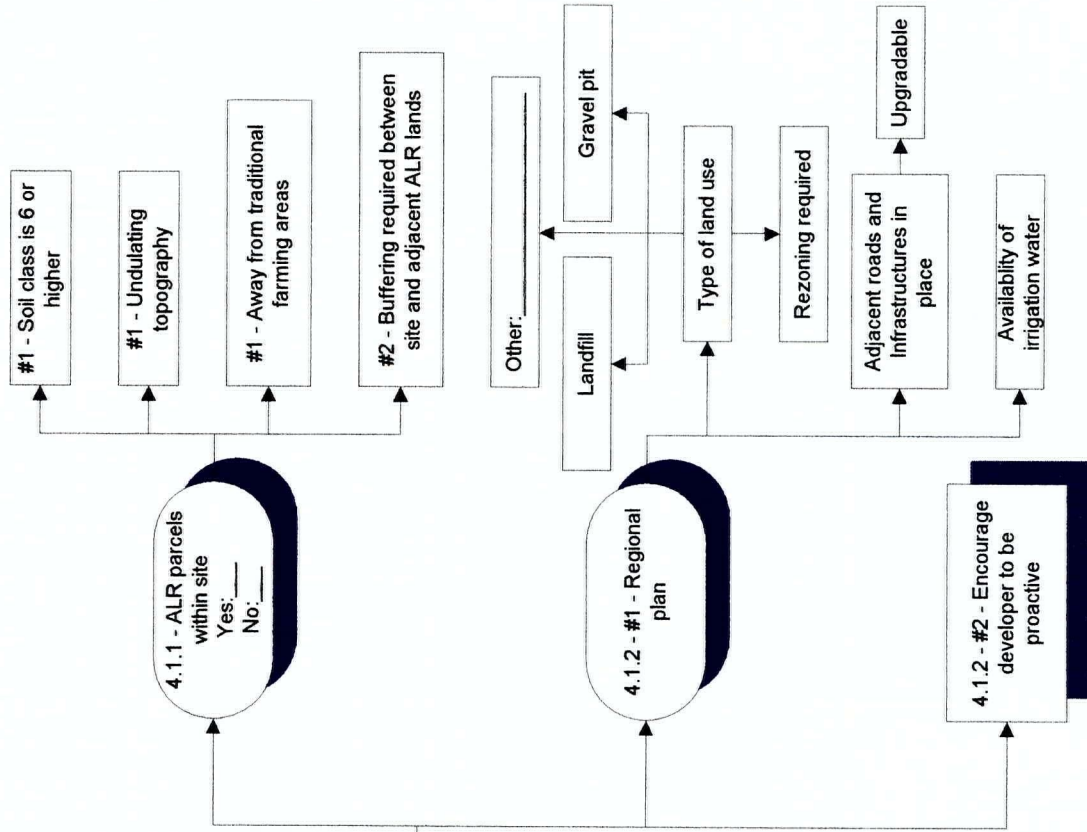
Date: _____
 Local government: _____
 Name of Proposal: _____

Impacts

To ALR and adjacent areas:
 Positive Neutral Negative Optimum conditions

Yes:___ Yes:___ Yes:___ Yes:___

Comments:



acceptable golf course development locations. Outlined below are three primary points that should be covered in a regional plan:

- The proposed site must be within and around appropriate land uses. Golf courses, as stated earlier, can become good buffer land uses between conflicting land uses - a golf course could be located between a residential neighbourhood and an airport. Ideally, golf courses could be designated within abandoned and eyesore land uses such as gravel pits or landfills.
- The condition of the local road networks and infrastructures must be able to support a new golf course;
- The close proximity of available irrigation water, preferably sewage effluent (also see section 4.5 - Planning an irrigation system).

Guideline 2 - encourage a developer to be pro-active. Planners must advise developers on the need for public interaction and involvement, and these include neighbourhood group meetings, interest group meetings, all public hearings, and information pamphlets about the proposal. Developers will need to:

- have good background knowledge of community opinions on unwanted growth;
- realize the requirement of good community relations and support is important in achieving a municipal approval;
- seek help from the local municipality or consultants if unsure of certain issues identify the potential causes of opposition such as perceived increases in land and infrastructure taxes, land use conflicts, and other unwanted growth concerns;
- design and implement a public affairs program to help resolve potential concerns - a few common solutions are developer funded road, sanitary sewer and water main improvements, and land use buffering (U.L.I., 1992, 149-153).

Open communication among the various stakeholders will hopefully resolve or prevent many of the unwanted growth issues.

4.2 Designing For Wildlife

Refer to **Checklist 4.2 - Designing for wildlife.**

Guideline 1 - use non-traditional land uses for golf courses. Developers, as stated earlier, should give priority to sites damaged by previous land uses. Landscapes that have been heavily damaged by mining operations, such as gravel pits, can be restored into productive ecological areas when transformed into a golf course.

Fairways and flags are now found at the bottom of many holes having been left by massive mining operations. Golf courses as land reclamation are an easy sell to most local regulatory agencies because they convert what are often trash-strewn eyesores into emerald playgrounds (Whitten, 1994, 202-207).

The Links at Spanish Bay in California, transformed an old gravel mine into a golf course that now supports various forms of wildlife.

Marshy 'wetlands' were created or preserved in two locations to accommodate natural drainage and to provide flood control insurance when needed. Deer now come to these areas in the morning and early evening, and other bird and wildlife abound. ...We have actually taken a given set of circumstances and made what was there much, much better. I often reflect on that once-desolate sand pit and the contrasting beauty that exists there now (Trent Jones Jr., 1989, 14).

Golf course reclamation projects can take discarded land and introduce wildlife, vegetation, and a community recreational use. Building golf courses on top of waste dumps or landfills has been done since the 1960s (Saunders, 1996, 116-124). Golf courses located on such areas can not only restore and reuse damaged land, but also increase available wildlife habitat (and protect existing habitat elsewhere in the community at the same time).

Guideline 2 - use the target-style design. The target-design greatly minimizes the total acreage to be cleared for the playing areas compared to the

Checklist 4.2 - Designing for wildlife

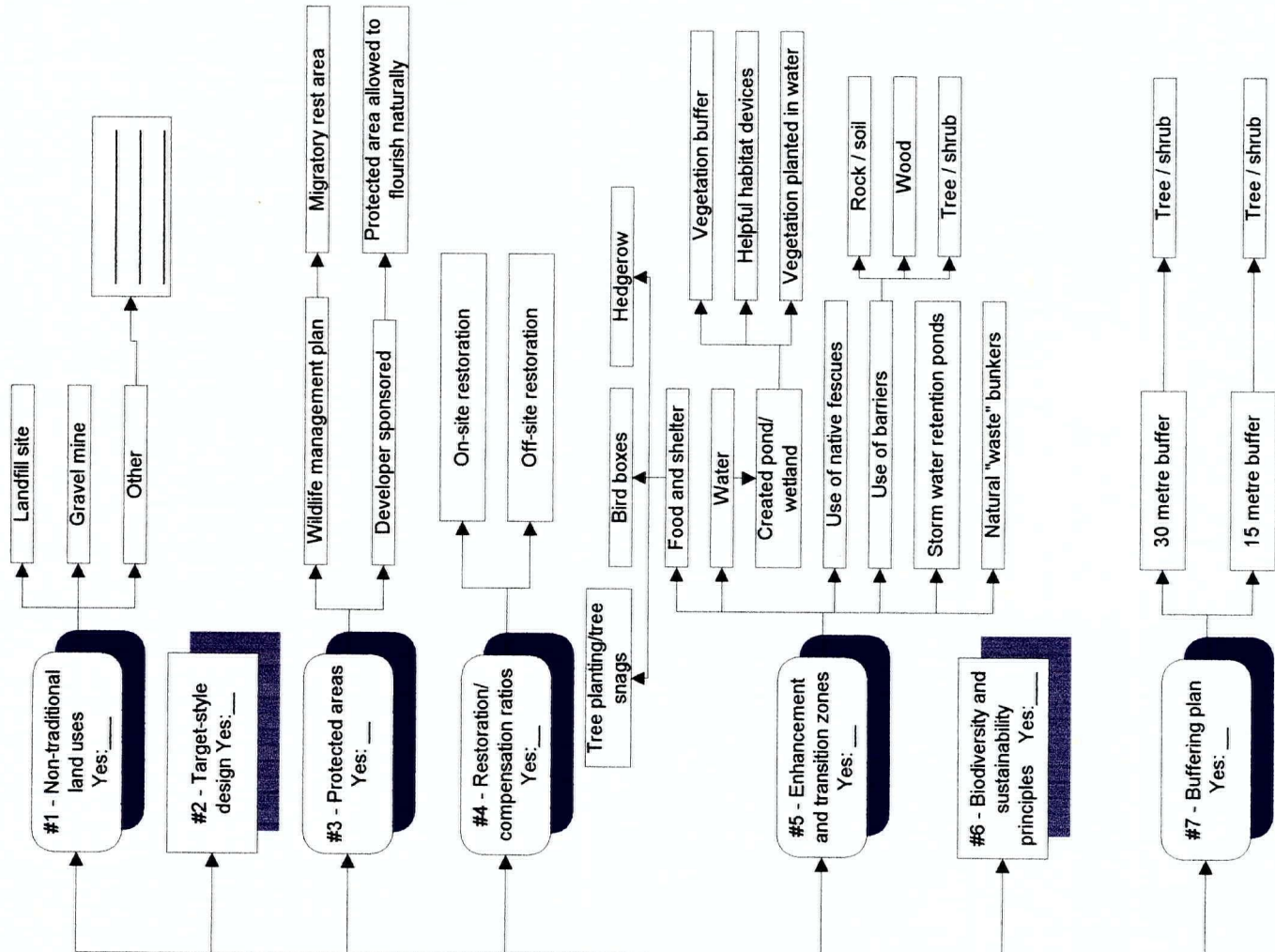
Date: _____
 Local government: _____
 Name of Proposal: _____
 (Box coloured in if option planned)

Impacts

Habitat: Positive Neutral Negative Remedial

Yes: ☐ Yes: ☐ Yes: ☐ Yes: ☐

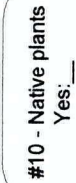
Comments:



continued

wildlife (cont.)

Name of Proposal:

[illegible]

standard layouts. The result is more acreage designated for protected areas and transition zones, providing existing wildlife with sustainable habitats.

Guideline 3 - use protection zones. Developing protected areas within the site is the best way to promote specie sustainability. These areas can be monitored by wildlife biologists or allowed to grow naturally (also see Guideline 11 - conservation easements). Specifically, migratory routes and resting areas for birds and animals must be protected.

Guideline 4 - use habitat restoration ratios. Habitat and vegetation restoration ratios must be used by regulatory agencies and local governments to protect sensitive areas. Habitat restoration, if it cannot be accomplished on-site, must be compensated elsewhere in the community by the developer. Habitat restoration helps in protecting diverse and sensitive wildlife and vegetation areas within the community.

Small yet diverse, natural habitat areas such as old fields (non-forested) must be protected, along with appropriate land buffers adjacent to the area to prevent fringe degradation. If some of the habitat area is to be used for the development of the course, it must have a 2 to 1 restoration ratio. If, for example, 10 acres of sensitive habitat is planned to be part of the golf course, then 5 acres of re-created habitat must be produced on-site or elsewhere in the community. Highly sensitive ecological features such as wetlands should have a 1 to 2 ratio, although wetland development of any kind must be opposed (Balogh and Walker, 1992, 502). However, a mitigation banking or trust fund policy - as used in the Boundary Shores development - can be implemented for habitat enhancement elsewhere in the municipality if the restoration is not possible on-site.

Guideline 5 - use habitat enhancement and transition zones. Habitat enhancement and transition zones should be used whenever possible. Illustration 4.1 shows two examples of both habitat buffering and enhancement within a golf course design. The designation of hedgerow, habitat enhanced water hazards, natural areas left in their natural state, bird boxes and areas to be enhanced after construction should be incorporated within the site plan.

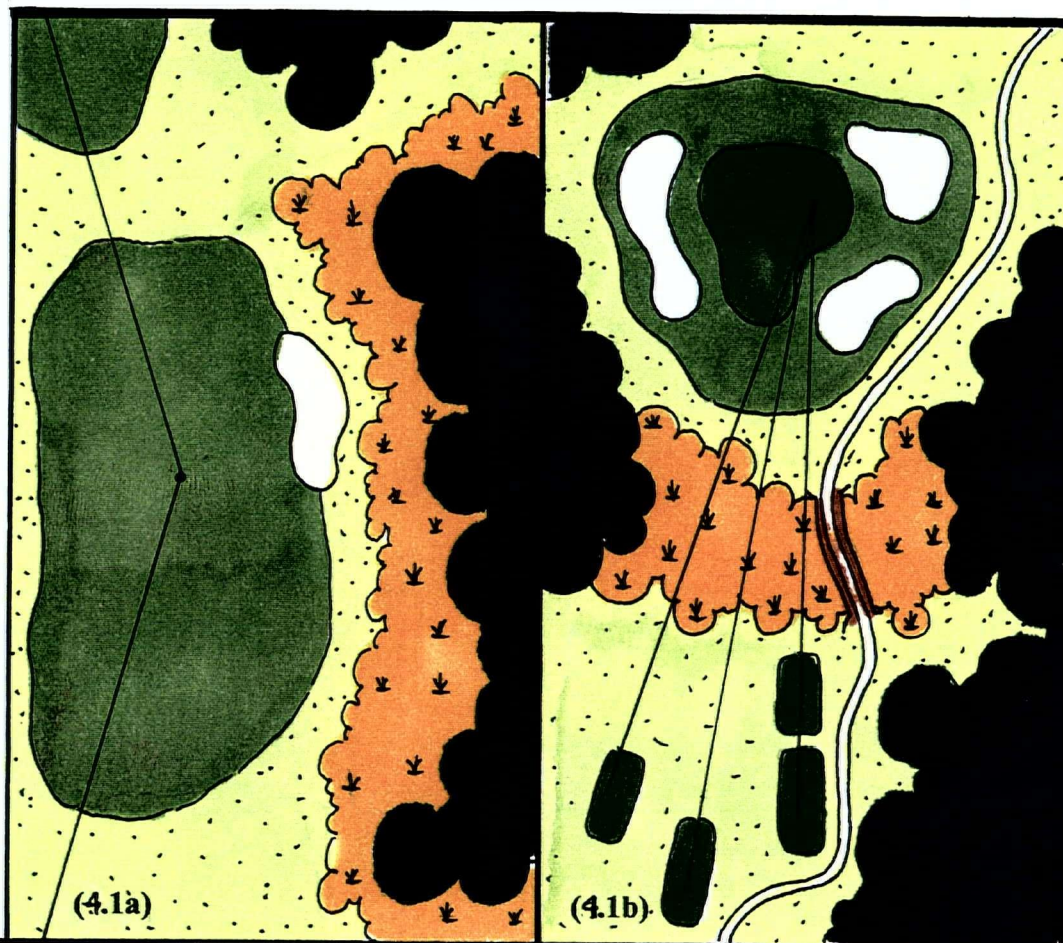


ILLUSTRATION 4.1 - HABITAT CONSIDERATIONS USING TRANSITION & ENHANCEMENT ZONES

(4.1a) A transition zone (shaded yellow) is used between a fairway and a protected area. The transition zone buffers the sensitive habitat area from intrusive golfers looking for lost golf balls. The composition of the zone would likely shift from primary rough to long grass and shrubs near the protected area. "Waste" bunkers consisting of sand and spotted vegetation (tuffs of long stemmed grass) are also occasionally used.

(4.1b) After initial development clearing and construction, an enhancement zone -- played as a hazard to hit across -- is created with native vegetation to connect two fragmented natural (protected) areas. The low growing shrubs within a small hollow in the landscape will allow the golfers to see the green (the tee-boxes could be elevated as well). The cart path bridge over the enhancement zone will allow easy movement for small wildlife between the two habitat areas.

Guideline 6 - use good biodiversity principles during landscape planning. The design of the golf course will have a big impact on wildlife and vegetation. To achieve habitat sensitive developments, sustainable protected areas, species diversity, allowance for habitat movement, and transition zones between habitats and the fairways must be designed into the golf course. Specific guidelines are as follows:

- Large areas of natural communities sustain more species than small areas;
- many patches of large natural communities in an area will help sustain regional diversity;
- the shape of a natural community patch is as important as the size;
- fragmentation of habitats, communities, and ecosystems reduces diversity;
- isolated patches of natural communities sustain fewer species than closely associated patches;
- species diversity in patches of natural communities connected by corridors is greater than that of disconnected patches;
- a heterogeneous mosaic of natural community types sustains more species and is more likely to support rare species than a single homogeneous community; and
- ecotones (transition zones) between natural communities support a variety of species from both communities and species specific to the ecotone (Harker, Harker, Evans, Evans, 1994, 23-24).

These habitat provisions must be incorporated in the golf course design.

Guideline 7 - maintain a 30 metre buffer. Golf courses can be located by water bodies, but must be no closer than 30 metres from the high or peak water mark, although in some instances an allowance to within 15 metres may be permitted (DFO, 1992, 18-20). Golf course construction and chemical use are prohibited within this designated buffer strip.

Guideline 8 - ask the developer to sign up for the Audubon program. It presents the golf course developer with the opportunity to learn about the many environmentally sensitive provisions in the program to produce a more sustainable golf course. Colin Softly, a golf course superintendent at Point Grey Golf Course in Vancouver, modified old operation practices in trying to make the course more environmentally sensitive. The Point Grey golf course has recently incorporated

and completed the National Audubon Society's initiatives that are specifically designed for golf courses, by planting more trees and letting non-playing areas naturally flourish.

Grasses and other plants in the ditches are left to proliferate, helping to stop erosion with their roots and providing food and shelter for small birds, frogs and salamanders.

"For two years now we've been planting trees - probably more than 1,000 by now - and trees and undergrowth are left shaggier and more natural," says Softly. "Sure, some members [of the private club] complain about balls lost in ditches and in denser woods, but most accept it when they're told about the program (Eberts, 1994, A49).

Point Grey, now Audubon certified, is a successful example of an existing course moving from old golf course operations to up-to-date environmentally sensitive practices. Though the program is quite expensive (approximately \$5,000(U.S.) minimum), the developer is provided with numerous, site specific, environmental development options by Audubon staff specialists. The 1994 Audubon Signature Golf Course (Award) illustrates some of these points in the Collier's Reserve 448 acre residential and 18 hole golf course (6800 total yards) development in Florida:

- only 88 acres of planted bermuda grass;
- 39 acres of created lakes and wetlands;
- 53 acres of native southwestern vegetation;
- 500,000 native plants (12 different species) were replanted around the fairways with little if any maintenance (irrigation and fertilizers);
- a small creek choked by overgrowth was cleared by hand to increase aquatic populations and those creatures that feed on them (a success) (Hiers, 1995, 36-42).

The program ensures that the existing habitat is protected as much as possible. It is another pre-development tool to promote sustainable habitat.

Guideline 9 - have a comprehensive construction plan. During the construction stage, these specific guidelines should be followed:

- Schedule construction during the dry season, and stop the construction during a heavy rainfall;
- try to retain or protect existing vegetation on steeper slopes;
- seed the bare soils of sloped areas as soon as possible, and in some cases, use polyethylene tarps as a defense against sporadic rainfall (Note: when seeding steep fairway areas use the hydro-seed sprayers (Carrick, 1994, 46), similar to what is done on steep banks along a new highway. The seed and binding mix prevents the soil from eroding and provides for quick turf growth);
- divert runoff from steep areas by constructing small ditches or using natural drainage patterns;
- minimize the length of slope, thus preventing a concentration of water to accumulate and move downward;
- for collector drainage ditches, use rock or polyethylene lining to prevent channel erosion;
- use silt filtration traps to prevent sediment loss (Note: use of silt fences, which can consist of plastic (Kahler, 1991, 32) or even hay bales (Tolson, 1993, 42), must be a mandatory practice to prevent or control run-off on slopes);
- near sensitive areas, bridges should be constructed from the top down, rather than building from the ground up, by building sections out and then driving the posts or pilings into the ground with a vibratory hammer, thereby allowing the sensitive land below to remain relatively undamaged and wildlife movement unhindered (Kahler, 1991, 35-36); and
- inspect erosion control defenses regularly to prevent accidental erosion occurrences (DFO, 1992, 24-25).

Rare and unique vegetation native to the Pacific Northwest must be tagged, then pegged to outline the maximum root distances so the heavy machinery does not damage or accidentally kill the trees. Any tree damaged or knocked down should be replaced at a 1 to 2 ratio. Dead snags must also be marked and preserved since

they are heavily used by cavity nesters for homes and food (Millikin, 1994, 35). If, however, the snags present a safety hazard, they should be removed and piled on-site to ensure alternative forms of habitat (Tolson, 1993, 34).

Guideline 10 - use native plants for landscaping. Non-native or exotic plants must be limited as much as possible. Outside of minimal landscaping around the clubhouse or tee-boxes, non-native plants should be prohibited within the site. There are numerous native plants that can be used for ornamental purposes. The rationale for the minimal use of exotic plants is due to increased water management, increased chemical use for growth and disease management, increased maintenance costs, and native wildlife disregard for non-native plants for food and cover.

Guideline 11 - use conservation easements. Volunteers from wildlife or bird watching groups and other environmental groups can provide community input and hands-on experience in the creation of enhancement zones or protected areas. This would be beneficial to all stakeholders. The developer may designate a "conservation easement" on a sensitive portion of the site to be maintained by a local or provincial organization (Linder, 1990, 20-26). The area of land is assigned to the organization, but is not given title to the land. Furthermore, when the restrictions on the easement are agreed upon by the developer and the local organization and are legally documented, it gives the local organization legal power to litigate if habitat violations occur within the easement. A private course could remain private, but at the same time have a public conservation easement.

4.3 Creating Recreational Space Within A Golf Course

Refer to **Checklist 4.3 - Creating recreational space within a golf course.**

Guideline 1 - use recreational easements. When a golf course is beside a river or lake, a recreational easement providing public access to the water source for fishing, swimming or nature viewing should be established to better serve the community (Brewin, 1992, 46) (see Illustration 4.2). The Belmont Golf Course,

Checklist 4.3 - Creating recreational space within a golf course

Date: _____
 Local government: _____
 Name of Proposal: _____
 (Box coloured in if option planned)

Impacts

Greenspace: Positive Neutral Negative Remedial

Yes: ☐ Yes: ☐ Yes: ☐ Yes: ☐

Comments:

#1 - Recreation easement
 Yes: ☐

#2 - Access easements
 Yes: ☐

#3 - Community access plan
 Yes: ☐

To a unique natural amenity

Walking trail

Biking trail

Trail along river/ lake/ ocean

To nearby school

Connecting adjacent neighbourhoods

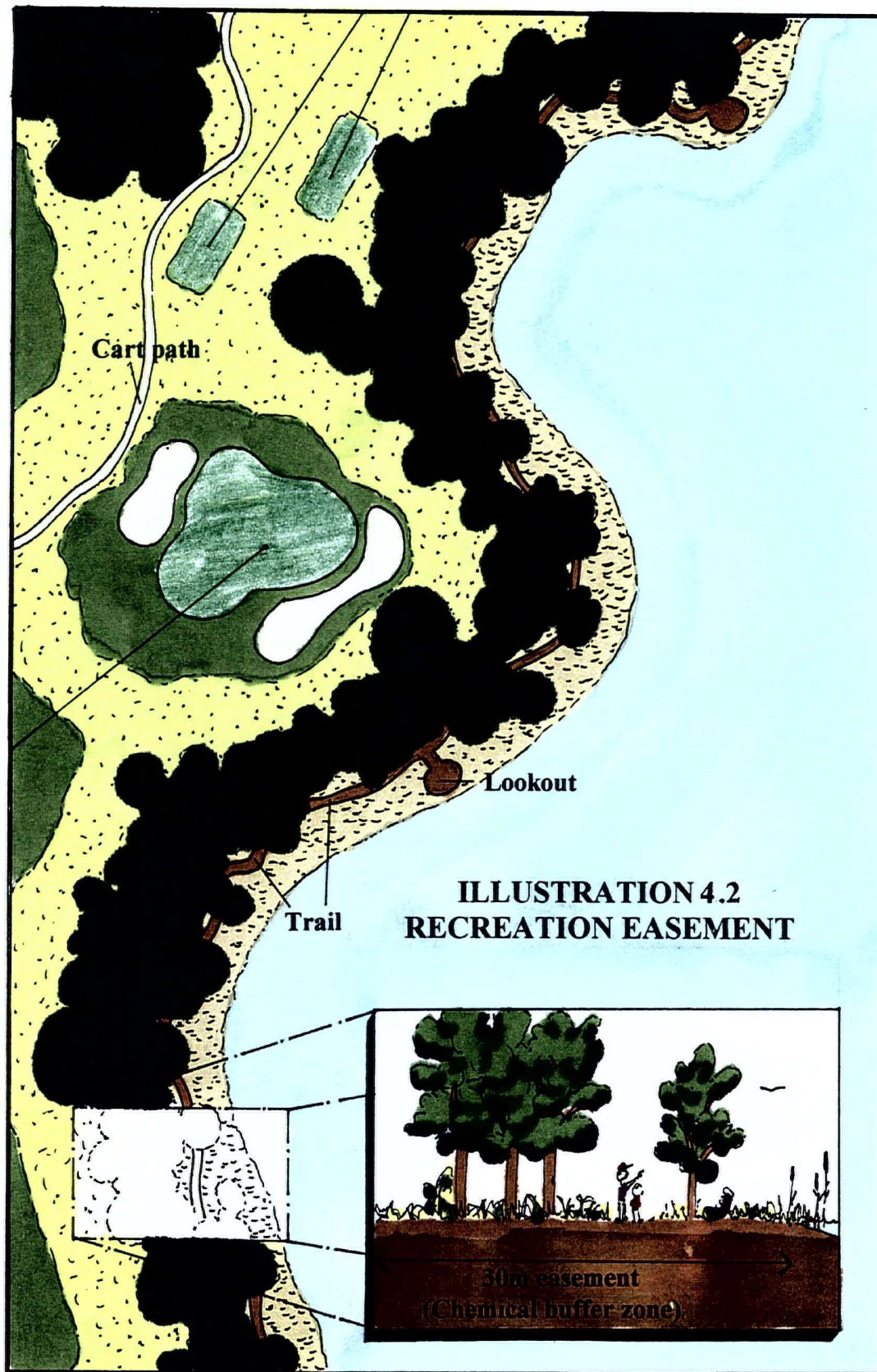
Provide buffering to adjacent land uses

Nature trail

Students

Seniors

Interest groups



which abuts the Salmon River, did not have to incorporate a recreational easement into the original development plan in 1992. Now, for the benefit of the local community, planners review golf courses as ideal uses to provide small community park and trail amenities.

The new direction is trails and parks within the golf development plan. If we took the Belmont Proposal to Langley today, we would have been told to put a path along the Salmon River. They have asked to put one after course operation, but by that time it was too late. The course layout was in place, and to have a community path beside a fairway was just too much of a legal liability (Doug Roxborough Interview, October, 1995).

Furthermore, the potential for a community walking or jogging easement within a natural and protected setting around the golf course may also be possible. The developer could construct the trail, then turn it over to the local parks department for future maintenance.

Guideline 2 - use access easements. Access easements must be provided to connect particular land uses whenever possible. Access easements that run through the middle of a golf course to provide school access, for example, would be difficult at best. However, if a small and narrow parcel within the site offers the opportunity for such an easement, the access issue should be pursued.

Guideline 3 - encourage golf course accessibility to non-golfers. Access to non-golfers is a good way to achieve additional recreation opportunities. Local community groups can plan bird watching or nature walks within the site (Danielson, 1993, 64). Community access depends on the natural attributes of the site, total acreage or size of the development proposal, and the intent of the golf course developer.

4.4 Designing For Safety

Refer to **Checklist 4.4 - Designing for safety.**

Checklist 4.4 - Designing for safety

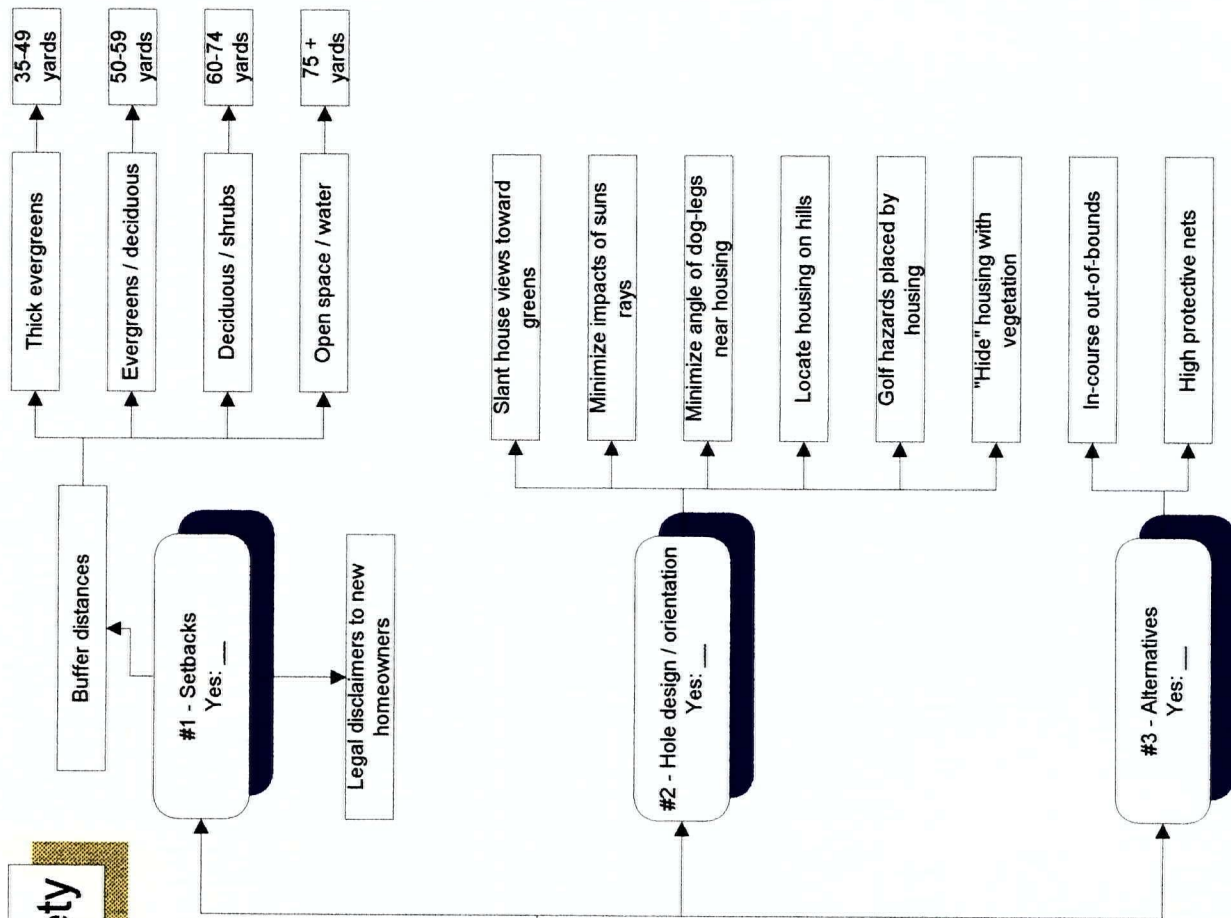
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 Local government: _____
 Name of Proposal: _____
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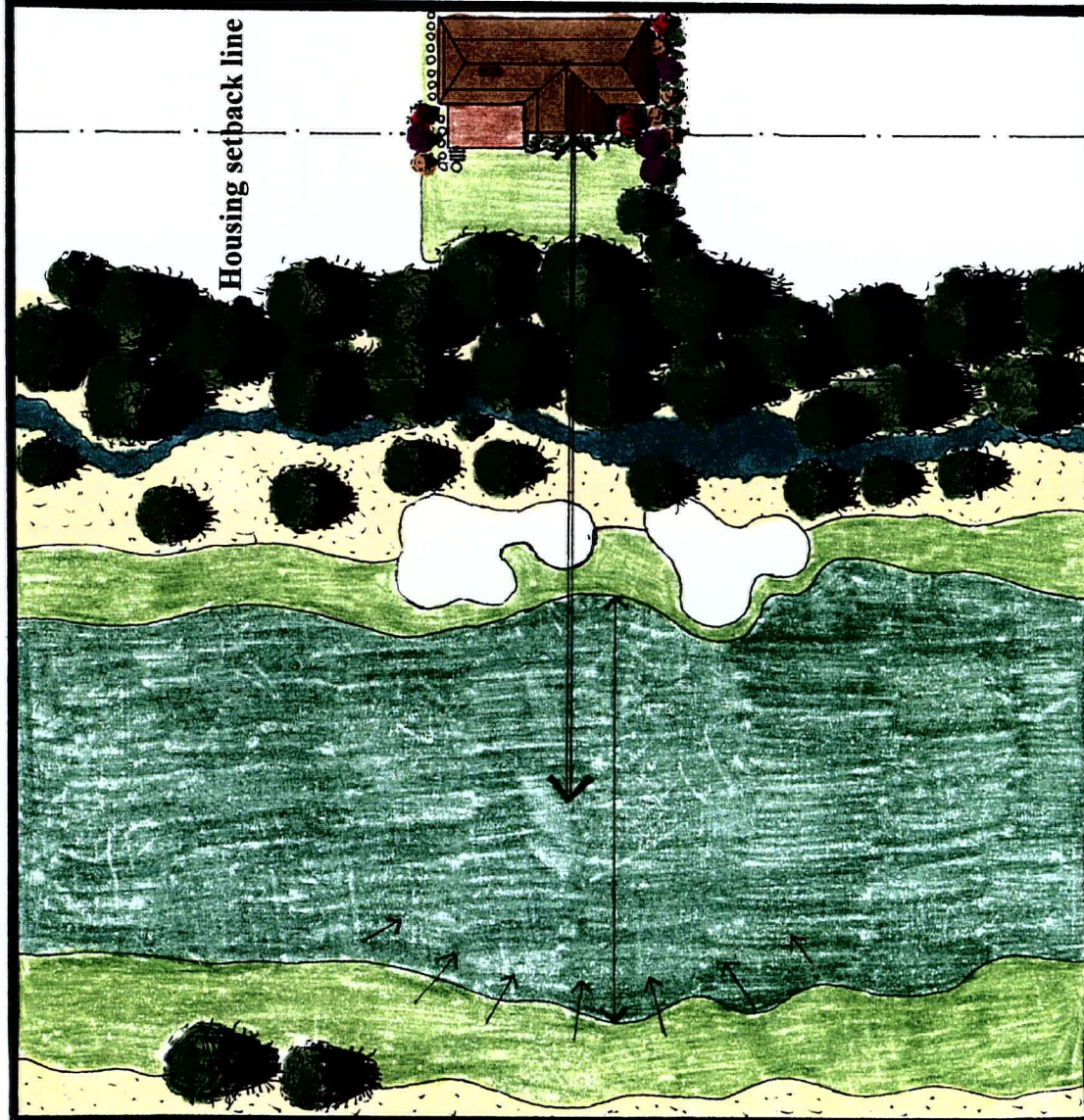
Impacts

Safety: Positive Neutral Negative Remedial

Yes: ☐ Yes: ☐ Yes: ☐ Yes: ☐

Comments:





The illustration contains the following features:

- uses golf hazards (in this case two bunkers and a ditch) to deter shots from the right or housing side of the fairway;
- the left side of the fairway offers more room to shoot for, coupled with a slope that slants toward the fairway;
- a large number of evergreen trees are used as a buffer to block “wild” shots from heading toward the houses;
- contains a suitable landing area of 35 yards;
- has a housing setback of 50-55 yards from the centre of the fairway.

ILLUSTRATION 4.3-- SAFETY PRECAUTIONS FOR HOUSING.

Guideline 1 - use good setbacks. Setbacks of approximately 200 to 210 feet (70 yards) from the middle of the fairway to the side of a house is recommended for an untreed buffer area. However, the setback distance can go down to a 35 yard buffer if a mature stand of trees flank the fairway (Firth, 1990, 17-19). Despite prudent setbacks, legal disclaimers must be discussed with potential residential buyers to make them aware of the dangers of living close to a golf course (as not all buyers play or are knowledgeable about the game);

Guideline 2 - use good hole and orientation design to encourage safety. There are a number of hole and orientation design guidelines to plan into new golf course proposals by urban areas, and they are as follows:

- natural buffers with tall-growing, low-branching evergreens for year round protection;
- golfing hazards placed on the same side of the fairway as the residential area to encourage golfers to hit away from the houses (see Illustration 4.3);
- residential areas placed up on hills, if possible, so the ball must travel farther to the houses;
- slanted view corridors allowed through the buffer trees only if they are facing the putting greens, and not the tee-boxes;
- hole orientation should be north/south rather than east/west because of sun direction, as it can create a glare and a distraction to golfers; and
- a provision not to allow housing on the inward, corner-side of sharp dog-legs (the use of netting to offer a further safeguard is also a possibility, but proper planning should make such measures unnecessary) (Firth, 1990, 17-19).

Every golf course proposal with nearby residential and road areas must utilize the above measures to ensure proper safety.

Guideline 3 - use alternative safety methods. When special cases arise, where unanticipated areas become landing areas for golf balls, either in-course-out-of-bounds can be placed along the obtrusive fairway, or high nets can be

erected to knock down errant shots. When guideline 1 and 2 are followed closely and correctly, however, this guideline should become obsolete.

4.5 Planning An Irrigation System

Refer to **Checklist 4.5 - Planning an irrigation system.**

Guideline 1- have an irrigation plan. The strategic layout of the irrigation system is crucial to ensure only the targeted areas are watered, with no waste into non-playing areas. Sprinkler spray circles can be altered to limit water waste. The pump system, run by computer, must be programmed to irrigate at night for maximum absorption. Irrigation water can also come from storm water retention ponds fed by a system of drainage pipes. Fairways that are slightly bowled toward the middle of the playing area will increase water catchment into the drainage system. Non-absorbed storm and irrigation water will flow into water retention ponds for re-use.

During windy conditions, golf course irrigation system use should be minimized. Too much waste occurs in windy conditions as the water is blown off into non-playing areas. If irrigation must occur on isolated areas such as greens, hoses must be used, as water flow can be controlled in a steady stream, with little water carried away.

The target-style layout is the best design to use in attempting to conserve water. Only the playing areas require water, with the many non-playing areas, at the discretion of the course superintendent, left to grow naturally. Grass heights must be maximized when dry conditions are in place. This will provide the turf with more shade, lessening the time it takes for the turf to dry out and die, and therefore lessening the amount of water consumption.

Guideline 2 - use alternative water systems. Golf course developers and regulatory agencies in British Columbia must attempt to gain more access to secondary or tertiary sewage water treatment plants. The Federal and Provincial Governments will invest hundreds of millions of dollars into new treatment facilities in the next ten years to stop the present dumping of waste into the Fraser

Checklist 4.5 - Planning an irrigation system

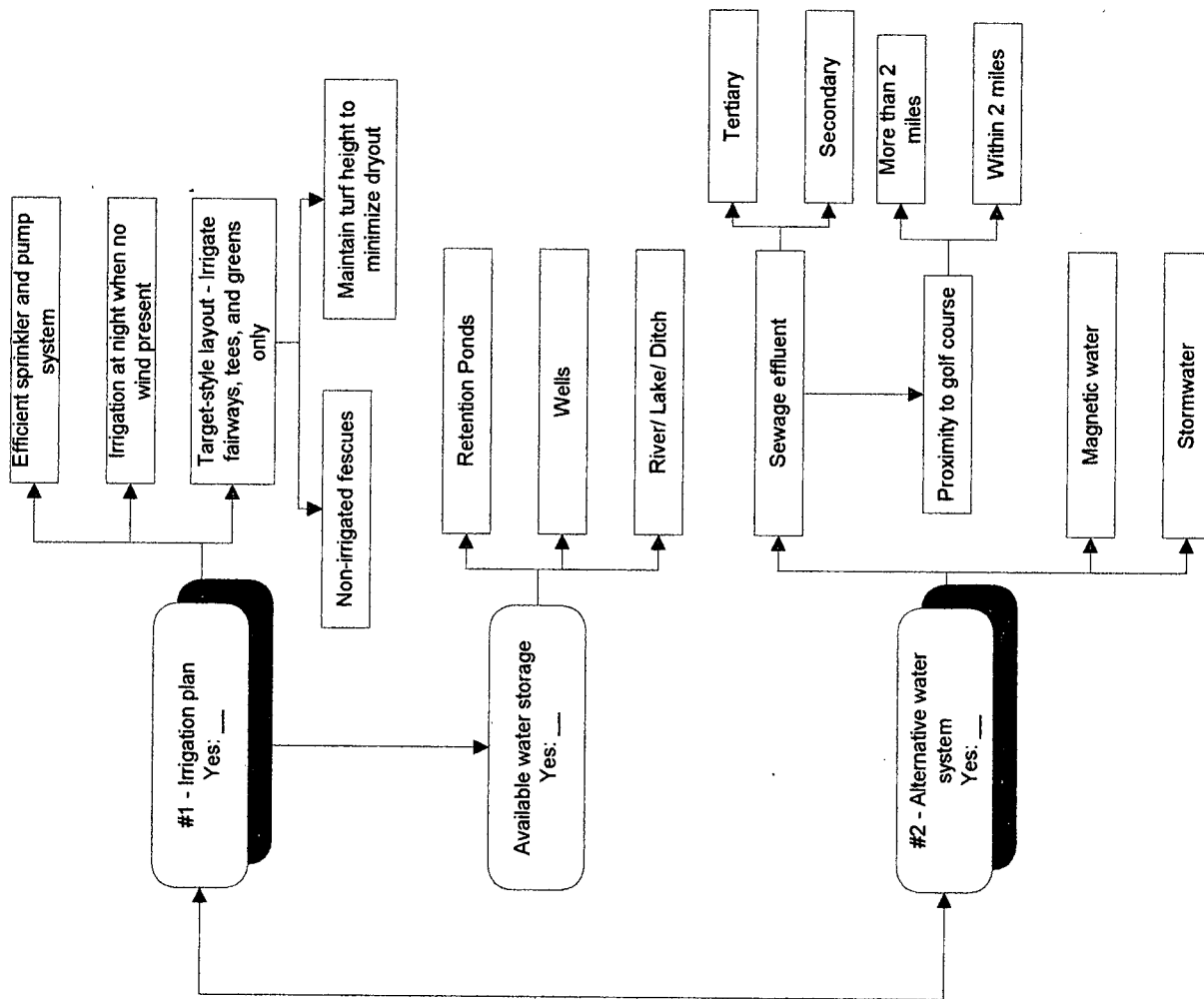
Date: _____
 Local government: _____
 Name of Proposal: _____
 (Box coloured in if option planned)

Impacts

Water: Positive Neutral Negative Remedial

Yes: ☐ Yes: ☐ Yes: ☐ Yes: ☐

Comments:



River. With some ingenuity and cooperation by the various agencies, the effluent can be used for turf irrigation, including recreational fields and parks. This will provide another chemical filtration layer by way of the golf course turf, and substantially save water consumption from traditional sources such as streams and aquifers. Golf courses should be located as close as possible (within 2 miles) to sewage treatment facilities in order to connect into the system, otherwise the costs may be too high.

While sewage effluent has proven its effectiveness to turf growth, another new water source is magnetically (electrically charged) treated water. Magnetic water may "improve turf quality, [and] reduce irrigation requirements due to lowered water surface tension, increase soil oxygen solubility, and greater availability of calcium [within the soil]" (Shepard, et. al., 1995, 55). Some magnetic water studies show irrigation reductions of up to 40 percent (Shepard, et. al., 1995, 55). The use of magnetic water is a controversial issue, however, as other studies have been unable to substantiate these claims (Shepard et. al., 1995, 55).

4.6 A Chemical Turf Care Plan

Refer to **Checklist 4.6 - A chemical turf care plan.**

A chemical use plan is mandatory. During golf course operation, there are three main chemical use programs available to minimize or prevent chemical contamination: (1) the Integrated Pest Management (IPM) plan reviews and prevents turf pests such as grubs; (2) the Best Management Plan (BMP) deals with overall chemical use on the course from pesticides to herbicides; and (3), the Integrated Disease Management (IDM) plan reviews and analyzes fungicide use. Each plan controls the proper storage, loading, and use of turf care chemicals on golf courses. Furthermore, the plan encourages the use of alternative measures to encourage turf health. Rather than heaping large amounts of chemicals onto the turf, there are four alternative ways within the three programs to prevent turf stress. Prevention is achieved by biological management (sunlight and irrigation), cultural

Checklist 4.6 - A chemical turf care plan

Date: _____

Local government: _____

Name of Proposal: _____

Impacts

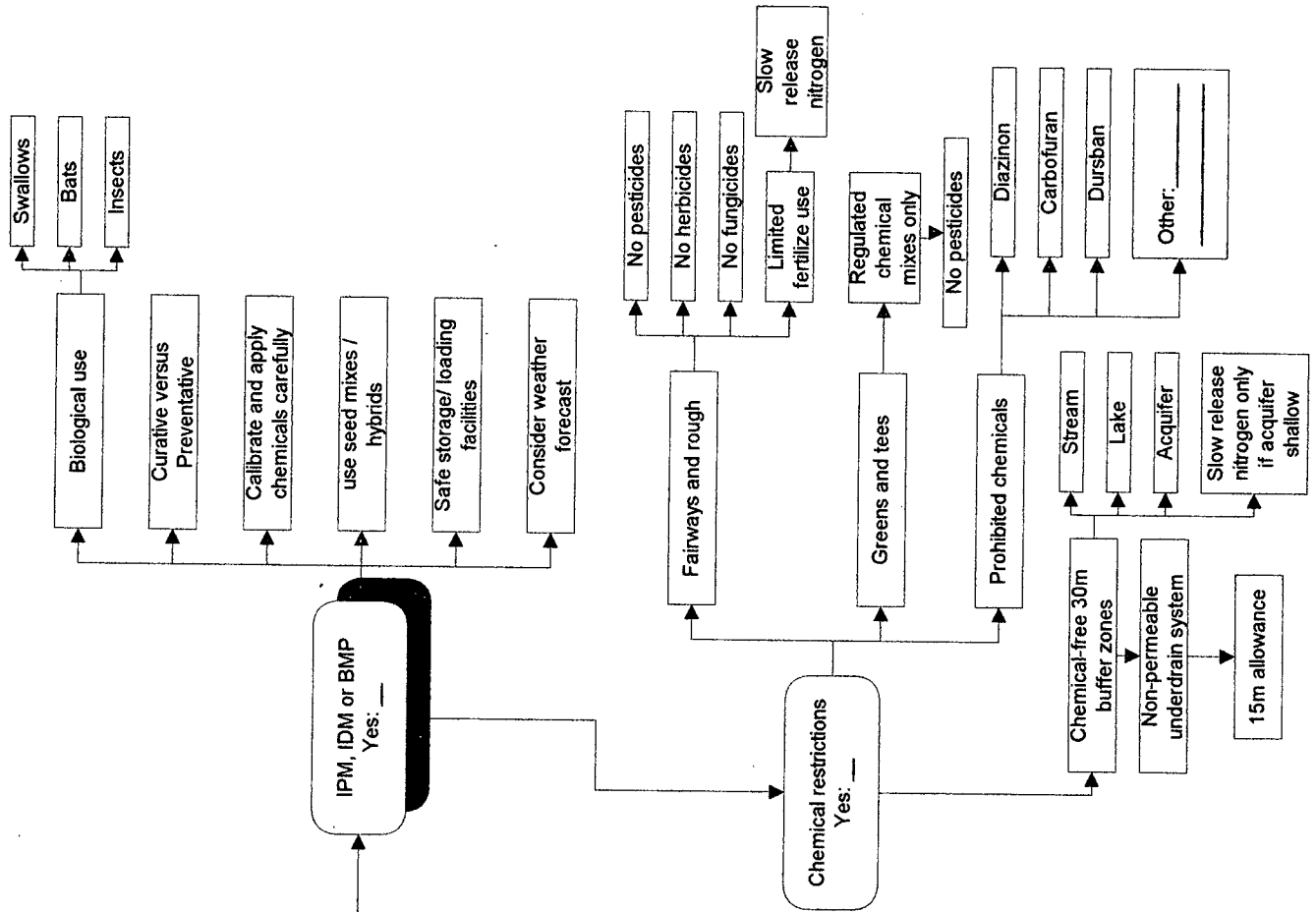
Chemical use: Positive Neutral Negative Remedial

Yes: —

Yes: _____

Yes

Comments:



management (soil monitoring and organic or slow-release fertilizer use), chemical management (using fungicides or herbicides), and genetic management (Vargas JR., 1995, 53). Many superintendents in B.C. are now holding regular meetings to discuss new options, practices or technologies for implementation on local golf courses. Much of this information can be found in the superintendents monthly publication The Turf Line News. The IPM, BMP, and IDM programs offer a comprehensive set of chemical use recommendations.

- Use the correct chemicals for the appropriate type of turf care;
- clean mowers and other equipment to prevent the spread of weeds and diseases;
- use pest enemies or predators such as birds or bats against grubs or mosquitoes;
- use chemicals as a curative rather than a preventative measure - in only the areas affected;
- maintain a healthy turf by proper mowing, fertilization and irrigation practices to reduce the susceptibility of disease or pest problems;
- use seed mixes or hybrids that are native to the region to reduce maintenance and resist disease;
- measure and calibrate carefully, and prevent against spills or back-siphoning;
- store all chemicals in a safe place, and dispose of all chemical waste carefully;
- consider weather conditions or forecasts;
- leave non-chemical buffer zones around sensitive areas;
- use chemicals for tee-boxes and greens, with limited use on fairways, and none at all within the primary rough; and
- prohibit specific chemicals from being applied (Balogh and Walker, 1992; Smart et al., 1993; and P.S.U., 1990, 53-54).

Also covered within a chemical plan are chemical free zones around water sources. Chemical turf care applications must be evaluated carefully when natural water bodies, including aquifers, are present. This includes areas where fissures or fractures within the sites geology provide easy access for chemical leachates to underground water. When geologically difficult sites are considered, regulatory agencies must insist on chemical free buffer areas. On the rest of the course, slow-release nitrogen and phosphorus fertilizers should only be allowed. For surface water bodies, a chemical free zone of 30 metres is mandatory - unless the water body is man-made such as a water retention pond. However, when non-permeable clays are used to prevent chemical leaching, playing areas may be allowed within the 30 metre buffer. Non-permeable seals (such as clay) must be used when playing areas are placed close to sensitive water sources and habitats. This process allows the irrigation water with potentially dissolved chemicals to filter down into the clay catchment, where it then drains into a infiltration trench away from sensitive water bodies and naturally broken down. The use of under-drains may allow the playing area to get within 15 metres of a natural water body.

A chemical use plan must be established during initial turf seeding and monitored monthly or semi-annually by local regulators thereafter.

4.7 - Golf Course Planning Conclusions.

The golf course development guidelines established in this chapter provide developers and planners with the general rules to achieve a functional, environmentally sensitive, community-benefiting recreational land use.

A good golf course location averts the major development concerns including the loss of the ALR, land use conflicts within the local OCP, site accessibility, and the availability of irrigation water. Golf courses are very useful for reclaiming old, abandoned land areas such as gravel pits and landfills. Once only abandoned eyesores, they can now be transformed into a vibrant and productive land use, while bringing back native vegetation and wildlife.

In addition to the right location, design guidelines for a proposed site are crucial in determining the success or failure of a golf course. Habitat concerns are solved with protected, transition, and enhancement zones along with turf care chemical-free zones of 30 metres width from any sensitive water bodies. Habitat restoration limits habitat loss. Where small portions of sensitive habitat are used for development, habitat restoration ensures that the same amount of habitat will be provided elsewhere on the site, or within the community. When the site can accommodate them, safe and aesthetic recreational easements should be located along water bodies for community use, including walking, fishing, or swimming. Safety concerns are solved with appropriate setback distances coupled with a buffering of thick trees. Water conservation is achieved with the design and placement of technologically superior sprinklers to ensure only the targeted areas are watered. The use of secondary sewage effluent reduces water consumption. The Audubon Sanctuary Program provides a multitude of environmentally sensitive development options from habitat considerations to native plant use to water and electricity conservation.

The construction and operation of golf courses must not ruin or negate the environmentally sensitive intentions of the design process. Construction plans must include erosion prevention (such as drainage ditches and silt fences) and marking and tagging strategies to prevent sensitive habitats and plants from being damaged. Chemical leaching and run-off will be reduced by using environmentally sensitive chemicals in limited amounts on the tees and greens, and even smaller amounts on the fairways. Chemical use plans such as the BMP or IPM ensures the proper loading, application, and storage of chemical products.

With every golf course proposal there are always differences from one site to another, and the capabilities of one developer to another. However, there is one general characteristic that should be present in every new golf course: the target-style design layout. The target-style design, as discussed in earlier stages of the thesis, accomplishes the following benefits: (1) minimization of the amount of seeded turf, with fairway acreage considerably less than the standard tee to green

layout; (2) allowance for more hedgerow and native long-stemmed grasses (fescue) and plants to offer more opportunities (food and cover) for wildlife; (3) reduction of the amount of turf requiring water, promoting water conservation; (4) reduction of the amount and cost of turf care chemicals with the smaller amount of fairway or turf to maintain; and (5), reduction of the cost of daily course maintenance (such as mowing). The target-style layout has many positive attributes.

Continuing public concern over environmental and land use impacts behoves local municipalities to thoroughly analyze and evaluate golf course proposals. Three aspects of this thesis will assist the planning profession.

1. The importance of predevelopment analysis and planning. A suitable golf course location will greatly minimize negative impacts to adjacent land uses, habitats, and water supplies. Regional planning is the best way to ensure appropriate golf course locations are identified.
2. This research offers a comprehensive look into the seven main concerns about golf courses. Not only does it analyze and evaluate each concern, but the research provides planners with a list of guidelines to reduce or even eliminate potential controversies. With the knowledge of golf course development concerns, planners will be better prepared to address various stakeholder concerns. Furthermore, this thesis promotes environmental awareness and discussion on proper golf course planning.
3. The realization that golf course development analysis and planning does not stop with the approval of a project. Local municipalities must continue to make on-site visits from initial site construction to golf course operation. Just as building inspectors scrutinize the housing sector, municipal and government agency inspectors must scrutinize the construction and operation of golf courses. The use of the Restrictive Covenant will ensure that agreed upon pre-development characteristics are upheld. Golf course planning, like planning in general, is an ongoing process.

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