

Spirit Mountain golf course / hotel EAW.

This version of this document was not supplied by the City of Duluth.

It was generated by computer software from scanned images of the original document. This process introduces errors in spelling and formatting not present in the original document. Numbers may also be incorrect.

Also note that the page numbering has changed – make references by section number, not page number.

To get a paper copy of the original document, go to room 409, City Hall. Phone Jim Mohn, 723 3328, before you go, to make sure copies are on hand.

The comment period for the EAW ends Dec. 1. Written submissions should be made before that date.

The planning commission will meet at 5 pm on Dec. 15 in the City Council Chambers, to consider the next stage. This is a public meeting, and an excellent opportunity to express you views.

Environmental Assessment Worksheet

Spirit Ridge Golf Course and Lodge Duluth, Minnesota

NOTE TO REVIEWERS; Comments must be submitted to the RGU (item 3) during the 30-day comment period following notice of the EAW in the EQB Monitor. (Contact the RGU or the EQB to learn when the comment period ends.) Comments should address the accuracy and completeness of the information, potential impacts that may warrant further investigation, and the need for an EIS.

Project Title: Spirit Ridge Golf Course and Lodge, Duluth, Minnesota

2. Proposer:	Spirit Ridge LLC	3. RGU:	City of Duluth
Contact:	Kent Oliver	Contact:	James B. Mohn
Title:	Project Manager	Title:	Senior Planner
Address:	215 North Central Avenue Duluth, Minnesota 55807	Address:	409 City Hall Duluth, Minnesota 55802
Phone	(218)628-2700 (218) 628-0311	Phone:	(218)723-3328
		E-mail:	jmohn@ci.duluth.mn.us

4. **Reason for EAW Preparation:** EAW is mandatory under; 44 10.4300 Subp. 36. Land use conversion, including golf courses.

5. **Project Location:**

Golf Course: Sections 15, 21 and 22, Township 49 North, Range 15 West
County of St. Louis, Cities of Duluth and Proctor and Township of Midway.

Hotel/Lodge: Section 22, Township 49 North, Range 15 West. City of Duluth

Attached as Appendix I are copies of:

- Map a. A county map showing the general location of the project.
- Map b. Copy of USGS 7.5-minute, 1:24,000 scale map indicating project boundaries.
- Map c. A site plan showing significant project and natural features.
- Map d. Copy of USGS 7.5-minute, 1:24,000 scale map indicating project boundaries, direction of surface runoff and designated channels.
- Map e. A site plan showing all wetlands and proposed wetland mitigation areas.
- Map f. Hotel site plan.
- Map g. A site map with an overlay of forest cover types.

6. **Description:**

The proposed Spirit Ridge Golf Course consists of an 18-hole course involving 432 acres, 277.69 acres (9 holes) in Spirit Mountain Recreation Area in the City of Duluth, 6.2 acres in the City of Proctor, and 153.33 acres (9 holes) in Midway Township. The course includes construction and management of greens, tees, fairways, roughs, bunkers, water hazards, irrigation pond, an associated club house and maintenance area. A driving range may utilize existing overflow parking area and ski runs used in the winter for Spirit Mountain Ski Area.

Timber Ridge Lodge (Hotel) is proposed to serve both the existing Spirit Mountain Ski Area and the Golf Course. The hotel site involves 5.46 acres of land (0.98 for the hotel and 4.48 acres for parking). The hotel contains; 150-160 rooms, meeting rooms, 125 seat restaurant, lounge, swimming and wading pools, fountain, gift shop and golf course pro shop.

A 50 or fewer word abstract for use in the EQB Monitor notice:

Spirit Ridge Golf Course consists of an 18-hole course involving 432 acres, located in; Spirit Mountain

Recreation Area, City of Duluth, City of Proctor and Midway Township. Timber Ridge Lodge, a 150-160 room hotel is proposed for a site of 5.46 acres on the south side of the Spirit Mountain Ski runs, and is proposed to serve both the existing Spirit Mountain Ski Area and the golf course.

7. **Project Magnitude Data**

Total Golf Course Project Area is 432 acres, the hotel site is 5.46 Acres. Total = 437.46 acres.

Golf Course and Maintenance Area 272 acres of land leased from Spirit Mountain Recreation Area (City of Duluth): 153 acres (Midway Township): 6 acres (City of Proctor). The Lodge site is 5.5 acres (Spirit Mountain Recreation Area/City of Duluth). There are no Residential uses proposed.

Golf Course and Maintenance Area:

Commercial / Institutional: gross floor area of buildings is as follows:

Net Golf Course area is 94.42 Acres; 250 sq.ft. of office space: 1500 sq.ft. of retail: Open equipment maintenance area of approximately 4,500 sq.ft; 750 sq.ft of warehousing (storage). There is no other Industrial, Institutional or Agricultural activities proposed. One Existing structure (one story) approximately 12 feet in height.

Hotel: areas in square feet	Lobby:	3,800	Total:
150-160 rooms: 96,360	Pool/spas/decks:		176,295
Office: 1,150			
Conference Rms: 3,520		7,120	
Mechanical, etc.	Restaurant/Kitchen &		
39,830	Lounge	8,500	
Retail/Archade: 1,104	Service areas	7,500	

The proposed hotel building is 4-stories- approximately 65 feet in height.

8. **Permits and Approvals Required.** List all known local, state, and federal permits, approvals, and funding required:

Unit of Government	Type of Application	Status
Federal		
U.S. Army Corps of Engineers	Section 404 (Wetland Alteration)	To be applied for
U.S. Fish and Wildlife Service	Threatened and Endangered Species (National Listing) and Wetland Review	Part of Section 404 permit
State		
Minnesota Office State Archaeologist / Minnesota Indian Affairs Council	Archaeological and Burial Site Investigation	complete
Minnesota Board Water and Soil Resources	Wetland Conservation Act Permits	complete
Minnesota Department of Agriculture	Pesticide Applicators License	To be applied for
Minnesota PCA	NPDES .Construction/Storm water	To be applied for
Minnesota PCA and Western Lake Superior Sanitary District	Sanitary Sewer Extension Permit	To be applied for
Minnesota PCA	Section 401 Water Quality	To be applied for
Minnesota PCA	Storage Tank Registration	To be applied for
Minnesota Historic Preservation Office	Cultural Resources Review	Complete
Minnesota Department of Health	Water Main Extension Permit	To be applied for
Minnesota Department of Health	Plan Review	To be applied for
Minnesota Department of Health	Well Drilling Permit	To be applied for
Minnesota Department of Natural	Threatened and Endangered Species	Search complete

Resources	Review	
Minnesota Department of Natural Resources	Protected water permit/assessment	To be applied for
Minnesota Department of Natural Resources	Permit to Work in Protected Waters	To be applied for
Minnesota Department of Natural Resources	Water Appropriation Permit	To be applied for
Local		To be applied for
City of Duluth/Spirit Mtn Authority	Work permits	To be applied for
City of Duluth	Grading Permit	To be applied for
City of Duluth	Building Permits	To be applied for
City of Duluth	Water Resources Management permits	To be applied for
City of Duluth	Utility Permits and Service Agreement	To be applied for
City of Duluth	Environmental Assessment Worksheet	Pending
City of Duluth Fire Marshal	Blasting Permit	To be applied for
City of Proctor	Construction and Conditional use Permits	To be applied for
Midway Township	Construction and Conditional use permits	Applied for
Western Lake Superior Sanitary Dist	Sanitary Sewer Extension Permit	To be applied for

Land Use.

Current land use of the proposed project area is undeveloped land. Currently part of the proposed project area, Spirit Ridge “East”, has a trail system. The trails traverse and fragment the entire east half of the property and are used for walking, cross-country skiing, and a separate trail for snowmobiling. Spirit Ridge “West” also is considered undeveloped land (Appendix I: Map c). There is anecdotal evidence which suggests unauthorized use of the cross-country ski and snowmobile trails for horseback riding during the summer. The Hotel site is on a parcel of undeveloped land between a downhill ski run and “Skyline Parkway”.

Historic use of the project area was logging, with different species and areas cut prior to 1948 (Larson 1997). The past removal of trees is not an environmental concern for the project area as no soil contamination is likely and no mitigation is required.

The project area has been undeveloped as evidenced by aerial photos dating from 1948. A small portion in the northern section, adjacent to the southern edge of current condominium units, was part of an auto salvage facility noted in 1961 and 1964 aerial photos, with encroachment onto the subject site noted in a 1972 aerial photo. Clean up of this area was noted in a 1981 aerial photo. In addition, a small portion of the southeastern corner of the proposed project area was cleared, as noted in a 1948 photo. This area is not part of the area for the golf course.

Current and Recent Past Land Use of the Properties Adjacent to the Proposed Project Area

Current and recent past land use of adjacent properties is primarily undeveloped land (west and south), rural residences (south), light commercial, retail businesses and residential (on the north and northwest in both Proctor and Midway), roadways (Interstate 35 & Thompson Hill Road along the north), and the Spirit Mountain (ski hill) Recreational Area.

City of Duluth File History; (City of Duluth Planning Department files)

a. In mid-1972 and in early 1973 the City Council, upon recommendation of the City Planning Commission, released lands from conservation tax-forfeited category in order that the lands might be sold under free conveyance to the City of Duluth for the recreation area.(EN 1-72024, 1-73029 and 1-73030).

b. **On** January 17, 1973, the City Council authorized filing of an application with the Federal Economic Development Administration for grants for partial construction of the recreation area.

c. **On** February 13, 1973, the City Planning Commission recommended approval of a draft of the Spirit Mountain state legislation with a number of changes (EN 1-73025).

d. On February 13, 1973, the City Planning Commission and on February 26, 1973, the City Council approved the release from conservation, lands located in Sections 27, 28 & 33, T49N, R15W. (EN 1-73030).

e. On May 18, 1973, the state legislation for the creation of the Spirit Mountain Recreation Area Authority was established. Laws of Minnesota for 1973 Chapter 327- H.F. No. 1969
The act reads in part;

Section 1. Duluth, City of: Spirit Mountain Recreation Area Authority; Purpose. The purpose of this act is to facilitate the development of a land area with the following objectives:

- (1) The development of wide-range recreational facilities available to both local residents and tourists
- (2) The aiding of the economy of northeastern Minnesota by encouraging private enterprise efforts in conjunction with the recreational facilities; and
- 3) The preservation of the environment in the area by a timely and intelligent plan of development.

Section 5. Powers and Duties. Subdivision 1. Notwithstanding anything to the contrary contained in any law or in the charter of the city of Duluth, or in any ordinance thereof, there is hereby conferred upon such authority the following powers and duties:

(e) The authority may construct and maintain buildings, facilities, and other equipment consistent with the purposes of this act. Previous zoning requirements within the recreation area shall be superseded by this act and replaced by procedures outlined hereinafter. Permitted uses include all forms of recreation facilities, including buildings and equipment, and commercial and recreational enterprises designed to be compatible with the recreation use of the area and to accomplish the purposes of this act, including, but not limited to, food services, intoxicating and nonintoxicating beverage sales, various forms of lodging, and shops which complement the recreational usage of the area. The authority may lease, sell or contract for the use of land within the area to individuals or firms for the aforesaid purposes.

Prior to construction of any building or facility or any other use of the area by the authority or others, the city council, upon recommendation of the city planning commission and the city park and recreation board shall review and approve a master plan for the development of the area and any subsequent changes to said master plan. Further, prior to the construction of any buildings or facility or prior to an y site preparation or removal of vegetation or initiation of any use within the area, the authority or any other person or firm shall obtain a permit form the city council after the city planning commission and city park and recreations board have held a public hearing and given their recommendations to the council. The planning commission, working jointly with the park and recreation board shall adopt necessary and reasonable requirements for such review to insure that the proposed use is within the purposes of this act and shall attach appropriate conditions and safeguards to insure compliance. The construction and maintenance codes of the city of Duluth shall apply to construction and maintenance in the area:

f. On January 21, 1974, the City Council adopted a resolution approving the Master Land Use Plan for the Spirit Mountain Recreation Area (Public Document 61453). EN 1-73212 Also see; 1974 Council Proceedings, Pages 19-20

g. On August 12 and September 19, 1975, the Planning Commission conducted hearings on a master plan amendment for a 200 acre, 18 hole golf course and a 220 unit motel. On October 6, 1975, the City Council adopted Resolution No.75-604 which approved an alteration in the "Spirit Mountain Master Land Use Plan" (City Council Public Document No. 61453) to the effect that the northwest corner of the recreation area shall be designated as an area for a golf course as indicated in the drawing titled 'Preliminary Study for Spirit Mountain Golf Course' and identified as City Council Public Document No. 64022." EN 1-75 138 Also see Council Proceedings 1975 Pg 335

h. On June 14, 1977, the Planning Commission approved; a) an expansion of the paved parking areas as indicated on the drawing entitled "Spirit Mountain Entrance Parking" and b) 10 proposed tent campsites as indicated on the drawing provided by Architectural Resources Inc. denied the proposed "Bike Lanes" plan dated, May 27, 1977, by Architectural Resources Inc. FN 1-77124

On July 12, 1977, the Planning Commission approved the alteration of the Master Plan to add 40 additional camping trailer sites including tent camping areas. Drawing entitled "Proposed Campground Expansion, 40 Travel Trailer Sites, Tent Camping Areas, and Camp Building" dated, 6/15/77, by Architectural Resources, Inc. FN 1-77141

j. On February 14, 1978, the Planning Commission approved the alteration of the Master Plan to add a motel site located approximately 600 feet northwest from the chalet. EN 1-78011

k. On February 14, 1984, the Planning Commission approved; a) the annexation of 80 acres located in

the City of Proctor below 1-35 and b) approximately 80 acres above Grand Avenue (and defined the boundaries of the buffer area) below the DWP right-of-way between Norton Park and Bessemer Street, to the Spirit Mountain area, and corrected language which defines the eastern peripheral area described in the original State Law. On March 16, 1984, (Governor signed on March 17, 1984) the Minnesota Legislature adopted S.F. 1770, Chapter 390, Amending Laws 1973, Chapter 327, Section 2, subdivision 1, annexing the 80 acres above Grand Avenue, but did not add the 80 acre parcel in Proctor, to the Spirit Mountain Recreation Area Authority (the land is owned by the City of Duluth). EN 84002

l. On December 17, 1984, the City Council adopted Resolution 84-0889 (3888410) which changed the boundaries of the tracts of land administered by the Spirit Mountain Recreation Area Authority (the Grand Avenue area) and dedicated and defined the buffer zone easements over portions of the area. EN 8400

m. On July 8, 1986, the Planning Commission approved an amendment to the Master Plan to include the following: a) Neo-Arctic Trail, b) Motel Site, c) Grand Avenue annexation (and identify buffer area), d) Quad Express Ski Lift. EN 86049

n. On July 13, and August 3, 1993, the Planning Commission and on August 9, 1993, the City Council approved Resolution No. 93-0661 which granted a Work Permit for Base Area (Grand Avenue) Parking Lot. EN 93091

o. On October 22, 1997, the Planning Commission recommended and on November 24, 1997 the City Council approved Resolution 97-0871, an Amendment to the Spirit Mountain Recreation Area Master Plan which provided for;

- (a) A reduction in the size of the golf course from 18 holes to nine holes;
- (b) Additional ski runs and lifts;
- (c) Addition of a summer youth recreation area;
- (d) Addition of a snowboard park;
- (e) Additional lodging areas; and

amending the Spirit Mountain master plan as contained in Public Document No. 61453 and Public Document No. 64022, by replacing it with the Spirit Mountain master plan on file in the office of the city clerk as Public Document No. 97-1124-18, subject to the following conditions:

- (a) The city of Duluth water resources management ordinance be used as a guide in the approval of all plans and work permits;
- (b) The parking standards established in the Duluth zoning ordinance be used as a guide in the approval of all plans and work permits. EN 97008

p. On June 8, 1998 The city council unanimously adopted Resolution 98-0180 as follows;
WHEREAS, the city council has approved a comprehensive amendment to the master plan of Spirit Mountain

to include the construction of a hotel facility and nine hole golf course; and

WHEREAS, Spirit Ridge LLC is in the process of developing its plans for the hotel facility and golf course and any such plans will need to be reviewed and approved by the city council and a work permit will need to be obtained from the city council prior to the construction of the building or facility and prior to any site preparation; and

WHEREAS, the city council desires to facilitate the development process while Spirit Ridge LLC is in the planning phase of the project by notifying Spirit Ridge LLC of the reports, studies and other information that will be required before the city council will consider approving a work permit.

NOW, THEREFORE, BE IT RESOLVED, that Spirit Ridge LLC must provide the following documents and information to the council prior to submission of work permit requests for the golf course and hotel:

- (a) An environmental assessment worksheet and the following:
 - (1) An appropriate archaeological review of the site, with follow-up as indicated, to determine the location, if any, of Indian burial or archaeological sites and a plan to deal with same as approved by the state archaeologist;
 - (2) A detailed map approved by the Army Corps of Engineers of all wetlands on the property to be developed and a plan to comply with the city's water resources and management ordinance;
 - (3) A review that addresses the impact on mature hardwood forests that exist on the property and a written plan to minimize any impact on the forest;
 - (4) A review of water quality and quantity issues to analyze the prospective impact that the development will have on the drinking water and wells of homeowners in the area as well as other nearby natural water bodies;
 - (5) A turf management plan that addresses procedures for the use of fertilizers, herbicides and pesticides and addresses the transport and fate of the applied fertilizers and pesticides;
- (b) A specific protocol (including on site monitoring) to oversee the construction of the golf course

to make sure that wetlands, forests and cross-country ski trails are protected and preserved as set forth in the work permit;

(c) A review of the impact, if any, on Spirit Mountain cross country ski trails, and, to the extent of impact, a mitigation plan;

(d) A written plan for the implementation of erosion control measures during construction complying with the Best Management Practices for Minnesota, manual prepared by the Minnesota pollution control agency.

Alternately, the council may consider other documents proposed by the city planning commission which provide the same information requested above. File No. 98170

Current Use: the portion of the project within the Spirit Mountain Recreation Area, “Spirit Ridge East”, has 56,012 lineal feet (19 acres) of Cross-country and 6,100 lineal feet (2.09 acres) of snowmobile trails which traverse and fragment the site. The portion within Midway Township is undeveloped.

Commercial: There are no commercial uses of the golf course area. The hotel site is adjacent to the western most downhill ski slope at Spirit Mountain Recreation Area. The Spirit Mountain Campground (40 sites) is located South of the 14th Fairway and West of the Hotel Site. The proposed “maintenance area”, in Midway Township at the corner of Russell Road and Thompson Hill Road, is presently the site of the Sundown Motel.

Residential: There are no residential uses of the golf course area or the hotel site. Spirit “Mountain Villas” (15 residential structures) are located East of the 15th fairway.

Environmental: There are passive uses along the trails of the golf course area. The hotel site is adjacent to a downhill ski slope.

10. **Cover Types.** Janet K.S. Bernu, Consulting Forester, Two by Forestry, conducted a field/forest survey of the project area in June 1999, and developed a “Forest Survey” as well as a “Harvesting Plan” for the project (See Map g and Table 6A & 6B of Bernu 1999a).

Golf Course	Before	After*
Types 2, 3, 4 & 6/7 Wetlands*	101.4 acres	104.17* acres
Wooded/Forest	314.5 acres	215.25 acres
Brush/Grassland	0.0 acre	0.0 acre
Crop Land	0.0 acre	0.0 acre
Urban/Suburban Lawn/Landscape Area#	0.1 acre	95.02 acres
Impervious Surfaces (cart paths)	1.8 acres	3.42 acres
<u>X-country & Snow Mobile Trails±</u>	<u>19.2 acres</u>	<u>19.2 acres</u>
Total	437.0 acres	437.06 acres

*1.17 acres of wetland are proposed for onsite mitigation of the Hotel site in Spirit Mountain (Duluth) and 1.6 acres in Midway Township. Trees will be cut from 7.2 acres of wetlands for lines of play with periodic mowing to maintain the vegetation as hydric forbes, sedges, and grasses. Trees will be removed from 0.23 acres of wetland within fairway areas in Midway Township with vegetation maintained as sedges and wetland grasses (Appendix I; Maps c, d, e and f).

Includes fairways, tees, greens, rough and areas with thinned trees which does not include wetland areas which cross the fairways and rough.

+ The average width of the snowmobile and cross-country ski trail is 15 feet. There are 10.6 miles of ski trails (56,012 lineal feet). There are 0.46 miles (2,450 lineal feet) or 4.37% of the existing ski trails which intersect with the proposed golf course or cart paths.

Hotel/Lodge	Before	After*
Types 6/7 Wetlands	1.71 acres	0.0* acres
Wooded/Forest	3.75 acres	0.2 acres
Brush/Grassland	0.0 acre	0.0 acre
Crop Land	0.0 acre	0.0 acre
Urban/Suburban Lawn/Landscaping	0.0 acre	0.2 acres

Impervious Surface	0.0 acre	5.06 acres
Other	0.0 acre	0.0 acres
Total	5.46 acres	5.46 acres

• 1.17 acres of wetlands will be mitigated in the golf course on Spirit Mountain Recreation Area Authority property.

11. Fish, Wildlife, and Ecologically Sensitive Resources; Sources of information for evaluation of impacts of the golf course and hotel on fish, wildlife, and ecologically sensitive resources are:
- Minnesota Natural Heritage Database Search for Spirit Ridge Golf Course and Lodge (Minnesota DNR 1998). The following notice is associated with all references to this report: Copyrighted 1998, State of Minnesota, Department of Natural Resources. Reprinted with Permission.
 - Onsite inspection of the headwaters of Stewart Creek and subsequent letter from Charles Revak, DNR Waters (Revak 1998).
 - St. Louis County. "Walk-Through Survey, Spirit Mountain Area, Duluth, Minnesota." May/June 1997 (Larson 1997).
 - Minnesota Department of Natural Resources. Letter from Dr. Kurt A. Rusterholz, dated August 26, 1997 (Rusterholz 1997).
 - Minnesota Department of Natural Resources. Letter from Kurt A. Rusterholz, dated August 26, 1997 (Rusterholz 1997).
 - Review of golf course impacts on wildlife and nongame habitat by Tietge (1992).
- a. Describe fish and wildlife resources on or near the site and discuss how they would be affected by the project. Describe any measures to be taken to minimize or avoid adverse impacts. And,
- b. State-listed endangered, threatened, or special-concern species; rare plant communities; colonial waterbird nesting colonies; native prairie or other rare habitat; or other sensitive ecological resources on or near the site? Describe measures to be taken to minimize or avoid adverse impacts.

Regarding Federally Listed Threatened and Endangered Species, Spectrum Research, Inc. has informally discussed the status of threatened or endangered species at the proposed project site with Paul Burke, biologist, at the St. Paul office of the U.S. Fish and Wildlife Service. In the general area the following species are currently listed on the Threatened and Endangered Species list: gray wolf, peregrine falcon, bald eagle, and piping plover. Although these federally listed species are found in the general area, the Minnesota DNR Heritage Program database did not document any known species found in the project area. A review of the species list will be conducted as part of the wetland mitigation plan review and permit conducted by the Army Corp of Engineers. It has been determined that it is unlikely that any of the federally listed wildlife species will be adversely affected by this project. This has been confirmed informally in a telephone conversation with Mr. Burke of the U.S. Fish and Wildlife Service on October 19, 1999. The final opinion on this matter is contingent on the federal review associated with the wetland permit.

A search of the DNR Minnesota Natural Heritage database was conducted at the request of Spectrum. This database is maintained by the DNR Natural Heritage and Nongame Research Program. No known rare or endangered species, fauna or flora, were reported for the site (Minnesota DNR 1998). Two forbes and one tree species of special concern were noted for the site. Based on the recommendation of the staff of the Natural Heritage program a plant survey was conducted at the site (Walton 1998). The results of the plant survey revealed several plants of special concern do exist on the site (e.g. *Claytonia caroliniana* and *Adoxa moschwellina*). The results of the Natural Heritage Program database search, plant study, and mitigation plan has been submitted. See Appendix II.

Holes #11, 12, 13, and 14 are located in an area of mature mixed hardwoods. The DNR Natural Heritage Program staff and The Duluth Tree Commission have expressed concern over the partial conversion of this area to a multiple use recreation area. The Duluth Tree Commission is an advisory council to the Duluth City Council. The Proposer and Spectrum have developed a golf course design to (a) minimize cutting of mature trees; and (2) preserve all valuable trees in the areas between the holes. DNR wildlife and fisheries have agreed to help with design issues in the Stewart Creek Watershed.

Tree age and value for the site has been assessed by the following four sources:

- 1 The Abstract of Title for the NW 1/4 of the NE 1/4 of Section 21, and the NE 1/4 of the NE 1/4 of Township 49 North, Range 15 west, in an entry dated December 10, 1885 and filed February 25, 1887, the Saint Paul and Duluth Railroad gave permission to Duncan Gamble and Co. ...“to cut and remove all the pine timber fit for merchantable saw logs now being or remaining on all of Section 21, Township 49, Range 15.” Removal of pine timber is consistent with the reports of two foresters, which follow.

2. Jim Larson, St. Louis County Forester, prepared a report entitled, “Walk-Through Survey, Spirit Mountain Area, Duluth, Minnesota,” based on site visits conducted in May and June of 1997, and from review of 1948, 1961, 1972, 1981, 1989, and 1991 aerial photos for the eastern portion of the proposed project area (see Appendix III for complete report).

In the section entitled “Timber Stand Ages” on page 2, he noted that, “The entire survey area was probably harvested for White Pine only, prior to 1900. There is very little evidence of this initial logging now. Only a very few old White Pine stumps were observed in the entire area. The assumption from this is that the pre-settlement forest here was primarily Sugar Maple Northern hardwood type, and that this area was not much impacted by the initial logging. Only the very scattered large White pines were removed.”

Mr. Larson identifies areas of four age classes based on the 1948 aerial photos. Areas in Age class #1 were nearly completely harvested five to 15 years prior to 1948. In Age class #2, areas were partially harvested approximately 15 to 20 years prior to 1948.

Age class #3 “appears to be unharvested except for some minor White Pine removal mentioned previously. This area may be a candidate for old-growth inclusion using State of Minnesota standards. Trees have multiple ages ranging from 78 to 135 years old with the stand average of 102. It is evident that some of the Red Oak and Black Ash here is 125+ years old. Note that the 1948 aerial photo reveals that some harvesting had taken place just south of this age class #3, south of the center of Section 22.”

Note: Most of the red oak and black ash categorized as age class 3 are not in areas to be used for golf course development.

He noted, “Age class #4 appears to be similar to age class #3 in ages by aerial photo interpretation. Tree ages checked here range from 65 to 95 years old, averaging 75.”

Mr. Larson noted a decline in Red Oak, Paper Birch, Yellow Birch, Basswood and Sugar Maple on the site. “This decline may be associated with (1) shallow soil over dense till and bedrock on the site; (2) perched water tables; (3) atmospheric pollution associated with industrial and commercial activity in Duluth, MN; (4) lack of natural fires for natural regeneration; and/or (5) deer browsing.”

3. Kurt A. Rusterholz, Ph.D., Forest Ecologist, Natural Heritage and Nongame Research Program of the Minnesota Department of Natural Resources, walked through the SW 1/2 of the NW 1/2 of Section 22. In a letter dated August 26, 1997, he noted that he surveyed the “old timber” age-class #3 prepared by a St. Louis County Forester.

Dr. Rusterholz wrote, “This mature northern hardwood forest stand is particularly significant for its large component of mature Yellow Birch in the 30-50 cm dbh size class..., which are concentrated on lower slopes, typically adjacent to wetlands. In my experience surveying natural-area quality northern hardwoods along the North Shore, I have encountered no other site with such a high density of Yellow Birch this size...”

“Without human intervention, this area is likely to develop into a high-quality old-growth northern hardwood forest within the next few decades. The abundance of Red Oak and possibly Yellow Birch might decline, but the presence of the network of ski trails has provided and will continue to provide microhabitats suitable for regeneration of both species. Furthermore, natural windstorms are likely to provide canopy openings of various sizes that will favor these species.”

NOTE: The edges of golf course fairways and buffer zones also provide areas for regeneration for these species.

NOTE: Larson (1997) observed that many of the mature trees are experiencing a decline in health and dieback which is possibly a result of both natural site conditions and human intervention.

Species of trees observed to be in decline are Red Oak, Paper Birch, Yellow Birch, Basswood and

Sugar Maple.

NOTE: A majority of the mature yellow birch and other large hardwoods are on the periphery of the proposed golf course. The majority of the cover type described by Dr. Rusterholz is located and protected in Magney/Snively Park.

The Proposer, the golf course architect, and Spectrum contracted a comprehensive study ,by Two by Forestry, of the mature trees on the entire proposed site and the vicinity. A major component of this study addresses the issue of protecting all of the mature trees not cut during golf course development. (Bernu I 999a, I 999b)

4. Two documents were prepared by Two by Forestry addressing cover type on the portion of the proposed project east of Russell/Ugstad Road (Bernu I 996a, I 996b). Cover types include Sugar Maple/Upland Brush Type; Black Ash/Lowland Brush Type; and Northern Hardwood Type.

The mature, mixed hardwood forest cut in the vicinity of Holes #12, 13, 14, and parts of #16 and 17 will result in the loss of approximately 23 acres of trees and forest habitat. Based on a rough estimate using the cover type maps provided by Larson (1997), approximately 65 acres of this cover type and habitat area will remain undisturbed on the site. The 1630 acre Magney / Snively Park Complex located immediately south of the development area has a significant reserve of this unique forest cover type. This area has also has been transected by cross-country ski trails.

Tree removal and habitat preservation will be conducted using best management practices established by the DNR (MN DNR 1995) and recommended by Matheny and Clark (1998). Large or exceptionally old trees will be avoided whenever possible to reduce the impact on the forest and habitat resource on the site. A plan for cutting trees and protection of edge trees has been prepared by Two by Forestry (Bernu 1 999b)

Habitat preservation and enhancement will be a priority for the substantial upland (260 acres) and wetland (108 acres) forest. The Spirit Ridge Golf Course will become a member of the Audubon Cooperative Sanctuary System through Audubon International (Tietge 1992). A summary of the habitat protection practices required for membership in this organization is provided in Appendix I.

An onsite inspection of the headwaters of Stewart Creek was conducted by Charles Revak, a hydrologist with DNR Waters, John Spurner and Don Schliep, biologists with DNR Fisheries, and Dr. Balogh of Spectrum on May 5, 1998. Stewart Creek, or the Stewart River Tributary has DNR Protected Waters status (Revak 1998). This tributary is a protected trout habitat. The extent of Stewart Creek on the Site is noted on the site maps (Appendix 1: Map e). The water is important for trout reproduction. Therefore, environmental issues of concern include:

1. Potential sedimentation during construction or from cart path traffic.
2. Changes in temperature of the water.
3. Changes in water quality during management of the golf course.

Suggestions made by Mr. Revak will be implemented by the Proposer during construction and management of the golf course. Spectrum, the DNR Division of Waters, Joel Goldstrand, the Proposer, and the golf course construction company all will cooperate on the final staking and construction plans to insure protection of this important fisheries resource. Specific mitigation strategies and the letter from Mr. Revak are in the Appendix.

Specific mitigation strategies for habitat and ecologically sensitive area has been submitted to the RGU.

Habitat protection plans are part of the TMS plan prepared by Balogh (1999a) and in the forest harvest plan (Bernu 1999b). Protection of edge trees and the remaining forest (70 percent of the site) is discussed in:

TMS Plan Section 3.2.4: Roughs & Other Low Management Areas
 TMS Plan Section 4.2.3.1: Soil and Water Conservation Practices for Established Turfgrass: Buffer Zones, Unmanaged Turfgrass, and Natural Areas: Recommended Practices; Other Vegetative and Modest Structural Enhancements to Reduce Runoff and Sediment Losses: Recommended Practices; Section 4.2.3.2 and Section 4.2.3.3.

Protection of surface water quality associated with tributaries and wetlands is discussed in detail in Section 18 of this report.

As a member of the Audubon Sanctuary Program habitat protection and enhancement will be an integral part of the management practices at the golf course.

12. **Physical Impacts on Water Resources.** Physical water resources on the site include: Stewart Creek, wetlands, and groundwater. Based on forest and turfgrass hydrology research (Balogh and Watson 1992; Luce 1995, Balogh 1999b), the following general impacts on the surface water resource (Stewart Creek, wetlands, and unnamed, vegetated drainage ways) are anticipated:

1. Small to medium increases in runoff during and immediately following construction
2. Small increases in runoff during the growing season during long-term management of the golf course
- 3. Moderate increases in runoff from the Hotel site.**
4. Wetland areas may expand somewhat during years of high rainfall due to increases in runoff and subsurface lateral flow.

Surface water and wetlands located on the site are outlined in the golf course and Hotel site maps (Appendix I, Maps c and d). Increased runoff into these surface water resources may result from reduction of evapotranspiration, reduction of detention storage, and reduction in forest cover associated with golf course construction and maintenance. Quantitative evaluation of these effects will be conducted using the EPIC water quantity and quality model. General and specific procedures for this evaluation have been outlined by Balogh et al. 1992b, King and Balogh 1997, and King and Balogh 1999b. A report on the details of the water quality and quantity evaluation has been submitted and is included in the Appendix by Balogh (1999b)

The irrigation pond has been proposed by the Golf Course Architect for the west end of the 18th fairway adjacent to an existing wetland. (Map c and Map e)

Approximately 8 acres of trees on wetlands will be cut on the golf course site and 1.17 acres of trees removed from wetlands on the Hotel site. Wetlands on the Hotel site will be replaced on the golf course "East". This action would require application for a variance and special use permit by the Proposer from the Duluth City Planning Commission and work permit from the Duluth City Council. The variance is only required because of the hotel development and is not required for the golf course.

Cut wetlands on the golf course site will be mowed periodically to maintain forbes, sedges, and grasses compatible with wetland conditions. The wetland delineation report is included in the Appendix, EBI 1998.

A panel of local, state and federal wetland regulators reviewed the site wetland delineation on August 26 and 27, 1998. The wetland mitigation report is included in the Appendix (EBI 1999).

C,

Groundwater on the site fluctuates between 9 to 30 feet below grade on the site (Heimbach and Waldstrom 1998). A perched high water table resulting from the dense till layer ranges between 2

to 4 feet below grade on the site (See item 16). On slopes the perched water moves as subsurface lateral flow and emerges at the surface as seepage based wetlands. Increased leaching of rain and irrigation may result from reduction of evapotranspiration, reduction in rooting depth and effective soil storage, and reduction in forest cover associated with golf course construction and maintenance. Quantitative evaluation of these effects have been conducted using the EPIC water quantity and quality model. General and specific procedures for this evaluation have been outlined by Balogh et al. 1992b, King and Balogh 1997, King and Balogh 1999, Balogh 1999b.

Surface Water

The Spirit Ridge golf course is located on glacial till deposited during the late Pleistocene. Eventually all surface drainage on the golf course migrates toward Lake Superior. A branch of Stewart Creek is located along the west side of Holes #2 and #6 and between the tees and green on Hole #5. This is part of the headwaters of Stewart Creek which is designated as a protected trout stream (Balogh 1998). Knowlton Creek is located to the northwest of the Spirit Ridge golf course. Although Knowlton Creek is not in close proximity to the golf course, some of the drainage water and subsurface lateral flow from Holes #15 (green), #17 (green and fairway), and #18 (all areas) will migrate toward Knowlton Creek (Map c, d). The majority of surface runoff and subsurface lateral flow migrates to the St. Louis River via unnamed intermittent drainage ways, Stewart Creek, and Knowlton Creek (Map d).

Flooding is not anticipated on the Spirit Ridge golf course. Most shallow drainage ways and runoff diversions on the golf course will have vegetative cover, usually with Kentucky bluegrass or native plants. A constructed irrigation pond is located just to the south of Hole #18 green.

Other constructed water features are located on Holes #1 and #16.

Potential outfalls for offsite movement of runoff water, sediment, nutrients and pesticides from the golf course can be seen on maps c, d & e (in Balogh 1999a). Outfalls are direct drainage or runoff linkages from turfgrass areas into offsite surface water. Major offsite runoff/interflow outfalls are located on:

- Stewart Creek: Drainage from Holes #2, #3, #6, #4, and #5 all potentially affect Stewart Creek. Buffer zone areas and rules must be maintained in these areas to protect the headwaters of this important water and fisheries resource (Map c and d). Hole #2 and #5 have steep slopes. These areas are subject to additional risk of runoff and erosion. Additional soil erosion and traffic control measures as discussed in soil the soil and water conservation practices section must be maintained.
- Drainage ditch north of Hole 18; Hole 18 drains toward the wetland and freeway access road drainage ditch (Map c and d). This wetland and drainage ditch eventually drain into Knowlton Creek.
- The mitigation plans to protect water quality in Stewart Creek and other surface water drainage ways on the proposed site are discussed in detail in Section 4.2.3 of the TMS plan (Balogh 1999a).

Shallow Groundwater and Wetlands

Shallow or perched groundwater occur beneath the entire Spirit Ridge golf course due to the dense subsurface till and the shallow depth to bedrock (Balogh 1999a). On the areas managed for turfgrass (Map c), the depth to perched groundwater ranges from 1.5 to 8 feet. Indication of the high level of perched groundwater was determined by soil morphological evaluation by Dr. Balogh of Spectrum. (Balogh 1999a & 1999b)

The abundance of wetlands on the site are another indication of the shallow, perched groundwater on the site (Map c). A wetland delineation report (EBI 1998) and mitigation report (EBI 1999)

was prepared prior to initial project construction. Each hole on the course is in proximity to a wetland area (Map c). The National Wetland Inventory maps for the West Duluth Quadrangle indicate the wetland areas on the site are primarily classified as Palustrine Forested Board-leaved Deciduous Saturated wetlands. The U. S. Fish and Wildlife Service Circular 49 wetlands observed on the site include (1) infrequently flooded meadows (Type 2), freshwater non-tidal marshes (Type 3), open water with less than 2 meters deep (Type 5), shrub-scrub swamps (Type 6), and forested swamps (Type 7).

Wetlands are an important component of this golf course. On the east side of the golf course there is a total of 63.3 acres of wetland. On the west side of the golf course there is a total of 36.4 of wetland. Out of the total of 432 acres on the golf course site, only 0.94 acres of wetlands would be filled and subsequently replaced on site (See Map e). The forest vegetation will be removed from 16.3 acres (or 16 percent) of the original wetlands during construction of the golf course. The amount of wetland within each hole is summarized in Table 9, page 30 of the TMS plan by Balogh (1999a).

The wetlands on the entire site are both an important feature of play and protect the water and soil quality in the vicinity of the golf course. It is the responsibility of the golf course superintendent to use all of the BMPs in this TMS plan to protect the quantity and quality of the wetlands on this site (Balogh 1999a). Maintenance of buffer zones and restricting vehicle traffic from wetland areas are very important BMPs protecting these valuable resources.

The importance of wetlands as an environmental resource and the potential effects of golf courses on

wetlands has been reviewed in detail by Kosian et al. (1992). Wetlands provide essential habitat for fish and wildlife, aesthetic and recreation areas, flood control, aquifer recharge, improvements in water and soil quality, stormwater and runoff control, and sediment and erosion control. BMPs for stewardship and protection of wetlands are documented Section 4.2.3.1, Section 4.2.3.2, and Section 4.2.3.3 of the Turfgrass Management System Plan (Balogh 1999a).

Regional Groundwater Aquifers

Depth to the groundwater in bedrock fractures beneath the site is highly variable (Heimbach & Wahlstrom 1999). The bedrock underlying the site has very low permeability and generally behaves as an aquitard that does not readily transmit water. However, there may be localized fracture zones, or fractured areas, within the bedrock. These areas are permeable enough to transmit water at a sufficient rate to provide a water source. Therefore, although the bedrock underlying the site appears to have very little capability for transmitting water, the possible fault depicted on the Minnesota Geological Survey map may present a permeable zone for transmitting groundwater from the soils on the site into the bedrock groundwater.

Drainage and Grassed Waterways:

The course has moderate to steep slopes with a complex network of shallow drainage channels and one tributary to Stewart Creek (Map c; Map e). The tributary channel is part of the headwaters of Stewart Creek. The branch or tributary of Stewart Creek is located along the west side of Holes #2 and #6 and between the tees and green on Hole #5. Stewart Creek is designated as a protected trout stream (Balogh 1998). Overland flow and wetland areas are connected to Knowlton Creek which is located to the northwest of the Spirit Ridge golf course. Although Knowlton Creek is not in close proximity to the golf course, some of the drainage water and subsurface lateral flow from Holes #15 (green), #17 (green and fairway), and #18 (all areas) will migrate toward Knowlton Creek (Maps c & d). Most of the surface drainage moves through permanently grassed waterways, wetlands, vegetated buffer zones, or deciduous forest. This reduces runoff velocity and the amount of sediment and management chemicals that escape from application areas.

Overall surface and subsurface drainage on the course is good (Map d). No flooding is anticipated at this time. Good quality turfgrass management, use of all BMPs, maintenance of buffer zones, and grassed waterway management will mitigate the water quality and sediment problems associated with runoff

and subsurface lateral flow.

Potential outfalls for movement of runoff water, sediment, and applied chemicals occur on Spirit Ridge golf course (Map c or Map d). A series of undesignated drainage ways and interconnected wetlands are located throughout the golf course. These areas are protected by buffer zones and large tracts of forest land. Drainage from Holes # 2, #3, #6, #4, and #5 all potentially affect Stewart Creek. Forested areas, buffer zone, and buffer zone rules must be maintained in these areas to protect the headwaters of this important water and fisheries resource. Hole #2 and #5 have steep slopes. These areas are subject to additional risk of runoff and erosion. All soil and water conservation BMPs are discussed in Section 4.2.3 of the Turfgrass Management System Plan (Balogh 1 999a). There is a drainage ditch located to the north of Hole 18 (Map d). Hole 18 drains toward the wetland and freeway access road drainage ditch. This wetland and drainage ditch eventually drain into Knowlton Creek (Map d). Impacts in these areas are anticipated to be relatively small using the BMPs discussed by Balogh (1999a) and evaluated in detail by Balogh (1999b) in the water impact study.

Open Water & Wetlands:

Streams, ponds, wetlands, and groundwater are important natural features on Spirit Ridge golf course. Establishing appropriate low or no maintenance vegetated buffers around these features is an important soil and water conservation practice (Balogh I 999a). Maintaining a vegetative or riparian buffer zone around surface water maximizes scavenging of nutrients moving in surface and subsurface flow (Balogh 1 999a).

Algae and other aquatic weeds in the irrigation pond and water hazards can be partially controlled by temperature, oxygen, light, and nutrient management. Interflow (e.g. lateral leaching) and runoff losses of

applied nitrogen and phosphorus near the perimeter of irrigation ponds and water hazards add to the nutrient

load in surface water. Greens #16 and #18 are close to constructed surface water features. Leachate, drainage, or runoff containing soluble nutrients from the greens, tees or surrounding fairways could add nutrients in the ponds.

Tall woody vegetation in the wetland areas within the cut zone on the golf course (Map c) will be periodically cut to maintain low growing wetland species. No other cultural, mechanical, or chemical practices will occur in these areas. Signs, and if necessary barriers, will be placed around wetland boundaries. No cart traffic and minimal foot traffic will be allowed in the wetlands.

13. **Water Use.**

a. There are no known abandoned wells in the project (Heimbach & Wahistrom 1998). If any are discovered they will be sealed following the appropriate rules and methodologies of the Minnesota Department of Health.

DPRA Environmental identified six private water wells and two monitoring wells within the study area of T49N, R15W, Sections 14, 15, 16, 22, 23, 26, 27 and 28. The static water levels recorded on the well records for the identified water well range from 9 feet to 30 feet below grade. The approximate elevation of these water levels range from 1041 feet to 1283 feet above mean sea level. The ground surface elevation within the are of the proposed golf coarse ranges from 1240 to 1350 above mean sea level.

The major water use for the hotel project will be for: drinking, bathing, food preparation, cleaning, fountain, and irrigation of landscape plants. Water will be used during Hotel construction for concrete mixing, cleaning, and dust control. Estimates for long-term, daily water use by the Hotel are outlined in Appendix I, Table 2. City of Duluth potable water will be the water source for the Hotel.

The major use of water on the golf course will be for irrigation of turfgrass (Balogh and Watson 1992). Minor uses of water will be for cleaning equipment and drinking water (Balogh and Anderson 1992;

Balogh and Watson 1992). A combination of local groundwater and surface water (an irrigation pond) will be used for irrigation. Groundwater will be obtained by drilling a well, after obtaining the appropriate permits from the Minnesota DNR and Minnesota Department of Health.

A survey of local wells using the Minnesota Department of Health well data base was conducted by Heimbach and Waldstrom (1998). A copy of this report is included in Appendix III. No unsealed wells were found on the proposed project sites. If any well-heads are found, they will be sealed following the appropriate rules and methodologies of the Minnesota Department of Health.

Quantitative evaluation of potential water use for irrigation on the site will be conducted using the EPIC water quantity and quality model. General and specific procedures for this evaluation have been outlined by Balogh et al. 1992b, King and Balogh 1997, and King and Balogh 1999. A report on the details of the water quality and quantity evaluation has been submitted by Balogh (1999b). Specific mitigation strategies for water conservation are included.

- b. The project may require an appropriation of ground or surface water. Dewatering is not anticipated on the golf course
 - c. The hotel site and portions of the project site will connect to the City's water supply. The DNR permit number for the City's water supply is 812066.
14. Water-related **Land Use Management Districts**. The proposed golf course and hotel projects are not within 1000 feet of Lake Superior, other lakes, ponds, or flowage. Holes #2, 3, 4, 5, and 6 on Spirit Ridge "West" are within 300 feet of a tributary to Stewart Creek. Setbacks from this tributary have been recommended by the Minnesota DNR (Revak 1998) as discussed under item 11 of this report. Spectrum and the Proposer have received the current ordinances for Stewart Creek and wetlands from Midway Township. All laws, rules, and ordinances of the State of Minnesota, St. Louis County, Cities of Duluth and Proctor, and Midway Township regarding surface water protection will be observed.
15. Water Surface Use. No water craft have or will use any of the surface water on the golf course or Hotel site.
16. Soil's approximate depth to: Ground Water: minimum: 9 feet. bedrock: at grade.

Soil information for the proposed golf course and hotel sites was provided by (1) on site observation by Spectrum; and (2) the local staff of the USDA Natural Resource Conservation Service (NRCS: formerly the USDA Soil Conservation Service). The NRCS soil scientists stated that no accurate NRCS soil survey maps for the project area are currently available. Based on preliminary field investigations the soil series most likely to be found on the site are summarized in TMS Plan (Balogh 1999a). Descriptions of each soil and summary of physical and chemical properties in the TMS Plan (Balogh 1999a & 1999b) are based on NRCS Minnesota Soil Interpretation Records and soil laboratory analyses conducted by Spectrum Research, Inc. (Balogh 1999a). Limitations and potential management stresses for turfgrass management are summarized in the TMS Plan. Additional information on physical and chemical soil properties are presented in the water quantity and quality assessment report (Balogh 1999b).

A preliminary reconnaissance of the soils on the golf course site was conducted by Dr. James C. Balogh, a Minnesota licensed soil scientist (#30001), on July 30, 1998. Using a soil auger, Dr. Balogh confirmed by visual field inspection in the area of Holes #1, 2, 5, 10, 14, and 15 that the dominant soil series on the site are similar to: Ahmeek, Finland, Canosia, Twig and unnamed histosols. A Finland-like soil was sampled by the staff of Spectrum on Hole #14. An Ahmeek-like soil was sampled by the staff of Spectrum on Hole #2. The Ahmeek-like soil most likely dominates the upland areas on the site. The Canosia-like soil most likely dominates the wetland portion of the site.

Laboratory data, texture and organic matter content, and NRCS records for these soils are included in the water assessment report (Balogh 1 999b). Quantitative evaluation of water use and quality for the golf course project requires additional description site specific soil properties (Balogh et al. 1992). A report on the site specific soil data is included in the water quality and quantity evaluation.

The soils observed on the site are characteristic of the Ahmeek-Finland-Automba soil association (Soil Survey Staff 1982). The soils in this association are formed on undulating to steep ground in northeastern Minnesota. Ahmeek-like soils are the dominant soil series on this site with possible inclusions of the Finland-like and Mesaba-like series. Finland soils are observed on well-drained slopes facing Lake Superior. Ahmeek and Finland soils have very similar morphological, chemical, and physical characteristics. Finland soils have a deeper umbric horizon compared to Ahmeek soils, Native vegetation associated with these soils was mixed hardwood forest. The parent material is noncalcareous loamy glacial till. These soils are generally well drained to moderately well drained. On this site both of the dominant upland soils, Ahmeek and Finland, have a loam to sandy loam cap (8-36 inches) over a very dense loam to sandy loam subsurface till. Some soil profiles have all loam texture (e.g. Hole #2). This would be an undesigned associate of the either the Ahmeek or Finland series.

Based on soil borings taken by the City of Duluth and the WPA program in the late 1930's, the depth of soil over bedrock on the site ranges from 0 to over 7 feet (City of Duluth 1941). The soil boring confirm the presence of a 0 to 36 inch sandy loam cap over dense till. The soil boring records also demonstrate the occurrence of a subsurface clay and clay loam subsurface horizon starting at a depth of 0.5 to 1 ft. This clayey parent material was observed at the very southern edge of the eastern portion of the Spirit Ridge golf course. Based in part on this information, NRCS soil scientists and Dr. Balogh of Spectrum have speculated there may be inclusions of Ontonagon and Hermantown soils at the southern edge of the golf course site. This area is at the boundary between the Highland Moraine and the Nemaaj i-Duluth Lacustrine Plain (Ericson et. al. 1977).

Golf course construction primarily will take place on the upland Ahmeek-like and Finland-like soils. Both the Ahmeek and Finland soils have moderate ion potential_and moderatel hi h runoff potential. Both erosion and runoff potential are mitigated by grass cover an surrounding orest cover (Balogh and Watson 1992). Ahmeek and Finland soil have slower deep percolation. This is caused by a dense subsurface horizon found between 15 and 30 inches. This dense layer impedes subsurface leaching, but increases the risk of lateral subsurface flow and surface runoff.

The deep to moderately deep Ahmeek-like and Finland-like soils have some increased risk of subsurface movement of soluble chemicals past the root zone. Bedrock is usually within 3 to 7 feet of the soil surface. Using slow release fertilizers, low mobility pesticides, and appropriate application methods will mitigate this elevated potential for leaching. The accumulation of thatch and organic matter in the topsoil also reduces the yisk on nitrate and pesticide leaching

The hydric soils on the site, Canosia-like and Twig, formed in the same parent material as the upland soils. The hydric soils have relatively shallow depth to the very dense till (paralithic or densic contact) which causes episaturation. This dense subsoil does cause perched water table conditions on the entire site. The occurrence of the dense till layer most likely varies between 8 to 36 inches on the site. The Canosia-like soils dominate the wetland areas on the site (Map c). Twig soils are found in deeper depressions in the center of the larger wetland areas.

17. **Erosion and Sedimentation:** the acreage to be graded or excavated and the cubic yards of soil to be moved: 20.6acres ; 80 to 110,000 cubic yards (on site cut and fill).

Describe any steep slopes or highly erodible soils and identify them on the site map:

The erosion and sedimentation measures to be used during and after construction of the project are to follow the standards provided in the MPCA, Division of Water Quality, publication "Protection Water Quality in Urban Areas", (1989, 1991 & 1994).

18. **Water Quality .Surface Water Runoff:**

a. Water Use and Water Quality Assessment Subbasins

The potential effects of turfgrass management on water and soil quality in the vicinity of Spirit Ridge golf course are controlled by the site specific management practices, irrigation practices, soil, site conditions, climate, and geology. The primary processes potentially affecting water quality in the vicinity of Spirit Ridge golf course are:

- Drift of applied chemicals during initial application and volatilization.
- Movement of dissolved chemicals in surface runoff water.
- Movement of suspended particulate (e.g. granular) formulations in runoff water.
- Movement of eroded soils and sediment-bound compounds in runoff water. Erosion is occurring primarily as a result of poor traffic supporting capacity of some soils, shade stress, and occasional runoff channeled over bare soil.
- Subsurface transport of compounds in drainage water moving into surface water by interflow.
- Subsurface leaching of compounds in water moving to groundwater.

Factors governing which conditions are dominant at Spirit Ridge golf course are:

- Proximity to surface water and groundwater.
- Soil, site, geological and hydrological conditions.
- Turfgrass management practices to control irrigation, pests and disease, and nutrients.
- Properties and formulation of pesticides and nutrients used on the course.
- Best management practices to control soil erosion, runoff and leaching.

BMPs to mitigate these potential effects are described in the TMS plan (Balogh 1999a). The magnitude of water losses, nutrient losses, and pesticide transport are discussed in detail in the water use and water quality study by (Balogh 1999b).

Using computer simulation models is a cost effective means of initially evaluating the relative efficacy of turfgrass management practices (Balogh et al. 1992b; King and Balogh 1999). Therefore prior to implementing recommending specific TMS plans with water quality BMPs, Spectrum used computer simulation of water resources and chemical fate to develop plans for environmentally sound turfgrass systems. A watershed approach was used for the simulation using the golf course version of the Environmental Policy Integrate Climate (EPIC) model. EPIC is a management level, watershed scale simulation model developed by the USDA Agricultural Research Service. In a cooperative research program with Spectrum, EPIC has been modified to incorporate the management, soil, and biological conditions consistent with turfgrass management (King & Balogh 1999a).

Using output from EPIC, Spectrum compared and integrated the relationship of site conditions, irrigation, drainage, fertilizer use, pesticide use, other turfgrass management practices, and water quality (Balogh 1999b). EPIC results were aggregated using the watershed approach developed by King et. al. (1999). Results of the water use and water quality assessment are presented for four subbasins and for a representative fairway, green, tee. and rough (Balogh 1999b). A full explanation is included in the water assessment by Balogh (1999b).

The Spirit Ridge golf course can be subdivided into four separate subbasins or drainage areas (Balogh 1999). These subbasins are based on the direction of surface water flow. The subbasins are defined as:

Subbasin I: Holes #2, #3, #4, #5, #6, #7, #11, #1 Green, and #10 Green (-141 acres).

Subbasin II: Holes #12, #13, #14, and #15 Tee (—73 acres).

Subbasin III: Holes #16, #17, and #15 green, fairway, rough (—87 acres).

Subbasin IV: Holes #8, #9, #18, and remainder of tee, fairway, and rough for #1 and #10 (—103 acres).

Ultimately, runoff and subsurface lateral flow migrates toward the St. Louis River (Map d). Practices evaluated in the water assessment were compared to the conditions prior to site development. EPIC is capable of simulating watershed water use and water quality for forested watersheds using watershed

aggregation techniques (Balogh 1999b). The comparative assessment of water quantity and quality effects of turfgrass management at Spirit Ridge (Balogh 1999b) includes tabular and graphical summaries of:

- Water use and water budgets.
- Nutrient budgets and fertilizer use including nitrogen and phosphorus fate and transport.
- Pest control strategies and pesticide use including surface and subsurface transport and losses.

EPIC was originally developed by the USDA ARS as a deterministic, management model used to simulate the effects of agriculture and silviculture on soil and water quality. The USDA ARS in cooperation with Spectrum revised EPIC for simulation of turfgrass systems (King & Balogh 1997 & 1999). The turfgrass version of EPIC has the unique ability to dynamically simulate turfgrass growth, soil erosion, hydrology, and nutrient and pesticide cycling. This particular version of EPIC also was designed specifically to simulate (1)

the multiple daily management operations specific to turfgrass management; and (2) compare the water quality effects when sites are converted from silviculture or agriculture to turfgrass conditions. An additional strength of this version of EPIC is its ability to simulate turfgrass management practices with a comprehensive turfgrass growth component. Other management and watershed models do not have this characteristic.

Surface Water See comments under Item 12 of this report.

Shallow Groundwater and Wetlands Also see comments under Item 12 of this report

The following identifies the routes and receiving water bodies for runoff from the site.

Potential outfalls for offsite movement of runoff water, sediment, nutrients and pesticides from the golf course can be seen on the site base map (Map c; Map d and Map e). Outfalls are direct drainage or runoff linkages from turfgrass areas into offsite surface water. Major offsite runoff/interflow outfalls are located on:

Stewart Creek: Drainage from Holes # 2, #3, #6, #4, and #5 all potentially affect Stewart Creek. Naturally vegetated buffer zone areas and setback rules must be maintained in these areas to protect the headwaters of this important water and fisheries resource (Map e). Hole #2 and #5 have steep slopes. These areas are subject to additional risk of runoff and erosion. Additional soil erosion and traffic control measures as discussed in soil the soil and water conservation practices section of the Turf Management Systems Plan

- ii. Drainage ditch north of Hole 18; Hole 18 drains toward the wetland and freeway access road drainage ditch. This wetland and drainage ditch eventually drain into Knowlton Creek (Map d).

Risk Factors

Soils proximity to surface water and wetlands, depth to permeable bedrock, topography, and certain management practices are the primary risk factors at Spirit Ridge golf course (Balogh 1999a). These factors are summarized in detail by Balogh (Balogh 1999a). The golf course superintendent, will understand all of these risk factors when selecting management practices.

The moderately deep to thin, coarse textured soils observed at Spirit Ridge are at risk to both surface runoff and subsurface leaching. Due to the dense subsurface soil horizons perched groundwater subject to lateral flow is a condition. The coarse-textured soils also are at risk to preferential subsurface flow. Soils forming significant preferential flow channels or drained with tile systems are at higher risk of subsurface quick flow of applied chemicals.

The topography of the site is rolling to moderately steep, which increases the risk of erosion in areas that may develop insufficient turfgrass cover. Waterways and buffer zones are maintained in permanent cover, reducing the velocity of runoff and movement of sediment. Holes #2, #3, #4, #5, and

#6 have areas associated with the tributary of Stewart Creek. Protection of the tributary is discussed in detail in Section 4.2.3 of the Turf Management System Plan manual.

Several areas on Spirit Ridge golf course may develop eroded soil or low density turfgrass caused by traffic, shade or poor drainage. Stressed or low density turfgrass does not have the nutrient uptake or pesticide attenuation capacity of dense, healthy turfgrass. Stressed turfgrass treated with fertilizers and pesticides has a higher risk of surface and leaching losses of soluble nitrogen (e.g nitrate) and relatively higher mobility of pesticides. Maintaining high quality turfgrass, protecting the buffer zones, and protecting the remaining forest vegetation on the site mitigates these potential problems (Balogh 1999b).

Any water percolating past the root zone on this course may pass vertically through the glacial till deposits to reach the underlying bedrock units. This water will primarily move laterally along the undulating bedrock surfaces. A dense subsurface till layer is generally present at 3 to 4 feet below the surface. This dense horizon and bedrock provides a direct subsurface pathway from glacial till deposits to the adjacent wetlands. Numerous wetlands on the site attest to this condition. Therefore, subsurface water generally is discharged from the site from the till deposits or directly from the surface from the bedrock units. In general, the bedrock unit beneath Spirit Ridge golf course is very slowly permeable and do not readily transmit water (Heimback and Wahlstrom 1998, 1999). The hydrogeologic conditions at Spirit Ridge golf course limit downward movement of water past the uppermost portions of the bedrock unit.

Movement of chemicals in subsurface flow is attenuated by moderately, deep soils with and high organic matter content in the surface horizons (Balogh and Anderson 1992; Walker and Branham 1992). Moderately deep to thin soils and perched groundwater depth to groundwater do enhance the risk of movement of soluble chemicals in subsurface lateral flow. BMPs to reduce chemical use and use slow-release and slow moving formulations must be used to protect surface water and groundwater. Surface runoff and subsurface lateral flow exiting the golf course and surrounding buffer zone will eventually flow into either Stewart Creek, Knowlton Creek, or unnamed intermittent drainage ways to the south of the Spirit Mountain Recreational Area.

Mowing height and frequency is one of the most intense aspects of golf course turfgrass management. The required intensity of all other cultural practices is in inverse proportion to the mowing height and mowing frequency. In Section 3.2.4, the suggestions to raise the mowing height slightly on fairways will significantly reduce the need for intense fertility, irrigation, and pest control practices.

The sequence of factors that influence turfgrass quality and growth at the Spirit Ridge golf course are determined by the climate, soil, vegetative conditions, and management practices. Turfgrass quality is controlled by these factors. In the order of decreasing importance, the conditions limiting turfgrass quality are: cutting height, moisture, nutrients, light, weeds, traffic, disease, thatch, temperature, and oxygen.

19. Water Quality - Wastewaters.

- a. Except for normal domestic sewage, there are no sanitary or industrial wastewaters produced or treated within the project site.

b. Golf Course and Maintenance Area

Sources, quantity, composition and treatment of sanitary waste from the golf course site are summarized in Table 12 of the Turf Management System Plan (Balogh 1999a). Human sewage on the golf course will be collected in portable toilets. Human sewage in the maintenance area Hole #1 and 10 area will be treated on-site in a pre-existing septic system currently used by the Sundown Motel. This system may need to be enlarged or re-designed to meet the increased loading. The soils in the area are capable of supporting mound based or other alternative septic systems. The paralthic or densic contact found between 2 to 4 feet on the site is associated with a perched water table. This condition typically

requires a mound system by the St. Louis County Health Department and regulations promulgated by the MPCA. The site soil conditions are summarized in Section 16 of this report.

Human sewage from the portable toilets will be removed and treated by a licensed contractor. All St. Louis County, MPCA Sewage Treatment, and other local regulations will be followed for disposal of sewage from golf course.

Pesticide rinsate from the golf course will be disposed following Minnesota Department of Agriculture and U. S. Environmental Protection Agency guidelines. Maintaining these guidelines is part of the golf course superintendents applicator license. Proper triple rinsing and disposal of chemical containers minimizes the risk of onsite accumulation of liquid formulated pesticides. Pesticide rinsate water will be applied on the turfgrass at the site as part of the pest control program.

Waste water from cleaning of equipment will be treated by disposal in the city sewer system.

Hotel

Human sewage, gray water, and liquid waste from restaurant and lounge are the primary sources of waste from the Hotel. This waste water will be transported by the City of Duluth sewer system to WLSSD treatment plant. The City of Duluth Planning Office and Engineering office believe the current system will be more than adequate to handle the increased loading to the waste treatment system.

- c. Other than domestic sewerage, no wastes will be discharged into a sewer system or pretreatment system.

20. Groundwater **Potential for Contamination:**

- a. Approximate depth (in feet) to groundwater; Based on the hydrogeologic report prepared by Heimbach and Waldstrom (1998), the following are estimates of groundwater depth:
 - Minimum Depth to Groundwater: 8-9 feet below ground surface.
 - Average Depth to Groundwater: 20 feet below ground surface.

- b. Site Hazards to ground water

The proximity of groundwater within 9 to 30 feet of the surface of the site, in addition to the perched water tables associated with the wetlands and dense subsoil is of concern regarding groundwater quality. Irrigation of turfgrass and the presence of shallow groundwater pose increased risk for impacts on groundwater quality (Balogh and Watson 1992). The primary risk under the soil, climate, and anticipated management conditions at the proposed site are for subsurface movement of nitrate.

Residents to the south of the project have expressed concern regarding groundwater protection in various

public meetings held by the City of Duluth, Midway Township, and onsite tours given by the Proposer and

Spectrum. The primary concern is for protection of shallow domestic wells from nitrates and pesticides.

Several homes to the south of the property have shallow, hand dug wells that are undocumented by the

Minnesota Department of Health.

These risks are mitigated and controlled primarily by: (1) regulating the amount of irrigation water used and use of water conservation practices; (2) using slow release fertilizer formulations commensurate with plant nutritional requirements; (3) using low mobility and relatively short-lived herbicides and fungicides; (4) using appropriate slow release fertilizer and pesticide formulations, rates, and timing of application; (5) using non-chemical alternate pest management strategies; and (6) monitoring groundwater quality in and adjacent to the golf course site. These practices have been

reviewed in detail by Balogh (1999a), Balogh and Anderson (1992), Balogh and Watson (1992), and Walker and Branham (1992). The Proposer willingly has agreed to implement all of these mitigation strategies.

A list of potential fertilizer formulations, nitrogen and phosphorus, herbicides, fungicides, and other management chemicals are provided in the TMS Plan (Balogh 1999a) and Water Assessment (Balogh 1999b).

Quantitative evaluation of potential effects on groundwater quality during construction and long-term management of the golf course will be conducted using the EPIC water quantity and quality model. General and specific procedures for this evaluation have been outlined by Balogh et al. 1992b, King and Balogh 1997, and King and Balogh 1999. This report is included in the general water quality and quantity evaluation report (Balogh 1999b).

Specific mitigation strategies for elimination of adverse groundwater quality impacts to surface water have been submitted (Balogh 1999a, 1999b).

Minimizing the risk of nonpoint source pollution to surface water and groundwater is one of the primary goals of environmentally sound turfgrass management. Golf course managers, golf course architects, golf course developers, and the public recognize the need to lessen potential adverse effects of turfgrass management on soil and water (Balogh et al. 1992b). The public remains intensely concerned about water and environmental quality issues.

Using carefully crafted plans for turfgrass management is the key for protection of soil and water resources on golf courses and in adjacent environments (Balogh and Walker 1992). Developing plans for integrated TMPs require assessing potential effects on surface water, groundwater and soil resources. The concept of integrated TMPs was reviewed under item **6 of this report. TMPs encompass the practice of(1) controlled** quality turfgrass management; (2) water quantity and quality management; (3) soil quality and erosion control; (4) management of reclaimed water for irrigation; (5) nutrient and fertilizer management; (6) integrated insect, weed and disease management; (7) prevention of offsite movement of pesticides and nutrients; and (8) wetland and wildlife habitat conservation (Balogh et al. 1992b; White and Peacock 1993).

Utilizing these principles in development of golf course management plans protects all water, soil, and environmental resources.

- c. Identify any toxic or hazardous materials to be used or present on the project site and identify measures to be used to prevent them from contaminating groundwater.
The use and control of fertilizer applications are part of the turfgrass management for the golf course. Nitrogen (N), phosphorus (P), and potassium (K) are the most common fertilizer elements. Occasionally calcium (Ca) is added to adjust soil pH on greens and tees. Iron is added to prevent chlorosis and stimulate development of good color on greens rather than using excessive amounts of nitrogen. Specific nutrient management practices are discussed in section 4.3.2 and 4.3.3 of the Turfgrass Management System Plan prepared by Spectrum Research, Inc. (Balogh 1999a)

21. Solid Waste: Hazardous Wastes: Storage Tanks:

- a. Describe the types, amounts, and compositions of solid or hazardous wastes to be generated, including animal manure, sludge and ashes. Identify the method and location of disposal. For projects generating municipal solid waste indicate if there will be a source separation plan, list types (s) and how the project will be modified to allow recycling.

b. Underground Storage Tanks

The MPCA identified the following storage tanks in and around the project area.

1. Leak 4693, Spirit Mountain Maintenance, 9500 Spirit Mountain Place, Reported 10/15/91,

- Closed
4/9/97
2. Leak 6604, Spirit Mountain Maintenance, 9500 Spirit Mountain Place, Reported 7/30/93, Closed
4/9/97
 3. Spill 24977, Spirit Mountain, 9500 Spirit Mountain Place, Reported 1/1/97
 4. Facility 19409, Holiday Station store #85, 9314 W. Skyline Parkway, 5 underground tanks.
 5. Facility 12939, Spirit Mountain Maintenance, 9500 Spirit Mountain Place, 6 under and above ground tanks.
 6. EPA ID 305777104, Graves Well Drilling, 550 5. Ugstad Road, Generator, out of business, less than 100kg/month.
 7. EPA ID MNR000003426, Northland Painting of Duluth, 2800 Ormsby Road. Generator, less than 100 kg/month.
 8. EPA ID MNDO8 1124018, Spirit Mountain Area Authority, 9500 Spirit Mountain Place, Generator, less than 100 kg/month.

For this project, one above ground storage tank for gasoline will be used in the vicinity of the golf course maintenance area (Map e). The MPCA approved above ground storage tank will have a capacity of approximately 100 gallons. The tank will be on a concrete pad with a containment curb. The tank itself will be in a concrete liner.

No storage tanks are anticipated for use at the Hotel site.

22. Traffic: Spirit Mountain Ski Area presently operates from November to April. The facility estimates that the ski hill generates 700 to 2500 vehicle trips per day during the ski season. The ski area has two access points; Skyline Parkway and Grand Avenue. The Grand Avenue access provides Duluth Transit Authority terminals and parking access for local users. The Skyline Parkway access provides the majority on non local traffic as well as immediate access to all ski hill amenities.

The following information was tabulated according to “The Transportation and Traffic Engineering Handbook”, Second Edition 1982, Institute of Transportation Engineers (ITE Manual);

Hotel: 160 rooms: 1550.4 average daily traffic. PM peak at 10.7 trips per hour. 190 offstreet parking spaces are proposed, 170 surface lot spaces and 20 basement level spaces. Skyline Parkway and Thompson Hill Road are built at a rural standard” with an ADT capacity of 2500. The Hotel is located on the “lower” south side of Skyline Parkway. This is the only roadway to the site and connects to 1-35 which is 3/5 mile east of the hotel site.

Golf Course: Parking spaces to be added for the golf course is unknown at this time. Existing number of parking spaces at Spirit Mountain Ski area is in excess of 500 along Skyline Parkway with an additional 200 spaces in the Grand Avenue lot. Winter users do not park in an organized manner so exact capacity is estimated at 500. Snow mobile trail users have a parking lot near the intersection of Skyline Parkway and Thompson Hill Road. Cross country Skiers use an area of the campground and on adjacent roadways. Estimated current total Average Daily Traffic (ADT) on Skyline Parkway, generated for the golf course, is 1000 ADT, based on City Engineering Division traffic counts at Lester Park and Enger Park Municipal Courses. The

ITE manual suggests a golf course of the proposed size will generate 859 ADT. Estimated maximum peak hour traffic generated and its timing: 200 at 3-4 P.M. The Proposer estimates 140 golfers per day which equates to 280 ADT without employee traffic. As stated above, Skyline Parkway and Thompson Hill road are built at a “rural street” standard with an ADT capacity of 2500.

Impact and Improvements: This traffic impact currently exists on a seasonal basis at Spirit Mountain
EAW-Spirit Ridge Golf Course & LodgePage 20

Recreation Area, the impacts of the golf course will maintain the level of traffic for a greater portion of the year. The greatest impacts will occur in the months of November through April and May through September. No new traffic related improvements are anticipated

23. Vehicle-related **air** emissions.

Hotel; The majority of the traffic and associated air emissions will be associated with the Hotel portion of the project. Given the seasonal traffic generated by The Spirit Mountain Ski facility, the hotel will have little if any impact on air quality, including carbon monoxide levels. The “seasonal traffic” volumes will be maintained though out the year.

Golf Course and Maintenance Area; It is anticipated that traffic associated with the golf course area will have minor impact on air quality. The additional local loading of nitrous and sulfur oxides, carbon monoxide, and other emissions from combustion of gasoline will be relatively minor compared to the air emissions generated by traffic from Interstate 35 and the seasonal traffic at the Spirit Mountain Recreation Area.

Electric golf carts will be used on the golf course. The golf carts will not add significantly to local traffic air emission. Mowers and other gasoline powered equipment associated with turfgrass management will make a small contribution of nitrous and sulfur oxides and carbon monoxide to the atmosphere. Turfgrass mowing, aeration, and use of maintenance carts typically lasts from mid-May through mid-October. The golf course superintendent will insure that all equipment is properly maintained and running efficiently to reduce the total emissions from the small engines used for turfgrass maintenance.

24. **Stationary source air emissions.**

Hotel The only stationary source of air emissions associated with the Hotel project will be the vent stacks from the hotel, restaurant and lounge. The emission from the hotel boilers has a minimal effect on air quality as most of the hotel utilizes electric heat. Water heaters and boilers are small gas units. A 2” gas line will be extended from the Duluth Water and Gas Department service line.

Golf Course and Maintenance Area No stationary source air emissions will be associated with the golf course and maintenance area.

25. **Project dust, odors and noise;**

Hotel; Dust will be generated during construction. The sources of dust will be primarily from the soil during excavation and movement of heavy vehicles during construction. Possible receptors of the dust include the Spirit Mountain Ski Area Chalet and local traffic using Skyline Parkway.

Dust will be controlled using a dilute solution of calcium carbonate (150 pounds of CaCO₃ per 55 gallons of water covering 30-35 ft³ per gallon of solution). The solution will be spread on those areas excavated and equipment traffic areas as needed.

Once in operation odors from the exhaust vents from the restaurant and lounge will be mitigated using all St. Louis County Health Department codes, City of Duluth building codes, and Minnesota Department of Health codes and standards.

Noise of construction will occur. The Hotel site is far enough away from any residences to mitigate this issue. The Spirit Mountain Authority will work with the Proposer to insure that construction noise and dust does not interfere with the operation of the ski chalet and ski slopes during the winter.

Golf Course and Maintenance Area; Dust and noise will be generated during construction of the golf course project. The sources of dust will be primarily from the soil during site preparation and grading of the proposed site as documented in item 6 of this document. Noise will result from the operation of the construction equipment. Possible receptors of the dust and noise include the businesses, residences, apartments, and local traffic using Thompson Hill Road (Appendix I: Map 3). The dust will result from the movement of tree clearing and grading equipment during construction.

Dust will be controlled using a dilute solution of calcium carbonate (150 pounds of CaCO₃ per 55 gallons of water covering 30-35 ft³ per gallon of solution). The solution will be spread on those areas excavated and equipment traffic areas as needed. Dust will be generated during the hours of construction. Most of the dust on the

golf course site will be attenuated by the foliage on the forest vegetation. This dust will be washed back into the forest floor during rain events. Dust impacts on receptors should occur for short periods of time during construction. At the direction of the Proposer and the Golf Course Architect, every effort will be made by the construction contractor to:

1. Locate access roads as far away as possible from neighboring residences.
2. Use watering solutions on temporary roads.
3. Use gravel on temporary roads next to local residences and access areas to the site.
4. Use temporary ground cover on areas potentially exposed to wind erosion.
5. Establish permanent cover on turfgrass areas as soon as possible following grading, installation of the irrigation system, and installation of the drainage system.
6. Operate heavy equipment between the hours of 7:00 AM to 6:00 PM to avoid adverse noise and dust impacts on residential neighbors of the golf course.

Turfgrass is considered a best management practice for dust and noise control (Balogh et al. 1992a). Cart paths on the golf course will be paved. Bare soil surfaces exposed to wind erosion are rare on well maintained golf courses (Balogh and Watson 1992).

26. Are any of the following resources on or in proximity to the site:

The hotel site and eastern portion of the golf course are within the Spirit Mountain Recreation Area. These uses are within the scope of uses intended by the state legislation. The western portion of the golf course is private land. Mn DNR State Snowmobile Trail is located along the northern and western boundary of the Spirit Mountain Recreation Area and perpetuation is accommodated in this plan.

a. **archeological, historical, or architectural resources;** Anecdotal evidence was presented at Duluth City Council meetings indicating that some Native American use a portion of the eastern side of the proposed golf course area for spiritual meditation. Mr. Jim Jones of the Minnesota Indian Affairs Council has evaluated the potential impact on the cultural use of the property by Native Americans and found an area of interest located south of and outside the project area. It is noted that 84% of the property will remain in its current condition. The Office of the State Archeologist also evaluated the project areas and found no areas of concern. This resource can be shared by all potential users of the public property. (See Appendix I: letters)

b. farmlands; USDA NRCS records show that the dominant upland soils on the site, Finland and Ahmeek, are designated as prime farmland soils (Balogh 1998). Information on the tentative Mesaba soil was not available. Comparison of the general prime farmland criteria to the properties of the Mesaba soil make this soil marginal for classification as a prime farmland soil (USDA NRCS 1998b).

The soil and site conditions as outlined in Sections 9 and 16 of this report would preclude the proposed project area from consideration as “unique” farmland (USDA NRCS 1998b). The past land use of this site is undeveloped forest land with occasional harvesting. Conversion of the property located within the jurisdiction of the Spirit Mountain Authority (Spirit Ridge “East” .Map b) on the City of Duluth to farmland would not be consistent with current land use and statutory requirements for the area. Conversion of the property designated as Spirit Ridge “West” (Map b) would be possible, but not consistent with current rural residential character of Midway Township. Conversion of the proposed properties to agricultural land would increase the possibility of soil erosion, pesticide and nutrient losses in runoff, pesticide and nutrient losses in leachate, and permanently change the character wetlands (Anderson et al. 1989; Balogh and Anderson 1992; Mitsch and Gosslink 1993; Walker and Branham 1992).

Given the site soil, topographic, edaphic, and land use conditions, conversion of the proposed project area to

agricultural use would not be an environmentally sound land use.

c. **designated parks, recreation areas, or trails;** The hotel site and golf course designated as Spirit Ridge “East” are part of the Spirit Mountain Recreational Area. As discussed in detail in Section 9. of this report, the hotel and golf course are well within intended the statutory use of this area. Spirit Ridge “West” is located on private land under control of Spirit Ridge LLC. This area is not a designated park or recreational area. Spirit Ridge LLC desires to make this area consistent with the land use associated with

the Spirit Mountain Recreational Area.

A Minnesota DNR State Snowmobile Trail is located along the northern and western boundary of the Spirit Ridge “East” site (Maps c and e). The golf course and hotel project will not affect this trail. It is intended that the hotel will provide additional services available to the user’s of this trail.

A portion of the extensive cross-country ski trails owned and operated by the Spirit Mountain Authority is located on the proposed Spirit Ridge “East” property (Maps c and e). The Spirit Mountain Authority currently maintains 10.6 miles of cross-country ski trails on this part of the proposed site. These trails are considered by the Proposer and the Spirit Mountain Authority as an integral part of the Spirit Mountain Master Plan. Approximately 2450 feet (0.5 miles) of the trail system intersects the areas to be converted to turfgrass.

The Proposer has worked directly with the Spirit Mountain Authority to minimize the effects on the trails. At the request of the Spirit Mountain Authority and the City of Duluth Planning Department, the original design of Spirit Ridge “East” was altered drastically to minimize impacts on the ski trails. As a result of this decision by the local units of government, the current golf course design has located several holes (e.g. Holes #12, 13, 14, and parts of 16 and 17) in the areas of mature mixed hardwoods. As discussed in detail in Section 9 of this report, this design change resulted in conflicts with the desires of the Duluth Tree Commission and local environmental groups.

The Proposer has agreed to work with the Spirit Mountain Authority to re-route the cross-country ski trails where necessary. The original designer of these ski trails, George Hoveland, Jr. agreed to consult with the Spirit Mountain Authority Board on the re-design of the cross-country ski trails. Mr. Hovland supports the golf course as an integral part of this recreational area, When the cross-country ski trails were originally designed by Mr.

Hoveland, it was his intention that a golf course would ultimately be incorporated into the overall design.

The cross-country ski trails will remain available for walking trails during the summer, spring, and fall. This use of the trails is entirely consistent with the (1) statutory intent for the property; (2) City of Duluth Master Plan for the Spirit Mountain Recreation Area; (3) the desires of the Proposer for a full service resort complex; and (4) the opinions stated by the citizens of the area.

d. scenic **views and vistas:** Skyline Parkway is a scenic drive and has been recommended for federal “Scenic Byway” designation. A one mile long portion of the parkway, through the Spirit Mountain Recreation area, was relocated up to one-quarter mile (raised in elevation) in 1973-4 to provide for the ski slopes of Spirit Mountain. The hotel will have access from the relocated portion of the roadway.

Skyline Parkway borders the east side of the golf course project area and provides an excellent scenic vista of the St. Louis River basin and the Duluth-Superior harbor (Map b). The golf course and hotel will not adversely affect this vista. The hotel will provide additional access to this vista.

Larson (1997) reported two landscape features of scenic interest. First is a corridor of sugar maple and northern hardwood types along the bluff line parallel to the St. Louis River and Lake Superior, extending northeast. This bluff line extends up the north shore of Lake Superior into Lake and Cook counties. The ridge is typically vegetated with sugar maple and other mixed hardwoods as observed by Grigal (1968). The proposed project will not significantly affect this feature as 84 percent of the natural cover will remain in place. The Proposer has agreed to work with the City of Duluth Public Works Department Forester to minimize damage to this area during

The overlooks west of Skyline Drive, facing east and northeast described by Larson (1997) were noted earlier in this section of the report. Currently these vistas are largely obscured by vegetation and are not accessible to the public. Golf course development will provide additional access to these vistas.

e. Other than discussed in Item a above, no other unique resources have been identified.

27. The project will not create any adverse visual impacts.

28. Compatibility with plans: The project is consistent with the Laws of Minnesota for 1973 Chapter 327- H.F. No. 1969, state legislation for the creation of the Spirit Mountain Recreation Area Authority, and the “Master Land Use Plan for the Spirit Mountain Recreation Area” (Public Document 61453), adopted by Duluth City Council resolution on January 21, 1974 and later amended ; by Resolution No.75-604 (Public Document No. 64022) on October 6, 1975; by the Minnesota Legislature adopted S.F. 1770, Chapter 390, Amending Laws 1973, Chapter 327, Section 2, subdivision 1, annexing the 80 acres above Grand Avenue; Council Resolution 84-0889; a July 8, 1986, Planning Commission amendment; and, Council Resolution 97-087 1 adopted November 24, 1997.

The project is consistent with the Laws of Minnesota for 1973 Chapter 327- H.F. No. 1969, which created the Spirit Mountain Recreation Area with the goals of: (1) The development of wide-range recreational facilities available to both local residents and tourists; (2) The aiding of the economy of northeastern Minnesota by encouraging private enterprise efforts in conjunction with the recreational facilities; and (3) The preservation of the environment in the area by a timely and intelligent plan of development. This project achieves all of the these goals.

The project is consistent with the Master Land Use Plan for the Spirit Mountain Recreation Area adopted January 21, 1974, by the Duluth City Council which, among other things, provided for; an 18 hole golf course (in the same general location as this project); a hotel/motel. And in accordance with the City Council action of November 24, 1997 which approved an Amendment to the Spirit Mountain Recreation Area Master Plan, which provided for:

- (a) A reduction in the size of the golf course from 18 holes to nine holes;
- (b) Additional ski runs and lifts;
- (c) Addition of a summer youth recreation area;
- (d) Addition of a snowboard park;
- (e) Additional lodging areas; and

amending the Spirit Mountain master plan as contained in Public Document No. 61453 and Public Document No. 64022, by replacing it with the Spirit Mountain master plan on file in the office of the city clerk as Public Document No. 97-1124-18, subject to the following conditions:

- (a) The city of Duluth water resources management ordinance be used as a guide in the approval of all plans and work permits;
- (b) The parking standards established in the Duluth zoning ordinance be used as a guide in the approval of all plans and work permits.

The project is also in accordance with the City of Proctor Master Plan of July 1997 which calls for commercial use of the lands between 1-35 and the southern limits of the City of Proctor. This area is zoned “C-2” Commercial under the Proctor Zoning Code.

29. Impact on Infrastructure and Public Services:

No new or expanded utilities, roads, other infrastructure, or public services will be required to

serve the project. The hotel will connect to existing municipal water and sewer services which pass through or are adjacent to the site.

- a. Are future stages of this development planned or likely? **Yes.** This is one element of the Spirit Mountain Recreation Area Master Plan See Items 9 and 28 of this report.

Future stages, timing, and plans for environmental review are based on the decisions of the Spirit Mountain Recreation Area Authority and statutory requirements based on size and type of development.

- b. Is this project a subsequent stage of an earlier project? **Yes.** This project is one of several elements of the Spirit Mountain Recreation Area Master Plan. See History under item 9 of this report.
- c. Is other development anticipated on adjacent lands or outlots? **Yes.** It is anticipated that related development such as commercial uses and lodging and possibly housing may occur on adjacent property in the City of Proctor and Midway Township.
- d. **If a, b, or c** were marked Yes, discuss any cumulative environmental impacts resulting from this project and the other development. As plans are developed and permits applied for they will be reviewed in accordance with the ordinances of the appropriate jurisdictions and EQB rules.

31. **Other Potential Environmental Impacts:** If the project may cause any adverse environmental impacts which were not addressed by items I through 28, identify and discuss them here, along with any proposed mitigation.

32. **SUMMARY OF ISSUES.** List any impacts and issues identified above that may require further investigation before the project is commenced. Discuss any alternatives or mitigative measures that have been or may be considered for these impacts and issues, including those that have been or may be ordered as permit conditions.

- a. **General Comment On Alternatives.**

1. Do Nothing; To do nothing is to fall short of the total recreational opportunities envisioned in the State legislation

2. The old design of the Golf Course in the Spirit Mountain Recreation Area Master Plan was determined to be inappropriate, though it did reflect the statutory goals of 1973, due to the creation of the City of Duluth, Water Resources Management Ordinance (Chapter 51 of the Code) 1980 and the Minnesota Wetland Conservation Act of 1991. The location and design was not in keeping with the goals and policies of these statutes, rules and ordinances.

3. The current design is in keeping with the State enabling legislation, the Spirit Mountain Recreation Area Master Plan, the goals and objectives of city Code and Wetland Conservation Act.

- b. Land Use And Compatibility With Plans. See items 9 and 28 above.

- c. Fish, Wildlife, and Ecologically Sensitive Resources. During public meetings related to this project and amendments to the Spirit Mountain Master Plan the following issues were raised: Impacts on Water Quality; Wetlands: "old growth forest"; cross country ski trails; Native American burial grounds.

Water Quality and Wetland conservation are an integral part of this plan.

Removal of trees of significant age and or size is minimized if not avoided in this plan.

Preservation and or perpetuation of the existing trail systems for all uses is included in this plan.

The Minnesota Indian Affairs Council and Office of the State Archeologist conducted on site evaluations of

the project area and concluded that there are no sites of significance within the project.

CERTIFICATIONS BY THE RGU (all three certifications must be signed for EQE acceptance of the EAW for publication of notice in the EOB Monitor)

A. I hereby certify that the information contained in this document is accurate and complete to the best of my knowledge.

Signature

B. I hereby certify that the project described in this EAW is the complete project and there are no other projects, project stages, or project components, other than those described in this document, which are related to the project as “connected actions” or “phased actions,” as defined, respectively, at Minn. Rules, pts. 4410.0200, subp. 9b and subp. 60.

Signature _____

C. I hereby certify that copies of the completed EAW are being sent to all points on the official EQB EAW distribution list.

Signature

Date

APPENDIX I

Environmental Assessment Worksheet, Spirit Ridge Golf Course and Lodge, Duluth, Minnesota

Maps

- Map a. A county map showing the general location of the project.
- Map b. Copy of USGS 7.5-minute, 1:24,000 scale map indicating project boundaries. Map c. A site plan showing all significant project and natural features.
- Map d. Copy of USGS 7.5-minute, 1:24,000 scale map indicating project boundaries, direction of surface runoff and designated channels.
- Map e. A site plan map showing all wetlands and proposed wetland mitigation areas.
- Map f. Hotel site plan map.
- Map g. A site map with an overlay of forest cover types.

Tables

1. Table 2 Features and Scope of the Proposed Timber Ridge Lodge.
2. Table 6A/6B Cover Types
3. Table 12 Sources, quantity, composition and treatment of sanitary waste water from the golf course site.

Letters

- A. Gimmetstad, Dennis A., Government Programs and Compliance Officer; Minnisota Historical Society, State Historic Preservation Office, dated August 6, 1998. 1 pp.
- B. Jones, James L., Cultural Resource Specialist; State of Minnesota Indian Affairs Council; dated June 10, 1999. 2pp.
- C. Dudzik, Mark J. State Archaeologist; Offices of the State Archaeologist, Minnesota; dated August 20, 1999. 1 pp + map
- D. Revak, Chuck, 1998. Minnesota Department of Natural Resources-Waters, Two Harbors, MN. May 5, 1992 pp. ± 2 maps.

OTHER REFERENCES:

The Audubon Cooperative Sanctuary System "The value of Being a Fully Certified Audubon Cooperative Sanctuary, Golf Program" 11/97

APPENDIX II
Environmental Assessment Worksheet,
Spirit Ridge Golf Course and Lodge, Duluth, Minnesota

References

Anderson, J.L., J.C. Balogh, and M. Waggoner. 1989. Soil Conservation Service procedure manual: Development of standards and specifications for nutrient and pesticide management. Section I & II. USDA Soil Conservation Service. State Nutrient and Pest Management Standards and Specification Workshop, St. Paul, MN. 453 pp.

Balogh, J.B. 1998a. Preliminary data submittal to the Environmental Quality Board to determine the responsible unit of government for the Spirit Ridge Golf Course and Lodge Project in Duluth, MN. Submitted to the Minnesota Environmental Quality Board, Minnesota Planning Department. Spectrum Research, Inc., Duluth, MN.

Balogh, J.B. 1999a. Turfgrass management system plan for the protection of water, soil, and vegetation in the vicinity of spirit ridge golf course. Submitted to Spirit Ridge, LLC and the City of Duluth Planning Office. Spectrum Research, Inc., Duluth, MN.

Balogh, J.C., and J.L. Anderson. 1992. Environmental impacts of turfgrass pesticides. *In* Balogh, J.C., and W.J. Walker (eds.). p. 221-353. Golf course management and construction: Environmental Issues. Lewis Publishers, Inc. Chelsea, MI.

Balogh, J.C., and W.J. Walker. (eds.). 1992. Golf course construction and management: Environmental issues. Lewis Publishers, Inc.

Balogh, J.C., and JR. Watson, Jr. 1992. Role and conservation of water resources. pp. 39-1 04. *In* Balogh, J.C., and W.J. Walker (eds.). Golf course management and construction: Environmental Issues. Lewis Publishers, Inc. Chelsea, MI.

Balogh, J.C., V.A. Gibeault, W.J. Walker, M.P. Kenna, and J.T. Snow, 1992a. Background and overview of environmental issues. pp. 1-37. *In* Balogh, J. C. and Walker, W. J. (eds.) Golf course management: Environmental issues. Lewis Publishers, Inc. Chelsea, MI.

Balogh, J.C., AR. Leslie, W.J. Walker, and M.P. Kenna. 1992b. Development of integrated management systems for turfgrass. pp. 355-439. *In* Balogh, J. C., and W. J. Walker (eds.). Golf course management and construction: Environmental Issues. Lewis Publishers, Inc. Chelsea, MI.

Bernu, J.K.S. 1999a. Forest survey for a portion of proposed Spirit Ridge golf course in Duluth, Proctor & Midway Township, MN. Prepared for Spirit Ridge, LLC by Two By Forestry. Cloquet, MN.

Bernu, J.K.S. 1999b. Harvesting plan for the proposed Spirit Ridge golf course in Duluth, Proctor & Midway Township, MN. Prepared for Spirit Ridge, LLC by Two By Forestry. Cloquet, MN.

City of Duluth. 1941. Types of soil within 7 feet of surface, surface cover, and 10 foot contour lines. 1:2400 Map. Section 22, T49N, R15W. WPA Project 65-1-71-2583. City Planning Department, City of Duluth. Duluth, Minnesota.

EBI. 1998. Wetland delineation report for holes 1-18 Spirit Ridge golf course. Submitted to Spirit Ridge, LLC. Earth Burners, Inc., Duluth, MN.

EBI 1999. Wetland replacement plan for Spirit Ridge golf course and Lodge. Submitted to Spirit Ridge, LLC. Earth Burners, Inc., Duluth, MN.

Erickson, R.A., RH. Rust, G.F. Harms, and L.D. Hanson. 1977. Minnesota soil atlas. Duluth sheet. Miscellaneous Report 148. University of Minnesota, Agricultural Experiment Station, St. Paul, MN + Map.

Grigal, D.F. 1968. The relationship between plant communities and soils in northeastern Minnesota.

Ph.D. thesis. University of Minnesota, Department of Soil Science. Minneapolis, MN.

Heimbach, R.H. and R.J. Wahlstrom. 1998. Spirit Ridge Golf Course and Lodge Project: I. Report on groundwater flow and surface water runoff submitted to Spectrum Research, Inc. DPRA, Inc., St. Paul, MN. 3 pp. + 2 maps.

Heimbach, R.H. and R.J. Wahlstrom. 1999. Spirit Ridge Golf Course and Lodge Project: II. Report on surface geology, subsurface geology, and hydrogeology submitted to Spectrum Research, Inc. DPRA, Inc., St. Paul, MN. 4 pp.

Institute of Transportation Engineers, The Transportation and Traffic Engineering Handbook, Second Edition 1982

King, K.W. and Balogh, J.C. 1997. Evaluation of an agricultural water quality model for use in golf course management.

In Ward, A.D. and Wilson, B.N. (eds.). Applications of Emerging Technologies in Hydrology. American Society of Agricultural Engineers. St. Joseph, MI. pp. 33-36.

King, K.W. and Balogh, J.C. 1999. Modeling evaluation of alternate management practices and reclaimed water for turfgrass systems. *J. Environ. Qual.* 28(1):187-193.

King, K.W., J.C. Balogh, and J.G. Arnold. 1999. Application of SWAT to whole turfgrass systems. American Society of Agricultural Engineers 1999 Annual Meeting. Toronto, Canada. *In Press.*

Kosian, P.A., M.E. Balogh, and R.M. Tietge. 1992. Wetlands and golf courses. pp. 479-517. *In* Balogh, J. C. and Walker, W. J. (eds.) Golf course management: Environmental issues. Lewis Publishers, Inc. Chelsea, MI.

Larson, J. 1997. Walk-through survey Spirit Mountain area, Duluth, Minnesota. Survey conducted by St. Louis County Land Department for the Spirit Mountain Authority at the request of the St. Louis County Land Commissioner. 9 pp.

Minnesota Department of Natural Resources. 1995. Protecting water quality and wetlands in forest management: Best management practices in Minnesota. Minnesota Department of Natural Resources, St. Paul, MN.

Minnesota Department of Natural Resources. 1998. Minnesota Natural Heritage Database Search for Spirit Ridge Golf Course and Lodge. Minnesota DNR Natural Heritage and Nongame Research, Program. St. Paul, MN. 4 pp.

Minnesota Pollution Control Agency, Division of Water Quality, publication "Protection Water Quality in Urban Areas", (1989, 1991 & 1994).

Mitsch, W.J. and J.G. Gosslink. 1993. Wetlands. Van Nostrand Reinhold. New York, NY.

Revak, C. 1998. Spirit Mountain Golf, Stewart River Tributary, St. Louis County. Report prepared by Minnesota DNR Waters, Minnesota Department of Natural Resources, Two Harbors, MN. 2 pp. + 2 maps.

Rusterholz, K. A. 1997. Minnesota Department of Natural Resources, Letter dated August 26, 1997.

Tietge, R.M. 1992. Wildlife and golf courses. pp. 441-478. *In* Balogh, J.C. and W.J. Walker (eds.). Golf course management and construction: Environmental Issues. Lewis Publishers, Inc. Chelsea, MI.

USDA NRCS. 1998a. Highly erodible soil map unit list: South St. Louis County, MN.

<http://www.mn.nrcs.usda.gov/soils/ken/137s.hel>. USDA Natural Resource Conservation Service, St. Paul, MN. USDA NRCS. 1998b. Minnesota prime farmland list.

<http://www.mn.nrcs.usda.gov/soils/ken/primel.dbe>. USDA Natural Resource Conservation Service, St. Paul, MN.

Walker, W.J., and B. Branham. 1992. Environmental impacts of turfgrass fertilization. p. 105-219. *In* Balogh, J.C., and W.J. Walker (eds.). Golf course management and construction: Environmental Issues. Lewis Publishers, Inc. Chelsea, MI.

Walton, G.B. 1998. Spirit Mountain Rare Plant Survey. Submitted to Spectrum Research, Inc. Duluth, MN. 22 pp. 2 maps.

White, R.W., and C.H. Peacock. 1993. Items for environmentally responsible golf course management. *Int. Turfgrass. Res. Soc. J.* 7:1000-1004.