Chapter P2

Yadon's Piperia

Introduction

This chapter presents a discussion of project direct and indirect impacts related to Yadon's piperia (*Piperia yadonii*), a federally listed endangered native orchid. The environmental setting used as the basis for evaluating these impacts is at the end of this chapter.

This revised analysis replaces the discussion of Yadon's piperia in Chapter 3.3 (direct) in its entirety and supplements the environmental setting information Appendix E (setting) in the Draft EIR relative to 2004 survey results. The revised cumulative analysis is provided in Chapter P7 of this document.

Revisions Since the Draft EIR

The key changes in analysis of Yadon's piperia in this document compared to the Draft EIR are as follows:

- The conclusion of the Draft EIR that the project impacts to Yadon's piperia can be mitigated to a less than significant has not changed, though the analysis and the mitigation have been changed as presented in this document.
- The results of spring 2004 surveys for this species are presented and the analysis updated using the results. All references in this document to acres or individuals on project sites are based on the 2004 survey results, unless otherwise noted.
- The analysis of indirect impacts has been expanded and the area of indirect impacts has been identified.
- The applicant's realignment of Stevenson Drive has been altered to reduce its impact and thus the realignment of Stevenson Drive traffic onto Bristol Court has been deleted.
- The applicant has revised the configuration of the building envelopes at Residential Areas F-2, F-3, I-2, K, and PQR to avoid and/or reduce the direct loss of Yadon's piperia. This has been taken into account in the revised analysis.

- Realignment of golf course holes as proposed as mitigation in the Draft EIR has been deleted as mitigation due to concerns about safety and slope.
- Transplantation is now limited to Area MNOUV only due to a concern about potential genetic contamination of transplanting material from Area MNOUV to other locations in the Del Monte Forest.
- Enhancement requirements have been expanded to additional locations.
- Preservation requirements have been expanded to include potential additional Yadon's piperia locations within the Aguajito parcels owned by the applicant based on a required spring 2005 survey to be conducted.
- Success criteria for transplantation and enhancement have been refined.

SUMMARY OF CHANGES TO DRAFT EIR		
DEIR (PRDEIR) Text	**New or Expanded Text is Added to DEIR**	**DEIR Text Replaced by PRDEIR**
Summary of Impacts		Replaces Impact BIO-D1
Relevant Project Characteristics	Adds text describing revised Stevenson Drive realignment.	
Project Impacts & Mitigation Measures		Replaces Impact BIO-D1 (Yadon's piperia) discussion on pages 3.3-31 to page 3.3-37 Replaces Mitigation Measure BIO-D1-1 through D1-4 (Yadon's piperia) discussion on pages 3.3-37 to page 3.3-41
Environmental Setting	Adds new text related to 2004 surveys for Yadon's piperia and revised estimates of occurrence areas and population size.	

Summary of Project Impacts

The following table provides a summary of the project impact on biological resources and the significance conclusion. The impact analysis is presented later in this section.

Summary of Project Impacts, Yadon's piperia

IMPACT TOPIC	GC	EC	SBI	SBE	SBR	PBL	SUB	CY	RD	HWY
D. Special Status Species										
D1. Yadon's piperia	⦿	⦿	—	⦿	—	—	⦿	—	⦿	—

● = Significant Unavoidable Impact

⦿ = Significant Impact that can be Mitigated to Less-than-Significant

○ = Less than Significant Impact

— = No Impact or Not Applicable to the development site

GC – Golf Course; **EC** – Equestrian Center; **SBI** – Inn at Spanish Bay; **SBE** – Spanish Bay Employee Housing; **SBR** – Spanish Bay Driving Range; **PBL** – The Lodge at Pebble Beach; **SUB** – Residential Subdivisions; **CY** – Corporation Yard Employee Housing; **RD** – Roadway Improvements; **HWY** – Highway 1/Highway 68/17-Mile Drive Improvement

Characteristics for Impact Analysis

The characteristics of the Proposed Project and cumulative development that were used as the basis for the impact analysis are described below. The environmental setting relative to the impact analysis is presented after the impact analysis itself.

Revised Stevenson Drive Realignment

The applicant's proposed realignment of Stevenson Drive described in the Draft EIR included separate connections from Stevenson Drive to Bristol Lane and Silver Court. The applicant revised this proposal to include only a single connection to a retained part of Bristol Curve that will provide access to both Bristol Lane and Silver Court in order to reduce the removal of Yadon's piperia. The revised Stevenson Drive realignment is shown in Appendix F in this document.

Impacts and Mitigation Measures

Significance Criteria

D. Special Status Species

The project would have a significance impact if it would:

have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special

status species in local or regional plans, policies, or regulations, or by the DFG or the U.S. Fish and Wildlife Service, (USFWS) including reducing the number or restricting the range of an endangered, rare or threatened species.

Impacts and Mitigation Measures

Impact BIO-D1. Project development would reduce the number of and restrict the range of Yadon's piperia, a federally listed endangered native orchid as well as result in indirect impacts to other occupied and unoccupied Yadon's piperia habitat. These impacts are partially offset by applicant's proposed preservation, transplantation, enhancement, and resource management. This is significant impact that can be reduced to a less-than-significant level by a comprehensive suite of mitigation measures including additional avoidance and minimization measures, resource management, transplantation, enhancement, and preservation of additional manageable areas of occupied habitat owned by the applicant.

Overall Impact Characterization

Seven project development sites and most of the proposed preservation areas contain occupied habitat for Yadon's piperia (also known as Yadon's rein orchid), which is federally listed as endangered.

The 2004 survey results are used to characterize the distribution and abundance by site. The individual 2004 survey plant counts are used to characterize population losses. Thus all reference in this section are based on the 2004 surveys, unless otherwise noted. The survey methodology is discussed further in "Existing Setting" below.

The occurrence area was estimated by including all forested areas that are within 50-feet of surveyed 2004 Yadon's piperia patches. The purpose of using a 50-foot buffer is to establish a conservative basis for estimating the occurrence acreage for Yadon's piperia in 2004. Known areas of non-habitat, such as developed areas, golf courses, roads, trails, wetlands, sand dunes, and open meadows were excluded from the defined occurrence areas. This methodology allows for inclusion of areas in which Yadon's piperia may be present, but not expressed above ground, areas where Yadon's piperia may have been missed in the surveys, areas where Yadon's piperia might most readily naturally colonize in the time before project development occurs, and the area in which Monterey pine forest provides critical filtering of direct sunlight considered essential to Yadon's piperia habitat. This occurrence area is used in this PRDEIR as an equivalent for occupied habitat. While general habitat characteristics for this species are not known, detailed scientific assessment of the specific habitat characteristics has not been conducted, and thus it is possible that our understanding of what constitutes habitat may change over time. Nevertheless, by using a 50-foot

buffer, this PRDEIR uses a definition of "occupied habitat' that is appropriately conservative.

A total of 127 acres, containing ~123,000 individual plants, occurs within the project area, including the proposed preservation areas. Approximately 58 acres containing ~53,000 plants are within development sites and 69 acres containing ~70,000 plants are within preservation or conservation areas. Updated resource maps showing areas of development and preservation relative to the Yadon's piperia occurrences as defined in 2004 are presented in Appendix E.3.

Although there are probably additional populations that have not been inventoried in resource studies conducted for this species to date and populations outside the project area have not been surveyed with a methodology akin to the 2004 survey, the total estimated known population (~173,000) plants and the approximate area of total occupied habitat (~355 acres) are used to establish a conservative basis for the significance determination in this document.

Overall Direct Adverse Impacts. Based on the development plans, the Proposed Project would result in the direct removal of approximately 36 acres and an estimated 36,000 individual plants (see Table P2-1).

Based on acreage, this would represent approximately 10% of the estimated known occupied habitat (355 acres) for Yadon's piperia. It should be noted that the acreage estimates used for areas outside the Del Monte Forest are based on different survey methodologies than the 2004 surveys used in this report for the project areas. Thus, this percentage acreage loss should only be considered a rough estimate. Using the 1996 survey data for the project sites, in the DEIR the estimated loss was about 8%, for reference.

Based on individuals, this removal would represent loss of approximately 26% of the known population in the Del Monte Forest, 25% of the known population on the Monterey Peninsula, and approximately 21% of the total known population (see Table P2-2). It should be noted that the population estimates for areas outside the Del Monte Forest are based on different survey methodologies than the 2004 surveys used in this report for the project areas. Thus, this percentage population loss should only be considered a rough estimate. Given that the census methodology for the 2004 surveys was more intensive than prior surveys for areas outside the Del Monte Forest, it is possible that the percentage loss estimates may overstate the level of impact.

The percent individual losses are much higher than the percentage occupied habitat loss due to the relatively higher density of individuals found within some the project development sites (in particular at the Proposed Golf Course).

Overall Indirect Adverse Impacts. Indirect impacts to Yadon's piperia from project development would also occur due to:

Table P2-1
Summary of Project Direct Impacts on Yadon's piperia

Project Area	Yadon's Piperia (occurrence acres, 2004)			Yadon's Piperia (individuals, 2004)		
	Total	Disturbed	Preserved	Total	Disturbed	Preserved
Proposed Golf Course (Area MNOUV)	53.5	34.4	4.8	57,150	36,322	10,547
New Equestrian Center	0.0	0.0	0.0	0	0	0
Inn at Spanish Bay	0.0	0.0	0.0	0	0	0
Lodge at Pebble Beach	0.0	0.0	0.0	0	0	0
Spanish Bay Employee Housing/ Pres. Area B	2.0	0.0	2.0	274	0	274
Spanish Bay Driving Range/ Conservation Area C	0.0	0.0	0.0	0	0	0
Preservation Area D	N/A	0.0	N/A	N/A	0	N/A
Residential Area F-2	1.9	0.4	0.0	514	26	0
Residential Area F-3/ Conservation Area F-3	1.4	0.4	0.6	135	2	54
Preservation Area G	4.9	0.0	4.9	757	0	757
Preservation Area H	4.7	0.0	4.7	624	0	624
Preservation Area I-1	9.7	0.0	9.7	2,972	0	2,972
Residential Area I-2	1.6	0.3	0.0	203	0	0
Preservation Area J	0.3	0.0	0.3	134	0	134
Residential Area K	2.3	0.2	0.0	3,909	6	0
Conservation Area K	1.2	0.0	1.2	416	0	416
Preservation Area L	0.1	0.0	0.1	4	0	4
Residential Area PQR	2.7	0.2	0.0	1,696	0	0
Preservation Area PQR	40.5	0.0	40.5	54,436	0	54,436
Corporation Yard	0.0	0.0	0.0	0	0	0
Internal Road Improvements	Potential	Potential	0.0	Potential	Potential	0
Highway 1/68	0.0	0.0	0.0	0	0	0
TOTAL	**126.6**	**35.9**	**68.7**	**123,224**	**36,356**	**70,218**

Note: Occurrence acres based on 50-foot buffering of 2004 Yadon's Piperia surveyed patches. Individuals are based on 2004 Surveys by Zander & Associates. See discussion of these two surveys and data sets in Appendix E.3. Occurrences and disturbance areas are shown on figures in Appendix E.3. Highway 1/68 based on negative results reported in LSA 2001.

Table P2-2. Project Direct Impacts on Yadon's Piperia in a Regional Context

Location	Known Population Size	Presently Preserved	Disturbed by Project	Preserved with Project	Additional Preservation Mitigation	Total Preserved With Project/Mitigation
Monterey Peninsula Within DMF	138,116	7,590	36,356	70,218	10,339	88,147
Percent of Total Within DMF	*100%*	*5%*	*26%*	*51%*	*7%*	*64%*
Percent of Total Known	*80%*	*4%*	*21%*	*41%*	*6%*	*51%*
Monterey Peninsula Outside of Project Areas	9,055	2,521	0	0	2,553	5,074
Monterey Peninsula	147,171	10,111	36,356	70,218	12,892	93,221
Percent of Total Within Monterey Peninsula	*100%*	*7%*	*25%*	*48%*	*9%*	*63%*
Percent of Total Known	*85%*	*6%*	*21%*	*41%*	*7%*	*54%*
Prunedale	18,086	8,545	0	0	0	8,545
Other Areas	7,256	7,218	0	0	0	7,218
Outside Monterey Peninsula	25,342	15,763	0	0	0	15,763
Percent of Total Outside Monterey Peninsula	*100%*	*62%*	*0%*	*0%*	*0%*	*62%*
Percent of Total Known	*15%*	*9%*	*0%*	*0%*	*0%*	*9%*
Total Known Population	172,513	25,874	36,356	70,218	12,892	108,984
Percent of Total Known	*100%*	*15%*	*21%*	*41%*	*7%*	*63%*

Note: The acreage estimates used for areas outside the project's preservation and development areas are based on different survey methodologies than the 2004 surveys used in this report for the project areas. Thus, the percentages should only be considered a rough estimate.

Sources: Project effects from sources in Table P2-1. Other than project information from Allen 1996 (Survey Report); J&S 1996 (Conservation Strategies); USFWS 2002 (Draft Recovery Plan); PBC DMF/PDP Resource Maps and associated resource estimates (PBC 2002a, 2002b, 2002c, 2003, Zander 2003a, 2003b, 2002, 2001), A. Graff (unpublished data).

- loss of adjacent suitable, but presently unoccupied habitat, limiting the ability of Yadon's piperia to colonize suitable adjacent areas;
- fragmentation of existing Yadon's piperia habitat into smaller separate habitat areas;
- increased edge impacts such as changes in microclimate (like increased light levels, decreased soil moisture, etc.), potential increased seed predation by birds, potential vulnerability to wind damage and windthrow, and potential change in pollination success;
- trampling of plants by humans, equestrians, and pets;
- mowing and other road maintenance activities;
- changes in soil and hydrologic conditions from increased irrigation and runoff;
- increased exposure to fertilizers and herbicides from the golf course, driving range, and adjacent residential areas;
- spread of invasive non-native plants from adjacent landscaped areas that may displace Yadon's piperia; and
- potential for increased herbivory and browsing from deer and rabbits.

It is difficult to quantify these indirect impacts, although the area of indirect impacts includes the retained Yadon's piperia populations in and directly adjacent to the proposed development sites as well as the populations in several preservation and conservation areas adjacent to new development (see Table P2-3). These areas total approximately 24 acres and contain about 17,000 individuals. As discussed below in the review of site-by-site impacts, while the indirect impacts noted above will occur within some of the indirect impact areas (in particular on the edges of these areas directly adjacent to development), it is not presumed that these indirect impacts will result in loss of the entire populations within the impact area. This presumption is based on by the presence of Yadon's piperia within retained forest adjacent to fairways at existing golf courses (such as Spyglass Hill Golf Course) as well as adjacent to other existing development, roads, and trails within the Del Monte Forest

No definitive definition of what constitutes suitable, but unoccupied, habitat for Yadon's piperia has been developed to date. However, substantial areas of Monterey pine forest with potentially suitable habitat are present adjacent to existing Yadon's piperia populations at the Proposed Golf Course location, Area B, and at all of the proposed residential subdivisions. Within these areas, project development will include removal of approximately 41 acres of adjacent forest that may contain suitable habitat for Yadon's piperia.

Overall Benefits of Proposed Conservation and Preservation. The applicant has proposed to dedicate new conservation easements for extensive areas of Yadon's piperia (69 acres containing approximately 70,000 individuals at ten locations) including Bristol Curve preserve adjacent to the Proposed Golf

Table P2-3
Project Indirect Impacts on Yadon's Piperia

Project Area	Indirect Effect for Existing Piperia		Adjacent Potentially Suitable Forest Habitat Removed (acres)			Notes
	area (acres)	number of individuals (#)	Forest Removed Outside of Piperia Areas	Unsuitable Habitat	Potential Suitable Habitat Removed	
Proposed Golf Course (Area MNOUV)	14.3	10,281	29.0	1.8	27.2	Indirect effect area includes the retained piperia areas between the fairways (does not include Bristol Curve). Unsuitable habitat consists of forested dune areas.
New Equestrian Center	0.0	0	3.2	3.2	0.0	Piperia not documented on site to date.
Inn at Spanish Bay	0.0	0	0.5	0.5	0.0	Piperia not documented on site to date.
Lodge at Pebble Beach	0.0	0	0.0	0.0	0.0	No undeveloped forest on site.
Spanish Bay Empl. Housing/ Pres. Area B	2.0	274	2.3	0.0	2.3	Indirect effect area is adjacent piperia population in preserve area. Potential suitable habitat removed is unoccupied forest within development area
Spanish Bay Driving Range/ Conservation Area C	0.0	0	16.9	16.9	0.0	Piperia not documented on site to date.
Preservation Area D	0.0	0	0.0	TBD	0.0	No development
Residential Area F-2	1.5	488	2.9	0.0	2.9	No indirect effect area identified due to presumed removal of piperia within lots. Potential suitable habitat removed is unoccupied forest within lots.
Residential Area F-3/ Conservation Area F-3	0.4	79	1.1	0.0	1.1	Piperia within conservation area adjacent to residential lots will be indirectly affected. Potential suitable habitat removed is unoccupied forest within lots.
Preservation Area G	0.0	0	0.0	0.0	0.0	No development
Preservation Area H	0.0	0	0.0	0.0	0.0	No development
Preservation Area I-1	0.0	0	0.0	0.0	0.0	No development
Residential Area I-2	1.3	203	2.6	0.0	2.6	Piperia in open space parcels will be indirectly affected. Potential suitable habitat removed is unoccupied forest within lots.
Preservation Area J	0.0	0	0.0	0.0	0.0	No development
Residential Area K	2.0	3,903	0.0	0.0	0.0	Indirect effect area is the piperia area outside of the proposed residential lot along the east side of Stevenson Drive. Potential suitable habitat removed is unoccupied forest within lot.
Conservation Area K	0.0	0	0.0	0.0	0.0	No development
Preservation Area L	0.0	0	0.0	0.0	0.0	No development
Residential Area PQR	2.5	1,696	2.7	0.0	2.7	No indirect effect area identified due to presumed removal of piperia within lots. Potential suitable habitat removed is unoccupied forest within lots.
Preservation Area PQR	0.0	0	0.0	0.0	0.0	No development
Corporation Yard	0.0	0	0.0	0.0	0.0	Development is within non-forested area
Congress Road Improvements	0.0	0	2.0	0.0	2.0	Improvements may remove suitable habitat.
Highway 1/68	0.0	0	0.0	0.0	0.0	No piperia identified in project effect area.
Huckleberry Hill Natural Area/ S.F.B. Morse Preserve	**Not estimated**	**Not estimated**	N/A	N/A	N/A	Indirect effects due to increased equestrian use.
TOTAL	**24.0**	**16,924**	**63.1**	**22.4**	**40.8**	

NOTE: Indirect effect areas identified as areas of extant piperia populations not removed by project development, but immediately adjacent to project development sites such that indirect effects, as described in the text, may occur. Note that the indirect effect area includes the retained populations after implementation of proposed avoidance mitigation for residential areas. Thus, some of the direct removal totals (before mitigation) overlap with these totals, and one should not add the direct and indirect totals. This table should not be taken as implying that all of these populations will ultimately be lost; the intent is to disclose the area and size of populations within which some level of indirect effects may occur. Potentially suitable habitat removed defined as Monterey pine forest removed minus areas identified as unsuitable habitat such as dune areas.

Course and Areas B, F-3, G, H, I-1, J, K, L, and PQR). Based on acreage, this would represent approximately 19% of the estimated known occupied habitat (355 acres) for Yadon's piperia. Based on the individual plants, this preservation component would represent 51% of the known Del Monte Forest population, 48% of the known Monterey Peninsula population, and 41% of the known total population. At present, it is estimated that about 15% of the known total population is presently preserved (see Table P2-2). The Proposed Project would protect one of the two largest known occurrences of Yadon's piperia within Area PQR. The proposed preservation area in Area PQR contains approximately 54,000 plants and occupies approximately 41 acres.

Overall Benefits of Applicant-Proposed Resource Management and Salvage and Transplantation. The applicant's special-status species management program proposes to manage Yadon's piperia in open spaces between development (e.g., golf course fairways) by maintaining natural conditions (including current drainage patterns and understory vegetation) and prohibiting understory clearing in designated Yadon's piperia conservation areas (Zander 2001). As noted above, Yadon's piperia has persisted in retained forest areas adjacent to and between fairways on other nearby golf courses. The Proposed Project would also implement measures described in the Best Management Practices (BMP) Plan (Questa Engineering 2003) to minimize the impacts of pesticides on wetlands and other resources in the Proposed Golf Course.

As part of the Proposed Project, the applicant also proposes to salvage Yadon's piperia from construction areas at the Proposed Golf Course prior to work in those areas and transplant them to suitable nearby locations. According to the Special-Status Species report (Zander 2001) and subsequent correspondence from the applicant's consultant (Zander 2003a), monitoring of experimental transplants within the Del Monte Forest has shown that survivorship of approximately 70% can be attained when the species is transplanted to suitable sites. David Allen transplanted Yadon's piperia in several locations in the Del Monte Forest in 1996 and reported as much as 70% survival in one of the plots in 1998; however no systematic follow-up monitoring of these locations has occurred (Zander 2003a). Zander and Associates relocated one of the Allen plots in 2003 and identified 68% of original planted plants; however no information is available on mortality of original plants, the influences of colonization from adjacent areas, seed production, seedling regeneration, survival and recruitment, or other factors (Zander 2003a). Zander and Associates established several plots within the Del Monte Forest to monitor recurrence of Yadon's piperia in known locations over time. They excavated subplots, removed Yadon's piperia tubers, measured and replaced in the same location. Data since 1999 indicated over 75% of Yadon's piperia in the excavated subplots have reemerged as leaf pairs; however no data is available on flower stalk, seed or seedling production, or survival plots (Zander 2003a).

Transplantation feasibility and potential efficacy as a mitigation approach was evaluated in detail in supporting studies conducted for the Draft EIR resulting in

the preparation of a draft Transplantation, Enhancement, and Adaptive Management (TEAM) Plan for Yadon's piperia (Ecosystems West 2004). After additional review of this plan by the County's biological consultants, review of comments on transplantation during the comment period of the Draft EIR, and consultation with the U.S. Fish and Wildlife Service and the California Department of Fish and Game, the County has determined that transplantation beyond Area MNOUV should not be conducted as mitigation, primarily due to the concern that transplantation of salvaged Yadon's piperia could result in negative impacts on existing Yadon's piperia populations (such as genetic contamination or introduction of pathogens) in off-site receiver sites. As described below, the County will require transplantation at Area MNOUV to be conducted with an overall suite of mitigation (now referred to as the Yadon's piperia Plan).

Site-Specific Impact Evaluation

Summary of Impacts at the Proposed Golf Course. The most substantial project impact on Yadon's piperia would occur on the Proposed Golf Course location.

Direct Impacts. The existing occurrence at Area MNOUV is one of the two largest known occurrences (approximately 54 acres containing an estimated 57,000 individuals). Development of the golf course and associated improvements would result in removal of more than 60% of the existing occurrence (approximately 36,000 individuals and 34 acres). The Proposed Project would preserve about 5 acres of high-density occupied habitat in a preserve area along Bristol Curve (containing an estimated 11,000 individuals). Direct impacts on this occurrence would result from construction of the fairways, underground utilities, new golf maintenance trails, new pedestrian trails, understory and selective clearing activities, and construction of realigned Stevenson Drive and other road improvements. The remaining Yadon's piperia occurrence in the Bristol Curve preserve area and the retained forest between fairways would be about 19 acres in size and contain an estimated 21,000 individuals.

Indirect Impacts. The remaining Yadon's piperia between the fairways and around the edge of the Proposed Golf Course would also be indirectly affected by the Proposed Project. Indirect impacts on the remnant population could include the impacts of adjacent golf course operations, changes due to the removal of adjacent forest cover, and the impacts of fragmentation. Golf course operations that could affect remnant Yadon's piperia include: pesticide/herbicide drift, spillover from golf course/rough seeding and vegetation management, increased runoff from irrigation, trampling by golfers and spectators, and maintenance vehicle transit. Removal of the adjacent forest cover will open up the forest canopy directly adjacent to remnant Yadon's piperia, which could increase forest edge temperatures and wind and reduce humidity that could change Yadon's piperia dynamics. Fragmentation into smaller populations could decrease genetic

exchange between remnant Yadon's piperia separated by fairways, greens, and tee areas. Creation of smaller habitat areas and occurrences also increases the risk that the smaller areas could be extirpated by a singular event such as storm windfall (that could remove necessary tree cover) or disease.

At present, the MNOUV occurrence covers approximately 54 acres in area and is more or less contiguous with some fragmentation due to existing roads and trails. With the Proposed Golf Course, the occurrence would be reduced to about 19 acres in area, in approximately 8 separate areas separated by fairways or other golf course development. (See updated Biological Resource figure in Appendix E.3). While existing gaps in habitat are relatively narrow (about 30 to 50' due to roads or 10 – 20' due to trails), new gaps in habitat created by new fairways will be on the order of 100 to 500 feet.

While these indirect impacts will occur, based on conditions around golf courses elsewhere in the Del Monte, they are not likely to result in complete loss of remnant Yadon's piperia populations. On other nearby golf courses such as Spyglass Hill Golf Course and the Monterey Peninsula Country Club, Yadon's piperia continues to grow in remnant forest areas between fairways many decades after these golf courses were built and operated. Since there was no baseline assessment prior to construction of these courses, it cannot be known precisely what changes may have occurred in the original populations of Yadon's piperia at these locations except to say that some Yadon's piperia have apparently survived for longer than 30 years alongside golf course development in remnant forest. Thus, complete loss of retained Yadon's piperia along the edge of the golf course and between fairways is not likely and it is presumed that at least some of the Yadon's piperia in remnant forest will survive decades after the Proposed Golf Course is built.

An additional indirect impact is the removal of approximately 41 acres of adjacent forest that is similar to the occupied habitat in as much as it is not located on a sandy substrate like that in Area M nor is within wetland or development areas. Although Yadon's piperia have not been found in these areas at Area NOUV, it is possible that these areas may contain areas of suitable habitat where, absent the project, Yadon's piperia might have naturally colonized.

Assessment of Impact Significance. The occurrence at the Proposed Golf Course location is one of the two largest occurrences of this species known to exist. This occurrence and the Area PQR (Pescadero Canyon) occurrence account for approximately 80% of the known Del Monte Forest population and 66% of the total known population. As noted above, these percentages may overestimate the share of the population found on these two sites, due to dissimilar methodology between the 2004 surveys in the Del Monte Forest and prior surveys outside the Forest. The USFWS Draft Recovery Plan for Five Coastal Plant Species on the Monterey Peninsula (USFWS 2002) recommends protection of the occurrences at the Proposed Golf Course and Pescadero Canyon and recommends protection of "six metapopulations, composed of multiple

colonies of Yadon's piperia yadonii in each of the two community types in which this species occurs: Monterey pine forest and maritime chaparral." The Final Recovery Strategies for Six Coastal Plants on the Monterey Peninsula report prepared for DFG (Jones & Stokes 1996) recommended protection of both of these locations and concluded that retention of more than about 70% of the population within four large population centers would be likely to ensure survival of the species. The occurrence at the Proposed Golf Course location was also identified in the DFG report as a "valuable location to ensure the long-term viability of the species."

The MNOUV occurrence of Yadon's piperia is considered important to the recovery of the species for several interrelated reasons:

- **Extinction probability.** Work done in the field of conservation biology has shown that the extinction probability of a population or species increases as population size decreases (Shaffer 1981; Lande 1988; Lawton 1995), thus the impact due to removal of over half the MNOUV occurrence could have a significant impact at the population and species level.
- **Important of large contiguous habitat.** There are abundant data indicating that large pieces of contiguous habitat with high numbers of the species in question and a low perimeter to area ratios are of more conservation value and have a greater probability of persistence than small, fragmented habitat patches with lower numbers of individuals (Shaffer 1981; Lande 1988; Saunders et al. 1991). Rationale supporting this conclusion include: the slowing of random genetic drift in large occurrences and the consequent maintenance of genetic diversity; the buffering impact of high numbers against catastrophic events (especially important in this species because it sets significantly more seed upon outcrossing compared to selfing [Doak and Graff 2001] so it would be expected to be affected by bottlenecks); the decreased extinction probability of large occurrences due to random demographic processes; the decrease in deleterious edge impacts in larger occurrences; and the greater ease of managing large areas compared to fragments. The project would further fragment the large contiguous habitat at Area MNOUV which increases the risk of population decline or loss at this site.
- **Importance of occupied and adjacent unoccupied habitat.** The MNOUV area not only contains a high proportion of occupied habitat compared to other smaller planning areas, it also has a lot of high quality unoccupied habitat that serves to buffer the occupied habitat and exists as potentially occupied habitat for the future. Unoccupied habitat that is contiguous with occupied habitat and has the same edaphic profile and vegetation structure has a reasonable probability of being suitable habitat for Yadon's piperia. The occurrence of this unoccupied habitat on MNOUV gives the species room for expansion and room to shift its distribution as vegetation structure changes with time through the creation of gaps or forest maturation. It is likely that suitable habitat exists in a continually shifting patch mosaic. With the loss of a substantial portion of the occupied and unoccupied habitat in

Area MNOUV, it is possible that Yadon's piperia could become marginalized onto many small habitat islands in a matrix of recreational development, with no room for expansion and no safe haven in the event of an unforeseen loss of some of the existing occurrences due to random or other events. As noted above, large occurrences are far more resilient to such potential impacts than are small occurrences.

- **Potential metapopulation dynamics.** Yadon's piperia seeds are extremely light and wind-dispersed. Although most seeds will fall comparatively close to the parent plant, orchid seeds may disperse as far as 5 to 10 kilometers, and even much farther (Rasmussen 1995). Given this, it is possible that the Yadon's piperia occurrences on the Monterey peninsula may be functioning as a *metapopulation*. Hanski and Gilpin (1991) defined a metapopulation as a "set of local populations which interact via individuals moving among populations." Hanski and Simberloff (1997) defined a metapopulation as a "set of local populations within some larger area, where typically migration from one local population to at least some other patches is possible." Minimally then, a metapopulation is a collection of relatively isolated, spatially distributed, local populations bound together by occasional dispersal between populations. These relatively long distance dispersal events may be infrequent, but must occur often enough to provide for recolonization of populations that have suffered local extinction. The regional metapopulation persists in the face of local extinctions precisely because of sufficient dispersal among populations. If dispersal among populations is so frequent that local extinctions do not occur, the concept of the metapopulation is superfluous, and the regional population is better thought of simply as a single spatially (albeit patchily) distributed population. On the other hand, if dispersal is too infrequent, and the probability of local extinction is greater than zero, eventually the regional metapopulation will not persist and will go extinct. Whether the occurrences within the Del Monte Forest or the Monterey Peninsula are actually operating as a metapopulation is not known. However if they are, then removal of over half of one of the largest occurrences within the metapopulation could reduce seed dispersal and increase the probability of local population extinctions outside of Area MNOUV.

For these reasons, the impacts of the Proposed Golf Course development on Yadon's piperia are considered significant on a site-specific and species level.

Summary of Impacts at Other Development Areas.

Additional direct and indirect impacts on Yadon's piperia would occur as a result of the development activities described below.

Direct Impacts

- Residential Subdivisions - Yadon's piperia are found within proposed residential Areas F-2; F-3; I-2; K; and PQR. The occurrences within residential Area K (2 acres; ~3,900 plants) and within lots 6 and 7 in Area PQR (3 acres; ~1,700 plants) are fairly extensive. It was conservatively

assumed that construction, landscaping, or indirect impacts would eventually remove the entire population within proposed building envelopes for the purposes of the analysis in this document. With the applicant's revised building envelopes, development on these five project sites could result in the loss of about 1.4 acres containing approximately 34 plants.

- Congress Road Improvements - Individual Yadon's piperia may also be found within the construction footprint of the Congress Road improvements (surveys to date have not identified Yadon's piperia within the footprint, but Yadon's piperia are known to be nearby).
- New Equestrian Center Utility Line - Individual Yadon's piperia may also be found within the construction footprint of the utility line connections to the New Equestrian Center.

Indirect Impacts

- Spanish Bay Employee Housing - The presence of the Spanish Bay Employee Housing in Area B could result in indirect impacts to the Yadon's piperia occurrence located nearby due to increased use of adjacent forest by residents and pets; use of herbicides and pesticides for landscaping; increased runoff from irrigation; and potential for introduction of invasive non-native species and landscaping plants into the forest landscape. In addition project development would result in the removal of 2 acres of potentially suitable, but unoccupied adjacent Monterey pine forest habitat.
- Residential Subdivisions - New residences located within Yadon's piperia habitat would have similar indirect impacts on retained or adjacent habitat as those described above for the Spanish Bay Employee Housing. Yadon's piperia occurrences not presumed removed due to development but adjacent to development include those north of the proposed lot at Area K, those east of the proposed lots at Area F-3, and those east and south of the lots in Area PQR. Residential development could also result in the removal or conversion of about 9 acres of adjacent Monterey pine forest not presently containing Yadon's piperia, but potentially containing suitable habitat for Yadon's piperia.
- New Equestrian Center/Corporation Yard Employee Housing - Huckleberry Hill Natural Area/S.F.B. Morse Preserve contains a substantial population of Yadon's piperia (~7,600 individuals in a 1995/1996 survey by Allen). Yadon's piperia within this area could be indirectly affected by increased trail use resultant from relocating the equestrian center directly adjacent to this area and increase of residents at the Corporation Yard Employee Housing. Increased trail use could result in trampling of plants by horses, people, and pets and well as by the potential introduction/spread of invasive non-native species through horse manure, dog feces, and through horse and human transit.

Assessment of Impact Significance. Development at other locations other than the Proposed Golf Course could result in the direct removal of up to1.4

acres containing about 34 individual Yadon's piperia as well as the indirect impacts noted above and this is considered significant.

Overall Significance Determination Before Mitigation

While applicant-proposed preservation and resource management would reduce the level of project-related impact to Yadon's piperia, the project, as proposed, would still result in a substantial adverse impacts (directly and indirectly and by contributing to cumulative impacts) for the following reasons:

- The Proposed Project would remove a substantial amount of habitat, a number of individual plants and fragment one of the two largest known occurrences of this species (at the Proposed Golf Course). The result would be the creation of smaller occurrences that could be more difficult to manage and more vulnerable to extirpation. As described above, the occurrence at the Proposed Golf Course is presently considered important to the recovery of the species.
- The Proposed Project would reduce the total known population by about 25%. On an acreage basis, the loss would represent about 10% of the estimated total known distribution of about 355 acres.
- Although the applicant has proposed to dedicate substantial preservation areas containing large occupied Yadon's piperia habitat and populations (representing about 19% of the known occupied habitat and 41% of the known population), preservation alone cannot offset the substantial losses of existing populations, particularly at the Proposed Golf Course, and does not provide sufficient preservation to assure the likely recovery of this species.
- As noted above, other potential projects may also result in significant loss of Yadon's piperia, both in terms of direct losses as well as indirect impacts. The project will contribute considerably to these cumulative impacts.

For these reasons, the direct and indirect impacts on Yadon's piperia from the Proposed Project are considered *significant*, taking into account both the adverse impacts of proposed development and the beneficial impacts of the applicant's proposed preservation and resource management. The project would also contribute considerably to cumulative impacts.

Mitigation

The mitigation required for impacts to Monterey pine forest described in the Draft EIR are considered part of a comprehensive suite of required mitigation for Yadon's piperia that includes Mitigation Measures BIO-D1-1 through BIO-D1-5 described below. The significance determination after consideration of the entire suite of required mitigation is provided following the mitigation presentation below.

Mitigation Measure BIO-D1-1. Avoidance - Avoid removal of Yadon's piperia within all residential subdivisions.

- Designate building envelopes of maximum size of building envelopes as 0.5 acres for all subdivisions and avoid all extant Yadon's piperia. Development outside the building envelope shall be limited to access roads and utilities and shall also avoid all extant Yadon's piperia. Areas containing Yadon's piperia and forested areas within 50 feet that are not within the building envelope or occupied by roads or utilities shall be dedicated in a negative easement to the Del Monte Forest Foundation to permanently prevent all future development within these areas. This measure would reduce the loss of approximately 1.4 acres containing 34 individuals.
- Utility line installation for the New Equestrian Center shall avoid all identified Yadon's piperia areas.
- Avoid all known Yadon's piperia areas for the routing of the recreational trail at Area F-3.

Mitigation Measure BIO-D1-2. Minimization - Redesign the Stevenson Drive Realignment. Reduce the removal of Yadon's piperia by eliminating one of the access roads to Bristol Lane/Silver Court and by limiting the traveled roadway to two 12-foot lanes and two 4-foot bicycle lanes.

Mitigation Measure BIO-D1-3. Preservation - The applicant shall permanently dedicate additional preservation areas for Yadon's piperia. In addition to the applicant-proposed preservation areas, the applicant shall be required to permanently dedicate all of the areas that it owns for preservation. These areas are:

- **Bristol Curve** – The portion of Area O between the lower fire road and the realigned Stevenson Drive. This area is about 2.8 acres and contains about 3,400 individuals.
- **Area F-1** – The portion of Area F-1 existing lots containing piperia and all forested areas within a 50-foot buffer. The portion containing piperia covers about 4.5 acres and includes ~2,500 individuals.
- **Area J** – The portion of Area J existing lots containing piperia and all forested areas within a 50-foot buffer. The portion containing piperia covers about 1.7 acres and includes ~2,400 individuals.
- **Area K** - The portion of Area K containing piperia (2.0 acres) within the proposed residential lot and the portion north of the residential lot with piperia (1.2 acres) and all forested areas within a 50-foot buffer around existing piperia. These areas contain ~5,500 individuals.
- **Old Capitol Site** - Based on 1996 surveys, the portion containing piperia covers about 57 acres and contains ~2,500 individuals (Allen, 1996). This site is shown in a figure in Appendix E.5. The actual dedication area shall be based on a 2005 survey and shall include all areas of extant piperia and all areas within 50 feet of extant piperia.

- **Aguajito** - While a small Yadon's piperia occurrence (~86 individuals) has been identified near Jack's Peak Road, the site has not had a systematic survey for Yadon's piperia. The actual dedication area shall be based on a 2005 survey and shall include all areas of extant piperia and all areas within 50 feet of extant piperia. This site is shown in a figure in Appendix E.5.

Prior to issuance of a grading permit, the applicant shall place a permanent, non-revocable conservation easement for these areas. These areas contain approximately 70 acres containing approximately 16,000 individuals as well as likely suitable adjacent forest habitat. Table P2-4 lists the applicant-proposed and additionally-required preservation areas.

Mitigation Measure BIO-D1-4. Piperia Plan. The applicant shall fund and implement a long-term Piperia Plan including transplantation, enhancement, and adaptive management elements to offset project losses of piperia range and extent.

Roles and responsibilities in implementing the Piperia Plan will be as follows:

- **Monterey County** will be the approving and authorizing party for implementation of the plan and for any changes determined feasible and necessary to promote its success.
- A qualified **third-party consultant** shall be selected by the County to prepare the final plan, implement research and testing during the initial phases, oversee applicant implementation of large-scale enhancement and transplantation, oversee applicant's resource management activities, and conduct annual oversight monitoring and reporting.
- An **Adaptive Management Team** (AMT) will be established which will include the County, the USFWS, the California Department of Fish and Game (CDFG), the applicant, the third-party consultant, and any other parties that the County determines appropriate, including scientists with expertise in Monterey pine forest ecology, Yadon's piperia, and conservation biology. The AMT will review and comment on the final plan and will also be responsible for the annual review of progress as well as resource management activities conducted for existing piperia populations.
- The **applicant** and the **applicant's consultants** are expected to be the implementing party of transplantation, enhancement, and resource management with the oversight of the County, the third-party consultant, and the AMT.

The final Piperia Plan shall be based on the draft TEAM plan (Ecosystems West 2004, see Appendix I of the Draft EIR) as amended (see Appendix I of this document) and shall contain a cost estimate for all aspects of implementation for the first 20 years. The final plan shall be reviewed by the AMT, and approved by the County prior to issuance of any grading permit for any site containing Yadon's piperia. The elements of the final approved plan shall be integrated into the master and site-specific RMPs for the project.

Table P2-4 Proposed And Additional Preservation Areas for Yadon's Piperia

Location	Piperia in Applicant – Proposed Preservation Areas(#)	Piperia in Additionally Required– Preservation Areas(#)	Total Piperia in Project Preservation Areas (#)	Total Project Preserved Piperia Occurrence Area (acres)
Proposed Golf Course Area (MNOUV)	10,547	3,349	10,547	7.6
Area B	274		274	2.0
Area D	TBD		TBD	TBD
Area F-1	0	2,486	2,486	4.5
Area F-3	54		54	0.6
Area G	757		757	4.9
Area H	624		624	4.7
Area I-1	2,972		2,972	9.7
Area J	134	2,336	2,470	2.0
Area K	416	5,517	5,933	4.3
Area L	4		4	0.1
Area PQR	54,436		54,436	40.5
Old Capitol Site		2,467	2,467	57.3
Aguajito		86	86	1.0
TOTAL	**70,218**	**16,241**	**86,459**	**139.1**

Note: Occurrence acres based on 50-foot buffering of 2004 Yadon's Piperia surveyed patches. Individuals are based on 2004 Surveys by Zander & Associates, except for Old Capitol and Aguajito which are based on Allen, 1996.

Funding and Guarantee. The applicant shall fully fund and implement the final plan for at least 20 years, unless the County determines that the success criteria are met at each required transplantation and enhancement treatment area or the County determines that all feasible measures have been implemented to promote success of transplantation and enhancement efforts. These efforts shall continue beyond 20 years and the applicant shall fully fund and implement them if it is determined by the County after considering a written recommendation by the AMT that such efforts are required for the long term sustainability of the species. Such determinations shall require and be presented at a noticed public hearing before the Board of Supervisors.

Upon approval of the final plan, applicant shall record a written guarantee to fulfill all required mitigation for impacts to Yadon's piperia against the real property comprising the new golf course site pursuant to requirements contained in the Yadon's piperia Plan. This obligation shall include Company's guarantee to provide adequate funding for the implementation of the Yadon's piperia Plan. Said guarantee shall provide a mechanism that would enable the County to impose and collect on a lien on the golf course property in the event that the Company fails to meet its funding obligations.

Success Criteria for the Piperia Plan. The primary success criteria for the Piperia Plan is to achieve no net loss of Yadon's piperia due to the Proposed Project.

The following objectives shall be the metrics used by the County and the AMT to determine whether implementation of the plan is meeting the primary success criteria:

- **Enhancement** – The plan shall result in a sustained expansion of piperia range in terms of "occupied habitat" at each required enhancement treatment area where unnatural impediments (such as invasive non-native species) to natural expansion of existing populations are identified and feasible enhancement treatments are developed.
- **Transplantation** – The plan shall result in salvage of Yadon's piperia at the proposed golf course and transplantation within a proposed minimum of 20 acres of suitable retained forest at Area MNOUV not containing "occupied habitat". This work shall be accomplished in accord with guiding principals contained within the Piperia Plan. Enhancement and maintenance of the transplantation areas will occur such that they contain self-sustaining populations of piperia.
- **Exclusion of existing piperia areas** - Success will only be achieved if piperia are present within transplantation or enhancement treatment areas that did not previously contain Yadon's piperia.
- **Occurrences comparable to control sites** - Success will only be achieved if transplantation or enhancement treatment areas contain the percent of cover, density, and percent flowering not significantly different from those found in control sites within adjacent existing piperia populations.

- **Demonstration Period** - Success will only be achieved when the criteria of percent cover, density, and percent flowering are met for three of five successive years starting in the sixth year after initial enhancement or transplantation.

- **"Occupied habitat"** - The definition of what constitutes "occupied habitat" for the purpose of this success criteria shall be determined by the AMT based on the results of a detailed study of the habitat characteristics for Yadon's piperia (see description in the draft TEAM plan) to be conducted in the spring of 2005. This study shall be conducted prior to completion of the final Piperia Plan. The resultant definition will be used to identify the areas containing piperia for the purposes of identifying transplantation and enhancement treatment areas. If an acceptable definition of "occupied habitat" is not developed as a result of the spring 2005 habitat characteristics study, the default definition of "occupied habitat" shall be the piperia occurrence areas identified in the PRDEIR based on the 2004 survey results.

The specific measures used to evaluate the success criteria and these objectives will be further developed within the Piperia Plan. As the Piperia Plan's research and analysis proceeds, the County and AMT will likely develop improved measures to assess how replacement efforts are meeting the primary success criteria and these objectives. The County and the AMT may determine that the objectives should be different than those articulated above based on an expanded understanding of Yadon's piperia.

Piperia Plan Phasing. The Piperia Plan is envisioned as a phased plan with each subsequent phase building on the knowledge of the prior phase.

- **Phase 1A: Research and Testing.** During this phase, a detailed understanding of Yadon's piperia ecology will be developed along with the methods and procedures for enhancement, transplantation, and resource management. This phase shall include investigations into the habitat characteristics for Yadon's piperia, examination of its horticultural requirements, and evaluation of its regeneration niche as outlined in the draft TEAM Plan (Ecosystems West 2004). Enhancement treatment areas (all locations identified below) and transplantation receiver sites (at MNOUV only) will be evaluated to identify impediments to Yadon's piperia, establish baseline conditions, and establish monitoring and control sites. This phase will also include the assessment and testing of feasible transplantation and enhancement methods in test plots in order to inform larger-scale efforts to follow in subsequent phases. The research component will continue into subsequent phases as needed to support adaptive management.

- **Phase 1B: Salvage and Transplantation.** During this phase, piperia at Area MNOUV within development areas will be salvaged for transplantation within retained forest areas not containing piperia at Area MNOUV. Transplantation will also be used experimentally on test plots at Area

MNOUV to examine demographics characteristics and to inform management of the species overall.

- **Phase 2: Enhancement Application.** Enhancement activities can include short-term and sustained activities found to be feasible and effective during research and testing. Examples of enhancement activities include: control of non-native plant species, restoration of roads and trails, creating access controls, directed management actions (e.g. selective vegetation/duff clearance, spot fire treatment, deer exclusion, seasonally-adjusted weed-whacking). Enhancement activities that are single-year efforts shall be conducted in the early portion of this phase in order to evaluate their sustainability without maintenance. Sustained activities (such as removal of invasive non-native species) can be done annually (or at frequencies determined to be necessary), but will be required to be continued in perpetuity as part of resource management within the treatment area after success demonstration if shown necessary to sustain population expansion/increases.

  Enhancement activities shall only be conducted on areas that are: owned by the applicant or the Del Monte Forest Foundation and are presently preserved; within the applicant's proposed preservation areas; will be preserved prior to commencement of enhancement activities; or are within designated resource management areas. Required enhancement treatment areas shall include the areas identified in Table P2-5.

- **Phase 3: Success Demonstration.** Success may be demonstrated at any time following six years after the commencement of enhancement activities within a treatment area or transplantation into a receiver site. Control sites shall be established for each treatment area/receiver site in adjacent existing Yadon's piperia populations in a similar environmental setting. Annual monitoring of the treatment area/receiver site and the control sites will be conducted to measure success. The success criteria must be met in at least three of five successive years. Final determination of success demonstration will be made by the County, in consultation with the AMT.

- **Phase 4: Post - Success Management.** When success criteria are met, the applicant shall be responsible to maintain piperia populations in the former transplantation and enhancement treatment areas using the methods described below for resource management in addition to any enhancement measures that require periodic application. The applicant may be required to periodically submit a report on the piperia populations if in the opinion of the County there is evidence that there are reductions in populations due to management actions or inaction, or general decline of the species. Such management, maintenance or periodic enhancement efforts within enhancement treatment and transplantation areas shall continue in perpetuity, unless and until a) Yadon's piperia is delisted by USFWS and b) the County and USFWS both determine that the management, maintenance and enhancement activities are no longer necessary to the recovery of the species.

Table P2-5. Required Enhancement Areas for Yadon's Piperia (acres)

Site ID	Total Site (1)	Existing Occupied Habitat	Unsuitable habitat	Potential Adjacent Habitat (2)	Potential Suitable for Enhancement (%)	Total (acres)
Required Enhancement Area in the Del Monte Forest						
Area PQR	233.1	45.9	11.5	175.7	6	13.8
Area I-1	38.2	13.9	6.0	18.3	9	3.1
Area G	47.9	11.8	16.0	20.2	2	0.8
Area H	53.2	9.1	1.3	42.8	8	4.1
Area B	22.1	0.6	2.6	19.0	*TBD*	*TBD*
Area J	9.4	2.6	1.9	4.9	*TBD*	*TBD*
Area L	18.2	0.5	1.1	16.5	*TBD*	*TBD*
HHNA/SFB	~200	*TBD*	*TBD*	*TBD*	*TBD*	*TBD*
					Subtotal	>21.8
Required Enhancement Area Outside the Del Monte Forest						
Old Capitol	74.6 (3)	57.3	0.0 (3)	17.3	100	74.6
					Subtotal	>74.6

NOTES:

1 Total site acreage = acreage of Monterey pine forest coverage

2 Identification of potential adjacent habitat for Yadon's piperia is preliminary at this time, given that appropriate habitat characteristic studies have not yet been completed.

3 Acreage identified is area of undeveloped Monterey pine forest coverage at the site, entire site is approximately 135 acres; no field identification of unsuitable habitat has been conducted.

Modified from Ecosystems West 2004.

Mitigation Measure BIO-D1-5. Resource Management - Manage proposed preservation, conservation, and resource management areas to sustain existing Yadon's piperia populations, protect existing populations from threats, and minimize indirect impacts of existing and proposed development. The applicant shall be required to manage preservation, conservation, and resource management areas to sustain the existing piperia populations and reduce potential indirect effects of existing and proposed development. These efforts shall be concurrent and complementary with the related preservation, conservation and resource management process for the Monterey pine forest and other related habitat as required by other mitigation measures identified in the Draft EIR. Resource management shall be informed by the activities and results of the Piperia Plan.

Roles and Responsibilities. Resource management for piperia shall be part of the Site-Specific Resource Management Plans (SSRMPs) required in accordance with Mitigation Measure-B1-1 (see the Draft EIR). **Monterey County** will be the approving and authorizing party for implementation of resource management and for any changes determined feasible and necessary to promote its success. The **third-party consultant** retained for the Piperia Plan shall prepare the piperia component of the SSRMPs, including a cost estimate for management and monitoring effort for the first 20 years and shall conduct the monitoring of the resource management effort for Yadon's piperia and report the results to the AMT. The **AMT** shall review and comment on the piperia component of all SSRMPs prior to their approval by the County, which must occur prior to issuance of any grading permit for any site with Yadon's piperia. The AMT shall also review and comment on the piperia component of the Annual Work Plan and Monitoring Report. The **applicant** and the **applicant's consultants** will be the implementers of resource management.

Funding. The applicant shall fully fund and implement the resource management effort for at least 20 years. These efforts shall continue beyond 20 years and the applicant shall fully fund and implement them if it is determined by the County after considering a written recommendation by the AMT that such efforts are required for the long term sustainability of the species. Such determinations shall require and be presented at a noticed public hearing before the Board of Supervisors.

Resource Management Areas. The applicant shall manage the following areas for the benefit of Yadon's piperia:

- the **applicant-proposed preservation and conservation areas** containing Yadon's piperia (See Table P2-4);
- the **additionally-required preservation areas** described above (See Table P2-4);
- **Area NOUV** – the retained forest between the Proposed Golf Course fairways (resource management to be conducted in concert with transplantation efforts described above);

- **Spanish Bay Employee Housing** – the retained forest within the development boundary containing piperia and/or piperia habitat; and
- **Residential Area F-2, F-3, I-2, and K** – the open space parcels and the piperia areas outside the reduced building envelopes.

Success Criteria. The success criteria for resource management is the maintenance of existing piperia within areas of "occupied habitat" as defined through the Piperia Plan. The specific evaluation measures will be developed during the preparation of the SSRMPs and will be informed by the final Piperia Plan.

Management Measures. The applicant shall implement the resource management measures identified in the final SSRMP for each managed site. These measures shall include the following, as appropriate, for the managed sites unless the AMT determines that alternative measures would be more effective to sustain Yadon's piperia:

- Conduct annual monitoring and removal of invasive non-native species.
- Restrict maintenance activities in areas that support Yadon's piperia or time maintenance to avoid/reduce effect on the plant (such as conduct maintenance outside the leafing and flowering period (February to August)
- Control irrigation and site drainage at the Proposed Golf Course to avoid excessive runoff.
- Adopt integrated pest management methods for the Proposed Golf Course to reduce pesticide drift and runoff.
- Adopt a fertilizer management plan to avoid increased drift and runoff of excess fertilizer into piperia areas.
- Protect the populations in the Proposed Golf Course from unintended disruptions by pedestrians and golfers by fencing the perimeter of the adjacent retained forest or otherwise indicating this area as out of play. If permanent fencing or barriers are used, they shall be designed to allow for wildlife movement while deterring casual human ingress.
- Temporary protective fencing shall be used during large golf tournaments/events. This fencing shall be extended to the period of the species' leafing, blooming and fruiting if it is determined by the AMT that this is required.
- Develop and implement an environmental awareness education program. The applicant shall retain a qualified biologist to conduct a mandatory environmental awareness education program for construction and maintenance personnel. The program would cover all sensitive biological resource issues, mitigation measures, and permit conditions. The training program would be provided annually and would be mandatory for all construction and maintenance management and personnel. The program will

cover measures that workers can implement to avoid and reduce the impact of their activities on Yadon's piperia

- Close and restore informal trails within existing piperia habitat.
- Coordinate management of existing piperia populations with management for other forest resources.
- Monitor piperia within preservation, conservation, and resource management areas annually for ten years, and at least every other year through the 20-year period. Monitoring protocols shall be developed as part of an adaptive management program within the site-specific resource management plans that link monitoring results to implementation of changes in management activities.

The effect of these measures would be to reduce the potential for indirect impacts in areas of retained habitat and to sustain the populations within the managed areas.

Significance Determination After Mitigation

With implementation of the measures noted above, the direct loss of habitat and individuals would be about 10% (34 acres) of known occupied habitat and 21% (36,000) of known individuals. The percentage of individuals lost may overstate the level of impact due to differences in surveys in 2004 in the Del Monte Forest and prior surveys outside the Forest.

The applicant will also be required to permanently dedicate 70 acres of additional occupied Yadon's piperia habitat (containing an estimated 16,000 Yadon's piperia). These 70 acres are all of the other known Yadon's piperia locations within manageable preservation areas on lands owned by the applicant outside the project area. The total of the applicant- proposed preservation and the additional preservation areas would be about 39% (139 acres) of the known habitat and 48% (83,000) of known individuals for this species; combined with existing preservation, a total of about 63% of the known population would then be preserved. While this amount is less than the 70% established as a goal for preservation in the CDFG Recovery Strategies report (Jones & Stokes 1996), the contribution of this project toward that goal would be quite substantial given the limited preservation areas for this species extant today.

Both the USFWS Draft Recovery Plan and CDFG Recovery Strategy for this species emphasize the preservation and management of large contiguous areas of habitat and occurrences. While the project would fragment the large occurrence at Area MNOUV, the project would also preserve large contiguous occurrences at Area PQR and adjacent to HHNA, as well as smaller, but sizeable occurrences elsewhere that will support recovery goals.

The success criteria for the Piperia Plan (transplantation, enhancement, and adaptive management) is no net loss of Yadon's piperia. In addition, the Piperia Plan implementation will contribute to the scientific understanding of the species that will assist in other recovery efforts for this species. The applicant will also be required to manage habitat for the benefit of the species within all preserved areas and in other retained habitat areas.

Short of an alternative not containing an 18-hole golf course in Area MNOUV (see Section 5 of the February 2004 Draft EIR), the County considers that all of the potentially feasible mitigation has been identified and will be required as a condition of approval. Taking into account the applicant's proposal and the comprehensive suite of required mitigation measures described above, the County does not consider that the mitigated project would ultimately hinder the recovery of the species, nor result in a residual substantially adverse impact on this species, nor contribute considerably to a cumulative impact and thus considers the impacts to Yadon's piperia to be mitigated to a *less than significant level*.

Existing Setting

Project Setting

Introduction

The project setting presented in Chapter 3.3, "Biological Resources" and in Appendix E of the Draft EIR is updated to include information from the 2004 surveys for Yadon's piperia in the Del Monte Forest.

For ease of reader reference, the two figures from the Draft EIR showing regional distribution of Yadon's piperia are included in this document, but have not been revised.

Yadon's Piperia Occurrences in the Project Area

A survey of Yadon's piperia was conducted within the project development and preservation sites in spring 2004. The 2004 survey used a different methodology from the 1996 survey. The survey methodology and results are described in Appendix E.3.

The 2004 census methodology developed by Ecosystems West was more intensive for counting Yadon's piperia and is judged to have result in a more precise count of individuals for use in this document. As described in Appendix E.3, the 2004 surveys identified a far higher number of individual Yadon's piperia throughout the Del Monte Forest. While the number of individual plants

found is nearly three times that found in 1996 surveys, due to the differences in survey methodology and effort, there is insufficient basis by which to make conclusions about potential change in the population between the two surveys. In addition, it is not uncommon for plant surveys in different years with different environmental conditions to identify substantial variations in individual counts. Yadon's piperia were not found on sites where they were not found in the 1996 surveys (for example at Area C – the proposed Spanish Bay Driving Range site). In general Yadon's piperia were found in similar, though not identical locations within sites. At the Proposed Golf Course site (Area MNOUV), piperia were found in a portion of Area N in 2004 where they were not identified in the 1996 surveys, which might indicate natural colonization, but might also indicate that these piperia may have been missed in the 1996 surveys. Also at the Proposed Golf Course site, no piperia were found in one area west of the existing Equestrian Center where piperia were found in the 1996 surveys. In this area, the forest cover is much more open in 2004 due to loss of Monterey pines due to storm windthrow after 1996 and possible removal of pitch canker-infested trees.

The methodology for estimating acreages of habitat occupied by Yadon's piperia from the two surveys also differed. In 1995 and 1996, EIP approximated the area within which Yadon's piperia were present in the 1996 surveys by David Allen by drawing polygons around the general area of the occurrences, and these acreages were used in the Draft EIR for this project (County of Monterey 1995 and 1997). In 2004, WWD/Zander & Associates delineated the patch area within which Yadon's piperia were present in the 2004 surveys by connecting all Yadon's piperia within 3 meters of other Yadon's piperia (10 feet) into polygons representing individual "patches". The result is that the acreage of "occupied habitat" using the 1996 EIP mapping is approximately 10 times the size of the acreage of "piperia patches" using the 2004 methodology. While the 2004 survey methodology is more precise, the 1996 methodology is more similar to the approximation methods used at surveys of Yadon's piperia at other locations outside the Del Monte Forest.

The delineated 2004 survey patch area is considered to underestimate the actual occupied habitat for Yadon's piperia because it cannot account for:

- the contiguous nature of occupied piperia habitat at many of the project sites;
- areas where piperia may be present but not expressed above ground,
- areas where individual piperia might have been missed in the 2004 survey, and
- areas where piperia are most likely to colonize naturally, if such colonization were to occur, and
- immediately adjacent Monterey pine forest areas that provide shading for Yadon's piperia which is essential for piperia habitat.

In order to better estimate the area of piperia occurrences, a 50-foot buffer around the delineated 2004 survey patches was used to estimate the occurrence area for

each development and preservation site. The 50-foot distance was measured from the outer perimeter of the 2004 survey polygons. Where the 2004 survey identified a single individual, a 50-foot radius around the surveyed point was used. Areas of non-habitat were excluded from the resultant occurrence layer, including roads, trails, wetlands, and developed areas. The 50-foot distance was selected after mapping iterations of several different distances indicated that this distance eliminated most of the small occlusions between dense concentrations of piperia, while not including excessive areas of unoccupied surrounding forest. This occurrence area should not be considered a precise delineation of piperia habitat, but rather a conservative estimate of the occupied piperia habitat found in the surveys in the spring of 2004. The proposed 2005 survey will increase knowledge of piperia habitat characteristics and assist in the creation of a better informed estimate of this habitat.

The resultant acreages are included in the tables presented earlier in this chapter. The occurrence areas for each development and preservation area are shown in updated biological resource figures in Appendix E.3 in this document.