Chapter 8
AIR QUALITY AND TRANSPORTATION

8-1. INTRODUCTION

This chapter presents a description of the existing conditions in the Shorezone area with respect to Air Quality and Transportation and identifies the potential environmental impacts on air quality and transportation that could result from each of the five alternatives.

Air quality is impacted by both natural and man-made factors. Natural conditions include large scale, external weather patterns, local weather characteristics, and the topography and other physical features of the Region. High levels of air pollution occur when winds are very light and pollutants are not dispersed. Often, the air aloft is warmer than surface air resulting in an inversion layer that traps pollution at lower levels. These inversions are very common during wintertime and on summer nights. Air quality within the Region reacts to both internal and external factors. External factors include polluted air transported into the Region via westerly winds from the Sacramento Valley and Bay Area. Internal sources include vehicle tailpipe emissions, wood heaters, and forest fires (both wild-land [high impact] and prescribed [low impact] fires).

Human-related factors include both local and out-of-Basin sources. Local sources include mobile source emissions (on- and off-road vehicles, watercraft, OHVs, etc.) and associated resuspended road dust, smoke from residential wood combustion and forest fires (wild and prescription), blowing dust and stationary sources. Out-of-Basin sources include polluted air transported into the Region via westerly winds from vehicular, agricultural and industrial activities in the Sacramento Valley and Bay Area, seasonal dust from Asia and smoke from regional fires.

Summer weather conditions are dominated by fair weather high-pressure systems, occasionally broken by storm systems moving through the Region. During the summer, clear, cloud-free weather accelerates reactions in the atmosphere that produce ozone, commonly called smog. Additionally, on a majority of days in the warmer months, winds from the Sacramento Valley and Bay Area enter the Basin, bringing pollutants with them. Winter weather is dominated by Pacific storm fronts moving inland, bringing moisture to the Region. During storm periods, high air pollution levels do not normally occur. Between storms, the atmosphere tends to stratify into different layers forming an inversion, thus trapping pollution at the surface of the Basin’s “bowl” shape. This results in little to no dispersion of pollutants, creating high-localized concentrations and higher deposition rates to the Lake’s surface. The atmospheric transport of pollutants from out of the Basin rarely occurs during the colder months, therefore local sources are the dominant contributors to air pollution during the winter.

REGULATORY CONSIDERATIONS

Tahoe Regional Planning Agency

The Regional Plan for the Lake Tahoe Region sets the standards for transportation and air quality in the Tahoe Region. The Goals and Policies (1986) provides the basis for the
integrated 1992 Regional Transportation Plan/Air Quality Plan (RTP/AQP). These plans guide decision-making for transportation and air quality improvements within the Region.

To meet the goals of the Transportation Element, Vehicle Miles Traveled (VMT) need to be reduced from 1981 levels by 10 percent and peak use traffic flow should not exceed:

- Level of service C on rural scenic/recreation roads;
- Level of service D in rural developed areas;
- Level of service D on urban roads;
- Level of service D for signalized intersections.
- Level of service E may be acceptable during peak periods not to exceed four hours per day.

**TRPA Code of Ordinances**
Chapter 93 of the TRPA Code, Traffic and Air Quality Mitigation, establishes criteria and mitigation requirements. Chapter 91 establishes Air Quality Control regulations. In June 1997, the TRPA Governing Board adopted a regulation to ban all carbureted two-stroke marine engines from operating in the Tahoe Region. This ban went into effect June 1, 1999.

**TRPA Thresholds**
Article V(b) of the Tahoe Regional Planning Compact requires TRPA to adopt thresholds for the Tahoe Region. Thresholds contain both numerical and management standards. For Air Quality, TRPA has adopted standards for carbon monoxide, ozone, visibility, and nitrate deposition. For Transportation, management standards have been adopted for VMT and Traffic Volume.

**Federal Agencies**

**U.S. Environmental Protection Agency (EPA)**
The Environmental Protection Agency has established Federal air quality standards. Federal (and state) regulations have established 23 separate air quality standards for 14 air quality parameters. These include carbon monoxide (CO), ozone, particulate matter less than 10 microns in size (PM10), nitrogen dioxide (NO2), sulfur dioxide (SO2), visibility, lead, hydro carbons, sulfates, hydrogen sulfide, oxides of nitrogen (NOx), wood smoke, suspended soil particles, and NOx transport (see Table 8-1).

**State Agencies**

**Departments of Transportation**
Numerous agencies, along with TRPA, exercise jurisdiction over transportation and air quality programs in the Region, but not all of them have established standards. The California Department of Transportation (Caltrans), Nevada Department of Transportation (NDOT) and each county have responsibilities for transportation system construction, operation and maintenance. In addition, local governments, public utility districts and TRPA (also designated the Tahoe Metropolitan Planning Organization [TMPO] in 1999) can influence the transportation systems and programs.

**Air Quality Programs**
Several agencies, in particular, retain jurisdiction over air quality programs. The California Air Resources Board (CARB) and the Nevada Bureau of Air Quality maintain standards to address air quality. The El Dorado and Placer County Air Pollution Control Districts (APCD), and the Washoe County District of Health have jurisdiction in their
respective portions of the Region; however, TRPA has adopted some standards that are stricter than the federal or state standards.

The ambient air quality standards for the states of California and Nevada, Federal, and TRPA are summarized below in Table 8-1.

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Time Period (average)</th>
<th>Federal Standards</th>
<th>California Standards</th>
<th>Nevada Standards</th>
<th>TRPA Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ozone</td>
<td>1 Hour</td>
<td>0.12 ppm</td>
<td>0.09 ppm</td>
<td>0.10 ppm</td>
<td>0.08 ppm</td>
</tr>
<tr>
<td></td>
<td>8 Hour</td>
<td>0.08 ppm</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td>1 Hour</td>
<td>35 ppm</td>
<td>20 ppm</td>
<td>35 ppm</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>8 Hour</td>
<td>9 ppm</td>
<td>6.0 ppm</td>
<td>6.0 ppm</td>
<td>6.0 ppm</td>
</tr>
<tr>
<td>Nitrogen Dioxide</td>
<td>1 Hour Annual Average</td>
<td>-</td>
<td>0.25 ppm</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.053 ppm</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sulfur Dioxide</td>
<td>24 Hour</td>
<td>0.14 ppm</td>
<td>0.04 ppm</td>
<td>0.14 ppm</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>3 Hour</td>
<td>0.5 ppm</td>
<td>-</td>
<td>0.5 ppm</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>1 Hour Annual Average</td>
<td>0.030 ppm</td>
<td>0.25 ppm</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Suspended Particulate Matter (10 microns)</td>
<td>24 Hour Annual Geometric Mean</td>
<td>150 ug/m³</td>
<td>50 ug/m³</td>
<td>150 ug/m³</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50 ug/m³</td>
<td>20 ug/ m³</td>
<td>50 mg/ m³</td>
<td>-</td>
</tr>
<tr>
<td>Suspended Particulate Matter (2.5 microns)</td>
<td>24 Hour Annual Arithmetic Mean</td>
<td>65 ug/ m³</td>
<td>25 ug/m³ (proposed)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15 ug/ m³</td>
<td>12 ug/ m³</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

1 Nevada Standard specific to the Lake Tahoe Air Basin (ozone) or to areas at or above 5000 ft. above mean sea level
2 California Standard specific to the Lake Tahoe Air Basin
3 Secondary Standards
Ppm Parts per million
µg/m³ Micrograms per cubic meter

8-2. EXISTING AIR QUALITY AND TRANSPORTATION CONDITIONS AND TRENDS

EXISTING CONDITIONS – AIR QUALITY

Attainment of the different state, federal and TRPA air quality standards has varied for each pollutant in past years. As previously discussed, air quality is impacted by both natural and human-made factors. The Tahoe Region has a permanent population of approximately 53,000 but there are approximately 15,000,000 visitors a year. During the summer months the average daily population, including visitors, swells to 500,000. (2004 Regional Transportation Plan.)
The following sections briefly discuss specific air pollutants in the Tahoe Region affected by Shorezone activity. Additional information is contained in TRPA's 2001 Threshold Evaluation Report, which was adopted by the TRPA Governing Board in July 2002.

**Vehicle Miles Traveled (VMT)**

Vehicle Miles Traveled (VMT) is a modeled value based on factors such as traffic counts, average trip length, etc. TRPA's VMT threshold standard indicator is based on the average daily VMT on a non-weekend summer day. TRPA implements a comprehensive planning strategy to attempt to meet VMT standards and fulfill the requirements of the Compact. In an effort to reduce VMT, TRPA, federal, state, and local agencies are implementing transportation projects that will increase the interregional and intraregional transit network to provide alternatives to the automobile.

**Carbon Monoxide (CO)**

Carbon monoxide (CO) is a tasteless, odorless, and colorless gas that is slightly lighter than air. It affects humans by reducing the supply of oxygen to the tissues of the body and is regulated because of concern for public health. TRPA's indicator for Carbon Monoxide is the second highest 8-hour concentration at a monitoring site in Stateline, Nevada. CO levels have significantly decreased from the 1980's through the mid-1990's, and current trends are fairly stable. This is primarily due to technological improvements that have reduced vehicle emissions, and federal and state regulations requiring such reductions. The Federal Standard has not been violated since 1992. The states' and TRPA's 8-hour standard (6 ppm) was not exceeded from 1995-2001, although a few exceedances occurred in 2002 and 2003. All 1-hour CO standards are in attainment (attainment status is based on the second highest hourly peak concentration at the Stateline, NV site). The California portion of the Tahoe Region was re-designated as an attainment area by EPA in 1998. In order to maintain the attainment status, the Region must continue to implement those measures identified as necessary to reach attainment (see TRPA's 2001 Threshold Evaluation Report, Air Quality/Transportation Chapter [July 2002] for detailed measures). Attainment must be maintained for 10 years before the Region as a whole is treated as an attainment area. Until then, the Region is considered a maintenance area for federal conformity planning purposes.

Watercraft emit far more CO per mile than vehicles. However, CO is generally of concern only during the winter months, when weather conditions result in little dispersal of pollutants. For this reason, CO emissions during the summer months have often not been cause for as much concern. However, on July 4th and 5th of 2002, the Stateline, NV CO monitoring site recorded an exceedance of TRPA's 6-pmm 8-hour standard. This period occurred after a fireworks display ended, when the vehicle traffic in the Basin is extremely high. However, at the same time, there were many boats concentrated in the area nearby Stateline. Although the data necessary to determine the exact cause of this exceedance were not available, it is possible that boat traffic contributed to the high readings (especially given the greater rate of emissions per boat mile versus vehicle mile). Therefore, CO emissions are being included in this analysis.

**Ozone**

Ozone causes adverse human health effects in the form of respiratory irritation, impaired athletic performance, and possible functional changes in the respiratory system. Ozone also causes damage to vegetation, can cause injury to leaf tissue, and reduces photosynthetic activity. Ozone-induced damage is most serious on evergreen plants, particularly the Ponderosa and Jeffrey Pines, and on Quaking Aspen (Davis and
Gerhold, 1976). For this reason, TRPA’s standard for ozone is stricter than the state and federal standards, which are based only on human health effects.

Watercraft emit significant levels of hydrocarbons [HCs] (often grouped into reactive organic gases, or ROG, for emissions information) and nitrogen oxides (NOx), which when combined with sunlight, form ozone. Ozone is of greatest concern during the warmer months since it is formed from reactions with sunlight, and this formation is favored by the warmer temperatures. Obviously these conditions also coincide with the highest boat use on Lake Tahoe. Therefore, the emissions of HCs and NOx must be considered in this evaluation.

Ozone data for 1996-2002 show that the California ozone standard was met at the Lake Tahoe Boulevard monitoring site every year, with the exception of 1997 and 1999. The TRPA standard of .08 ppm has been exceeded on at least one occasion per year since its adoption. Table 8-2 lists the status of air quality attainment.

Visibility

The Tahoe Basin is known as one of the most beautiful places on earth. While a large part of the draw is the emerald and blue colors seen in the lake and the associated clarity, it is also framed by large, beautiful mountains on all sides. One of the special characteristics about the Tahoe Basin has been the large visual range where, on most days, an observer can see the features of land across the lake. TRPA has adopted more stringent standards to protect the Basin’s unique visibility.

Visibility is most affected by fine particulates (Particulate Matter 2.5 microns in diameter and less, or PM$_{2.5}$) and other visual pollutants, such as sulfates. The sources of PM$_{2.5}$ include smoke from residential wood combustion, forest fires (wild and prescription), dust from winds and re-entrained from roadways, and during the warmer months, some PM$_{2.5}$ is blown in from areas outside of the Basin, including the Sacramento Valley and Bay area and from Asia (mostly during the spring and fall). Sulfates are also mostly transported, since very few sources exist within the Basin.

Current monitoring methods indicate visibility ranges below the Sub-regional (local urban) threshold standards. While the 50 percent regional standard indicator is being met, the 90 percent standard is not in attainment. Data indicates that while the local visibility-reducing pollutant sources are decreasing, the days with the greatest amount of haze during the summer months are getting hazier. This indicates contributions from out-of-Basin sources, such as motor vehicles, agricultural activities, industrial uses and some seasonal contributions from Asia. However, the significance of these non-local sources is as yet unknown (studies are currently underway).

For the management standard, the status of the wood smoke reduction is unknown. The 1981 values were never determined; therefore, the amount of reduction equivalent to 15 percent is unknown (direct measurement methodology was not available and is currently being developed). However, current aerosol monitoring provides an indirect indication that wood smoke levels in South Lake Tahoe decreased from 1991 through 1999.

Watercraft emit PM$_{10}$ and PM$_{2.5}$. With the current emissions requirements, the level of PM generated by boat exhaust is relatively small compared to the other sources. Therefore, the impacts to visibility are expected to be rather small. However, data collected in the late 1990’s and recent studies indicate that particles are having a significant impact on lake clarity. The importance of the contribution from air deposition to the lake remains unknown, however research is currently underway to estimate the
contribution. Enough information is available to know that particle deposition to the lake must be considered in all environmental analyses. Since boat emissions occur immediately over the lake’s surface, the chances of deposition are higher than emissions generated on-land. Therefore, PM is included in this analysis.

PM\textsubscript{10}

As mentioned above, PM affects visibility; however, it is regulated by federal and state laws primarily due to its impact to human health. These health impacts include respiratory irritation and damage, especially to those more sensitive to PM (such as children, the elderly population, and those with sensitive respiratory systems such as asthmatics), and possibly more severe impacts. The federal and state standards address inhalable particulate matter less than 10 microns in diameter (PM\textsubscript{10}) and less than 2.5 microns in diameter (PM\textsubscript{2.5}). TRPA has not adopted separate PM standards, but includes the federal and state standards in the evaluation of its own standards and indicators.

All PM\textsubscript{10} geometric and arithmetic means standards are being met, and have been in attainment for several years. The California 24-hour average has been violated in the past and, in 2001, exceeded the 50g/m\textsuperscript{3} standard on three days (attainment status for the California standard is impacted by four exceedances in one year) and exceeded the standard one day in 2002. However, the EPA-approved method for monitoring PM\textsubscript{10} and PM\textsubscript{2.5} is a sample collection once in every 6 days; therefore, it is expected that many exceedances are not captured by the equipment. Unfortunately there is no continuous sampler that meets EPA’s criteria for PM monitoring, so the number of exceedances per year is estimated by multiplying the measured exceedances by six.

Atmospheric Deposition

The lake’s clarity has been dropping by approximately one foot per year for over 30 years (see Chapter 5, Water Quality, for more information). Clarity loss has been tied to increased inputs of the nutrients nitrogen (N) and phosphorus (P). These nutrients cause an increase in the growth of algae, which results in reduced clarity. Recent data indicates that particles in the water also have a significant impact to lake clarity. Data in the late 1970’s and early 1980’s found that nitrogen deposition from the atmosphere was contributing to the nutrient load in the lake. At that time, it was believed that excess nitrogen was having the largest impact on the loss of lake clarity. Therefore, TRPA adopted a threshold indicator for nitrogen deposition to the lake. However, data collected in the 1980’s and 1990’s indicated that phosphorous also plays a significant role in lake clarity, and in some years its role was equal to or more significant than nitrogen. Research published in 1994 found that phosphorous is also depositing from the air into the lake (Jassby et al.). This has prompted further study into the role of atmospheric deposition, with data indicating that phosphorous loading to the lake must also be reduced if the loss of clarity is to be slowed and, hopefully, reversed. Although TRPA has not yet adopted indicators for deposition of phosphorous, it is expected that as the indicator update process gets underway, an indicator will be included for this nutrient. As discussed above, particle deposition to the lake is also important to clarity. However, it is not yet known if the current federal and state standards for PM are stringent enough to also address the role of PM in lake clarity loss.

TRPA’s atmospheric nutrient loading threshold standard for nitrogen (20 percent reduction from 1973-1980 annual average) followed a positive trend in the 1980’s and mid-1990’s, and has remained fairly stable since (based on South Lake Tahoe data). However, base values were never determined, and there is no way currently to obtain those values, so the status of this indicator remains unknown. The management
standard of this threshold (VMT reduction by 10 percent of 1981 values) is not in attainment; VMT has increased by approximately 8.5 percent since 1981.

Table 8-2 summarizes the 2001 status for the air quality threshold indicators discussed above.

<table>
<thead>
<tr>
<th>Table 8-2. Air Quality Indicator Status for Pollutants Impacted by Shorezone Activities</th>
<th>2001 Threshold Status</th>
<th>2001 Attainment Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Monoxide (CO) (AQ-1)</td>
<td>CO concentrations at Stateline, California violate threshold standards during the winter. Trends are positive and TRPA predicts attainment in this decade.</td>
<td>As of 1995, all State, Federal, and TRPA CO standards are being met</td>
</tr>
<tr>
<td>Ozone (AQ 2)</td>
<td>Ozone concentrations at Lake Tahoe Boulevard have violated the threshold standard every year since 1982. No trend is apparent. TRPA suspects long-range transport of ozone is occurring.</td>
<td>The TRPA standard is not being met. The California, Nevada and Federal standards are being met.</td>
</tr>
<tr>
<td>Inhalable Particulate Matter (PM10) (AQ-3)</td>
<td>PM10 concentrations at Lake Tahoe Boulevard violate the California 24-hour standard.</td>
<td>All Federal and California PM10 standards are being met.</td>
</tr>
<tr>
<td>Visibility (AQ-4)</td>
<td>Visibility measurements at Lake Tahoe Boulevard and Bliss State Park show that the Region attains the thresholds for regional and subregional visibility. Components of the fine particulate (PM2.5), in mass order, are: organic carbon, water, soil, ammonium, sulfate, and ammonium nitrate.</td>
<td>California, Nevada, and TRPA sub-regional standards are being met. TRPA visibility standard for the Region (basin-wide) is not being met.</td>
</tr>
<tr>
<td>Vehicle Miles of Travel (VMT) (AQ-7)</td>
<td>TRPA estimates VMT increased 10 percent from 1981 to 1987. The Regional does not attain the threshold standard.</td>
<td>Region still does not meet the threshold, and VMT continues to increase (significant impacts from out-of-Basin development).</td>
</tr>
<tr>
<td>Atmospheric Deposition (AQ-8)</td>
<td>Concentrations of NO3 and NO2 monitored on the South Shore are lower than they were in 1981. The Region appears to attain the threshold standard.</td>
<td>Unknown. However, concentrations have not changed much since 1996 evaluation.</td>
</tr>
</tbody>
</table>


The California Air Resources Board (CARB) has developed emission inventories (EIs) for local air districts. CARB generates an annual inventory for all of California’s air basins, providing estimates of total emissions, as well as emissions generated by boats. Table 8-3 uses information from the 2003 CARB inventory, with adjustments using the 2002 boater’s survey (included in the appendices of this DEIS), to estimate boat emissions compared to total emissions for the Lake Tahoe Air Basin (see http://www.arb.ca.gov/). The Boater’s survey indicated that on the day of the survey, approximately 64 percent of the California residents on the lake were from counties other than Placer and El Dorado, and that more than approximately 76 percent of Nevada residents surveyed were from counties other than Washoe, Carson City or Douglas. Given the popularity of Tahoe’s waters, it is expected that a significant portion of those who are from the five counties that include portions of Lake Tahoe within their boundaries are actually from areas outside of the Region, and, thus, are not included in the EI. However, since such an estimate is not available, it was decided that the average
non-resident proportion of 70 percent would be used. The difference between this conservative estimate and a more liberal estimate is expected to be “balanced out” by weekdays when fewer non-residents are on the lake. Using these figures, it was estimated that CARB’s EI only accounts for 30 percent of the boats on the lake on an average summer day. Therefore, a 70 percent increase in emissions was added to the published 2003 EI emissions (tons/day) from CARB for all four pollutants below and the total from all sources.

It should be noted that because similar information is not available for Nevada, the California numbers (after the addition of 70 percent) are simply multiplied by 1.5 to account for the entire air basin.

<table>
<thead>
<tr>
<th>Emission Sources</th>
<th>NOₓ</th>
<th>CO</th>
<th>ROG*</th>
<th>PM₁₀</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boats</td>
<td>0.62</td>
<td>14.82</td>
<td>1.89</td>
<td>0.13</td>
</tr>
<tr>
<td>Total</td>
<td>7.92</td>
<td>87.63</td>
<td>12.66</td>
<td>11.96</td>
</tr>
<tr>
<td>Percent From Boats</td>
<td>7.8%</td>
<td>16.9%</td>
<td>14.9%</td>
<td>1.10%</td>
</tr>
</tbody>
</table>

* Reactive Organic Gases (ROG) are included in CARB’s EI, however HCs are not. Since HCs are included in ROG measurements, ROG has been used to determine impacts.

Source: CARB 2003, with a 70% increase added to values, based on adjustments from 2002 boaters survey and adjustments for the inclusion of Nevada.

It was estimated that in 2004 there were approximately 231,000 boat trips on Lake Tahoe. Exhaust from boats can cause great emissions and degrade air quality. The emissions from boats, per hour or other comparable unit, greatly exceed those from vehicles. For example, one of TRPA’s pollutants of concern is NOx. To protect human health (through reduction of ozone) and lake clarity (from a reduction of nitrogen deposited to the lake), the TRPA adopted a threshold indicator for reducing NOx pollutant. The indicator requires a reduction in VMT in the Region to a level 10 percent below the 1981 base year levels. The NOx emissions from boats were compared to those from vehicles. CARB’s emission factor requirements state that vehicles weighing less than 8500 lbs (most passenger cars and SUV’s) emit between 0.25-0.277 grams of NOx per mile (pre-2004 vehicles) or 0.06 grams NOx/mile (new 2004 CA regulations). Assuming this factor, the NOx emissions generated by daily boat use shown in Table 8-3 equate to approximately 2.2 million miles driven in a pre-2004 CA vehicle (average of vehicles less than 8,500 lbs) and approximately 9.4 million miles driven in a 2004 and post-2004 vehicle.

In June 1997, the TRPA Governing Board adopted an ordinance to ban all carbureted two-stroke engines from operating in the Region to reduce the pollution emitted into the Lake (including poly-aromatic hydrocarbons [PAHs], unburned fuel and other pollutants). The ban went into effect beginning June 1, 1999; in February 1999, TRPA modified the ban to extend exemptions from compliance for some uses from 1999 to 2001. As of October 1, 2001, with the exception of direct fuel-injected low emission two-stroke engines, all carbureted and two-stroke engines are not allowed to operate on Lake Tahoe Regional Lakes. The ban resulted in reduced air pollution emitted from the watercraft exhaust systems. However, these pollutant reductions were already realized by the 2002 base year for this analysis, and therefore base year pollutant levels already incorporated the effects of the ban.
TRENDS – AIR QUALITY

Carbon Monoxide
The Region has experienced steady reductions in concentrations of carbon monoxide (CO), and the numbers of days the standards were exceeded at the Stateline, California station (moved to Stateline, NV in 1999). In 2002, the TRPA, California and Nevada 8-hour standard (6 ppm) was exceeded on 2 days (July 5 and December 8). By comparison, in 1990, the standard was violated on 38 days. The reductions can be primarily attributed to more stringent emission controls on motor vehicles and requirements for oxygenated fuels.

Ozone
The trend in ozone concentrations as measured at a Lake Tahoe Boulevard monitoring site on the South Shore indicates ozone concentrations have been relatively stable since 1981. This occurred despite an increase in regional VMT. Air quality monitoring data indicates that high ozone concentrations are partially due to upwind sources transported into the Region; however, data from recent studies have indicated that local sources are likely responsible for a majority of ozone pollution (Fiore, et al.). It is assumed that the current trend in ozone concentrations would continue, and may decline further if ozone precursor control measures are implemented in the Basin and upwind of the Region. Implementation of transportation and air quality control measures in the Tahoe Region that will reduce the emissions of ozone precursors should contribute to a decline in ozone concentrations.

Visibility
Since TRPA began its visibility-monitoring program in 1989, the visibility range has remained relatively constant. Recent data shows visibility ranges have generally improved, with all but the regional 90 percent standards being below the threshold standards. During winter months, visibility impacts are due primarily to wood smoke from residential heating and re-entrained road dust blown up by vehicles after the sand applied to icy roadways dries. Additionally, prescribed burns occur during the cooler months, and can contribute to smoke levels. During the summer months, visibility is degraded by smoke from forest fires, dust (blown by the wind from bare areas and resuspended by vehicles), fine particles from mobile exhaust (i.e. vehicles, watercraft) and out-of-Basin sources.

Particulate Matter
The trend in PM_{10} 24-hour measurements has fluctuated significantly since measurements were first taken in 1985. However, the overall trend has been downward. In 2001, the California 24-hour average was violated on three days, compared with 10 days in 1990. It is assumed this downward trend will continue as Best Management Practices (BMPs) continue to be applied and stricter controls on combustion devices are implemented in the Tahoe Region. Also, new monitoring equipment is available which can provide continuous PM measurements along with chemical analysis to help determine the sources of the PM. This information will provide a better assessment of the PM levels in the Region and help TRPA to implement appropriate programs and controls to further reduce PM levels.

In June 1997, the TRPA Governing Board adopted an ordinance to ban all carbureted two-stroke engines from operating in the Region. The reason for the ban was because two-stroke carbureted engines emit a much higher level of hydrocarbons than four-stroke engines, and also emit unburned fuel directly into the body of water.
Hydrocarbons, especially poly-aromatic hydrocarbons (PAHs), have been shown to be toxic to certain marine life. The ban on two-strokes decreased the discharge of unburned fuel into the Lake, and decreased the hydrocarbons emitted by marine engines.

However, while the ban has decreased hydrocarbon (HC) emissions, the increased use of four-stroke engines was expected to result in an increase in NOx, since they produce more NOx than two-stroke engines. To address this possibility, Dr. Tom Cahill and Dr. Steve Cliff from the University of California, Davis, in collaboration with the Tahoe Research Group, examined the effects on nitrogen levels in the air and water resulting from eliminating the two-stroke engines and increasing use of four-stroke engines. They concluded that the switch would have a negligible effect on the levels of nitrogenous pollutants in either the air or water at Lake Tahoe when compared to the overall nitrogen budget (1997, TRPA). However, the base year for this analysis is 2002, and the impacts of the ban are already incorporated into the emissions inventories used.

EXISTING CONDITIONS - TRANSPORTATION

Surface and Air Transportation

The Tahoe Region's transportation system includes several components. These components, which function as separate but related systems, include highways and roads, public and private transit, pedestrian and bicycle facilities, waterborne and air services.

The automobile continues to be the primary mode of transportation in the Tahoe Region, and highways, streets and roads provide the network these vehicles use. The highway network includes federal, state and local road facilities. Annual average daily traffic (AADT) volumes measured at the U.S. 50 and Park Avenue intersection show that traffic counts fluctuated considerably during the years between 1981 and 1990. However, more recently, 2001 traffic counts were measured at 44,500 AADT compared to 43,000 AADT in 1981, a 3.4 percent increase.

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The Tahoe Region is currently served by two publicly operated transit systems, tourist-oriented trolley bus services, a number of privately operated shuttle systems and taxi services. Tahoe Area Regional Transit (TART) operates two fixed routes serving 30 miles of shoreline area along Tahoe's North Shore, as well as the community of Truckee, with an annual ridership in 2003 of 301,400 passengers. BlueGO, operated by CTS Management Company serves the South Shore primarily along US 50. BlueGO provides fixed route and demand response service throughout the day and evening by employing a network of information kiosks and dedicated Interactive Voice Response phone units, along with custom software for scheduling and demand response trip requests. BlueGO had an annual ridership of 1,153,143 in 2003. The BlueGO bus fleet is primarily comprised of vehicles that use alternative fuels such as compressed natural gas (CNG) as their main fuel source. Tourist trolley bus services, also part of the TART and BlueGO systems, are offered in the summer as a tourist attraction. The TART-operated summer trolley had 19,594 passengers in 2003. The South Shore BlueGO-operated trolley had a 2003 ridership of 47,736 passengers.

In addition to local transit service, there are intercity and charter bus services, which enjoy significant ridership both within and from outside the Region, offered through a number of private operators. Bus service from Reno and Carson City in Nevada is provided on a daily basis for trips to the Tahoe Region and through the area to Sacramento and other cities in California. Service is also provided by the Tahoe Casino Express from the Reno airport to Tahoe. Ridership on this service, which offers 14 round
trips per day during the summer time, and 18 round trips during the winter, currently averages 120 passengers per day.

**Shuttle Services**

Several privately operated shuttle services are offered in the Tahoe Region. During the winter months, the major ski areas offer shuttle services on both the North and South Shore. The shuttles operate twenty hours per day on a demand-responsive basis and serve approximately 500,000 passengers annually (personal communication, N. Haven, 2003). During the winter months, the major ski areas offer shuttle services on a contract basis or privately.

The North Shore ski areas operate shuttles that serve the South Shore. Presently, coordination of services between the public transit system on the South Shore and the ski shuttles is afforded by use of common bus stops. In addition, a waterborne ski shuttle service between South and West Shore locations is provided aboard the Tahoe Queen located at the Ski Run Marina. Transportation to skiing destinations is provided by shuttle bus. A number of other recreation attractions and resorts also provide limited shuttle service for their guests.

**Bicycle and Pedestrian Facilities**

Currently, there are 74.2 miles of multi-use trails and 18.2 miles of sidewalk in the Tahoe Region, yet the bikeway and sidewalk system is incomplete in many communities around the Lake. TRPA defines bikeways as all facilities that provide for bicycle travel. Bikeways range in design from a Class I bicycle path separated from the roadway, to a Class III signed bike route that shares the highway with vehicles.

Pedestrian facilities in the Region primarily are found in the more urbanized areas. These facilities include both sidewalks, generally paved, and walkways, which may or may not be paved. In many areas, pedestrians share the use of available bike paths. Pedestrian facilities in the Region are not continuous, with frequent and lengthy gaps between facilities. Many sidewalks are in disrepair, are not ADA accessible and many walkways are not paved. In South Lake Tahoe, the condition of existing pedestrian facilities discourages pedestrian activity and encourages vehicle use even for short trips. On the North Shore, the pedestrian facilities in Incline Village and Kings Beach are generally unpaved. During the winter months, snow and ice removal occurs infrequently. The lack of snow removal during the winter months often forces pedestrians to walk immediately adjacent to or on the highway. The TRPA, in November 2003, adopted the RTP Bicycle and Pedestrian Element for the Lake Tahoe Region, which lists the policies and projects needed to upgrade and complete the bicycle and pedestrian facilities around the Lake.

**Aviation Service**

There are three recognized aviation facilities operating within the Tahoe Region as well as a number of airports in the general vicinity of Lake Tahoe. All of these facilities are located on the South Shore. The primary aviation facility in the region is the South Lake Tahoe Airport located in the City of South Lake Tahoe. The two other facilities on the South Shore are a heliport site at Heavenly Valley, and a helipad at Barton Memorial Hospital.

The South Lake Tahoe Airport (TVL), built in 1959, is the only airport that serves the Lake Tahoe Basin directly, with an 8,544-foot runway and a holding capacity limited to 115 permanent aircraft parking spaces. The Lake Tahoe Airport is a fully certificated...
FAA commercial service airport, capable of safely accommodating medium sized (100-180 passenger) aircraft. In addition to providing facilities for the national aviation system, the South Lake Tahoe Airport serves a vital function in providing an emergency access staging area for firefighting equipment and medical evacuations as well as housing the CNG fueling station used by the BlueGO transit system.

**Waterborne Transportation**

TRPA recognizes that waterborne services may provide an opportunity to reduce dependency on the automobile. Waterborne services can reduce automobile traffic to scenic and recreation areas (e.g., Emerald Bay and ski areas). Waterborne services may also reduce automobile commuter traffic between the North and South Shores by providing a connection not currently served by transit.

The TRPA *Code of Ordinances* requires that all commercial and tour boat facilities are located within a marina facility. Waterborne transportation services currently operate from facilities located at Ski Run Marina, Timber Cove Marina, and Tahoe Keys Marina on the South Shore, the Zephyr Cove Marina on the East Shore, and the Homewood Marina and Tahoe City on the West Shore. The Zephyr Cove Marina offers bus shuttle services to the marina from the South Stateline area.

It is estimated that 10,000 vehicle miles traveled (VMT) could be reduced on a peak summer day with the use of waterborne transit (TRPA, 1992). The cruise operators currently in service on the Lake carry over 400,000 passengers per year (Tahoe Transportation District, 1994). These operations are strictly tourist-oriented. Visitors to Tahoe comprise nearly 60 percent of the average daily VMT in the Region. The 75-mile perimeter of Lake Tahoe is a tourist draw and fixed-route water transit on the Lake could have a positive impact on travel patterns (TTD, 1994).

In 1995, the Transit Capital Improvement Program awarded the Tahoe Transportation District a grant for a waterborne transit analysis for the Tahoe Region. The analysis examined if and how implementation of waterborne transit could take place in the Region. The analysis concluded that waterborne transit could be effective in the Tahoe Region and identified potential landside facility locations and implementation strategies. Funding from a variety of sources is currently being sought to purchase vessels and conduct further planning studies to implement a waterborne transit system in the next 20 years.

**TRENDS - TRANSPORTATION**

**Traffic Volumes**

Peak summer daily traffic volumes at the entry points to the Region were forecast by utilizing historical trends. Peak month external cordon growth rates were used, with greater emphasis placed on the more recent years. These factors were used to forecast future growth at these stations. From 1987 through 1995, traffic entering the Region at the California entry points, has not shown any increase in traffic volumes. During those years, however, the volumes have fluctuated at different stations. Traffic entering the Region at the Nevada entry points during this same time period increased by 33 percent.

The trends in traffic volumes at the U.S. 50/Park Avenue intersection have fluctuated over the years. TRPA’s threshold for traffic volume reduction along U.S. 50, monitored at this intersection, does show a reduction in traffic volumes during the hours from 4:00 pm to 12:00 midnight, averaged from November 1 through January 31.
Utilizing the TranPlan traffic model, vehicle trips made within the Region were forecasted. From the 1995 base year, vehicle trips were forecast to increase by 5.5 percent by 2001, 13.4 percent by 2006, and 29.3 percent by the 2016 forecast horizon.

**Vehicle Miles Traveled (VMT)**

Reflecting the assumptions for growth in traffic volumes as shown above, regional vehicle miles of travel have also been forecast to increase from 1995 to 2016. This forecasted increase reflects the limited growth within the Basin, along with the more significant impacts anticipated from the extensive growth in population occurring in areas adjacent to the Region and the resulting increased levels of activity within the Region. The forecasts do not include a diversion of trips to transit. Under this scenario, regional VMT is forecast to increase by 29.6 percent from 1995 to 2016.

### 8-3. SUMMARY OF PROJECT ALTERNATIVES

As discussed in Chapter 2 of this EIS, the different alternatives would have varied effects on Shorezone development at Lake Tahoe.

**ALTERNATIVE 1 – NO PROJECT ALTERNATIVE**

This alternative would continue current practices for the review of Shorezone projects under the existing TRPA Code of Ordinances.

**ALTERNATIVE 2 – PROPOSED PROJECT ALTERNATIVE**

This alternative would result in revisions to the Shorezone provisions of the Code of Ordinances based on the consensus agreements of the Shorezone Partnership Group, direction from the Shorezone Policy Committee, and TRPA staff revisions for consistency, streamlining, and environmental adequacy. The general goal of this proposal is to assure all littoral parcels are eligible to apply for a pier and sufficient buoys to access the lakes of the Region; that all related impacts would be mitigated; and that all applicable environmental thresholds would be attained. The prohibition on the location of Shorezone structures in prime fish habitat would be eliminated under this alternative. This alternative would also include a new scenic review system and would introduce the concept of private, quasi-public, and public structures to provide the basis for design standards and deviation from those standards.

**ALTERNATIVE 3 – NO FISH HABITAT RESTRICTIONS ALTERNATIVE**

This alternative would continue all Shorezone provisions of the current TRPA Code, except that the prohibitions on Shorezone structures located in fish habitat areas would be eliminated, including stream setbacks. In addition, this alternative would allow littoral parcel owners, who also have the availability of a multiple-use facility, to apply for their own private Shorezone structure.

**ALTERNATIVE 4 – PUBLIC STRUCTURES ONLY ALTERNATIVE**

This alternative would remove the prohibition on locating Shorezone structures in prime fish habitat. The prohibition of Shorezone structures within 200 feet of a stream mouth would remain unchanged. However, in order to promote thresholds, this alternative
allows new or expanded structures for public facilities (open to the general public) only. No new or expanded private structures are allowed.

**ALTERNATIVE 5 – REDUCED DEVELOPMENT ALTERNATIVE**

This alternative would prohibit the construction of private single-use Shorezone structures. Under this alternative, only multiple use structures would be permitted and would require a 2:1 structure reduction mitigation for private multiple use and quasi-public structures, and a 1:1 structure reduction mitigation for public multiple use structures.

Table 8.4 below provides a summary of the main project features of the five proposed alternatives and provides an abbreviated overview of their differences. Table 8.5 provides a summary of the overall total buildout numbers for the five alternatives.

<table>
<thead>
<tr>
<th>Table 8-4. Summary of Project Alternatives</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project Features</strong></td>
</tr>
<tr>
<td>Streamlined Review</td>
</tr>
<tr>
<td>New Structures</td>
</tr>
<tr>
<td>Private Structures</td>
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<tr>
<td>Quasi–Public Structures</td>
</tr>
<tr>
<td>Public Structures</td>
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<tr>
<td>Repairs/ Modifications</td>
</tr>
<tr>
<td>Reduction in Structures</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 8-5. Full Buildout Numbers by Alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Structure Type</strong></td>
</tr>
<tr>
<td>Piers</td>
</tr>
<tr>
<td>Buoys</td>
</tr>
<tr>
<td>Ramps</td>
</tr>
<tr>
<td>Floating Docks</td>
</tr>
<tr>
<td>Slips</td>
</tr>
</tbody>
</table>

*Totals do not include new extensions/expansions.
8-4. **STANDARDS OF SIGNIFICANCE**

Determining level of significance for impacts to transportation and air quality is difficult. The analysis can determine a predicted increase in an amount of a pollutant, yet this calculation may not be directly comparable to TRPA’s thresholds, which are generally written in concentrations. For example, two of the air quality pollutants evaluated for this DEIS, hydrocarbons and nitrogen, are both precursors to the formation of ozone. Although the highest ozone concentrations in the Tahoe Region exceed the TRPA thresholds, it is difficult to determine exactly how much the increase in precursors would affect the ozone concentrations. Logically, increases in the amount of the precursors would result in an increased concentration of ozone, yet many other factors contribute to ozone formation and a quantifiably predictable relationship does not exist. However, this DEIS considers that any increases in these two pollutants will impact ozone concentrations in the Basin.

**TRPA Compact**

Article V of the Tahoe Regional Planning Compact requires TRPA to prepare a transportation element of the Regional Plan that:

- Reduces dependency on the automobile by making more effective use of existing transportation modes and public transit to move people and goods within the Region;
- To reduce, to the extent feasible, air pollution, which is caused by motor vehicles.

When increases in traffic capacity are required, TRPA is directed to give preference to public transportation and public programs to provide such capacity. Article V(d) of the Compact also requires TRPA to provide for attaining and maintaining federal, state, or local air and water quality standards.

Specific management standards and criteria for the various plans and policies managed by TRPA and federal and state agencies are summarized below in Table 8-6.
<table>
<thead>
<tr>
<th>Agency/Organization</th>
<th>Management Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tahoe Regional Planning Compact</strong></td>
<td>Tahoe Regional Transportation Planning in the Region is Required Planning Compact (A) to reduce dependency on the automobile by making more effective use of existing transportation modes and of public transit to move people and goods within the Region; and (B) to reduce to the extent feasible, air pollution that is caused by motor vehicles.</td>
</tr>
</tbody>
</table>

### TRPA Thresholds

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Numerical Standard</th>
<th>Management Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Carbon Monoxide</strong></td>
<td>Maintain carbon monoxide concentrations at or below 6.0 parts per million (ppm) averaged over eight hours.</td>
<td>Reduce traffic volumes on the U.S. 50 corridor by seven percent during the winter from the 1981 base year, between 4:00 p.m. and 12:00 midnight (evaluated as indicator 5 – traffic volume).</td>
</tr>
<tr>
<td><strong>Ozone</strong></td>
<td>Maintain ozone concentrations at or below 0.08 ppm averaged over one hour.</td>
<td>Maintain oxides of nitrogen emissions at or below the 1981 level.</td>
</tr>
</tbody>
</table>

### Regional Visibility

<table>
<thead>
<tr>
<th>Numerical Standard</th>
<th>Management Standard</th>
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<tbody>
<tr>
<td>Achieve an extinction coefficient of 25 Mm⁻¹ at least 50 percent of the time as calculation from aerosol species concentrations measured at the Bliss State Park monitoring site (visual range of 156 km, 97 miles); and achieve and extinction coefficient of 34 Mm⁻¹ at least 90 percent of the time as calculation from aerosol species concentrations measured at the Bliss State Park monitoring site (visual range of 115 km, 71 miles). Calculations would be made on three year running periods using the existing 1991-1993 monitoring data as the performance standards to be met or exceeded.</td>
<td>Reduce wood smoke emissions by 15 percent of the 1982 base values through technology, management practices, and educational programs (evaluated as indicator 6 – wood smoke).</td>
</tr>
</tbody>
</table>

### Subregional Visibility

<table>
<thead>
<tr>
<th>Numerical Standard</th>
<th>Management Standard</th>
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<tbody>
<tr>
<td>Achieve an extinction coefficient of 50 Mm⁻¹ at least 50 percent of the time as calculation from aerosol species concentrations measured at the South Lake Tahoe monitoring site (visual range of 78 km, 48 miles); and achieve and extinction coefficient of 125 Mm⁻¹ at least 90 percent of the time as calculation from aerosol species concentrations measured at the South Lake Tahoe monitoring site (visual range of 31 km, 19 miles). Calculations would be made on three-year running periods using the existing 1991-1993 monitoring data as the performance standards to be met or exceeded.</td>
<td>Reduce suspended soil particles by 30 percent of the 1982 base values through technology, management practices, and educational programs. Reduce wood smoke emissions by 15 percent of 1981 base values through technology, management practices, and educational programs. Reduce vehicle miles of travel by 10 percent of 1981 base values (evaluated as indicator 6 – wood smoke).</td>
</tr>
</tbody>
</table>

### Nitrate Deposition

<table>
<thead>
<tr>
<th>Numerical Standard</th>
<th>Management Standard</th>
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<tbody>
<tr>
<td>Reduce the transport of nitrates into the Basin and reduce oxides of nitrogen produced in the Basin consistent with water quality thresholds. Reduce vehicle miles of travel (VMT) in the Basin by 10 percent of the 1981 base year values (evaluated as indicator 7 – VMT).</td>
<td></td>
</tr>
</tbody>
</table>

### TRPA Goals and Policies

| The Transportation Element and the Air Quality Subelement of the Goals and Policies are the Goals and Policies of the 1992 RTP/AQP. These documents set the level of service standards. The applicable standards are LOS “D” for urban roads, and LOS “D” with brief periods of LOS “E” for signalized intersections. |

### TRPA Regional Transportation Plan (RTP)

| See above |

### TRPA Air Quality Plan (AQP)

| See above |

### TRPA Code of Ordinances

| Adherence to Chapter 91 and 93 requirements for stationary source controls and traffic analyses; the Code sections require reducing significant impacts to a less than significant level. |
SUMMARY OF POTENTIALLY SIGNIFICANT IMPACTS

Potential impacts within the Shorezone could result from increased recreational traffic accessing public and quasi-public facilities, from development allowed in the Shorezone, and from the increase in boat usage. In addition, the following potentially significant impacts to air quality and transportation may occur. In this analysis, an alternative is considered to have a significant impact on air quality if it would result in any of the following:

- Increased CO from boats and motor vehicles by greater than 30 percent
- Increased NOx from boats and motor vehicles by greater than 30 percent
- Increased HCs (hydrocarbons) from boats and motor vehicles greater than 30 percent
- Increased PM (particulate matter) from boats and motor vehicles to levels which may exceed PM standards
- Increased demand for existing parking by greater than 30 percent
- Increased VMT from on-land access to Shorezone structures by greater than 30 percent

This analysis does not specifically examine one air quality issue - increased airborne sediments due to blowing beach sand. During years of low lake levels, larger beach areas are exposed, creating localized situations of blowing sand and other materials. However, Osborne (Sedimentology of Littoral Zone in Lake Tahoe, California, Nevada, 1995) found the particle size of these affected areas is coarser than the 10 microns considered a health hazard that are regulated by the PM10 standard. Blowing sand may increase particulates, but does not constitute a potential for significant impact to human health standards. Further, the timing of the recent exceedances of CA’s 24-hour PM10 standard has been correlated with higher concentrations of smoke and/or re-entrained road dust after sand applications. Regarding water quality, recent data indicate that airborne particulates have a significant impact on lake clarity. However, since increased blowing sand is generally a function of lake level changes that would not be influenced by issues examined in this DEIS, blowing sand would not be analyzed by each alternative.

Vehicle miles traveled would also not be examined separately for each alternative. This analysis concludes that additional public Shorezone development generates additional vehicle travel, presenting a potentially significant impact. Any VMT or Level of Service analysis should be conducted for each project as part of the environmental analysis to make certain there is consistency with TRPA goals and policies. No additional mitigation measures are necessary at this time.

Increased Boat Emissions

Motorized watercraft in operation emit by-products of the combustion process. Boating Use Projections show the increases in boat usage from the base year (2002), by alternative. This analysis relies on these boating and fuel use numbers to calculate the boat emissions for each alternative. Although many combustion engine by-products are discharged through operation of motorized watercraft, four pollutants (particulate matter [PM], hydrocarbons [HCS], oxides of nitrogen [NOx] and carbon monoxide [CO]) were fully analyzed for these purposes because it is these four that would be most effected by marine engine activity. Tables 8-7 shows the estimated increase in boat emissions caused by full implementation of each alternative. Estimates were generated by dividing
the base year emissions by the estimated number of boat trips for the base year to generate an emission factor for each pollutant per boat trip. These factors were then multiplied by the number of additional boat trips in the other analyses to estimate total emissions per year. The increase over base year was determined by subtracting the base year emissions from the emissions for each alternative. Emissions of all pollutants of concern increase in Alternatives 1 through 4, with a small decrease in overall emissions in Alternative 5.

<table>
<thead>
<tr>
<th>Table 8-7. Alternatives Comparison: Air Quality / Transportation (Tons/Year)</th>
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<tbody>
<tr>
<td>Impact</td>
</tr>
<tr>
<td>Increased NOx from boats</td>
</tr>
<tr>
<td>Increased ROG from boats</td>
</tr>
<tr>
<td>Increased PM from boats</td>
</tr>
<tr>
<td>Increased CO from boats</td>
</tr>
<tr>
<td>Increased parking demand</td>
</tr>
</tbody>
</table>

* Assumption includes increase in public piers, buoys, ramps, floating docs, and slips.

Carbon Monoxide:
Carbon monoxide (CO) is a tasteless, odorless, and colorless gas that is slightly lighter than air. It affects humans by reducing the supply of oxygen to the tissues of the body and is regulated because of concern for public health. Although CO has generally been a wintertime pollutant, TRPA’s 6-ppm (8-hour average) standard was exceeded on July 5th, 2002. Given the timing of the exceedances (post-fireworks display), it is thought that the exceedance may have been due to a combination of idling vehicles traveling after the fireworks show was complete, idling boats on the lake in the area, and weather conditions favorable to little dispersal of pollutants (although data are not available to evaluate the sources). Marine engines, therefore, may contribute to carbon monoxide concentrations where, in combination with other sources that alone do not exceed the standard, violations of the CO standards are possible.

Hydrocarbons (or reactive organic gases):
Hydrocarbons (often grouped into reactive organic gases, or ROG, for emissions information) and nitrogen oxides, combined with sunlight, form ozone. Ozone causes adverse human health effects in the form of respiratory irritation, impaired athletic performance, and possible functional changes in the respiratory system. Ozone also causes damage to vegetation, including trees in the Tahoe Region. Ozone damage ages the trees, reducing productivity through premature aging of pine needles, reducing sap flow, and making trees vulnerable to drought, insect attack, and other stress factors (Cliff and Cahill, 2000). For this reason, TRPA’s standard for ozone is stricter than state and federal standards, which are based only on human health effects. The TRPA prohibition on two-stroke carbureted marine engines that went into effect in June 1999 has had an important moderating effect on some marina engine emissions, including HCs. However, these reductions have already been incorporated into pollutant levels for the 2002 base year. Therefore, the increase in emissions of ROG (and NOx) must be evaluated from a base year where the ban is already in place.

Nitrogen Oxides:
NOx impacts both air and water quality. As discussed above, NOx leads to the formation of ozone. However, NOx also contributes to the nitrogen levels in the lake (via deposition to the lake’s surface), and therefore contributes to the loss of lake clarity. Previous studies have suggested that over half of the nitrogen in the lake may come from the air (Jassby et al., 1994).
Particulate Matter:
The health impacts of PM include respiratory irritation and damage and possibly more severe impacts, especially for those more sensitive to PM (such as children, the elderly population, and those with sensitive respiratory systems such as asthmatics). The federal and state standards address inhalable particulate matter less than 10 microns in diameter (PM$_{10}$) and less than 2.5 microns in diameter (PM$_{2.5}$).

Increased Parking Need
Expanded public access to the Shorezone generates increased parking need. Locating and developing adequate parking for public facilities creates localized alterations to travel patterns and increases in coverage near the shore. Most of these impacts can only be evaluated at the project stage, based on local conditions.

Boat use growth assumptions and associated impacts to air quality
The 1997 Motorized Watercraft Environmental Assessment estimated that the annual growth rate for boat use on Lake Tahoe was approximately 1.5 percent per year. Therefore, boat use between 1994 and 2004 would have increased by 15 percent. In this same time period, average annual concentrations of CO, O$_3$ and PM have dropped, as has the number of annual exceedances of established standards for these pollutants. Therefore, assuming no advances in technology that would reduce boat emissions, the number of boats in use on the lake can increase by approximately 15 percent (at buildout) with no significant impact to air quality (though "hot spots" are expected in areas of high activity). However, it is expected and, in some cases required by proposed federal and state requirements, that continued advances in boat emissions technology will occur over the next 20+ years. In some cases, regulations may reduce emissions by over half of the current levels. Assuming that recent trends are continued, meaning that at any given time approximately 30 percent of the boats on the lake were manufactured within the previous three years, as estimated from the 2002 boater’s survey (refer to Appendix B), and that the adoption of federal and state regulations that will result in a 50 percent reduction in emissions for new model boats will occur by 2010, then an emissions increase of approximately 30 percent at buildout (over the base year) would not be expected to significantly impact air pollution levels. For this analysis, 30 percent emissions increase is expected to follow a 30 percent increase in boat use. However, as fleet turnover occurs (older, more polluting boats are replaced with new boats which emit far less pollution), some of the pollution associated with an increase in boat numbers may be offset. This is addressed in the mitigation measures.

Lake Tahoe ONRW Boat Sticker Mitigation Program
Several lakes and other water bodies around the country use local sticker programs for watercraft to fund environmental protection, mitigation, enforcement, and public outreach programs. Lake George in New York is one example where such a local registration sticker is required for mooring, launching or operation of motorized or large non-motorized watercraft, with annual fees from $30.00 - $37.50 or more depending on the size of the boat. Other lakes use a differential fee ($10 - $20) depending on watercraft registration in or out-of state. Current stickers must be prominently displayed on the watercraft to avoid violation. The proposed Lake Tahoe sticker could be used to fund and facilitate boating education and outreach, emissions mitigation and monitoring, perhaps tuning requirements for emission reductions (although this would require a more specific certification, or tuning certificate from a qualified local mechanic), enforcement for a variety of boating issues and noise standards, and with some limited boat inspection facilitate many of the mitigation measures discussed under the alternatives below (e.g. boat and trailer washing before launch, and checking for aquatic weeds).
Local jurisdiction, and likely state law support would be required to reap the full benefit of this program and provide financial support to local and other enforcement entities from the program.

**Long-Term Monitoring Program for Air Quality Standards**

Air quality monitoring in Lake Tahoe has been fairly extensive for some pollutants, but not consistent for all pollutants. Pollutants monitored on a regular basis include O₃, CO, PM₁₀ (mass) and PM₂.₅ (mass and speciation) and NOₓ. Other measurements have been done for short-term studies.

The monitoring plan will be funded through the Tahoe ONRW sticker program cited above and other Shorezone mitigation fees and will include, but not be limited to, the following;

- The Air Quality Working Group will reconvene to review existing data and assist in program development, including site selection, frequency and constituent sampling / analysis list. Pollutants to be included in the monitoring program include ozone, NOₓ and carbon monoxide.

Historical and recent data have indicated that pollutants from the western and northern portions of the region may travel across the lake to the Incline Village/North Shore area during the warmer months (Cahill et al., 2004). Therefore, the monitoring program shall include the installation of additional equipment at an appropriate location in this area. Monitoring shall include O₃, NOₓ and CO. The current site operated by Washoe County in Incline Village, considered an appropriate location for catching the pollutants "downwind," includes continuous O₃ monitoring and the County intends to add NOₓ monitoring with operation tasks being shared with TRPA; therefore, for this location, only a CO monitor needs to be purchased and fully operated through the program. Site operations for other equipment at the site will be included in the program. To support this effort, TRPA will use funds from the boat use sticker program, and collaborate with local air quality districts to install additional monitoring equipment in an appropriate location.

Due to the high concentrations of CO measured after the South Shore fireworks show in 2002, the monitoring program shall include CO monitoring on the beach located in an area of high boat use (South Shore/Stateline beach area) on July 4th and 5th to capture the impacts of high boat use during and after the fireworks show. Results will be compared to the CO monitor on Highway 50 at Stateline, vehicle counts and weather data to determine the impacts from boats.

During the summer months short-term air quality-monitoring locations will be based on the structures, potential boating and other impacts of the five proposed alternatives. Long term monitoring will incorporate the existing data and identify areas with data gaps and/or need for baseline information. A baseline or reference site for the boat sticker monitoring program will be established in a potential pathway of high boat use in open waters of Lake Tahoe, without significant influence from other sources, possibly located on the South Shore to Emerald Bay.

A boater’s survey, similar to that conducted in 2002, will be conducted every two years. This information, along with air quality monitoring data, will be used to identify the emissions impacts of boat use. Methodology used for this analysis (including assumptions made based on the 2002 boater’s survey data), or methods shown to be of equal or greater accuracy, will be used for estimating the emissions inventory for watercraft use and to identify if further mitigation measures are required.
The final monitoring plan will reflect the adopted alternative and be open to revision for technology changes in engines, fuel additives and limits on boat use.

8.5 POTENTIAL AIR QUALITY/TRANSPORTATION IMPACTS AND REQUIRED MITIGATION

ALTERNATIVE 1 – NO PROJECT ALTERNATIVE

The No Project Alternative would continue to review Shorezone projects under the current Code of Ordinances. This alternative does not allow new Shorezone structures in mapped or field verified fish spawning habitats, or within 200 feet of designated spawning streams. The TRPA may permit new structures in marginal fish habitats.

The evaluation criteria described above provides the basis for determining the significance of impacts to air quality and transportation. The following impacts have been determined to be significant when evaluated against the specific criteria described.

Increased Boat Emissions

Annual boat trips at buildout of the No Project Alternative would reach 322,080; this represents a 39 percent increase in emissions of concern from watercraft over the 2004 base year (Table 8-7) due to additional mooring opportunities. At peak use periods, areas of concentrated boat activity would likely experience degradation to local air quality. At peak use periods, areas of concentrated boat activity would likely experience degradation to local air quality.

Increased Parking Need

The increase in public facilities would increase parking demand at these facilities. Project specific features, such as available room for parking or feasibility of relying on public transit, may decrease the effect from new public facilities on parking demand and other features of the transportation system. Any VMT or LOS analysis should be conducted for each individual project as part of the environmental analysis to make certain there is consistency with TRPA goals and policies. No additional mitigation measures are necessary at this time.

Significant Air Quality Impacts

Impact 8.1.1: The No Project Alternative would result in an increase of NOx emissions from motorized watercraft.

Under this alternative, increased boating use would produce increases in oxides of nitrogen levels by 24 tons per year. Although a standard of significance has not been precisely set for nitrogen levels, increased nitrogen is expected to exacerbate air and water quality conditions by contributing to ozone and nitrogen levels. Estimates above indicate an increase in emissions by greater than 30 percent at buildout may cause significant air quality impacts. TRPA’s ozone standard is currently exceeded every year, therefore any increases in the precursors to ozone, including NOx and HCs, which may affect ambient levels will create a significant impact.

Mitigation Measure 8.1.1a: TRPA shall perform bi-annual boater’s surveys, as conducted in 2002, to obtain data that will be used in conjunction with air quality monitoring to determine the impacts from watercraft on air pollution. This mitigation measure could be partially funded and facilitated through the Tahoe boating sticker program discussed above.
Mitigation Measure 8.1.1b: TRPA shall implement an ongoing public education program directed towards the benefits of proper tuning of boats. It is expected that most residents and those who use their boats frequently on Lake Tahoe and other high-elevation lakes will have their boats properly tuned for the elevation, therefore reducing air emissions and improving the functionality of the boat. However, those bringing boats in from out of the Basin may not have their boats properly tuned, which results in an increase in air emissions. Therefore, the public education program should include intense focus on this group of boat users. This mitigation measure could be partially funded and facilitated through the Tahoe boating sticker program discussed above.

Mitigation Measure 8.1.1c: As determined above, estimates indicate that emissions at buildout can increase by approximately 30 percent from 2002 base levels without significant impacts to air quality. However, with watercraft fleet turnover and future regulations to reduce boat emissions, the predicted emissions for this alternative may fall lower than is currently estimated, therefore allowing a larger increase in boat use. The impacts to air quality from increased boat use will be measured by ongoing air quality monitoring, which includes currently-existing on-land monitoring sites operated by TRPA and other entities, plus increased monitoring of specific areas resulting from the implementation of the above mitigation measures. Also, bi-annual boater’s surveys will be conducted to obtain the information found in the 2002 boater’s survey. The combined monitoring and survey data will be used to analyze the affects of boat use on air emissions. If it is found that boat emissions are having a significant impact on air quality (including contributing to or solely causing the exceedances of any federal, state or TRPA standard), or if emissions have increased by 25 percent over the base year for any pollutant, then measures will be taken to reduce these impacts to a less than significant level. Such measures include the implementation of the following programs, either individually or in combination: limitations on daily boat launches (may be daily, peak day/weekend or Holiday periods), limitations on new shoreline structures that increase the number of boats on the lake, and/or changes to existing structures which will reduce the number of boats in use at any one time.

Impact 8.1.2: The No Project Alternative would result in an increase of ROG emissions from motorized watercraft. Under this alternative, increased boating use would produce increases in ROG by 73 tons per year. Although a standard of significance has not been precisely set for ROG levels, increased ROG is expected to exacerbate air quality conditions by contributing to increases in ozone formation. Estimates above indicate an increase in emissions by greater than 30 percent at buildout may cause significant air quality impacts. TRPA’s ozone standard is currently exceeded every year, therefore any increases in the precursors to ozone, including NOx and HCs (which make up a good portion of the ROG), may affect ambient levels and may create a significant impact.

In order to mitigate impacts on air quality, Mitigation Measures 8.1.1a, 8.1.1b and 8.1.1c presented above shall be implemented. Implementation of these mitigation measures would reduce this impact to less than significant.

Impact 8.1.3: The No Project Alternative would result in an increase of CO emissions from motorized watercraft. Under this alternative, increased boating use would produce increases in CO emissions by 576 tons per year. Although CO is generally a wintertime pollutant due to weather conditions that concentrate pollutants at the surface, a recent exceedance of TRPA’s 8-hour standard may have been in part due to CO emissions from boats. Therefore, the impacts to CO concentrations from increased boat use must be considered as they have the potential to have a significant impact. Estimates above indicate an increase in
emissions by greater than 30 percent at buildout may cause significant air quality impacts. TRPA’s CO standard has been exceeded in recent years, therefore any increases in CO emissions that may affect ambient levels will create a significant impact.

In order to mitigate impacts on air quality, Mitigation Measures 8.1.1a, 8.1.1b and 8.1.1c presented above shall be implemented. Implementation of these mitigation measures would reduce this impact to less than significant.

**Non-Significant Air Quality Impacts**

The No Project Alternative would result in an increase in PM from boat emissions. The increase in total boating use at proposed buildout under this alternative would result in an overall increase in PM emissions from motorized watercraft. However, PM emissions from boats represent approximately 1.1 percent of total PM emissions in the Tahoe Basin. All air jurisdictions in the Basin are currently in attainment of state and federal PM standards. When standards have been exceeded, the sources were determined to be smoke and/or resuspended road sand. Therefore, the emissions generated by the no project alternative will not have a significant impact on air quality in the region, and therefore no mitigation is required.

The No Project Alternative would result in an increase in parking. This alternative is not expected to result in significant impacts from the potential increase in parking demand. When a project that would increase public facilities in the Shorezone is proposed, parking demand would be addressed on a project-by-project basis, and would be mitigated as necessary at the time of project implementation. This would result in a less than significant impact on air resources.

**Beneficial Air Quality Impacts**

There would be no beneficial impacts with the No Project Alternative.

**ALTERNATIVE 2 – PROPOSED PROJECT ALTERNATIVE**

This alternative would result in revisions to the Shorezone provisions of the Code of Ordinances based on the consensus agreements of the Shorezone Partnership Group, direction from the Shorezone Policy Committee, and TRPA staff revisions for consistency, streamlining, and environmental adequacy. The general goal of this proposal is to assure all littoral parcels are eligible to apply for a pier and sufficient buoys to access the lakes of the Region; that all related impacts would be mitigated; and that all applicable environmental thresholds would be attained. The prohibition on the location of Shorezone structures in prime fish habitat would be eliminated under this alternative. This alternative would also include a new scenic review system and would introduce the concept of private, quasi-public, and public structures to provide the basis for design standards and deviation from those standards.

**Increased Boat Emissions**

Annual boat trips at buildout of the Proposed Project Alternative would reach 358,501. This increase would represent a 55 percent increase in emissions of concern from watercraft over the 2004 base year (Table 8-7) due to additional mooring opportunities. At peak use periods, areas of concentrated boat activity would likely experience degradation to local air quality.
Increased Parking Need

The increase in public facilities would increase parking demand at these facilities. Portions of the lakeshore would experience a doubling of public facilities at buildout of this alternative. Project specific features, such as available room for parking or feasibility of relying on public transit, may decrease the effect from new public facilities on parking demand and other features of the transportation system. Any VMT or LOS analysis should be conducted for each individual project as part of the environmental analysis to make certain there is consistency with TRPA goals and policies. No additional mitigation measures are necessary at this time.

Significant Air Quality Impacts

Impact 8.2.1: The Proposed Project Alternative would result in an increase of NOx emissions from motorized watercraft.

Under this alternative, increased boating use would produce increases in oxides of nitrogen levels by 34 tons per year. Although a standard of significance has not been precisely set for nitrogen levels, increased nitrogen is expected to exacerbate air and water quality conditions by contributing to ozone and nitrogen levels. Estimates above indicate an increase in emissions by greater than 30 percent at buildout may cause significant air quality impacts. TRPA’s ozone standard is currently exceeded every year, therefore any increases in the precursors to ozone, including NOx and HCs, which may affect ambient levels will create a significant impact.

In order to mitigate impacts on air quality, Mitigation Measures 8.1.1a, 8.1.1b and 8.1.1c presented above shall be implemented. Implementation of these mitigation measures would reduce this impact to less than significant.

Impact 8.2.2: The Proposed Project Alternative would result in an increase of ROG emissions from motorized watercraft.

Under this alternative, increased boating use would produce increases in ROG by 103 tons per year. Although a standard of significance has not been precisely set for HC levels, increased HC is expected to exacerbate air quality conditions by contributing to increases in ozone formation. Estimates above indicate an increase in emissions by greater than 30 percent at buildout may cause significant air quality impacts. TRPA’s ozone standard is currently exceeded every year, therefore any increases in the precursors to ozone, including NOx and HCs, which may affect ambient levels will create a significant impact.

In order to mitigate impacts on air quality, Mitigation Measures 8.1.1a, 8.1.1b and 8.1.1c presented above shall be implemented. Implementation of these mitigation measures would reduce this impact to less than significant.

Impact 8.2.3: The Proposed Project Alternative would result in an increase of CO emissions from motorized watercraft.

Under this alternative, increased boating use would produce increases in CO emissions by 808 tons per year. Although CO is generally a wintertime pollutant due to weather conditions that concentrate pollutants at the surface, a recent exceedance of TRPA’s 8-hour standard may have been in part due to CO emissions from boats. Estimates above indicate an increase in emissions by greater than 30 percent at buildout may cause significant air quality impacts. TRPA’s CO standard has been exceeded in recent years, therefore any increases in CO emissions that may affect ambient levels will create a significant impact.
In order to mitigate impacts on air quality, Mitigation Measures 8.1.1a, 8.1.1b and 8.1.1c presented above shall be implemented. Implementation of these mitigation measures would reduce this impact to less than significant.

**Non-Significant Air Quality Impacts**

The Proposed Project Alternative would result in an increase in PM from boat emissions. The increase in total boating use at proposed buildout under this alternative would result in an overall increase in PM emissions from motorized watercraft. However, PM emissions from boats represent approximately 1.1 percent of total PM emissions in the Tahoe Basin. All air jurisdictions in the Basin are currently in attainment of state and federal PM standards. When standards have been exceeded, the sources were determined to be smoke and/or resuspended road sand. Therefore, the emissions generated by the no project alternative will not have a significant impact on air quality in the region, and therefore no mitigation is required.

The Proposed Project Alternative would result in an increase in parking. This alternative is not expected to result in significant impacts from the potential increase in parking demand. When a project that would increase public facilities in the Shorezone is proposed, parking demand would be addressed on a project-by-project basis, and would be mitigated as necessary at the time of project implementation. This would result in a less than significant impact on air resources.

**Beneficial Air Quality Impacts**

There would be no beneficial impacts with the Proposed Project Alternative.

**ALTERNATIVE 3 – NO FISH HABITAT RESTRICTIONS ALTERNATIVE**

This alternative would continue all Shorezone provisions of the current TRPA Code, except that the prohibitions on Shorezone structures located in fish habitat areas would be eliminated, including stream setbacks. In addition, this alternative would allow littoral parcel owners, who also have the availability of a multiple-use facility, to apply for their own private Shorezone structure.

**Increased Boat Emissions**

Annual boat trips at full buildout under Alternative 3, would reach 549,099. This increase in boating trips would represent this represents a 137 percent increase in emissions of concern from watercraft over the 2004 base year (Table 8-7) due to additional mooring opportunities. At peak use periods, areas of concentrated boat activity would likely experience degradation to local air quality. At peak use periods, areas of concentrated boat activity would likely experience degradation to local air quality.

**Increased Parking Need**

Under this alternative, increased public access facilities would also increase parking demand at these facilities. Project specific features, such as available room for parking or feasibility of relying on public transit, may decrease the effect from new public facilities on parking demand and other features of the transportation system. Any VMT or LOS analysis should be conducted for each individual project as part of the environmental analysis to make certain there is consistency with TRPA Goals and Policies. No additional mitigation measures are necessary at this time.
Significant Air Quality Impacts

Impact 8.3.1: The No Fish Habitat Restrictions Project Alternative would result in an increase of NOx emissions from motorized watercraft. Under this alternative, increased boating use would produce increases in oxides of nitrogen levels by 85 tons per year. Although a standard of significance has not been precisely set for nitrogen levels, increased nitrogen is expected to exacerbate air and water quality conditions by contributing to ozone and nitrogen levels. Estimates above indicate an increase in emissions by greater than 30 percent at buildout may cause significant air quality impacts. TRPA’s ozone standard is currently exceeded every year, therefore any increases in the precursors to ozone, including NOx and HCs, which may affect ambient levels will create a significant impact.

In order to mitigate impacts on air quality, Mitigation Measures 8.1.1a, 8.1.1b and 8.1.1c presented above shall be implemented. Implementation of these mitigation measures would reduce this impact to less than significant.

Impact 8.3.2: The No Fish Habitat Restrictions Project Alternative would result in an increase of ROG emissions from motorized watercraft. Under this alternative, increased boating use would produce increases in ROG by 258 tons per year. Although a standard of significance has not been precisely set for HC levels, increased HC is expected to exacerbate air quality conditions by contributing to increases in ozone formation. Estimates above indicate an increase in emissions by greater than 30 percent at buildout may cause significant air quality impacts. TRPA’s ozone standard is currently exceeded every year, therefore any increases in the precursors to ozone, including NOx and HCs, which may affect ambient levels will create a significant impact.

In order to mitigate impacts on air quality, Mitigation Measures 8.1.1a, 8.1.1b and 8.1.1c presented above shall be implemented. Implementation of these mitigation measures would reduce this impact to less than significant.

Impact 8.3.3: The No Fish Habitat Restrictions Project Alternative would result in an increase of CO emissions from motorized watercraft. Under this alternative, increased boating use would produce increases in CO emissions by 2026 tons per year. Although CO is generally a wintertime pollutant due to weather conditions that concentrate pollutants at the surface, a recent exceedance of TRPA’s 8-hour standard may have been in part due to CO emissions from boats. Estimates above indicate an increase in emissions by greater than 30 percent at buildout may cause significant air quality impacts. TRPA’s CO standard has been exceeded in recent years, therefore any increases in CO emissions that may affect ambient levels will create a significant impact.

In order to mitigate impacts on air quality, Mitigation Measures 8.1.1a, 8.1.1b and 8.1.1c presented above shall be implemented. Implementation of these mitigation measures would reduce this impact to less than significant.

Non-significant Air Quality Impacts

The No Fish Habitat Restrictions Alternative would result in an increase in PM from boat emissions. The increase in total boating use at proposed buildout under this alternative would result in an overall increase in PM emissions from motorized watercraft. However, PM emissions from boats represent approximately 1.1 percent of total PM emissions in the Tahoe Basin. All air jurisdictions in the Basin are currently in attainment of state and federal PM standards. When standards have been exceeded, the sources were
determined to be smoke and/or resuspended road sand. Therefore, the emissions generated by the no project alternative will not have a significant impact on air quality in the region, and therefore no mitigation is required.

The No Fish Habitat Restrictions Alternative would result in an increase in parking. This alternative is not expected to result in significant impacts from the potential increase in parking demand. When a project that would increase public facilities in the Shorezone is proposed, parking demand would be addressed on a project-by-project basis, and would be mitigated as necessary at the time of project implementation. This would result in a less than significant impact on air resources.

**Beneficial Air Quality Impacts**
There would be no beneficial impacts with the No Fish Habitat Restrictions Alternative.

**ALTERNATIVE 4 – PUBLIC STRUCTURES ONLY ALTERNATIVE**

This alternative would remove the prohibition on locating Shorezone structures in prime fish habitat. The prohibition of Shorezone structures within 200 feet of a stream mouth would remain unchanged. However, in order to mitigate existing and additional development and to promote public access, this alternative allows new or expanded structures for public facilities (open to the general public) only. No new or expanded private structures are allowed.

**Increased Boat Emissions**
Under this alternative, annual boat trips at full buildout would reach 317,390. This increase in boating trips would represent 35 percent increase in emissions of concern from watercraft over the 2004 base year (Table 8-7) due to additional mooring opportunities. At peak use periods, areas of concentrated boat activity would likely experience degradation to local air quality. At peak use periods, areas of concentrated boat activity would likely experience degradation to local air quality.

**Increased Parking Need**
Under this alternative, the increase in public facilities would increase parking demand the most significantly compared to the other 4 alternatives. Project specific features, such as available room for parking or feasibility of relying on public transit, may decrease the effect from new public facilities on parking demand and other features of the transportation system. Any VMT or LOS analysis should be conducted for each individual project as part of the environmental analysis to make certain there is consistency with TRPA Goals and Policies. No additional mitigation measures are necessary at this time.

**Significant Air Quality Impacts**

**Impact 8.4.1: The Public Structures Only Project Alternative would result in an increase of NOx emissions from motorized watercraft.**
Under this alternative, increased boating use would produce increases in oxides of nitrogen levels by 23 tons per year. Although a standard of significance has not been precisely set for nitrogen levels, increased nitrogen is expected to exacerbate air and water quality conditions by contributing to ozone and nitrogen levels. Estimates above indicate an increase in emissions by greater than 30 percent at buildout may cause significant air quality impacts. TRPA’s ozone standard is currently exceeded every year,
therefore any increases in the precursors to ozone, including NOx and HCs, which may affect ambient levels will create a significant impact.

In order to mitigate impacts on air quality, Mitigation Measures 8.1.1a, 8.1.1b and 8.1.1c presented above shall be implemented. Implementation of these mitigation measures would reduce this impact to less than significant.

Impact 8.4.2: The Public Structures Only Project Alternative would result in an increase of ROG emissions from motorized watercraft.
Under this alternative, increased boating use would produce increases in ROG by 70 tons per year. Although a standard of significance has not been precisely set for HC levels, increased HC is expected to exacerbate air quality conditions by contributing to increases in ozone formation. Estimates above indicate an increase in emissions by greater than 30 percent at buildout may cause significant air quality impacts. TRPA’s ozone standard is currently exceeded every year, therefore any increases in the precursors to ozone, including NOx and HCs, which may affect ambient levels will create a significant impact.

In order to mitigate impacts on air quality, Mitigation Measures 8.1.1a, 8.1.1b and 8.1.1c presented above shall be implemented. Implementation of these mitigation measures would reduce this impact to less than significant.

Impact 8.4.3: The Public Structures Only Project Alternative would result in an increase of CO emissions from motorized watercraft.
Under this alternative, increased boating use would produce increases in CO emissions by 546 tons per year. Although CO is generally a wintertime pollutant due to weather conditions that concentrate pollutants at the surface, a recent exceedance of TRPA’s 8-hour standard may have been in part due to CO emissions from boats. Estimates above indicate an increase in emissions by greater than 30 percent at buildout may cause significant air quality impacts. TRPA’s CO standard has been exceeded in recent years, therefore any increases in CO emissions that may affect ambient levels will create a significant impact.

In order to mitigate impacts on air quality, Mitigation Measures 8.1.1a, 8.1.1b and 8.1.1c presented above shall be implemented. Implementation of these mitigation measures would reduce this impact to less than significant.

Non-significant air impacts:
The Public Structures Only Alternative would result in an increase in PM from boat emissions. The increase in total boating use at proposed buildout under this alternative would result in an overall increase in PM emissions from motorized watercraft. However, PM emissions from boats represent approximately 1.1 percent of total PM emissions in the Tahoe Basin. All air jurisdictions in the Basin are currently in attainment of state and federal PM standards. When standards have been exceeded, the sources were determined to be smoke and/or resuspended road sand. Therefore, the emissions generated by the no project alternative will not have a significant impact on air quality in the region, and therefore no mitigation is required.

The Public Structures Only Alternative would result in an increase in parking. This alternative is not expected to result in significant impacts from the potential increase in parking demand. When a project that would increase public facilities in the Shorezone is proposed, parking demand would be addressed on a project-by-project basis, and would
be mitigated as necessary at the time of project implementation. This would result in a less than significant impact on air resources.

**Beneficial Air Quality Impacts**

There would be no beneficial air quality impacts with the Public Structures Only Alternative.

**ALTERNATIVE 5 – REDUCED DEVELOPMENT ALTERNATIVE**

This alternative would prohibit the construction of private single-use Shorezone structures. Under this alternative, only multiple use structures would be permitted and would require a 2:1 structure reduction mitigation for private multiple use and quasi-public structures, and a 1:1 structure reduction mitigation for public multiple use structures.

**Increased Boat Emissions**

Under this alternative, annual boat trips at full buildout would reach 227,718. This figure represents a two percent decrease in boating trips and associated emissions over the 2004 base year. This alternative would focuses on a reduction in private piers and a slight increase in multiple use piers. As a result, this alternative would result in an overall decrease in mooring opportunities, thereby resulting in the decrease in emissions associated with motorized watercraft engines. However, at peak use periods, areas of concentrated boat activity would likely experience degradation to local air quality.

**Increased Parking Need**

This alternative would result in the lowest increase in public facilities out of all the proposed alternatives. As with the other alternatives, future project specific features, such as available room for parking or feasibility of relying on public transit, may decrease the effect from new public facilities on parking demand and other features of the transportation system. Any VMT or LOS analysis should be conducted for each individual project as part of the environmental analysis to make certain there is consistency with TRPA Goals and Policies. No additional mitigation measures are necessary at this time.

**Significant Air Quality Impacts**

There would be no significant air quality impacts as a result of the Reduced Development Alternative.

**Non-Significant Air Quality Impacts**

The Reduced Development Alternative would result in a decrease in emissions of all air quality pollutants from watercraft (and no detectable change in PM emissions). Increases in pollutants from on-land increases in vehicle use will be mitigated at the project level.

The Reduced Development Alternative would result in an increase in parking. While no significant impacts are expected under this alternative from an increase in parking demand, because this alternative would focus on multiple use piers and the reduction of private piers, the demand for parking may be higher under this alternative than Alternative 4. Because pier use would be more concentrated under this alternative, the need for increased parking to support areas with multiple use piers would likely occur.
However, these impacts would be mitigated on a case-by-case basis and would result in a less than significant impact on air resources.

**Beneficial Air Quality Impacts**

The Reduced Development Alternative would result in a decrease in NOx, HC, PM and CO emissions from motorized watercraft. Buildout under this alternative would produce an actual decrease in annual boating trips and as a result would lead to an overall decrease in the above mentioned pollutant levels, over the 2004 base levels. As a result, this alternative would have a beneficial impact on air resources.