DEPARTMENT OF TRANSPORTATION
DISTRICT 7-OFFICE OF TRANSPORTATION PLANNING
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LETTER A16

Serious drought.
Help save water!

April 5, 2017

Mr. Craig Chalfant
City of Long Beach
333 West Ocean Boulevard
Long Beach, CA 90802

RE: Southeast Area Specific Plan
SCH # 2015101075
GTS # LA-2016-00654AL-DEIR
Vic. LA-01, LA-22, LA-405, LA-605

Dear Mr. Chalfant:

Thank you for including the California Department of Transportation (Caltrans) in the environmental review process for the above referenced project. The Project consists of a Specific Plan, General Plan Amendment, Zoning Ordinance amendment, and Local Coastal Program (LCP) amendment to shape the land use and development on 1,481 acres.

As a reminder, Senate Bill 743 (2013) mandated that CEQA review of transportation impacts of proposed development be modified by eliminating consideration of delay- and capacity- based metrics such as level of service (LOS) and instead focusing analysis on another metric of impact. The Governor's Office of Planning and Research (OPR) is currently updating its CEQA Guidelines to implement SB 743 (https://www.opr.ca.gov/s_sb743.php) and is proposing that vehicle miles traveled be the primary metric used in identifying transportation impacts.

Caltrans is aware of challenges that the region faces in identifying viable solutions to alleviating congestion on State and Local facilities. With limited room to expand vehicular capacity, this development should incorporate multi-modal and complete streets transportation elements that will actively promote alternatives to car use and better manage existing parking assets. Prioritizing and allocating space to efficient modes of travel such as bicycling and public transit can allow streets to transport more people in a fixed amount of right-of-way. A16-1

Caltrans supports the implementation of complete streets and pedestrian safety measures such as road diets and other traffic calming measures. Please note the Federal Highway Administration (FHWA) recognizes the road diet treatment as a proven safety countermeasure, and the cost of a road diet can be significantly reduced if implemented in tandem with routine street resurfacing.

The City should refer the project's traffic consultant to OPR's website, guidelines on evaluating transportation impacts in CEQA if VMT methodology is used for specific project:

https://www.opr.ca.gov/docs/Revised_VMT_CEQA_Guidelines_Proposal_January_20_2016.pdf

The project will generate a net 30,568 daily trips and 1,748/2,459 AM/PM peak hour trips. When the Specific Plan and cumulated projects are built, significant cumulative impacts would occur. As a reminder, the decision makers should be aware of this issue and be prepared to mitigate cumulative traffic impacts in the future.

Please verify the result produced on the Table 5.16-14 Ramp Queues, Existing with Project and Table 5.16-15 Ramps Queues, Cumulative (2035), With and Without Project from the DEIR (Page 5.16-52 and 5.16-53). The tables referenced to source: Fehr & Peers 2017a. Please provide this source for our review. We would like to remind you that an off-ramp queuing analysis should be conducted utilizing the Highway Capacity Manual (HCM). The capacity of the off-ramp should be calculated by the actual length of the off-ramp between the terminuses to the gore point with some safety factor (85% of total queue length as general practice) or other methods approved in advance by Caltrans. The existing queue length should be calculated from the traffic counts and the percent of truck assignments with an adequate passenger car equivalent factor. The analyzed result may need to be calibrated with actual signal timing when available. A16-2

Many of the freeway segments including I-405, I-605, SR-22, and State facilities (including Pacific Coast Highway) will operate at an unacceptable level and the project adds traffic to these facilities. As such, there are project-level impacts and cumulative impacts to the State facilities. Caltrans does agree that those impacts are significant, however, Caltrans does not consider these impacts to be unavoidable. A16-3

Potential improvements/mitigations that you may want to explore include restriping, lane re-configuration, signal upgrades, signal timing adjustments, additional deceleration/acceleration lane, interchange improvements, off-ramp expansion, freeway widening, downsizing the Specific Plan or density, and etc. When an impact is identified, those improvements could be implemented through fair share contribution. Caltrans understands that funds for larger capital improvements may be difficult to obtain. It will be both agency's responsibility to plan and to seek funding for larger projects. A16-4

The City may accept fair share funding contributions towards future improvements of the State facilities so long as we can show that such improvements are reasonably expected to be implemented in a reasonable time frame. Please contact Caltrans to explore and develop these reasonable measures and plan.

We recommend that the City consider incorporating the following new policies to the Southeast Area Specific Plan. A16-5

- The City will involve Caltrans in the new/revision and update of the existing Transportation Impact Fee program that would include the State transportation systems and facilities.
- The City will work with Caltrans to identify cumulative traffic impact locations on State facilities and traffic improvements to alleviate traffic congestion within the Specific Plan area.

- The City will work with neighboring Cities to address cumulative significant traffic impact on I-405, I-605, SR-01, and SR-22.
- The City will work with Caltrans to evaluate access management needs and strategies to better manage traffic operations on arterial streets located within close proximity of freeway on/off-ramps in an effort to reduce traffic backups and frictions at Caltrans transportation systems. A16-5 Cont'd

Caltrans encourages the City to work with neighboring developing cities to resolve any cumulative significant traffic impacts on the State facilities from other cities' development. For a mutual collaboration, Caltrans would like to work with the City to determine potential traffic concerned locations with feasible improvement list in the near future. A16-6

Please be reminded that any work performed within the State Right-of-way will require an Encroachment Permit from Caltrans if the restoration is at State Right-of-way. Any modifications to State facilities must meet all mandatory design standard and specifications.

Storm water run-off is a sensitive issue for Los Angeles and Ventura counties. Please be mindful that projects should be designed to discharge clean run-off water. Additionally, discharge of storm water run-off is not permitted onto State highway facility (SR-01) without any storm water management plan. A16-7

Transportation of heavy construction equipment and/or materials, which requires the use of oversized-transport vehicles on State highways, will require a transportation permit from Caltrans when transporting disposed materials. It is recommended that large size truck trips be limited to off-peak commute periods.

In addition, a truck/traffic construction management plan may be needed for any project when high volume of construction vehicles are working on/near by the State facility such as SR-01. Traffic Management Plans involving lane closures or street detours, which may impact the circulation system affecting traffic to and from freeway on/off-ramps should be coordinated with Caltrans.

If you have any questions, please feel free to contact Mr. Alan Lin the project coordinator at (213) 897-8391 and refer to GTS # LA-2016-00654AL-DEIR.

Sincerely,

DIANNA WATSON
IGR/CEQA Branch Chief

cc: Scott Morgan, State Clearinghouse

LETTER A17

From: Mary Parsell
Sent: Monday, April 03, 2017 11:14 PM
To: Craig Chalfant
Subject: SEASP Recirculation of DRAFT EIR Traffic

El Dorado Audubon Society

Mission: Conservation of Native Birds and their Habitats and Education

By email and US mail

April 3, 2017

RE: SEASP recirculation of Draft EIR, traffic

Mr. Chaig Chalfant

Developent Services, Planning

City of Long Beach, CA

Dear Craig,

Regarding the proposed development in A17-1 Long Beach aka "SEASP" Draft EIR Recirculated which includes Los Cerritos Wetlands, we respectfully ask for protection of the environment and the adjacent sensitive wetlands. We are concerned with impacts affecting habitat, birds, wildlife and people. Impacts include building less than 100 feet from wetlands, road improvements/extensions resulting in loss of wetlands acreage (should be no loss of wetlands). Each of the following areas are under the jurisdiction of the California Coastal Commission. A17-1

Figure5, 16-5 - Feasibility of Intersection Improvements, 5. Environmental Analysis

#12, Pacific Coast Highway and Loynes Drive

#17 Shopkeeper Road and Second Street

#18 Studebaker Road and 2nd Street

#20 Pacific Coast Highway and Studebaker, extension of Shopkeeper and Studebaker (at PCH), loss of wetlands

#12, Pacific Coast Highway and Loynes Drive, *part of the circle is Sim's Biological Reserve*

A17-1 Cont'd

#17 Shopkeeper Road and Second Street

Street improvements to will widen Shopkeeper, turn lanes, etc. will take wildlife habitat on the Marketplace Marsh, owned by the City of Long Beach and on private property on the north side of 2nd Street

#18 Studebaker Road and Second Street

Street improvements on the north side will take wetlands/wildlife habitat on private property on the west side and on property owned by the Los Cerritos Wetlands Authority on the east side

Street improvements on the south side will take wetlands/wildlife habitat on private property (Bryant) that the Los Cerritos Wetlands Authority is trying to purchase

#20 Pacific Coast Highway and Studebaker, extension of Shopkeeper and Studebaker

Current use of three sides of the intersection is currently commercial use. The north/east side is not in use (except for a seasonal use selling trees, pumpkins and strawberries). *Extension of Shopkeeper past the current dead-end and around the back of the office building to connect to small section of Studebaker will result in loss of wetlands habitat.*

Page 5.16-30

A17-1 Cont'd

"Studebaker Road/Shopkeeper Road will have two lanes and connect Pacific Coast Highway to 2nd Street"

(Marketplace Marsh, City of Long Beach and Lyon Properties)

Thank you for your consideration for preservation and conservation of native birds and their habitats for the benefit of humanity.

Sincerely,

Mary

Mary Parsell

Conservation Chair, El Dorado Audubon

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LETTER A18

April 7, 2017

Mr. Craig Chalfant, Senior Planner
Development Services Department
City of Long Beach
333 West Ocean Boulevard
Long Beach, CA 90802

Via email *craig.chalfant@longbeach.gov*

Re: Draft Environmental Impact Report for the Southeast Area Specific Plan (SEASP), SCH No. 2015101075

Dear Mr. Chalfant:

We submit these comments on behalf of the Los Cerritos Wetlands Land Trust (LCWLT) on the recirculated traffic section of the draft EIR prepared for the Southeast Area Specific Plan ("SEASP" or "the Project").

I. The Traffic Analysis Remains Inadequate.

LCWLT has again engaged Tom Brohard and Associates to review the updated traffic analysis. Mr. Brohard's review, which is attached to this letter as **Exhibit 1**, identifies several flaws and continuing omissions which must be corrected in a revised and recirculated Draft EIR. For example, the Traffic Demand Management program is still ill-defined and unable to ensure the reduction in trip generation required to reach the trip rates in the analysis. There is no analysis of weekend peak trips that would likely show significant impacts. The EIR also still fails to provide any actual analysis of impacts to emergency vehicles under future conditions beyond noting that emergency vehicles currently meet their goal response times. This says nothing of the future. Importantly, Mr. Brohard's review identifies new CEQA deficiencies related to the updated traffic analysis. Increases in traffic generate demands for traffic relief measures. Such measures are often designed to increase roadway capacity through extensions, new connections, and widenings. In Southeast Long Beach, these types of traffic relief measures could result in encroachment into the Los Cerritos Wetlands. A18-1

II. Air Quality Affects Wetlands.

Closely related to and reliant on adequate traffic analyses are CEQA analyses of A18-2

greenhouse gas emissions (GHG) and air quality impacts. The flawed traffic analysis results in flawed and incomplete GHG and air quality analysis in the SEASP EIR. As Tom Brohard's review noted, "the February 2017 RDEIR and the Updated TIA for the Southeast Area Specific Plan remain flawed. Gridlocked conditions will result on weekdays from the development of 5,439 condominiums-townhomes and 701,344 square feet of retail. Only one of the 18 significant traffic impacts will be mitigated. Additional significant traffic impacts will also be identified when weekend traffic conditions are included in the Updated TIA." (Exhibit 1, p. 1.) Specifically, revised GHG and air quality analyses must be completed based on the Updated TIA and that these revised analyses address the potential for increased emissions to impact the wetlands and upland vegetation.

Scientific literature has documented the progressive adverse changes in biotic community structure and composition as a result of increased nitrogen emissions as well as other emissions caused by increased traffic and traffic congestion.[1] Many ecosystems are presently nitrogen-limited and respond adversely to incremental additions of nitrogen, exhibiting changes in productivity, species composition and overall function. Studies done on critical loads of nitrogen on freshwater and estuarine intertidal wetlands show that phytoplankton, algae and other species that live in the water column are sensitive to the chemical environment in which they reside, including to nutrient and acidity levels; both of which are in turn influenced by vehicle emissions. Changes in ecosystem structure as a result of an "overdose" of nutrients associated with the tailpipe emissions are linked to changes in ecosystem function. For example, extirpation of lichens can alter food webs by reducing the availability of n ıg material for birds, invertebrate habitat and winter forage. The same chain of events can occur in a wetland system where an overdose of nutrients, including nitrogen, can trigger ecosystem changes that reduce the ecosystem function and can reduce the presence of some species and increase other species that are non-native and harmful to ecosystem function. Critical loads vary by receptor and response and must be studied locally for these reasons. A18-2 Cont'd

It is likely not possible within the timeframe of the SEASP to do the scientific research necessary to get a full understanding of the potential range of impacts associated with increased traffic, traffic congestion and related emissions. However, a revised GHG and air quality analysis should be completed that acknowledges the emerging scientific literature, the potential for adverse impacts to the wetlands and upland vegetation as a result of increased emissions, and provides recommendations for additional appropriate actions. This could include expansion of the Wetland Monitoring Fee to a Wetland Monitoring *and Enhancement* Fee such that the funds generated can be

[1] Attachment A: Effects and Empirical Critical Loads of Nitrogen for Ecoregions of the United States and referenced sources.

used to address air quality and GHG related impacts to the wetlands from SEASP such as those associated with increased emissions and associated nitrogen and other constituents (including those that cause increased acidification also shown to adversely impact aquatic systems)[2]. A18-2 Cont'd

Conclusion.

LCWLT thanks the City for another opportunity to provide input into this process. LCWLT looks forward to continuing to collaborate with the City toward a SEASP that provides for coherent planning and improvement to the southeast Long Beach as well as continued preservation and opportunities for restoration of the Los Cerritos Wetlands. Please contact us if you have any questions about these comments. A18-3

Sincerely,

Michelle N. Black

Exhibits:
1. Memorandum of Tom Brohard and Associates, April 5, 2016
2. Effects and Empirical Critical Loads of Nitrogen for Ecoregions of the United States

[2] The Santa Clara Valley Habitat Authority assesses a nitrogen deposition fee based on vehicle emissions; a first of its kind fee levied by the Conservation Plan: Nitrogen Deposition Fee: The nitrogen deposition fee is based on the Plan costs related to mitigating the impacts of airborne nitrogen deposition from new development on habitat within the Plan area. As described in Chapter 4 of the Plan, serpentine grassland and serpentine covered species in the Plan area are particularly sensitive to deposition of airborne nitrogen compounds generated by air pollution resulting from vehicles and other sources. These nitrogen compounds enter ecosystems as nitrogen fertilizer. This increased soil fertility favors nonnative annual grasses over native plant species found in serpentine soils. One native serpentine plant species, the dwarf plantain, is the host plant for the Bay checkerspot butterfly, a federally listed endangered species and a key covered species in the Plan. Serpentine plants covered by the Plan that will be adversely affected by increased nitrogen deposition include Metcalf Canyon jewelflower, most beautiful jewelflower, smooth lessingia, Tiburon paintbrush, and fragrant fritillary. http://scv-habitatagency.org/178/Santa-Clara-Valley-Habitat-Plan

ENCLOSURE 1

Tom Brohard and Associates

April 5, 2017

Ms. Michelle Black
Attorney at Law
Chatten-Brown & Carstens
2200 Pacific Coast Highway, Ste. 318
Hermosa Beach, CA 90254

SUBJECT: Review of Recirculated Draft Program Environmental Impact Report for the Southeast Area Specific Plan in the City of Long Beach - Transportation and Traffic Comments

Dear Ms. Black:

As authorized by the Los Cerritos Wetlands Land Trust, I have reviewed the February 2017 Recirculated Draft Program Environmental Impact Report (RDEIR) prepared by Placeworks for the Southeast Area Specific Plan (Project) in the City of Long Beach. My review focused on Section 5.16 of the RDEIR, Transportation and Traffic. I have also reviewed supporting documents for this section including Appendix J, the February 2017 Final Long Beach Southeast Area Specific Plan Transportation Impact Analysis (Updated TIA) prepared by Fehr & Peers, and its appendices.

Southeast Area Specific Plan RDEIR and Updated TIA Are Still Flawed A18-4

My September 13, 2016 letter, a copy of which is enclosed, pointed out a number of flaws in the July 2016 Draft EIR and various supporting documents for the Southeast Area Specific Plan. As discussed throughout this letter, the February 2017 RDEIR and the Updated TIA for the Southeast Area Specific Plan remain flawed. Gridlocked conditions will result on weekdays from the development of 5,439 condominiums-townhomes and 701,344 square feet of retail. Only one of the 18 significant traffic impacts will be mitigated. Additional significant traffic impacts will also be identified when weekend traffic conditions are included in the Updated TIA. An alternative to the Proposed Project that does not create any significant traffic impacts must be considered.

These significant errors and deficiencies have not been addressed or corrected in the updated materials. As examples from my September 13, 2016 letter:

1) Additional weekend peak hour trips that will be generated by the proposed project development of 5,439 new condominium-townhome units and the new 701,344 square feet of retail development have not been acknowledged, quantified, analyzed, or mitigated (see Page 3). A18-5

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2) Significant traffic impacts will not be mitigated in a timely manner as required by CEQA (see Page 4). A18-6

3) With an additional seven intersections evaluated in the revised materials, there are now even more significant traffic impacts that have not been mitigated (now only one of 18 significant traffic impacts will be mitigated in Year 2035 – see Page 4). A18-7

4) The revised TDM Plan still contains no effective enforcement measures or penalties for non-compliance (see Page 5). A18-8

In addition to the numerous failures to meaningfully address my prior comments, the revised materials introduce even more flaws and errors including these:

1) No Data or Calculations Provided for the Seven Additional Intersections – The Summary of Revisions lists seven additional intersections that have now been included in the traffic study. These locations are identified as being within an expanded study area but they are actually intersections that were omitted and are within the original study area. Page 5.16-11 of the RDEIR indicates traffic counts at the original 21 intersections were made in July 2015 and traffic counts at the seven new intersections were made in September 2016, November 2016, and in January 2017. Bringing in counts made during different times of the year without any adjustments introduces seasonal variations. No traffic counts for these intersections are included in the Updated TIA Appendices. No adjustments to compensate for seasonal variations were discussed or shown. No calculations of Level of Service for the different scenarios were included and in fact these seven intersections are not even listed within any of the summary tables in the Updated TIA or the RDEIR. Figures in the RDEIR were not updated to include lane configurations and peak hour traffic volumes for any of the seven added intersections. A18-9

2) Active Transportation Network Expansions Require Further Study – Page 5.16-59 of the RDEIR states "The proposed Specific Plan includes robust improvements to the pedestrian and bicycle network." As indicated below, enhancements to the bicycle network will be difficult to achieve and the additional sidewalks on some streets will not result in significant reductions in vehicle miles travelled as claimed in Tables 5.16-17 and 18 on Page 5.16-59. A18-10

   a. Bikeways - The Updated TIA indicates that the City will add and improve bikeways to achieve its goal of becoming the most bikeable City in the United States. Without proper and more complete evaluation, Page 78 of the Updated TIA suggests Class IV cycle tracks along Pacific Coast Highway (a Caltrans highway whose approval will be needed) and Studebaker Road as well as Class II bicycle lanes along 2nd Street, Shopkeeper Road, and Marina Drive. Cycle tracks A18-11

and bicycle lanes will require additional right of way and/or the elimination of vehicle travel lanes, neither of which have been properly and/or thoroughly evaluated at this point. The conclusion that the Project would have a beneficial impact to bicycle facilities is considered "less than significant" cannot be supported without extensive further review at this time. A18-11 Cont'd

b. Sidewalks – Page 78 of the Updated TIA states "...the existing pedestrian facilities throughout SEASP are continuous and present on both sides of the street. The SEASP proposed pedestrian connections within the project site and off-site." The first sentence is incorrect and the second is incomplete. The Updated TIA indicates sidewalks will be provided on one or both sides of many streets in the Southeast Area. The installation of sidewalks on streets that do not have them today may require the purchase of additional right-of-way which could result in significant impacts. The conclusion that "...the project would have a beneficial impact to pedestrian facilities and is considered less than significant" Is not supported by the material presented in this discussion. A18-12

c. Trip Reductions - According to the Updated TIA, the bicycle and pedestrian improvements in combination will result in a 4.9% reduction in vehicle trip generation below what would otherwise occur. This estimate lacks foundation and cannot be achieved until all streets in the area are improved with these facilities. These "robust" improvements to bicycle and pedestrian networks" will take many years to accomplish and there is no evidence that a nearly 5% reduction in vehicle trips will result. The assertion on Page 5.16-59 of the RDEIR that the maximum VMT reductions associated with this "in-fill" development would approach 40% is not supported by the data presented in the RDEIR. A18-13

3) Freeway Impacts Are Not Properly Identified – Page 79 of the Updated TIA lists nine freeway segments that will be significantly impacted under Existing (2015) Plus Project Conditions. The eighth segment indicates "Northbound I-605 From Katella Avenue – AM and PM Peak Hour (LOS F)" but does not give the limits of the impacted segment. A18-14

4) Project Will Result in Inadequate Emergency Access – Page 5.16-55 of the Recirculated Draft EIR states "The Long Beach Fire Department (LBFD) indicated that it is currently meeting its response time goals and expects to do so in the future. Additionally, the Specific Plan's additional connectivity in the area will provide route choices for emergency responders, which would assist in improving response times in the area." The RDEIR comment is weak and A18-15

generalized, and offers no proof to support its hypothesis that the project will provide adequate emergency response.

5) TDM Plan Is Incomplete and Certainly Not Robust – Page 5.16-59 of the RDEIR states "The proposed Specific Plan includes a robust TDM Plan." As pointed out in my September 13, 2016 comment letter, the TDM plan does not include any meaningful enforcement strategies. Table 5.16-18 indicates improvements to the bicycle and pedestrian environment can be expected to reduce vehicle miles travelled by 7.4 percent. This reduction is higher than what appears in the Updated TIA as discussed above. The assertion that the VMT per service population will decrease by about 19 percent compared to existing conditions is unfounded. It appears to have been based upon a significant increase in population in the area associated with construction and occupancy of 5,439 condominiums-townhomes rather than installation of bicycle facilities and sidewalks. A18-16

The Southeast Area Specific Plan in the City of Long Beach creates significant traffic impacts that have not been properly disclosed, analyzed or mitigated through alternatives and/or traffic improvements. The errors identified in this letter and in my September 13, 2016 comment letter require that each of these issues be reanalyzed and reevaluated through additional study. If you should have any questions regarding these findings, please contact me at your convenience. A18-17

Respectfully submitted,

Tom Brohard and Associates

Tom Brohard, PE
Principal

Enclosure

ATTACHMENT

Tom Brohard and Associates

September 13, 2016

Ms. Michelle Black
Attorney at Law
Chatten-Brown & Carstens
2200 Pacific Coast Highway, Ste. 318
Hermosa Beach, CA 90254

SUBJECT: Review of Draft Program Environmental Impact Report for the Southeast Area Specific Plan in the City of Long Beach - Transportation and Traffic Comments

Dear Ms. Black:

As authorized by the Los Cerritos Wetlands Land Trust, I have reviewed the July 2016 Draft Program Environmental Impact Report (Draft EIR) prepared by Placeworks for the Southeast Area Specific Plan (Project) in the City of Long Beach. My review focused on Section 5.16 of the Draft EIR, Transportation and Traffic. I have also reviewed various other sections of the Draft EIR including Section 3 (Project Description), Section 7 (Alternatives), and Appendix J, the April 2016 Final Long Beach Southeast Area Specific Plan Transportation Impact Analysis (TIA) prepared by Fehr & Peers.

Education and Experience

Since receiving a Bachelor of Science in Engineering from Duke University in Durham, North Carolina in 1969, I have gained over 45 years of professional engineering experience. I am licensed as a Professional Civil Engineer both in California and Hawaii and as a Professional Traffic Engineer in California. I formed Tom Brohard and Associates in 2000 and now serve as the City Traffic Engineer for the City of Indio and as Consulting Transportation Engineer for the Cities of Big Bear Lake and San Fernando. I have extensive experience in traffic engineering and transportation planning. During my career in both the public and private sectors, I have reviewed numerous environmental documents and traffic studies for various projects. Several recent assignments are highlighted in the enclosed resume.

Southeast Area Specific Plan Draft EIR and TIA Are Flawed

As discussed throughout this letter, the Draft EIR and the supporting TIA for the Southeast Area Specific Plan are flawed. Gridlocked conditions will result on weekdays from the development of 5,439 condominiums-townhomes and 701,344 square feet of retail. Only one of the 15 significant traffic impacts will be mitigated. Additional significant traffic impacts will be identified when weekend traffic conditions are included in the TIA. An alternative to the Proposed Project that does not create any significant traffic impacts must be considered.

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Density of Residential and Retail Land Use Increases Significantly

At buildout, the Proposed Project will significantly increase the density of development in the Southeast Area Specific Plan area in the City of Long Beach. As discussed in the sections that follow in this letter, these significant increases in residential and retail development create significant additional volumes of peak hour trips during weekdays and during weekends as well.

According to Table 3-2 on Page 3-13 of the Draft EIR, the Proposed Project includes these significant increases in development:

- The number of dwelling units will increase from 4,079 units today up to 9,518 units at buildout, an increase of 5,439 residential units. In comparing Table 4-3 on Page 30 with Table 4-1 on Page 29 of the TIA, all of the additional dwelling units will be condominiums-townhomes.

- Population in the Southeast Area Specific Plan will increase from 6,486 people today up to 15,134 people at buildout, a net increase of 8,648 people.

- Commercial/employment space in the Southeast Area Specific Plan area will increase from 2,091,476 square feet today up to 2,665,052 square feet at buildout, a net increase of 573,576 square feet. In comparing Table 4-3 on Page 30 with Table 4-1 on Page 30 of the TIA indicates there will be an increase of 701,344 square feet of retail development, with a slight decrease in the amount of office space making up the difference.

- Employees in the Southeast Area Specific Plan will increase from 3,555 people today up to 4,115 people at buildout, a net increase of 560 employees.

- Hotel rooms in the Southeast Area Specific Plan will increase from 375 rooms today up to 425 rooms at buildout, a net increase of 50 hotel rooms.

While not stated directly, the Proposed Project essentially includes 5,439 new condominium-townhome units and 701,344 square feet of new retail space. Both of these significant increases in land use will result in major increases in peak hour trips on weekdays and on weekends as well. These very large development increases must be tempered and reduced to eliminate the number of resulting significant traffic impacts that are currently forecast to occur.

Increased Land Use Density Adds Significant Weekday Peak Hour Trips

Page 5.16-29 of the Draft EIR states: "The Proposed Project would generate additional vehicular travel in the study area." Table 5.16-5 provides trip generation forecasts for the Proposed Project. The significant increases in

development outlined above are forecast to generate significant additional vehicular trips on area roadways in the Southeast Area Specific Plan as follows:

- AM peak hour trips in the Southeast Area Specific Plan are forecast to increase from 3,047 trips today up to 5,021 trips at buildout, a net increase of 1,974 trips.

- PM peak hour trips in the Southeast Area Specific Plan are forecast to increase from 5,299 trips today up to 8,569 trips at buildout, a net increase of 3,270 trips.

- Daily trips in the Southeast Area Specific Plan are forecast to increase from 65,731 trips today up to 101,170 trips at buildout, a net increase of 35,439 trips.

The additional weekday peak hour trips that will be created by the proposed development directly result in numerous significant traffic impacts at intersections and at freeway locations. Further significant traffic impacts are expected to occur when weekend peak hour trips are analyzed as discussed immediately below.

Additional Weekend Peak Hour Trips Have Not Been Quantified, Analyzed, or Mitigated

Using basic trip generation rates published by the Institute of Transportation Engineers in Trip Generation, 9th Edition, the 5,439 new condominium-townhome units and the new 701,344 square feet of retail development will generate about 62,000 new Saturday daily trips including about 5,600 new Saturday midday peak hour trips. Both of these forecasts are higher than the weekday daily and the weekday PM peak hour trips that have been evaluated in the Draft EIR, even after considering internal trips between the residential and the retail uses. In addition, it is reasonably foreseeable that baseline weekend trips on Saturdays in the Southeast Area Specific Plan are higher than weekday trips, particularly in July when trips to and from the beach and other attractions along the coast are already included.

The Draft EIR and the TIA did not evaluate traffic conditions that already occur in the study area on weekends and did not evaluate cumulative traffic conditions in Year 2035 that are likely to occur without and then with Proposed Project traffic added. To properly evaluate and analyze weekend trips that are higher than weekday trips for the new condominium-townhome and retail development, Saturday conditions in July must be studied and analyzed. Until this additional work is completed, the Draft EIR and the TIA are incomplete as they do not evaluate, analyze, or mitigate the reasonably foreseeable worst case conditions on a Saturday in July when traffic volumes are at their highest in the Southeast Area Specific Plan.

Significant Traffic Impacts Are Not Mitigated In a Timely Manner as Required

Page 3-18 of the Draft EIR states "No specific phasing program has been identified. The proposed project would be implemented on a parcel-by-parcel basis as future development applications are submitted. Public realm improvements would occur as funding becomes available. A generalized phasing plan for development and infrastructure is provided in Section 9.3.2, Implementation Actions and Phasing. However, for purposes of environmental analysis, the Proposed Project is expected to be built out by 2035."

The discussion of project phasing is so generalized that it has no value in determining when construction of various mitigation measures will be required during the 20 years of project buildout. For transportation and traffic, only two scenarios have been analyzed in the Draft EIR – "Existing" as well as "Year 2035 Buildout" both without and then with project traffic. The Draft EIR should have forecast trip generation at the midway point between existing and cumulative buildout, say in Year 2025, but it did not.

The California Environmental Quality Act (CEQA) mandates that mitigation measures must be implemented in a timely manner as they are needed. The Draft EIR and the TIA have failed to address this requirement.

Only One of 15 Significant Traffic Impacts Will Be Mitigated in Year 2035

According to the analysis of "Existing with Project" conditions in Table 5.16-6 on Page 5.16-32, the Proposed Project will create significant traffic impacts at nine of the 21 intersections evaluated in the TIA. Five study intersections will suffer significant traffic impacts in both the AM and in the PM peak traffic hours plus an additional four of the study intersections will suffer significant traffic impacts in the PM peak hour. As shown in Table 5.16-11 on Page 5.16-40, four freeway segments, off-ramps, and on-ramps will operate at a deficient LOS during peak traffic hours with Project traffic. As shown in Table 5.16-14 on Page 5.16-43, both of the CMP intersections studied in the TIA on Pacific Coast Highway at 7th Street and on Pacific Coast Highway at 2nd Street will also be significantly impacted under "Existing with Project" conditions in the PM peak hour.

As shown in Table 5.16-9 on Pages 5.16-36 and 37 of the Draft EIR in the analysis of "Cumulative Year 2035 with Project" conditions, the Proposed Project will create significant traffic impacts at 15 of the 21 intersections evaluated in the TIA. Six of the study intersections will suffer significant traffic impacts in both the AM and in the PM peak traffic hours, one of the study intersections will suffer significant traffic impacts in the AM peak hour, and an additional nine of the study intersections will suffer significant traffic impacts in the PM peak hour. As shown in Table 5.16-14 on Page 5.16-43, both of the CMP intersections studied in the

TIA on Pacific Coast Highway at 7th Street and on Pacific Coast Highway at 2nd Street will also be significantly impacted under "Cumulative Year 2035 with Project" conditions in both the AM and in the PM peak hours. Traffic forecast for the Proposed Project would also result in a significant impact on the main-line segment of State Route 22 and at the Studebaker ramps at State Route 22.

Even with all of these traffic impacts on weekdays that are forecast in the Draft EIR and in the TIA, it is reasonably foreseeable that there will be even more significant traffic impacts on weekends as discussed above. In addition, the Draft EIR and the TIA conclude that only one of the impacted intersections will actually be mitigated, Intersection #15 at Marina Drive and 2nd Street, which is a part of the Proposed Project.

The significant traffic impacts at the other intersections are considered by the Draft EIR to be "significant and unavoidable". In many cases, this conclusion is reached as the significant traffic impact occurs at a location under the jurisdiction of another agency such as Caltrans rather than within the City of Long Beach. In those situations, the City of Long Beach cannot control whether or not Caltrans will implement the required improvements. This condition can be rather easily addressed as discussed on Page 5.16-53 of the Draft EIR regarding traffic signal coordination if the State relinquishes jurisdiction of the State Highways in the Southeast Area Specific Plan to the City of Long Beach.

Before reaching the conclusion that traffic impacts are "significant and unavoidable", CEQA requires lead agencies to impose all feasible alternatives and/or mitigation measures. The supporting TIA must document the geometry of intersections that the Draft EIR finds to have "significant and unavoidable" traffic impacts, then identify the specific traffic measures or alternatives evaluated, and discuss why each of these options cannot feasibly be implemented. Without doing this, the Draft EIR may not dismiss the potential mitigation measures as infeasible.

The Southeast Area Specific Plan must be responsible for reduction of and mitigation of its traffic impacts. Furthermore, an additional alternative that reduces peak hour trips to a level that creates no significant traffic impacts must be developed, analyzed, and evaluated. All feasible mitigation measures must also include significant additions to the proposed TDM plan as discussed below.

Transportation Management Demand (TDM) Plan Requires Enhancements

Page 5.16-50 of the Draft EIR indicates that the City shall establish a Transportation Management Association (TMA) but offers no specifics, evaluation, or enforcement of the potential vehicle trip reductions that could be required. Additional TDM measures must be required to mitigate traffic impacts considered to be "significant and unavoidable". At a minimum, the Draft EIR must

evaluate the potential effectiveness of these additional TDM measures and others that may also be appropriate.

Trip reductions are maximized when an employer provides a coordinated and comprehensive TDM program that includes support measures, transportation services, and economic incentives. The enclosed Pages 122 and 123 of Trip Generation Handbook, 2nd Edition published by the Institute of Transportation Engineers report the typical experience of various TDM measures identified as part of Transit Cooperative Research Program (TCRP) Project B-4. This project surveyed 49 employers with active TDM programs across the nation to ascertain the costs and benefits (both perceived and actual) of TDM programs to employers. Information was also gathered to enable computation of overall reductions in the number of commuter vehicles based on existing TDM programs. The TCRP report categorized the many different TDM programs into the following three categories and reported the following:

"Support measures are measures provided by employers to foster a work environment that supports commuting by alternative modes. Support measures include employee transportation coordinators, rideshare matching, promotional activities, on-site dependent care, and alternative work schedules (such as flexible work hours, compressed work weeks, staggered work hours, and telecommuting). The surveyed TDM programs that provide only support services were measured to have no effect on the number of vehicles (not number of vehicle-trips) used by commuters.

Transportation Services include employer-based efforts such as van-pool programs, shuttle bus service to off-site transit stations, guaranteed ride home programs, and the provision of on-site showers and changing facilities. TDM programs that involve transportation services provided by the employer were measured to have a noticeable impact on the number of vehicles (not number of vehicle-trips) used by commuters (an average 8 percent reduction in the number of vehicles at the survey sites).

Economic Incentives are any steps taken by an employer to provide a monetary incentive for employees to use an alternate travel mode. These include transit subsidies, parking fees for non-rideshare vehicles, parking discounts for rideshare vehicles, and transportation allowances. TDM programs with economic incentives to not drive alone were found to reduce the number of commuter vehicles generated by an employment site (not number of vehicle-trips) by an average of 16 percent.

Finally, TDM programs that combine economic incentives with transportation services produce the most significant effect on commuter vehicles (not vehicle-trips) generated by a site (an average 24 percent reduction at survey sites)."

TDM measures suggested must include support, transportation, and economic incentive measures. Only by adopting all feasible measures would the Southeast Area Specific Plan be able to realize the full benefits of TDM measures – benefits that the TCRP report found could result in an average 24% reduction in employee trips and benefits that also include reductions in customer trips.

Emergency Vehicle Access Will Be Significantly Impacted

Page 5.16-44 of the Draft EIR indicates that the Proposed Project will have a less than significant impact on emergency access, indicating that "traffic and circulation components of the proposed project would be designed and constructed in accordance with all applicable LBFD design standards for emergency access." While the Proposed Project must meet the City Fire Department standards, 12 of the 21 study intersections are forecast to operate at LOS E or LOS F during one or both peak hours in Year 2035. As defined in Table 5.16-1 on Pages 5.16-11 and 12, significant congestion with extreme traffic delays will occur under these conditions.

Under capacity conditions at LOS E and under gridlock conditions at LOS F, vehicles will be queued back significant distances in all traffic lanes on the approaches to congested signalized intersections. Stopped vehicles will not be able to maneuver out of the path of the emergency vehicle as the adjacent lanes on the approaches to the gridlocked traffic signals will already be occupied by other vehicles. This is a significant impact and must be fully evaluated and mitigated.

The City cannot simply find that impacts to emergency access are unavoidable. Instead, in a revised EIR, the City must fully explain and support the Draft EIR's broad statement that "...impacts on emergency access would be less than significant." A revised EIR must show that the City has analyzed both LOS E and gridlock conditions at LOS F throughout the Southeast Area Specific Plan and has mitigated these impacts to significantly reduce or eliminate health and safety risks resulting from delays to emergency vehicles.

Technical Errors in the Traffic Analysis Must Be Corrected

My review of the Draft EIR and the supporting TIA also indicates a number of technical errors and inconsistencies in the Transportation and Traffic Analysis of the Project. Some of the results reported in various tables throughout the Draft EIR are illogical as adding more traffic without providing physical improvements cannot reduce delay, and no physical improvements are planned.

In addition to the other concerns raised above, each of the technical errors identified below must be addressed and reevaluated through additional study in a revised and recirculated Draft EIR as follows:

1) Traffic Analyses for Year 2015 for Intersections Are Faulty – There are inconsistencies in the evaluation of baseline (Year 2015) conditions and those for cumulative (Year 2035) conditions for the same intersection without Project traffic. While not possible, intersection performance is shown to improve by adding traffic without making any physical improvements. The inconsistencies between Table 5.16-2 on Page 5.16-13 and Table 5.16-8 on Page 5.16-34 of the Draft EIR must be reconciled to provide proper traffic analyses of the Project. As one example of this, please see below regarding the faulty traffic analysis of the intersection of Channel Drive and Pacific Coast Highway (#10):

   a) Channel Drive and Pacific Coast Highway (#10) – AM Peak – For this intersection, Table 5.16-2 indicates delay of 16.0 seconds and Level of Service (LOS) B for the existing baseline conditions in the AM peak in 2015. In 2035 with higher traffic volumes than 2015 and without any identified traffic improvements, delay is reduced to 15.1 seconds with performance at LOS B without Project traffic. Without improvements, adding traffic to the intersection cannot reduce delay.

   b) Channel Drive and Pacific Coast Highway (#10) – PM Peak – For this intersection, Table 5.16-2 indicates delay of 13.0 seconds and Level of Service (LOS) B for the existing baseline conditions in the PM peak in 2015. In 2035 with higher traffic volumes than 2015 and without any identified traffic improvements, delay is reduced to 11.6 seconds with performance at LOS B without Project traffic. Without improvements, adding traffic to the intersection cannot reduce delay.

2) Traffic Analyses for Year 2035 for Intersections are Faulty – There are inconsistencies in the evaluation of cumulative (Year 2035) conditions without Project traffic and those for cumulative (Year 2035) conditions for the same intersection with Project traffic. While not possible, intersection performance is shown to improve by adding traffic without making any physical improvements. The inconsistencies between Table 5.16-8 on Page 5.16-34 and Table 5.16-9 on Page 5.16-36 of the Draft EIR must be reconciled to provide proper traffic analyses of the Project. As examples, please see below regarding the faulty traffic analysis of several intersections:

   a) Channel Drive and Pacific Coast Highway (#10) – AM Peak – For this intersection, Table 5.16-8 indicates delay of 15.1 seconds and Level of Service (LOS) B for cumulative conditions in the AM peak in 2035 without project traffic added. In 2035 with higher traffic volumes with project traffic added and without any identified traffic improvements, delay is reduced to 14.5 seconds with performance at LOS B. Without improvements, adding traffic to the intersection cannot reduce delay.

b) Channel Drive and Pacific Coast Highway (#10) – PM Peak – For this intersection, Table 5.16-8 indicates delay of 11.6 seconds and Level of Service (LOS) B for cumulative conditions in the PM peak in 2035 without project traffic added. In 2035 with project traffic added and without any identified traffic improvements, delay is reduced to 10.0 seconds with performance at LOS A with Project traffic. Without improvements, adding traffic to the intersection cannot reduce delay.

c) Studebaker Road & SR-22 Eastbound Ramps (#11) – AM Peak – For this intersection, Table 5.16-8 indicates delay of 6.8 seconds and Level of Service (LOS) A for cumulative conditions in the AM peak in 2035 without project traffic added. In 2035 with higher traffic volumes and without any identified traffic improvements, delay is reduced to 6.5 seconds with performance at LOS A. Without improvements, adding traffic to the intersection cannot reduce delay.

d) Pacific Coast Highway & 1st Street (#21) – AM Peak – For this intersection, Table 5.16-8 indicates delay of 19.5 seconds and Level of Service (LOS) B for cumulative conditions in the AM peak in 2035 without project traffic added. In 2035 with project traffic added and without any identified traffic improvements, delay is reduced to 19.2 seconds with performance at LOS B with Project traffic. Without improvements, adding traffic to the intersection cannot reduce delay.

The Southeast Area Specific Plan in the City of Long Beach creates significant traffic impacts that have not been properly disclosed, analyzed or mitigated through alternatives and/or traffic improvements. The errors identified in this letter require that each of these issues be reanalyzed and reevaluated through additional study in a revised and recirculated EIR. If you should have any questions regarding these findings, please contact me at your convenience.

Respectfully submitted,

Tom Brohard and Associates

Tom Brohard

Tom Brohard, PE
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Enclosures

Tom Brohard, PE

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Education:	1969 / BSE / Civil Engineering / Duke University
Experience:	45+ Years
Memberships:	1977 / Institute of Transportation Engineers – Fellow, Life 1978 / Orange County Traffic Engineers Council - Chair 1982-1983 1981 / American Public Works Association – Life Member

Tom is a recognized expert in the field of traffic engineering and transportation planning. His background also includes responsibility for leading and managing the delivery of various contract services to numerous cities in Southern California.

Tom has extensive experience in providing transportation planning and traffic engineering services to public agencies. Since May 2005, he has served as Consulting City Traffic Engineer for the City of Indio. He also currently provides "on call" Traffic and Transportation Engineer services to the Cities of Big Bear Lake and San Fernando. In addition to conducting traffic engineering investigations for Los Angeles County from 1972 to 1978, he has previously served as City Traffic Engineer in the following communities:

- Bellflower ..... 1997 - 1998
- Bell Gardens ..... 1982 - 1995
- Huntington Beach ..... 1998 - 2004
- Lawndale ..... 1973 - 1978
- Los Alamitos ..... 1981 - 1982
- Oceanside ..... 1981 - 1982
- Paramount ..... 1982 - 1988
- Rancho Palos Verdes ..... 1973 - 1978
- Rolling Hills ..... 1973 - 1978, 1985 - 1993
- Rolling Hills Estates ..... 1973 - 1978, 1984 - 1991
- San Marcos 1981
- Santa Ana ..... 1978 - 1981
- Westlake Village ..... 1983 - 1994

During these assignments, Tom has supervised City staff and directed other consultants including traffic engineers and transportation planners, traffic signal and street lighting personnel, and signing, striping, and marking crews. He has secured over $10 million in grant funding for various improvements. He has managed and directed many traffic and transportation studies and projects. While serving these communities, he has personally conducted investigations of hundreds of citizen requests for various traffic control devices. Tom has also successfully presented numerous engineering reports at City Council, Planning Commission, and Traffic Commission meetings in these and other municipalities.

Tom Brohard and Associates

In his service to the City of Indio since May 2005, Tom has accomplished the following:

- Oversaw preparation and adoption of the 2008 Circulation Element Update of the General Plan including development of Year 2035 buildout traffic volumes, revised and simplified arterial roadway cross sections, and reduction in acceptable Level of Service criteria under certain conditions.

- Oversaw preparation of fact sheets/design exceptions to reduce shoulder widths on Jackson Street and on Monroe Street over I-10 as well as justifications for protected-permissive left turn phasing at I-10 on-ramps, the first such installations in Caltrans District 8 in Riverside County; reviewed plans and provided assistance during construction of both $2 million projects to install traffic signals and widen three of four ramps at these two interchanges under Caltrans encroachment permits.

- Reviewed traffic signal, signing, striping, and work area traffic control plans for the County's $45 million I-10 Interchange Improvement Project at Jefferson Street.

- Reviewed traffic impact analyses for Project Study Reports evaluating different alternatives for buildout improvements of the I-10 Interchanges at Jefferson Street, Monroe Street, Jackson Street and Golf Center Parkway.

- Oversaw preparation of plans, specifications, and contract documents and provided construction assistance for over 50 traffic signal installations and modifications.

- Reviewed and approved over 1,200 work area traffic control plans as well as signing and striping plans for all City and developer funded roadway improvement projects.

- Oversaw preparation of a City wide traffic safety study of conditions at all schools.

- Obtained $47,000 grant from the California Office of Traffic Safety and implemented the City's Traffic Collision Database System. Annually reviews "Top 25" collision locations and provides traffic engineering recommendations to reduce collisions.

- Prepared over 900 work orders directing City forces to install, modify, and/or remove traffic signs, pavement and curb markings, and roadway striping.

- Oversaw preparation of engineering and traffic surveys to establish enforceable speed limits on over 400 street segments.

- Reviewed and approved traffic impact studies for more than 35 major projects and special events including the annual Coachella and Stagecoach Music Festivals.

- Developed and implemented the City's Golf Cart Transportation Program.

Since forming Tom Brohard and Associates in 2000, Tom has reviewed many traffic impact reports and environmental documents for various development projects. He has provided expert witness services and also prepared traffic studies for public agencies and private sector clients.

Tom Brohard and Associates

Trip Generation Manual, 9th Edition

Volume 1: User's Guide and Handbook

The Institute of Transportation Engineers is an international educational and scientific association of transportation professionals who are responsible for meeting mobility and safety needs. ITE facilitates the application of technology and scientific principles to research, planning, functional design, implementation, operation, policy development and management for any mode of ground transportation. Through its products and services, ITE promotes professional development of its members, supports and encourages education, stimulates research, develops public awareness programs and serves as a conduit for the exchange of professional information.

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ed at the site. For example, the TDM program may only affect commuters who travel outside the peak hour.

Data Isolating TDM Effects

There are **very little controlled before-and-after data** for which the only change is the initiation of TDM programs or transit services. Traditionally, the pre-TDM mode shares are determined by survey (e.g., asking the employee how he/she commuted six months before). This method relies on the memory of the survey respondent and may not adequately account for potential bias on the part of the respondent or on the impacts of any employee turnover.

The design, initiation and operation of TDM and transit programs for which trip reductions are being sought are traditionally the responsibility of individual employers, groups of employers (e.g., through a transportation management association), or a regional or local governmental agency. Therefore, these **actions are not site-driven** which is different from all other trip generation estimating applications. There are exceptions, of course. Some site-driven measures can have a significant bearing on TDM program effectiveness (e.g., the provision of on-site services, the limitation of the on-site parking supply) while others have merely minor effects (e.g., sidewalks to neighboring sites, bus stop shelters).

The concerns over the reported experience as described above may on first inspection appear to be relatively insignificant. However, the potential error introduced by these TDM/transit factors (for the sake of argument, between 5 and 10 percent) is nearly as great as the anticipated trip reductions attributable to TDM/transit (described later in Section B.3 as 5 to 20 percent). Therefore, these data need to be used with extreme caution.

B.3 Reported Typical Experience TCRP Project B-4—Cost-Effectiveness of TDM Programs

As part of Transit Cooperative Research Program (TCRP) Project B-4, 49 employers with active TDM programs were surveyed nationwide. The primary purpose of the survey was to ascertain the costs and benefits (both perceived and actual) of TDM programs to employers. In addition, information was gathered that would enable the computation of overall reductions in the number of commuter vehicles based on the TDM programs in place. The following presents a summary of the survey results as they pertain to trip generation.

CAUTION

The magnitude of the TDM program effects is only an estimate and is not based on actual before/after counts.

Several notes of caution should be emphasized regarding the TCRP study data base.

◆ An employer survey was used to determine the number of vehicles (***not the number of vehicle-trips***) used for commuting by employees. Therefore, the "with-TDM" commute mode shares are only estimates and are **not based on actual vehicle counts.**

◆ Mode shares are **for commuters only.** The trip generation rates for non-commuter trips generated at a place of employment (e.g., visitors, deliveries, non-commute trips by on-site employees) are not included in the trip reduction estimates attributable to TDM programs.

◆ Trip reduction estimates are for commuter trips spread **throughout the day.** The values are at best suitable for an overall peak period but may not be valid estimates for a particular peak hour.

◆ To quantify the trip reduction benefits of a TDM program at an individual site, it is necessary to compare the "after" condition with the "before" condition. However, the data on **"pre-TDM" mode shares are not available.** The TCRP study assumed that the "before-TDM" baseline value should correspond to the overall mode share distribution for the surrounding area (i.e., ambient conditions), based on U.S. Bureau of the Census data.

◆ Trip reduction estimates are based on **small sample sizes** (typically 10 or fewer sites).

The following classification scheme was used in the TCRP report to categorize the many TDM programs into those that are *supportive* of persons willing to commute using an alternative travel mode, actual services that directly *enable* persons to commute using an alternative mode and financial (i.e., cash) incentives that *encourage* commuters to use an alternative travel mode.

Support Measures are measures provided by employers to foster a work environment that supports commuting by alternative modes. Support measures include employee transportation coordinators, rideshare matching, promotional activities, on-site dependent care and alternative work schedules (such as flexible work hours, compressed work weeks, staggered work hours and telecommuting).

The surveyed TDM programs that provide only ***support services*** *were measured to have* ***no effect*** *on the number of vehicles (not number of vehicle-trips) used by commuters.*

Transportation Services include employer-based efforts such as vanpool programs, shuttle bus service to off-site transit stations, guaranteed ride home programs and the provision of on-site showers and changing facilities.

TDM programs that involve ***transportation services*** *provided by the employer were measured to have a noticeable impact on the number of vehicles (not number of vehicle-trips) used by commuters (an average 8 percent reduction in the number of vehicles at the survey sites).*

Economic Incentives are any steps taken by an employer to provide a monetary incentive for employees to use an alternate travel mode. These include transit subsidies, parking fees for non-rideshare vehicles, parking discounts for rideshare vehicles and transportation allowances.

TDM programs with ***economic incentives*** *to not drive alone were found to reduce the number of commuter vehicles generated by an employment site (not in number of vehicle-trips) by an average of 16 percent.*

Finally, TDM programs that ***combine economic incentives with transportation services*** *produce the* ***most significant effect*** *on commuter vehicles (not vehicle-trips) generated by a site (an average 24 percent reduction at survey sites).*

Oregon Department of Transportation—Transportation Impact Factors

The State of Oregon sponsored a study with the intent of estimating the impacts of urban form, TDM programs and transit services on travel behavior. Tables B.1, B.2 and B.3 are extracted from that study as provided in the ITE Recommended Practice *Traditional Neighborhood Development Street Design Guidelines*, 1999.

CAUTIONS

- **Vehicle trip reduction factors are only for commute trips (not all trips generated by a site)**
- **Vehicle trip reduction factors are for all commute trips (not just those during a peak hour)**
- **Vehicle trip reduction factors include trip reductions attributable to multi-use development**

Table B.1 presents an estimated reduction in site vehicle trip generation for sites with no transit service and as a function of the development pattern and density, pedestrian and bicycle facilities, and other characteristics.

The analyst should note that the larger trip reduction factors are achieved with development patterns that ITE would consider multi-use (see Chapter 7 of this handbook). For example, the 7 percent reduction is associated with a "mixed-use commercial...development that includes residential units." For multi-use development sites, the guidelines and trip estimation methodology presented in Chapter 7 should be used rather

ENCLOSURE 2

Chapter 5
Effects and Empirical Critical Loads of Nitrogen for Ecoregions of the United States

Linda H. Pardo, Molly J. Robin-Abbott, Mark E. Fenn, Christine L. Goodale, Linda H. Geiser, Charles T. Driscoll, Edith B. Allen, Jill S. Baron, Roland Bobbink, William D. Bowman, Christopher M. Clark, Bridget Emmett, Frank S. Gilliam, Tara L. Greaver, Sharon J. Hall, Erik A. Lilleskov, Lingli Liu, Jason A. Lynch, Knute J. Nadelhoffer, Steven J. Perakis, John L. Stoddard, Kathleen C. Weathers and Robin L. Dennis

5.1 Introduction

5.1.1 Effects of Nitrogen Deposition on Ecosystems

Human activity in the last century has led to a significant increase in nitrogen (N) emissions and deposition (Galloway et al. 2004). Total N emissions in the United States have increased significantly since the 1950s (Galloway 1998, Galloway et al. 2003). As S deposition has declined in response to regulation, the rate of N deposition relative to S deposition has increased since the 1980s (Driscoll et al. 2001, 2003) followed by a general decrease in NO_x emissions from electric utilities since the early 2000s. More recently, the relative proportion of NH_x ($NH_4^+ + NH_3$) to NO_x ($NO + NO_2$) emissions has also increased for many areas of the United States (Kelly et al. 2005; Lehmann et al. 2005).

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Because of past, and, in some regions, continuing increases in emissions (Lehmann et al. 2005; Nilles and Conley 2001), N deposition has reached a level that has caused or is likely to cause alterations in many United States ecosystems. In some ecoregions, the impact of N deposition has been severe, altering N cycling and biodiversity. Indicators of altered N cycling include increased N mineralization, nitrification, and nitrate (NO_3^-) leaching rates, as well as elevated plant tissue N concentration. The eventual outcome of increases in these processes can be N saturation, the series of ecosystem changes that occur as available N exceeds plant and microbial demand (Aber et al. 1989, 1998).

As N availability increases, there are progressive changes in biotic community structure and composition, including changes in diatom, lichen, mycorrhizal fungal and terrestrial plant communities. For example, in the Mediterranean California ecoregion, native plant species in some ecosystems have been replaced by invasive species that are more productive under elevated N deposition (Fenn et al. 2010;

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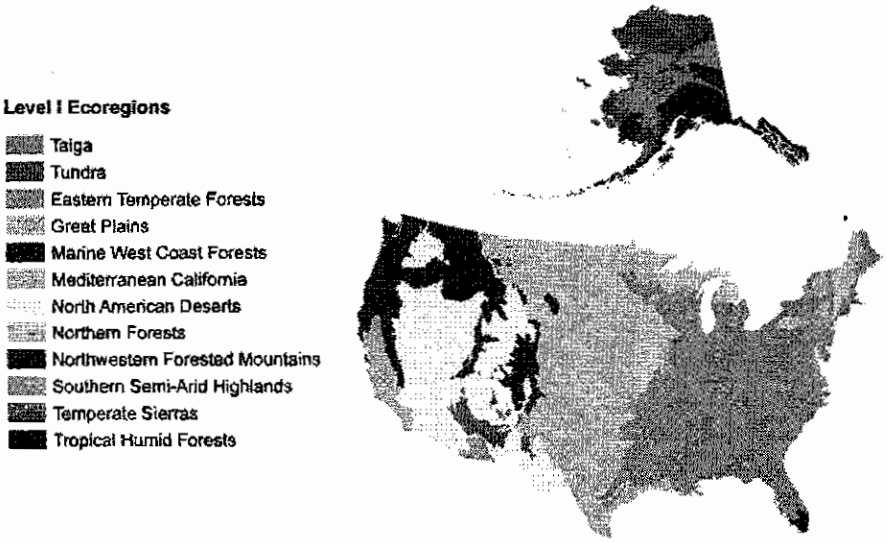

Fig. 5.1 Level I ecological regions in the United States. (Commission for Environmental Cooperation 1997)

Rao and Allen 2010; Rao et al. 2010; Weiss 1999; Yoshida and Allen 2004). Such shifts in plant community composition and species richness can lead to overall losses in biodiversity and further impair particular threatened or endangered species (Stevens et al. 2004), as has occurred for the checkerspot butterfly (Weiss 1999).

5.1.2 Approach for Determining Empirical Critical Loads of Nitrogen

Recently, Pardo et al. (2011a–d) synthesized research relating atmospheric N deposition to effects on terrestrial and freshwater ecosystems in the United States and quantified empirical critical loads of atmospheric N deposition, with one chapter devoted to each of 12 major ecoregions. This chapter summarizes those findings and includes a brief discussion of the approach used to set critical N loads.

For this synthesis, we reviewed studies of responses to N inputs for U.S. ecoregions as defined by the Commission for Environmental Cooperation (CEC) Level I ecoregions map for North America (CEC 1997; Fig. 5.1). We estimated critical loads based on data from > 3200 sites (Fig. 5.2). We identified the receptor of concern (organism or ecosystem compartment), the response of concern, the critical threshold value for that response, and the criteria for setting the critical load and extrapolating the critical load to other sites or regions. These methods are described in detail in Pardo et al. (2011a, b, d).

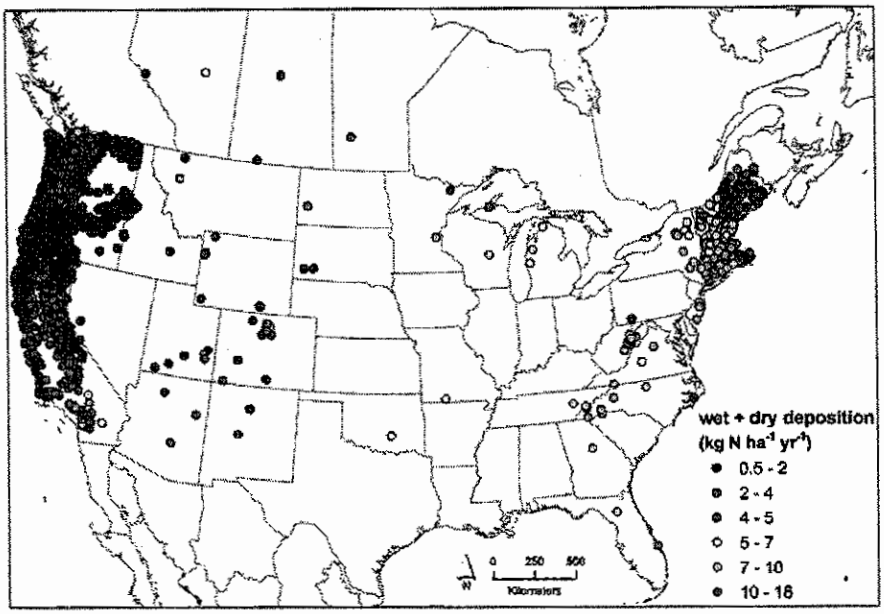

Fig. 5.2 Locations of > 3200 sites in the United States with modelled N deposition for which ecological responses are reported

The receptors evaluated included freshwater diatoms, mycorrhizal fungi, lichenized fungi (henceforth lichens), bryophytes, herbaceous plants, shrubs, and trees. Ecosystem impacts included: (1) biogeochemical responses and (2) individual species, population, and community responses. We considered N addition (fertilization) experiments, N deposition gradient studies and long-term monitoring studies in order to evaluate ecosystem response to N deposition inputs. Nitrogen deposition at sites included in this analysis (Weathers and Lynch 2011) was either based on the deposition reported in the publication or, when that was not available, we used modelled deposition quantified by the Community Multiscale Air Quality (CMAQ) model v.4.3 simulations of wet + dry deposition of oxidized (NO_y) and reduced (NH_x) N species (Fig. 5.2). Hereafter, this model is referred to as CMAQ 2001, as it uses 2001 reported data (Byun and Schere 2006; Byun and Ching 1999). In some areas of elevated N deposition, CMAQ at this grid scale (36 km) likely underestimates total N deposition. This is the case, for example, over much of California (Fenn et al. 2010). For more detail on deposition, see Weathers and Lynch (2011). We afforded greater weight to long-term fertilization studies (5–10 years) than to short-term studies. Single-dose forest fertilization studies exceeding 50 kg N ha^{-1} were generally not considered, but lower dose short-term studies were considered when other observations were limited.

We rarely had data to distinguish biotic or ecosystem response to reduced forms versus oxidized forms of N. There is some evidence that for some species, reduced forms of N may have more substantial impacts than oxidized forms (Bobbink et al. 2003; Cape et al. 2009; Kleijn et al. 2008; Sutton et al. 2009). Differences in uptake rates and preference for NH_4^+ versus NO_3^- across different plant taxa (Falkengren-Grerup 1995; McKane et al. 2002; Miller and Bowman 2002; Nordin et al. 2006) lead to differences in sensitivity to NH_x (Krupa 2003) and NO_y. However, not all species are more sensitive to NH_x than NO_y (Jovan et al. 2012); these responses vary by species and functional type. Some species are more sensitive to increases in NO_y, as was demonstrated for boreal forests (Nordin et al. 2006).

In general, we determined the critical load based on the observed response pattern to N inputs. In some cases, there was a clear dose-response relationship where the response changed above a certain threshold. In other cases, when response to increasing N was more linear, we estimated the "pristine" state of N deposition and the deposition that corresponded to a departure from that state. The criteria for setting critical loads are discussed in detail in Pardo et al. (2011a, b, d).

5.1.3 Contents of this Chapter

In this chapter we synthesize empirical critical loads of N reported for all the ecoregions of the United States, compare critical loads by life form or ecosystem compartment across all ecoregions, discuss the abiotic and biotic factors that affect the critical loads, present the significance of these findings and, finally, compare critical loads in the United States to those for similar ecoregions/ecosystems in Europe. For each receptor, we present maps of critical loads by ecoregion.

The range of critical loads of nutrient N reported for the United States ecoregions, inland surface waters, and freshwater wetlands is 1–39 kg N $ha^{-1}yr^{-1}$ (Table 5.1). This broad range spans the range of N deposition observed over most of the country (see Weathers and Lynch 2011). The number of locations for which ecosystem response data were available (Fig. 5.2) for an ecoregion is variable, which impacts the level of certainty of the empirical critical loads estimates.

5.2 Mycorrhizal Fungi

Mycorrhizal fungi reside at the interface between host plants and soils, exchanging soil resources, especially nutrients, with host plants in exchange for photosynthates (carbon compound). Due to this important and unique ecological niche, mycorrhizal fungi are at particular risk due to changes in either the soil environment or host carbon allocation.

Table 5.1 Summary of critical loads of nutrient N for United States ecoregions including their reliability

Ecoregion	Ecosystem component	CL for N deposition kg N $ha^{-1}yr^{-1}$	Reliability	Response	Comments	Study
Tundra	Prostrate dwarf shrubs	1–3	##	Changes in CO_2 exchange, cover, foliar N, and community composition of vascular plants	N addition study, Greenland high arctic, P enhanced N effects	(Arens et al. 2008)[a]
Tundra	Lichens	1–3	(#)	Changes in lichen pigment production and ultrastructure, changes in lichen and bryophyte cover	N addition studies, high and low arctic, P enhanced or moderated N effects	(Hyvärinen et al. 2003)[b]; (Makkonen et al. 2007)[b]; (Arens et al. 2008)[a],
Taiga	Lichen, moss, and algae in forests and woodlands	1–3	#	Changes in alga, bryophyte, and lichen community composition, cover, tissue N or growth rates		(Poikolainen et al. 1998)[b]; (Strengbom et al. 2003)[d]; (Vitt et al. 2003)[c], (Berryman et al. 2004)[c]; (Moore et al. 2004)[c]; (Berryman and Straker 2008)[c]; (Geiser et al. 2010)
Taiga	Spruce forests	5–7	(#)	Change in ectomycorrhizal fungal community structure	Expert judgment, extrapolated from Marine West coast spruce and northern spruce-fir forest	(Lilleskov 1999); (Lilleskov et al. 2001, 2002, 2008)
Taiga	Shrublands	6	##	Change in shrub and grass cover, increased parasitism of shrubs	Long term, low N addition study: shrub cover decreased, grass cover increased	(Strengbom et al. 2003)[d]; (Nordin et al. 2005)[d]
Northern Forests	Hardwood and Coniferous Forests	>3	#	Decreased growth of red pine, and decreased survivorship of yellow birch, scarlet and chestnut oak, quaking aspen, and basswood		(Thomas et al. 2010)

Table 5.1 (continued)

Ecoregion	Ecosystem component	CL for N deposition kg N $ha^{-1}yr^{-1}$	Reliability	Response	Comments	Study
Northern Forests	Lichens	4–6	(#)	Epiphytic lichen community change	Loss of oligotrophic species. Synergistic and/ or confounding effects of acidic deposition not considered; assumes response threshold similar to Marine West Coast Forest	(Geiser et al. 2010)
Northern Forests	Ectomycorrhizal fungi	5–7	#	Change in fungal community structure		(Lilleskov et al. 2008)
Northern Forests	Herbaceous cover species	>7 and <21	#	Loss of prominent species	Response observed in low-level fertilization experiment	(Hurd et al. 1998)
Northern Forests	Hardwood and Coniferous Forests	8	##	Increased surface water NO_3^- leaching		(Aber et al. 2003)
Northern Forests	Old-growth montane red spruce	>10 and <26	#	Decreased growth and/or induced mortality	Response observed in low-level fertilization experiment	(McNulty et al. 2005)
Northern Forests	Arbuscular mycorrhizal fungi	<12	(#)	Biomass decline and community composition change		(Van Diepen et al. 2007); (Van Diepen 2008)
Northwest Forested Mountains	Alpine lakes	1.5	##	Changes in diatom assemblages	As wet deposition only	(Baron 2006)
Northwest Forested Mountains	Lichens	1.2–3.7	(#)	Epiphytic lichen community change in mixed-conifer forests, Alaska	Application of western Oregon and Washington model	(Geiser et al. 2010)

Table 5.1 (continued)

Ecoregion	Ecosystem component	CL for N deposition kg N $ha^{-1}yr^{-1}$	Reliability	Response	Comments	Study
Northwest Forested Mountains	Lichens	2.5–7.1	##	Epiphytic lichen community change, thallus N enrichment in mixed-conifer forests, non-Alaska		(Fenn et al. 2008); (Geiser et al. 2010)
Northwest Forested Mountains	Sub-alpine forest	4	##	Increase in organic horizon N, foliar N, potential net N mineralization, and soil solution N, initial increases in N leaching below the organic layer		(Baron et al. 1994); (Rueth and Baron 2002)
Northwest Forested Mountains	Alpine lakes	4.0	#	Episodic freshwater acidification		(Williams and Tonnessen 2000)
Northwest Forested Mountains	Alpine grassland	4–10	##	Changes in plant species composition		(Bowman et al. 2006)
Northwest Forested Mountains	Ectomycorrhizal fungi	5–10	(#)	Changes in ectomycorrhizal fungal community structure in white, black, and Engelmann spruce forests	Expert judgment, extrapolated from Marine West Coast spruce and northern spruce-fir forest	(Lilleskov 1999); (Lilleskov et al. 2001, 2002, 2008)
Northwest Forested Mountains	Mixed conifer forest	17	## #	NO_3^- leaching reduced fine root biomass		(Fenn et al. 2008)
Marine West Coast Forests	Western OR and WA forests	2.7–9.2	##	Epiphytic lichen community change	Loss of oligotrophic species, enhancement of eutrophic species. CL increases with regional range in mean annual precipitation from 45–450 cm	(Geiser et al. 2010)

Table 5.1 (continued)

Ecoregion	Ecosystem component	CL for N deposition kg N $ha^{-1}yr^{-1}$	Reliability	Response	Comments	Study
Marine West Coast Forests	SE Alaska forests	5	(#)	Fungal community change; declines in ectomycorrhizal fungal diversity		(Whytemare et al. 1997); (Lilleskov 1999), (Lilleskov et al. 2001, 2002)
Eastern Temperate Forest	Eastern Hardwood Forest	>3	#	Decreased growth of red pine, and decreased survivorship of yellow birch, scarlet and chestnut oak, quaking aspen, and basswood		(Thomas et al. 2010)
Eastern Temperate Forest	Lichens	4–8	(#)	Epiphytic lichen community change	Loss of oligotrophic species. Synergistic/ confounding effects of acidic deposition not considered; based on application of model and estimated response threshold	(Geiser et al. 2010)
Eastern Temperate Forest	Southeast Coastal Plain	5–10	(#)	Ectomycorrhizal fungi community change		(Lilleskov et al. 2001, 2002, 2008); (Dighton et al. 2004)
Eastern Temperate Forest	Eastern Hardwood Forests	8	##	Increased surface water NO_3^- leaching		(Aber et al. 2003)
Eastern Temperate Forest	Michigan deposition gradient	<12	(#)	AMF biomass decline and community composition change		(Van Diepen et al. 2007); (Van Diepen 2008)
Eastern Temperate Forest	Herbaceous species	<17.5	(#)	Increases in nitrophilic species, declines in species-rich genera (e.g., *Viola*)		(Gilliam 2006, 2007); (Gilliam et al. 2006)

Table 5.1 (continued)

Ecoregion	Ecosystem component	CL for N deposition kg N $ha^{-1}yr^{-1}$	Reliability	Response	Comments	Study
Great Plains	Tall-grass prairie	5–15	#	Biogeochemical N cycling, plant and insect community shifts		(Tilman 1987, 1993); (Wedin and Tilman 1996); (Clark and Tilman 2008); (Clark et al. 2009)
Great Plains	Mixed-grass prairie	10–25	#	Soil NO_3^- pools, leaching, plant community shifts		(Clark et al. 2003, 2005); (Jorgensen et al. 2005)
Great Plains	Short-grass prairie	10–25	(#)		Inferred from mixed grass	(Epstein et al. 2001); (Barret aud Burke 2002)
Great Plains	Mycorrhizal fungi	12	(#)	Decline in arbuscular mycorrhizal fungal activity		Egerton-Warburton, unpub. data
North American Desert	Lichens	3	(#)	Lichen community shifts, thallus N concentration	Uncertainty regarding modelled deposition estimates	(Porter 2007); (Geiser et al. 2008)
North American Desert	Shrubland, woodland, desert grassland	3–8.4	#	Vegetation response, vascular plant community change		(Inouye 2006); (Baez et al. 2007); (Allen et al. 2009); (Rao et al. 2010)
Mediterranean California	Coastal Sage Scrub	7.8–10	#	Invasive grass cover, native forb richness, arbuscular mycorrhizal fungi richness	Modelled and inferential N deposition estimates and published data for mycorrhizae, unpublished data for vegetation survey	[1]Allen unpublished data; (Egerton-Warburton and Allen 2000); (Tonnesen et al. 2007); (Fenn et al. 2010)
Mediterranean California	Chaparral; Lichens	3–6	#	Epiphytic lichen community change	Lichen critical loadis from modelled N deposition data and published data for lichens	(Jovan and McCune 2005); (Jovan 2008); (Fenn et al. 2010); (Geiser et al. 2010)

Table 5.1 (continued)

Ecoregion	Ecosystem component	CL for N deposition kg N $ha^{-1}yr^{-1}$	Reliability	Response	Comments	Study
Mediterranean California	Chaparral, Oak Woodlands, Central Valley	10–14	#	NO_3^- leaching; stimulated N cycling	Critical load for NO_3^- leaching of 10 kg N $ha^{-1}yr^{-1}$ is based on 1 year of throughfall data in Chamise Creek and an additional year of throughfall data from adjacent Ash Mountain, both in Sequoia National Park	(Fenn and Poth 1999); (Fenn et al. 2003a, 2003b, 2003c, 2009, 2011); (Meixner and Fenn 2004)
Mediterranean California	Mixed conifer forest; Lichens	3.1–5.2	##	Lichen chemistry and community changes	The lowest critical load is based on lichen tissue chemistry above the clean site threshold	(Fenn et al. 2008, 2010)
Mediterranean California	Mixed conifer forest	17	#	Reduced fine root biomass		(Grulke et al. 1998); (Fenn et al. 2008, 2010)
Mediterranean California	Mixed conifer forest	17–25.9	#	NO_3^- leaching; soil acidification		(Breiner et al. 2007); (Fenn et al. 2008, 2010)
Mediterranean California	Mixed conifer forest	24–39	(#)	Understory biodiversity; forest sustainability	N deposition from Fenn et al. (2008)	(Grulke et al. 1998, 2009); (Grulke and Balduman 1999); (Jones et al. 2004); (Allen et al. 2007)
Mediterranean California	Serpentine grassland	6	##	Annual grass invasion, replacing native herbs	Critical load based on a local roadside gradient; Serpentine grassland site is actually west of the Central Valley	(Weiss 1999); (Fenn et al. 2010)

Table 5.1 (continued)

Ecoregion	Ecosystem component	CL for N deposition kg N $ha^{-1}yr^{-1}$	Reliability	Response	Comments	Study
Temperate Sierras	Lichens	4–7	(#)	Epiphytic lichen community change	Increase in proportion of eutrophic species. Estimated from Marine West Coast Forests model, response threshold allows ~60% eutrophs due to dry, hot climate, hardwood influence	(Geiser et al. 2010)
Temperate Sierras	*Pinus* forest	15	#	Elevated NO_3^- in stream and spring waters	Data are from *Pinus hartwegii* sites in the Desierto de los Leones National Park and Ajusco, Mexico	(Fenn et al. 1999, 2002); (Fenn and Geiser 2011)
Tropical and Subtropical humid Forests	N-rich forests	<5–10	(#)	NO_3^- leaching, N trace gas emissions	CL for N-rich forests should be lower than for N-poor forests based on possibility of N losses	ND
Tropical and Subtropical Humid Forests	N-poor forests	5–10	(#)	Changes in community composition; NO_3^- leaching, N trace gas emissions	CL for N-poor forests based on estimates for Southeastern Coastal Plain forests	ND
Wetlands	Freshwater wetlands	2.7–13	#	Peat accumulation and NPP change	CL for wetlands in the northeastern U.S. and southeastern Canada	(Rochefort et al. 1990)[c]; (Aldous 2002)[c]; (Vitt et al. 2003)[c]; (Moore et al. 2004)[c]
Wetlands	Freshwater wetlands	6.8–14	(#)	Sarracenia purpurea community change	CL based on northeastern populations	(Gotelli and Ellison 2002, 2006)

Table 5.1 (continued)

Ecoregion	Ecosystem component	CL for N deposition kg N $ha^{-1}yr^{-1}$	Reliability	Response	Comments	Study
Wetlands	Intertidal wetlands	50–100	##	Loss of eelgrass		(Latimer and Rego 2010)
Wetlands	Intertidal salt marshes	63–400	(#)	Changes in salt marsh community structure, microbial activity and biogeochemistry		(Wigand et al. 2003); (Caffrey et al. 2007)
Aquatic	Western Lakes	2	##	Freshwater eutrophication		(Baron 2006)
Aquatic	Eastern Lakes	8	#	NO_3^- leaching		(Aber et al. 2003)

reliable, # fairly reliable, (#) expert judgment
[a] based on data from Greenland
[b] based on data from Finland
[c] based on data from Canada
[d] based on data from Sweden
[1] Allen, E.B. unpublished data. Professor and Natural Resource Extension Specialist, Department of Botany and Plant Sciences and Center for Conservation Biology, University of California, Riverside, CA, 92521.

5.2.1 *Effects of Nitrogen Deposition*

Nitrogen deposition adversely affects mycorrhizal fungi (1) by causing decreased belowground C allocation by hosts and increased N uptake and associated metabolic costs (Wallander 1995) and (2) via soil chemical changes associated with eutrophication and acidification. There are two major groups of mycorrhizal fungi that are evolutionarily and ecologically distinct: arbuscular mycorrhizal fungi (AMF) and ectomycorrhizal fungi (EMF). Under sufficiently high N inputs, the progressive effect of elevated N is an early decline of sporocarp (reproductive structure) production for EMF and spore production for AMF, and subsequent decline in biological diversity and loss of taxa adapted to N-poor environments or sensitive to acidification (Lilleskov 2005). Sporocarp and spore production appears to be especially sensitive to N deposition, often declining before the communities on root tips have been substantially altered, presumably because sporocarps and spores are at the end of the carbon flux pathway from hosts.

Of the two plant-fungal symbioses examined here, mycorrhizal fungi appear to be less sensitive to N deposition than lichens, presumably because the soil environment buffers these soil fungi from some of the immediate impacts of N deposition to which lichens are directly exposed. Lichens have an advantage as indicators when compared with mycorrhizal fungi because they can be relatively easily inventoried. However, the critical role of mycorrhizal fungi as (i) root symbionts, central to plant nutrition and belowground production, (ii) repositories of a large part of the eukaryote diversity in forests, (iii) major components of food webs, and (iv) non-timber forest products of high economic value (edible sporocarps or mushrooms) (Amaranthus 1998), provides sufficient impetus to improve our understanding of their response to N deposition.

5.2.2 *Critical Loads of Nitrogen*

We reviewed empirical studies on mycorrhizal fungal response to N inputs to determine empirical critical loads for different ecoregions the United States (Table 5.1; Fig. 5.3). Nitrogen deposition sufficient to elevate inorganic N, especially NO_3^-, availability in soils can have measurable effects on mycorrhizal fungi. The data for EMF indicate that N deposition to N-limited conifer forests in the range of 5–10 kg $ha^{-1}yr^{-1}$ can significantly alter community structure and composition and decrease species richness (Dighton et al. 2004; Lilleskov 1999; Lilleskov et al. 2001, 2002, 2008). Similarly, the data for AMF suggest that N deposition levels of 7.8–12 kg $ha^{-1}yr^{-1}$ can lead to community changes, declines in spore abundance and root colonization, and changes in community function. This range is based on re-analysis of data from Egerton-Warburton et al. (2001) combined with N deposition data, decreases in fungal abundance (Van Diepen et al. 2007, Van Diepen 2008), and

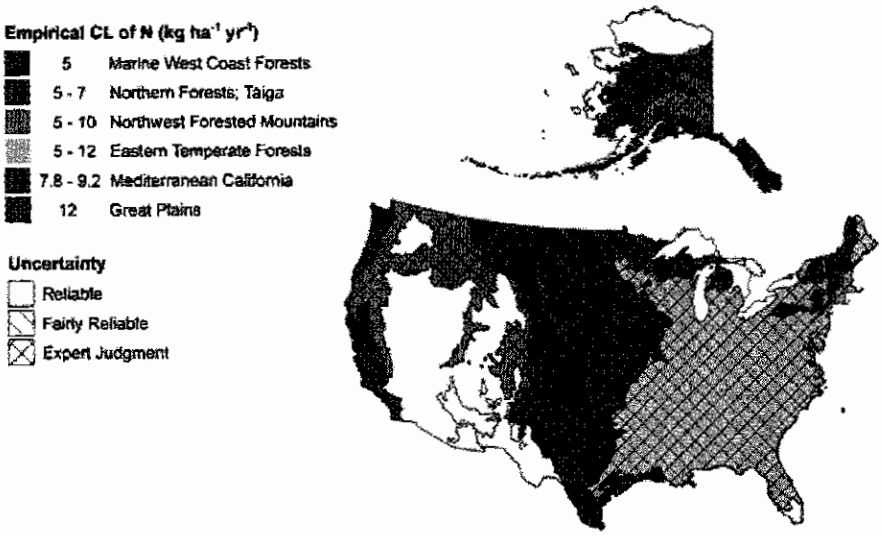

Fig. 5.3 Map of critical loads for mycorrhizal fungi by ecoregion in the United States (The *hatch marks* indicate increasing level of uncertainty: *no hatch marks* for the most certain "reliable" category, *single hatching* for the "fairly reliable" category, and *double hatching* for the "expert judgment" category. The colour sequence moves from red toward *blue* and *violet* as the critical load increases. As the range of the critical load gets broader, the saturation of the colour decreases)

declines in fungal activity[2]. The actual threshold for N effects on AMF could be even lower, because high background deposition precludes consideration of sites receiving deposition at or near pre-industrial levels. Therefore, the provisional expert judgment is that critical loads for mycorrhizal diversity for sensitive ecosystem types are 5–10 kg $ha^{-1}yr^{-1}$. The uncertainty of this estimate is high, because few studies have been conducted at low N deposition to further refine the critical load. Variation across ecoregions is associated with differences in EMF and AMF responses. Critical load values are lower in Marine West Coast Forests, Northern Forests, Taiga, and Northwestern Forested Mountains, with EMF as receptors. Eastern Forests, which include both EMF and AMF as receptors, have the greatest range in critical loads values. Mediterranean California and the Great Plains, with only values for AMF reported, have the highest critical loads.

[2] Egerton-Warburton, L.M. Unpublished data. Chicago Botanic Garden, 1000 Lake Cook Road, Glencoe, IL, 60022.

5.3 Lichens and Bryophytes

Lichens and bryophytes make substantial contributions to biodiversity. About 4100 lichens and 2300 bryophytes are known from North America north of Mexico—approximately one fourth of the number of vascular plant species (about 26,600 species; USDA NRCS 2009).

5.3.1 Effects of Nitrogen Deposition

Lichens and bryophytes are among the most sensitive bioindicators of N in terrestrial ecosystems (Blett et al. 2003; Bobbink et al. 2003; Fenn et al. 2003b, 2010; Glavich and Geiser 2008). Unlike vascular plants, lichens and bryophytes lack specialized tissues to mediate the entry or loss of water and gases (e.g., waxy epidermis, guard cells, root steele). Thus, they rapidly hydrate and absorb gases, water, and dissolved nutrients during high humidity or precipitation events. However, they dehydrate to a metabolically inactive state quickly as well, making them slow growing and vulnerable to contaminant accumulation. Consequently, the implementation of lichen or bryophyte-derived critical loads may prevent undesired impacts, such as declines in biological diversity, to much of the broader forest ecosystem (McCune et al. 2007).

Species of epiphytic lichens in wet and mesic forests that are most sensitive to N (i.e., the large pendant and foliose species) play important ecological roles that are not duplicated by the nitrophytic (i.e., N tolerant) species that may replace them. Dominant regional oligotrophs (e.g. *Alectoria, Bryoria, Lobaria, Ramalina, Usnea*) comprise the bulk of lichen biomass in old-growth forests, contribute to nutrient cycling through N_2 fixation, and are used for nesting material, essential winter forage for rodents and ungulates, and invertebrate habitat (McCune and Geiser 2009). Storage of water and atmospheric nutrients by these lichen genera and epiphytic bryophytes moderates humidity and provides a slow release system of essential plant nutrients to the soil (Boonpragob et al. 1989; Cornelissen et al. 2007; Knops et al. 1991; Pypker 2004). In the tundra, lichens and bryophytes represent a significant portion of the biomass, and reindeer lichens are a vital link in the short arctic food chain (Kytöviita and Crittenden 2007). Mosses comprise the bulk of the biomass of the extensive boreal peatlands. In the desert, together with other microbiota, lichens and bryophytes form cryptogamic mats important to soil stabilization and fertility.

5.3.2 Critical Loads of Nitrogen

The critical loads estimated (Pardo et al. 2011c) for lichens range from 1–9 kg N $ha^{-1}yr^{-1}$ (Fig. 5.4; Table 5.1). The certainty associated with these estimates for li-

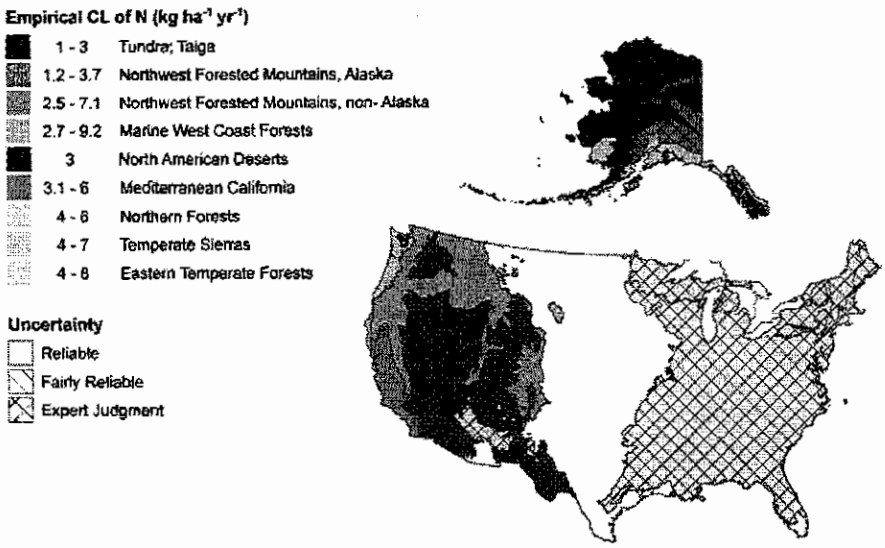

Fig. 5.4 Map of critical loads for lichens by ecoregion in the United States (see Fig. 5.3 for legend explanations)

chens varies considerably by ecoregion. This is partially because of differences in sampling scheme and intensity. For example, in the Pacific Northwest lichen communities were assessed intensively across wide environmental gradients spanning low to high N deposition on a fine grid over time, yielding highly reliable critical N load estimates (Geiser and Neitlich 2007; Jovan 2008), whereas assessments in the eastern United States are more problematic due to historical and contemporary S and N deposition. It is more difficult to determine the critical load where historical information necessary to identify a "pristine" or "clean" state is lacking, and the resulting confidence associated with the critical load is low.

The intensive studies in the Pacific Northwest facilitated the development of simple regressions to relate N deposition with shifts in community composition (Geiser and Neitlich 2007; Geiser et al. 2010; Jovan 2008) and thus to set critical loads. If such simple models could be tested and confirmed in other regions of the country, the confidence in the critical loads in those regions would improve.

The variation in critical loads for lichens across ecoregions (Fig. 5.4) is among others due to differences in ecosystem type, pre-existing lichen communities, and background N deposition. Marine West Coast Forests, with its broad range in environmental gradients, has the greatest range in critical loads. The low end of the critical load range in eastern ecoregions is higher than the low end of the critical load range in western ecoregions, likely as a result of higher historical S and N deposition in the eastern United States, which makes it difficult to establish critical loads for sensitive species.

5.4 Herbaceous Plants and Shrubs

Herbaceous species and shrubs are found in grasslands, shrublands, forests, deserts, and wetlands and comprise the majority of the roughly 26,600 vascular plant species found in North America north of Mexico (USDA NRCS 2009). Herbaceous plants play an important role in those ecosystems in which they are the dominant primary producers (e.g., grasslands, shrublands). In forests, however, the role of the herbaceous community in ecosystem function also has a significance disproportionate to its low relative biomass. For example, although they represent only ~0.2 % of standing above-ground biomass, herbaceous understory species produce >15 % of forest litter biomass and comprise up to 90 % of forest plant biodiversity, including endangered or threatened species (Gilliam 2007).

5.4.1 Effects of Nitrogen Deposition

Herbaceous plants and some shrubs appear intermediate between cryptogam and tree species in their sensitivity to N deposition, due to specialized tissues that mediate the entry or loss of water and gases compared with cryptogams, and rapid growth rates, shallow rooting systems, and often shorter lifespan compared with trees. Thus, herbaceous species in a forest understory will likely respond more rapidly to changes in N deposition and to a greater degree than the trees with which they coexist. Herbaceous plants in alpine or tundra environments will respond later and to a lesser degree than the cryptogams with which they coexist.

5.4.2 Critical Loads of Nitrogen

The range of critical loads of N for herbaceous plants and shrubs across all ecoregions is 3–33 kg N $ha^{-1}yr^{-1}$ (Fig. 5.5; Table 5.1). Although this range is broader than those for lichens or mycorrhizal fungi, many of the critical loads for herbaceous plants fall into the range of 5–15 kg N $ha^{-1}yr^{-1}$. The uncertainty of these estimates is moderate. The shorter lifespan of some herbaceous plants can result in a more rapid response to N addition. This is especially relevant for annuals or perennials with little N storage. In grasslands, for example, elevated N deposition often leads to a rapid (1–10 years) increase in herbaceous production and a shift in biomass allocation towards more above-ground tissue. This often decreases light levels at ground surface and decreases the numbers of plant species, primarily of perennials, legumes, and natives (Clark and Tilman 2008; Suding et al. 2004; Tilman 1993).

As a result of this relatively rapid response, experimental studies of moderate to long duration (3–10 years) allow determination of the critical load with reasonable certainty. Longer studies (>10 years) would decrease the uncertainty further. In some cases, it can be difficult to determine whether the condition in reference plots or at the low end of a deposition gradient represents a "pristine" condition or

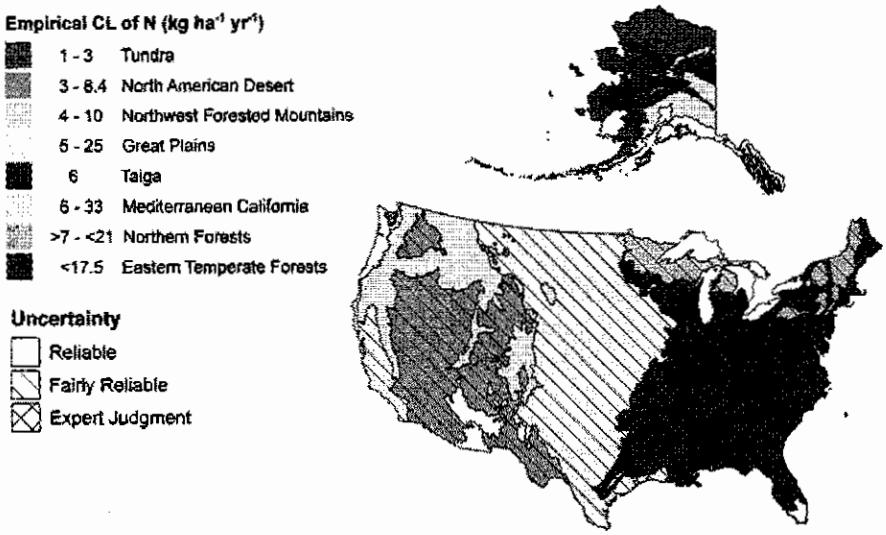

Fig. 5.5 Map of critical loads for herbaceous plants and shrubs by ecoregion in the United States (see Fig. 5.3 for legend explanations)

whether a site has already been altered by N deposition prior to or at the time of the study. For example, the Watershed Acidification Study at Fernow Experimental Forest, West Virginia, added 35 kg N $ha^{-1}yr^{-1}$ via aerial application in addition to ambient deposition of 15–20 kg N $ha^{-1}yr^{-1}$, which has led to changes in understory species composition (Adams et al. 2006). Recently, similar changes in understory species composition have occurred on the adjacent reference watershed receiving only ambient atmospheric deposition[3] (Gilliam et al. 1996) suggesting that the deposition to the reference watershed currently exceeds the critical load. Where deposition rates exceed the critical load, measurement of the rate of change of an ecological metric (e.g. plant abundance, diversity, or community composition) over a range of N inputs provides an estimate of the N level at which increased ecological change occurs (Bowman et al. 2006), but it is difficult to determine the critical load.

The large variation across ecoregions for herbaceous critical loads (Fig. 5.5) is caused, in part, by the differences in receptor species and ecosystems, the paucity of data in some ecoregions and historic N status. Where few studies are available, the range reported for the critical load is broad and is considered less reliable. Additional studies could narrow the range of the critical load and increase the reliability. N-poor sites and sites with relatively low productivity (e.g., Tundra, North American Deserts) have lower critical loads for herbaceous species than sites with more fertile soil and higher productivity (e.g., Great Plains). High levels of historical N deposition and lack of low-level N fertilization experiments mean that the critical loads for some ecoregions may be lower than currently reported.

[3] Gilliam, F.S. Unpublished data. Professor, Department of Biological Sciences, Marshall University, Huntington, WV 25755–2510.

5.5 Trees/Forest Ecosystems

In this section we discuss the responses of trees and the overall biogeochemical responses of forest ecosystems to N inputs, excluding the specific responses of mycorrhizal fungi, lichens, or understory herbaceous plants. Forest ecosystems represent about a third of landcover in the United States (USFS 2001) and are significant in Northern, Eastern, Tropical Wet, and Marine West Coast Forests, Northwestern Forest Mountains, and Mediterranean California ecoregions.

5.5.1 Effects of Nitrogen Deposition

In northeastern forests, gradient studies demonstrate that N deposition enhances growth in some fast-growing tree species, including many hardwoods with AMF associations, whereas it slows growth in some EMF species (red spruce, red pine), and has no detectable effect on still other species (Thomas et al. 2010). Similarly, N deposition enhances survivorship in a few species capable of forming AMF associations (black cherry, red maple, paper birch) and decreases survivorship in others, all ectomycorrhizal (Thomas et al. 2010). Survivorship under chronic N deposition, and possibly other co-occurring pollutants such as ozone, is often dependent on interactions with other stressors such as pests, pathogens, climate change, or drought (Grulke et al. 2009; McNulty and Boggs 2010). Over the long-term, these differential effects of N deposition on tree growth and survivorship are likely to shift species composition, possibly to more nitrophilic species, similar to patterns seen for organisms with shorter lifespans.

We have few data that show a major structural or functional shift in forest ecosystems, due to the long response times of trees and forest soils to changes in N inputs and N availability. This is caused by the relatively large pools of organic N in the forest floor, mineral soil, tree biomass, and detritus. Because of the long lag-time in response to N treatments, it can be difficult to determine the actual critical load of N for forest ecosystems based on short-term fertilization studies. If a response is observed over a relatively short period of time (i.e. years), it is nearly certain that the critical load is below the total N input at the treatment site and it can be difficult to further constrain the critical load. It is expected that the more complex and interconnected processes in forests will result in a higher critical load than other ecosystem types, in part because large N storage pools give forest ecosystems a greater capacity to buffer N inputs.

5.5.2 Critical Loads of Nitrogen

The range of critical loads reported for forest ecosystems is 4–39 kg N $ha^{-1}yr^{-1}$ (Fig. 5.6; Table 5.1). The threshold N deposition value which caused increased NO_3^- leaching from forest ecosystems into surface water was 8–17 kg N $ha^{-1}yr^{-1}$;

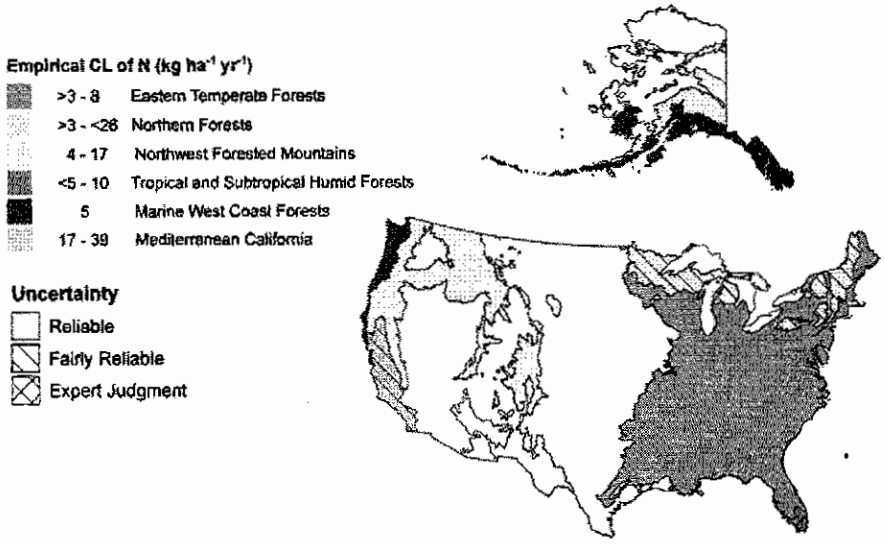

Fig. 5.6 Map of critical loads for forest ecosystems by ecoregion in the United States (This map does not include the responses of mycorrhizal fungi, lichens, or understory herbaceous plants already represented; see Fig. 5.3 for legend explanations)

the lower end of the range representing Northern and Eastern Forests, the upper end representing Mediterranean California mixed conifers (Fig. 5.6). At 4 kg N $ha^{-1}yr^{-1}$ in the Colorado Rockies, increasing NO_3^- concentration was reported in the organic horizon, which suggests incipient N saturation (Rueth and Baron 2002). The highest critical loads were reported for Mediterranean California mixed conifer forests for forest sustainability and for soil acidification caused by increased N deposition. These sites experience some of the highest N deposition reported in the United States, up to approximately 70 kg N $ha^{-1}yr^{-1}$ (Fenn et al. 2008).

Critical loads for forests vary across ecoregions due in part to reported receptors, site and soil characteristics, and background N deposition status. Critical loads values were lower for ecoregions where sensitive forest receptors, such as mycorrhizal fungi (Marine West Coast Forests) were used to set critical loads. Use of forest health and species composition resulted in a large range in critical loads in Northern Forests and Mediterranean California. In the Northwestern Forested Mountains, the critical load based on NO_3^- leaching ranged from a low value of 4 kg $ha^{-1}yr^{-1}$ in subalpine forests to 17 kg $ha^{-1}yr^{-1}$ in mixed conifer forests.

5.6 Freshwater and Wetland Ecosystems

Freshwater lakes and streams, and wetlands (freshwater and estuarine intertidal) are ecosystem types that occur in most ecoregions in North America. In freshwater lakes and streams, phytoplankton, algae that live in the water column, are sensitive

to the chemical environment in which they reside, and many species can be used as indicators of the levels of nutrients or acidity because of individual species' preference for specific chemical conditions. Diatoms are used in this discussion because there has been more work published on these algae than others, but other types of algae also respond to N deposition (Lafrancois et al. 2004; Michel et al. 2006). Of the wetlands which occur in the conterminous United States, 95% are freshwater and 5% are estuarine or marine (USDI FWS 2005). The species composition differs between freshwater and intertidal wetlands, although together they support more than 4200 native plant species. Despite the high biodiversity, the effects of N loading are studied in just a few plant species.

5.6.1 Effects of Nitrogen Deposition

For the analysis of nutrient N effects to freshwater lakes and streams, we relied on papers and studies that linked aquatic biological and ecological response to atmospheric deposition, but the results are consistent with laboratory or *in situ* dose-response studies and even land use change studies. The productivity of minimally disturbed aquatic ecosystems is often limited by the availability of N, and slight increases in available N trigger a rapid biological response that increases productivity and rearranges algal species assemblages (Nydick et al. 2004; Saros et al. 2005). The mechanism for change is alteration of N:P ratios, which can increase productivity of some species at the expense of others (Elser et al. 2009). As with the terrestrial systems described above, the nutrient responses of lakes and streams are most evident where land use change and acidic deposition have been limited, thus most evidence of exceedance of critical loads comes from high elevations of the western United States (Baron et al. 2011). As with terrestrial plants, some diatoms respond rapidly to an increase in available N. An example that has been observed from a number of different lakes of the Rocky Mountains is dominance of two diatoms (*Asterionella formosa* and *Fragilaria crotonensis*) in lakes with higher N, in contrast to the flora of lakes with lower N deposition where there is a more even distribution, thus high biodiversity, of diatoms. Higher trophic levels (zooplankton, macroinvertebrates) may be secondarily affected by N, but further increases in primary, or autotrophic, production will be limited by other nutrients such as P or silica (Si).

Both freshwater and estuarine intertidal wetlands tend to be N-limited ecosystems (LeBauer and Treseder 2008; U.S. EPA 1993). Known responses to N enrichment are generally derived from nutrient-addition studies in the field and observations along gradients of N deposition. A variety of ecological endpoints are evaluated, such as altered soil biogeochemistry, increased peat accumulation, elevated primary production, changes in plant morphology, changes in plant population dynamics, and altered plant species composition (U.S. EPA 2008). In general, the sensitivity of wetland ecosystems to N is related to the fraction of rainfall (a proxy for atmospheric N deposition) in the total water budget. Most freshwater wetlands, such as bogs, fens, marshes and swamps, have relatively closed water and N cycles,

thus are more sensitive to N deposition than estuarine intertidal wetlands, such as salt marshes and eelgrass beds (Greaver et al. 2011).

5.6.2 *Critical Loads of Nitrogen*

In general, critical loads for freshwater lakes and streams tend to be low, because the target organisms are unicellular algae that respond rapidly to changes in their chemical environment. The range of critical loads for eutrophication and acidity in freshwaters is 2–9 kg N $ha^{-1}yr^{-1}$ (Baron et al. 2011); the range reported for terrestrial ecosystems is much broader (Table 5.1; Fig. 5.7). Critical loads for NO_3^- leaching from terrestrial ecosystems ranged from 4–17 kg N $ha^{-1}yr^{-1}$, but many sensitive freshwaters at high altitudes are found above the tree-line where few watershed buffering mechanisms exist, due to sparse vegetation, poorly developed soils, short hydraulic residence time, and steep topography. These factors influence how rapidly a system exhibits elevated N leaching in response to increased N deposition, and how this increased N availability subsequently influences biota. In general, lakes have relatively rapid N turnover times compared to soil N pools and are at least seasonally well-mixed. They would thus be expected to have lower critical loads. Thus responses of terrestrial plants would not be expected to be as rapid as those of freshwater organisms.

Generally, freshwater wetlands are more sensitive to N deposition than estuarine intertidal wetlands, with critical loads for freshwater wetlands that range

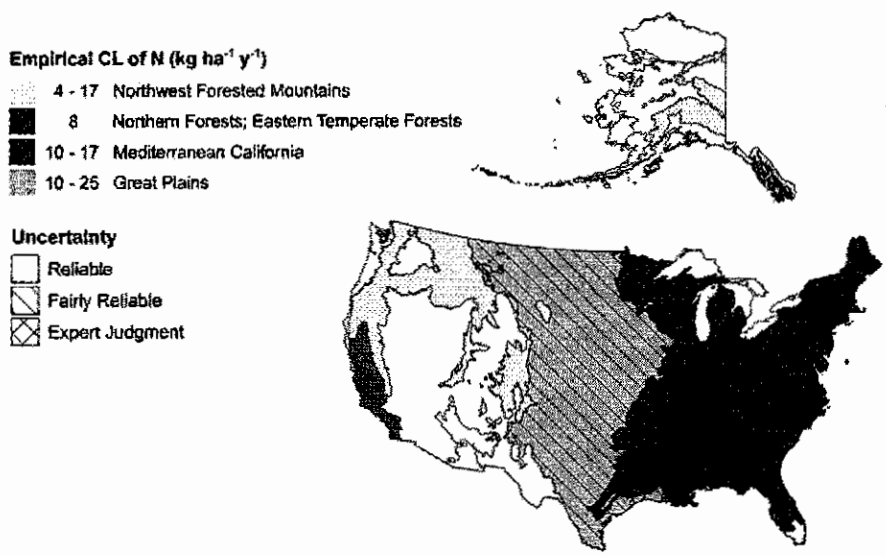

Fig. 5.7 Map of critical loads for freshwater and wetland ecosystems based on increased nitrate leaching by ecoregion in the United States (see Fig. 5.3 for legend explanations)

from 2.7–14 kg N $ha^{-1}yr^{-1}$ (Table 5.1; Greaver et al. 2011). The bryophyte genus *Sphagnum* and the carnivorous pitcher plant are the two taxa most commonly studied. The critical loads reported for freshwater wetlands (Greaver et al. 2011) fall between those reported for inland surface waters (Baron et al. 2011) and those reported for terrestrial ecosystems (Pardo et al. 2011c). This pattern may be related to the rate of N released by soils/sediment to the ecosystem. The critical load tends to be higher for estuarine intertidal wetlands than other types of ecosystems because they have open nutrient cycles which are often strongly affected by N loading sources other than atmospheric deposition. Based on field observations of N loading effects on plant growth and species composition on salt marsh and eel grass habitat, the critical load for estuarine intertidal wetlands ranges between 50–400 kg N $ha^{-1}yr^{-1}$ (Table 5.1).

5.7 Discussion and Conclusions

5.7.1 Effects of Nitrogen Deposition

The most significant changes that we are currently observing in the United States in response to elevated N deposition are changes in species composition: losses of N-sensitive species, shifts in dominance, and losses of native species in favour of exotic, invasive species. Shifts in diatom and lichen community composition away from N-intolerant (oligotrophic) species are observed across the country. Alterations in herbaceous species are broadly observed, but are not always clearly documentable because of the long-term pollution inputs and other disturbances (including land-use change) that caused changes prior to the initiation of careful observations.

Numerous examples illustrate the significance of these species- and community-level effects. In serpentine grasslands in California, it was clearly demonstrated that unless N inputs are decreased or N is removed in biomass, a larval host plant and numerous nectar source plants utilized by a threatened and endangered butterfly will decrease to levels unable to sustain the checkerspot butterfly population (Fenn et al. 2010; Weiss 1999). In Joshua Tree National Park in southern California, N deposition favours the production of sufficient invasive grass biomass to sustain fires that threaten the survival of the namesake species (Fenn et al. 2010; Rao et al. 2010). Other sensitive ecosystems include alpine meadows, where relatively low levels of N deposition have already changed species composition (Bowman et al. 2006). Changes in historical diatom community composition from N-limited to N-tolerant species have been observed in lake sediment cores at many locations in the western United States, providing early evidence of freshwater ecosystem eutrophication (Wolfe et al. 2001; 2003).

Changes in ecosystem structure are linked to changes in ecosystem function. For example, extirpation of lichens can alter food webs by reducing the availability of nesting material for birds, invertebrate habitat, and critical winter forage for

mammals, and can also affect nutrient cycling (Cornelissen et al. 2007). In some arid low-biomass California ecosystems, N-enhanced growth of invasive species results in increased fire risk, even in areas where fire is normally infrequent (Allen et al. 2009; Fenn et al. 2010; Rao et al. 2010).

There is also evidence of N deposition contributing to multiple stress complexes, resulting in reduced forest sustainability (Grulke et al. 2009; McNulty and Boggs 2010). In North Carolina, elevated N deposition predisposed a pine ecosystem to a pest outbreak following a drought (McNulty and Boggs 2010). These types of complex interactions may be difficult to predict, but may intensify the impact of elevated N deposition in concert with other stressors, including climate change (Wu and Driscoll 2010). Further examples of changes in ecosystem structure and function are observed in coastal areas, where increased N export has led to toxic algal blooms (Rabalais 2002). As an example of N deposition effects on trace gas chemistry and climate change, N loading to ecosystems results in increased emissions of N trace gases, such as NO (nitric oxide, an ozone precursor), N_2O (nitrous oxide, a long-lived and powerful greenhouse gas); as well as declines in soil uptake of CH_4 (methane, another long lived and powerful greenhouse gas) (e.g. Liu and Greaver 2009).

5.7.2 Relative Sensitivities of Different Receptors, Ecosystem Types, and Regions

This synthesis demonstrates that empirical critical loads of N differ among life forms, tending to increase in the following sequence: diatoms < lichens and bryophytes < mycorrhizal fungi < herbaceous plants and shrubs < trees. Nitrogen deposition more rapidly affects those species that experience the most direct exposure to elevated N levels in the atmosphere (lichens and bryophytes) or receiving waters (diatoms), especially for those organisms that lack protective structures. By contrast, the capacity of soil organic matter to accumulate large quantities of N may delay adverse impacts on many herbs, shrubs, and trees. Altered N availability often appears to shift species composition most rapidly within those communities dominated by species with short lifespans (diatoms) compared to those with long lifespans (trees).

Critical loads vary more by receptor and response type than by region. For the same response of a given receptor, the western U.S. has generally similar critical load values to the eastern U.S., with the apparent exception that the critical load for NO_3^- leaching is approximately twice as high in Mediterranean California mixed conifers compared to northeastern forests (Fig. 5.7). In contrast, the critical load for NO_3^- leaching in high elevation catchments in the Colorado Front Range are lowest in the U. S., likely attributable to low biological N retention and storage capacity in these steep, rocky catchments (Baron et al. 2000; Fenn et al. 2003a, b; Sickman et al. 2002; Williams and Tonnessen 2000).

5.7.3 Factors Affecting the Critical Load

Multiple abiotic and biotic factors affect the critical load (Table 5.2). Abiotic influences include a range of climatic, hydrologic, and soil factors that can affect the timing and magnitude of N delivery to sensitive receptors. Climatic factors include temperature, precipitation amount and distribution, and the extent and rate of climate change. Hydrologic factors include catchment size, topographic relief, and flow path. Soil factors include soil type, age, depth, coverage, and parent material. Disturbance—forest fires or cutting—and past agricultural use can also affect soil N and thus the critical load.

Biological factors likely to contribute to lower critical loads of N include particularly sensitive species (diatoms, lichens, mycorrhizal fungi, certain plants), single species versus community responses, low biomass and low productivity ecosystems, short lifespan of receptor of concern, presence of invasive species, and presence of ozone-sensitive species (Fenn et al. 2008; Grulke et al. 1998, 2009; Grulke and Balduman 1999). For example, low-biomass ecosystems (e.g., grasslands, coastal sage scrub, desert) are more sensitive to N-enhanced growth of invasive species, if invasive pressure occurs. These low-biomass ecosystem types sometimes occur because of warm and dry climatic conditions. Because warmer temperatures often correspond to greater metabolic rates, longer periods of biological activity, greater biomass, and more rapid N cycling, one might expect that the critical load would increase with increasing temperature as has been suggested in Europe (Bobbink et al. 2003). We do not observe such a pattern across U.S. ecoregions in the critical loads reported in this synthesis, but Europe does not have warm and dry deserts with low critical loads as does the U.S. Note, however, that the uncertainty of the critical load estimates varies and is often fairly high, which may make it difficult to discern patterns in critical load values across regions. Moreover, a temperature pattern may be confounded by gradients in deposition form and quantity, moisture and elevation.

5.7.4 Comparison to Critical Loads in Europe

The range of critical loads of N deposition in U.S. ecoregions for terrestrial ecosystems is 1–39 kg N $ha^{-1}yr^{-1}$, which is close to the range for the most recently reported critical loads values for similar ecosystems in Europe (Bobbink and Hettelingh 2011). However, the low end of the critical loads range is nearly always lower in the U.S. than in Europe (Fig. 5.8; Table 5.3). There are several potential reasons why critical loads for the U.S. remain lower than European critical loads. These includes greater availability of pristine baselines in the U.S., more intensive land use in Europe; greater dominance of N deposition by reduced forms of N in Europe, and different threshold criteria.

Table 5.2 Assessment and interpretation of empirical critical loads of nutrient N for North American ecoregions

Ecoregion	Factors affecting the range of CL[a]	Comparison within ecoregion[b]
Tundra	1) Moisture 2) Competition between vascular plants and cryptogams 3) P-limitation 4) Temperature 5) pH	Critical loads are higher in wet and P-limited tundra; acidic tundra may be more sensitive to N deposition than non-acidic tundra. Increased N deposition may be more detrimental to lichens in the presence of graminoids and shrubs in the low and mid arctic than to lichens with less competition in the high arctic. Response time increases with latitude due to colder temperatures, less light, and poorer N and P mobilization
Taiga	1) Soil depth 2) Vegetation type and species composition 3) latitude	Morphological damage to lichens has been observed at a lower deposition in forests and woodlands than in shrub lands, bogs or fens; cryptogam dominated mats on thin soils become N saturated faster than forest islands
Northern Forest	1) Receptor 2) Tree species 3) Stand age 4) Site history 5) Pre-existing N status	CLs for lichen are generally lowest, followed by CLs for ectomycorrhizal fungi and NO_3^- leaching. CLs for herbaceous species and forests are generally higher than for other responses
Northwest Forested Mountains	1) Biotic receptor 2) Accumulated load of N 3) Ecosystem 4) Region	In alpine regions, diatom changes in lakes are seen at the lowest CL. Changes in individual plants are seen next, followed by vegetation community change, then soil responses. In subalpine forests, the CL of 4 kg N $ha^{-1}yr^{-1}$ for foliar and soil chemistry changes is similar to the lichen CL of 3.1–5.2 kg N $ha^{-1}yr^{-1}$ for lichen community change
Marine West Coast Forests	1) Background N status 2) Soil type 3) Species composition 4) Fire history 5) Climate	The midrange of responses reported for lichens (2.7–9.2 kg N $ha^{-1}yr^{-1}$) is broadly comparable to that for plant, soil, and mycorrhizal responses (5 kg N $ha^{-1}yr^{-1}$), despite limited studies for non-lichen responses.
Eastern Forests	1) precipitation 2) soil cation fertility and weathering 3) Biotic receptors	CLs for NO_3^- leaching, lichen community change, and ectomycorrhizal fungal response are within the same range. Arbuscular mycorrhizal fungal and herbaceous CLs are higher

Table 5.2 (continued)

Ecoregion	Factors affecting the range of CL[a]	Comparison within ecoregion[b]
Great Plains	1) N status 2) Receptor 3) Precipitation	CLs are lower in the tall grass prairie than in the mixed- and short-grass prairies. CLs in tall- and mixed-grass prairie are lower on N poor sites and sites with very N responsive plant species. CL in the short-grass prairie is likely lower in wet years than in dry years
North American Deserts	1) Receptor 2) Interaction of annual grasses with native forb cover 3) Precipitation	The lichen CL is lowest, at 3 kg N $ha^{-1}yr^{-1}$; vegetation CL varies from 3–8.4 kg N $ha^{-1}yr^{-1}$
Mediterranean California	1) Presence of invasive exotic annual grasses interacting with a highly diverse native forb community 2) N-sensitivity of mycorrhizal fungi 3) N-sensitivity of lichens 4) N retention capacity of catchments, catchment size 5) Co-occurrence of ozone and ozone-sensitive tree species	The lowest CLs in Mediterranean California are for sensitive lichen in chaparral and oak woodlands and mixed conifer forests. The CL for plant and mycorrhizal fungal community change in coastal sage scrub is higher, at 7.8–10 kg $ha^{-1}yr^{-1}$. CL for NO_3^- leaching is lower in chaparral and oak woodlands (10–14 kg $ha^{-1}yr^{-1}$) than in mixed conifer forests (17 kg $ha^{-1}yr^{-1}$). CLs are highest for mixed conifer forest plant community change and sustainability. Fine root biomass in ponderosa pine is reduced by both ozone and elevated soil N
Wetlands	1) Vegetation species 2) The fraction of rainfall in the total water budget 3) The degree of openness of N cycling	CL is much higher for intertidal wetlands (50–400 kg N $ha^{-1}yr^{-1}$) than for freshwater wetlands (2.7–14 kg N$ha^{-1}yr^{-1}$), which have relatively closed water and N cycles
Freshwaters	1) Extent of upstream vegetation development 2) Topographic relief 3) Land use/deposition history	CLs are lower in western mountain lakes/streams with poorly vegetated watersheds and steep catchments. CLs are greater in eastern lakes with prior land use and decades of acidic deposition

[a] Factors causing the critical load (CL) to be at the low or high end of the range reported
[b] Comparison of values and causes for differences if multiple critical loads are reported for an ecoregion

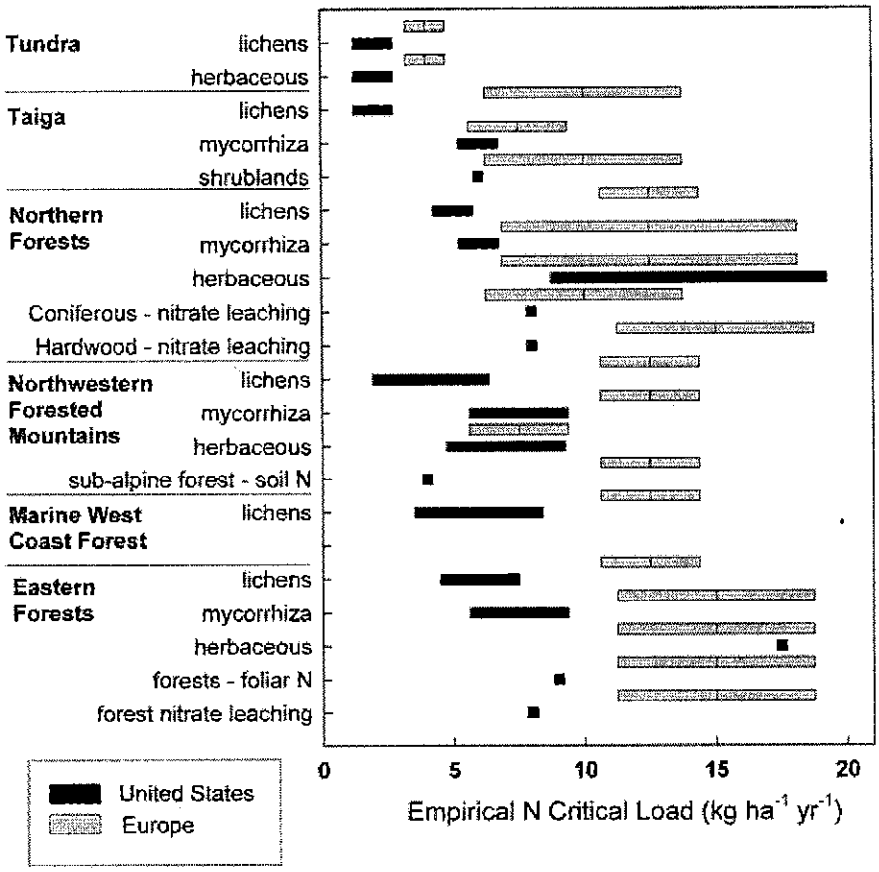

Fig. 5.8 Comparison of empirical critical loads of nutrient nitrogen for Europe. (based on Bobbink and Hettelingh 2011) and the United States

Availability of Pristine Baselines and Studies at Low Deposition: Because of high historic deposition levels, many European systems lack pristine baseline ecosystems as a reference to compare to those experiencing elevated N deposition. For example, past European critical loads for lichens were much higher than those in the U.S. (Bobbink et al. 2003). These loads were influenced by study sites in Scotland experiencing a deposition gradient from 10–22 kg N $ha^{-1}yr^{-1}$ from which critical loads were set at 11–18 kg N $ha^{-1}yr^{-1}$ (Mitchell et al. 2005). However, no oligotrophic species were observed, presumably because they were eliminated prior to the initial studies. The more recently reported European critical loads (Bobbink and Hettelingh 2011), used in our comparison, were set at 5–10 kg N $ha^{-1}yr^{-1}$. In some European ecosystems, such as dry grass lands, there is, however, still a need for more low N addition and deposition experiments (Bobbink and Hettelingh 2011).

Table 5.3 Critical loads for European ecosystems compared to critical loads for U.S. Ecoregions

European Ecosystem type (EUNIS code)	Critical load	Reliability	Indication of exceedance	U.S. Ecoregion; Ecosystem component	Critical load	Reliability	Indication of exceedance
Permanent oligotrophic lakes, ponds, and pools (C1.1)	3–10	##	Change in the species composition of macrophyte communities, increased algal productivity and a shift in nutrient limitation of phytoplankton from N to P	Aquatic; eastern and western high elevation lakes	2–8	#	Increased productivity, eutrophication, altered algal species assemblages
Raised and blanket bogs (D1)	5–10	##	Increase in vascular plants, altered growth and species composition of bryophytes, increased N in peat and peat water	Wetlands; bogs, fens, and swamps	2.7–14	#	Alterations in sphagnum accumulation and net primary productivity; alteration in threatened *Sarracenia purpurea* community
Suh-Atlantic semi-dry calcareous grasslands (E1.26)	15–25	##	Increase in tall grasses, decline in diversity, increased mineralization, N leaching; surface acidification	Great Plains; mixed-grass prairie	10–25	#	Change in soil NO_3^- pools, increased leaching, plant community shifts
Non-Mediterranean dry acidic and neutral closed grasslands (E1.7)	10–15	##	Increase in graminoids, decline in typical species, decrease in total species richness	Great Plains; tall-grass prairie	5–15	#	Change in biogeochemical N cycling, plant and insect community shifts
Tundra (F1)	3–5	#	Changes in biomass, physiological effects, changes in species composition in bryophyte layer, decrease in lichens	Tundra; prostrate dwarf shrub, lichens	1–3	#	Changes in lichen, bryophyte, and vascular plant cover. Changes in vascular plant CO_2 exchange, foliar N, and community composition; change in lichen pigment production and ultrastructure
Arctic, alpine, and subalpine scrub habitats (F2)	5–15	#	Decline in lichens, bryophytes and evergreen shrubs	Taiga; shrublands—lichen, moss, and algae	1–6	#	Change in shrub and grass cover, increased parasitism of shrubs; changes in alga, bryophyte, and lichen community composition, cover, tissue N, or growth rates

Table 5.3 (continued)

European Ecosystem type (EUNIS code)	Critical load	Reliability	Indication of exceedance	U.S. Ecoregion; Ecosystem component	Critical load	Reliability	Indication of exceedance
Broadleaved deciduous woodland (G1)	10–20	##	Changes in soil processes, nutrient imbalance, altered composition mycorrhiza and ground vegetation	Eastern and Northern Forests; hardwood forest, southeast coastal plain	3–21	#	Change in mycorrhizal fungal community structure and biomass, change in herb layer and loss of prominent species, increased surface water NO_3^- leaching, increased foliar N, change in tree growth and mortality
Coniferous woodland (G3)	5–15	##	Changes in soil processes, nutrient imbalance, altered composition mycorrhiza and ground vegetation	Northern Forests; coniferous forest	3–26	#	Change in mycorrhizal fungal community structure, biomass decline in arbuscular mycorrhizal fungi, loss of prominent herbaceous species, increased surface water NO_3^- leaching, change in tree growth and mortality
Abies and Picea woodland (G3.1)	10–15	(#)	Decreased biomass of fine roots, nutrient imbalance, decrease in mycorrhiza, changed soil fauna	Northwestern Forested Mountains; subalpine forest	4	##	Increase in organic horizon N; higher net N mineralization rates
Spruce taiga woodland (G3.A)	5–10	##	Changes in ground vegetation, decrease in mycorrhiza, increase in free living algae	Taiga; spruce-fir forests	5–7	(#)	Change in ectomycorrhizal fungal community structure
Temperate and boreal forest; lichen and algae (G)	5–10	#	Decline in lichens, increase in free-living algae	Eastern and Northern Forests, Northwestern Forested Mountains, Marine West Coast Forest; lichens	1–9	#	Lichen community change

reliable, # fairly reliable, (#) expert judgment

Land Use: A larger fraction of the forested landscape in Europe is heavily managed (harvested and planted) relative to the U.S. High rates of harvest removals of N in biomass, creating greater N demand and storage during re-establishment of the forest stand could contribute to higher critical loads in Europe than the U.S.

Forms and Mode of Measurement of N inputs: NH_4^+ inputs tend to be higher and represent a greater proportion of total N inputs in Europe, particularly in past decades; this is changing in the U.S. Some receptor species can be more sensitive to reduced than to oxidized forms of N inputs, and nitrification of NH_4^+ inputs can accelerate ecosystem acidification relative to inputs of NO_3^-.

Threshold Criteria: Another possible explanation for the higher critical loads is that the response thresholds utilized in Europe are sometimes higher. For example, choosing a threshold of a shift in lichen community composition will produce a much lower critical load than a threshold of near extirpation of lichen species as used in earlier European work (Bobbink et al. 2003). As a second example, choosing a threshold of initial changes in N biogeochemistry in the Colorado Front Range, interpreted as incipient responses of N saturation, led to a critical load <4 kg N $ha^{-1}yr^{-1}$ (Rueth et al. 2003). This is a subtle initial N enrichment response when compared to the magnitude of change (a later stage of N saturation) for the critical loads thresholds in Europe (10–15 kg $ba^{-1}yr^{-1}$). Finally, much of the same research was used to set critical loads for both European and U.S. tundra and taiga ecosystems (Bobbink and Hettelingh 2011; Pardo et al. 2011c). The difference in the critical loads for these ecosystems is primarily due to different threshold criteria.

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LETTER A19

Los Angeles County
Metropolitan Transportation Authority

One Gateway Plaza
Los Angeles, CA 90012-2952

213.922.2000 Tel
metro.net

Metro

April 3, 2017

Craig Chalfant
City of Long Beach
Development Services Department
333 West Ocean Blvd. Long Beach, CA 90803
Los Angeles, CA 90012

RE: Southeast Area Specific Plan- City of Long Beach- Notice of Availability of a Recirculated Draft Draft Environmental Impact Report

Dear Mr. Chalfant:

Thank you for the opportunity to comment on the Notice of Availability of a Recirculated Draft Environmental Impact Report for the proposed Southeast Area Specific Plan (SEASP) located on the Southeast edge of the City of Long Beach. This letter conveys recommendations from the Los Angeles County Metropolitan Transportation Authority (Metro) concerning issues that are germane to our agency's statutory responsibility in relation to our facilities and services that may be affected by the proposed project.

Metro is committed to working with stakeholders across the County to support the development of transit oriented communities (TOCs). TOCs are built by considering transit within a broader community and creating vibrant, compact, walkable, and bikeable places centered around transit stations and hubs with the goal of encouraging the use of transit and other alternatives to driving. Metro looks forward to collaborating with local municipalities, developers, and other stakeholders in their land use planning and development efforts, and to find partnerships that support TOCs across Los Angeles County. A19-1

Project Description

The proposed project would replace the current 1,475-acre PD-1 zoning district with a new Specific Plan covering 1,466 acres and remove nine acres from the PD-1 boundaries to convert to conventional zoning. Land use designations would include: Single Family Residential, Mobile Homes, Multi-Family Residential, Commercial-Neighborhood, Mixed Use Community Core, Mixed Use Marina, Industrial, Public, Coastal, Habitat/Wetlands/Recreation, Open Space/Recreation, Right-of-Way (ROW)/Caltrans, Dedicated ROW (not built), and Channel/Marina/Waterway. Build out of the Specific Plan would allow a total of 9,698 dwelling units, 2,665,052 square feet of commercial/employment uses, and 425 hotel rooms. This would result in a net increase of 5,619 dwelling units, 438,292 sq-ft of commercial/employment uses, and 50 hotel rooms.

Metro Comments

Bus Ops (adjacent bus stop)

Several Metro bus lines operate within SEASP. Metro bus line 577 operates on E 7th St, in the vicinity of to the proposed project area. Although the project is not expected to result in any long-term impacts A19-2

on transit, the developer should be aware of the bus services that are present. Metro recommends that the SEASP include language that informs future development activity within SEASP area of Metro's notification procedures and considerations for projects located in close proximity to a Metro facility that may impact Metro bus operations. Please contact Metro Bus Operations Control Special Events Coordinator at 213-922-4632 regarding construction activities that may Impact Metro bus lines at least 30 days in advance of initiating construction activities. For closures that last more than six months, Metro's Stops and Zones Department will also need to be notified at 213-922-5188, 30 days in advance of initiating construction activities. Other municipal bus operators may also be impacted and should be included in construction outreach efforts. A19-2 Cont'd

If you have any questions regarding this response, please contact Elizabeth Carvajal at 213-922-3084 or by email at DevReview@metro.net. LACMTA looks forward to reviewing the Final EIR. Please send it to the following address:

LACMTA Development Review
One Gateway Plaza MS 99-23-4
Los Angeles, CA 90012-2952

Sincerely,

Elizabeth Carvajal
Senior Manager, Transportation Planner

STATE OF CALIFORNIA
NATIVE AMERICAN HERITAGE COMMISSION
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Edmund G. Brown Jr., Governor

LETTER A20

February 28, 2017

Craig Chalfant
City of Long Beach
333 West Ocean Boulevard
Long Beach, CA 90802

Re: SCH# 2015101075 Southeast Area Specific Plan, Los Angeles County.

Dear Mr. Chalfant:

The Native American Heritage Commission (NAHC) has reviewed the Recirculated Draft Environmental Impact Report prepared for the project referenced above.

The California Environmental Quality Act (CEQA)[1], specifically Public Resources Code section 21084.1, states that a project that may cause a substantial adverse change in the significance of a historical resource is a project that may have a significant effect on the environment.[2] If there is substantial evidence, in light of the whole record before a lead agency, that a project may have a significant effect on the environment, an environmental impact report (EIR) shall be prepared.[3] In order to determine whether a project will cause a substantial adverse change in the significance of a historical resource, a lead agency will need to determine whether there are historical resources with the area of project effect (APE).

CEQA was amended in 2014 by Assembly Bill 52. (AB 52).[4] **AB 52 applies to any project for which a notice of preparation or a notice of negative declaration or mitigated negative declaration is filed on or after July 1, 2015.** AB 52 created a separate category for "tribal cultural resources"[5], that now includes "a project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment.[6] Public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource.[7] Your project may also be subject to **Senate Bill 18 (SB 18)** (Burton, Chapter 905, Statutes of 2004), Government Code 65352.3, if it also involves the adoption of or amendment to a general plan or a specific plan, or the designation or proposed designation of open space. **Both SB 18 and AB 52 have tribal consultation requirements.** Additionally, if your project is also subject to the federal National Environmental Policy Act (42 U.S.C. § 4321 et seq.) (NEPA), the tribal consultation requirements of Section 106 of the National Historic Preservation Act of 1966[8] may also apply. A20-1

Consult your legal counsel about compliance with AB 52 and SB 18 as well as compliance with any other applicable laws.

Agencies should be aware that AB 52 does not preclude agencies from initiating tribal consultation with tribes that are traditionally and culturally affiliated with their jurisdictions before the timeframes provided in AB 52. For that reason, we urge you to continue to request Native American Tribal Consultation Lists and Sacred Lands File searches from the NAHC. The request forms can be found online at: http://nahc.ca.gov/resources/forms/. Additional information regarding AB 52 can be found online at http://nahc.ca.gov/wp-content/uploads/2015/10/AB52TribalConsultation_CalEPAPDF.pdf, entitled "Tribal Consultation Under AB 52: Requirements and Best Practices".

The NAHC recommends lead agencies consult with all California Native American tribes that are traditionally and culturally affiliated with the geographic area of your proposed project as early as possible in order to avoid inadvertent discoveries of Native American human remains and best protect tribal cultural resources.

A brief summary of portions of AB 52 and SB 18 as well as the NAHC's recommendations for conducting cultural resources assessments is also attached.

Please contact me at katy.sanchez@nahc.ca.gov or call (916) 373-3712, if you have any questions.

Sincerely,

Katy Sanchez
Associate Environmental Planner

Attachment
cc: State Clearinghouse

[1] Pub. Resources Code § 21000 et seq.
[2] Pub. Resources Code § 21084.1; Cal. Code Regs., tit.14, § 15064.5 (b); CEQA Guidelines Section 15064.5 (b)
[3] Pub. Resources Code § 21080 (d); Cal. Code Regs., tit. 14, § 15064 subd.(a)(1); CEQA Guidelines § 15064 (a)(1)
[4] Government Code 65352.3
[5] Pub. Resources Code § 21074
[6] Pub. Resources Code § 21084.2
[7] Pub. Resources Code § 21084.3 (a)
[8] 154 U.S.C. 300101, 36 C.F.R. § 800 et seq.

Pertinent Statutory Information:

Under AB 52:
AB 52 has added to CEQA the additional requirements listed below, along with many other requirements:
Within fourteen (14) days of determining that an application for a project is complete or of a decision by a public agency to undertake a project, a **lead agency** shall provide formal notification to a designated contact of, or tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice.
A **lead agency** shall begin the consultation process within 30 days of receiving a request for consultation from a California Native American tribe that is traditionally and culturally affiliated with the geographic area of the proposed project.[9] and **prior to the release of a negative declaration, mitigated negative declaration or environmental impact report**. For purposes of AB 52, "consultation shall have the same meaning as provided in Gov. Code § 65352.4 (SB 18).[10]
The following topics of consultation, if a tribe requests to discuss them, are mandatory topics of consultation:

a. Alternatives to the project.
b. Recommended mitigation measures.
c. Significant effects.[11]

1. The following topics are discretionary topics of consultation:

a. Type of environmental review necessary.
b. Significance of the tribal cultural resources.
c. Significance of the project's impacts on tribal cultural resources.

If necessary, project alternatives or appropriate measures for preservation or mitigation that the tribe may recommend to the lead agency.[12]
With some exceptions, any information, including but not limited to, the location, description, and use of tribal cultural resources submitted by a California Native American tribe during the environmental review process **shall not be included in the environmental document or otherwise disclosed by the lead agency or any other public agency to the public, consistent with Government Code sections 6254 (r) and 6254.10.** Any information submitted by a California Native American tribe during the consultation or environmental review process shall be published in a confidential appendix to the environmental document unless the tribe that provided the information consents, in writing, to the disclosure of some or all of the information to the public.[13]
If a project may have a significant impact on a tribal cultural resource, **the lead agency's environmental document shall discuss** both of the following:

a. Whether the proposed project has a significant impact on an identified tribal cultural resource.
b. Whether feasible alternatives or mitigation measures, including those measures that may be agreed to pursuant to Public Resources Code section 21082.3, subdivision (a), avoid or substantially lessen the impact on the identified tribal cultural resource.[14]

Consultation with a tribe shall be considered concluded when either of the following occurs:

a. The parties agree to measures to mitigate or avoid a significant effect, if a significant effect exists, on a tribal cultural resource; or
b. A party, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached.[15]

Any mitigation measures agreed upon in the consultation conducted pursuant to Public Resources Code section 21080.3.2 **shall be recommended for inclusion in the environmental document and in an adopted mitigation monitoring and reporting program**, if determined to avoid or lessen the impact pursuant to Public Resources Code section 21082.3, subdivision (b), paragraph 2, and shall be fully enforceable.[16]
If mitigation measures recommended by the staff of the lead agency as a result of the consultation process are not included in the environmental document or if there are no agreed upon mitigation measures at the conclusion of consultation, or if consultation does not occur, and if substantial evidence demonstrates that a project will cause a significant effect to a tribal cultural resource, **the lead agency shall consider feasible mitigation** pursuant to Public Resources Code section 21084.3 (b).[17]
An environmental impact report **may not be certified**, nor may a mitigated negative declaration or a negative declaration be adopted unless one of the following occurs:

a. The consultation process between the tribes and the lead agency has occurred as provided in Public Resources Code sections 21080.3.1 and 21080.3.2 and concluded pursuant to Public Resources Code section 21080.3.2.
b. The tribe that requested consultation failed to provide comments to the lead agency or otherwise failed to engage in the consultation process.
c. The lead agency provided notice of the project to the tribe in compliance with Public Resources Code section 21080.3.1 (d) and the tribe failed to request consultation within 30 days.[18]

This process should be documented in the Tribal Cultural Resources section of your environmental document.

Under SB 18:
Government Code § 65352.3 (a) (1) requires consultation with Native Americans on general plan proposals for the purposes of "preserving or mitigating impacts to places, features, and objects described § 5097.9 and § 5091.993 of the Public Resources Code that are located within the city or county's jurisdiction. Government Code § 65560 (a), (b), and (c) provides for consultation with Native American tribes on the open-space element of a county or city general plan for the purposes of protecting places, features, and objects described in Sections 5097.9 and 5097.993 of the Public Resources Code.

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[9] Pub. Resources Code § 21080.3.1, subds. (d) and (e)
[10] Pub. Resources Code § 21080.3.1 (b)
[11] Pub. Resources Code § 21080.3.2 (a)
[12] Pub. Resources Code § 21080.3.2 (a)
[13] Pub. Resources Code § 21082.3 (c)(1)
[14] Pub. Resources Code § 21082.3 (b)
[15] Pub. Resources Code § 21080.3.2 (b)
[16] Pub. Resources Code § 21082.3 (a)
[17] Pub. Resources Code § 21082.3 (e)
[18] Pub. Resources Code § 21082.3 (d)

- SB 18 applies to **local governments** and requires them to contact, provide notice to, refer plans to, and consult with tribes prior to the adoption or amendment of a general plan or a specific plan, or the designation of open space. Local governments should consult the Governor's Office of Planning and Research's "Tribal Consultation Guidelines," which can be found online at: https://www.opr.ca.gov/docs/09_14_05_Updated_Guidelines_922.pdf
- Tribal Consultation: If a local government considers a proposal to adopt or amend a general plan or a specific plan, or to designate open space it is required to contact the appropriate tribes identified by the NAHC by requesting a "Tribal Consultation List." If a tribe, once contacted, requests consultation the local government must consult with the tribe on the plan proposal. **A tribe has 90 days from the date of receipt of notification to request consultation unless a shorter timeframe has been agreed to by the tribe.**[19]
- There is no Statutory Time Limit on Tribal Consultation under the law.
- Confidentiality: Consistent with the guidelines developed and adopted by the Office of Planning and Research,[20] the city or county shall protect the confidentiality of the information concerning the specific identity, location, character, and use of places, features and objects described in Public Resources Code sections 5097.9 and 5097.993 that are within the city's or county's jurisdiction.[21]
- Conclusion Tribal Consultation: Consultation should be concluded at the point in which:
  - The parties to the consultation come to a mutual agreement concerning the appropriate measures for preservation or mitigation; or
  - Either the local government or the tribe, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached concerning the appropriate measures of preservation or mitigation.[22]

NAHC Recommendations for Cultural Resources Assessments:

- Contact the NAHC for:
  - A Sacred Lands File search. Remember that tribes do not always record their sacred sites in the Sacred Lands File, nor are they required to do so. A Sacred Lands File search is not a substitute for consultation with tribes that are traditionally and culturally affiliated with the geographic area of the project's APE.
  - A Native American Tribal Contact List of appropriate tribes for consultation concerning the project site and to assist in planning for avoidance, preservation in place, or, failing both, mitigation measures.
    - The request form can be found at http://nahc.ca.gov/resources/forms/.
- Contact the appropriate regional California Historical Research Information System (CHRIS) Center (http://ohp.parks.ca.gov/?page_id=1068) for an archaeological records search. The records search will determine:
  - If part or the entire APE has been previously surveyed for cultural resources.
  - If any known cultural resources have been already been recorded on or adjacent to the APE.
  - If the probability is low, moderate, or high that cultural resources are located in the APE.
  - If a survey is required to determine whether previously unrecorded cultural resources are present.
- If an archaeological inventory survey is required, the final stage is the preparation of a professional report detailing the findings and recommendations of the records search and field survey.
  - The final report containing site forms, site significance, and mitigation measures should be submitted immediately to the planning department. All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum and not be made available for public disclosure.
  - The final written report should be submitted within 3 months after work has been completed to the appropriate regional CHRIS center.

Examples of Mitigation Measures That May Be Considered to Avoid or Minimize Significant Adverse Impacts to Tribal Cultural Resources:

- Avoidance and preservation of the resources in place, including, but not limited to:
  - Planning and construction to avoid the resources and protect the cultural and natural context.
  - Planning greenspace, parks, or other open space, to incorporate the resources with culturally appropriate protection and management criteria.
- Treating the resource with culturally appropriate dignity, taking into account the tribal cultural values and meaning of the resource, including, but not limited to, the following:
  - Protecting the cultural character and integrity of the resource.
  - Protecting the traditional use of the resource.
  - Protecting the confidentiality of the resource.
- Permanent conservation easements or other interests in real property, with culturally appropriate management criteria for the purposes of preserving or utilizing the resources or places.
- Please note that a federally recognized California Native American tribe or a non-federally recognized California Native American tribe that is on the contact list maintained by the NAHC to protect a California prehistoric, archaeological, cultural, spiritual, or ceremonial place may acquire and hold conservation easements if the conservation easement is voluntarily conveyed.[23]
- Please note that it is the policy of the state that Native American remains and associated grave artifacts shall be repatriated.[24]

The lack of surface evidence of archaeological resources (including tribal cultural resources) does not preclude their subsurface existence.

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[19] (Gov. Code § 65352.3 (a)(2)).
[20] pursuant to Gov. Code section 65040.2,
[21] (Gov. Code § 65352.3 (b)).
[22] (Tribal Consultation Guidelines, Governor's Office of Planning and Research (2005) at p. 18).
[23] (Civ. Code § 815.3 (c)).
[24] (Pub. Resources Code § 5097.991).

- Lead agencies should include in their mitigation and monitoring reporting program plan provisions for the identification and evaluation of inadvertently discovered archaeological resources.[25] In areas of identified archaeological sensitivity, a certified archaeologist and a culturally affiliated Native American with knowledge of cultural resources should monitor all ground-disturbing activities.
- Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the disposition of recovered cultural items that are not burial associated in consultation with culturally affiliated Native Americans.
- Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the treatment and disposition of inadvertently discovered Native American human remains. Health and Safety Code section 7050.5, Public Resources Code section 5097.98, and Cal. Code Regs., tit. 14, section 15064.5, subdivisions (d) and (e) (CEQA Guidelines section 15064.5, subds. (d) and (e)) address the processes to be followed in the event of an inadvertent discovery of any Native American human remains and associated grave goods in a location other than a dedicated cemetery.

[25] per Cal. Code Regs., tit. 14, section 15064.5(f) (CEQA Guidelines section 15064.5(f)).

STATE OF CALIFORNIA

Governor's Office of Planning and Research

State Clearinghouse and Planning Unit

Edmund G. Brown Jr.
Governor

Ken Alex
Director

LETTER A21

April 4, 2017

Craig Chalfant
City of Long Beach
333 W. Ocean Boulevard
Long Beach, CA 92802

Subject: Southeast Area Specific Plan
SCH#: 2015101075

Dear Craig Chalfant:

The State Clearinghouse submitted the above named Draft EIR to selected state agencies for review. On the enclosed Document Details Report please note that the Clearinghouse has listed the state agencies that reviewed your document. The review period closed on April 3, 2017, and the comments from the responding agency (ies) is (are) enclosed. If this comment package is not in order, please notify the State Clearinghouse immediately. Please refer to the project's ten-digit State Clearinghouse number in future correspondence so that we may respond promptly.

Please note that Section 21104(c) of the California Public Resources Code states that:

> "A responsible or other public agency shall only make substantive comments regarding those activities involved in a project which are within an area of expertise of the agency or which are required to be carried out or approved by the agency. Those comments shall be supported by specific documentation."

These comments are forwarded for use in preparing your final environmental document. Should you need more information or clarification of the enclosed comments, we recommend that you contact the commenting agency directly.

This letter acknowledges that you have complied with the State Clearinghouse review requirements for draft environmental documents, pursuant to the California Environmental Quality Act. Please contact the State Clearinghouse at (916) 445-0613 if you have any questions regarding the environmental review process.

Sincerely,

Scott Morgan
Director, State Clearinghouse

Enclosures
cc: Resources Agency

1400 TENTH STREET P.O. BOX 3044 SACRAMENTO, CALIFORNIA 95812-3044
TEL (916) 445-0613 FAX (916) 323-3018 www.opr.ca.gov

Document Details Report
State Clearinghouse Data Base

SCH# 2015101075
Project Title Southeast Area Specific Plan
Lead Agency Long Beach, City of

Type EIR Draft EIR

Description Note: Recirculated

The project consists of a specific plan, general plan amendment, zoning ordinance amendment, and local coastal program amendment to shape the land use and development on 1,481 acres. The project consists of two components: 1) the Southeast Area specific plan covering 1,472 acres and 2) the conventional zoning area covering 9 acres. Both of these areas constitute the project for purposes of CEQA.

Lead Agency Contact

Name Craig Chalfant
Agency City of Long Beach
Phone 562 570 6368 **Fax**
email
Address 333 W. Ocean Boulevard
City Long Beach **State** CA **Zip** 92802

Project Location

County Los Angeles
City Long Beach
Region
Lat / Long 33° 46' 0" N / 118° 6' 45" W
Cross Streets City's southeast area
Parcel No. Various
Township **Range** **Section** Varies **Base**

Proximity to:

Highways SR-1, 22, I-405, 605
Airports Long Beach
Railways No
Waterways Los Cerritos Channel, San Gabriel River, Alamitos Bay
Schools Various
Land Use GPLUD: Current land use designations include single family district, mixed use district institutional and school district and open space and park district.
Z: planned development district, SEADIP

Project Issues

Reviewing Agencies Resources Agency; California Coastal Commission; Department of Fish and Wildlife, Region 5; Department of Parks and Recreation; Department of Water Resources; Resources, Recycling and Recovery; Caltrans, Division of Aeronautics; California Highway Patrol; Caltrans, District 7; Department of Housing and Community Development; State Water Resources Control Board, Division of Drinking Water; Regional Water Quality Control Board, Region 4; Native American Heritage Commission; State Lands Commission; San Gabriel & Lower Los Angeles Rivers & Mountains Conservancy

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Date Received 02/17/2017 **Start of Review** 02/17/2017 **End of Review** 04/03/2017

Note: Blanks in data fields result from insufficient information provided by lead agency.

STATE OF CALIFORNIA
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Edmund G. Brown Jr., Governor

clear
04/03/17 E

February 28, 2017

Governor's Office of Planning & Research
MAR 03 2017
STATE CLEARINGHOUSE

Craig Chalfant
City of Long Beach
333 West Ocean Boulevard
Long Beach, CA 90802

Re: SCH# 2015101075 Southeast Area Specific Plan, Los Angeles County.

Dear Mr. Chalfant:

The Native American Heritage Commission (NAHC) has reviewed the Recirculated Draft Environmental Impact Report prepared for the project referenced above.

The California Environmental Quality Act (CEQA)[1], specifically Public Resources Code section 21084.1, states that a project that may cause a substantial adverse change in the significance of a historical resource is a project that may have a significant effect on the environment.[2] If there is substantial evidence, in light of the whole record before a lead agency, that a project may have a significant effect on the environment, an environmental impact report (EIR) shall be prepared.[3] In order to determine whether a project will cause a substantial adverse change in the significance of a historical resource, a lead agency will need to determine whether there are historical resources with the area of project effect (APE).

CEQA was amended in 2014 by Assembly Bill 52. (AB 52).[4] **AB 52 applies to any project for which a notice of preparation or a notice of negative declaration or mitigated negative declaration is filed on or after July 1, 2015.** AB 52 created a separate category for "tribal cultural resources"[5], that now includes "a project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment.[6] Public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource.[7] Your project may also be subject to **Senate Bill 18 (SB 18)** (Burton, Chapter 905, Statutes of 2004), Government Code 65352.3, if it also involves the adoption of or amendment to a general plan or a specific plan, or the designation or proposed designation of open space. **Both SB 18 and AB 52 have tribal consultation requirements.** Additionally, if your project is also subject to the federal National Environmental Policy Act (42 U.S.C. § 4321 et seq.) (NEPA), the tribal consultation requirements of Section 106 of the National Historic Preservation Act of 1966[8] may also apply.

Consult your legal counsel about compliance with AB 52 and SB 18 as well as compliance with any other applicable laws.

Agencies should be aware that AB 52 does not preclude agencies from initiating tribal consultation with tribes that are traditionally and culturally affiliated with their jurisdictions before the timeframes provided in AB 52. For that reason, we urge you to continue to request Native American Tribal Consultation Lists and Sacred Lands File searches from the NAHC. The request forms can be found online at: http://nahc.ca.gov/resources/forms/. Additional information regarding AB 52 can be found online at http://nahc.ca.gov/wp-content/uploads/2015/10/AB52TribalConsultation_CalEPAPDF.pdf, entitled "Tribal Consultation Under AB 52: Requirements and Best Practices".

The NAHC recommends lead agencies consult with all California Native American tribes that are traditionally and culturally affiliated with the geographic area of your proposed project as early as possible in order to avoid inadvertent discoveries of Native American human remains and best protect tribal cultural resources.

A brief summary of portions of AB 52 and SB 18 as well as the NAHC's recommendations for conducting cultural resources assessments is also attached.

Please contact me at katy.sanchez@nahc.ca.gov or call (916) 373-3712, if you have any questions.

Sincerely,

Katy Sanchez

Katy Sanchez
Associate Environmental Planner

Attachment
cc: State Clearinghouse

[1] Pub. Resources Code § 21000 et seq.
[2] Pub. Resources Code § 21084.1; Cal. Code Regs., tit.14, § 15064.5 (b); CEQA Guidelines Section 15064.5 (b)
[3] Pub. Resources Code § 21080 (d); Cal. Code Regs., tit. 14, § 15064 subd.(a)(1); CEQA Guidelines § 15064 (a)(1)
[4] Government Code 65352.3
[5] Pub. Resources Code § 21074
[6] Pub. Resources Code § 21084.2
[7] Pub. Resources Code § 21084.3 (a)
[8] 154 U.S.C. 300101, 36 C.F.R. § 800 et seq

Pertinent Statutory Information:

Under AB 52:
AB 52 has added to CEQA the additional requirements listed below, along with many other requirements:
Within fourteen (14) days of determining that an application for a project is complete or of a decision by a public agency to undertake a project, a **lead agency** shall provide formal notification to a designated contact of, or tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice.
A **lead agency** shall begin the consultation process within 30 days of receiving a request for consultation from a California Native American tribe that is traditionally and culturally affiliated with the geographic area of the proposed project.[9] and **prior to the release of a negative declaration, mitigated negative declaration or environmental impact report**. For purposes of AB 52, "consultation shall have the same meaning as provided in Gov. Code § 65352.4 (SB 18).[10]
The following topics of consultation, if a tribe requests to discuss them, are mandatory topics of consultation:

a. Alternatives to the project.
b. Recommended mitigation measures.
c. Significant effects.[11]

1. The following topics are discretionary topics of consultation:

a. Type of environmental review necessary.
b. Significance of the tribal cultural resources.
c. Significance of the project's impacts on tribal cultural resources.

If necessary, project alternatives or appropriate measures for preservation or mitigation that the tribe may recommend to the lead agency.[12]
With some exceptions, any information, including but not limited to, the location, description, and use of tribal cultural resources submitted by a California Native American tribe during the environmental review process **shall not be included in the environmental document or otherwise disclosed by the lead agency or any other public agency to the public, consistent with Government Code sections 6254 (r) and 6254.10.** Any information submitted by a California Native American tribe during the consultation or environmental review process shall be published in a confidential appendix to the environmental document unless the tribe that provided the information consents, in writing, to the disclosure of some or all of the information to the public.[13]
If a project may have a significant impact on a tribal cultural resource, **the lead agency's environmental document shall discuss** both of the following:

a. Whether the proposed project has a significant impact on an identified tribal cultural resource.
b. Whether feasible alternatives or mitigation measures, including those measures that may be agreed to pursuant to Public Resources Code section 21082.3, subdivision (a), avoid or substantially lessen the impact on the identified tribal cultural resource.[14]

Consultation with a tribe shall be considered concluded when either of the following occurs:

a. The parties agree to measures to mitigate or avoid a significant effect, if a significant effect exists, on a tribal cultural resource; or
b. A party, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached.[15]

Any mitigation measures agreed upon in the consultation conducted pursuant to Public Resources Code section 21080.3.2 **shall be recommended for inclusion in the environmental document and in an adopted mitigation monitoring and reporting program**, if determined to avoid or lessen the impact pursuant to Public Resources Code section 21082.3, subdivision (b), paragraph 2, and shall be fully enforceable.[16]
If mitigation measures recommended by the staff of the lead agency as a result of the consultation process are not included in the environmental document or if there are no agreed upon mitigation measures at the conclusion of consultation, or if consultation does not occur, and if substantial evidence demonstrates that a project will cause a significant effect to a tribal cultural resource, **the lead agency shall consider feasible mitigation** pursuant to Public Resources Code section 21084.3 (b).[17]
An environmental impact report **may not be certified**, nor may a mitigated negative declaration or a negative declaration be adopted unless one of the following occurs:

a. The consultation process between the tribes and the lead agency has occurred as provided in Public Resources Code sections 21080.3.1 and 21080.3.2 and concluded pursuant to Public Resources Code section 21080.3.2.
b. The tribe that requested consultation failed to provide comments to the lead agency or otherwise failed to engage in the consultation process.
c. The lead agency provided notice of the project to the tribe in compliance with Public Resources Code section 21080.3.1 (d) and the tribe failed to request consultation within 30 days.[18]

This process should be documented in the Tribal Cultural Resources section of your environmental document.

Under SB 18:
Government Code § 65352.3 (a) (1) requires consultation with Native Americans on general plan proposals for the purposes of "preserving or mitigating impacts to places, features, and objects described § 5097.9 and § 5091.993 of the Public Resources Code that are located within the city or county's jurisdiction. Government Code § 65560 (a), (b), and (c) provides for consultation with Native American tribes on the open-space element of a county or city general plan for the purposes of protecting places, features, and objects described in Sections 5097.9 and 5097.993 of the Public Resources Code.

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[9] Pub. Resources Code § 21080.3.1, subds. (d) and (e)
[10] Pub. Resources Code § 21080.3.1 (b)
[11] Pub. Resources Code § 21080.3.2 (a)
[12] Pub. Resources Code § 21080.3.2 (a)
[13] Pub. Resources Code § 21082.3 (c)(1)
[14] Pub. Resources Code § 21082.3 (b)
[15] Pub. Resources Code § 21080.3.2 (b)
[16] Pub. Resources Code § 21082.3 (a)
[17] Pub. Resources Code § 21082.3 (e)
[18] Pub. Resources Code § 21082.3 (d)

- SB 18 applies to **local governments** and requires them to contact, provide notice to, refer plans to, and consult with tribes prior to the adoption or amendment of a general plan or a specific plan, or the designation of open space. Local governments should consult the Governor's Office of Planning and Research's "Tribal Consultation Guidelines," which can be found online at: https://www.opr.ca.gov/docs/09_14_05_Updated_Guidelines_922.pdf
- Tribal Consultation: If a local government considers a proposal to adopt or amend a general plan or a specific plan, or to designate open space it is required to contact the appropriate tribes identified by the NAHC by requesting a "Tribal Consultation List." If a tribe, once contacted, requests consultation the local government must consult with the tribe on the plan proposal. **A tribe has 90 days from the date of receipt of notification to request consultation unless a shorter timeframe has been agreed to by the tribe.**[19]
- There is no Statutory Time Limit on Tribal Consultation under the law.
- Confidentiality: Consistent with the guidelines developed and adopted by the Office of Planning and Research,[20] the city or county shall protect the confidentiality of the information concerning the specific identity, location, character, and use of places, features and objects described in Public Resources Code sections 5097.9 and 5097.993 that are within the city's or county's jurisdiction.[21]
- Conclusion Tribal Consultation: Consultation should be concluded at the point in which:
  - The parties to the consultation come to a mutual agreement concerning the appropriate measures for preservation or mitigation; or
  - Either the local government or the tribe, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached concerning the appropriate measures of preservation or mitigation.[22]

NAHC Recommendations for Cultural Resources Assessments:

- Contact the NAHC for:
  - A Sacred Lands File search. Remember that tribes do not always record their sacred sites in the Sacred Lands File, nor are they required to do so. A Sacred Lands File search is not a substitute for consultation with tribes that are traditionally and culturally affiliated with the geographic area of the project's APE.
  - A Native American Tribal Contact List of appropriate tribes for consultation concerning the project site and to assist in planning for avoidance, preservation in place, or, failing both, mitigation measures.
    - The request form can be found at http://nahc.ca.gov/resources/forms/.
- Contact the appropriate regional California Historical Research Information System (CHRIS) Center (http://ohp.parks.ca.gov/?page_id=1068) for an archaeological records search. The records search will determine:
  - If part or the entire APE has been previously surveyed for cultural resources.
  - If any known cultural resources have been already been recorded on or adjacent to the APE.
  - If the probability is low, moderate, or high that cultural resources are located in the APE.
  - If a survey is required to determine whether previously unrecorded cultural resources are present.
- If an archaeological inventory survey is required, the final stage is the preparation of a professional report detailing the findings and recommendations of the records search and field survey.
  - The final report containing site forms, site significance, and mitigation measures should be submitted immediately to the planning department. All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum and not be made available for public disclosure.
  - The final written report should be submitted within 3 months after work has been completed to the appropriate regional CHRIS center.

Examples of Mitigation Measures That May Be Considered to Avoid or Minimize Significant Adverse Impacts to Tribal Cultural Resources:

- Avoidance and preservation of the resources in place, including, but not limited to:
  - Planning and construction to avoid the resources and protect the cultural and natural context.
  - Planning greenspace, parks, or other open space, to incorporate the resources with culturally appropriate protection and management criteria.
- Treating the resource with culturally appropriate dignity, taking into account the tribal cultural values and meaning of the resource, including, but not limited to, the following:
  - Protecting the cultural character and integrity of the resource.
  - Protecting the traditional use of the resource.
  - Protecting the confidentiality of the resource.
- Permanent conservation easements or other interests in real property, with culturally appropriate management criteria for the purposes of preserving or utilizing the resources or places.
- Please note that a federally recognized California Native American tribe or a non-federally recognized California Native American tribe that is on the contact list maintained by the NAHC to protect a California prehistoric, archaeological, cultural, spiritual, or ceremonial place may acquire and hold conservation easements if the conservation easement is voluntarily conveyed.[23]
- Please note that it is the policy of the state that Native American remains and associated grave artifacts shall be repatriated.[24]

The lack of surface evidence of archaeological resources (including tribal cultural resources) does not preclude their subsurface existence.

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[19] (Gov. Code § 65352.3 (a)(2)).
[20] pursuant to Gov. Code section 65040.2,
[21] (Gov. Code § 65352.3 (b)).
[22] (Tribal Consultation Guidelines, Governor's Office of Planning and Research (2005) at p. 18).
[23] (Civ. Code § 815.3 (c)).
[24] (Pub. Resources Code § 5097.991).

- Lead agencies should include in their mitigation and monitoring reporting program plan provisions for the identification and evaluation of inadvertently discovered archaeological resources.[25] In areas of identified archaeological sensitivity, a certified archaeologist and a culturally affiliated Native American with knowledge of cultural resources should monitor all ground-disturbing activities.
- Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the disposition of recovered cultural items that are not burial associated in consultation with culturally affiliated Native Americans.
- Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the treatment and disposition of inadvertently discovered Native American human remains. Health and Safety Code section 7050.5, Public Resources Code section 5097.98, and Cal. Code Regs., tit. 14, section 15064.5, subdivisions (d) and (e) (CEQA Guidelines section 15064.5, subds. (d) and (e)) address the processes to be followed in the event of an inadvertent discovery of any Native American human remains and associated grave goods in a location other than a dedicated cemetery.

[25] per Cal. Code Regs., tit. 14, section 15064.5(f) (CEQA Guidelines section 15064.5(f)).

STATE OF CALIFORNIA

Governor's Office of Planning and Research

State Clearinghouse and Planning Unit

Edmund G. Brown Jr.
Governor

Ken Alex
Director

April 7, 2017

Craig Chalfant
City of Long Beach
333 W. Ocean Boulevard
Long Beach, CA 92802

Subject: Southeast Area Specific Plan
SCH#: 2015101075

Dear Craig Chalfant:

The enclosed comment (s) on your Draft EIR was (were) received by the State Clearinghouse after the end of the state review period, which closed on April 3, 2017. We are forwarding these comments to you because they provide information or raise issues that should be addressed in your final environmental document.

The California Environmental Quality Act does not require Lead Agencies to respond to late comments. However, we encourage you to incorporate these additional comments into your final environmental document and to consider them prior to taking final action on the proposed project.

Please contact the State Clearinghouse at (916) 445-0613 if you have any questions concerning the environmental review process. If you have a question regarding the above-named project, please refer to the ten-digit State Clearinghouse number (2015101075) when contacting this office.

Sincerely,

Scott Morgan
Director, State Clearinghouse

Enclosures
cc: Resources Agency

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APR 05 2017
STATE CLEARINGHOUSE

April 5, 2017

Mr. Craig Chalfant
City of Long Beach
333 West Ocean Boulevard
Long Beach, CA 90802

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RE: Southeast Area Specific Plan
SCH # 2015101075
GTS # LA-2016-00654AL-DEIR
Vic. LA-01, LA-22, LA-405, LA-605

Dear Mr. Chalfant:

Thank you for including the California Department of Transportation (Caltrans) in the environmental review process for the above referenced project. The Project consists of a Specific Plan, General Plan Amendment, Zoning Ordinance amendment, and Local Coastal Program (LCP) amendment to shape the land use and development on 1,481 acres.

As a reminder, Senate Bill 743 (2013) mandated that CEQA review of transportation impacts of proposed development be modified by eliminating consideration of delay- and capacity- based metrics such as level of service (LOS) and instead focusing analysis on another metric of impact. The Governor's Office of Planning and Research (OPR) is currently updating its CEQA Guidelines to implement SB 743 (https://www.opr.ca.gov/s_sb743.php) and is proposing that vehicle miles traveled be the primary metric used in identifying transportation impacts.

Caltrans is aware of challenges that the region faces in identifying viable solutions to alleviating congestion on State and Local facilities. With limited room to expand vehicular capacity, this development should incorporate multi-modal and complete streets transportation elements that will actively promote alternatives to car use and better manage existing parking assets. Prioritizing and allocating space to efficient modes of travel such as bicycling and public transit can allow streets to transport more people in a fixed amount of right-of-way.

Caltrans supports the implementation of complete streets and pedestrian safety measures such as road diets and other traffic calming measures. Please note the Federal Highway Administration (FHWA) recognizes the road diet treatment as a proven safety countermeasure, and the cost of a road diet can be significantly reduced if implemented in tandem with routine street resurfacing.

The City should refer the project's traffic consultant to OPR's website, guidelines on evaluating transportation impacts in CEQA if VMT methodology is used for specific project:

https://www.opr.ca.gov/docs/Revised_VMT_CEQA_Guidelines_Proposal_January_20_2016.pdf

The project will generate a net 30,568 daily trips and 1,748/2,459 AM/PM peak hour trips. When the Specific Plan and cumulated projects are built, significant cumulative impacts would occur. As a reminder, the decision makers should be aware of this issue and be prepared to mitigate cumulative traffic impacts in the future.

Please verify the result produced on the Table 5.16-14 Ramp Queues, Existing with Project and Table 5.16-15 Ramps Queues, Cumulative (2035), With and Without Project from the DEIR (Page 5.16-52 and 5.16-53). The tables referenced to source: Fehr & Peers 2017a. Please provide this source for our review. We would like to remind you that an off-ramp queuing analysis should be conducted utilizing the Highway Capacity Manual (HCM). The capacity of the off-ramp should be calculated by the actual length of the off-ramp between the terminuses to the gore point with some safety factor (85% of total queue length as general practice) or other methods approved in advance by Caltrans. The existing queue length should be calculated from the traffic counts and the percent of truck assignments with an adequate passenger car equivalent factor. The analyzed result may need to be calibrated with actual signal timing when available.

Many of the freeway segments including I-405, I-605, SR-22, and State facilities (including Pacific Coast Highway) will operate at an unacceptable level and the project adds traffic to these facilities. As such, there are project-level impacts and cumulative impacts to the State facilities. Caltrans does agree that those impacts are significant, however, Caltrans does not consider these impacts to be unavoidable.

Potential improvements/mitigations that you may want to explore include restriping, lane re-configuration, signal upgrades, signal timing adjustments, additional deceleration/acceleration lane, interchange improvements, off-ramp expansion, freeway widening, downsizing the Specific Plan or density, and etc. When an impact is identified, those improvements could be implemented through fair share contribution. Caltrans understands that funds for larger capital improvements may be difficult to obtain. It will be both agency's responsibility to plan and to seek funding for larger projects.

The City may accept fair share funding contributions towards future improvements of the State facilities so long as we can show that such improvements are reasonably expected to be implemented in a reasonable time frame. Please contact Caltrans to explore and develop these reasonable measures and plan.

We recommend that the City consider incorporating the following new policies to the Southeast Area Specific Plan.

- The City will involve Caltrans in the new/revision and update of the existing Transportation Impact Fee program that would include the State transportation systems and facilities.
- The City will work with Caltrans to identify cumulative traffic impact locations on State facilities and traffic improvements to alleviate traffic congestion within the Specific Plan area.

- The City will work with neighboring Cities to address cumulative significant traffic impact on I-405, I-605, SR-01, and SR-22.

- The City will work with Caltrans to evaluate access management needs and strategies to better manage traffic operations on arterial streets located within close proximity of freeway on/off-ramps in an effort to reduce traffic backups and frictions at Caltrans transportation systems.

Caltrans encourages the City to work with neighboring developing cities to resolve any cumulative significant traffic impacts on the State facilities from other cities' development. For a mutual collaboration, Caltrans would like to work with the City to determine potential traffic concerned locations with feasible improvement list in the near future.

Please be reminded that any work performed within the State Right-of-way will require an Encroachment Permit from Caltrans if the restoration is at State Right-of-way. Any modifications to State facilities must meet all mandatory design standard and specifications.

Storm water run-off is a sensitive issue for Los Angeles and Ventura counties. Please be mindful that projects should be designed to discharge clean run-off water. Additionally, discharge of storm water run-off is not permitted onto State highway facility (SR-01) without any storm water management plan.

Transportation of heavy construction equipment and/or materials, which requires the use of oversized-transport vehicles on State highways, will require a transportation permit from Caltrans when transporting disposed materials. It is recommended that large size truck trips be limited to off-peak commute periods.

In addition, a truck/traffic construction management plan may be needed for any project when high volume of construction vehicles are working on/near by the State facility such as SR-01. Traffic Management Plans involving lane closures or street detours, which may impact the circulation system affecting traffic to and from freeway on/off-ramps should be coordinated with Caltrans.

If you have any questions, please feel free to contact Mr. Alan Lin the project coordinator at (213) 897-8391 and refer to GTS # LA-2016-00654AL-DEIR.

Sincerely,

DIANNA WATSON
IGR/CEQA Branch Chief

cc: Scott Morgan, State Clearinghouse