Nov 17, 2010

EIS comments from Richard Pauli Seattle November, 2010

I-123-001

Summary Conclusion:

This 2nd draft EIS statement is not properly derived from any baseline definition of our dynamically changing environment.
The final EIS should address environment change, the rate of change, the risk to considering the climate models and the timeline of change plotted against the lifetime of the project.

The entire Bored Tunnel project is at risk of being terribly embarrassed by missing science.
The Bored Tunnel EIS draft failed to define existing conditions for the environment. A crucial missing element. Also missing is:

- current reference to recent climate change research - 2007 IPCC is outdated.
- current references to recent science on projected sea level rise to the year 2100.
- citations to current science - such as the UW Climate Impacts group
- no statement of the duration of the life of the tunnel (100 or 200 years?)

Totally missing from this EIS is any statement of how the environment will impact the project.

========== ==========

I am shocked and dismayed to see crucial considerations missing from the EIS statement for the Bored Tunnel. This EIS is unsatisfactory from the start. To start my concerns are over the very definition of environment seems to be missing from the document. Our regional environment is no longer as stable as it once was.

Significant changes in environment now and to come will further redefine the existing conditions that make up the current environment to such a high degree that environment can only be defined dynamically. Your process questions as posed by the WAC 197-11-96 Environmental checklist and other documents all incorrectly presume the environment is not changing. And the predicted effects are falsely predicated on a stable environment.

The first two sentences of your EIS release to the Web page states:

Environmental analysis is conducted and Environmental Impact Statements (EIS) are published in accordance with the National and State Environmental Policy Acts (NEPA and SEPA), so the public and decision-makers have sufficient information to make an

I-123-001

Regarding the comments related to adequate NEPA analysis, WSDOT concurs that vulnerability due to climate change is an important consideration during the NEPA process. WSDOT has developed project-level guidance which was issued in 2009 and revised in October 2010. WSDOT's internal guidance which is posted online at: http://www.wsdot.wa.gov/Environment/Air/Energy.htm.

Our staff actively participates in state and federal working groups to stay current with emerging issues. As a result, WSDOT's guidance document represents the current state of the practice, which is subject to frequent changes as new tools, legislation, and scientific understanding evolve. WSDOT is committed to answering questions about greenhouse gas emissions and climate impacts of our proposed projects as part of our compliance with the NEPA and SEPA. At the project-level, our work focuses on two main topics:

- Evaluating emissions related to our proposed projects, and
- Assessing the projects' vulnerability to changes in climate forecasted for the Pacific Northwest.

The Final EIS contains updated information on climate change projections for the region and how they were considered.

As the commenter recommended, WSDOT relies on information provided by Climate Impacts Group at the University of Washington. In addition to our project-level analysis, WSDOT is working with other state agencies to develop the state's climate response strategy. See details online at: http://www.ecy.wa.gov/climatechange/adaptation.htm.

The project design staff has considered available climate change information and has updated the analysis in the Final EIS.

I-123-001

informed decision about a project. This is a methodical process with technical experts conducting analysis and preparing reports, which includes extensive review cycles to ensure thorough and accurate analysis. http://www.wsdot.wa.gov/Projects/Viaduct/eis.htm

In the Second Supplemental Draft EIS we see a comprehensive outward facing impact statement based on information that was known to you at the time the document was authored. However, you fail to consider of the significantly powerful and dangerous changing climate. **Missing from your EIS is any consideration of the changing regional environment; missing is any discussion of an extensive review calendar which would reflect not only the changes but the changing rate of change and missing is a commonly known timeline of predictable change expected in the next two decades and beyond. Our environment today differs from that of 3 years ago, and our environment will differ even more in the future. The changes are open ended and not at all stable, and are not at all regarded in this EIS draft.**

Some of the currently measured , scientifically predicted and even risky prospective changes to our environment will include sea level changes to Puget Sound, sea water acidification (PH drops), changes to sea life and climate changes that will increasingly include destabilizing weather, temperature and moisture swings.

These are core considerations of environment, which no longer has the stability that it did only 5 and 10 years ago when much of this engineering was begun. A sufficiently responsible EIS would address these issues.

Specifically, climate change and destabilization has already struck the area with anomalous weather events such as extreme rainfall, heat waves and storms.

========== California considerations ==========

Climate change is starting to come into general EIS language in California (2006, California passed into law the California Global Warming Solutions Act of 2006 (commonly referred to as AB-32)) see http://www.awma.org/files/CCIC/0509.pdf pp 10

> Since an analysis of the no-project baseline is required in many EIRs/EISs, one must consider the possibility that the future will be affected by climate change. Examples of expected changes due to the global warming include:
>
> 1. Change in water availability and quality.
> 2. Increase in the frequency and severity of extreme weather events such as storms, heat waves,
> and flooding.
> 3. Changes in cloud cover and rainfall patterns.
> 4. Increases frequency and severity of ozone exceedances due in part to changes in photochemistry.
> 5. Sea level rise.

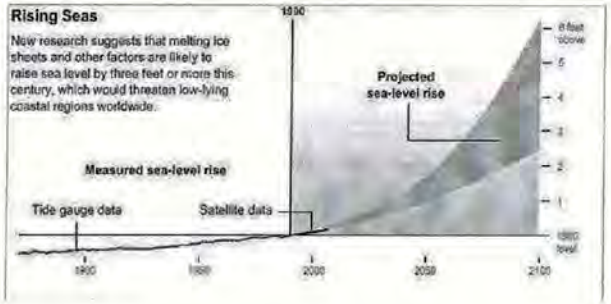
I-123-001

6. Increased intrusion of seawater into estuaries due to sea level rise.
7. -snip – Many, many other effects.....

For projects that don't affect climate change but are affected by climate change the "fair argument" criterion is subtler. Clearly, any effect of climate change specifically mentioned in AB-32 such as rises in sea level and changes in snow pack should be addressed, but it is not yet clear to what extent climate change impacts not mentioned in AB-32 should be dealt with. It is expected that California agencies will canonize likely consequences of climate change that fall under its purview. For example, it is expected that the California Department of Water Resources (DWR) will formalize a list of foreseeable water quality issues associated with varying degrees of climate change.

=======Sea Level Rise projections ==========

"For example, the record-breaking "once in one thousand years" rains that drove the recent Nashville flood is part of the long-term trend of increasing heavy precipitation events in the Southeastern United States that has been fully documented and firmly attributed to climate change. " http://climatesignals.org/



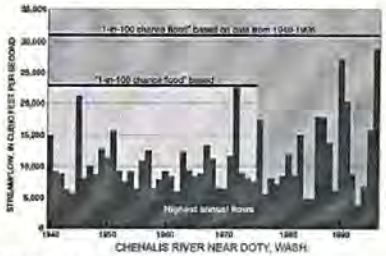
Streamflow data that have been collected since 1975 on the Chehalis River near Doty indicate that the estimated streamflow of **"1-in-100 chance flood" is higher than it was 20 years ago.**

The earlier flood designation was accurate on the basis of the data that were available at the time; more large floods happened after 1975 than from 1940-1975.

The change in the flood designation after 20 years of additional data collection highlights the importance of continued river monitoring.

I-123-001

Annual peak flow data for 1995 and 1996 are provisional and may change.



http://pubs.usgs.gov/fs/FS-229-96/
http://pubs.usgs.gov/fs/FS-229-96/pdf/FS_229-96.pdf
======

Unlike any other time in recorded history, we are in the early phases of devastatingly disruptive environmental change. This is well known and clearly outlined in both International IPCC documents and in US govt regional reports from Global Change.gov. The key phrase of which is: **Historical weather patterns are no longer a reliable predictor of the future.**

An EIS that fails to account for a changing environment, fails to deliver on its core mandate.

> "The discipline reports present the detailed technical analyses of **existing conditions and predicted effects** of the Bored Tunnel Alternative."

Instead it should have a best-effort statement of the current science concerning the rate of climate change. This should cover the expected duration of construction and for the life of the projects. Or it should provide a clear statement that the tunnel is immune to any expected climate change and ocean changes that affect the environment. A statement of risk for the increasing rate change must include the range of possible sea level rise now extending beyond 1 meter (50 inches) by the year 2100. Some respected academic studies predict 27 feet.

> In a new study "Does the Agulhas Current amplify global temperatures during super-interglacials?" (Turney & Jones 2010), the authors use 263 estimates from ocean sediments and ice to reconstruct temperatures around the globe during the last interglacial. Globally, the world was around 1.9°C warmer than pre-industrial temperatures. In polar regions, temperatures were more than 5°C warmer while tropical warming was not so pronounced (similar to warming patterns today). Global warming of 1.9°C is roughly the amount of warming expected in the more optimistic IPCC emission scenarios (to put this in perspective, we're currently tracking above the most pessimistic

I-123-001

scenario). So the last interglacial gives us an empirical window into what our best-case future will look like.

During the last interglacial, sea levels were 6.6 to 9.4 metres higher than current sea levels. Large parts of the Antarctic and Greenland ice sheets melted, with the southern part of Greenland having little or no ice. When we look at accelerating ice loss from the Greenland and Antarctica and wonder about its future trajectory, the past gives the answer. Metres of sea level rise.

There's a degree of uncertainty over the time frames involved. But several peer-reviewed studies, using independent methods, indicate we'll experience roughly 80cm to 2 metres sea level within this century (Pfeffer 2008, Vermeer 2009). The driving question from this study remains: can 6 to 9 metres sea level rise be considered safe?
http://skepticalscience.com/What-constitutes-safe-global-warming.html

And recent runs of climate models suggest that projections to the year 2100 have potential to occur by the year 2050. These are all climate model event risks, the time-line risks and the climate models are not statements of certainty, but since they are products of climate science the risk they describe needs to be addressed in an EIS statement. And as prescribed in the mission statement for the Tunnel EIS this should provide for a review cycle that stays current with climate science and updates the latest climate change projections for a dynamic revision of the EIS document.

How can you have an EIS statement that is locked onto any one point in time to define the environment?

Describing a Regionally Changing environment:

In this region, the 100 year floods are "so common in the US that the term has begun to lose it's meaning" Environmental Science and Technology by Manahan. And the 500 year flood is not uncommon in other parts of the US. I see no mention of this in the EIS. How will the project be protected from extreme flooding? Last winter, Seattle had 13 inches of rain in 2 days. This increases risk of flooding. The bored tunnel is essentially two large open holes to a road running below sea level - all this situated at the bottom of a large hill In a heavy rain, the simple act of clogged drains uphill could easily cause horrible flooding down hill.

How can we proceed to design this without a stable understanding of our environment or a more full understanding of our unstable environment?

If the EIS is not the proper place to address this issue, what is?

If the engineering is sufficient to meet all these environmental concerns - then where is that shared?

I-123-001

I refer you to the US Govt document on regional climate changehttp://www.globalchange.gov/. Current as of 2009 http://www.globalchange.gov/publications/reports/scientific-assessments/us-impacts/regional-climate-change-impacts/northwest

* Declining springtime snowpack leads to reduced summer streamflows, straining water supplies.
* Increased insect outbreaks, wildfires, and changing species composition in forests will pose challenges for ecosystems and the forest products industry.
* Salmon and other coldwater species will experience additional stresses as a result of rising water temperatures and declining summer streamflows.
* Sea-level rise along vulnerable coastlines will result in increased erosion and the loss of land. Climate change is expected to exacerbate many of the stresses and hazards currently facing the coastal zone. Sea-level rise will increase erosion of the coast and cause the loss of beaches and significant coastal land areas. Among the most vulnerable parts of the coast is the heavily populated south Puget Sounds region, which includes the cities of Olympia, Tacoma, and Seattle, Washington.
http://www.globalchange.gov/images/cir/pdf/northwest.pdf

from p 137 of the regional impact climate assessment document:
Among the most vulnerable parts of the coast is the heavily populated south Puget Sound region, which includes the cities of Olympia, Tacoma, and Seattle, Washington. Some climate models project changes in atmospheric pressure patterns that suggest a more southwesterly direction of future winter winds.
Combined with higher sea levels, this would accelerate coastal erosion all along the Pacific Coast.
Sea-level rise in the Northwest (as elsewhere) is determined by global rates of sea-level rise, changes in coastal elevation associated with local vertical movement of the land, and atmospheric circulation patterns that influence winddriven "pile-up" of water along the coast. **A mid-range estimate of relative sea-level rise for the Puget Sound basin is about 13 inches by 2100. However, higher levels of up to 50 inches by 2100 in more rapidly subsiding (sinking) portions of the basin are also possible given the large uncertainties about accelerating rates of ice melt from Greenland and Antarctica in recent years (see Global and National Climate Change sections).**

An additional concern is landslides on coastal bluffs. **The projected heavier winter rainfall suggests an increase in saturated soils and, therefore, an increased number of landslides. Increased frequency and/or severity of landslides is expected to be especially problematic in areas where there has been intensive development on unstable slopes. Within Puget Sound, the cycle of beach erosion and bluff landslides will be exacerbated by sea-level rise, increasing beach erosion, and decreasing slope stability.**
http://www.globalchange.gov/publications/reports/scientific-assessments/us-impacts/climate-change-impacts-by-sector/transportatoin

I-123-001

Historical weather patterns are no longer a reliable predictor of the future.

Sea-level rise and storm surge will **increase the risk of major coastal impacts, including both temporary and permanent flooding of airports, roads, rail lines, and tunnels.**
Flooding from increasingly intense downpours will increase the risk of disruptions and delays in air, rail, and road transportation, and damage from mudslides in some areas.
The increase in **extreme heat will limit some transportation operations and cause pavement and track damage.** Decreased extreme cold will provide some benefits such as reduced snow and ice removal costs.
Increased intensity of strong hurricanes would lead to more evacuations, infrastructure damage and failure, and transportation interruptions.

Extreme heat can cause deformities in rail tracks, at minimum resulting in speed restrictions and, at worst, causing derailments. **Air temperatures above 100°F can lead to equipment failure (see maps page 90). Extreme heat also causes thermal expansion of bridge joints, adversely affecting bridge operations and increasing maintenance costs. Vehicle overheating and tire deterioration are additional concerns.** Higher temperatures will also increase refrigeration needs for goods during transport, particularly in the South, raising transportation costs.

Increases in very hot days and heat waves are expected to limit construction activities due to health and safety concerns for highway workers. Guidance from the U.S. Occupational Safety and Health Administration states that concern for heat stress for moderate to heavy work begins at about 80°F as measured by an index that combines temperature, wind, humidity, and direct sunlight.

Perhaps the design and engineering addresses concerns over climate change - but since these are so large, constantly changing and will affect the project so extensively, this should be addressed in the EIS document.

How do you evaluate climate change? Should that be in the EIS?
Insured losses from catastrophes? Since insurance is not longer regarding extreme weather events from climate change as unforeseeable events, how will you protect against loss?
? Insurance is only willing to cover unforeseen risks - do you know what level is climate events regarded as foreseeable risk?
When there are foreseen disruptive weather events, how do you expect insurance to cover the project?

http://www.globalchange.gov/publications/reports/scientific-assessments/us-impacts/climate-change-impacts-by-sector/society

City residents and city infrastructure have unique vulnerabilities to climate change.
Climate change affects communities through changes in climate-sensitive resources

I-123-001

that occur both locally and at great distances.
Insurance is one of the industries particularly vulnerable to increasing extreme weather events such as severe storms, but it can also help society manage the risks.

If there are societal impacts that are triggered by changing environment, should these be addressed in an EIS statement? Or specified and then excluded?

City residents and city infrastructure have unique vulnerabilities to climate change. Over 80 percent of the U.S. population resides in urban areas, which are among the most rapidly changing environments on Earth. In recent decades, cities have become increasingly spread out, complex, and interconnected with regional and national economies and infrastructure.319 Cities also experience a host of social problems, including neighborhood degradation, traffic congestion, crime, unemployment, poverty, and inequities in health and well-being.320 **Climate-related changes such as increased heat, water shortages, and extreme weather events will add further stress to existing problems. The impacts of climate change on cities are compounded by aging infrastructure, buildings, and populations, as well as air pollution and population growth. Further, infrastructure designed to handle past variations in climate can instill a false confidence in its ability to handle future changes**. However, urban areas also present opportunities for adaptation through technology, infrastructure, planning, and design.

More frequent heavy downpours and floods in urban areas will cause greater property damage, a heavier burden on emergency management, increased clean-up and rebuilding costs, and a growing financial toll on businesses and homeowners. The Midwest floods of 2008 provide a recent vivid example of such tolls. **Heavy downpours and urban floods can also overwhelm combined sewer and storm-water systems and release pollutants to waterways.313 Unfortunately, for many cities, current planning and existing infrastructure are designed for the historical one-in-100 year event, whereas cities are likely to experience this same flood level much more frequently as a result of the climate change projected over this century.**

Cities are also likely to be affected by climate change in unforeseen ways, necessitating diversion of city funds for emergency responses to extreme weather.313 There is the potential for increased summer electricity blackouts owing to greater demand for air conditioning.325 For example, there were widespread power outages in Chicago during the 1995 heat wave and in some parts of New York City during the 1999 heat wave. In southern California's cities, additional summer electricity demand will intensify conflicts between hydropower and flood-control objectives.164 Increased costs of repairs and maintenance are projected for transportation systems, including roads, railways, and airports, as they are negatively affected by heavy downpours and extreme heat190 (see Transportation sector). Coping with increased flooding will require replacement or improvements in storm drains, flood channels,

I-123-001 levees, and dams.
from http://www.globalchange.gov/publications/reports/scientific-assessments/us-impacts/regional-climate-change-impacts/northwest

Does the Bored Tunnel project call upon scientific studies of any sort? Can you accept the US Govt regional document on climate change?

I-123-002 *If electricity shortage triggers brown outs - shouldn't this be considered in the plan?*

I-123-003 **Everyone who has studied Washington State history knows the story of the most famous bridge failure- nicknamed Galloping Gerty. A marvelous piece of engineering collapsed due to unforeseen and until then unrealized harmonic stresses that caused the breakup.**

The bored tunnel has the benefit of foreknowledge and forwarding of destabilising and potentially catastrophic events that represent real risk.; You do not want the bored tunnel to take on the moniker of the Underground Galloping Gerty. Potential failures made worse by the fact that there now are more than ample warnings for this situation.

I-123-004 *Has the bored tunnel engineering considered known climate risk? What climate model will you be using in your engineering design?*

What is the lifetime of the tunnel? What is the latest projected sea level rise and where does this intersect with the tunnel usage date range?

Does the Army Corp adopt and accept the gov regional climate change documents? What does the Corp say about global warming?

Conclusion

This 2nd draft EIS statement is not properly derived from any baseline definition of our dynamically changing environment.
The final EIS should address environment change, the rate of change, the risk to considering the climate models and the timeline of change plotted against the lifetime of the project.

Thank you for addressing the specific questions in this document.

Links and references provided on request

I hope that the final draft and final filing of the EIS statement will address these issues.

Thanks

Richard Parks

Nov. 17, 2010

I-123-002

The Final EIS Appendix K, Public Services and Utilities, discusses the potential effect of disruption to electrical service.

I-123-003

The preferred Bored Tunnel Alternative is a safe alternative. Generally, structural engineers agree that tunnels are one of the safest places to be during an earthquake because the tunnel moves with the earth. No Seattle tunnels were damaged during the 2001 Nisqually earthquake, including the Mt. Baker and Mercer Island I-90 tunnels, Battery Street Tunnel, Third Avenue Bus Tunnel, and Burlington Northern Tunnel. The bored tunnel would be built to current seismic standards, which are considerably more stringent than what was in place when the viaduct was built in the early 1950s. The bored tunnel design includes improving relatively soft, liquefiable soils found near the south tunnel portal. Emergency exits would be provided every 650 feet in the tunnel. The engineers also considered the possible threat of tsunamis during the design process.

I-123-004

The lead agencies acknowledge that the effects of climate change may alter the function, sizing, and operation of the facility. Climate projections for the Pacific Northwest are available from the Climate Impacts Group at the University of Washington, and WSDOT is working with other state agencies to develop the state's climate response strategy.

Climate change experts indicate that Washington State is likely to experience some or all of the following effects over the next 50 years:

- Increased temperature (extreme heat events, changes in air quality, glacial melting)
- Changes in volume and timing of precipitation (reduced snow pack, increased erosion, flooding)

- Ecological effects of a changing climate (spread of disease, altered plant and animal habitats, negative impacts on human health and well-being)
- Sea-level rise, coastal erosion, salt water intrusion

The design horizon for the bored tunnel is 100 years. The project team considered the information on climate change with regard to preliminary design, as well as the potential for changes in the surrounding natural environment. The design process will continue to examine all project features to provide greater resilience and function with the potential effects brought on by climate change.

The U.S. Army Corps of Engineers is not one of the lead agencies for this project. The project team does not know whether the agency adopts and accepts the regional climate change documents or what the agency says about global warming.