



Last Chance Grade
Economic Impact of US-101 Closure
California Department of Transportation
District 1

Prepared by
Economic Analysis Branch
Office of State Planning
Division of Transportation Planning
California Department of Transportation

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EXECUTIVE SUMMARY

United States Highway (US)-101 is the primary route that provides direct access to Del Norte County for commercial trucking year round, as well as for recreational traffic especially during tourist season. There has been a recurring problem of slides and slip outs around Last Chance Grade on US-101 in Del Norte County over the past several decades, resulting in frequent travel delays due to lane closures and high maintenance costs at this location. Were a major slide to occur that closes both lanes, traffic between Del Norte and Humboldt Counties would be re-routed around Last Chance Grade via the US-199/I-5/SR-299 corridor, for an additional distance of **320 miles**. Such detour would cost the traveling public (trucking industry and passenger vehicles) an estimated **\$1,340,000 per day (\$450 million per year)** in travel delay and added vehicle operating costs.

The added travel costs and loss in business activity resulting from a closure of US-101 would cost the Del Norte County approximately **\$300 to \$400 million in annual output** and as many as **3,000 to 4,000 jobs**. The loss of jobs would cost the region **\$100 to \$130 million** in income **annually**. Tourist dependent industries such as Leisure & Hospitality and Retail would be impacted the most severely along with other industries dependent on transportation. Closure of US-101 at Last Chance Grade would affect intraregional and interregional travel and have broader impacts beyond tourism and goods movement. US-101 is the primary route for travel within Del Norte County and regional travel into Humboldt County providing residents with access to schooling, medical services and other essentials. Although this study is intended to focus on the economic impacts to Del Norte County, it is recognized that surrounding regions with business links would also experience adverse affects, particularly Humboldt County.

Preliminary cost estimates of building a permanent bypass around Last Chance Grade on US-101 is in the range of **\$250 million to \$1.070 billion**. Combining travel cost impacts of **\$450 million** with the annual economic impacts of **\$300 to \$400 million**, and applying the annual cost of the term of construction, demonstrates consideration of the feasibility of expending as much as **\$1 billion** to rectify the Last Chance Grade complex.

There has been a recurring problem of slides and slipouts around Last Chance Grade on US-101 in Del Norte County over many decades. According to District 1 engineers, the hillside at Last Chance Grade is unstable, and the entire hillside slide plane is moving. The slides to date have been relatively small within the larger hillside slide plane. Unstable soil and large block movement result in frequent road closures and high maintenance costs at this location. A 2000 geological study conducted by the California Geological Survey mapped over 200 active slides within the corridor area. Major slide activity is likely to occur more frequently over time, with movements both above and below the roadway. These incidents are likely to cause major damage, close Route 101 for months, and require millions of dollars to keep this segment of the highway open. This paper presents a brief analysis of the traffic and economic impacts of a major landslide at Last Chance Grade, which would close US-101 for an extended period of time, and an economic evaluation of the proposed realignment project in that location.

BACKGROUND

US-101 in Del Norte County is a rural principal arterial that is considered the “lifeline of the California’s North Coast”. It is a part of the National Highway System (NHS), the Interregional Road System (IRRS), and both a “high emphasis” and “focus route” facility for priority improvements in the 2013 Interregional Transportation Strategic Plan (ITSP). This route is the primary route that provides direct access for commercial trucking year round, as well as recreational traffic especially during the summer months (tourist season). Maintaining US-101 open and in good condition between Humboldt County and the Oregon Border is very critical to the economic well being of Del Norte County and the north coast region.

Currently, there are no Surface Transportation Assistance Act (STAA) restrictions between Humboldt County and Del Norte County on US-101. If Last Chance Grade were to fail, and a detour would be implemented, STAA trucks would not be able to travel from Del Norte County to Humboldt County and vice versa. Until STAA restrictions on SR-299 or US-199 are lifted, STAA trucks would not be able to access Humboldt County from Del Norte County in the event of a Last Chance Grade failure.

Road closures from post mile (PM) 12.5 to 16.3 due to slides and slipouts are responsible for a continual maintenance problem. When slipouts occur, the highway can sometimes be kept open only to one-way traffic, causing long delays to the traveling public and truckers. When a major slide occurs that closes both lanes, traffic traveling north and south would be diverted around Last Chance Grade via US-199/Interstate (I)-5/State Route (SR)-299 corridor, for an additional distance of 320 miles. Tourist traveling in this region would bypass the region entirely were US-101 to be closed to thru traffic.

Since 1997, it is estimated that project and repair costs for the Last Chance Grade slide complex have been \$29.3 million dollars. Frequent repairs are necessary to repair slipouts, re-construct shoulders and secure existing retaining walls. A Feasibility Study is underway that will examine prior studies of the area, available data, and the information gathered by earlier projects for the development and exploration of alternatives to the existing process of rebuilding and repairing the roadway. Although definitive cost estimates have not been developed, building a bypass around the Last Chance Grade is thought to range between \$240 million and \$1.07 billion.

TRAFFIC IMPACT

A major slide along US-101 at Last Chance Grade would close the highway to through traffic between Del Norte and Humboldt Counties. Due to the remote nature of the region a detour route within close proximity is not viable, adding hundreds of miles to travel into and out of the region. Construction of a new route around the slide area is estimated to take between two and three years to complete. A sketch-level analysis was performed to estimate the traffic impacts in the event US-101 is closed due to a major slide at Last Chance Grade. The alternative route for travel between Crescent City, Del Norte County to Eureka/Arcata, Humboldt County is US-199 to I-5 to SR-299. Table 1, Daily Vehicle Miles Traveled, shows the current volume of travel on US-101 and the miles traveled between SR-199 and SR-299 compared with travel on the above described detour.

Table 1: Daily Vehicle Miles Traveled

	AADT	VMT Via US-101	VMT Via 199/I-5/299	Added VMT
All Vehicles	5,050	360,000	1,800,000	1,400,000
Trucks	556	44,000	222,000	176,000

TRUCK TRAFFIC

Trucks traveling on US-101 along the impacted area consist of interregional trips between Crescent City and Eureka/Arcata and those heading for other destinations. US-101 is the most direct route into and out of Del Norte County and Crescent City. It also is the main corridor within the county connecting the towns of Smith River and Klamath, Crescent City and many other points of interest reliant on goods shipments. This route is considered a primary route for transporting commercial goods to coastal towns north into Oregon from Sacramento and the San Francisco Bay Area. In this analysis all trucks are assumed to use the detour route. The narrow and winding nature of the detour make it difficult for trucks to traverse US-199 and SR-299, thus reducing the speed traveled. Travel is also impacted by few opportunities for passing, restricting faster moving trucks and passenger vehicles. There are some sections of SR-299 with steep grades and posted signs advising 20 MPH. Recent upgrades at Buckhorn Grade have improved the average speed in this section. Still, adding approximately 5,000 vehicles to SR-299 will have a measurable impact on the operational level of service, increasing delays for recreational traffic and goods movement on that route.

The number of extra miles required to travel the detour from around the Last Chance Grade slide area via US-199 to I-5 to SR-299 is approximately 320 miles. Based on an estimated speed of 45 MPH, the detour route would take an estimated 7 hours of additional travel time per vehicle to complete. It is estimated that the detour will cause 3,900 additional daily truck hours of travel. Based on Caltrans'

California Life-Cycle Benefit/Cost Analysis Model (Cal-B/C), the truck delay costs are \$113,000 per day. The additional 176,000 miles of truck travel adds \$200,000 per day to truck operating costs. Total added cost for trucks is estimated to be \$313,000 per day.

PASSENGER VEHICLES

For passenger vehicles (excluding 5+ axle trucks) the analysis applied similar assumptions as truck travel. US-101 is a vital link connecting Del Norte and Humboldt Counties. This route carries workers between regions and provides a link for Del Norte County residents to expanded commerce and services located in neighboring Humboldt County. Additionally, US-101 is the primary route providing access to tourist attractions located in the north coast region, particularly during the summer season. Finally, this is the primary route for intra-regional travel for locals to destinations within Del Norte County.

Based on the above scenario, in case of a closure along US-101, there will be an additional 26,000 daily vehicle hours of delay which will cost motorists about \$327,000. The additional 1,400,000 miles of travel per day would also cost motorists about \$700,000 in added vehicle operating costs. Therefore, the total additional user costs for travelers to the Del Norte County area would be slightly more than \$1,000,000 per day so long as US-101 is closed.

The added cost to all travelers using the detour around the slide area at Last Chance Grade would be approximately \$1,300,000 per day. It should be noted that these user costs are based on the current average level of traffic. Daily user costs would be expected to increase as traffic volume increases over time and the cost of driving increases.

Table 2, Summary Daily Travel Impacts and Costs, summarizes the daily impacts from the closure of US-101 to all travelers. Over the year, total travel costs would amount to approximately \$450 million, assuming 250 days of travel for trucks and 365 days of travel for passenger vehicles. As stated above,

repair of US-101 after a major slide could take two to three years. It is anticipated that significant changes in travel would occur, therefore, it is not within the scope of this analysis to determine long-term financial impacts from a catastrophic failure at Last Chance Grade.

Table 2: Summary Daily Travel Impacts and Costs

	Daily Cost	Vehicle Operating Cost	Total Cost
5+ Axle Trucks	\$113,000	\$200,000	\$313,000
All Other Vehicles	\$327,000	\$700,000	\$1,027,000
Summary Total:			\$1,340,000

ECONOMIC IMPACT

The closure of US-101 at Last Chance Grade is likely to have immediate and substantial economic impacts to the community of Crescent City and to the County of Del Norte. US-101 provides the only major access through Crescent City and Del Norte County, representing the primary route for moving goods and services into and out of the region. The increase in distance and time necessary to travel alternative routes into and out of the region will significantly add to the costs of travel for both business and regional travelers. The closure of US-101 would also re-direct tourists traveling along the North Coast of California to alternative routes that completely bypass Del Norte County and Crescent City. The potential economic impacts from these effects were analyzed using data outputs from the sketch-level traffic impact analysis.

The economic impact analysis was conducted using the Transportation Economic Development Impact System (TREDIS) model developed by Development Research Group, Inc. and designed to assess economic impacts due to changes in travel amount, type and quality. The main focus of this analysis was to evaluate the impacts economic output in Del Norte County and Crescent City from increased transportation costs and, to a limited degree, the loss of tourism/destination travelers from the closure of US-101. The basis of the analysis is the change in travel as the result of the closure. Travel flow data

was provided by Caltrans, District 1 and was synthesized through Caltrans' Cal-B/C Tool in order to obtain inputs for the TREDIS model. A scenario was developed to simulate travel patterns resulting from the closure of US-101 that were compared with the current, uninterrupted flows of traffic. To get a further understanding of the regions reliance on US-101, Caltrans conducted interviews with local business representatives and elected officials and sent a survey questionnaire to nearly 300 additional business owners/representatives who were not personally contacted. Information received from interviewees and survey respondents provided an understanding of the real and perceived impacts on individual businesses and the community. The information was incorporated into the model input assumptions and used to validate the model outcomes.

Because of the sketch-level detail of the data, the level of precision of the economic analysis is limited. The data used in the analysis were generated from annual average daily travel (AADT) counts taken of travelers along US-101, as recorded by Caltrans. Estimates of the number of travelers making the trip(s) between Crescent City and the Humboldt County line were developed from AADT counts taken from various points along the highway. This travel is thought to represent the interregional and destination travelers (i.e., tourist, recreational, etc.) and would be most impacted by a closure. Interregional travelers include Del Norte County residents traveling to Humboldt for goods and services and freight trucks transporting goods into, out of, and through Del Norte County and Crescent City. The distribution of trips by type, were estimated for both the pre-slide and post-slide scenario evaluation. The results of the economic analysis are meant to provide a scale of the potential impacts on the economy of Crescent City and Del Norte County from the disruption of travel due to a slide along US-101 at Last Chance Grade.

THE ECONOMY

The Del Norte County economy, like the State, reflects a shift from a resource extraction and manufacturing based economy to a service based economy, lead by the government, education and health services, and the retail sectors. The region continues to support the fisheries and agricultural industries but the primary component of the regional economy relies on tourism, drawn by the natural

features of the north coast and further supporting the retail and services sector industries. In 2013, approximately 9,800 Del Norte County residents reported being employed, while nearly 8,000 jobs were reported by employers located in the County, accounting for an estimated \$300 million in total wages. Table 3, Del Norte County Employment and Unemployment, describes the labor market for the county and employment by industry sector.

Table 3: Del Norte County Employment & Unemployment

Civilian Labor Force⁽¹⁾	11,100
Civilian Employment	9,820
Civilian Unemployment	1,280
Civilian Unemployment Rate	11.6%
Total, All Industries⁽²⁾	7,990
Total Farm	320
Total Nonfarm	7,670
Total Private	4,060
Goods Producing	250
Mining, Logging and Construction	170
Manufacturing	80
Service Providing	7,420
Private Service Providing	3,810
Trade, Transportation & Utilities	1,060
Information	80
Financial Activities	190
Professional & Business Services	190
Educational & Health Services	1,390
Leisure & Hospitality	780
Other Services	130
Government	3,610
Federal Government	150
State & Local Government	3,470
State Government	1,540
Local Government	1,930

(1) Civilian labor force data are by place of residence; include self-employed individuals, unpaid family workers, household domestic workers, & workers on strike. Data may not add due to rounding. The unemployment rate is calculated using unrounded data.

(2) Industry employment is by place of work; excludes self-employed individuals, unpaid family workers, household domestic workers, & workers on strike. Data may not add due to rounding.

Source: California Employment Development Department - Labor Market Information Division

The Del Norte County economy was estimated at \$790 million in market value of goods and services produced in 2012. Total taxable sales, including retail sales, contributed \$226 million to the regional economy. Approximately half of taxable sales, \$111 million, were generated from tourism and recreation related expenditures. Agriculture production generated \$40.2 million in 2012. The major commodities produced included nursery, flowers and foliage, livestock and livestock products. Timber accounted for \$1.3 million in production. Fish harvesting contributed \$34.3 million to the economy. Dungeness crab accounted for just over \$30 million of output in the fisheries industry. Real estate services are estimated to generate \$40 - 50 million in sales annually supporting ancillary industries within and outside the region. Manufacturing and construction's input to the economy continue to decline as a contribution to economic output in the region.

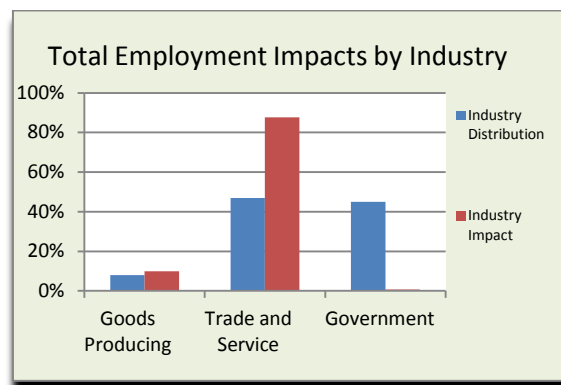
The region is home to four federally recognized Native American Tribes operating numerous business enterprises in Crescent City and throughout the region, including three casinos. These operations provide local retail and entertainment needs but are also dependent on tourism and pass through travelers for sales. Proceeds from these operations support the tribes' communities with job opportunities and other services.

Del Norte County has a strong business connection to Curry County, Oregon, to the north and Humboldt County to the south. A failure of US-101 at Last Chance Grade would disrupt the flow of goods, such as fuel, dairy products and timber, to Crescent City and the northern half of Del Norte County from Humboldt County. Other disruptions would occur for emergency response and transport services. Residents of Del Norte County travel to Humboldt County for medical services that are not available locally. The economic impacts will occur beyond Del Norte County as these services are either delayed or not sought due to the additional cost of travel. To the north of Del Norte County, communities located in southern Oregon rely on the business generated from tourist traveling the Pacific Coast Region of California, Oregon and Washington.

MODEL OUTCOMES

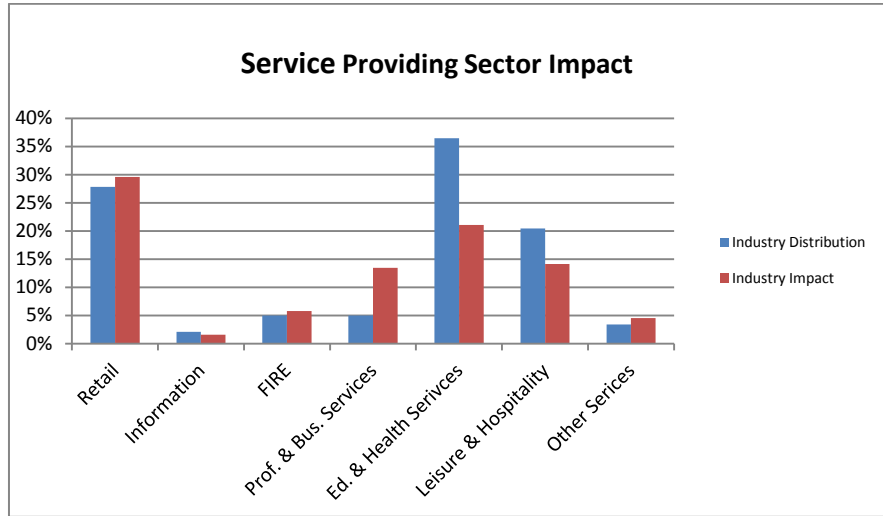
The complete closure of US-101 at Last Chance Grade could result in \$300 to \$400 million in reduced annual output according to the TREDIS results. Additionally, as many as 3,400 to 4,200 jobs could be lost and \$100 to \$130 million in wages annually. The Trade and Service Sector industries are impacted the most severely, accounting for nearly 90 percent of job losses, according to the results. Goods Producing industries and Government make up the remaining 10 percent. Table 4, Employment Impacts by Industry, shows the distributions of jobs by Sector and the impacts from closure of US-101 between Goods Producing, Trade and Service and the Government Sectors.

Table 4: Total Employment Impacts by Industry



Within the Trade and Service Sector, TREDIS model results indicate Retail and Leisure & Hospitality experience the greatest impact in losses as a percentage of existing jobs, at just below 50 percent. The results also show significant impacts to Education & Health Service and Business Service/Finance, Insurance & Real Estate Sectors, particularly in medical related fields and real estate. Table 5, Service Providing Sector Impact, describes the impacts to jobs as a percent of jobs across the Service Providing Sector.

Table 5: Service Providing Sector Impact



The distribution of job and income impact in the Retail and Leisure & Hospitality industries is provided in Table 6, Retail and Leisure & Hospitality Sector Impacts. The loss of Retail jobs reach across the entire Sector, though industries serving tourist related travel are especially at risk.

Table 6: Retail and Leisure & Hospitality Sector Impacts

Sector	Industry	Jobs Lost	Income Lost (\$mil.)
Retail Services	Food and beverage	200	5.632
	Gasoline stations	73	3.506
	General merchandise	167	5.022
	Miscellaneous	112	1.607
Leisure & Hospitality	Arts, Entertainment, and Recreation	29	0.303
	Lodging	58	1.002
	Restaurants & Drinking Establishments	422	6.967

ASSESSMENT

As explained above, the TREDIS Transportation Economic Model is only able to provide a generalized assessment of the economic impacts to the region from the closure of US-101. However, the TREDIS results are important in that they show similar impacts regarded by the business representatives interviewed and responding to the survey, for this analysis. Business representatives and government officials expressed concerns that closure of US-101 would have catastrophic impacts to the regional economy. The TREDIS results indicate that the region would experience significant impacts approaching those feared in the community. Below is a brief summary of the interview and survey results with comparisons to the TREDIS results.

The survey results provide a consistent concern among the business community regarding the impacts from the closure of US-101. Survey respondents were primarily from the Retail and Service industries dependent on tourism. Other industries represented in the survey included Agriculture, Manufacturing Utilities, Real Estate and Government. Tribal representatives were also interviewed in person or responded to the survey. In all, **40** interviews were conducted and/or surveys received as part of the Last Chance Grade economic analysis study.

The general consensus from interview and survey respondents was for an immediate economic impact from a closure of US-101 in the event of a major slide at Last Chance Grade. Respondents representing industries catering to tourism and general retail and service related goods foresee an immediate impact on their level of business, resulting in lay-offs with potential closure of businesses in some instances. Respondents indicated a long-term closure of the US-101, 6 to 12 months, would result in closure of their businesses, and significant impact on the community. Agriculture, Manufacturing and Utilities industry respondents, particularly with business links to Humboldt County, expressed concerns regarding additional costs associated with the transportation of materials between Humboldt and Del Norte Counties. Significant increases in transportation costs are anticipated from the additional travel expected from detouring around the Last Chance Grade area on US-101. Real Estate and Finance industry respondents expressed concerns related to impacts on property values and sales, including

long-term recovery once US-101 is opened to through traffic. The impacts on property values and sales would also result in job losses, not only in Del Norte County but also in Humboldt County and in Oregon as these regions are closely interlinked. Many respondents expressed concern that economic growth would continue to be adversely impacted until such time as a permanent fix US -101 at Last Chance Grade is completed.

The survey results highlight the reliance Del Norte County has on tourism, and the link US-101 provides for facilitating these activities in and out of the region. For respondents who identified themselves as dependent on tourism, 50 to 100 percent of sales are generated from tourist expenditures. The tourist season was generally identified as the period between May and September when a majority of sales occurred. Coincidentally, respondents reliant on tourism anticipate an immediate impact on business resulting in layoffs and business failure, were the closure to last beyond six months or a year. Additionally, respondents in the Retail industry with less reliance on tourism, still anticipate affects as layoffs ripple through the region impacting their sales.

Respondents in Manufacturing, Agriculture and utilities (fuels) industries expressed their reliance on US-101 for transporting raw and finished goods between Del Norte and Humboldt Counties, and beyond. Business obligations preclude many respondents from altering their relationship with sources in Humboldt County for raw and finished materials meaning these trips would still be required resulting in significant increases in transportation costs. Respondents noted that besides the increase in direct cost associated with the additional mileage and travel time between Del Norte and Humboldt Counties, additional costs include the need to add a second driver to make a trip or pay lodging costs to allow single drivers ample rest periods. Respondents indicated that increased transportation costs would impact profit margins adversely.

Responses from the survey also indicated a strong reliance on US-101 of coastal cities in Southern Oregon. US-101 also acts as a primary route of access for transporting goods to cities located along this route and tourist traveling along the west coast between San Francisco to Portland, or Seattle. The closure of US-101 at Last Chance Grade would also divert traffic away from cities located in Southern

Oregon. Tourist making this trip would opt for more direct routes to connect with the coast at locations located north toward Central Oregon. Though the scope of this analysis does not include impacts to Oregon cities, respondents are sensitive to the impacts on their neighbors to the north and the boomerang affects on the Del Norte County economy.

There are a number of situations created by the closure of US-101 that are not captured in the analysis but will still impose costs and hardship to residents in the County. Services such as schools, health and welfare, and emergency response will be severely disrupted. Many of the children living in towns and communities south of the Last Chance Grade are bused in to Crescent City to attend school. Since no practicable alternate routes exist, special arrangements would need to be made to ensure the requisite number of school days are attended. This may require temporary locations be established or that the children are bused to schools located in Humboldt County. Either alternative described above will likely impact the budget, and jobs, of the school district(s). Similarly, access to social and medical services would be impacted in the same way by a closure of the highway. Emergency response, be it medical, fire or police, would require coordination between multiple jurisdictions to ensure critical response is available and timely. This too, is likely to impact the budgets of the various jurisdictions involved. Each of these situations will require swift and effective coordination with limited resources and time to react.

The analysis does not consider the revenue impacts to local government entities. Del Norte County would stand to lose a substantial amount of revenues from sales and use taxes, personal income taxes and business taxes and fees. As the only incorporate city in the County, Crescent City would be impacted in similar ways as Del Norte County. The loss of tax revenues would impact the level of services each of the above entities would be able to provide. However, in the given situation, demand for government services would likely increase for those directly impacted by the closure.

CONCLUSION

Based on the analysis it can be demonstrated that closure of US-101 at Last Chance Grade would impose significant costs on travelers of this route. The additional miles of travel required to travel around the slide area at Last Chance Grade would add an additional \$1.3 million in travel costs per day, and as much as \$450 million over a one year period. According to the results of the TREDIS Model, these additional costs translate into \$300 to \$400 million in reduced output to the Del Norte County economy, approximately 3,000 to 4,000 lost jobs, and lost wages of \$100 to \$130 million over a one year period. Impacts of this magnitude would be severe to an economy the size of Del Norte County. Businesses dependent on tourism and on the transportation of goods on US-101 would be at particular risk of failure. Secondary affects could adversely impact additional businesses not otherwise dependent on tourism, and/or goods movement along US-101. Even those businesses that are able to absorb the additional cost associated with higher transport and secondary affects will be at risk should the closure of US-101 extend for a long length of time.

This study did not include an analysis of the economic impacts to Humboldt County that would occur from closure of US-101. However, Humboldt County businesses provide goods and services to businesses in Del Norte County that would be impacted from a closure.

Despite the limitations of the analysis addressed earlier, the results merit consideration for assessing the financial viability for taking action to remediate the risk associated with a major slide along US-101 at Last Chance Grade. Table 7, Economic and Highway Realignment Cost Impacts, compares the modeled economic impacts with the estimated project costs of building a new alignment around Last Chance Grade. The cost estimates for the project were provided by Caltrans, District 1 staff and reflect the total cost to design and construct the new highway. The table shows the total economic impacts carried out over three years, the amount of time to complete the project, against three project cost scenarios. In all three scenarios, **the potential economic impacts exceed project costs**. The exception is when the high cost project scenario is completed in one year, which is unlikely with a project this complex.

Table 7: Economic and Highway Realignment Cost Impacts

	Project Costs (million)	Total Financial and Economic Impacts- Year 1* (\$750-\$850 mil)	Total Financial and Economic Impacts- Year 2* (\$1,500-\$1,600 mil)	Total Financial and Economic Impacts- Year 3* (\$2,250-\$2,350 mi)
Alternative #1	\$250	\$500-\$600	\$1,250-\$1,350	\$2,000-\$3,000
Alternative #2	\$500	\$250-\$350	\$1,000-\$1,100	\$1,750-\$1,850
Alternative #3	\$1,070	(\$320-\$420)	\$430-\$530	\$1,180-\$1,280

*Based on \$450 million annual cost to travelers and \$300-\$400 million impact on economic output to Del Norte County.