

URBAN systems

# HUU-AY-AHT FIRST NATIONS

## Alberni-Bamfield Road Business Case

***Road Paving Between Port Alberni and Anacla/Bamfield***

**January 17, 2019**

huu ay aht

ANCIENT SPIRIT, MODERN MIND

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# 1 EXECUTIVE SUMMARY

This study examines the business case and justification for improving the Alberni-Bamfield logging road. The road extends 85 kilometres southwest from Port Alberni, connecting the Anacla and Bamfield area to the Province's highway network. Improving the road is seen as a critical step in improving the economic development potential of Huu-ay-aht First Nations (HFN), as well as improving the safety and wellbeing for current Anacla and Bamfield residents.

The study looked at direct impacts of improving the road, including economic impacts such as faster driving time which factor into a Benefit/Cost ratio, as well as qualitative impacts such as improved visibility and reduced greenhouse gases.

According to traffic data collected by the BC Ministry of Forests the road records an Annual Average Daily Traffic (AADT) volume of approximately 370 vehicles between Port Alberni and Franklin Camp and 210 vehicles between Franklin Camp and Bamfield. According to the Arbutus Engineering report (**Appendix D**) 75% of all traffic is forestry related, and only 25% of traffic is passenger vehicles. Traffic has been increasing sharply at an annual rate of 5.5% between Franklin Camp and Bamfield over the past 5 years.

The Arbutus Engineering report from 2016 estimated that chip sealing 75 km of the existing unpaved road would cost $13.3 million and require annual maintenance costs of $1.8 million. Current annual maintenance costs are approximately $420,000.

The following table provides the 5-year Benefit Cost Summary for improving the road.

**Table 1 - 5-Year Benefit Cost Summary**

| | Port Alberni – Franklin Segment | Franklin – Bamfield Segment | Full Road |
|---|---|---|---|
| **Financial Account** | | | |
| Capital Cost (PV) | $6,263,547 | $6,785,509 | $13,049,057 |
| Maintenance (PV) | $2,649,397 | $2,847,340 | $5,496,737 |
| Salvage Value (PV) | $ - | $ - | $ - |
| ***TOTAL INCREMENTAL COST (PV)*** | ***$8,912,944*** | ***$9,632,850*** | ***$18,545,794*** |
| **Customer Service Account** | | | |
| Travel Time Savings (PV) | $8,278,075 | $5,381,972 | $13,660,047 |
| Vehicle Operation Cost Savings (PV) | $3,723,523 | $2,312,141 | $6,035,664 |
| Safety (PV) | $ - | $ - | $ - |
| ***Total Incremental Benefits (PV)*** | ***$12,001,598*** | ***$7,694,113*** | ***$19,695,711*** |
| **Key Economic Indicators** | | | |
| **Net Present Value** | **$3,088,654** | **-$1,938,736** | **$1,149,917** |
| **Benefit Cost Ratio** | **1.3** | **0.8** | **1.1** |

Additional impacts are summarized qualitatively in the following table.

**Table 2 - Impacts of Improving Alberni-Bamfield Road**

*( ● - Improved, ⊙ - Limited or Mixed Impact, ○ - Negative)*

| Category | Impact | Impact Details |
|---|---|---|
| Visibility | ● | • Dust minimized |
| Rideability | ● | • Smoother surface, less bumpy |
| Travel time | ● | • Average travel time between Port Alberni and Bamfield reduced by 40% or 1 hour (from 2.5 hours to 1.5 hours) |
| Road safety | ⊙ | • Chip sealing will lead to higher vehicle speeds which may increase collision severity<br>• Chip sealing may reduce property damage collisions due to improved road surface |
| Vehicle operation | ● | • Less wear-and-tear, improved operation efficiency |
| Tourism | ● | • Ease travel for tourists, potential increase for tourism in area<br>• Potential for campgrounds, hotels and resorts to expand<br>• Ease staffing issues (i.e., attract more seasonal staff, attract more staff from neighbouring communities) |
| Accessibility | ● | • Improved for daily travel between Anacla, Bamfield, and surrounding communities<br>• Improved for services travelling to-and-from Port Alberni / Vancouver Island, or between Anacla and Bamfield for social needs related to: mental health, urgent care, medical, dental, specialist care, etc. |
| Emergency services | ● | • RCMP can respond in real time, can provide crime prevention services<br>• Access to hospitals and ambulance services improved |
| Goods transportation | ● | • Time to transport reduced<br>• Cost of goods reduced<br>• Damage to goods reduced<br>• Supports tourism industry development |
| Fit for forestry industry | ⊙ | • Reduced travel time represents a **significant savings** to forestry companies (estimated **$16.7M** of combined travel time, fuel, truck time savings over 5 years).<br>• Reduced wear and tear on vehicles and equipment<br>• **Currently, forestry companies can operate 80 cubic metre vehicles along the road.** Improving the road would require logging companies to use standard 40 cubic metre highway capable vehicles. However, it appears that 80 cubic metre vehicles are being phased out.<br>• Forest Companies have indicated support for the project and can provide letters of support |
| Environmental | ● | • Annual GHG emissions savings due to chip sealing:<br>  ○ Port Alberni – Franklin Camp segment: 433 T<br>  ○ Franklin Camp – Bamfield segment: 259 T |

| | | |
|---|---|---|
| Economic development | ● | • Potential for future economic development opportunities such as LNG at Sarita, new port for Port Alberni Port Authority, increased tourism, increased research and student enrollment at BMSC |
| Property values and taxation | ● | • Improved accessibility would likely result in increased land values and taxation opportunities |
| Indigenous Reconciliation | ● | • Provincial and federal support for road upgrades presents a significant opportunity to advance reconciliation with Huu-ay-aht First Nation |

Improving the Alberni-Bamfield Road is also expected to have significant economic development impacts for the Anacla/Bamfield area. Stakeholders and business operators were interviewed to get a sense of the economic development impacts.

In general, the economic opportunity provided by improving the road is believed to be extensive, particularly for the tourism sector. The rapid growth in popularity and tourism spending in the Tofino/Ucluelet sector is believed to be an indication of the opportunity at Anacla/Bamfield.

Key comments from stakeholders regarding the opportunity presented by improving the road include:

- Existing businesses have had issues with staffing, as many staff live in Port Alberni and do not want to drive the Alberni-Bamfield Road regularly.
- Tourist traffic to Bamfield drops during the shoulder seasons as tourists do not wan to drive the road in wet conditions.
  - Increasing tourism during the shoulder and winter seasons will be a major benefit of improving the road.
- Investment in existing accommodations that require renovation, and new tourist accommodations would be viable if shoulder season tourism was occurring.

An effort was made to quantify the impact of increased tourism spending based on additional tourists to the Anacla/Bamfield area. Tourist spending was based on Destination BC's estimate of spending per day and nights spent on Vancouver Island.

**Table 3 - Additional Tourist Spending**

| | Additional Daily Tourist Vehicles | | | Tourist Spending - 4-month season | | |
|---|---|---|---|---|---|---|
| | **Low** | **Medium** | **High** | **Low** | **Medium** | **High** |
| **2020** | 2 | 4 | 14 | $100,000 | $300,000 | $900,000 |
| **2021** | 3 | 8 | 27 | $200,000 | $600,000 | $1,900,000 |
| **2022** | 4 | 12 | 39 | $300,000 | $900,000 | $2,800,000 |
| **2023** | 5 | 18 | 52 | $400,000 | $1,200,000 | $3,600,000 |
| **2024** | 7 | 24 | 64 | $500,000 | $1,700,000 | $4,500,000 |

The low scenario assumed an additional 7 tourist vehicles per day during the summer season by 2024, a very conservative estimate, would equate to an additional $500,000 of tourist spending annually. The high

scenario, involving 64 additional tourist vehicles per day during the summer, would create $4.5 million of tourist spending per year.

Ultimately, it is believed that the economic opportunities created by improving the Alberni-Bamfield Road would eventually more than cover the costs of annual maintenance, before considerations of wellbeing for residents of the Anacla/Bamfield area.

# 2 INTRODUCTION

This Business Case examines the feasibility and potential impacts of improving the Alberni-Bamfield Road. The road extends 85 kilometres southwest from Port Alberni, connecting the Anacla and Bamfield area to the Provincial highway network. Currently, the roadway is a gravel logging road maintained to industrial standards. Proposed improvements would consist of chip seal paving, brushing, and curve testing.

The road is the main land access to Huu-ay-aht First Nations (HFN) principle community at Anacla, Bamfield, and surrounding settlements, and is used regularly by residents accessing Port Alberni. Other regular users include workers, industry, tourists, recreationalists, students, and researchers.

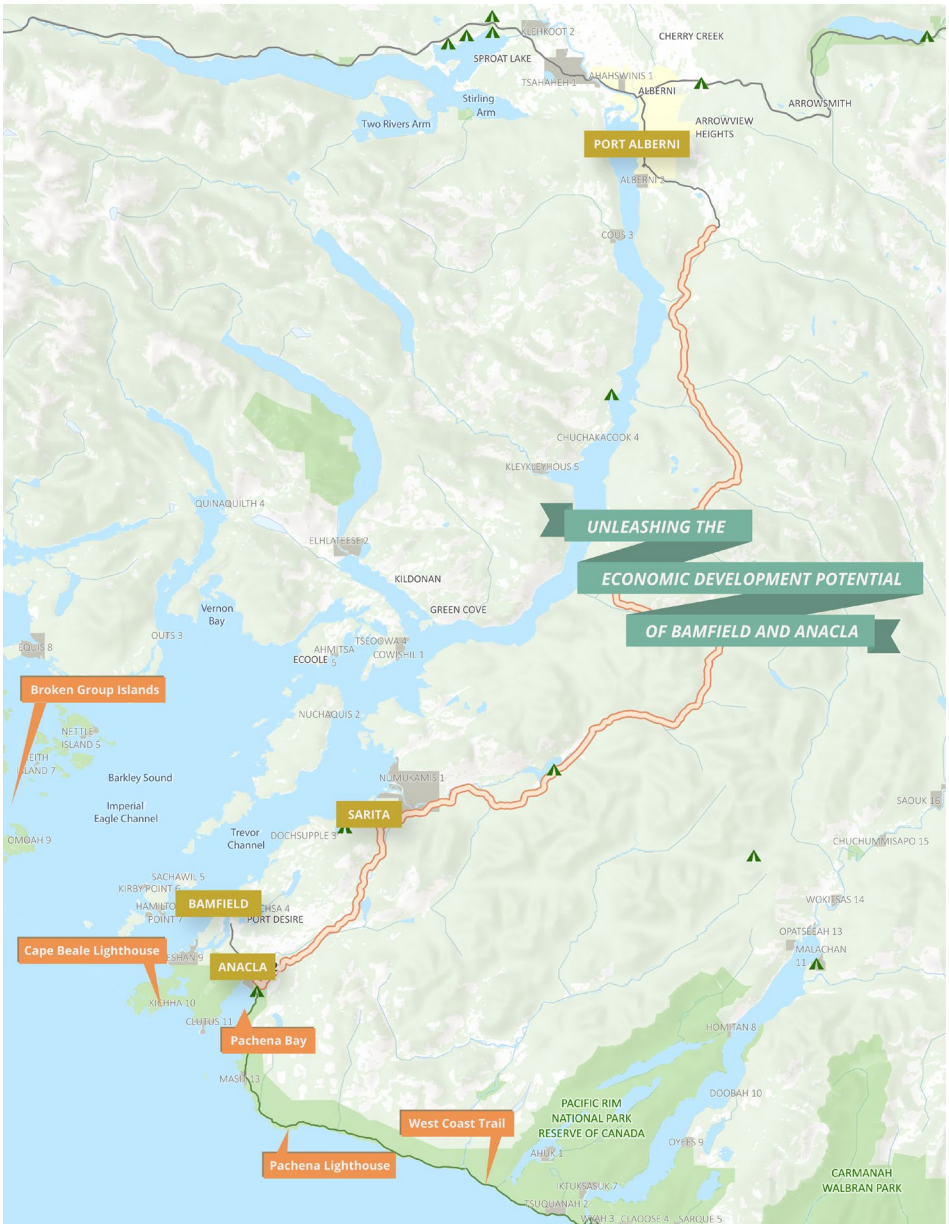



**Figure 1 - Alberni-Bamfield Road to the Anacla and Bamfield Area**

This report presents potential impacts of improving the road. These impacts include the following:

- Multiple account evaluation
- Economic evaluation
- Qualitative evaluation
- Social Impacts
- Economic development impacts

## 2.1 Data and Methodology

This study employed a range of quantitative and qualitative methods, including traffic count data analyses, cost-benefit analyses, case studies, and stakeholder interviews. These data were analyzed together to generate a business case as interpreted through stakeholder opinions and comparable scenarios.

The performance assessment, financial account, and customer service account are based on a benefit-cost model prepared for a 5-year horizon, to align with the 5-year life cycle of the proposed type of pavement. The benefit cost model is described in further detail in Section 5 of this report.

## 2.2 Approach

A 5-year horizon offers a unique 'pilot' opportunity to experience impacts of improving the Alberni-Bamfield Road. Current projections show significant benefits over a 5-year horizon, during which time more detailed information can be gathered to inform whether any further, more permanent investments should be pursued. Further improvements for consideration could include more permanent paving, an adjacent trail for pedestrians and cyclists, and additional pull outs to facilitate traffic movement.

## 2.3 Alignment with Federal and Provincial Initiatives

HFN has discussed potential funding sources that could help pay for upgrades to the Alberni-Bamfield Road with both the Federal and Provincial Governments. Those parties indicated that they expected to announce an infrastructure grant program sometime during 2018 and that upgrading the Alberni-Bamfield Road would be an eligible project. The application requirements for this program were expected to be similar to those of the recent *Building Canada Fund - Small Communities Fund*.

On September 12, 2018 the Canadian and British Columbian governments committed up to $95 million towards an initial intake of the new *Rural and Northern Communities (RNC) Program*. Upgrading the Alberni-Bamfield Road does appear to be an eligible project.

## 2.4 Reconciliation

Provincial and Federal support for road upgrades presents a significant opportunity to advance reconciliation with HFN. An improved road would provide HFN with better ongoing access to their lands, territories, and resources, and a significant opportunity for economic development. This is critical for HFN to successfully implement their vision for vibrant and prosperous future.

It would offer the Huu-ay-aht Group of Businesses and other HFN members the chance to reach their economic potential, and to share in the wealth generated as part of the broader regional and provincial economy. This includes the opportunity for HFN to further develop cultural tourism, which is valued by the community as an opportunity to preserve and strengthen their language, culture, and history, and to share these with visitors.

Improving access to the Anacla community would also facilitate easier access to more remote HFN settlements in the surrounding area. This support HFN's capacity to govern effectively and provide programs and services to their citizens.

These effects would directly align with directions in the *Draft Principles that Guide the Province of British Columbia's Relationship with Indigenous Peoples,* the *United Nations Declaration on the Rights of Indigenous Peoples*, and the Truth and Reconciliation Commission's *Calls to Action.*[1]

[1] See Principle 8 in https://news.gov.bc.ca/files/6118_Reconciliation_Ten_Principles_Final_Draft.pdf?platform=hootsuite; "Language and Culture" in http://www.trc.ca/websites/trcinstitution/File/2015/Findings/Calls_to_Action_English2.pdf ; and, Articles 5, 20, 21, and 32 in https://www.un.org/esa/socdev/unpfii/documents/DRIPS_en.pdf.

# 3 BACKGROUND

HFN is a self-governing, modern treaty Nation whose lands are located throughout the Barkley Sound region on the west coast of Vancouver Island at the entrance to Alberni Inlet. Many HFN citizens reside around the village of Anacla, the Nation's principal community close to Bamfield.

Tourists from around the world are recognizing the West coast of Vancouver Island as a premier destination as Tofino and Ucluelet are becoming increasingly popular options. However, Anacla and Bamfield offer similar world class attractions. These attractions include, but are not limited to:

- Access to Pachena Bay, Brady Beach, and other pristine beaches that provide excellent surfing opportunities.
- Access to the West Coast Trail.
- Access to old growth forests.
- Breathtaking scenery (including storm watching opportunities).
- Abundant wildlife (including whale watching opportunities).
- Kayaking and sport fishing opportunities in and around Barkley Sound (e.g. the Deer Group and Broken Group islands).
- Unique charms experienced in Bamfield (including the boardwalk through its 'Downtown').
- A unique indigenous history and opportunities for authentic cultural experiences (see **Figure 2**).




**Figure 2 - Example of a unique cultural tourism attraction near Anacla and Bamfield**

## 3.1 Alberni-Bamfield Road

Currently, the Anacla and Bamfield area can be reached by chartered float plane, boat, or logging road. The most common route is the gravel logging road from Port Alberni, the Alberni-Bamfield Road. It is also possible to access the area via dirt and gravel logging roads from Lake Cowichan through Nitinat Lake. Travel blogs report this route is tougher to travel and takes significantly more time than the Alberni-Bamfield Road.

The Alberni-Bamfield Road opened in 1964.[2] It runs 85 kilometers southwest from Port Alberni and connects the Anacla and Bamfield area to the provincial highway network. Although well-travelled, it is maintained to an industrial standard suitable for logging trucks rather than standard passenger vehicles. It is semi-public, meaning non-forestry traffic must yield to logging trucks and heavy equipment using the route. It is a significant portion of the alternate route out of the Alberni Valley, with the potential to access southern Vancouver Island.

According to traffic data collected by the BC Ministry of Forests included in **Appendix A**, the road records an Annual Average Daily Traffic (AADT) volume of approximately 370 vehicles between Port Alberni and Franklin Camp and 210 vehicles between Franklin Camp and Bamfield. As noted in Arbutus Engineering's *Proposed Road Improvement Program: Alberni-Bamfield Road (2016)* included in **Appendix D**, light vehicle traffic represents approximately 25% of all corridor traffic, with the majority of traffic being heavy logging-related vehicles. Over the last five years, traffic has grown sharply at compound annual growth rates of 2.9% between Port Alberni and Franklin Camp and 5.5% between Franklin Camp and Bamfield.

Wet weather often affects the gravel surface, causing rough road conditions and occasional washouts.[3] During the summer, dry conditions can cause unpleasant and dangerous amounts of dust. [4] The road is narrow, winding, and can be challenging to drive. Drivers are recommended to be prepared with a spare tire, full tank of fuel, and a vehicle in overall good working order.[5] There are no gas/service stations and no cell service on the road. Depending on conditions, it takes approximately 2.5 hours to travel the road from Port Alberni to the Anacla and Bamfield area.

Unfortunately, this discourages tourism and investment in the region. Travel articles highlighting the beauty of Anacla and Bamfield often refer to the Alberni-Bamfield Road in a negative way, describing it as harrowing and dangerous.[6] Some even suggest taking a boat to Bamfield instead of driving.

Paving the road would provide the Anacla and Bamfield area with a chance to demonstrate their economic development potential. Proposed paving and improvements discussed in the cost benefit analysis are expected to last five years before requiring further action. This represents a low level of investment for potentially significant community benefits and offers the Province the chance to gather more evidence to make an informed decision about more permanent improvements.

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[2] http://www.bamfieldhistory.com/photos/community/

[3] Stakeholder interviews; see also http://www.wfproadinfo.com/bamfield.html

[4] Stakeholder interviews; see also http://www.wfproadinfo.com/bamfield.html

[5] http://www.bamfieldmsc.com/about/bmsc-overview/how-to-get-here

[6] For example, see https://www.melissawest.com/the-road-to-bamfield-bc/; http://www.vancouverislandgrandloop.com/stage-descriptions/stage-5; https://thetyee.ca/Life/2012/10/02/Bamfield-Off-Grid/

## 3.2 Road Users

The roadway is an active gravel commercial logging road maintained to industrial standards. It can pose as a barrier to residents who must travel through an active industrial zone to access basic necessities and prevents tourists and emergency vehicles from easily accessing Anacla and Bamfield.

There are several distinct groups who regularly use the Alberni-Bamfield Road.

### 3.2.1 Residents and Workers

The Anacla and Bamfield area has a combined population of approximately 261 residents.[7] During the summer, the population is estimated to swell to 2,000 or more.[8]

The Alberni-Bamfield Road is critically important to Anacla and Bamfield residents as the most reliable land access to the area, otherwise accessible only by air or boat. It is the community's link to services and supplies, including hospitals/physicians, and police. The Bamfield Health Centre does not have a helipad and ambulance service must come in on the road from Port Alberni. Tsunami risk in the community is high and access would be challenging should the area ever experience such an emergency event.[9] It is the residents' only practical link to economic opportunities, people, places, and events beyond their community.

Interviews with community stakeholders showed that residents use the road regularly for travel between Anacla and Bamfield, to access services not available in the area, and/or for work purposes. Most residents are employed in fishery, tourism, or at the Bamfield Marine Sciences Centre (BMSC).[10]

Stakeholders indicate that the road in its current state has a negative influence on staff recruitment and retention at the BMSC (see **Appendix C**). Currently, students are either shuttled in from Nanaimo or drive the road themselves, often in cars that are not well-equipped for the trip.

Interviewees also suggested that paving the road would help residents employed in the tourism industry by providing greater access to Port Alberni, allowing transportation of recreational equipment (which is currently too risky due to the uneven surface), easing tourist travel to the area, and reducing business expenditures on shuttle buses or tourist transportation.

### 3.2.2 Forestry Industry

The Alberni-Bamfield Road is semi-public, meaning that while public can use the road, it is part of a network of logging roads managed by Western Forest Products Inc. Western Forest Products hold the principle permit to use the road for their forestry operations. Island Timberlands also uses the road and owns a small segment (see **Figure 3**). Logging trucks and heavy equipment use the road seven days a week, year-round

[7] Statistics Canada, 2016.

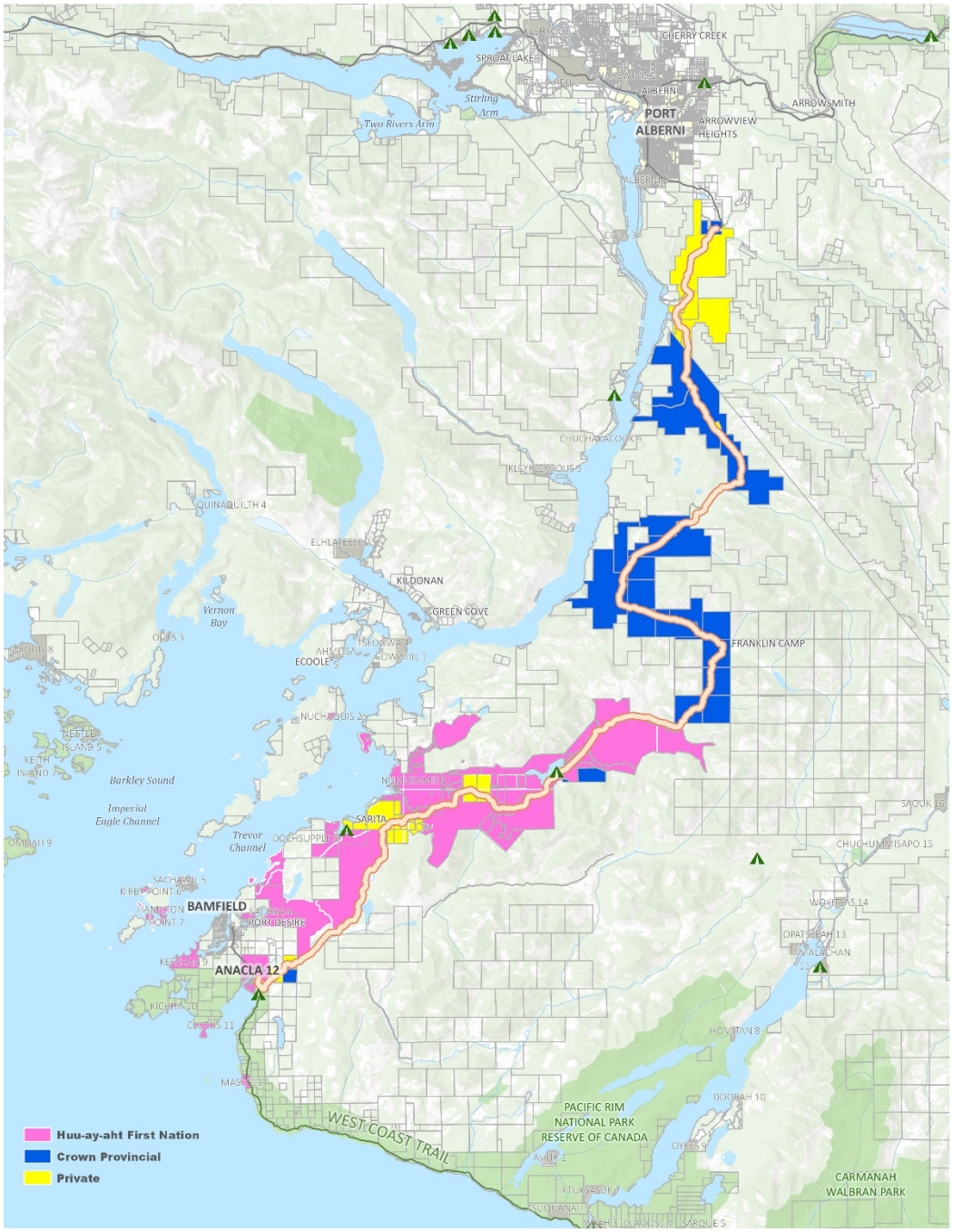
[8] Wastewater Treatment Study by Stantec Consulting Ltd., 2012; New Bamfielder article, May 2017; Alberni-Clayoquot Regional District, 2012.

[9] See http://bamfielder.ca/sites/default/files/2018/February/New%20Bamfielder%20PDF%20issue%2081.pdf for an account of the January 2018 tsunami alert.

[10] http://www.geog.uvic.ca/viwilds/hc-bamfield.html

and represent 75% of traffic on the road. The road is maintained to an industrial standard suitable for such traffic.

Non-forestry traffic must yield to logging trucks and equipment, including pulling-over and backing-up if necessary to allow trucks to pass.[11]




*Parcels owned by Island Timberlands are indicated in yellow

**Figure 3 - Ownership of Parcels along the Alberni-Bamfield Road**

[11] http://www.wfproadinfo.com/bamfield.html

### 3.2.3 Tourism and Recreation

Tourists and visitors attracted by the recreation opportunities around Bamfield are already an important user of the road.[12] These users are coming to Anacla and Bamfield to appreciate the natural beauty of the area and often engage in activities such as fishing, hiking, camping, surfing and other related activities.

Anecdotal evidence from stakeholder interviews and data from Parks Canada suggest that the number of tourists are increasing steadily. For instance, the area is traditionally the end point for the popular West Coast Trail, a multi-day hiking trail within the Pacific Rim National Park Reserve. From 2014 to 2017, the number of hikers on the West Coast Trail increased by 43% (see **Figure 4**).

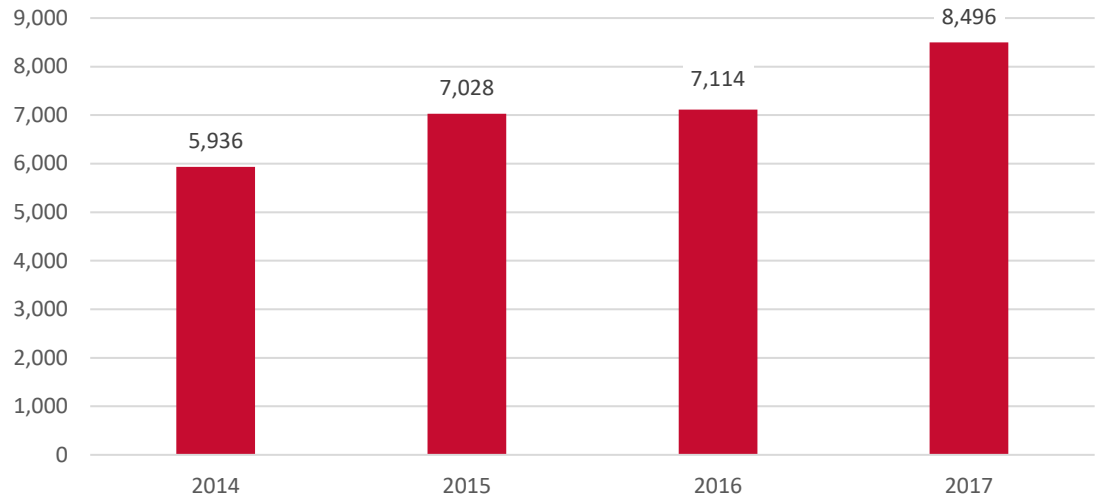



**Figure 4 - Number of West Coast Trail Hikers, 2014-2017**

Reports from the operators of Pachena Bay Campground indicate that as of the past two years the campground has been fully booked all summer. The hotel operated by HFN has recently had occupancy of 75% in the summer months.

The belief of all tourism business operators interviewed is that tourism will increase with an improved road. Specifically, visitors to the Anacla/Bamfield area will increase during the shoulder and winter seasons. The example of Tofino/Ucluelet is illuminating as that region is successful in attracting tourists to visit during the shoulder months during 'storm season', whereas tourists avoid Bamfield during shoulder months, most likely due to the condition of the road.

[12] Kiixin 2017 Pilot Tours Assessment;

# 4 PROPOSED IMPROVEMENT PACKAGE

In 2016, the Huu-ay-aht First Nation retained Arbutus Engineering to develop a preliminary improvement plan for the Alberni-Bamfield Road that focused upon economical improvements to the road surface. The Arbutus Report recommends chip sealing 75km of the currently unpaved roadway at an estimated capital cost of $13.3M. Average annual maintenance and rehabilitation costs are estimated at $1.8M, up from $420,000 to maintain the road in its current condition.

Chip sealing the Alberni-Bamfield Road improves the surface of the roadway from current unpaved conditions but does not address other issues along the corridor such as one-lane bridges, sharp curves, or steeper grades near bridges. Chip sealing has an operational lifespan of 5 years. Surface repair is assumed to occur over a 5-year life cycle.

According to the Arbutus Report, chip sealing the road improves average travel speeds from 30 km/h in the existing condition to 50 km/h, reducing one-way travel time between Port Alberni and Bamfield from 2.5 hours to 1.5 hours, a 40% reduction.

**Table 4 - Anticipated Travel Time Savings of Chip Sealing the Alberni-Bamfield Road**

| Road Condition | Average Travel Speed | Average Travel Time | Travel Time Savings |
|---|---|---|---|
| Current: Unmaintained gravel surface, single lane bridges, present alignment | 30 km/h | 2.5 hr | - |
| Proposed: Hard surface, single lane bridges, present alignment | 50 km/h | 1.5 hr | 1 hr, 40% |

Chip sealing the surface is additionally estimated in the Arbutus Report to save operators of light vehicles on average 20% of vehicle operating and maintenance costs.

The full Arbutus Engineering report, *Proposed Road Improvement Program: Alberni Bamfield Road (2016),* is provided for reference in **Appendix D.**

# 5 MULTIPLE ACCOUNT EVALUATION

A Multiple Account Evaluation (MAE) of road improvements is intended to capture both the quantifiable measures of project cost and direct project benefits, in addition to more qualitative measures of wider scale direct and indirect benefits. Within the MAE, the quantitative measures are monetized to determine the Net Present Value and Benefit/Cost Ratio. The following accounts are assessed:

- Financial Costs
  - Project costs
  - Maintenance
- Mobility
  - Travel time savings
  - Vehicle operation cost savings
- Economic
  - Benefit/Cost ratio
  - Net Present Value
- Visibility
- Road Rideability
- Road Safety
- Tourism Potential
- Accessibility
- Emergency Services
- Goods Transportation
- Fit for Forestry Industry
- Environmental
  - Total GHG reduction

The following is assumed:

- 2017 recorded annualized traffic volumes
- Project costs (construction and maintenance) are as provided in the Arbutus Report (2016).
- Benefit period: 2020-2024 (5 years). A 5-year period was selected as it corresponds to the lifespan of the improvement. A standard provincial discount rate of 6% is employed.
- A conservative approach to traffic growth is taken by assuming a continuation of observed historic growth trends along the corridor. The historic compound annual growth rates of 2.9% between Port Alberni and Franklin Camp and 5.5% between Franklin Camp and Bamfield are used to project 2020 and 2024 traffic volumes.
- As per the Arbutus report, average travel speed is assumed to increase from 30 km/h to 50 km/h; light vehicle operations costs are assumed to reduce by 20%.

## 5.1 Economic Evaluation

**Table 5** presents results of the economic analysis of chip sealing the Alberni-Bamfield Road. The economic evaluation considers the financial costs as well as the mobility and vehicle operating benefits to light vehicles to develop an overall Net Present Value (NPV) and Benefit/Cost ratio (B/C). Key economic indicators such as Net Present Value (NPV) and Benefit/Cost Ratio (B/C) reflect a 5-year analysis period and a 6% discount rate.

Overall, chip sealing the Alberni-Bamfield Road results in an *economic net benefit to the area with a Net Present Value of $1.15M and Benefit/Cost ratio of 1.1 over 5 years.* The economic analysis is based on

current (2017) traffic volumes and 5-year historic growth. **The results are conservative in that they do not take into consideration traffic growth above historic rates that may result due to chip sealing, which would result in additional benefits.**

Road improvements are anticipated to result in *increases in operating speed from 30 km/h currently to 50 km/h, resulting in approximately 1 hour of travel time savings per vehicle per direction.*

- Over a 5-year period this results in approximately 140,000 hours of travel time saved for both cars and trucks along the corridor.
- According to 2018 BC Ministry of Transportation default values, this represents $13.7M of travel time savings over a 5-year period assuming current traffic and historic growth rates.
- As 75% of the traffic on the road is logging traffic, most of these savings will be incurred by logging operators (i.e. companies will need to pay truckers for one hour less of travel along the road).

Significant vehicle operations cost savings are anticipated as a result of more efficient travel speeds and reductions in personal vehicle maintenance costs for light vehicles resulting in savings totalling $6.0M over 5 years.

**Table 5 - 5-Year Benefit-Cost Summary**

| | Port Alberni – Franklin Segment | Franklin – Bamfield Segment | Full Road |
|---|---|---|---|
| **Financial Account** | | | |
| Capital Cost (PV) | $6,263,547 | $6,785,509 | $13,049,057 |
| Maintenance (PV) | $2,649,397 | $2,847,340 | $5,496,737 |
| Salvage Value (PV) | $ - | $ - | $ - |
| ***TOTAL INCREMENTAL COST (PV)*** | ***$8,912,944*** | ***$9,632,850*** | ***$18,545,794*** |
| **Customer Service Account** | | | |
| Travel Time Savings (PV) | $8,278,075 | $5,381,972 | $13,660,047 |
| Vehicle Operation Cost Savings (PV) | $3,723,523 | $2,312,141 | $6,035,664 |
| Safety (PV) | $ - | $ - | $ - |
| ***Total Incremental Benefits (PV)*** | ***$12,001,598*** | ***$7,694,113*** | ***$19,695,711*** |
| **Key Economic Indicators** | | | |
| **Net Present Value** | **$3,088,654** | **-$1,938,736** | **$1,149,917** |
| **Benefit Cost Ratio** | **1.3** | **0.8** | **1.1** |

## 5.2 Non-Economic Evaluation

In addition to the economic evaluation, wider scale direct and indirect benefits of chip sealing the Alberni-Bamfield Road were assessed qualitatively and are displayed in **Table 6.** The qualitative evaluation helps capture social, environmental, and community accounts that cannot be integrated into the economic evaluation, allowing for a broader assessment of pros and cons on which to evaluate the proposed improvement package.

The proposed improvement is expected to result in positive impacts to most accounts. Mixed impacts are anticipated for road safety as well as fit for the forestry industry. The improvements are not anticipated to result in negative impacts to any account.

**Table 6 - Potential Impacts of Improving the Alberni-Bamfield Road**

*( ● - Improved, ⊙ - Limited or Mixed Impact, ○ - Negative)*

| Category | Impact | Impact Details |
|---|---|---|
| Visibility | ● | • Dust minimized |
| Rideability | ● | • Smoother surface, less bumpy |
| Travel time | ● | • Average travel time between Port Alberni and Bamfield reduced by 40% or 1 hour (from 2.5 hours to 1.5 hours) |
| Road safety | ⊙ | • Chip sealing will lead to higher vehicle speeds which may increase collision severity<br>• Chip sealing may reduce property damage collisions due to improved road surface |
| Vehicle operation | ● | • Less wear-and-tear, improved operation efficiency |
| Tourism | ● | • Ease travel for tourists, potential increase for tourism in area<br>• Potential for campgrounds, hotels and resorts to expand<br>• Ease staffing issues (i.e., attract more seasonal staff, attract more staff from neighbouring communities) |
| Accessibility | ● | • Improved for daily travel between Anacla, Bamfield, and surrounding communities<br>• Improved for services travelling to-and-from Port Alberni / Vancouver Island, or between Anacla and Bamfield for social needs related to: mental health, urgent care, medical, dental, specialist care, etc. |
| Emergency services | ● | • RCMP can respond in real time, can provide crime prevention services<br>• Access to hospitals and ambulance services improved |
| Goods transportation | ● | • Time to transport reduced<br>• Cost of goods reduced<br>• Damage to goods reduced<br>• Supports tourism industry development |
| Fit for forestry industry | ⊙ | • Reduced travel time represents a **significant savings** to forestry companies (estimated **$16.7M** of combined travel time, fuel, truck time savings over 5 years).<br>• Reduced wear and tear on vehicles and equipment<br>• **Currently, forestry companies can operate 80 cubic metre vehicles along the road.** Improving the road would require logging companies to use standard 40 cubic metre highway capable vehicles. However, it appears that 80 cubic metre vehicles are being phased out.<br>• Forest Companies have indicated support for the project and have provided letters of support |

| | | |
|---|---|---|
| Environmental | ● | • Annual GHG emissions savings due to chip sealing:<br>  ○ Port Alberni – Franklin Camp segment: 433 T<br>  ○ Franklin Camp – Bamfield segment: 259 T |
| Economic development | ● | • Potential for future economic development opportunities such as LNG at Sarita, new port for Port Alberni Port Authority, increased tourism, increased research and student enrollment at BMSC |
| Property values and taxation | ● | • Improved accessibility would likely result in increased land values and taxation opportunities |
| Indigenous Reconciliation | ● | • Provincial and federal support for road upgrades presents a significant opportunity to advance reconciliation with Huu-ay-aht First Nation |

As highlighted in the above table, stakeholders felt the road would have an important impact on the well being of residents specifically in terms if improved access for services such as medical, dental, mental health, and counselling. Stakeholders also referred to the high costs of basic goods as they are currently being shipped by boat due to the rough surface of the road.

RCMP also referenced the travel time and suggested that it impacted their ability to attend to the Anacla and Bamfield communities. Currently the RCMP are in Anacla/Bamfield on dedicated days, but an improved road would allow them to be a more proactive service.

# 6 ECONOMIC DEVELOPMENT IMPACT

Improvements to the Alberni-Bamfield Road would have a positive effect on the larger economy along the entire corridor of the road. Specifically, it is anticipated that this project would provide a substantial boost to local economic development in the Anacla and Bamfield area. The stakeholder interviews, case studies, as well as a cost-benefit analysis, produced for this study all indicate strong evidence of a positive economic impact. The most significant economic development benefits are expected for the tourism industry, but other positive impacts could include the support for a potential liquefied natural gas (LNG) port to be developed at Sarita, as well as for a trans-shipment port being proposed by the Port Alberni Port Authority.

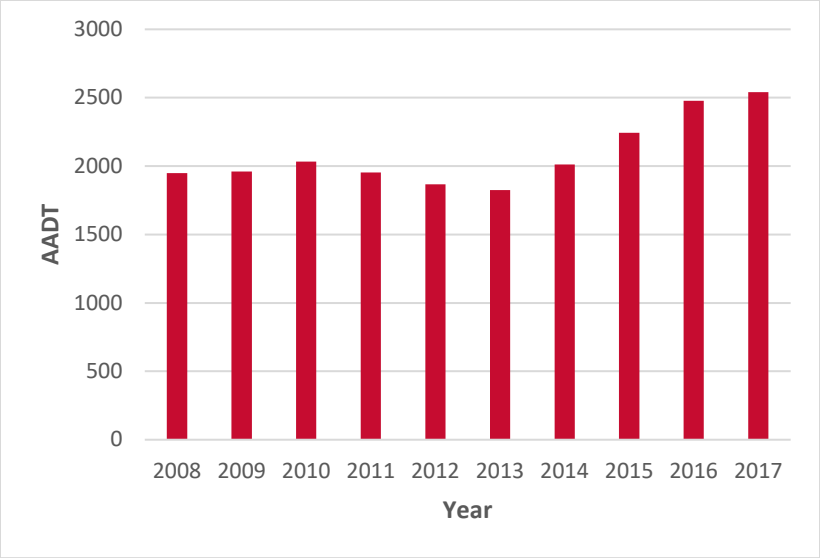
In **Appendix B** other comparable roads / highways that have been improved in BC were profiled. The improvements for these roads are generally much more extensive than those recommended for the Alberni-Bamfield Road. In all cases, growth in the tourism potential and economic development were listed as benefits for improving access. However, the tourism potential for Anacla / Bamfield is likely much more important than most of the reviewed case studies.

## 6.1 Tourism Industry

As mentioned previously, the Tofino and Ucluelet areas are often compared with the Bamfield area as potential draw for tourists. Bamfield provides many of the same attractions as Tofino and Ucluelet including beaches, surf, old-growth forests as well as a pristine coastline and nearby islands suitable for kayak trips.

Destination BC estimates that visitors to Vancouver Island spend an average of $112 per day and stay and average of 3.6 nights. Conversations with Tourism Tofino indicate that visitor spending in Tofino is likely higher than spending from visitors to Vancouver Island in general. In Tofino visitors have many options to spend money, including higher end restaurants, fishing tours, trips to the hot springs, whale watching, surfing lessons and other experiences provided by local operators. Based on the similarity between the communities, it can be assumed that the Anacla and Bamfield area will attract similar spending once the tourism infrastructure in Bamfield evolves, including the creation of additional restaurants, surfing rental / instructing businesses, additional guiding companies, etc.

Tourism Tofino has not tracked visitation numbers and relies on either visitor numbers at the National Parks, or traffic data. The increasing popularity of Tofino/Ucluelet is noticeable from the traffic data, with the following counts occurring east of Tofino Ucluelet junction on Highway 4.




*Source: Ministry of Transportation & Infrastructure*

**Figure 5 - Average annual daily traffic (AADT) along Highway 4, east of Ucluelet Junction**

Since 2013, traffic along Highway 4 has increased by almost 40%, and annualized growth rates are just below 7%. From 2013 to 2017 there are approximately an average of 715 more vehicles travelling Highway 4 every day, or an average annual increase of 179 cars per day.

This growth in traffic symbolizes the increasing popularity of the Tofino / Ucluelet area for visitors, and it is assumed that Bamfield could expect to capture some of this growth if the road was improved.

### Tourism Traffic Growth Impact Estimate

As the tourism sector will likely be one of the main beneficiaries of the improved road, an effort was made to quantify what the impact on the Bamfield economy might be. The economic impact includes the following assumptions:

- Destination BC estimates that all travellers to Vancouver Island spend an average of 3.6 nights on the Island and $112 per night.
  - To be conservative, this impact estimate assumed tourists would spend an average of 2.6 nights in Bamfield, with another night spent elsewhere on the Island.
  - Tourists were only assumed to be travelling to Bamfield during 4 months of the year. This is a conservative assumption.
- Current Average Annual Daily Traffic (AADT) on the Alberni-Bamfield Road is assumed to be 206 vehicles, of which only 52 are passenger vehicles. The remainder are trucks servicing the forestry industry.
- Current estimates indicate traffic along the Alberni-Bamfield Road has been increasing by 5.5% per year.
- It is assumed that after the Alberni-Bamfield Road was improved, the traffic on the road would increase. The improved road was assumed to be completed in 2020.
- It was assumed that 30% of this additional traffic on the road would tourists. The majority of the additional traffic was assumed to be from local Anacla/Bamfield residents, as well as staff and business operators that live in Port Alberni. This is a conservative estimate and the proportion of tourists from the additional traffic could be higher.
- Additional traffic from tourists was assumed to only have 2 people in the car. This is also a conservative estimate.

With these assumptions in mind, three scenarios of increased traffic were created.

- The **low scenario** assumed passenger vehicle traffic would increase 10% beyond the growth expected if the road was not improved. This would equate to 6 extra vehicles per day the year the road was improved and 22 extra vehicles per day 5 years after the road was improved.
- The **medium scenario** assumed an increase in of 20% beyond the growth expected if the road was not improved. This would equate to 12 additional passenger vehicles per day the year the road was improved and 91 additional vehicles 5 years later.
- The **high scenario** assumes an increase of 45 additional passenger vehicles per day. This scenario is based on the growth Highway 4 to Tofino / Ucluelet has seen – which was an increase of almost 180 vehicles per day, each year for the past five years.

**Table 7 - Additional Tourist Spending**

| | Additional Daily Tourist Vehicles | | | Tourist Spending - 4-month season | | |
|---|---|---|---|---|---|---|
| | Low | Medium | High | Low | Medium | High |
| **2020** | 2 | 4 | 14 | $100,000 | $300,000 | $900,000 |
| **2021** | 3 | 8 | 27 | $200,000 | $600,000 | $1,900,000 |
| **2022** | 4 | 12 | 39 | $300,000 | $900,000 | $2,800,000 |
| **2023** | 5 | 18 | 52 | $400,000 | $1,200,000 | $3,600,000 |
| **2024** | 7 | 24 | 64 | $500,000 | $1,700,000 | $4,500,000 |

The above assumptions lead to an estimate where the improved road could bring an additional $500,000 in tourist spending annually after 5 years of a new road to the Anacla/Bamfield region under the low scenario – 7 new tourist vehicles per day during the summer months - which is believed to be too conservative.

The high scenario sees over $4.5 million in additional tourist spending in the Anacla/Bamfield region after 5 years. By 2024 the high scenario assumes 64 additional tourist vehicles per day during the summer months. This level of increased traffic would require significant investment in new tourism infrastructure to capture the associated spending. However, the high scenario reflects a growth in traffic that is only 25% of the growth that the Tofino/Ucluelet area has experienced over the past 5 years.

### Interview Findings

A number of business operators with ties to the Anacla/Bamfield area were interviewed regarding their thoughts on the impact of a new road. The impacts regarding the tourism sector are summarized below:

#### 6.1.1 General Tourism Comments

- Many current visitors to Bamfield arrive by boat, travelling on the Lady Rose, due to fears over the road. Therefore, a road would make the area much more accessible.
  - An improved road would see increases to the number of people driving RV's or hauling boats that visit Anacla/Bamfield.
- It was believed that the Anacla/Bamfield area could become a must visit for tourists, similar to how travelling to Haida Gwaii has become so popular.
- Tourism operators out of Port Alberni take their clients to Tofino / Ucluelet because the road is so hard on vehicles and equipment. The risks of taking the Alberni-Bamfield Road on a regular basis are too high. A new road will increase the number of tour operators that bring groups to the area.
- Businesses in Port Alberni would benefit with an improved road as it would provide them with another destination for their clients and would help establish Port Alberni as a tourist hub with multiple destinations available.
- The recent increases in tourism to Anacla/Bamfield is noticeably driven by people who live on Vancouver Island (Victoria and Nanaimo residents).

#### 6.1.2 Pachena Campground / Accommodations

The Pachena Bay Campground currently includes between 80 – 90 campground spaces and, as of the past few years, reportedly operates at capacity during the summer months.

However, the campground is ready for growth, and already has plans to expand with 200 – 300 new pads with even more room for growth. Many of the additional camping spaces would include services for RV's. It is expected there would be many more RV's travelling the road if it was improved.

The hotel operated by Huu-ay-aht First Nations includes approximately 75 rooms in three separate buildings. These rooms have been operating at 75% occupancy during the summer months in recent years. The buildings are in need of investment, but justifying this investment is currently difficult with the low levels of tourists during the shoulder and winter months.

Other interviews suggested that the cabins available for rent and available resorts all also operate at near capacity during the summer months, with many overflow visitors camping on nearby beaches. Additional accommodation options will be required to meet demand if the road is improved.

Improving the attraction of Anacla/Bamfield during the shoulder and winter seasons is seen as critical for growth of the tourism sector. Currently, tourist traffic slows dramatically once the weather turns due to road conditions. As mentioned previously, Bamfield could attract the same 'storm watching' market that Tofino has done so well to attract.

- Promoting tourism during shoulder seasons and during the winter is highlighted as a goal in Tofino's 2014 Tourism Master Plan.
  - One strategy includes promoting arts and cultural events during shoulder and offseason
  - Both Tofino and its resorts have promoted storm watching as a romantic getaway, and the marketing campaign has been successful.
    - The Wickaninnish Inn had winter occupancy rates of 30-35% in 1996. Winter occupancy rates were 60-65% in 2018.

### 6.1.3 Tourism Preparedness

A number people interviewed expressed concerns regarding the level of tourism infrastructure Bamfield. The Anacla/Bamfield area will require more businesses to cater to the demands of the influx of tourists. This would include:

- Accommodations
- Restaurants
- Gift shops
- Tour operators
- Equipment rental businesses
- Marina space

For example, in Tofino there are 4 canoe/kayak rental businesses, 11 surf and standup paddle board businesses, 12 fish guiding operations, and 25 boutique stores selling clothing or gifts. These types of businesses would need to be started in Anacla/Bamfield to support the increased number of tourists and to capture their spending potential.

In order for the local population to benefit from the expected increase in tourists, these businesses should be started by current residents. If not, much of the benefit of the increased traffic will flow to business owners who are not from the area.

Some people interviewed mentioned the difficulty in finding staff for existing businesses. An improved road would make it much easier for residents of Port Alberni to travel to Anacla and Bamfield for work, which should help ease the staffing issue.

It was also suggested that Anacla/Bamfield should plan for increased tourism by building:

- Outhouses
- Covered seating areas in town – there are currently none on the west side of town
- Expanded parking

### 6.1.4 Indigenous Tourism

In 2017, HFN piloted a program of daily guided tours from the Anacla and Bamfield area to the Kiixin village site. Kiixin is an ancient village, which was commemorated as a National Historic Site in 1999 and is the only known site on the southern coast of B.C. containing undisturbed, standing remains of traditional long houses. The site is accessed via a short hike lead by HFN Knowledge Holders, who teach visitors about HFN history and culture. The pilot tours were offered free of charge to test the feasibility of the business.

In total, 605 guests participated in the pilot tours, most of whom arrived in the Anacla and Bamfield area via vehicle. Visitor surveys indicated high overall levels of satisfaction and 85% of participants suggested they would likely recommend the tour to others.[13] Some guests travelled to the Anacla and Bamfield area specifically for the tour or extended their stay to participate. The Kiixin Tours Assessment indicates that the program provides needed jobs for HFN citizens and generates benefits for other tourism businesses in the region, while allowing HFN to share their culture and history with visitors.

Based on visitor surveys, anecdotal evidence from local businesses, and B.C. tourism data, the assessment concluded that HFN have a unique opportunity to create a cultural tourism program that will create new jobs and economic growth for HFN, the Huu-ay-aht Group of Businesses, and the local area.

Considering the growing demand for authentic cultural experiences in B.C.[14], it can be expected that with improved road access, the Anacla and Bamfield area would be a significant draw for Indigenous tourism such as the Kiixin Tours.

### 6.1.5 Pacific Rim National Park Reserve Access

Pacific Rim National Park is comprised of Long Beach, the Broken Group Islands archipelago, and the West Coast Trail, a popular multi-day hiking route. While Long Beach is located between Ucluelet and Tofino, the Anacla and Bamfield area offers easy access to the Broken Group Islands and is one trailhead of the West Coast Trail.

The Broken Group Islands are accessible by boat. Typically, access is via kayak from the Anacla and Bamfield area, Ucluelet, Sechart Lodge, or Toquaht Nation's Secret Beach Campground. Toquaht Nation recently announced they will be constructing a $1.35 million, 40-slip marina and boat launch at Secret

[13] Kiixin Pilot Tours Assessment, 2017

[14] Aboriginal Tourism Association of B.C.

Beach, which indicates the economic opportunities currently available in the booming West Coast tourism industry.[15]

The northern entry/exit point to the West Coast Trail is at Pachena Bay, in Anacla. Travel blogs suggest parking a car at the southern trailhead, Gordon River, then taking a bus to Pachena Bay to start the trail, ending up back at Gordon River. Although buses also run in the opposite direction, hikers are warned about the difficult road access to Pachena Bay and are cautioned to drive and park at Gordon River instead.

Use of the West Coast Trail has increased over the past 5 years. Parks Canada does not have consistent visitor data for the Broken Group Islands, however, the total number of paid user nights in 2018 is higher than previous years.

## 6.2 Local Economy

There are other local economy impacts that could be expected from the improved road beyond tourism impacts, including:

- More reliable goods shipment. Currently Bamfield receives many of its goods via boat due to the bumpiness of the road.
- The Bamfield Marine Sciences Centre has suggested that an improved road could lead to an expansion of the BMSC campus and allow for an increase in the number of students and researchers.
- It was felt that staffing issues at existing businesses would be improved with an upgraded road.
- Redevelopment or renovations of existing businesses would lead to construction jobs in the community.

## 6.3 LNG Terminal – Transshipment Facility

The Huu-ay-aht First Nations and the Port Alberni Port Authority have been working together to explore opportunities to develop both an LNG Terminal and a transshipment Facility in the Alberni Inlet and Barkley Sound.

The development of either of these opportunities would rely on improving the existing road.

The LNG Terminal, called Kwispaa LNG, would be located at Sarita Bay and the company Steelhead LNG is working to make the project a reality. The project has received export licenses from the National Energy Board (NEB) to export up to 24 million tonnes annually of liquified natural gas for 25 years.

Current plans for the Kwispaa LNG Terminal involve a subsea pipeline that would travel between Powell River and Comox, and plans have been delivered to the BC Environmental Assessment Office. Steelhead LNG believes construction on the project could begin in 2020 and be operational in 2024 – 2025.

The Transshipment Facility has a number of potential locations along the Alberni Inlet, but all would require an improved Bamfield Road. The vision for the transshipment facility would be to reduce pressure for

[15] https://www.westerlynews.ca/business/1-35-million-marina-in-the-works-for-toquaht-first-nations-secret-beach-near-ucluelet/

industrial land in other parts of the Province by providing preliminary sorting and reshipment to other ports throughout the west coast.

The Port Alberni Port Authority currently lobbying the Provincial and Federal Governments, as well as the private sector for funding to move the project forward.

# 7 RESULTS AND CONCLUSIONS

This study looked at the business case for improving the Alberni-Bamfield Road through a few different perspectives. The benefit cost analysis of the road was completed, as well as an assessment of qualitative impacts of upgrading the road. Interviews with key stakeholders were also undertaken to assess the expected economic impacts of improving the road. These interviews also highlighted some of the significant social benefits that an improved road would provide.

In summary, improving the Alberni-Bamfield Road will provide a wide variety of benefits, including the following:

- A positive benefit cost ratio of 1.1 and a net present value of $1.15 million over 5 years.
  - The positive benefit cost ration and NPV stem from creating significant travel time savings and vehicle operating cost savings.
- Significant qualitative benefits, including better access for emergency vehicles, improved visibility, cheaper and more reliable goods transportation, lower greenhouse gas emissions, and much improved accessibility for Anacla/Bamfield residents. The improved accessibility for local residents is seen as critical for improving access to medical and social services.
- Economic development opportunities. An improved road will greatly increase tourism opportunities in the Anacla/Bamfield. The increased tourism will provide these specific benefits:
  - Opportunities to create small businesses catering to the increased number of tourists, providing anything from guiding services, renting outdoor equipment, or gift shops.
  - Create the potential for shoulder and off-season tourism. Currently the deterioration of the road in non-summer months causes a much steeper decline in tourism than Tofino / Ucluelet.
    - Shoulder and off-season tourism will help support the needed renovation of existing accommodation facilities.
  - Resolve the staff shortages experienced by local businesses. Road conditions of the existing road have made Port Alberni residents wary of travelling regularly for work.
  - Increase RV traffic. The Pachena Bay Campground has significant expansion plans that will proceed if the road is improved. An improved road will see the number of RV's travelling to Anacla/Bamfield dramatically increase.
  - Support the Kwispaa LNG and transshipment initiatives being pursued by Huu-ah-aht First Nation and the Port Alberni Port Authority.

Based on all the above factors, there is a strong business case for improving the Alberni-Bamfield Road. For comparison, **Appendix B**, includes case studies of other communities that have seen access upgrades. In most cases the road upgrades were much more extensive than those being considered for the Alberni-Bamfield Road, and do not provide similar opportunities for economic growth.

# APPENDIX A

# Alberni-Bamfield Road Traffic Counts

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# Master Summary

Download as Excel CSV

| Year | Site | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | ADT† | ADT†x365 | Days with data |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2014 | 5-1 Bamfield - Cameron Shop | | | | | *17,567** | 18,423 | 17,712 | 14,663 | 15,143 | 16,828 | 17,386 | 11,957 | 527.378 | *192,493* | 233 |
| | 5-2 Bamfield - China Creek Bridge | | | | | *12,646** | 13,858 | 13,578 | 12,041 | 12,856 | 11,699 | 11,209 | 9,310 | 396.146 | *144,593* | 233 |
| | 5-3 Bamfield - Past Franklin Camp | | | | | *7,619** | 7,191 | 9,352 | 7,842 | 6,830 | 5,445 | *5,644** | 4,655 | 221.728 | *80,931* | 232 |
| | 5-4 Bamfield - Past Central Main | | | | | *3,638** | 3,549 | 5,548 | 5,737 | 3,316 | 2,066 | 2,084 | 1,530 | 111.845 | *40,824* | 233 |
| | 5-5 Bamfield - Pavement - WCT Road | | | | | *4,639** | 4,277 | 6,740 | 7,485 | 4,515 | 2,636 | 2,782 | 2,340 | 144.283 | *52,663* | 233 |
| 2015 | 5-1 Bamfield - Cameron Shop | 14,698 | 14,518 | 17,711 | 16,608 | 18,304 | 19,393 | 18,139 | 16,550 | 17,355 | 16,716 | 16,028 | 13,288 | 546.049 | 199,308 | 365 |
| | 5-2 Bamfield - China Creek Bridge | 9,700 | 9,956 | 11,040 | 12,103 | 12,528 | 14,436 | 15,779 | 16,174 | 13,583 | 9,573 | 12,031 | 7,238 | 394.907 | 144,141 | 365 |
| | 5-3 Bamfield - Past Franklin Camp | 6,408 | 5,562 | 5,789 | 5,749 | 6,853 | 6,412 | 7,921 | 8,688 | 6,838 | 5,426 | 4,749 | 2,994 | 201.066 | 73,389 | 365 |
| | 5-4 Bamfield - Past Central Main | 1,753 | 1,787 | 2,017 | 2,313 | 3,411 | 3,841 | 5,502 | 6,136 | 4,451 | 2,522 | 1,793 | 1,589 | 101.685 | 37,115 | 365 |
| | 5-5 Bamfield - Pavement - WCT Road | 2,345 | 2,309 | 2,588 | 2,942 | 4,480 | 4,803 | 6,917 | 7,635 | 1,377 | 2,468 | 2,310 | 2,121 | 115.877 | 42,295 | 365 |
| 2016 | 5-1 Bamfield - Cameron Shop | 16,211 | 16,962 | 16,585 | 15,585 | 15,205 | 15,217 | 18,210 | *16,582** | *15,721** | 14,586 | 14,565 | 10,448 | 507.006 | *185,564* | 354 |
| | 5-2 Bamfield - China Creek Bridge | 6,881 | 8,613 | 8,522 | 9,999 | 10,817 | 12,149 | 14,363 | 14,656 | 11,967 | 9,385 | 9,140 | 6,735 | 336.686 | 123,227 | 366 |
| | 5-3 Bamfield - Past Franklin Camp | 2,478 | 2,819 | 3,481 | 4,294 | 5,275 | 6,102 | 8,599 | 9,929 | 6,770 | 4,188 | 3,652 | 2,414 | 163.937 | 60,001 | 366 |
| | 5-4 Bamfield - Past Central Main | 1,457 | 1,720 | 2,354 | 2,621 | 3,387 | 4,244 | 6,443 | 6,401 | 4,031 | 2,021 | 1,723 | 1,302 | 103.016 | 37,704 | 366 |
| | 5-5 Bamfield - Pavement - WCT Road | 2,059 | 2,205 | 2,729 | 3,081 | 4,276 | 5,449 | 7,998 | 8,292 | 5,263 | 2,786 | 2,537 | 2,125 | 133.333 | 48,800 | 366 |
| 2017 | 5-1 Bamfield - Cameron Shop | 11,005 | 9,617 | 13,668 | 14,892 | 16,090 | 17,028 | 21,772 | 19,896 | 17,564 | 19,075 | 17,507 | 13,482 | 524.921 | 191,596 | 365 |
| | 5-2 Bamfield - China Creek Bridge | 6,131 | 5,954 | 9,693 | 10,744 | 10,483 | 12,045 | 16,842 | 16,773 | 14,403 | 12,432 | 11,550 | 9,149 | 373.148 | 136,199 | 365 |
| | 5-3 Bamfield - Past Franklin Camp | 2,732 | 2,880 | 4,514 | 4,846 | 6,057 | 7,648 | 10,631 | 11,105 | 8,284 | 6,300 | 5,304 | 5,060 | 206.468 | 75,361 | 365 |
| | 5-4 Bamfield - Past Central Main | 1,354 | 1,402 | 1,920 | 2,188 | 3,532 | 4,644 | 6,397 | 7,467 | 4,406 | 2,552 | 1,902 | 1,744 | 108.241 | 39,508 | 365 |
| | 5-5 Bamfield - Pavement - WCT Road | 2,276 | 2,092 | 3,123 | 3,317 | 4,978 | 6,010 | 8,334 | 9,816 | 6,079 | 3,716 | 2,672 | 2,452 | 150.315 | 54,865 | 365 |
| 2018 | 5-1 Bamfield - Cameron Shop | 17,709 | 17,569 | 19,999 | 18,837 | 20,519 | 21,725 | 22,519 | 17,124 | *15,403** | | | | 630.423 | *230,104* | 267 |
| | 5-2 Bamfield - China Creek Bridge | 11,921 | 9,996 | 13,411 | 14,997 | 14,951 | 17,050 | 17,663 | 14,866 | *14,119** | | | | 472.472 | *172,452* | 267 |
| | 5-3 Bamfield - Past Franklin Camp | 5,383 | 5,953 | 6,783 | 7,202 | 9,221 | 8,475 | 10,807 | 8,248 | *6,876** | | | | 253.082 | *92,375* | 267 |
| | 5-4 Bamfield - Past Central Main | 1,853 | 1,899 | 2,804 | 2,961 | 4,377 | 5,244 | 8,036 | 7,137 | *4,776** | | | | 142.816 | *52,128* | 267 |
| | 5-5 Bamfield - Pavement - WCT Road | 2,613 | 2,658 | 3,585 | 3,710 | 5,503 | 6,141 | 9,806 | 9,304 | *6,038** | | | | 180.337 | *65,823* | 267 |

ADT† = Average Daily Traffic

* = based upon that month's ADT Learn more Indicates months with less than 6 days of data.

# APPENDIX B

# Case Studies

Case studies of comparable road upgrades were completed to gauge potential impacts of improving the Alberni-Bamfield Road. Communities were chosen based on their similarity to the Anacla/Bamfield setting and context, and their experiences with improved access highlighted.

# Tofino

Media, travel articles, and Vancouver Island businesses frequently compare the Anacla and Bamfield area to Tofino.[16] The areas are similarly located and offer comparative recreation and outdoor attractions, such as access to the Pacific Rim National Park Reserve. The Park's Long Beach Unit is located between Tofino and Ucluelet, while the West Coast Trail portion is accessed from the Anacla and Bamfield area. The final portion of the Park, the Broken Group Islands, can be accessed by boat from either area. Tofino's reputation as a pristine forest environment has been a key factor in tourism development for the community.[17] The Anacla/Bamfield area has a similar natural setting.

**Figure A1. Aerial view of Tofino.**



*Image: Dante Aguiar, 2017*

The District of Tofino is home to nearly 2,000 residents.[18] Summer population estimates range from 5,000 – 8,000 with the influx of seasonal workers, a 250 – 400% change.[19] Estimates indicate the

[16] For example, see http://www.tofinotime.com/articles/A-T708-20frm.htm; https://newsinteractives.cbc.ca/longform/people-of-resilience-huu-ay-aht-first-nation-reshapes-vancouver-island-fishing-village;

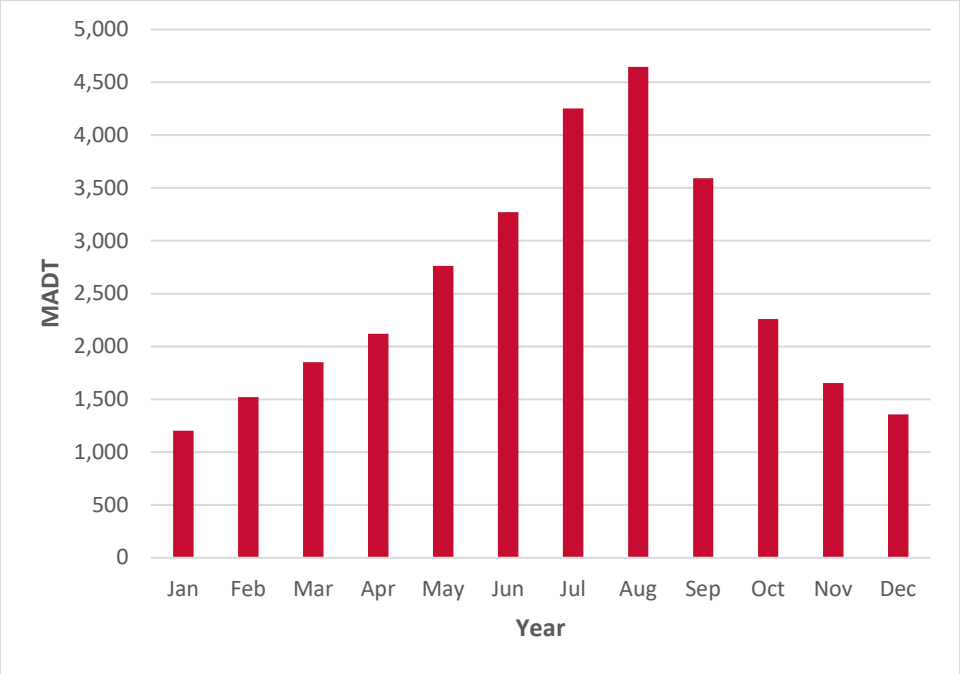
[17] https://open.library.ubc.ca/media/download/pdf/831/1.0090392/1

[18] Statistics Canada, 2016.

[19] Tofino Tourism Master Plan; https://www.cbc.ca/news/canada/british-columbia/tofino-airbnb-rental-motion-passes-1.3493320

Anacla/Bamfield area sees similar but more substantial seasonal fluctuations in population, swelling from 261 to 2,000 people, a difference of over 760%.[20] **Figure A2** shows seasonal variance in traffic Monthly Average Daily Traffic (MADT) entering Tofino, which demonstrates this pattern.

**Figure A2. MADT along Highway 4, east of Ucluelet Junction**




Since the mid 1990s, tourism has grown to become Tofino's major economic activity. This is attributed to a series of factors, including the establishment of the Pacific Rim National Park Reserve, the development of the ecotourism industry in the 1980s, and international media attention from protests in Clayoquot Sound (1984, 1993).[21]

Tofino has seen a steady increase in the number of visitors over the past 15 years (see **Figure A3**). Although there are no official estimates for the number of visitors to Tofino each year, it is possible to approximate based on data from Parks Canada, which has the longest running visitor monitoring program in the area.[22] The figure below estimates visitors to Tofino using visitor data for Long Beach Unit in Pacific Rim National Park Reserve, assuming that 50% of visitors to Tofino visit Long Beach.[23] This is the method preferred by Tourism Tofino, and is referenced in their Master Plan.

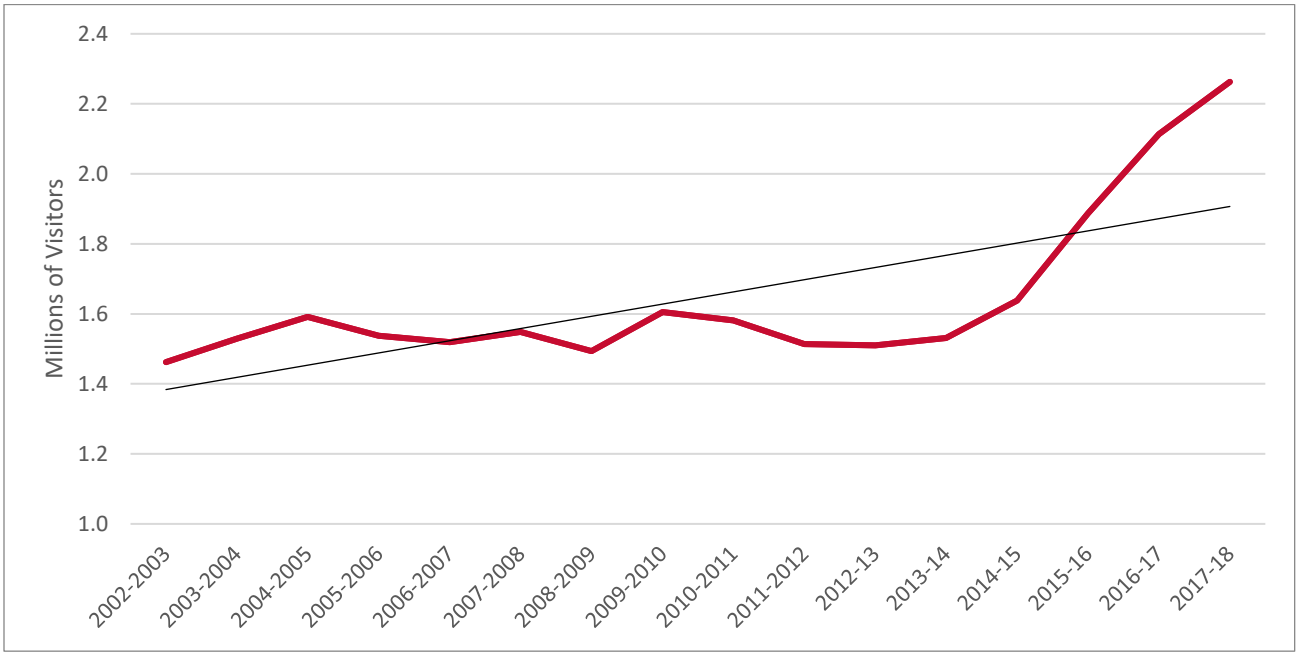
[20] Statistics Canada, 2016; Stantec Consulting Ltd., 2012.

[21] http://www.tofino-bc.com/about/tofino-history.php; https://open.library.ubc.ca/media/download/pdf/831/1.0090392/1

[22] Tofino Tourism Master Plan

[23] Tofino Tourism Master Plan

**Figure A3. Visitors to Tofino based on Long Beach Unit, 2003 – 2018.**




| Key Facts | |
|---|---|
| **Accessibility** | • Logging road from Port Alberni was established in 1959, paved in 1972 following establishment of the Pacific Rim National Park Reserve<br>• Airport with service to Vancouver Island, Vancouver area, San Juan Islands, and the Seattle area<br>• Frequent bus service available from Vancouver, Victoria, and Vancouver Island communities and connects with BC Ferries<br>• Accessible by boat |
| **Community characteristics** | • Approximately 1,932 residents<br>• Fairly easy access from Nanaimo and Port Alberni (located at terminus of Highway 4)<br>• Main industry is tourism (previously forestry and fishing) |
| **Local businesses / services** | • 81 accommodation options ranging from 5-star hotels to campgrounds, plus 281 Airbnb listings<br>• At least 40 food and beverage options<br>• Tours and rentals: 12 fishing, 4 kayak / canoe, 11 surf / stand-up paddle board, zip line, wildlife tours<br>• 4 grocery stores<br>• 3 gas stations and several hardware stores<br>• Approximately 25 boutiques / shops (clothing, gifts, etc.)<br>• Other: spas, yoga studio, fitness options |

| | | |
|---|---|---|
| **Tourism** | **Recreation** | • Pacific Rim National Park access<br>• Surfing, stand-up paddle boarding, kayaking / canoeing, fishing, trails, birding, beaches, camping, whale watching / wildlife viewing, bike trail, gardens, golf, storm watching<br>• Hot springs accessible by water taxi, through tours |
| | **Development (properties)** | • 17 housing units created through "major construction" projects so far in 2018<br>• Sea Otter Place 20 x 1,500 sf townhomes<br>• Tla-o-qui-aht First Nation Container Housing Project (21 affordable units) |
| | **Resorts / campgrounds (some duplication)** | • 5 campgrounds / RV parks<br>• 4 hostel options<br>• 22 inns / B&Bs<br>• 9 motels<br>• 15 resorts / hotels |
| | **Cultural / historical** | • Kwisitis Visitor Centre and Nuu-chah-nulth Trail adjacent (in Pacific Rim National Park Reserve)<br>• Dugout canoe tours<br>• Cultural walks and tours<br>• Tofino Clayoquot Heritage Museum |
| | **Other** | • Spas / wellness |

**Takeaways**

The Anacla and Bamfield area shares many of the characteristics that made Tofino a preeminent tourist destination in B.C. These include: a 'pristine' natural setting; ocean recreation activities; fishing attractions; and, access to Pacific Rim National Park Reserve. Surfing has become an important attraction in Tofino, and the Anacla / Bamfield area also has beaches with good surfing, which will help attract tourists. The Anacla / Bamfield area also have an important research centre and access to the popular West Coast Trail, which Tofino does not.

Compared to Highway 4 from Port Alberni to Tofino, the Alberni-Bamfield Road is 30% shorter, has about the same total change in elevation and has significantly fewer difficult curves and changes in grade.[24] Based on this, it can be inferred that once improved, people would be willing to travel the length and difficulty of the Alberni-Bamfield Road to access tourism and recreation Anacla / Bamfield area.

[24] From Arbutus Engineering report (see Appendix E).

# Lax Kw'alaams



*Image: Darold Massaro, 2016*

Lax Kw'alaams is located approximately 35 kilometres north of Prince Rupert and is home to approximately 820 Tsimshian First Nation residents.[25] Previously called Port Simpson, part of its history is as a Hudson's Bay Company trading post during the 1800's.[26] The people of Lax Kw'alaams have a storied history as musicians, sportsmen, artists, and storytellers with a sense of humour,[27] and the community is involved in the natural resources and energy sectors.[28] Access to this community was recently improved by paving Tuck Inlet Road, the only road access to Lax Kw'alaams.

| Key Facts | |
|---|---|
| **Past accessibility** | • Accessible only by air / boat until 1997<br>• Connection via Tuck Inlet Road (dirt) and ferry from Prince Rupert created in 1997<br>• *Spirit of Lax Kw'alaams* (ferry) runs from Prince Rupert to Tuck Inlet twice daily<br>• Tuck Inlet Road runs from ferry landing to the community<br>• Purpose of dirt road was to improve connections between islands around Port Simpson; connect Lax Kw'alaams and Metlakatla communities by road |
| **Change in accessibility** | • Tuck Inlet Road is 17.5 km long, approximately 40-minute drive<br>• Paved by MoTI in 2016<br>• Road improvements including realignment, bridge replacement, and safety enhancements<br>• Ferry parking lot paved and lit with solar and wind powered lights<br>• Purpose of paving was to improve safety, reliability, and accessibility, especially during the winter months.<br>• Anticipated users are residents / workers, businesses, some tourists |

[25] https://www.tranbc.ca/2017/02/02/upgrading-a-critical-link-to-lax-kwalaams-a-story-in-photos/

[26] https://www.straight.com/article/towns-tides-of-history

[27] http://laxkwalaams.ca/who-we-are/people/

[28] https://www.cbc.ca/radio/checkup/open-for-business-how-the-lax-kw-alaams-first-nation-revitalized-forestry-in-b-c-s-northwest-1.4679852

| | | |
|---|---|---|
| **Community characteristics** | | • Approximately 820 residents<br>• Quite remote – approximately 1 hour 40 min by car and ferry from Prince Rupert<br>• Key industries include forestry, fishing, aquaculture |
| **Local businesses / services** | | • 3 gift shops<br>• 3 accommodation options (hotel, B&Bs)<br>• A couple of restaurants, general store, grocery store<br>• Health clinic, K-10 school, recreation centre, post office |
| **Tourism** | **Recreation potential** | • Kayaking, sportfishing<br>• Wildlife tours by boat, running out of Prince Rupert |
| | **Development (properties)** | • n/a |
| | **Resorts / campgrounds** | • n/a |
| | **Cultural / historical** | • n/a |
| | **Other** | • International media attention in 2015 after refusing a $1-billion offer from Petronas to develop the Pacific North West LNG pipeline, a project which was later cancelled. Main concern was the impact on salmon habitat in Flora Bank. |

**Takeaways**

Paving and improvements to Tuck Inlet Road paving were anticipated by the community for a while before it they were completed. The improvements made the community more accessible for residents and seasonal workers (e.g., for work, groceries, etc.) and makes travel more reliable during the winter months. Overall safety was significantly improved. Lax Kw'alaams operates the ferry, which allows them to control access to some extent.

Since the road was paved, there has not been a measurable increase in tourism – even with international media attention for environmental activism. The community sees some sportfishing, kayaking, and wildlife tours, most of which operate as boat trips out of Prince Rupert.

The most significant community changes occurred when the road was originally built. Paving and improvements did not make a significant difference in traffic, but eased travel for residents / workers. When the road was installed and paired with the ferry from Prince Rupert in 1997, the community was opened up to access by truck, school buses, and more. This improved delivery of important community services (e.g., ambulance, social, police), but overall, access remained challenging until the 2016 improvements.

# Nisga’a Highway 113

The Nass River Valley northwest of Terrace is home to approximately 1,800 Nisga’a residents in four different villages. In 2000, the *Nisga’a Final Agreement* came into effect. One component of the Agreement required the Provincial government to make improvements to the resource road running through the Nass River Valley, to provide access to four Nisga’a villages.



Highway 113 was created by paving and extending the resource road. Since this time, tourism has become more of an industry for Nisga’a, although fishing, forestry, government, health care, and the employment sectors are also significant industries.

| **Key Facts**[29,30] | |
|---|---|
| **Past accessibility** | • 3 of 4 villages accessible via 90 km gravel resource road<br>• No road access to Gingolx; only accessible by boat or plane |
| **Change in accessibility** | • In 2006, the road was brought up to Provincial highway standards and named Highway 113<br>• 120 km total; 90 km of improved road and 30 km of new road to access Gingolx<br>• Safety enhancements, bridge rebuilt and expanded to withstand washouts and allow two-way traffic<br>• Upgrades to existing highway funded by Province; extension funded by Provincial, federal, and Nisga’a governments[31]<br>• Purpose of road was to improve safety and address difficult and dangerous access to Gingolx<br>• Road also intended to offer new economic opportunities for Nisga’a (i.e., ice-free port for shipping forest resources, access to Fishery Bay, access for tourism and recreation opportunities)<br>• Nisga’a monitors road conditions, conducts road checks with RCMP, and reports required maintenance to Province |

[29] http://www.nisgaanation.ca/

[30] http://www.nisgaatourism.com/

[31] https://www.aadnc-aandc.gc.ca/eng/1100100031762/1100100031764#The1

| | | |
|---|---|---|
| **Community characteristics** | | • Approximately 1,800 residents in 4 villages (New Aiyansh Gitlaxt'aamiks is largest)<br>• Less remote – located approximately 2 hours from Terrace via highway<br>• Key industries include fishing and forestry<br>• Growth in government, employment, health care sectors<br>• Tourism has increased in the past 10 years; website http://www.nisgaatourism.com/ |
| **Local businesses / services** | | • Gingolx has local stores, 2 B&Bs<br>• Gitwinksihlkw has grocery store, 2 B&Bs<br>• New Aiyansh Gitlaxt'aamiks has 2 B&B lodges, general store, gas station, restaurant<br>• Elementary school (New Aiyansh Gitlaxt'aamiks)<br>• RCMP detachment, health services, recreation centre, arts and culture centre, post office, community hall |
| **Tourism** | **Recreation** | • Nisga'a Lava Bed Memorial Provincial Park<br>• Hot springs<br>• Suspension bridge<br>• Walking trails, lookouts, picnic areas in communities<br>• Kayaking, boating, sport fishing, public boat launch<br>• Wildlife viewing |
| | **Development (properties)** | • Nass Camp work camp (work camp and campground) |
| | **Resorts / campgrounds** | • 8 B&Bs / lodges<br>• 2 campgrounds |
| | **Cultural / historical** | • Museum, Hli Goothl Wilp Adokshl Nisga'a, with over 300 cultural artifacts and collection of NW Coast aboriginal art<br>• "Autotours" of Nisga'a villages<br>• Cultural longhouse / carving shed, tribal smokehouses and traditional food<br>• Totem poles, Unity Pole |
| | **Other** | • Visitor Centre<br>• Crabfest annual celebration<br>• Seafood, salmon run |

**Takeaways**

Although initiated by requirements in the *Final Agreement,* the creation of Highway 113 was also intended to improve safety and access and to create new economic opportunities for Nisga'a. In 2012, the Nisga'a Economic Development Division identified development of the tourism industry as a priority area and

began planning and promoting tourism of their natural and cultural assets.[32] Highway 113 is a central component of this, as it provides easy and safe access for tourists. “Autotours” of the Nisga’a villages, construction of a museum (opened 2011), and use of the parks and campgrounds have been facilitated by the new road. Nisga’a now has a dedicated tourism website and the communities are promoted on the Destination BC website.[33] Nisga’a, the Province, and the RCMP work together to patrol and maintain the highway.

[32] https://www.sauder.ubc.ca/Faculty/Research_Centres/Centre_for_Social_Innovation_and_Impact_Investing/Core_Themes/First_Nations_Economic_Development/Nisgaa_Tourism_Strategic_Planning

[33] https://www.hellobc.com/road-trips/nass-valley-and-lava-beds/

# Klemtu Ferry

Klemtu is a small, remote village of approximately 420 residents, including the Kitasoo and Xai'xais people. It is located on Swindle Island, in the Great Bear Rainforest. A coastal steamer service ran to the village during the 1870s. Now, it is serviced by BC Ferries on the Inside Passage Route.[34] Improvements to the ferry terminal in 2011 enabled the community to accommodate a 638-passenger vessel, opening up economic opportunities, and helping residents travel more easily to access services.



*Image: Werner Baver. 2017*

Kitasoo / Xai'xais economic development focuses on sustainable eco-tourism, wildlife viewing, and cultural experiences in the friendly and peaceful community at Klemtu.[35]

| Key Facts | |
|---|---|
| **Past accessibility** | • No road access – only accessible by boat or air |
| **Change in accessibility** | • New BC Ferries terminal opened in 2011, big enough to accommodate 638 passenger vessels[36]<br>• Part of BC Ferries' Inside Passage Route – 16-hour route, runs year-round with 4 to 5 sailings per month during the winter season, and 9 to 10 per month during the summer season<br>• Terminal improvements included vehicle and passenger ramps and road improvements on-site<br>• Purpose of new terminal is to help residents travel more easily for health care, education, and employment, and to open up economic opportunities, including tourism[37] |
| **Community characteristics** | • Approximately 420 residents<br>• Most remote – Accessible only by boat, Bella Coola approximately 190 km away |

[34] http://britishcolumbia.com/plan-your-trip/regions-and-towns/cariboo-chilcotin-coast/klemtu/

[35] https://www.spiritbear.com/site/culture/community-of-klemtu.html

[36] https://news.gov.bc.ca/stories/klemtu-now-on-tourism-economic-map-thanks-to-ferry-terminal

[37] https://www.tranbc.ca/2012/06/08/klemtu-ferry-terminal-a-winning-collaboration/

| | | |
|---|---|---|
| | | • Key industries include fishing (commercial fishing licenses), aquaculture, forestry, some tourism<br>• Tourism focuses on Inside Passage Route, adventure tourism, wildlife viewing |
| **Local businesses / services** | | • General store, marine fuel station, café, community health clinic, post office[38] |
| **Tourism** | **Recreation** | • Eco-tourism, adventure tourism<br>• Wildlife tours (4 to 7-day packages through Spirit Bear Lodge)<br>• Kayaking, diving, fishing<br>• Camping, hiking<br>• Waterfront boardwalk in village |
| | **Development (properties)** | • n/a |
| | **Resorts / campgrounds** | • Spirit Bear Lodge (est. 2001) offers package tours May to October and corporate bookings during off-season<br>• Some nearby camping accessible by kayak |
| | **Cultural / historical** | • Cultural heritage incorporated in multi-day wildfire tours<br>• Promotes traditional cultural celebrations, art, local culture at community in Klemtu<br>• Cultural feasts |
| | **Other** | • n/a |

**Takeaways**

The community at Klemtu is promoting eco-tourism as a key industry, aided by improved access through BC Ferries' new terminal and the Inside Passage Route. The Kitasoo have "shifted toward eco-tourism and adventure travel because it is sustainable, non-extractive industry option".[39] There are limited tourist amenities in Klemtu (boardwalk, café, kayaking options), but the community runs popular multi-day wildlife / adventure tourism / eco-tours out of Spirit Bear Lodge.

[38] http://britishcolumbia.com/plan-your-trip/regions-and-towns/cariboo-chilcotin-coast/klemtu/

[39] https://klemtu.com/economic-development/spirit-bear/

# Pacific Marine Circle Route: Lake Cowichan to Port Renfrew and Pacheedaht



*Image: Pierre Mariotta, 2017*

Port Renfrew is located 2 – 3 hours by car from Victoria and is home to approximately 300 residents. Previously at the end of Highway 14, a logging road connecting Port Renfrew to Lake Cowichan was improved and paved in 2009, completing a circle route connecting the east and west coasts of Southern Vancouver Island. Throughout the 19th and early 20th centuries, Port Renfrew was a successful fishing and logging community. After an economic lull during the 1980's to 2000's, tourism has emerged as a significant industry.[40]

The traditional territory of Pacheedaht First Nation covers Port Renfrew and adjacent areas.[41] They have seen growth in tourism over the past 10 years similar to Port Renfrew, and recently opened the only gas station between Lake Cowichan and Sooke.[42] The Nation also runs a popular campground located at one end of the West Coast Trail. The communities are similar in setting, proximity to larger Vancouver Island communities, and recreation opportunities to the Anacla and Bamfield area.

The emergence of tourism in the area is in part attributed to paving the final portion of the Pacific Marine Circle Route, among other attractions.

| Key Facts | |
|---|---|
| **Past accessibility** | • Port Renfrew accessible from west coast of Vancouver Island via Sooke on paved, winding single-lane highway<br>• Lake Cowichan accessible from east coast of Vancouver Island via highway out of Duncan<br>• Port Renfrew and Lake Cowichan connected by logging road, approximately 54 km |
| **Change in accessibility** | • Road purchased by the Province in 2004<br>• Straightened and paved in 2009 |

[40] https://www.nanaimobulletin.com/life/port-renfrew-reborn/

[41] http://pacheedahtfirstnation.com/pacheedaht-first-nation-history-and-villages/

[42] https://www.cbc.ca/news/canada/british-columbia/port-renfrew-gas-station-pacheedaht-tourism-1.4397290

| | | |
|---|---|---|
| | | • Purpose was to complete the Pacific Marine Circle Route and create a fully paved circular highway route connecting Victoria, Duncan, Lake Cowichan, Port Renfrew, and Sooke |
| **Community characteristics** | | • Approximately 300 residents, also significant populations in near communities (e.g., Sooke, Lake Cowichan, Duncan)<br>• Fairly easy access from Victoria (winding highway)<br>• Main industry is tourism / recreation (previously forestry)<br>• Only stores, services, and gas station between Sooke and Lake Cowichan |
| **Local businesses / services** | | • General store<br>• Pacific Gateway Marina (60 slips)<br>• Community Centre<br>• Couple pubs, couple seasonal restaurants<br>• Accommodation / restaurant combos<br>• Post office<br>• Elementary school, Pacheedaht building K-12 school<br>• Key industry is vacation rentals<br>• Coast Guard Canada opening a new search and rescue station |
| **Tourism** | **Recreation** | • West Coast Trail access<br>• Surfing, stand-up paddle boarding, sea kayaking, beach<br>• Whale watching, crabbing<br>• Botanical Beach Provincial Park |
| | **Development (properties)** | • Subdivision for 20 single-family houses<br>• Various new and re-developments by Wild Renfrew developments (Wild Coast Cottages 70 strata cabins / vacation rentals)<br>• Vacation rental homes |
| | **Resorts / campgrounds** | • Pacheedaht Campground, upgraded after increased traffic<br>• Fairy Lake Recreation Site<br>• 50-bed hostel proposed<br>• At least 20 small to medium-sized accommodation options (B&Bs, lodges, rental cabins, retreats, Airbnb)<br>• RV Park |
| | **Cultural / historical** | • Trees, including world's largest Douglas fir – Port Renfrew reputation as "tall tree capital of Canada" |
| | **Other** | • Scenic drive |

**Takeaways**

Since the logging road between Port Renfrew and Lake Cowichan was paved in 2009, completing the Pacific Marine Circle Route, there has been noticeable growth in the Port Renfrew and Pacheedaht

communities. This growth has shifted what was once a logging and fishing economy to one based on outdoor recreation and adventure tourism.[43] Most growth has been in vacation rentals and accommodation options. Some property developers have begun to build vacation cottages (e.g., Wild Renfrew) and the community has noticed an increase in tourism from Vancouver Island / B.C. residents and international tourists. Shops and services are still fairly limited but expected to increase significantly in the coming years.

Port Renfrew is developing a master plan for the area, which will include a new town centre with retail shops, a new hotel, suburbs, and more recreation trails. Pacheedaht recently acquired land in nearby Jordan River and has begun community and land use planning processes for their territory.[44]

[43] https://www.timescolonist.com/news/local/jack-knox-port-renfrew-community-reborn-and-it-s-a-gas-1.23090134

[44] http://pacheedahtfirstnation.com/

# APPENDIX C

# Letters of Support

There is broad-based support for improving the Alberni-Bamfield Road, which has been expressed in Letters of Support from a diverse group of organizations. Support for improving the Alberni-Bamfield Road has been voiced from local governments, such as the City of Port Alberni, public organizations, such as the Bamfield Marine Sciences Centre and the Port Authority of Port Alberni, as well as other First Nations and local businesses.

The Letters of Support that have been collected can be provided by Huu-ay-aht First Nations upon request.

# APPENDIX D

# Arbutus Engineering Report

Amendment #3

# PROPOSED ROAD IMPROVEMENT PROGRAM
# ALBERNI-BAMFIELD ROAD
*Final Draft Report*

Prepared for:
Huu-ay-aht First Nations
March 2016



Prepared by:
***Arbutus Engineering***
*Nanaimo BC*

## EXECUTIVE SUMMARY

The Alberni-Bamfield Road runs for 85 kilometres southwest from Port Alberni, connecting communities and forestry operations in the Bamfield and Anacla Village areas to the province's highway network. Traffic along the road was, in 2007, about 550 one-way trips per day in the peak summer season. The eastern 76-kilometre segment of the road is an Industrial Service Road, with most of its right-of-way owned by the Province and a small portion owned by Island Timberlands. Western Forest Products holds the principal permit to use the road for its forestry operations on Crown lands and, as a condition of that permit, Western Forest Products maintains the road. In 2007, Western Forest Products spent about $420,000 on road maintenance, to which the Province contributed about $170,000 in recognition of the public use of the road. The growth of communities in the Bamfield area and the development of properties along the south shore of Alberni Sound have increased light vehicle's share of the traffic on the Alberni-Bamfield Road from less than 10% in 1991 to about 25% in 2007.

Reflecting its historical and principal use, Alberni-Bamfield Road is maintained to an industrial standard with a native soil surface: appropriate for industrial vehicles but barely adequate for light vehicles. The industrial-grade surface makes light vehicles less fuel-efficient, increases the wear and tear upon those vehicles by at least 20% and adds to the difficulty of driving in mountainous terrain. It also forces a travel time between Port Alberni and Bamfield of up to 2.5 hours as light vehicles operate at speeds that are often only half of the posted speed limits. The Bamfield area is sensitive to these direct costs that the road surface imposes upon its users – vehicle costs, travel time, and driving difficulty – as these factors discourage tourists from visiting the area.

This indirect effect – the discouragement of tourism – is particularly significant since the choices that tourists make upon entering the Alberni Valley to travel westward to either Bamfield or to Tofino and Ucluelet are influenced by their perception of the difficulty of driving to these alternatives. Compared to Highway 4 from Port Alberni to Tofino, the Alberni-Bamfield road is 30% shorter, has about the same total change in elevation, has about $^{1}/_{2}$ the number of difficult curves and about $^{2}/_{3}$ the number of difficult changes in grade. The industrial surface of the Alberni-Bamfield Road, however, makes it the more difficult of the two alternatives to drive.

The Huu-ay-aht First Nations commissioned Arbutus Engineering to provide a preliminary version of an improvement plan for the Alberni-Bamfield Road that focussed upon improvements to the 76 kilometres of the road surface that are unpaved. Our informal and preliminary assessment of the road's current characteristics – alignment and grade, brushing and sight-lines, cross-sectional geometry of the base, and drainage – led us to conclude that:

- 39 kilometres could be chip-sealed with no other improvements required;
- 37 kilometres could be chip-sealed and other improvements to the road's geometry safely deferred for the five year life of the chip seal; and,

- 1 kilometre should not be chip-sealed until other improvements to the road's geometry are made.

Our preliminary estimate of all repairs and improvements to bring the Alberni-Bamfield Road to a two lane highway standard is about $120 million plus annual average maintenance and rehabilitation costs of about $1.4 million to maintain that standard. That standard is capable of moving about 5,000 round trips per day, a capacity that is far beyond what is required to accommodate near-term traffic volumes on the Alberni-Bamfield Road. We therefore proffer two options for the first stage of an improvement program as follows:

1. A cost-efficient option that chip-seals the 39 kilometres of the road that do not require any improvements to their current alignment and grade, cross-sectional geometry or drainage; and treats the other 37 currently-unpaved kilometres with a gravel surface appropriate for light vehicles. This option is cost-efficient in that none of the 37 kilometres that require other improvements are chip-sealed until sometime in the future when those improvements can be made. Our preliminary cost estimate for the cost-efficient option, which includes the chip-sealing of 39 kilometres and brushing to improve sight lines along the entire length of the road, is about $7.2 million plus average maintenance and rehabilitation costs of about $1.1 million to maintain the improvements.
2. A cost-effective option that chip-seals 75 kilometres of the 76 kilometres of unpaved road. This option is not cost-efficient in that 37 kilometres of the chip-sealed kilometres will still require other improvements sometime in the future, at which time the chip seal initially installed on that 37 kilometres will have to be removed. The option is cost-effective, however, in that the direct costs and the tourism losses caused by driving difficulty are almost entirely eliminated. Our preliminary cost estimate for cost-effective option, which includes the chip-sealing of 75 kilometres and brushing to improve sight lines along the entire length of the road, is about $13.3 million plus annual average maintenance and rehabilitation costs of about $1.4 million to maintain the improvements.

We recommend cost-effective Option 2 as the first stage in improving the Alberni-Bamfield Road, at an initial cost of about $13.3 million and a subsequent average annual cost of about $1.4 million, shown in the table on the following page. This is, in our opinion, the superior of the two alternatives for the first stage of improvement: for incremental initial costs of about $6.1 million and incremental annual costs that average $0.3 million, the cost-effective option:

- Reduces travel time between Bamfield and Port Alberni from up to 2.5 hours to about 1.5 hours;
- Reduces vehicle operating and maintenance costs induced by the Alberni-Bamfield by about 20%: and,
- Improves the driving experience of the Alberni-Bamfield Road to the point where, instead of choosing to drive from Port Alberni to Tofino, drivers will choose to drive from Port Alberni to Bamfield.

## Table ES-1: Annual Expenditures, 10 Year Program

| ACTIVITY | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Construction Costs** | | | | | | | | | | |
| Brush 76 km | 30,000 | | | | | | | | | |
| Gravel 76 km | 1,231,200 | | | | | | | | | |
| Hard surface 25 km per year | 2,875,000 | 2,875,000 | 2,875,000 | | | | | | | |
| Curve testing | 5,000 | 5,000 | 5,000 | | | | 3,000 | 3,000 | 3,000 | |
| Signing | 12,500 | 12,500 | 12,500 | | | | 6,000 | 6,000 | 6,000 | |
| Reconstruct KM 40 | | | | | | 5,000,000 | | | | |
| Reconstruct 36 km (12 km per yr) | | | | | | | 10,404,000 | 10,404,000 | 10,404,000 | |
| **Construction sub total** | $ 4,136,200 | $ 2,875,000 | $ 2,875,000 | $ - | $ - | $ 5,000,000 | $ 10,413,000 | $ 10,413,000 | $ 10,413,000 | $ - |
| **Construction Soft Costs** | | | | | | | | | | |
| Engineering - 15% of constructio | 620,430 | 431,250 | 431,250 | - | - | 750,000 | 1,561,950 | 1,561,950 | 1,561,950 | - |
| Contingency - 20% of constructio | 827,240 | 575,000 | 575,000 | - | - | 1,000,000 | 2,082,600 | 2,082,600 | 2,082,600 | - |
| **Soft Costs sub total** | $ 1,447,670 | $ 1,006,250 | $ 1,006,250 | $ - | $ - | $ 1,750,000 | $ 3,644,550 | $ 3,644,550 | $ 3,644,550 | $ - |
| **Construction Total** | **$ 5,580,000** | **$ 3,880,000** | **$ 3,880,000** | **$ -** | **$ -** | **$ 6,750,000** | **$ 14,060,000** | **$ 14,060,000** | **$ 14,060,000** | **$ -** |
| **Maintenance** | | | | | | | | | | |
| Brush (3 yr cycle) | - | | | 15,000 | | | 15,000 | | | 15,000 |
| Grading | 420,000 | 280,000 | 145,000 | 10,000 | 10,000 | 10,000 | | | | |
| Surface repair (5 yr cycle) | - | 575,000 | 1,150,000 | 1,730,000 | 1,730,000 | 1,730,000 | 1,470,000 | 1,470,000 | 1,470,000 | 1,750,000 |
| **Maintenance Total** | **$ 420,000** | **$ 855,000** | **$ 1,295,000** | **$ 1,755,000** | **$ 1,740,000** | **$ 1,740,000** | **$ 1,485,000** | **$ 1,470,000** | **$ 1,470,000** | **$ 1,765,000** |
| **ANNUAL EXPENDITURE** | **$ 6,000,000** | **$ 4,740,000** | **$ 5,180,000** | **$ 1,760,000** | **$ 1,740,000** | **$ 8,490,000** | **$ 15,550,000** | **$ 15,530,000** | **$ 15,530,000** | **$ 1,770,000** |

# 1 INTRODUCTION

This report was prepared to assist the Huu-ay-aht First Nations and others in determining the most strategic program for the hard surfacing of Alberni-Bamfield Road. A better road network is essential to encourage growth and development in Anacla and Bamfield. The information offered here is a basis for the conversation about next steps.

To prepare this report, a site visit was conducted in February 2016 and costs were extracted from current Ministry of Transportation and Infrastructure construction cost documentation. Additional costs were sourced from work carried out previously and current industry standards. The program offered is a guide to give order-of-magnitude costing, and, additional engineering work is recommended to refine the cost estimates.

The report contains four sections:

- Proposed program;
- Direct benefits;
- Impedance of a road as a factor in tourism; and,
- Estimated costs.

A map of the road and a line diagram showing the condition of Alberni-Bamfield Road are provided at the end of the document for reference.

# 2 PROPOSED PROGRAM

The goal of this hard surfacing program is to promote an increase in traffic volumes to the communities of Anacla Village and Bamfield. We have chosen to examine the potential for hard surfacing of the road from the perspective of effectiveness only.

One kilometre of road, KM 40 to 41 westbound, has small radii curves, limited visibility, and a narrow driving surface with poor drainage. This one-kilometre section has roadside barrier made up of concrete and metal railings and a very steep cliff on the south side. In this section, the consequence of driver error could be considered very serious. It therefore has been eliminated from the proposed hard surfacing program because it should be reconstructed first.

Long stretches of Alberni-Bamfield Road could be reconstructed to full engineering standards for a posted speed of 60 km/h before hard surfacing. This is the typical process for road improvements and is considered efficient. Efficiency dictates sections of road with less than ideal alignment first be reconstructed then resurfaced. This saves the need for going back later, removing any hard surfacing, completing road reconstruction, and then replacing the hard surface. However, hard surfacing as much as possible now is the most effective way to generate increased traffic volumes.

Adjusting for the one-kilometre section with the steep cliff, the program evaluated here includes hard surfacing approximately 75 km of the total distance of 76 km (98.7%).

The proposed steps include:

- Brushing;
- Curve testing and signing;
- Placement of surfacing gravels; and,
- Hard surfacing.

A line diagram is provided at the end of this report showing the road alignment conditions during the site visit February 20/21 2016, the proposed hard surfacing plan, and the excluded kilometre.

## 2.1 Brushing

Brushing is needed to increase sight distance as much possible. Sight distance is the length of road that is visible while driving; a driver must be able to see not only a road's general characteristics but also its actual surface. For higher speeds, longer sight distances are necessary so drivers are able to identify what is up ahead and respond calmly and appropriately. During the site visit of February 20/21 2016, it was noted that brushing was not carried out consistently along Alberni-Bamfield Road. As part of the hard surfacing program, brushing costs have been included.

## 2.2 Curve Testing and Signing

The comfortable travelling speed of a curve is established by an engineering procedure called ball-bank indicator testing or "curve testing". During testing, the ball-bank indicator is

mounted in a vehicle and readings are taken at different speeds along a curve to determine the comfortable travelling speed for an average passenger vehicle. The ball-bank indicator measures how much lateral force is exerted on the vehicle. In terms of comfort, this translates to how much "slosh" the driver feels when negotiating the curve.

Warning signs advising drivers what the comfortable speed is for the curve are determined based on the difference between the posted speed and the comfortable travelling speed generated by the test. For small differences, less than 10 km/h, curve warning signs are not usually installed. Warning signs are usually installed for reductions of 10 km/h and up.

Curve testing and warning sign installation should take place as soon as possible after hard surfacing. Cost estimates for the testing and signing are included in the program estimates.

### 2.3 Placement of Surface Gravels

Gravel acts like a cushion beneath hard surfacing; it is what allows the surface to bend and flex under the load of vehicles. Gravel comes in a range of diameters and may be specified to exacting measurements to achieve desired engineering goals. The cost estimate in this report assumes surface gravels are properly laid two lanes wide for 76 km prior to hard surfacing.

### 2.4 Hard Surfacing

The surfacing proposed is graded aggregate seal, often called chip-sealing. It consists of graded aggregate – the size of the gravel particle is strictly controlled – combined with an asphalt binder, then spread and compacted in one application on a suitably prepared road bed. Chip sealing costs are about 20% of asphalt, depending on the depth applied, which makes it cost effective for low volume roads. It provides the benefits of asphalt such as improved travel times and reduced vehicle operating costs with much less capital investment. The downside is its limited lifespan. It lasts from three to seven years; the average lifespan of five years has been used for analysis in this report.

# 3 DIRECT BENEFITS

The direct benefits of the first phase of work described above are reductions in travel costs for vehicle operators who use the road in the forms of:

- Reduced travel time in that vehicles will more consistently hold the design speed and posted speed limits of 60 km/h; and,
- Reduced vehicle wear and reduced probability of cosmetic damage from loose aggregates.

These direct benefits will be realised by residents of the Bamfield area, other individuals who own property adjacent to the road along its length, and the industrial users of the road, chief among them Western Forest Products Inc. and Island Timberlands.

## 3.1 Reduced Travel Time

Presently, the Alberni-Bamfield Road surface varies between native soils (dirt and clay), large aggregate, and good quality surface gravels. The west coast of Vancouver Island receives 3.3 m (129 inches) of rain on average ever year. The weather in combination with the gravel surface means the road is heavily potholed throughout the winter and whenever the forest companies are not operating. There are fewer potholes during summer and on the stretches where the road has been thoughtfully constructed. Hard surfacing would generate reduced travel time by eliminating the tedious process of pothole avoidance. It would also permit safer maneuvering around corners, and on and off bridge decks.

Shown in Table 3-1 below are the comparisons between current travel times and estimated future travel times with hard surfacing. Without road improvements, the alignment of the road restricts travel to something less than continuous 60 km/h speeds. There are three options shown: gravel road without improvements (current conditions); hard surfaced road without realignments (proposed); and, hard surfaced road with full reconstruction (future consideration). The comparison shows the proposed hard surfacing program has the potential to provide travel time savings appreciable to the driver.

**Table 3-1: Travel Time Comparison**

| *Road Condition* | *Average Travel Speed* | *Average Travel Time* | *Travel Time Saving* |
|---|---|---|---|
| Current: Unmaintained gravel surface, single lane bridges, present alignment | 30 km/h | 2.5 hr. | ~ |
| Proposed: Hard surface, single lane bridges, present alignment | 50 km/h | 1.5 hr. | 1 hr., 40% |
| Future consideration: Hard surface, two lanes throughout, reconstructed alignment | 60 km/h | 1.3 hr. | 1.2 hr., 48% |

### 3.2 Reduced Vehicle Operating and Maintenance Costs

A literature survey undertaken by Perrin, Thorau & Associates Ltd. for the Huu-ay-aht First Nations indicated that converting the surface of the Alberni-Bamfield Road from the 100% native soil surface that existed in the spring of 2008 into a 100% chip seal surface would save operators of light vehicles on average 20% of vehicle operating and maintenance costs. This is taken from three component savings:

- General vehicle repair: 20% savings
- Tire repairs: 65 – 70% savings
- Fuel: 20 – 30% savings

Given the proportion that each of the costs represents for vehicle ownership, the average savings is calculated to be 20% with a fully hard surfaced Alberni-Bamfield Road.

# 4 IMPEDANCE OF A ROAD AS A FACTOR IN TOURISM

The direct benefits of the first phase of Alberni-Bamfield road improvements, outlined in Section 3 above, will lead to indirect benefits: reduced costs of goods and services in the Bamfield area, increases of visits to the area for tourism and leisure purposes, and improved access to communities northwest of Lake Cowichan. Defining and estimating these indirect benefits are beyond the scope of this review.

Highway engineering can, however, answer one question that is relevant to the economic and social benefits of improving the Alberni-Bamfield Road. Would an improved Alberni-Bamfield Road open up the Bamfield area as a viable leisure and tourism alternative to the Tofino-Ucluelet area? More narrowly defined, would the phase 1 improvements to Alberni-Bamfield Road reduce the impedance of that road to a level about the same as the impedance of Highway 4 west of Port Alberni?

The impedance of a road takes into account all of the factors that drivers consider would cause them to choose not to travel that road: the travel time and cost, as described in Section 3 above; environmental factors such as hours of daylight, precipitation, and fog; and, the difficulty of driving the road. In this section, we compare the impedance of an improved Alberni-Bamfield road to that of Highway 4 west of Port Alberni.

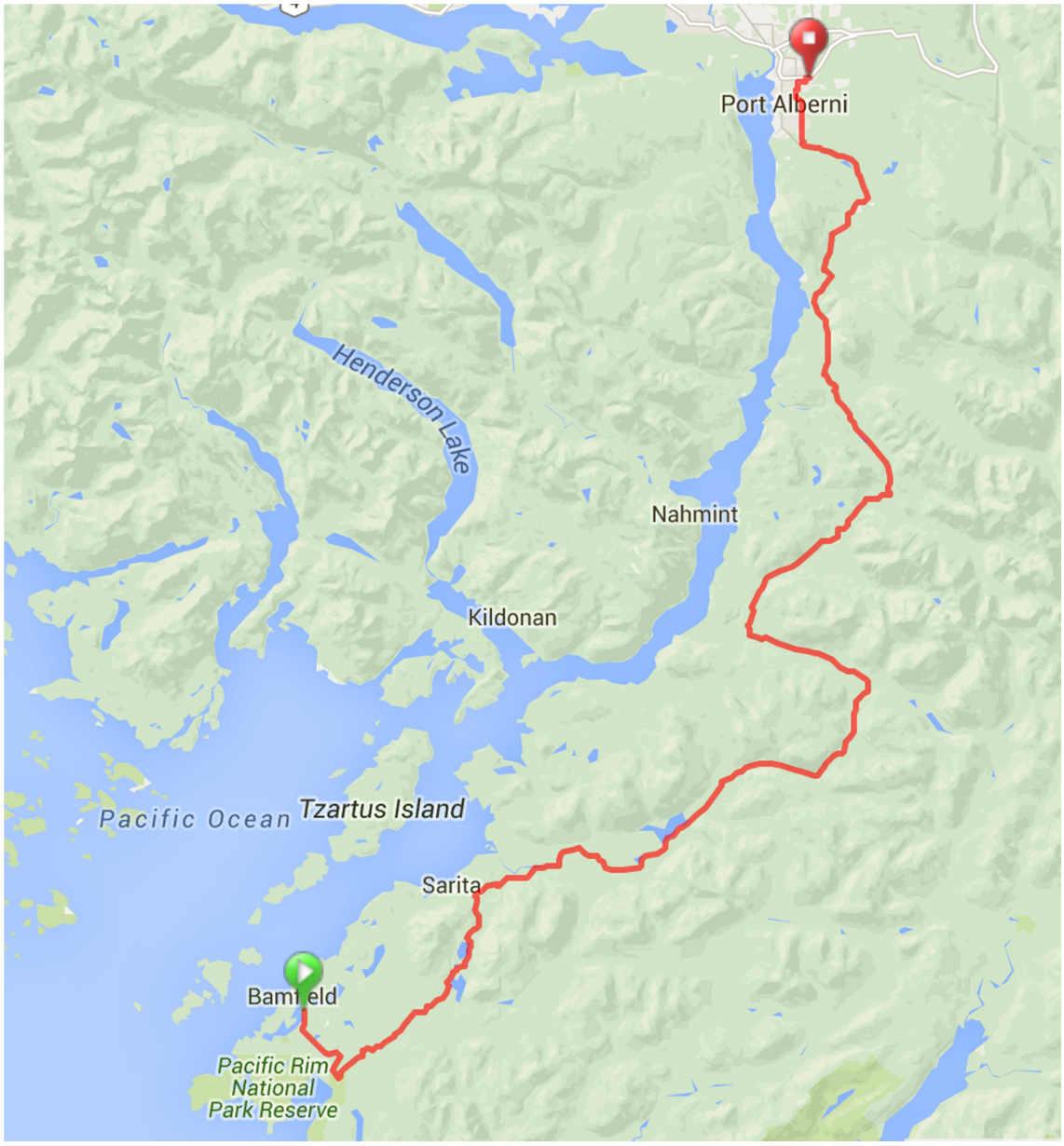
The horizontal alignments (plan views) and the vertical profiles of the two roads are compared Table 4-1 in below.

**Table 4-1: Approximate Alignment and Grade Parameters**

| *All Measures are Approximated* | *Alberni-Bamfield Road* | *Highway 4 West of Port Alberni Highway* |
|---|---|---|
| Centre-line Length, km | 85 | 125 |
| Number of Curves with Significant Speed Restrictions | 40 | 85 |
| Minimum Elevation, m | 10 | 10 |
| Maximum Elevation, m | 400 | 300 |
| Total Elevation Change, m | 1,350 | 1,400 |
| Maximum Grade, % | 14% | 12% |
| Mean Grade of Largest Ascent | 12%[1] | 12%[2] |
| Number of Summits with Elevation Change > 100m | 3 | 4 |

[1] Eastbound, East of Sarita Lake.
[2] Westbound, East end of Kennedy Lake.

The length from Alberni-Bamfield Road is about 30% shorter than Highway 4 to Tofino, measured from the same point of origin east of Port Alberni. The intersection of Highway 4 and the Port Alberni Highway is about 5 km northeast of downtown Port Alberni. The simple of statistic of length conceals, however, the driving difficulties that the horizontal alignment of a road poses; a measure of a road's curvature is required. We take an indicator of curvature, the number of curves on which a speed advisory is posted that is lower than the prevailing speed limit on the segments of either side of the curve.




*Google maps*

**Figure 4-1: Horizontal Alignment, Alberni-Bamfield Road**

The Alberni-Bamfield Road has about 40 such curves whereas Highway 4 west of Port Alberni has about 85 such curves. The two alignments are presented for comparison in Figure 4-1 and Figure 4-2.




*Google maps*

**Figure 4-2: Horizontal Alignment, Highway 4 west of Port Alberni**

Road curvature is directly associated with driving difficulty. Approaching and negotiating a curve requires a driver to alter his or her vehicle's trajectory: he or she must alter the vehicle's direction to follow the line of the curve and, perhaps, also alter the vehicle's velocity. The driver's evaluations and consequent adjustments to steering, power, and braking add to the demands upon the driver and contribute to driver fatigue. That Highway 4 west of Port Alberni requires more than double of number of these driver evaluations and adjustments than the Alberni-Bamfield Road suggests that driver fatigue induced by curves is significantly higher on Highway 4.

The summit of the Alberni-Bamfield Road is about 30% higher than Highway 4 west of Port Alberni; however the sum of all elevation changes on each of the two roads is about equal: between 1350 metres and 1400 metres. This comes from elevation changes on the Alberni-Bamfield Road that are larger but fewer than those on Highway 4 west of Port Alberni. These different patterns in elevation changes – large and few on the Alberni-Bamfield Road versus small and many on Highway 4 west of Port Alberni – are evident in the profiles of the two roads illustrated in Figure 4-3 below.

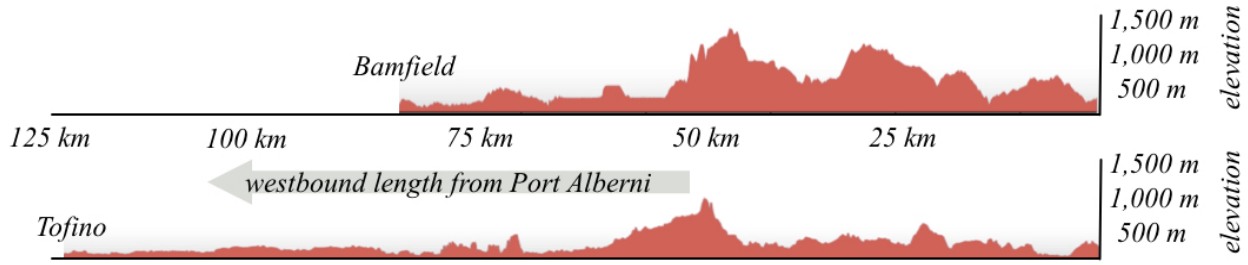



**Figure 4-3: Approximate Vertical Profiles**

Neither elevations nor changes in elevation themselves increase driving difficulty and induce driving fatigue. If a vehicle is ascending or descending on a road at a constant rate climb or descent then the adjustments that the driver must make to that vehicle's power and braking are not significantly greater than those required while driving on a level road. This is why highways in mountainous terrain are, to the extent practical, designed with long segments along which the grade[3] does not change. It is the number of changes in grade along a road that create driving difficulty: each significant change of grade requires the driver to evaluate the change required in power or braking and then make that change to maintain appropriate speed.

There are about 90 changes in grade along the Alberni-Bamfield Road and about 125 changes in grade along Highway 4 west of Port Alberni. Figure 4-4 below shows the estimated[4] grades along the two roads on an equivalent scale of horizontal distance.

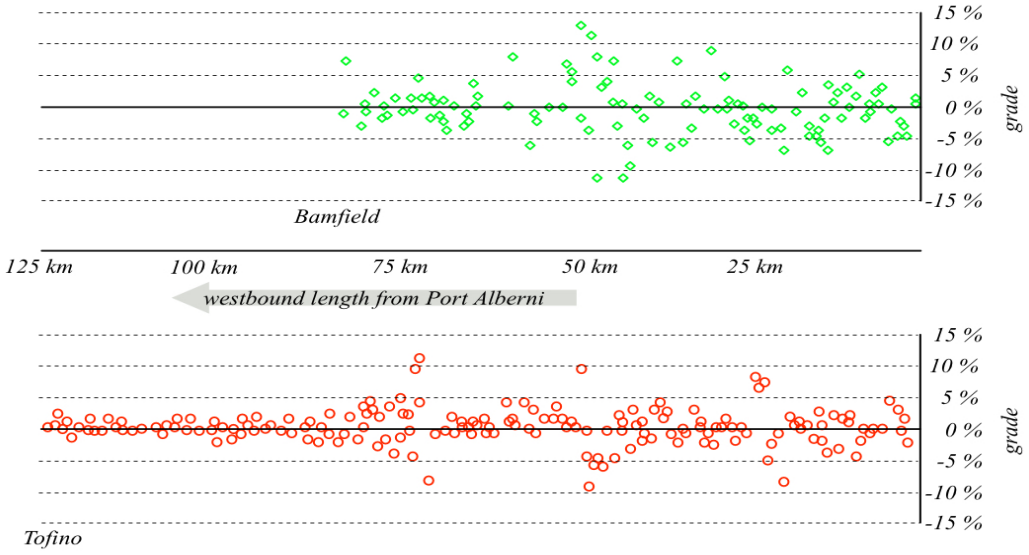



**Figure 4-4: Approximate Grades**

[3] Grade is a numerical measure of the steepness of an incline or decline, expressed as percentage in which the numerator is the number of meters of vertical rise or fall along a number of meters of horizontal run, which is the denominator. A slope with a 45 degree angle would have a grade of 100% (uphill) or -100% (downhill).

[4] Measured by GPS at intervals required to capture grade changes and in no instance greater than one kilometer. Measurements on each road were taken while travelling in a westerly direction.

While the Alberni-Bamfield Road requires drivers to make larger ascents and descents, Highway 4 presents drivers with a larger number of changes from one grade to another.

A simple count of grade changes tends to under-state the contribution of grade changes to driving difficulty and ensuing driver fatigue. Grade changes in excess of 5% or grade changes of changing sign (i.e. changing between "uphill" and "downhill") require significant intervention by drivers and Table 4-2 below indicates that the number of significant grade changes on Highway 4 west of Port Alberni is about 50% higher than number of significant grade changes on the Alberni-Bamfield Road.

**Table 4-2: Significant Changes in Grade**

| *All Measures are Approximated* | *Alberni-Bamfield Road* | *Highway 4 West of Port Alberni Highway* |
|---|---|---|
| Number of Grade Changes in excess of 5% | 55 | 50 |
| Number of Grade Changes between Positive and Negative | 40 | 95 |

Relative to Highway 4 west of Port Alberni, the Alberni-Bamfield Road is 30% shorter, has about $^{1}/_{2}$ the number of difficult curves and about $^{2}/_{3}$ the number of difficult changes in grade.

Once the surface of the Alberni-Bamfield Road has been improved through the work that is proposed in Section  above, it will offer an impedance that is lower than that of Highway 4 west of Port Alberni.

# 5 ESTIMATED COSTS

We were asked to create a 10 year program, where hard surfacing happens in the first three years, and reconstruction is staged after that. For this program, the following components were estimated:

- Brushing, 76 km;
- Gravelling, 76 km;
- Hard surfacing, 75 of 76 km over three years for an average of 25 km per year;
- Curve testing and signing when resurfacing is done;
- Reconstruction of KM 40;
- Reconstruction of the remaining 36 km of road five years after hard surfacing; and,
- Routine maintenance of brushing, remaining gravel sections, and the new hard surfaced sections.

## 5.1 Brushing

Brushing appeared to be an infrequent activity during the site visit February 2016. While unleafed, brush was dense and tall near the roadside. Thus the cost estimate for this activity is conservatively estimated for the first year, and then as it is carried out routinely over a three year cycle, this cost is reduced to average costing. Brushing costs were estimated at $1500/day, a 5-metre swath on each shoulder, and two to three passes to clear accumulated brush and trees in 2016 (Year 1). At 2019 (Year 4) and beyond, costs were reduced by half.

## 5.2 Gravelling

Gravelling was estimated for a 76-kilometre length, two lanes wide (total 12 m) and 75 mm deep. The cost per cubic metre was estimated at $18. This was assumed to be carried out in 2016 (Year 1) for the entire road.

## 5.3 Hard surfacing

Chip seal was assumed for 25 kilometres per year over 2016 – 2018 (Years 1, 2, and 3), and estimated to cost $57,500 per lane-km, assuming a 10m top. The 10m top was assumed in order to accommodate off-road logging truck operation and provide additional surface protection at the road edges. Costs for curve testing and two signs per kilometre were included after each 25-km section of hard surfacing is completed.

## 5.4 Reconstruction of 37 kilometres

KM 40, the section with narrow width and a steep cliff was included for reconstruction at 2021 (Year 6). A place marker of $5M was used as the cost estimate. As no engineering investigation was carried out for reconstruction of this kilometre, this cost estimate needs to be refined and should not be relied upon.

The remaining 36 kilometres were divided into three, 12-km sections for the 2022 – 2024 (Years 7, 8, and 9). Costs were also included for curve testing and signing post-construction of these sections.

## 5.5 Maintenance

Routine maintenance estimated for this exercise included:

- Brushing on a three-year cycle;
- Grading of all 76 km in 2016 (Year 1), 51 km in 2017 (Year 2), 26 km in 2018 (Year 3), and some nominal maintenance of KM 40 in 2019 – 2021 (Years 4, 5, and 6 before reconstruction); and,
- Surface repair on a five year cycle for the chip seal.

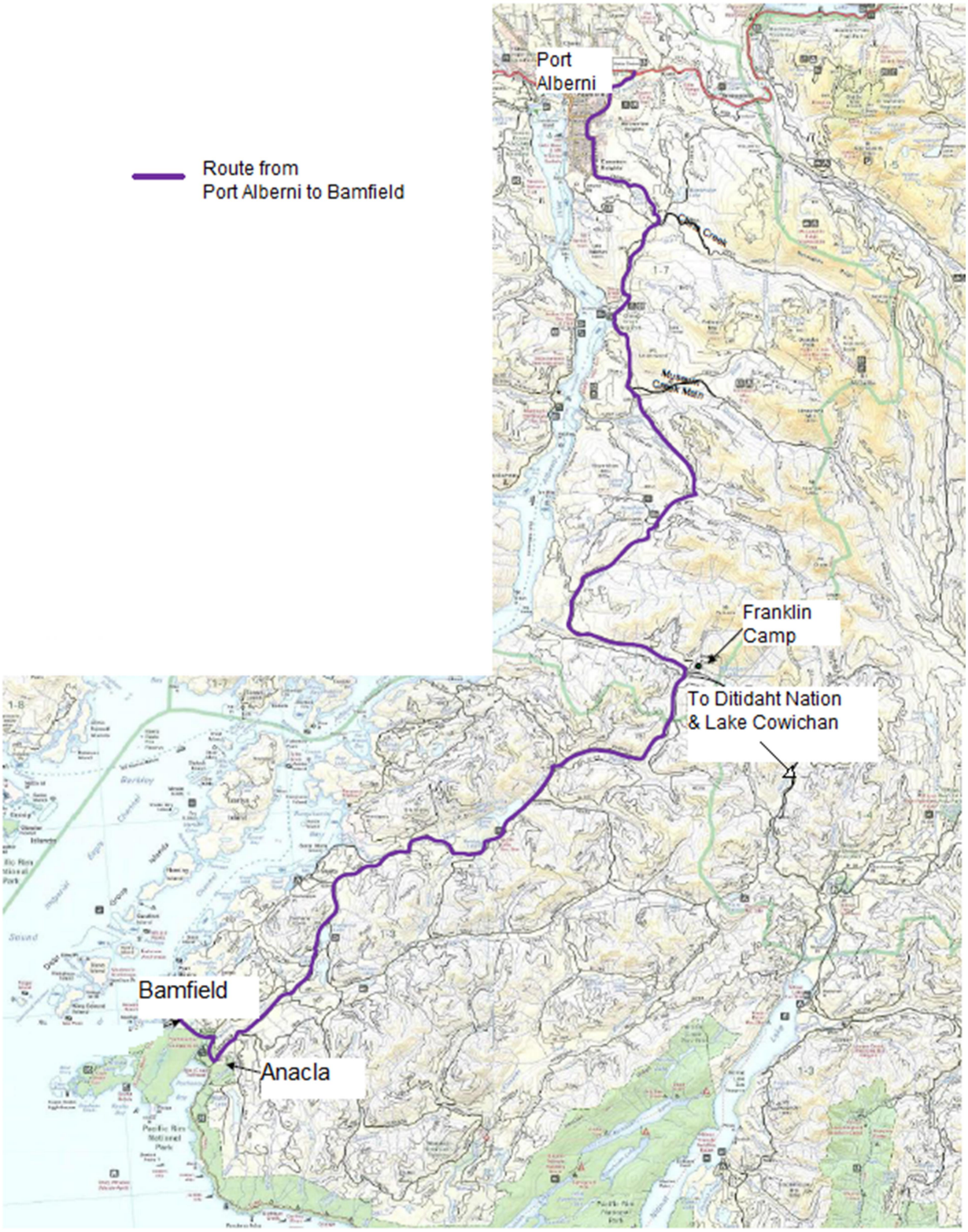
In 2017 (Year 2), the hard surface repair estimate included repair of 1/5 (20%) of the first 25-km hard surface section. In 2018 (Year 3), this increases to 1/5 of 50-km of hard surface, and in 2019 – 2021 (Years 4, 5, and 6), the estimate includes 1/5 of 75-km of hard surface. In 2022 – 2024 (Years 7, 8, and 9), repair is reduced by the 12-km section that is being reconstructed. Thus in 2025 (Year 10), hard surface maintenance includes 1/5 of all 76 kilometres.

The annual expenditures for 2016 to 2025 (Years 1 through 10) are shown below in Table 5-1 on the following page. The proposed three-year hard surfacing program of 75 kilometres is estimated to cost about $5.6 million in the first year, and $3.9 million in the following two years for a construction estimate of $13.3 million.

The annual expenditure reduces to maintenance costs only in 2019 and 2020 (Years 4 and 5), then increases for four years under the planned reconstruction, up to about $15.5 million in 2022 (Year 7). When the improvement program is complete in 2025 (Year 10), the estimate contains only maintenance, $1.8million.

**Table 5-1: Annual Expenditures, 10 Year Program**

| ACTIVITY | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Construction Costs** | | | | | | | | | | |
| Brush 76 km | 30,000 | | | | | | | | | |
| Gravel 76 km | 1,231,200 | | | | | | | | | |
| Hard surface 25 km per year | 2,875,000 | 2,875,000 | 2,875,000 | | | | | | | |
| Curve testing | 5,000 | 5,000 | 5,000 | | | | 3,000 | 3,000 | 3,000 | |
| Signing | 12,500 | 12,500 | 12,500 | | | | 6,000 | 6,000 | 6,000 | |
| Reconstruct KM 40 | | | | | | 5,000,000 | | | | |
| Reconstruct 36 km (12 km per yr) | | | | | | | 10,404,000 | 10,404,000 | 10,404,000 | |
| **Construction sub total** | $ 4,136,200 | $ 2,875,000 | $ 2,875,000 | $ - | $ - | $ 5,000,000 | $ 10,413,000 | $ 10,413,000 | $ 10,413,000 | $ - |
| **Construction Soft Costs** | | | | | | | | | | |
| Engineering - 15% of constructio | 620,430 | 431,250 | 431,250 | - | - | 750,000 | 1,561,950 | 1,561,950 | 1,561,950 | - |
| Contingency - 20% of constructio | 827,240 | 575,000 | 575,000 | - | - | 1,000,000 | 2,082,600 | 2,082,600 | 2,082,600 | - |
| **Soft Costs sub total** | $ 1,447,670 | $ 1,006,250 | $ 1,006,250 | $ - | $ - | $ 1,750,000 | $ 3,644,550 | $ 3,644,550 | $ 3,644,550 | $ - |
| **Construction Total** | **$ 5,580,000** | **$ 3,880,000** | **$ 3,880,000** | **$ -** | **$ -** | **$ 6,750,000** | **$ 14,060,000** | **$ 14,060,000** | **$ 14,060,000** | **$ -** |
| **Maintenance** | | | | | | | | | | |
| Brush (3 yr cycle) | - | | | 15,000 | | | 15,000 | | | 15,000 |
| Grading | 420,000 | 280,000 | 145,000 | 10,000 | 10,000 | 10,000 | | | | |
| Surface repair (5 yr cycle) | - | 575,000 | 1,150,000 | 1,730,000 | 1,730,000 | 1,730,000 | 1,470,000 | 1,470,000 | 1,470,000 | 1,750,000 |
| **Maintenance Total** | **$ 420,000** | **$ 855,000** | **$ 1,295,000** | **$ 1,755,000** | **$ 1,740,000** | **$ 1,740,000** | **$ 1,485,000** | **$ 1,470,000** | **$ 1,470,000** | **$ 1,765,000** |
| **ANNUAL EXPENDITURE** | **$ 6,000,000** | **$ 4,740,000** | **$ 5,180,000** | **$ 1,760,000** | **$ 1,740,000** | **$ 8,490,000** | **$ 15,550,000** | **$ 15,530,000** | **$ 15,530,000** | **$ 1,770,000** |


Route from
Port Alberni to Bamfield
Port
Alberni
Franklin
Camp
To Ditidaht Nation
& Lake Cowichan
Bamfield
Anacla

# ALBERNI-BAMFIELD ROAD
## CURRENT CONDITIONS AND PROPOSED HARD SURFACE PROGRAM

