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ENVIRONMENTAL IMPACT STATEMENT

FOR

PROVINCIAL PRIMARY HIGHWAY NO. 40

9c/

DEPARTMENT
OF THE ENVIRONMENT
GOVERNMENT OF ALBERTA

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November 1, 1972.

To: The Honourable W. J. Yurko, P. Eng.,
Minister of the Environment,
Government of Alberta.

Sir:

The undersigned has the honour to transmit herewith the "Environmental Impact Statement for Provincial Primary Highway No. 40".

The role of the Alberta Department of the Environment, within the context of total function of Government, is to promote a balance between resource management, environmental protection and the quality of life.

This Environmental Impact Statement for 31 miles of the total 700 miles of Primary Highway No. 40 is our first. However, the basic principles outlined above were the guiding criteria which were considered by our staff who collaborated with the Department of Highways and Transport and the Department of Lands and Forests. Their guidance, counsel and detailed work is hereby acknowledged.

Respectfully submitted,

E. E. Ballantyne

E. E. Ballantyne, D.V.M., P.Ag., F.R.S.H.

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APPENDIX I

1. HISTORICAL RESUME

The Kananaskis River was named by Dr. J. Hector, a member of the Palliser Expedition, in honour of a member of the Stony Indian Band Mythology.

The earliest development in the valley was a logging operation by Eau Claire Logging Co. which started in 1883 and continued until 1944. This operator floated his logs to Calgary for sawing.

The first water storage facility in the valley was constructed in 1933 at the Kananaskis Lakes. The Barrier Dam and Power Plant on the Kananaskis River were completed in 1947. The Pocaterra and Interlake Dams and power plants were completed at Kananaskis Lakes in 1955.

The original Federal Forestry Experimental Station was established in 1935. It consisted of 63 square miles but has since been reduced to 23 square miles. The Experimental Station Headquarters and University of Calgary Experimental Sciences Centre are established on a permanent basis beside Barrier Lake on about a 35 acre site with permanent office, labs, classroom and townsite facilities.

A Federal-Provincial agreement of 1947 established the Eastern Rockies Forest Conservation Board whose main objective has been to protect the watershed. Under this Board's direction the road was completed in 1947 - 51 from the end of the coal haul road at Ribbon Creek to Coleman in the Crowsnest Pass.

A coal mine operated at Ribbon Creek by Kananaskis Development Company produced coal between 1947 and 1956. The coal was trucked 15 miles on a road which they constructed or improved for this purpose to Ozada which is on the C.P.R. main line.

The Kananaskis Valley has been used considerably for different types of government and private camps, relief work camps in the 1930's, youth training camps in late 1930's, as well as foreign and national prisoner of war and alternative service camps during the 1940's. Labour from these camps was used to construct forestry trails, roads, camping facilities, etc. Since the last war several filming companies have set up camp in the valley to produce movies.

Recent recreation developments include a 71 lot lake cottage subdivision at Kananaskis Lake in 1955. In 1969 Snowridge Ski development opened with a major lodge and facilities suitable for 1200 skiers per day.

2. ENVIRONMENTAL INVENTORY[1]

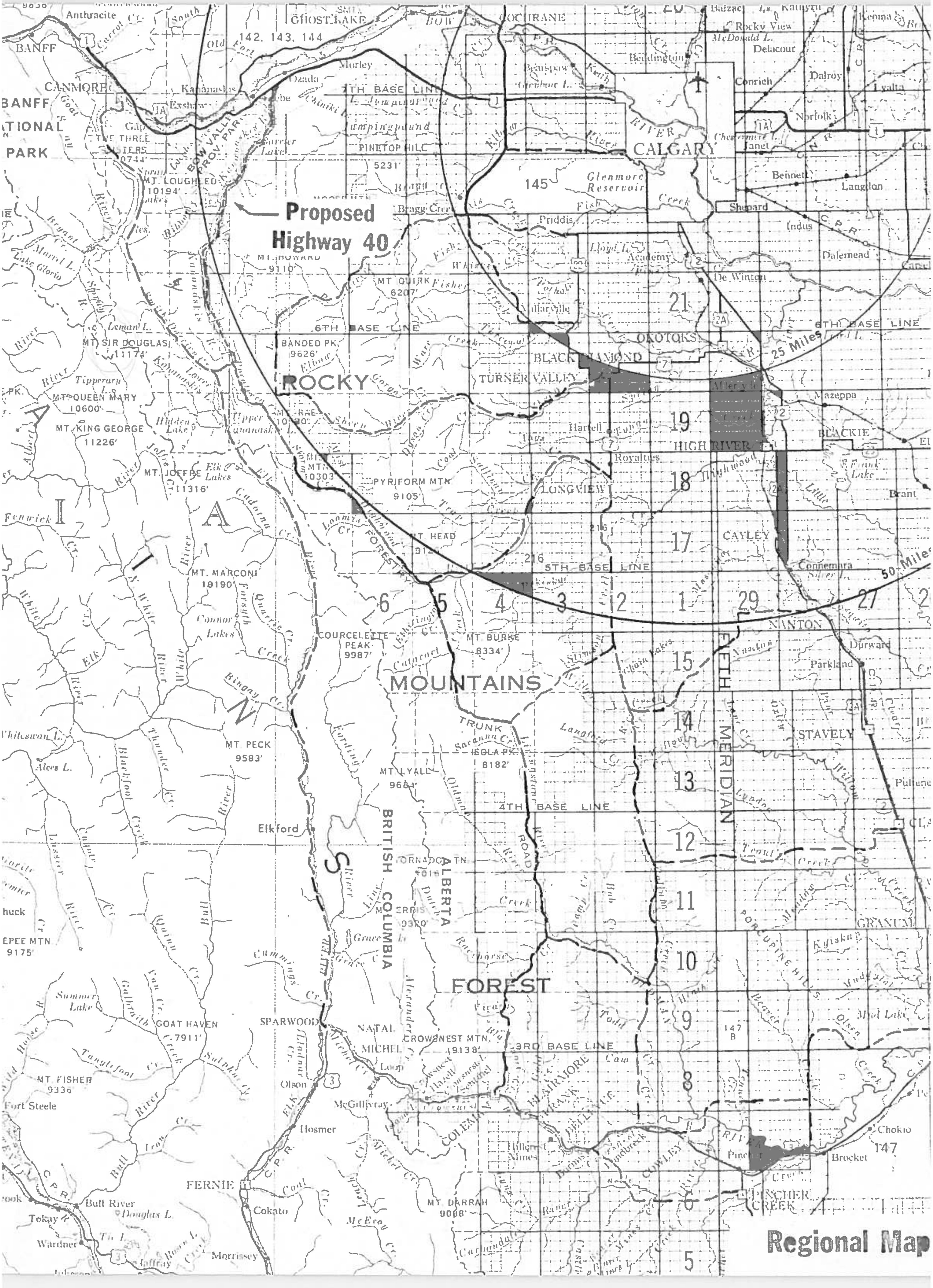
The proposed highway located in the Rocky Mountain Foothills Region, will pass through three separate administrative areas; the Stony Indian Reserve, Government of Canada Experimental Station and the Rocky Mountain Forest Reserve.

In order to rationally identify and evaluate the impact associated with the project a brief description of the main components of the environment of the area is necessary.

Physiography

The proposal follows the Kananaskis Valley, featuring the Kananaskis River and its flood plain confined in an average valley width of two to three miles to the north narrowing to a mere half mile width to the south. The folded glaciated mountain and associated formations confining the valley rise four to five thousand feet above the valley floor. There are numerous

[1]This section is a compilation of material derived from the Lombard North Planning Ltd., Kananaskis Highway Impact Study, and the Department of Lands and Forests Foothills Resources Allocation Study. Phase I - Kananaskis-Spray Drainage Basin.



Regional Map

small tributary valleys with their associated alluvial formations joining the main valley. All culminate in a most striking scenic mountain valley.

Bedrock controls most of the topography with past glaciation giving the main valley its U shaped appearance and together with fluvial activity accounts for the more recent surficial deposits and formations.

Soils

The complex nature of mountainous terrain provides conditions for the formation of a variety of soils. The dominant soil type in the Valley are the Podzols. In general the soils are well drained and erosion resistant but due to their limited fertility and other factors the natural propensity for tree cover to regenerate is limited.

Vegetation

Two vegetation zones are evident, tundra at the higher elevations and alpine conifer at the lower elevations.

In general the lower coniferous forest spreads over the relatively flat terrain of the valley floor and up the north and east facing slopes. In many areas, however, mature forests are lacking due to past fires and intensive cutting. The result is the domination of sub-climax lodgepole pine.

The south and west facing slopes of the river terrain as well as portions of the frequently stream dissected valley floor tend to support grasslands.

Climate

The climate is fairly typical of most mountainous areas, characterized by cool summer winds with average maximum daily and monthly minimum temperatures reflecting only minor differences from the Calgary area. However, significant

climatic differences do occur which is reflected by the number of frost free days. In the valley there are 58 days compared to 110 in the Calgary area.

During the winter months the valley experiences heavy snowfall and periodic chinook winds causing rapidly rising temperatures.

Wildlife

The area has two basic faunal zones, Alpine and Hudsonian Canadian. Indications are, however, that wildlife populations are not abundant and the imposition of man may be one of the more important reasons for under utilization. Of the ungulate population, mule deer may be the most abundant and is generally distributed but favors the high elevations on steep south and west facing slopes.

Fisheries

There are five broad categories of fishery habitats throughout the Kananaskis watershed. A few fisheries are supported by repeated stocking programs. Due to the present water regulation patterns of the hydro-electric developments at the Kananaskis and Barrier Lakes there is little opportunity for the development of a sustained stream community in the Kananaskis River main stream. The upper six miles of the Kananaskis, below Kananaskis Lake, probably stands as the most productive part of the river offering the most consistent fishing. The reservoirs, Barrier Lake and the Kananaskis Lake are presently managed by repeated stocking with rainbow trout. Most angling in these lakes is restricted to boat fishing since shoreline access is frequently encumbered due to expansive used flats exposed after drawdown of water levels as a result of hydro-electric generation.

Drainage

The main drainage feature is the meandering Kananaskis River with its floodplain varying in width from less than a quarter mile to over two miles. Two Calgary Power hydro-electric developments creating the Barrier Lake Reservoir and Kananaskis Lakes Reservoir currently regulate the flow of the main stream.

There are numerous tributary creeks spilling down the valley sides forming alluvial fans at their base.

Internal drainage over the entire area appears to be generally good.

Recreation

To date existing recreation developments include:

- Eau-Clair Campground
- Institutional Camp
- Limited roadside picnic facilities
- Fully developed 71 lot cottage subdivision at Kananaskis Lakes with camping, boating and trail riding facilities
- Snow Ridge ski development built to accomodate approximately 1200 days users
- youth hostel

In addition there is presently a Recreational Reserve in the Evans-Thomas area, but no detailed plans for development have been presented.

The valley offers opportunity for various ecological interpretive activities, fishing, hunting and hiking, many of which are day user activities.

Resources

Presently the resource exploitation of the valley is limited to:

- Calgary Power hydro-electric facility at Barrier Lake
- Calgary Power hydro-electric facility at Kananaskis Lake
- Timber operation in the Mud Lake Area.

There are also mineral extraction claims within the valley but to date none have been developed.

Management and Research

Present uses of the valley for management and research purposes include:

- Alberta Forestry Service Ranger Station
- Government of Canada Forestry Experimental Station
- Environmental Research Station (University of Calgary) in conjunction with the Federal Experimental Station
- Marmot Basin Watershed Research Area

Other

Other uses include:

- Transmission lines
- Forestry trunk road and right-of-way.

3. LAND USE CAPABILITY[2]

The existing Forestry Trunk road has been used primarily by recreationists, as well as the Federal Forestry Research Station, the Alberta Forest Service, Calgary Power Limited and cottage owners at Spray Lakes. In addition there has been some exploration for coal, gas and oil in the northwest areas of the valley. The Foothills Resource Allocation

[2]This section has been extracted from the Foothills Resource Allocation Study Phase I. Preliminary Analysis, May, 1972.

Study Phase I report summarizes the land use capabilities and priorities of the area as follows:

Watershed

The most significant management consideration in the Kananaskis Spray Drainage District, is the watershed condition. Therefore, the Kananaskis Spray Watershed must be recognized as having an exceptional suitability for supplying water and this suitability ought to be a basic concern in management for the entire watershed. This must include a concern for the stability of the surficial material.

Ungulate Range

Ungulate range rates second in terms of abundance and quality. In most cases these ranges are being utilized. Since ungulate habitation, with the proper management, is usually compatible with watershed management, increased emphasis could be placed on programs to increase the sizes of the herds especially on goat ranges and to ensure the continuation of herds on all ranges.

Recreation

Third on this list of resources is recreation. In most cases recreational uses are extensive and non-destructive to other resources. In sites suited to intensive recreational activities such as skiing, well planned developments may be warranted for facilities which exploit the recreational resource while minimizing disturbances to watershed and wildlife.

Forestry

Forestry occupies only fourth place in this drainage district. Despite isolated units of high timber value or even viable sized harvest

blocks this resource ought to be viewed more as a part of the recreational landscape and as a vehicle for watershed and wildlife range maintenance. As such, large scale harvest operations should be discouraged.

Coal

The coal potential of this region needs very careful consideration particularly where it conflicts with the Marmot Basin Research Project. The high watershed values of the Kananaskis - Spray area and the need for watershed research casts serious doubts on the utility of developing coal mining operations at the present time. Any developments which may occur will have to be well planned, well managed and take full account of the region.

Present Land Use

Finally, it is appropriate to emphasize the role and value of present commitments in establishing management guides. For example, hydro-electric development in this drainage district indirectly regulates other developments along the shoreline through the effects of drawdown. In like manner, although the ungulate capability at the Snow Ridge ski development is very high, the recreational complex assumes management preference at the present time.

4. EXISTING FACILITY

The Seebe-Kananaskis Lakes road is presently a part of the Forestry Trunk Road under jurisdiction of the Department of Lands and Forests which continues southward some additional 90 miles terminating at Coleman on primary Highway No. 3.

The existing road is of relatively low standard, varying between 18 and 25 feet in width, with numerous sharp curves and steep grades. It

was originally constructed partly as a coal mine access road and partly as a forest protection access during the years 1947 - 1951.

Maintenance for the most part is carried out by the Department of Lands and Forests, supplemented during the winter months with assistance from Calgary Power.

The existing facility is deficient in many aspects, lacking especially with regards to safety and capacity for present and future traffic volumes.

5. PROPOSED HIGHWAY FACILITY

The proposed highway will be a two lane facility with parking shoulders for a total road surface width of thirty-six (36) feet. The design for vertical (over crest) sight lines, and for horizontal curves and super elevation of curve slopes will permit safe travel for normal highway operating speeds and traffic growth. The design is subject to the restraints common to mountainous topography which will cause the reduction of side ditch width, steeper slopes and some reduced speed zones where necessary.

Specifically the roadway will consist of two 12 feet wide travel lanes and 6 foot wide paved shoulders for stopping purposes.

The highway will provide access to roadside developments and viewpoints by providing adequate sight lines in the design.

Road slopes and right-of-way widths have been selected to promote safety and to permit revegetation. Roadside planting will be selected to be compatible with the surrounding environment.

6. LOCATION CONSTRAINTS

In selecting the location for the route, every attempt was made to adhere as close as possible to the existing Forestry Trunk Road towards minimization of further disruption of the valley environment.

Between 65 and 70% of the new alignment therefore coincides with or incorporates the Forestry Road right-of-way which existed previously.

Some other significant constraints which limited the choice of route were:

1. The requirement that an undisturbed buffer be maintained between the road and the Experimental Station.
2. That the route be maintained clear of interference or disruption of the station's water supply.
3. The route stay clear of the Ranger Station facilities.
4. The physical constraint of the Barrier Dam Reservoir.
5. The location of numerous Forestry Test Plots.
6. The location of several Forestry Camp Site developments.
7. Economic and Environmental limitations of crossings of alluvial fans of tributary streams.
8. Avoidance for public safety reasons of a known avalanche area.

7. OBJECTIVES AND BENEFITS OF THE PROPOSED HIGHWAY

This Environmental Impact Statement deals primarily with the highway between the Seebe area and Kananaskis Lake. When considering the report, it should be kept in mind that this section of highway is not an entity in itself but one link of a projected road improvement program for the western side of the Province.

The primary objective of the proposed highway is to provide a safe, all weather, multiple purpose transportation facility along the foothills corridor. Consequently, the location and engineering components must provide for the projective transporation requirements of the future (20 years and over) to accomodate resource development, tourism, recreation, local residential use as well as inter-regional transportation.

Construction of this highway will ensure citizens of Calgary and other parts of the Province as well as other tourists improved access to recreational areas within a few hours of Calgary who otherwise are denied the privilege because of its limited accessability and hazardous road conditions. This will provide an alternative to existing city, provincial and federal recreational areas within the vicinity resulting in a more equitable distribution of recreationists. In addition, the Province will benefit directly as well as indirectly from the rational resource development of the region.

The statement of objectives for the road are as follows:

1. To service the growing demand for access to new and expanding recreation facilities.
2. To provide service for the existing private, commercial, and institutional and research activities in the area.
3. To complement long range plans of various government objectives to more adequately serve the citizens of Alberta.
4. To integrate with existing forest management access roads thus giving greater mobility and flexibility to these functions.
5. To provide access to a large geographic area and thus disperse recreation over-use from a few existing areas.

8. ENVIRONMENTAL IMPACT

Preamble

The assessment of the environmental impact created as a result of planning, constructing and using a primary highway is extremely complex. Because of the difficulty in quantifying the magnitude and importance of environmental impacts the procedure outlined in the U.S. Geological

Survey Circular 645 (1), is used as a guide. In this chapter those actions which cause the greatest impact are isolated and alternatives or modifications to reduce the magnitude and importance of the impact are recommended.

The preparation of an impact statement requires information on the existing environment and a plan of the proposed action. The state of the existing environment has been well documented in the Kananaskis Highway and Recreation Study by Lombard North Planning Limited. The plan of action is described in the Location Study Report Secondary Road 940-Proposed Primary Highway prepared by the Planning Branch, Department of Highways and Transport. Land use information is also available from the Phase I report of the Kananaskis Spray Lakes Drainage District prepared by the Forest Land Use Branch, Department of Lands and Forests.

Methodology

Appendix I lists the proposed actions which may cause environmental impact along the top, and the existing characteristics and conditions of the environment which may be affected, along the side. Each action has been rated as to magnitude and importance of impact on existing environmental characteristics. Magnitude has been considered on a 1 - 10 scale with 1 representing the least impact and 10 representing the greatest impact. Importance was also rated on a 1 - 10 scale with 1 having long term effects and 10 having the greatest long term effects. Not all impacts are negative, some may be positive (+).

It is essential in this type of analysis that the ratings be done by people experienced and qualified in their respective fields of endeavor. Where possible it is preferrable to have several people in each field discuss the ratings. The Department of the Environment contacted the following agencies to establish ratings and recommend modifications that

would reduce the impact: Department of Lands and Forests, Fish and Wildlife Division; Department of the Environment, Water Resources Division, Pollution Control Division, and the Interdepartmental Planning Division.

A. IDENTIFICATION OF IMPACT AND ANALYSIS OF THE MAGNITUDE AND IMPORTANCE OF THE IMPACT

The greatest impact on land use of the proposed highway is in the order of watershed values, ungulate populations and habitat, recreation, and timber management.

Analysis of the Impact

The actions resulting from the proposed highway construction considered to have the most significant impact on the environment are:

1. Alteration of ground cover
2. Alteration of drainage
3. Highways and bridges
4. Roads and trails
5. Recreation structures
6. Clearcutting and other lumbering
7. Erosion control and terracing
8. Landscaping

Environmental characteristics that will be affected by the above actions are covered under three broad categories:

A. Physical and Chemical Characteristics

B. Biological Conditions

C. Cultural Factors

The Matrix

The following discussion is based on the magnitude and importance

that the above actions of planning, constructing, and using of the primary highway will have on the environmental characteristics.

The project initiates thirteen major activities which will affect forty-four elements of the environment (Appendix I). The following discussion identifies in some detail the major areas of impact and suggests ways of reducing or modifying the impact.

1. Alteration of Ground Cover.

The right-of-way measures from 150 - 200 feet wide and 31 miles long. Depending upon the cut or fill 75 - 90% of the ground cover will be altered. A strip approximately 114 to 164 feet wide along the 31 mile right-of-way will be disturbed and in most cases revegetated. The remaining 36 feet will be paved.

The removal of trees, increased soil erosion, and the loss of wilderness qualities are the most serious long term effects caused by the alteration of ground cover. The availability of scenic views and vistas are increased resulting in a positive impact.

The width of the strip therefore should be kept to a minimum while providing snow storage space and lateral visibility and the topsoil stockpiled for use in seedbed preparation and revegetation.

2. Alteration of Drainage.

The construction of roadside borrow pits tends to concentrate runoff changing the pattern, quantity, and rate of flow below the highway. The construction of fills and the installation of bridges and culverts over existing watercourses also changes the flow pattern immediately above and below the structure. In addition changes in downstream flow rates will affect sedimentation especially during construction.

The proposal calls for a diversion of the Kananaskis River channel

by means of a cut which would divert the river along the west side of the road in the SW 21, Twp. 23, Rg. 8, W6. Culverts would be placed to provide fresh water in the old channel. Any construction within the main river channel creates an impact which has long term affects and therefore should only be done after all alternatives have been considered.

The use of bridges rather than fill and culverts to cross watercourses, along with normal erosion control and revegetation following construction minimizes disturbance of the channel. Bridges and culverts can have significant benefits if designed to create additional pools for fish.

3. Highways, Bridges, and Culverts.

A completed highway, as outlined, in the proposal will make the area readily available to many more people. The major impacts in order of importance are on wilderness qualities, wilderness and open spaces, surface water, land animals, soils and trees. When considering the impact of this project on wilderness qualities the existing trunk road tends to lessen the impact of the new road. The positive impacts are mainly related to the fact that the area will become readily available to all types of recreationists who will be able to enjoy the views and participate in such activities as skiing, hiking, fishing, hunting, camping, and picnicing. It is obvious also that increased numbers of people using the area will have a major environmental impact in itself in that increased pressure will be placed on recreational facilities, roads, and trails in the area. Conversely, it may reduce the impact on existing facilities currently being used.

Landscape design, reforestation, and reclamation of the abandoned trunk road are required to achieve any significant reduction of impact of the highway on the environment.

4. Roads and Trails.

Existing roads and trails in the area will receive increased use

as a result of the highway. There will also be a demand for greater access to wilderness areas and a need for more trails. This increased use will provide recreation to more people but will at the same time increase the environmental impact through increased erosion, sedimentation, depletion of fish and wildlife populations, and degradation of vegetation.

Roads and trails should be kept to a minimum through careful location and use of existing trails to prevent their proliferation throughout the valley. More consideration should also be given to abandonment of existing roads and trails that are subject to erosion or no longer serve the purpose for which they were intended.

5. Recreational Structures.

The present recreational facilities in the area include the Eau Claire campground and Evans Thomas recreational reserve for public use, the Snow Ridge Chalet and commerical ski area, and limited roadside picnic facilities. The Lombard North Limited Study has identified 18 viewpoints along the proposed highway, of which 4 give low potential views, 13 average, and 1 high. The high potential view is located approximately one half mile south of the Kananaskis River diversion. This viewpoint would be of major interest for both camping and picnicing.

The location and design of camping and picnicing facilities will be considerably improved through the application of landscape architecture. The objective would be to locate facilities in areas that provide maximum wilderness enjoyment with the minimum effect on the natural ecology.

Overuse of recreational facilities is a major concern of parks specialists at the present time. The resultant degradation of vegetation, surface features, and water quality, together with the accumulation of litter can diminish the aesthetic qualities of a wilderness area in a short period of time. The operation and maintenance of recreational facilities

therefore must be committed at the planning stage. The planning and development of recreational areas, campsites and viewpoints should be coordinated and be an integral part of the project both in concept and timing.

6. Clearcutting and Lumbering Operation.

Clearing of the highway right-of-way necessitates the removal of all trees and shrubs wherever a cut or fill is required for highway and borrow pit construction. Additional clearing of trees will be required at campsites, viewpoints, and picnic areas.

The impact here is usually total because trees are completely removed, however, the impact can be modified through landscape design and reforestation. Here again it is well to note the importance of land reclamation and reforestation of abandoned trails, roads and the old highway right-of-way. In this way the total loss of trees is considerably reduced.

Timber along the right-of-way should be properly salvaged for commerical use or in the construction of recreational facilities rather than burned; selective cutting and reforestation needs to be co-ordinated by means of an architectural landscape design; and finally the use of chemical sprays for weed and brush control is not a desirable practise in a wilderness type area.

7. Erosion Control and Terracing.

Erosion control consists of the stabilization of exposed slopes and borrow pits by means of seedbed preparation and hydraulic seeding. The ultimate objective is to prevent siltation of watercourses, streams, and lakes that will occur as a result of highway construction. On a primary highway many structures are also required to reduce the velocity of runoff to a degree where vegetation can hold the soil in place. The

structures themselves also require protection from high runoff and this is usually accomplished through the use of rock, concrete, or other special armoring techniques.

The criteria, standards, and practices developed by the Department of Highways in Alberta are quite adequate and are as high a standard as anywhere in North America. The major part of erosion and resulting siltation occurs during construction and therefore is temporary. Watercourses are the most vulnerable and therefore special desilting and erosion control measures should be incorporated during the construction period.

8. Landscaping.

The intent of architectural landscaping is to blend the highway with the surrounding area so that the natural aesthetic qualities of the valley are preserved and enhanced. The landscaping architectural design would include the adjustment of the edge effect of the proposed right-of-way, clearing patterns for viewpoints, picnic areas, and campgrounds, and the design and location of recreational facilities.

The architectural landscape design provides an overview of the highway proposal that can be evaluated, readily and objectively, from the point of view of environmental impact.

The preparation of the landscape architectural design should evolve as a major component of the total highway proposal, based on the highway design and information of the existing ecology of the area.

B. SUMMARY OF ENVIRONMENTAL IMPACT ANALYSIS

There is a clear and distinct alignment of opinions on the one side by those who are charged with the preparation of the highway proposal and on the other by those who are affected by the construction and use of the highway. Both groups have justified points of view based on knowledge

and experience in their field. The impact evaluation has shown specifically how the impact of the actions may be modified to finalize a proposal that could be acceptable to the majority.

The actions of this proposal that have major impacts on the characteristics of the environment are as follows: (1) Highways and Bridges, (2) Recreational Structures, (3) Clearcutting, (4) Alteration of Ground Cover, (5) Roads and Trails, (6) Alteration of Drainage. Actions related to erosion control and landscaping have been evaluated as positive impact which reduce or modify the negative impacts.

The characteristics of the environment that are most seriously altered or affected are widerness and open space qualities, vegetation, soils, land forms, and animals. Characteristics that may be improved primarily because of increased accessability are related to quality of life and cultural patterns through provision of recreational opportunities for more people.

Positive Impacts

1. The attainment of all project objectives.
2. Improve highway safety and traffic flow characteristics.
3. Improved view from the road.
4. The attainment of safe highway egress and ingress.
5. Reduce incompatibility of resource, institutional and through traffic with recreational traffic.
6. Increase of recreational opportunities for more people.
7. Eliminates dust on roadside foliage.
8. Improvement of snow clearance characteristics to facilitate winter transportation.

Negative Impacts

1. Alteration of existing topographic features, exemplified by river diversion.
2. Alteration of present drainage patterns.
3. Erosion and siltation during construction stage and prior to revegetation.
4. Conflict with wildlife grazing.
5. Proximity of route to east shore of Barrier Lake.
6. Improved accessibility leading possibly to overuse of the recreational resource of the valley.
7. Possible higher wildlife kill due to increased traffic.
8. Transfer of diversified land use into one single purpose facility (highway) with a resulting loss of land as surface space for any other purpose. This aspect must be viewed in terms of only those lands additional to the existing Forestry Trunk road right-of-way since much of the proposal follows the existing route.

9. MEASURES TAKEN TO MINIMIZE ADVERSE EFFECT ON ENVIRONMENT DURING LOCATION PHASE

1. Planning studies carried out by use of contour maps made from aerial photos.
2. Helicopters used for control surveys minimizing ground disturbance by vehicles.
3. Minimum handcut lines for survey.
4. Close liason with affected agencies in selection of alignment.

10. MEASURES WHICH WILL BE TAKEN TO MINIMIZE ADVERSE EFFECT ON ENVIRONMENT DURING CONSTRUCTION PHASE

The following are usual or sometimes special steps or practices observed

during construction phases which are in keeping with preserving the environment.

A. Construction Practices.

1. Use of flat side slopes to facilitate revegetation and to minimize erosion.
2. Use of mulching and seeding as soon as possible after construction to promote revegetation.
3. Use of gentle gradients, drainage offtakes, blocks and interceptor to minimize erosion.
4. Borrow pits carefully selected and reclaimed in consultation with Department of Lands and Forests' staff.
5. Use of rock and granular materials in crossing of stream channels to minimize siltation.
6. Culverts rip-rapped to prevent erosion.
7. Culverts placed at proper depth and grade to accomodate fish passage.
8. Interference with stream channels kept to a minimum, stream bank growth retained, and riprap and spurs used for erosion control.
9. Benching and use of offtake flumes, drains, used on large cuts and fills to minimize erosion.
10. Bridge surface drainage collected and directed by pipes or flumes to minimize erosion.
11. Dust control during construction.
12. Road oiling used in first year of construction to reduce dust and erosion until paving is finished.
13. Salvage of merchantable timber.
14. Protection of archealogical sites.

B. Landscaping Practices.

Based on a landscape architectural design showing final edge of right-of-way, viewpoint, and recreational facility design, the following measures will be taken.

1. Salvage of top soil during construction stage for re-use before seeding.
2. Revegetation to control erosion.
3. Provision and preservation of buffer strips.
4. Rounding and shaping of cuts to improve aesthetics.
5. Reclamation and reforestation of the trunk road and other roads and trails throughout the valley that are no longer being used for the purpose they were originally intended.

II. CONCLUDING STATEMENT

This documentation represents a summation of reports and studies undertaken for the Kananaskis Valley relating directly and indirectly to the effects an improved road will have on the environment of the valley. Therefore in addition to the environmental impact study, the report includes explanations and presentations of concerns in the other studies and reports noted above.

The highway will cause some adverse environmental effects which must be weighed against the objectives, goals and benefits accruing to the social and economic well being of the majority of Albertans.

II PROPOSED ACTIONS WHICH MAY CAUSE ENVIRONMENTAL IMPACT

INSTRUCTIONS

1. Identify all actions (located across the top of the matrix) that are part of the proposed project.
2. Under each of the proposed actions, place a slash at the intersection with each item on the side of the matrix if an impact is possible.
3. Having completed the matrix, in the upper left-hand corner of each box with a slash, place a number from 1 to 10 which indicates the MAGNITUDE of the possible impact; 10 represents the greatest magnitude of impact and 1, at least, (no zeroes). Before each number place + if the impact would be beneficial. In the lower right-hand corner of the box place a number from 1 to 10 which indicates the IMPORTANCE of the possible impact (e.g.regional vs. local); 10 represents the greatest importance and 1, the least (no zeroes).
4. The text which accompanies the matrix should be a discussion of the significant impacts, those columns and rows with large number of boxes marked and individual boxes with larger numbers.

I EXISTING CHARACTERISTICS AND CONDITIONS OF THE ENVIRONMENT

			PROPOSED ACTIONS	A. Alteration of ground cover	A. Alteration of drainage	A. Weather modification	A. Burning	A. Surface or paving	A. Noise and vibration	B. Highways and bridges	B. Roads and trails	B. Recreational structures	C. Blasting and drilling	C. Clearcutting and other lumbering	E. Erosion control and terracing	E. Landscaping			COMMENTS
A. PHYSICAL AND CHEMICAL CHARACTERISTICS	1		Mineral Resources							4/2								1	
			Construction material							6/4			4/3					2	
			Soils	5/2	7/4		3/1	2/1		9/6	8/6	6/3		3/2	7/3	6/5		10	
			Land form	5/2				2/1		8/6	4/3	3/2	5/2		8/7	3/3		8	
			Unique physical features							6/4								1	
	2		Surface	7/3	8/7			4/2		9/8	6/8	5/7	2/1	5/2	4/2	7/2		10	
			Quality		6/2					7/2		5/1						3	
			Snow, ice and permafrost	4/4				4/4		5/5		4/4				4/4		5	
	3		Quality (gases, particulates)										4/1					1	
			Climate (micro, Macro)							4/3				3/3				2	
	4		Floods	6/6	6/6			3/2		3/2		4/6			3/2	4/2		7	
			Erosion	7/5	6/5					8/4	6/4	4/3	3/1	4/1	5/5	5/5		9	
			Deposition (sedimentation, precipitation)	6/3	6/2			2/1		8/4	6/4	4/3	3/1	4/3	4/3	5/5		10	
			Stability (slides, slumps)	3/1	3/1					3/2			4/2	4/2	2/1	3/2		7	
			Air movements							4/3				4/3				2	
B. BIOLOGICAL CONDITIONS	1		Trees	9/5	7/3		6/5			9/5	9/5	6/3		8/5	5/4	5/4		9	
			Shrubs	3/2			3/2			7/2	7/2			6/3	3/2	4/2		7	
			Grass	1/1			3/2	4/2		6/2	6/2			4/3	4/3	3/2		8	
			Endangered Species	2/1						2/1								2	
	2		Birds					4/2					7/1	4/1		4/4		4	
			Land animals including reptiles					8/7	6/3	9/7	8/6	5/4	7/1	6/3	3/1	4/3		9	
			Fish and shellfish		6/2					4/2	4/2							3	
			Insects											3/1				1	
			Microfauna											2/1				1	
C CULTURAL FACTORS	1		Wilderness and open spaces	8/7	6/3			9/4	7/4	9/8	9/8	6/5		8/1	7/4	7/7		10	
			Wetlands		5/8					7/8	6/4	4/1			6/3	4/1		6	
			Forestry	6/2						2/2				2/2	6/2	4/3		5	
	2		Fishing	4/1	6/2			2/1		8/2	8/2	5/3	4/1					7	
			Boating							3/3		3/3						2	
			Camping and hiking	3/2	2/1			4/2	5/3	5/3	4/3	6/3	1/1	2/1	3/2	5/4		11	
			Picnicking	3/2	2/1			3/2	4/3	5/4	5/4	4/3	1/1	2/1	2/1	5/4		11	
			Resorts					2/2	4/2	6/4	6/4	3/3	1/1	2/1	4/4	2/2		8	
	3		Scenic views and vistas	6/6	5/4			4/3		6/6	5/5	5/5		8/8	4/4	8/8		9	
			Wilderness qualities	7/7	7/7			4/4	4/4	9/9	8/8	7/7		7/7	8/6	7/7		10	
			Unique physical features	3/2	2/1					3/2	2/2	2/1						5	
			Parks and reserves	3/2	2/1					4/4	5/4	4/4						5	
	4		Cultural patterns (life style)									7/6				6/6		2	
			Employment							6/2		4/4	4/1	3/1	3/1			5	
			Population density							4/4								1	
	5		Structures		3/1			3/1		4/2								3	
			Transportation network (movement access)					6/5		7/6								2	
			Waste Disposal			2/1		2/1			3/2	4/6						4	
D			Salinization of water resources					2/1										1	
			Brush encroachment	4/4	4/3	4/3										3/3		4	
				22	20	2	4	19	7	36	21	24	14	22	19	23			
COMPUTATIONS			MINUS AVERAGE	5.3	5.3	3	5.3	3.6	4.9	6.1	6.1	4.5	3.5	4.4	4.4	4.7			
			PLUS AVERAGE	6			3	4.2	8	6.5	5.5	4.4	4	3.2	4.1	4.5			

IA. 1. Earth, 2. Water, 3. Atmosphere, 4. Process
IB. 1. Flora, 2. Fauna,
IC. L. Land Use, 2. Recreation, 3. Aesthetics and Human Interest
ID. ECOLOGICAL RELATIONSHIPS SUCH AS
IIA. MODIFICATION OF REGIME, IIB. LAND TRANSFORMATION AND CONSTRUCTION
IIC. RESOURCE EXTRACTION , IIE. LAND ALTERATION.