



**Report Title:** Site C Environmental Impact Statement

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**NOTE TO READER:**

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**During Stage 2 of the Site C Project, studies are underway to update many of the historical studies and information known about the project.**

**The potential Site C project, as originally conceived, will be updated to reflect current information and to incorporate new ideas brought forward by communities, First Nations, regulatory agencies and stakeholders. Today's approach to Site C will consider environmental concerns, impacts to land, and opportunities for community benefits, and will update design, financial and technical work.**

SECTION 16.0 - B.C. HYDRO'S APPROACH TO MITIGATION AND COMPENSATION

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## SECTION 16.0 - B.C. HYDRO'S APPROACH TO MITIGATION AND COMPENSATION

### 16.1 INTRODUCTION

With the appeal of the Seven Mile project license in 1975 a formal debate began in British Columbia over the extent to which environmental impacts should be mitigated or, if unmitigable, the amount of compensation for loss or damage that should be paid and to whom the payments should be made. The issues were not new in that major developers, including B.C. Hydro, have made design changes in the past to avoid impacts, and payments have been made which could be interpreted as compensation. What the Seven Mile appeal and subsequent award signalled was a change in both scope and comprehensiveness of the issues.

This change occurred at a time when the Environment and Land Use Committee's (ELUC) Secretariat was in the process of developing Benefit/Cost Guidelines for project evaluation. The Secretariat prepared a report on the impact of the Seven Mile dam upon which the Comptroller of Water Rights' Mitigation Award was based. This report followed in a general fashion the principles outlined in the Benefit/Cost Guidelines. The Secretariat would like to carry the process further by generating a comprehensive policy on compensation and mitigation which the various agencies and crown corporations could agree to follow. A working committee has been established on which B.C. Hydro and provincial resource agencies are represented. Its goal is to present a consistent set of principles based on both recent theoretical work and case examples of resource conflicts.

This section represents B.C. Hydro's present position with respect to mitigation and compensation, and it is intended that these principles form the basis for discussions with resource management agencies and local government. The Environment and Land Use Committee

## 16.1 INTRODUCTION - (Cont'd)

may ultimately adopt policy guidelines which differ in some respect from the ones proposed here. B.C. Hydro's position would be reviewed at that time.

## 16.2 DEFINITIONS AND FRAMEWORK OF EVALUATION

Before discussing the benefit/cost framework and the underlying principles of economic evaluation, it may be useful to present formal definitions of the concepts to be discussed.

### (a) Definitions

#### (i) Mitigation

Mitigation measures may be taken in the planning, design, operation and decommissioning phases of projects to prevent adverse impacts on resources. The cost of these measures becomes part of direct project costs. In principle, mitigation measures should bring about at least as valuable a reduction in resource losses as the cost of the measures themselves. If good information were available on the value of impact reduction then mitigation becomes part of project optimization analysis.

#### (ii) Compensation

Compensation refers to payments or programs for resource losses which cannot be prevented by cost-effective modification of project actions. For example, maintaining stream flows to protect sport fish would be a mitigation expenditure, and money spent on fisheries management or enhancement would be compensation.

16.2 DEFINITIONS AND FRAMEWORK OF EVALUATION - (Cont'd)

(iii) Opportunity Cost

The opportunity cost of a resource is the amount that it could earn in alternative employment; this cost could be different from what is actually paid for it. It is a measure of what society gives up in terms of value in order to employ a resource in a particular use. Value, in economic terms, is measured by the total willingness to pay by consumers for the output produced.

(iv) Social Cost Analysis

Social cost analysis refers to a comprehensive accounting of the opportunity cost of resources. The distinction from private costs is that the latter are accounted from a specific perspective. Resources can be impacted resulting in social costs which may not be taken into account by the private developer and thus may entail no private costs. Thus, a social cost/benefit analysis differs from a private cost/benefit analysis in its comprehensiveness and perspective.

(v) Property Rights and Privileges

Compensation for privately held proprietary interests are not discussed here because these are dealt with under well established legal and administrative rules. The Crown holds most of the resources which might be affected by generation projects, however, and the questions of whether and how compensation should be paid depends on an interpretation of ownership rights. The strictest interpretation would have payments being made to the Crown, that is, the general revenue fund of the province. But the users of Crown resources may also be considered to have notional rights of ownership.

## 16.2 DEFINITIONS AND FRAMEWORK OF EVALUATION - (Cont'd)

Moreover, many environmental and socio-economic resource impacts may have different values depending on how ownership is attributed. The difference lies in the willingness to pay of users if ownership is not attributed, compared to the amount required to make them willing sellers if ownership is attributed.

### (vi) Economic Efficiency

Efficiency is achieved in economic terms by allocating resources to uses where they generate the highest return. Evaluation on strict efficiency criteria need take no account of who earns the returns or where, within the jurisdiction of interest, they are earned.

### (vii) Equity

Equity considerations enter when, in addition to the efficient allocation of resources, we are interested in which groups within a jurisdiction are affected by the allocation. Impacts which redirect income flows from one area to another may have no efficiency consequences but could be significant in terms of the region that is negatively affected. For example, the same number of tourists may visit the province following construction of a project but if fewer visit the project area then regional effects may be significant while provincial effects are negligible.

### (b) The Benefit/Cost Framework

The social benefit/cost framework uses principles of economics to analyze the social desirability of investment projects. Benefit/cost analysis differs from corporate financial

## 16.2 DEFINITIONS AND FRAMEWORK OF EVALUATION - (Cont'd)

analysis in both the types of costs and benefits included and the estimation of those costs and benefits where market prices do not fully reflect value. The provincial document Guidelines for Benefit/Cost Analysis, recommends that results be displayed on three separate accounts: provincial income (efficiency), regional income (equity) and the environmental account. In briefest terms, the provincial income account adds up the social benefits and costs of a project without regard to whom they accrue within the province. The regional income account specifies who gains and who loses and by how much. The environmental account is a description of intangible environmental and socio-economic benefits and costs which cannot be evaluated in income terms. Examples of the latter would be visual and heritage resource impacts.

Where all resources are in private ownership, where markets are reasonably competitive and where no uncontrolled environmental spillovers occur, the expected costs and returns evaluated by the private developer in his investment decision would be no different from costs and benefits evaluated from the public perspective. Design modifications would be made to mitigate the impacts on other resource owners up to the point where additional mitigation costs would be cheaper than paying compensation. Compensation would then be paid for remaining impacts. This would be the natural consequence of the full allocation of property rights.

The social benefit/cost framework is a method for comparing costs and returns as if property rights were well defined and markets worked tolerably well. Any decision to commit crown resources to development should be supported by such an analysis to show, at a minimum, that social benefits would exceed social costs if the development proceeds. The next section examines some of the arguments which have been presented for actually paying

## 16.2 DEFINITIONS AND FRAMEWORK OF EVALUATION - (Cont'd)

compensation once a development has been shown to be economic (including the full social opportunity costs of all the resources used).

## 16.3 THE CASE FOR COMPENSATION AND MITIGATION EXPENDITURES

A case for compensation and mitigation expenditures can be made on grounds of either economic efficiency or equity. Since the environmental account is a description of intangible effects, expenditures that would be justified on this account are difficult to estimate. Thus we look primarily at efficiency and equity. Different implications as to how the expenditures should be made once the amounts have been estimated are reviewed on each account.

### (a) Efficiency Account

Under compensation on the efficiency account, payments would be made by resource developers to the crown to cover the cost of resources used or damaged by a development. The payment structure would ensure that benefits from a project would cover all the costs. Both the developer and agencies with a management responsibility for resources would have an incentive to calculate carefully the value of the impacts.

A second efficiency consideration aided by actual payment is the incentive provided to examine design alternatives to reduce or eliminate the effects at a lower cost than full compensation. Thus both mitigation and compensation expenditures might be better rationalized with a system which requires actual payment.

A third consideration on efficiency grounds is that actual payments would be reflected in the price of the product, and thus the price would include full social costs.



### 16.3 THE CASE FOR COMPENSATION AND MITIGATION EXPENDITURES - (Cont'd)

Efficiency payments for the use of crown resources would not be tied, in principle, to any subsequent program but would simply be paid to general revenue. Payments for forest losses, for example, would not necessarily go to the B.C. Forest Service for further forestry expenditure. Equally, efficiency payments would not necessarily be applied in the region affected. They would be a source of revenue, like any other, to be allocated by the political process to whatever ends are deemed most desirable, including, potentially, a general tax cut.

#### (b) Equity Account

The effects of development projects vary significantly by region and by sub-groups within the population. Expenditures for equity purposes would return some of the economic benefits generated by a project to the regions and groups that lose the most as a result. If environmental resources or social services suffer in a region as a result of a project, then project benefits can be used to redress those damages. For example, the funding provided for a recreation centre at Revelstoke is clearly a compensation payment made on equity grounds.

Equity payments would have two characteristics. They would be made when a community or region suffers relative to the province as a whole, and they would be paid to agencies for the purpose of making compensating investments in the region. Where resources can be evaluated, payments on equity grounds would be guided by the value of the resource affected. Where intangible resources are at issue, such as the quality of life in a community, acceptable payments would have to be negotiated and sanctioned by the political process or surrogate; for example, the community impact committee established as a condition of the Revelstoke water license.

## 16.3 THE CASE FOR COMPENSATION AND MITIGATION EXPENDITURES - (Cont'd)

### (c) Environmental Account

Critics of the benefit/cost framework point out the tendency of items which can be quantified to assume greater importance than intangible consequences which cannot be evaluated. Compensation and mitigation decisions requiring actual outlays of funds are much more readily directed to impacts which can be evaluated. Concern over public health and safety, loss of aesthetic and heritage resources, long term ecological effects, and changes in the cohesiveness of stable communities are examples of real impacts which cannot be quantified but which nevertheless have to be addressed.

Current procedures for dealing with these issues are not very satisfactory. Agencies and communities press for payment, developers resist and there is no common framework for evaluating competing claims. At a minimum it is necessary to be explicit about the nature of the intangible impacts and the intended ameliorating effect of a compensation or mitigation measure. A complementary approach where the long run social costs of impacts are indeterminate would be to establish either a specific fund or a commitment for funding future research and compensation or mitigation based on the findings.

A further implication of this commitment would be to undertake to preserve options for future mitigation or compensation in cases where complete measures could not be justified at the time of project licensing. The preservation of options, where such possibilities exist, differs from the research fund proposal in that it implies taking some action, perhaps small in scale and low in cost, which would facilitate later more comprehensive action should events prove this to be desirable.

#### 16.4 POLICY ISSUES

A number of policy issues arise from the context of the preceding discussion of principles - policy issues pertinent to B.C. Hydro's future practice with regard to compensation and mitigation expenditures.

##### (a) Replacement Cost

A common argument for compensation expenditures is that they should be made in order to replace where possible the physical assets impaired or lost through development. If, for example, several hundred acres of winter range for ungulates are flooded then this approach would hold that management practices should be funded in areas nearby to enable the support of the same amount of wildlife as without the project. This approach ignores the use made of the resource, and thus its value in the economic sense, and is not supportable on either efficiency or equity grounds within the framework of benefit/cost analysis.

The cost of mitigation or compensation actions which would fully replace a particular resource is useful information in that it represents an upper limit to a developer's liability. But, clearly, if the value of the resource is less than the cost of full replacement, it is this value which should guide compensation and mitigation decisions.

##### (b) Compensation for Development Foregone

Pressure to compensate for resources used in development has produced the opposite argument in favour of compensating developers for foregoing opportunities. The most obvious example in B.C. Hydro's case is the virtual taboo on Fraser River generation projects. Should electricity users be compensated by, in this case, the salmon fisheries industry for substituting more expensive projects? Some analysts have dismissed this out of hand saying that the compensation issue does not arise unless and until

#### 16.4 POLICY ISSUES - (Cont'd)

an alteration of the natural environment is proposed. But this view is not consistent with the framework laid down in the province's Guidelines for Benefit/Cost Analysis and it is worthwhile to develop the argument more fully to gain an appreciation of the issues involved.

The decision not to develop a resource for a particular purpose, even if only an implicit decision, entails a consideration of the potential costs and benefits involved. In the case of Fraser generation the implicit evaluation places a higher value on the salmon fishery and natural resource amenities of the Fraser River than on hydroelectric development. That is, in principle, the value of the resource in its present state is deemed to be higher than in an alternative, developed state. While some might doubt that this conclusion could be empirically demonstrated it nevertheless implies that the opportunity cost of the resource, its value for hydroelectric and flood control purposes, could be paid and still show a net benefit to remaining in its undeveloped state. To argue that the compensation issue does not arise in the absence of a development initiative is to assign a right to one state that is denied another. The analytical framework within which these arguments are presented, however, treats all provincial resources and the uses to which they can be put as equivalent with no use having a pre-eminent right.

##### (c) Mitigation for Efficiency

Mitigation measures might be undertaken for either efficiency or equity reasons. Once a particular development has been demonstrated to be economically desirable in terms of provincial resource use there remains the issue of whether some development benefits should be foregone in order to secure other benefits. If benefits are produced by, for example, expenditures to maintain stream flows and if these benefits are greater than

#### 16.4 POLICY ISSUES - (Cont'd)

the social cost of the measures, there would be a gain in total social welfare from making the expenditure. And since most mitigation measures would have their effects in the region of impact, equity considerations would also be served.

##### (d) Compensation for Efficiency

The case made above for compensation payments to be made for reasons of economic efficiency rested on three main points: 1) payments would ensure that all resource costs are taken into account; 2) incentive would be provided to investigate cost-effective mitigation measures (to avoid larger compensation payments); 3) the opportunity cost of resources would be reflected in the price of the final output produced by development.

However, compensation based on efficiency arguments, if paid by B.C. Hydro, would simply result in a transfer payment from electricity consumers to general revenue. That type of compensation would in effect be a form of general taxation since virtually the whole population of the province will be served by B.C. Hydro's additional generating stations. If a policy of paying for efficiency losses applied to projects of provincial government agencies, extra funds for social costs would have to be appropriated for a project and then re-paid into general revenue. The same effect would result if B.C. Hydro were to pay compensation to general revenue.

Funds paid for specific compensating enhancement actions that direct programs to groups who suffer as a result of a project are addressed below.

In sum, our conclusion is that compensation payments for B.C. Hydro's projects should not be made for efficiency reasons, but only for equity reasons as discussed below.

16.4 POLICY ISSUES - (Cont'd)

(e) Compensation and Mitigation for Equity Purposes

It is desirable that those who stand to lose the most from a development project receive some of the benefits directly in terms of either reduced impact via mitigation measures or compensation for impacts. People in communities or regions directly affected have a claim on the project apart from strict efficiency considerations.

In most instances equity claims for compensation or mitigation would best be met through provincial agencies and local governments responsible for managing the socio-economic or natural environments. B.C. Hydro should negotiate appropriate measures and funding support with the agencies concerned.

(f) Compensation for Community Service Impacts

Impacts on community education, health and recreation facilities are very difficult to quantify and evaluate. Estimates can be made of the number of workers expected to move into a community with their families and of the demands they might be expected to make on community facilities but the social costs of these impacts are rarely reflected in increased cost of service. It is more likely that the effects will be a cumulation of congestion, diminished quality of service and longer waiting times, all of which tend to alter the quality of life for people in the region affected. It has been B.C. Hydro's policy in the past to ensure that local school districts bear no additional tax burden for school costs caused by the families of in-migrant construction workers. In principle the same policy should be applied to other community services where feasible so that the project pays the full social costs of its impacts. It is B.C. Hydro's intention therefore, to reduce as much as practical the impact on the quality of community services during the construction period.

#### 16.4 POLICY ISSUES - (Cont'd)

There are other quality of life considerations in a local community which may be threatened by a large construction workforce. These include community cohesiveness and stability and general concern over indicators of social breakdown such as alcohol abuse. However, there is a growing body of evidence (e.g. from B.C. Hydro's Peace Canyon, Seven Mile and Revelstoke projects) to suggest that construction workers differ little in their behavioural patterns from members of local communities. Potential problems should be recognized and B.C. Hydro would be prepared to respond in whatever way is most appropriate if problems arise.

B.C. Hydro, with two exceptions, pays school taxes on the same basis as all other taxpayers in the Province. The exceptions are generation and storage developments on the Peace and Columbia River systems. B.C. Hydro also pays annual grants in lieu of general, local improvement and regional district tax levies. These grant amounts are calculated on a basis similar to the taxes levied on privately-owned utilities in municipal areas. Together with other government funds, these regular payments should protect taxpayers from tax increases during the project construction period.

Community impacts are not all negative.

Expenditures by workers increase cash flows to businesses in local areas and direct and secondary employment opportunities are increased. There is a tendency for developers to overstate the local benefits flowing from their projects and for local opposition groups to exaggerate the social costs. What is required is a careful accounting of both social benefits and costs. One of the more promising approaches is to follow up the impact assessment process with a monitoring program so that actual, rather than perceived, impacts are compensated for.

16.4 POLICY ISSUES - (Cont'd)

Independent control of this function can ensure that monitoring does not become an end in itself.

16.5 SUMMARY OF B.C. HYDRO'S APPROACH TO COMPENSATION AND MITIGATION

1. Mitigation and compensation payments for environmental resource impacts must bear some reasonable relationship to the value of the resources affected.
2. Mitigation expenditures will be made provided that the benefits exceed the cost.
3. Compensation payments will be made only if the local region would otherwise lose out disproportionately to the remainder of the province, e.g. if local fishermen lost their fishing resource as a result of development. (The objective of compensation payments would be to maintain social and environmental well-being in the region affected by the development, relative to the province as a whole.)
4. Compensation payments will generally be made to the agencies directly responsible for the resources affected and will be used to benefit the region affected. Funding should, where possible, be tied to specific programs with budgets agreed to in advance.
5. Compensation for community service impacts will be based on the social costs imposed by development. These will be determined with reference to both impact assessments done prior to licensing and monitoring programs funded by B.C. Hydro.



SECTION 17.0 - CONSULTANTS' PROPOSALS FOR MITIGATION AND COMPENSATION

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## SECTION 17.0 - CONSULTANTS' PROPOSALS FOR MITIGATION AND COMPENSATION

### 17.1 INTRODUCTION

Each of the environmental studies consultants for the Peace Site C development was asked to consider and recommend proposals for mitigating or compensating for the impacts of the project. No constraints were imposed by B.C. Hydro and the consultants were not asked to evaluate their recommendations to establish their respective benefits and costs. The result was that a large number of suggestions were made without particular regard for either technical or economic feasibility. These suggestions can thus be viewed as a starting point both for the evaluation of mitigation and compensation proposals, and for discussions with the relevant government agencies.

In addition, the government agencies will have their own ideas as to what would constitute appropriate mitigation and compensation. Accordingly, B.C. Hydro will be meeting with the government agencies and with other interested parties, to establish what appear to be the most desirable and cost-effective ways of maintaining, and perhaps in some cases even enhancing, the resource values which would be affected by the project.

This Section of the impact statement gives brief responses, or statements of B.C. Hydro's position with respect to each of the suggestions made by the consultants. It is not a compensation package as this is yet to be developed with considerable input to come from others. It is merely a compilation of the consultants' various ideas and B.C. Hydro's initial reaction to them.

Section 18.0 of this report evaluates the major recommendations for compensation, and provides some further ideas and a framework within which to work in developing these ideas further.

## 17.1 INTRODUCTION - (Cont'd)

Before discussing the consultants' recommendations, it is worth commenting briefly on B.C. Hydro's environmental guidelines. As one of the conditions of the Revelstoke Water Licence, B.C. Hydro was required to prepare environmental guidelines to be followed in carrying out the construction activities. These guidelines embody the various clauses contained in the contract documents and which are concerned with environmental protection, and also clarify the intent of these clauses and how they will be administered.

These environmental guidelines, while specifically written for the Revelstoke Project, would be applicable in principle to the Site C project also, and are therefore included in this impact statement as Appendix A. If a water licence is granted for the Site C project, then a similar set of environmental guidelines would be prepared to incorporate these principles together with any other specific requirements identified in the licence.

## 17.2 PHYSICAL ENVIRONMENT (PE)

The following recommendations are from the report "Peace River Site C Hydroelectric Development, Physical Environment Impact Assessment" by Thurber Consultants Ltd.

PE-1 "Topsoil Removal - Excavation of topsoil from fertile areas below the reservoir full supply level prior to reservoir flooding." (Thurber p. 112-3)

The costs quoted by Thurber appear to be low. B.C. Hydro estimates that, if 0.3 metre of soil were required, the cost per hectare for soil alone would be \$5000 to \$9000. This is equivalent to \$2000 to \$3500 per acre. To this would have to be added the present value of the land to be upgraded, the cost of clearing, etc. The total appears to be very expensive compared to the current market value of good agricultural land, but it may be worth doing in certain localized areas.

## 17.2 PHYSICAL ENVIRONMENT - (Cont'd)

PE-2 "Gravel Removal - Excavation of the underlying granular material (gravel) from topsoil removal areas for stockpiling or use in road construction." (Thurber p. 113)

The previous comment on costs would apply here also. Where practical (i.e. reasonably economic) the construction materials for Highway 29 relocations would be taken from within the reservoir area.

PE-3 "Shoreline Area Reclamation - Use of the topsoil to raise the level of gently sloping terraces near full supply level and to improve the fertility of other areas above the full supply level which are not being used for agriculture." (Thurber p. 113-4)

This would be extremely costly, as discussed under PE-1 above, but may be worth doing in certain localized areas.

PE-4 "Gravel Spawning Beds - Placement of clean gravel on gently sloping terraces near full supply level to form fish spawning areas." (Thurber p. 115-6)

Both the locations proposed appear to be liable to silting from the tributaries which enter the Peace River just upstream. It may be potentially more beneficial to spend funds on stripping overburden from gravel in suitable areas. This will be discussed with the Fish and Wildlife Branch when examining the potential for fisheries mitigation.

## 17.3 GENERAL LAND USE (LU)

The following recommendations are from the report "Peace River Site C Hydroelectric Development, General Land Use Studies" by Thurber Consultants Ltd.

### Subregional Planning

LU-1 "Development of a subregional land allocation plan as the basis for defining optimal land uses within the valley with and without the proposed development." (Thurber p. 36)

17.3 GENERAL LAND USE - (Cont'd)

This is beyond Hydro's mandate but will be discussed with the ELUC Secretariat and the regional district to see what can be done.

LU-2 "Development of a zoning and access plan (by-law) to optimize and control land use on all lands below the safeline with and without the proposed development." (Thurber p. 36)

Same comment as for LU-1 above.

LU-3 "Lowering of the present flood reserve downstream of Site C to approximately El.1375 to encourage private land acquisition and improvement in this zone." (Thurber p. 36)

B.C. Hydro supports this recommendation and will initiate discussions with the Lands Branch which has the responsibility for establishing flood reserves.

LU-4 "Adoption of a 6-month or 1-year cancellation clause in leases issued on Crown land remaining within the flood reserve downstream of Site C. B.C. Hydro is providing for long-term (1 to 3 years) notice of cancellation in lease-back agreements on land acquired around the proposed reservoir." (Thurber p. 36-7)

Hydro has no difficulty in accepting this proposal and will discuss it with the Lands Branch and Forest Service.

LU-5 "Placement of all high capability agricultural lands downstream of Site C and around the Site C reservoir within an 'Agricultural Improvement District' in which special measures would be provided to increase productivity, reduce production costs and stabilize the agricultural industry." (Thurber p. 37)

This will be discussed with the Ministries involved.

LU-6 Provision of improved access to the water and development of recreational facilities near the Alaska Highway at Taylor and at specific points around the proposed reservoir." (Thurber p. 37)

17.3 GENERAL LAND USE - (Cont'd)

Hydro is committed to providing recreation facilities, and the entire question will be discussed in detail with provincial agencies and local government to determine the most appropriate type and level of facilities to be provided, and the financial contribution from B.C. Hydro.

LU-7 "Provision of permanent access across the Peace River at Site C and connection of this with the present secondary road system between the Moberly and Pine rivers." (Thurber p. 37)

This would involve additional costs but could be done if it can be justified on economic grounds and if it fits in with plans for highways development in the area.

Further Land Use at the Damsite

LU-8 "Reclamation of all agricultural land used for borrow pits or temporary construction facilities. Present carrying capacities of grazing lands and productivity of arable lands should be re-established by careful handling of topsoil resources, erosion control and cover cropping program. Nearby topsoil that would be flooded could be removed and stockpiled for use in reclamation. The reclamation plan for lands within the Agricultural Land Reserve should be jointly approved by the Provincial Agricultural Land Commission and B.C. Ministries of Agriculture and Environment." (Thurber p. 38-9)

B.C. Hydro's construction specifications require all topsoil to be removed and stockpiled. When the work is completed the borrow and spoil disposal areas are graded to "provide free draining surfaces which do not detract from the general appearance of the area" and the work areas are seeded.

LU-9 "Design of permanent facilities to allow for a tourist look-out and parking area near the dam." (Thurber p. 39)

This is now standard practice on all hydroelectric projects.

LU-10 "Liaison with the city of Fort St. John to ensure compatibility between the nearby landfill site and future use of the damsite by tourists." (Thurber p. 39)

17.3 GENERAL LAND USE - (Cont'd)

This will be done.

LU-11 "Provision of safe access to the reservoir or downstream waters for fishing or boat launching. Further studies of bio-physical features of the site would be necessary before specific access points could be chosen." (Thurber p. 39)

This will be an important consideration in establishing optimum recreation facilities.

LU-12 "Minimize clearing of trees by careful layout of construction work areas; where practical leave buffer strips between the main access road and clearings." (Thurber p. 39)

This will be done. The contractor has specific areas allocated by the engineer and he has to have his proposals for land use approved. If he were to inadvertently destroy trees or vegetation outside his area this would have to be replaced.

LU-13 "Design the access road and river crossing with a view to its long-term use as a public road." (Thurber p. 39)

Provision of permanent access across the Peace River could be done with some additional cost providing it can be justified on economic grounds.

Further Land Use Around Reservoir

LU-14 "Retain abandoned portions of Highway 29 wherever practical as access to the reservoir (e.g. at Bear Flats)." (Thurber p. 40)

This would have to be considered within the overall context of a recreational plan, which would include reservoir access, boat launch ramps, picnic sites, etc.

17.3 GENERAL LAND USE - (Cont'd)

LU-15 "At 'Jim Rose Prairie' (parcel 59), the secondary road from Bear Flats could be abandoned in favour of local farm access provided from the east as shown on Map 4, Sheet 2." (Thurber p. 40)

Equivalent alternate access to this area would be provided by Hydro, however, the most practical routing would seem to be from the north rather than the east.

LU-16 "Provision of fencing and farm crossings and/or underpasses whenever necessary along the relocated portions of Highway 29 to facilitate cattle management." (Thurber p. 40)

There is a provincial policy to provide fences along highways such as No. 29. Therefore Hydro would provide fences upon request. It is not expected that underpasses should be required. However, Hydro Properties Division staff would investigate any requests as part of the overall land program.

LU-17 "Provision of suitable access roads from relocated portions of the highway to nearby farmsteads and residences above the safeline." (Thurber p. 40)

Access roads would be relocated as necessary, and would be built to the same standards as existing access roads.

LU-18 "In the final alignment of the highway, minimize interference with cultivated fields and residential lots (e.g. at Lynx Creek)." (Thurber p. 40)

This would be done to the maximum practical extent.

LU-19 "Set back borrow pits and finish highway in a manner that will complement recreational use of the valley. This may include one or two new pull-out viewpoints and some minor landscaping."



17.3 GENERAL LAND USE - (Cont'd)

B.C. Hydro would work with the Department of Highways to provide a road compatible with the general and recreational use of the valley.

LU-20 "Reservation of strips of Crown land less than 500 feet in width between the road and reservoir as recreational lands and establish access from the highway to the reservoir in the vicinity of Bear Flats, Farrell Creek and Lynx Creek."

This will have to be discussed with the ELUC Secretariat and the Lands Branch to determine the extent to which it is desirable and practical. It should be considered in the context of the overall recreational plan.

LU-21 "Every attempt should be made by B.C. Hydro to maintain present agricultural and residential uses on lands purchased by the Authority until they are specifically required for some element of the Site C development." (Thurber p. 41)

This is B.C. Hydro's policy and practice (see Appendix B, Section B.2).

LU-22 "Whenever flooding creates fractional parcels whose utility can be improved by integration with adjacent parcels, this should be undertaken through a replotting or amalgamation procedure." (Thurber p. 41)

This will be encouraged where practical.

LU-23 "If a Class A over-night campsite and recreational facility is to be located near Bear Flats, land should be reserved for this purpose at an early stage." (Thurber p. 41)

If this campsite is part of the recreational plan which is developed, then Hydro would agree with this suggestion.

LU-24 "Greater utilization of the community cattle pasture at Farrell Creek could be promoted (or new pasture created) to compensate for loss of grazing land caused by the development and to reduce conflicts between cattle and wildlife management in the valley." (Thurber p. 41)

17.3 GENERAL LAND USE - (Cont'd)

This will be discussed with the people concerned.

LU-25 "Develop means of removing topsoil or gravel from selected sites below the flood level and stockpiling them for nearby land reclamation or road construction projects." (Thurber p. 41)

This has been discussed under Hydro's comments on PE-1 and PE-2.

LU-26 "Residential safelines and flowage easements should be plotted on detailed plans of private holdings wherever buildings and other improvements fall below the safeline. These plans would be useful to property owners and appropriate zoning authorities to assist in land use planning in advance of final disposition of the easements." (Thurber p. 41)

The present safeline is conservative. In areas of particular sensitivity it would be examined in more detail.

17.4 AGRICULTURE (A)

The following recommendations are from the report "Peace River Site C Hydroelectric Development Environmental and Socio-economic Assessment, Agriculture" by Canadian Bio Resources Consultants Ltd. (CBRC).

A-1 "Parcel Size - In those areas where the proposed Site C reservoir may reduce the size of any existing agricultural holdings to the extent where it will no longer represent a viable agricultural unit measures should be taken to either incorporate it with an adjoining agricultural unit or amalgamate the remaining land parcels into an agricultural unit that can be managed efficiently as an individual farm unit." (CBRC p. 75)

This will be encouraged wherever practical.

17.4 AGRICULTURE - (Cont'd)

A-2 "Topsoil Removal - For a few locations along the reservoir it would appear that the opportunity exists to remove topsoil from some of the alluvial terraces and transport this material onto locations where improvement in agricultural production would occur. This practice could effectively increase the agricultural potential of some land on the intermediate terraces that is presently considered of marginal agricultural capability." (CBRC p. 76)

This has already been discussed under recommendation PE-1. It appears to be much too costly to warrant large scale implementation.

A-3 "Highway Relocation - The location and construction of the highway should take into consideration those items outlined as impacts in Section 4.1.2(c) (CBRC p. 54). The final route selection and construction standards should be reviewed by competent agrologists to ensure that as many mitigation measures as possible are included in the relocation plan." (CBRC p. 76)

This recommendation will be discussed with the Department of Highways which would probably either carry out or direct this aspect of the project.

A-4 "Vegetable Industry Enhancement - As an enhancement measure for the region the following course of action is recommended to strengthen the vegetable industry if the Site C project is developed:

1. The flood reserve be removed in the remainder of the Peace River valley and a policy statement issued by the provincial government that agriculture and not hydro-electric power has priority.
2. That a detailed study be done to lay out a development plan that would enable the vegetable industry to develop into a viable entity. Included in this development plan should be the appointment of a development officer to assist local producers to achieve the goals of this development plan." (CBRC p. 77-8)

The removal of flood reserves on the lower Peace River, as indicated, is a political matter. B.C. Hydro is presently conducting a study into

17.4 AGRICULTURE - (Cont'd)

the viability of a vegetable industry in the Peace River area, and the results will be made available once the work is completed.

17.5 RECREATION (R)

The following recommendations concerning recreation are from the report "Peace River Site C Hydroelectric Development, Recreation Impact Assessment" by Edwin, Reid & Associates Ltd. (ERA). As these recommendations are general and conceptual rather than specific, they will be quoted here in their entirety, followed by a general discussion of how B.C. Hydro intends to develop a comprehensive recreational plan.

R-1 "In Section 9.2 (Edwin, Reid p. 62-5), 'A Recreational Development Concept', we have discussed recreation facilities that could be developed on the reservoir. It is our opinion that these facilities would provide reasonable enhancement of the reservoir. They would, with the exception of the dam-site, be typical of the facilities now provided by the Provincial Parks Branch. At the present time, however, there are far too many unknowns to begin using these ideas for planning purposes.

Because it is difficult to predict specifically (1) where the opportunities for shoreline development will be most attractive, and (2) how the demand for facilities will change with the creation of the reservoir, funds for the creation of facilities could be made available over a time period. The most convenient form of funding would be a lump sum from which development capital could be drawn over a 10-year period. We would recommend that consideration be given to this arrangement. The advantages are that the fund administrator(s) could respond to changing demand and would not be forced into large, single effort developments in a region where resource development programs may create major changes in the population size and distribution. A potential disadvantage is that the general availability of funds encourages inefficient usage.

Another possibility is that Hydro share responsibility for portions of the recreational development of the Site C reservoir. The Reservoir Land Management Department has developed popular day use areas on Buntzen and Daisy reservoirs. These developments provide the public with recreational facilities of a slightly different type than the Parks Branch.

## 17.5 RECREATION - (Cont'd)

A further avenue worth pursuing is the provision of funds to the B.C. Forest Service which could develop facilities at a lower standard and cost than the Parks Branch. The Forest Service is more responsive to immediate pressures for facilities because their developments are less elaborate, though not necessarily less attractive to the public. There is a 'wilderness' aspect to Forest Service developments not found in the traditional Parks Branch campgrounds. However, the Parks Branch campgrounds are able to withstand more intensive use.

Since the Site C reservoir would extend to Hudson's Hope and to the shores of Alwin Holland Park it would be a public benefit to increase the capacity of that part. It is suggested here that expansion of the day use facilities is more important than campground expansion in the limited space available. The provision of more parking and picnic tables and upgrading the shoreline trails would add to the attractiveness of this park.

The 'open fund system' would permit public agencies and citizens groups to petition the fund administration for capital to build projects. The administering body could be comprised of the regional district, the Parks Branch, the Forest Service, representatives of the local district municipalities and B.C. Hydro. Project approval should be consistent with long-term development goals.

The advantages of providing compensation funds in this manner is that facilities can be tailored to emerging public pressures. By encouraging a variety of persons and agencies to participate in compensation and enhancement programs the widest identification of needs will be met with a correspondingly broad capability to respond with attractive solutions." (Edwin, Reid p. 83-4)

B.C. Hydro feels confident that with careful planning through discussion with the appropriate agencies, the various local government bodies, and with input from local people, that a satisfactory plan for recreational facilities can be developed.

There has been much confusion concerning B.C. Hydro's requirement to provide recreation facilities at the Peace Canyon project, and a feeling that Hydro has been tardy in coming forth with funding. In our view a commitment to provide recreational facilities associated with

17.5 RECREATION - (Cont'd)

the Peace Canyon project has always existed, and is in fact a condition of the water licence. However, a decision on the type and location of facilities should be based on a consensus of interested parties. Others felt such a decision should be postponed until a decision is made on the Site C project. This is premised on the conclusion that if Site C proceeds, the best recreational development for the region would be founded on integrated development of facilities associated with both projects. Thus if Site C is approved planning for both reservoirs will proceed together. In the event that Site C is not approved, recreation facilities will be developed for the Peace Canyon dam alone, as originally planned.

In order to avoid the type of misunderstanding that developed over the Peace Canyon facilities, B.C. Hydro would prefer to see a specific proposal for Site C (and associated developments at Peace Canyon) agreed upon prior to licence hearings, as was the case at the Revelstoke Project, and will make every effort to reach such an agreement.

17.6 FORESTRY (F)

The loss of forest land would have little impact on the forest resource and no impact on the regional forest industry. Thus, the forestry consultants made no recommendations for mitigation or compensation. During the clearing of the reservoir all merchantable timber will be salvaged.

17.7 WILDLIFE (W)

The following recommendations are from the report "Peace River Site C Hydroelectric Development, Environmental and Socio-economic Assessment, Wildlife Subreport" by Donald A. Blood & Associates. The recommendations are preceded by the following introduction:

17.7 WILDLIFE - (Cont'd)

"It must be stated at the outset that natural ecological systems cannot be recreated by man. Wildlife habitats that are unique in the area (every sizeable land area has some unique combination of characteristics) will be permanently lost. Short of digging a new Peace River valley in an adjacent agricultural area, the losses cannot be replaced in kind. Productive valley-complex habitats are a diminishing resource in British Columbia, making any remaining areas that much more unique, important and valuable.

Little can be accomplished in the way of mitigation that will be of long-term benefit to wildlife, but the following items should be considered."

- W-1 "Reservoir clearing will be least damaging if the late winter-early spring period, when ungulates are in poorest physical condition, is avoided, as well as the spring and early summer period of bird nesting. In other words, reservoir clearing will have least impact during the year it is accomplished if carried out during the August to January period." (Blood p. 76)

Clearing could not be carried out over the entire reservoir area during a short period, but would have to be phased over several years. If certain limited areas could be identified which are particularly important for wintering ungulates or for nesting birds, it may be possible to delay clearing in those areas until late in the clearing program. This would have to be discussed with the Forest Service, if they take responsibility for the clearing program as at Revelstoke, and would be implemented where practical.

- W-2 "The nesting tree of the bald eagles near Hudson's Hope, and some trees around it, should be left standing. This area will be only shallowly flooded, and leaving the trees may encourage nesting to continue there." (Blood p. 76)

We are concerned that flooding would kill the trees, causing them to rot out and fall, leaving snags in the reservoir. However, this will be given site-specific consideration to see what might be done.

17.7 WILDLIFE - (Cont'd)

- W-3 "Access to the area below full supply level should be carefully planned, and the clearing operation carefully conducted, so that plant communities and wildlife habitats immediately above full supply level are not needlessly lost or degraded." (Blood p. 76)

This would be done. Whether the work is done directly by contractors or through the Forest Service, the specifications will cover this point.

- W-4 "Reservoir clearing should take place as late as possible in the project schedule so that the affected habitats are available for as long as possible." (Blood p. 76)

See comment under item W-1.

- W-5 "Dam Construction - The following points should be considered: careful planning and control of access routes so as to avoid damage to peripheral wildlife habitats." (Blood p. 76)

This would be done. The construction specifications would be written to provide this control, and the site staff would provide the necessary monitoring.

- W-6 "Avoidance of blasting during the bird-nesting season (15 May to 30 June), provided that this activity can reasonably be carried out at other times." (Blood p. 76)

Blasting effects would generally be limited to the work areas near the dam where other construction activity would likely preclude nesting.

- W-7 "Revegetation of all areas devegetated during the construction process. The ultimate objective should be the establishment of plant cover similar to that now occurring in the area. This would not likely involve an initial planting of those species, because soil conditions following borrow removal or other construction work will probably be much different than before. Initial emphasis should be on establishment of herbaceous plant species that are adaptable to