



Guidance for Evaluating the Feasibility of Controls to Meet Water Quality Standards for Dams in Washington

Washington State Department of Ecology
Olympia, WA

DRAFT for Public Review

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Special Notes to Reviewers

of the first draft of *Guidance for Evaluating the Feasibility of Controls to Meet Water Quality Standards for Dams in Washington*.

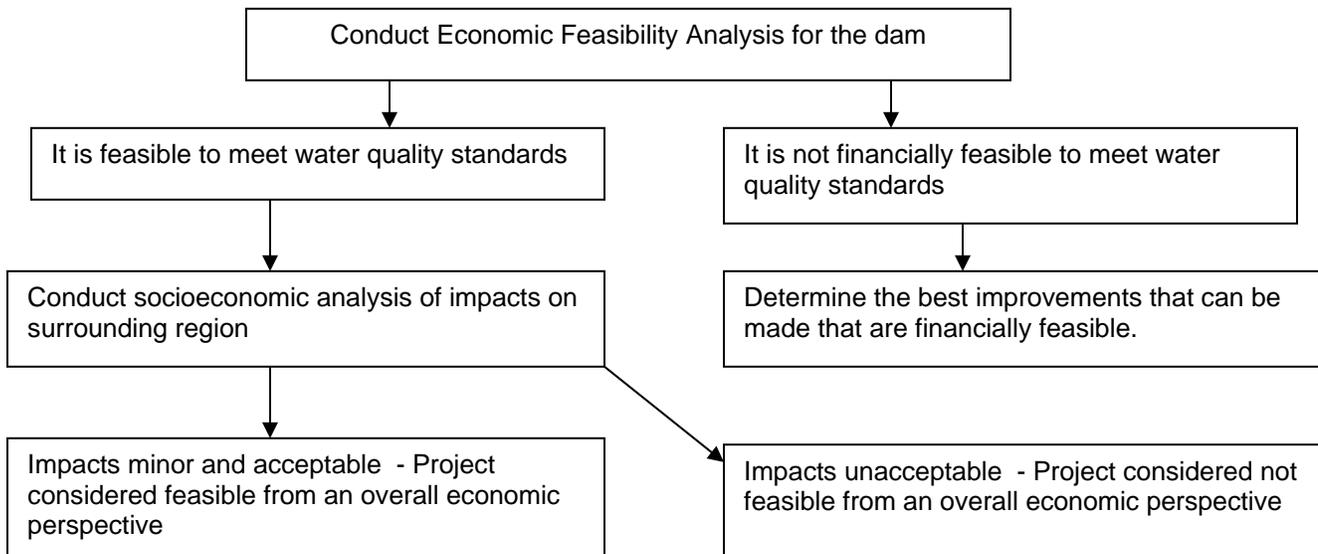
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As Ecology has worked with the public and interested groups to develop this draft guidance several areas of concern have emerged. As you review the draft guidance Ecology hopes you will consider the following points as you draft your comments:

1. The general approach for the dam compliance schedule (WAC 173-201A(510)) is not the same as the widespread and substantial socioeconomic analysis in the federal regulations on use attainability analysis (40CFR 131.10(g)(6))

The approach to feasibility analysis in this draft guidance is **not** the same approach that would be used to meet the federal requirements for a use change for a waterbody under (40CFR 131.10(g)(6)). The federal approach requires both substantial impacts at the level of the entity being examined **and** widespread impacts on the surrounding region in order to change a use.

The approach in this document follows a different path in order to bring an individual facility into compliance with water quality standards under the state dam compliance schedule(*not* to change a designated use). The path outlined in this draft is shown in the following diagram:



2. This document is a preliminary draft

Ecology is sending this draft out for public comment very early in its development. Several areas need additional information (for instance the section on PUDs still needs to include some of the specific cost considerations used by that sector in determining whether certain projects are affordable). However, Ecology is sending this guidance out now for several reasons:

- We want the good dialogue on economic feasibility that is currently happening among stakeholders and Ecology and EPA to continue – this draft will bring out ideas and techniques that can help further that discussion.
- The overall approach outlined in the diagram above is something that has been talked about – but seeing exactly how it is laid out and where it is applicable (i.e. with the dam compliance schedule and not with the federal use attainability regulations) should help to clarify the intent of this guidance: to first address in-state needs in implementing the dam compliance schedule, and secondarily to provide specific analytical tools that can be used in the future for use attainability analysis and variance requests.
- EPA has provided Ecology with technical assistance through a contractor. The contract ends at the end of September. Providing the public with a draft at this time will allow for a reasonable public comment period (30 days) and then some later time in September to work with the contractor to address the comments sent in by the public.

3. Public process undefined

The current draft does not include a public process associated with economic feasibility analysis review. Because the feasibility analysis is part of the larger water quality attainment plan required under the dam compliance schedule, the opportunities for public review that are part of the larger process would apply to the feasibility analysis also. However, is there a need for additional opportunity for public review of the economic feasibility analysis? If so, please explain why this would be useful, and please suggest where in the process review would be most useful.

4. Appropriate cost – outside the scope of this guidance

One question raised frequently at the public meetings was “is it worth it?” The scenario leading to that question was where the dam had the ability to finance a costly project, but the project would only result in a small amount of water quality improvement. Other scenarios could be large cost and resulting large gain in water quality, or, small cost and large gain in water quality, or, small cost and small gain in water quality. These are important considerations for agencies, the public, and dam owners, but determining whether specific situations such as these will result in requirements for projects is *beyond the scope of this draft guidance. This draft guidance only addresses what is economically feasible for the dam, and tries to ensure that feasible alternatives would not result in unacceptable socioeconomic impacts on the surrounding area.* Questions of whether the costs for a project are appropriate are more appropriately discussed in larger venues with broad public participation. The results of the analyses described in the draft guidance can help to inform those larger discussions.

5. What if feasible improvements won't result in meeting water quality standards?

This issue is addressed on the overall requirements of the dam compliance schedule. The last requirement in the schedule is that if previous analyses have failed to find a way to meet water quality standards at the dam level, to propose another option, which could include a variance (a temporary waiver from a water quality standard), a designated use change supported by a use attainability analysis, a water quality offset, or other options that could include extensions of compliance schedules.

As Ecology works with the dam owner to fulfill the requirements of the dam compliance schedule the main focus will be on meeting water quality standards, but if this does not appear feasible after a thorough analysis, Ecology will work with the dam operator to develop an approach for the future that will consider both environmental and economic needs. **Those future approaches are not within the scope of this draft guidance.**

6. Cost of the Economic Analysis

As Ecology has worked on the draft guidance it has become obvious that in some cases carrying out the economic feasibility analysis could become expensive for the dam operator. In particular in some cases regional models that can be used to calculate socioeconomic effects (an analysis required after the dam-level analysis has determined that the project is feasible) can be complex and expensive to use. Additionally, the worksheets contained in the appendices of the draft guidance can appear confusing and daunting. Ecology expects that an economist or financial analyst will prepare these worksheets, but in some cases a dam owner/operator may not have these resources readily available on staff. Ecology also will need to devote resources to review the reports as they are submitted, and to have someone with the right training available to talk with dam owners/operators as they conduct the feasibility analysis. If you have suggestions on how these costs could be minimized or the process streamlined while still providing dependable and comprehensive information, please include them in your comments.

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Acknowledgements (to be completed later)

Acronyms and Abbreviations

BLS	Bureau of Labor Statistics
BPA	Bonneville Power Administration
CBI	Confidential Business Information
CFR	Code of Federal Regulations
CPI	Consumer Price Index
CWA	Clean Water Act
EBT	Earnings Before Taxes
Ecology	Washington Department of Ecology
EPA	U.S. Environmental Protection Agency
FY	Fiscal Year
IOC	investor-owned company
kWh	kilowatt-hour
MHI	Median Household Income
O&M	Operating and Maintenance
POTW	Publicly Owned Treatment Works
PUD	Public Utility District
RCW	Revised Code of Washington
TMDL	Total Maximum Daily Load
WAC	Washington Administrative Code
WQBEL	Water Quality Based Effluent Limit
WQS	water quality standards
WUTC	Washington Utilities and Transportation Commission

1. Introduction

This document provides guidance for dam operators regarding compliance with Washington Administrative Code (WAC) 173-201A-510(5), “Compliance schedules for dams.” The compliance schedule for dams was developed with the hydropower industry. Specifically, this guidance document provides methods for evaluating the feasibility of controls for dams and other hydrologic modification projects that cause or contribute to an exceedance of water quality standards (WQS). This guidance does not constitute a regulation, but instead documents methods for complying with existing regulations and subsequent requirements. The guidance focuses on existing hydroelectricity generating facilities, but can be adapted to address other types of dams. A feasibility analysis will be required in two situations:

- When the dam owner/operator claims it cannot comply with WQS because they are not affordable, or
- When the improvements to meet WQS could result in unacceptable socioeconomic effects on the surrounding community or region.

1.1 Purpose of the Guidance

The Washington State Department of Ecology (Ecology) developed this guidance to assist the operators of dams and other large hydrologic modification projects in the state to comply with WAC 173-201A-510(5), “Compliance Schedules for Dams, and the public and Ecology in reviewing economic feasibility analyses. This chapter of the WAC specifies requirements for all dams in the state. For those facilities that cause or contribute to an exceedance of a water quality standard, the operator must identify all “reasonable and feasible improvements” that could be used to meet the standards. **This guidance describes the types of information Ecology will need in order to assess a single component (economic feasibility analysis) of the dam compliance schedule in WAC 173-201A-510(5), and provides the dam owner/operator with the tools needed to substantively demonstrate that the proposed project identified to attain the WQS is, or is not, economically feasible.**

While the federal regulations for use attainability analysis also have a provision for determining whether dams can feasibly meet designated uses [40 Code of Federal Regulations (CFR) 131.10(g)(4)], **this draft guidance document is not specifically focused on determining attainability for purposes of the federal process of revising designated uses and determining attainable uses.** However, Ecology expects that this guidance will be used to inform decisions on how to proceed with that analysis if needed, and this guidance contains the specific analytical techniques (e.g., specific approaches to assess socioeconomic effects) that Ecology would use in reviewing a request for a variance or designated use change.

In 1995 EPA developed interim economic guidance for evaluating the economic impacts of water quality standards as a means for determining whether designated uses are attainable (*Interim Economic Guidance for Water Quality Standards* (U.S. EPA, 1995)). The EPA guidance is based on economic impacts, not on a cost-benefit test, because the federal Clean Water Act (CWA) does not require benefits to exceed costs for measures used to implement water quality standards. Using the interim economic guidance as a starting point, Ecology has modified the method and tailored the analyses to more accurately address the dam-level analysis

needed to implement the dam compliance schedule for large hydropower producers and other dams operating in Washington. Note that the federal process for reviewing an application for variance or designated use change requires, in part, a more stringent set of economic and financial tests.

1.2 Confidentiality

Ecology is sensitive to the confidentiality of private business information. Should dam operators need to submit any confidential business information, they should clearly identify such information it believes so qualifies (e.g., submit a redacted version of any part of the application containing confidential information, as well as an unredacted version for Ecology's review). If Ecology is requested to provide such information, Ecology will prior to releasing any such information notify the dam operator of such request so as to provide the dam owner an opportunity to apply for a court order authorizing Ecology to withhold such information. If the dam operator does not timely seek and obtain a court order, Ecology may release the information.

1.3 Background

In 2003, the State of Washington revised its WQS to include a compliance schedule provision for dams. The provision (see **Appendix A**) requires dams that cause or contribute to a violation of the WQS to develop a water quality attainment plan that provides a detailed strategy for achieving compliance, including (WAC 173-201A-510(5)):

- (i) A compliance schedule that does not exceed 10 years
- (ii) Identification of all reasonable and feasible improvements that could be used to meet standards, and if the standards are not attainable, then to achieve the highest attainable level of improvement.

When using the dam compliance schedule regulation, Ecology uses the word “reasonable” to apply to the process of developing, modeling, and prioritizing structural and/or operational alternatives that could bring the system into compliance, and does not consider it to have an economic connotation. In comparison, Ecology interprets “feasible” to include both engineering and economic feasibility. The feasibility analysis consists of two steps:

- The first step is the engineering analysis to determine operational or structural modifications that could bring the dam into compliance with water quality standards. Ecology will evaluate engineering feasibility on a case-by-case basis, working with the dam owners and operators
- The second step is the economic analysis (in this case a financial analysis) that will address engineering alternatives developed in step one.

This guidance addresses only the second step: the economic feasibility of engineering alternatives for dams.

1.4 Nature of the Economic Analysis

A brief description follows that provides the user with a basic understanding about different categories and types of economic analyses. This understanding will be useful when the guidance discusses the application of specific economic analysis that are part of the economic feasibility analysis process.

In the broadest context economic analyses generally fall into two categories: efficiency and distributional. Economic efficiency analyses, such as benefit-cost analysis and cost-effectiveness analysis, are used to select the most efficient option from a set of choices. In contrast, distributional analyses provide information about the economic impacts of a selected option, and how those impacts might differ throughout the affected area. Distributional analyses include economic impact analysis and a variety of equity analyses (U.S. EPA, 2000). An economic analysis of a private or public entity looks beyond the internal (i.e., financial) factors for that entity when analyzing the particular project designed to attain the WQS.

There are two approaches to using cost effectiveness analysis or CEA. The first approach is to minimize the cost for achieving a predetermined goal. This can be considered the least cost approach, that is, finding the least cost technology to attain the (predetermined) WQS. The second approach is to maximize the effort towards achieving the goal when faced with a budget constraint. For this guidance the budget constraint is the amount the entity can afford to pay for the technology to achieve the best incremental improvement towards attaining the WQS. In the context of the economic feasibility analysis, only the least cost CEA approach will be utilized.

The least cost CEA approach will be used when more than one technology has been identified that can attain the WQS at 100%, and the applicant has to determine which of these technologies provides the least cost approach to achieve the 100% WQS attainment. The least cost CEA approach will also be utilized when there are no technologies available that can attain the WQS at 100% but there are at least two technologies that can achieve the same level of incremental improvement towards attaining the WQS, and these two (or more) technologies also provide the same highest incremental improvement.

Economic feasibility analysis is undertaken once the least cost or incrementally available technologies have been identified. Under WAC 173-201A-510(5), Compliance Schedule for Dams, Ecology considers economic feasibility to refer to controls that are financially feasible for dam owners. The economic feasibility analysis developed for this guidance provides a methodology for determining whether the applicant can afford the cost of the preferred alternative for attaining the WQS. There are a number of elements that are reviewed with specific relevance to the entity's ability to financially undertake the project, such as a cash flow analysis, the ability to fund the project from cash reserves or unallocated funds, the entity's borrowing capacity, callable loans, identifying non-revenue generating assets, etc.. The analysis also considers the impact the project can have on the entity's ongoing operations and financial health. Because of the nature of this industry, the analysis then broadens in scope to determine the potential impact the project's financing can have on customers, since there is a likelihood that some or all of the project costs may be passed on through rate increases, particularly so for

public entities. The financial analysis does not include consideration of the relative contribution of the entity to employment and income in the community. In addition, it does not account for the fact that expenditures on pollution controls do not vanish from the community, but become business revenues and household incomes that can offset adverse financial impacts experienced by the affected entities

1.5 Who will Use This Guidance?

Dam operators and Ecology will use this guidance when working together to develop the dam operator's feasibility analysis. Because this guidance will only be needed when the dam owner contends that meeting WQS is not possible, the dam operator will use this guidance to demonstrate that it is or is not economically infeasible to meet the WQS, and to determine possible improvements in WQ. Many of the economic components of the draft approach apply on a case-by-case basis (as described in this document). Ecology expects the applicant to work closely with the agency to resolve issues that arise during the application process. This includes determining the alternatives to evaluate, with an emphasis on assessing the most cost-effective alternatives that can meet the WQS or, if standards cannot be attained for technical (engineering) reasons, that will result in the highest attainable water quality. In situations in which attaining standards is clearly feasible, Ecology will work with the dam operator to develop the control plan to help ensure that the feasible alternatives do not negatively impact other water quality parameters.

Dam operators [including municipalities, public utility districts (PUDs), investor owned corporations, and federal agencies] should use this guidance to ensure that they submit the information that Ecology requires as part of the applicant's process to comply with requirements of the dam compliance schedule that are included in their CWA Section 401 certification or, for federal dams, to comply with WQS. The public, other agencies, and adjoining governments should use this guidance when reviewing information submitted to comply with requirements for economic feasibility analysis.

1.6 Organization

The remainder of this document is organized as follows. Section 2 provides an overview of the guidance. Section 3 discusses identifying alternatives and estimating control costs. Sections 4, 5, and 6 describe the financial analysis for municipal dam owners, investor-owned dams, and federally-owned dams. Section 7 discusses socioeconomic impact analysis. Section 8 provides a summary and discusses the review process. Appendices provide additional information and worksheets for the analyses.

2. Overview

This section provides an overview of the process for identifying control strategies, estimating costs, and conducting the economic analyses that Ecology is requiring of dams that contribute to an exceedance of WQS. After reading the following sections, the user will have a better understanding of the process described and the applicable conditions that are necessary during each step.

2.1 Water-Quality Based Requirements

Ecology could establish water quality-based requirements applicable to dams in the context of a total maximum daily load (TMDL), or through a CWA Section 401 certification (i.e., certification required for any permit or license issued by a federal agency for any activity that may result in a discharge into waters of the state to ensure that the discharge will not cause or contribute to a violation of state WQS). Under WAC 173-201A-510 (5), the owners of all dams that cause or contribute to a violation of WQS must develop a water quality attainment plan that provides a detailed strategy for achieving compliance within ten years. Therefore, facilities that are not in compliance with water quality-based requirements will need to develop an attainment plan.

2.2 Identifying Alternatives

The purpose for including more than one method for attaining the WQS alternatives in the application is to demonstrate to Ecology, and by extension to the public, that the applicant has considered the most likely and least-cost available technologies that could be implemented in order to attain the WQS.

In the guidance, the method used to attain the WQS may be referred to as the technology or the control strategy, and once identified, as the control project or project. Once an available technology/control strategy has been identified that can attain the WQS at 100%, it is considered to be one of a number of alternative technologies that should be further evaluated. Where more than one available technology has been identified, then these Alternatives should be labeled Alternative #1, Alternative #2, and so on. Where there is a variation of an Alternative, say to Alternative #1, then the variation would be Alternative #1A. Other than being used to identify a specific alternative, there is no other purpose for the assignment of numbers. These assigned numbers will stay with that alternative throughout the process. Of these alternatives, the applicant should designate which is its preferred alternative.

In the event there is no available technology that can attain the WQS at 100%, then the applicant should review those available technologies that can provide an incremental improvement towards attaining the WQS. Again, the selected technologies should be assigned Alternative numbers and the applicant designate its preferred alternative.

The number of alternatives presented to Ecology is likely to depend on the specific circumstances regarding the complexity of controls, attainment of WQS, and cost. While it is possible there may only be one available technology that can attain the WQS, either 100% or

partially, more likely there would be two or more Alternatives available. In the latter instance, the applicant should submit a minimum of two alternatives, including its preferred alternative. The applicant should always submit the lowest-cost technologically feasible alternative that would result in 100% or partial attainment (i.e., the most cost-effective alternative).

In its review of available technologically feasible alternatives, the applicant may find that some apparently relevant technologies turn out to be not technologically feasible. In this case, or where there are no available technologies that cannot either attain WQS at 100% or partially, the applicant should still provide, where possible, at least two eliminated alternatives which should also be numbered. The applicant should provide an adequate description explaining why each alternative was eliminated and include this information in its application.

Collaborative Process

Overall, Ecology expects that the application process will be an ongoing and collaborative process with the applicant. In a case where the dam operator believes it can afford the control project, Ecology still requires the applicant to conduct a socioeconomic impact analysis to ensure that the costs will not adversely impact the local economy. This collaborative effort is expected to provide a more efficient approach for completing the application, addressing issues that come up as part of the application process more effectively, and overall providing a more transparent process.

Assuring Identification of the Most Cost-Effective Control Strategy

In the applicant's initial review of available control strategies that could meet 100% of the WQS, as a result of its collaboration with Ecology, or as a result of Ecology's review of the application detailing which alternatives were reviewed by the applicant, Ecology will evaluate whether options other than those presented by the applicant are available and could attain standards or the same level of water quality at a lower cost. Therefore, the alternatives that the applicant ultimately presents to Ecology should represent the most cost-effective methods of achieving a particular level of water quality control. However, in making a choice among similarly priced projects, Ecology will need to evaluate, working with the applicant, which alternative will work best overall for the waterbody.

In the event the applicant demonstrates that it cannot afford the least cost alternative that attains the WQS at 100%, the applicant must then demonstrate how much it can afford towards this least cost alternative. The amount the affordability analysis indicates will then determine the level of attainment possible from that alternative, i.e., the budget constraint CEA.

2.3 Estimating Costs

Once the applicant identifies prospective compliance technologies, it must estimate the cost of these alternatives. These costs include both the capital and operating costs associated with modifications. It is important to note that in some cases the cost of an alternative may include the cost of purchasing replacement power or other services.

Accurate estimates of control costs are essential for defensible economic feasibility analyses. The applicant must clearly and thoroughly document all assumptions that it makes in estimating the costs of alternatives. Section 3 discusses this step in detail; **Appendix B** provides worksheets for documenting the estimates for Ecology.

2.4 Conducting a Financial Analysis

Applicants claiming an inability to attain standards will need to submit a financial analysis, which documents the basis for determining that the applicant cannot afford the project, i.e., the project is not financially feasible. **If an applicant concludes (and Ecology agrees) that the least cost alternative that attains 100% of the WQS is not feasible, it does not have to conduct a broader socioeconomic analysis for that alternative, but must identify what level of control would be feasible based on the amount it can afford to pay.** Although in many instances the cost of improvements may ultimately fall on households and businesses, Ecology expects that all entities with the ability to absorb costs (e.g., through lowered profitability, use of available budget, conversion of nonessential assets) will evaluate these alternatives. Claims of economic infeasibility that do not reflect good faith efforts or a priority for pollution control will not be considered to be completed economic feasibility analyses.

The particular type of analysis will depend in part on the ownership characteristics of the entity (e.g., municipal or investor owned), and on whether the entity will pass costs on to its customers. Sections 4, 5, and 6 discuss the financial analysis in detail as it relates to municipal, investor-owned, and federal dam operators, respectively. For convenience, the applicant should use the worksheets provided in Appendix B to document the analyses. The sources of information on the worksheets (e.g., census data) should be cited and supporting documentation available for submittal to Ecology if requested. The applicant should feel free to discuss with Ecology an issue or issues relevant to the financial analysis part of the application, including but not limited to the submission of proprietary information, clarification of the suggested methodology, the inclusion of additional analyses that are not part of the guidance, etc.

2.5 Conducting Socioeconomic Analysis

Conducting a socioeconomic impact analysis is important in that it informs not only the applicant, but also Ecology and the public, as to potential positive and adverse impacts on the affected communities as a result of implementing the project. In the first instance the analysis informs the applicant. Where the analysis indicates there is the prospect for widespread adverse impacts, the applicant can claim that this would not allow it to proceed with the project to attain the WQS. For Ecology, the analysis provides information that it requires from a policy perspective, and after review may come to the same conclusion as the applicant, or working with

the applicant and the public, revise the project or WQS approach. The analysis also informs the public as to prospective impacts that may occur and allows them to independently review the process and address their concerns to Ecology. Overall, this provides for a transparent process for all concerned stakeholders.

The socioeconomic impact analysis involves estimating likely changes in employment, income, households below the poverty level, and other indicator variables pertaining to the affected communities, that are a result of implementing the control strategy. **Where an applicant demonstrates that it is both technologically and economically feasible to attain standards, then the applicant is required to conduct a socioeconomic impact analysis. Where the results of the socioeconomic impact analysis demonstrate widespread adverse impacts to the affected communities as a result of implementing the project, this would support the conclusion that these adverse impacts are not acceptable from a socioeconomic policy perspective and the project should not proceed.** Section 7 discusses this type of analysis in detail. Appendix B also provides worksheets for documenting the analysis.

2.6 Summary and Determinations

Exhibit 1 summarizes the required analyses. Ecology will review the analyses and make a determination as to the economic feasibility of the alternative. The applicant should be aware that as part of its review process, Ecology may require additional information from the applicant – part of the iterative process used to review and evaluate the economic feasibility analysis submission.

Exhibit 1. Summary of Economic Analysis Requirements¹

Type of Analysis	Description	Reason Needed
Cost Analysis - after one or more technologically feasible alternatives have been identified	Estimate the capital, operating, and any replacement service costs associated with the control strategy	<ul style="list-style-type: none"> • Identify cost-effective strategy • Input to financial analysis
Financial Analysis	<u>Municipality or PUD:</u> Ability to finance controls, community financial health (e.g., bond rating, debt level, unemployment rate), and increase in user fees (e.g., electricity rates) <u>Investor owned:</u> Profitability with and without controls, financial ratio analysis (liquidity, solvency, leverage), and increase in user fees (e.g., electricity rates) <u>Federal:</u> Increase in user fees (e.g., electricity rates)	<ul style="list-style-type: none"> • Establish whether controls are economically “feasible”
Socioeconomic Analysis	Estimate of the change in socioeconomic indicators (e.g., employment, income, poverty rate) with and without the project	<ul style="list-style-type: none"> • Confirm that economically “feasible” control costs will not adversely affect the economy

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Exhibit 1. Summary of Economic Analysis Requirements¹

Type of Analysis	Description	Reason Needed
	1. Reflects an iterative analysis process starting first with the lowest-cost, technologically feasible alternative that would attain the established effluent limitations, or the alternative that would attain the next highest level of water quality (at the lowest cost for a given level of water quality; that is, the most cost-effective alternative for a given level of water quality).	

There are no numeric thresholds for determining feasibility, because each situation will differ. For example, wealthy communities may be able to absorb greater percentage increases in electricity rates than communities with lower household incomes. (If Ecology finds that the alternative is feasible, then the applicant may/will be required to implement the controls.) If Ecology agrees that the alternative is not feasible, then the applicant will have to evaluate the option that attains the next highest level of water quality.

3. Identifying Alternatives and Estimating Costs

This section provides guidance for identifying compliance options, estimating costs, and documenting the alternatives for Ecology's review. As discussed in Section 2, Ecology should be involved in the development of all water quality attainment plans for dams that may cause or contribute to an exceedance of WQS.

3.1 Control Options

Ecology will establish effluent limitations applicable to the dam either in the context of a TMDL or through a CWA Section 401 certification. The next step is for the applicant to identify control strategies that could be used to attain the limits. Applicants should consider a broad range of structural and/or operational compliance options including:

- changing the quantity and timing of releases and diversions
- changing the location of the reservoir outlet
- upgrading or constructing water treatment facilities
- other structural modifications
- mitigation that may not be related to the dam's structure or operation (e.g., forest buffers).

It is important to note that Ecology is not requiring consideration of dam removal. However, the applicant may want to consider the removal of dams for which other factors (e.g., age, safety, expensive to maintain) are of concern.

The applicant should make clear which control options result in achieving the applicable standards, and fully document the estimates of pollutant levels attainable with each option. Because of the potential for impacts on other water quality parameters, the applicant should document estimates of pollutant levels for the parameters of concern as well as other affected parameters.

Among options that result in achieving the same level of water quality, the applicant should present the most cost-effective option. For alternatives for which economic feasibility is a concern, Ecology will evaluate whether options other than those presented by the applicant could attain standards or the same level of water quality at a lower cost, and as part of the collaborative process, discuss its findings with the applicant. If none of the improvements are capable of fully meeting WQBELs, the applicant should present alternatives for achieving the highest water quality attainable (i.e., the alternatives that can achieve the highest incremental improvement over the existing condition).

3.2 Control Costs

The applicant should then estimate the costs of the different alternatives. In doing so, the applicant should provide the basis for the estimate, show that the project costs are reasonable for

the proposed technology or operation strategy, and document that the project costs are specific to meeting the water quality criteria; that is, the costs cannot include the costs of capacity expansion, or other growth-related or age-related expenditures that would occur regardless of whether the facility is required to comply with the effluent limitations associated with WQS. For example, upgrades necessary to keep an aging dam operational should not be included in the estimate of improvements necessary to meet effluent limitations associated with WQS. However, timing improvements with other upgrades may result in construction efficiencies, thus reducing project costs.

Note that the cost of an alternative may include environmental studies or mitigations that must be carried out along with the project. However, if implementing a pollution control project reduces existing mitigation costs (e.g., by providing a permanent solution to an ongoing problem), then the applicant should subtract the mitigation costs that would no longer be incurred from the project costs. General information regarding the proposed pollution control project and other projects considered can be summarized using **Worksheet A** in Appendix B of this guidance.

Documentation of project costs should include assumptions about excess capacity and population growth. For comparative purposes, cost estimates (e.g., capital, O&M, other project costs) for each alternative considered should be presented in the same units and for the same dollar year. The most accurate estimate of project costs may be available from the design engineers for the dam. If site specific engineering cost estimates are not available, preliminary project cost estimates can be derived from a comparable project in the state or from the judgment of experienced engineers. Capital, O&M, and other project costs can be summarized using **Worksheet B** in Appendix B (financing assumptions for these worksheets are discussed in Section 4). The applicant will need to complete a new Worksheet B for each alternative it analyzes for economic feasibility.

Adjusting Project Costs for Inflation

All costs should reflect the same year, for example in 2006 dollars. If project costs are estimated for a prior year, these costs should be adjusted upward to reflect current year prices using an appropriate price index. The Engineering News-Record (ENR) is one reference that provides construction and building cost indices that may be appropriate for treatment upgrades, and the Bureau of Labor Statistics (BLS) provides an average annual Consumer Price Index (CPI) which measures overall inflation. If the costs of the project reflect expenditures other than construction materials or services, such as hiring additional staff, then the CPI is more likely to be the appropriate index for adjusting costs. In using these indices, the adjustment factor is the ratio of the price index value for the current year to the year when costs were estimated. Similarly, if the costs are in “future dollars” that include an inflation factor, that factor needs to be removed from the estimates so they are in current year dollars.

Long-Term Service Contracts

Some applicants may have one or more long-term contracts to provide a certain amount of power and/or capacity to a certain customer or customers. If one or more alternatives result in the reduction of capacity or power generation that could adversely affect these contracts, it is not

sufficient to claim that the alternative is not feasible due to the existence of a long term contract. Instead, the applicant should add the costs of alternative methods that could be used to meet the terms of the contract, such as purchasing additional capacity from another provider.

Foregone Revenues

Applicants that pass through project costs to customers in the form of rate increases may find that demand for the good or service they provide declines. While the foregone revenues that result from this decline in quantity demanded are attributable to the pollution control project, the applicant should not include these foregone revenues in project costs. Investor-owned applicants will incorporate the effects of increased prices in their financial analysis (e.g., of the profit rate), which is described in Section 5.

3.3 Summary of Documentation

In summary, the applicant should describe the potential control alternatives on Worksheet A, indicating its preferred strategy, and document the costs of the different alternatives on Worksheet B (i.e., fill out Worksheet B for each alternative). In completing these worksheets, the applicant should be sure to clearly document all aspects of the estimates, including:

- method of estimation
- method for adjusting prices
- units (e.g., year dollars)
- any assumptions regarding capacity, growth, or meeting the terms of long-term contracts
- key uncertainties, and the potential impact on the estimates.

In addition, the applicant should provide estimates of the water quality attainable under each option for the parameters of concern (e.g., temperature, dissolved oxygen), and any other parameters that may change as a result of the controls (e.g., downstream flow). This information will assist Ecology in evaluating the best alternative for the waterbody overall, and should clearly identify:

- water quality units (e.g., mg/L, kg/yr)
- type of estimate (average monthly, daily maximum)
- all assumptions and uncertainties.

4. Financial Analysis: Municipalities and PUDs

A range of nonfederal public entities may operate dams, including municipalities, PUDs (see box on this page), irrigation districts, water districts, conservation districts, and reclamation districts. For any of these public entities, the financial analysis involves evaluating its ability to pay for or finance improvements, and the impact of the control costs on its customers. This is important to note that analyzing this project is similar to analyzing an entity's ability to pay for a compliance effort. Since the project is not being implemented for the purpose of generating revenue, the financial analysis does not have to address a project's revenue related financial indicators and their implications, such as the entity's hurdle rate or the project's Internal or Financial Rate of Return (IRR or FRR, respectively.) This section provides guidance to the applicant for conducting the financial analyses, using acceptable methodologies, that are necessary for determining whether control options are economically feasible.

The applicant should discuss with Ecology any issues it has about the financial analysis methodology, including the inclusion of additional analyses that the applicant believes are appropriate for this process.

4.1 Estimating Annual Costs

After estimating the capital and O&M project costs (see Section 3), the applicant must also estimate annual costs (i.e., annualized capital plus annual O&M) for comparison to other annual measures, such as annual household or business income. Generally, calculating annual costs involves four steps:

- determine how much of the capital cost needs to be financed
- determine the appropriate interest rate and period of time for which to annualize capital costs
- apply the resulting annualization factor to determine annualized capital costs
- add annual O&M costs.

Determine Capital Cost to be Financed

The applicant should estimate financing costs only for the portion of the project that must be financed. Thus, the applicant must document other available sources of funding for paying the capital costs of improvements (i.e., without borrowing funds). These may include:

Public Utility Districts

There are 28 PUDs in Washington that provide electric, water, sewer, and/or telecommunications service for 1.7 million people across the state. PUDs provide electricity service to 28% of the state's population (<http://www.wpuda.org/pudinfo.htm>). PUDs are owned by the communities that they serve, and have the basic business structure of a private corporation, with a board of commissioners who serve in the same capacity as a board of directors. The elected commissioners set electric and water rates and utility policies at regular, open meetings.

Under RCW Chapter 54, PUDs have the authority to issue general obligation and revenue bonds or borrow money from any financial institutions. PUDs can also apply for funding from the State Clean Water Revolving Loan Fund, and from certain state and federal grant programs. PUDs can levy property taxes and assess fees for services (e.g., electric rates); rates must be fair, nondiscriminatory, and adequate to pay for debt obligations and operating costs.

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- nonessential assets that can be liquidated
- cash reserves
- unallocated or unappropriated funds
- federal or state grant funds (e.g., from the U.S. Department of Agriculture Rural Utilities Service)
- planned future expenditures that can be postponed in favor of implementing the project and meeting effluent limitations.

Applicants must document the assumptions regarding the funding for the improvements. (Note that projects that can be paid for by available funds are not likely to pose a feasibility issue.) Once the applicant has determined the capital costs that can be paid from other sources, it should deduct those costs from total capital costs. The result is the capital costs to be financed.

Determine Interest Rate and Time Period and Calculate Annualized Capital Cost

Municipalities or PUDs may have a variety of options for debt instruments, such as:

- revenue bonds
- general obligation bonds
- state infrastructure (e.g., State Revolving Fund) loans
- federally subsidized loans (such as those offered by the U.S. Department of Agriculture Rural Utilities Service)
- commercial bank loans.

The interest rate will depend on the type of debt instrument as well as the entity's credit standing. For example, State Revolving Fund loans tend to have below-market interest rates, while commercial bank loans will be set at market rates and may vary over the term of the loan. The applicant should note the likely source of funding and the interest rate on Worksheet B, and provide justification for the rate. For instance, if the applicant indicates it would use a commercial bank loan, it should explain it could not obtain a loan from the State Revolving Loan fund or issue a revenue or general obligation bond. Similarly, the applicant should document why it assumes a particular rate for a new bond issue, such as the interest rate for the most recent bond issue and how credit market conditions have changed since that issue.

The time period over which to annualize capital costs is the same as the repayment period for the loan or bond issue. Once it has determined the interest rate and term, the applicant can calculate the annualization factor using the formula on Worksheet B. The applicant can then calculate annualized capital costs as follows:

$$\text{Total Capital Costs} \times \text{Annualization Factor} = \text{Annualized Capital Costs}$$

Add O&M Costs

O&M costs include any recurring costs, such as for:

- monitoring
- inspection
- equipment repair or replacement
- administration (include only administration that is incremental to the project).

The applicant should identify all recurring costs and show the amount for each line item, in terms of dollars per year, on Worksheet B. If O&M costs would vary from year to year, the applicant should document that, and use an average cost. Next, the applicant should sum the O&M costs to obtain an annual estimate for a typical year, and add the total to the annualized capital cost. The sum of the annualized capital cost and total annual O&M costs is the total annual cost of the project.

4.2 Evaluate Household Costs

Municipal and PUD applicants should then evaluate the anticipated impact of the project costs on their customers. Applicants should start by describing the dam, the goods and services it provides, the types of customers, and dam ownership structures, using **Worksheet C** in Appendix B. For dams that provide multiple goods or services, the applicant should analyze the financial impacts of different services individually. This section describes how to evaluate costs on households.

Calculate Annualized Cost Per Household

To assess the burden that pollution control costs are expected to have on households, the applicant should calculate an average annualized pollution control cost per household for all households in the community that would bear project costs. Therefore, the applicant must determine what proportion of the costs will be borne by households, and which households will actually pay for pollution control. For instance, in the case of a PUD, the affected community is the population served by the PUD, which may include parts of more than one municipality or a subset of a single municipality. If the project would affect households in more than one municipality, the applicant should conduct the analysis of both financial and socioeconomic impacts on a municipality by municipality basis once project costs are allocated to each municipal jurisdiction served. In comparison, if the applicant would spread the cost over a subset of the households in the jurisdiction, the applicant should calculate the per-household cost using only the households that will actually bear costs.

For dams that provide goods and services to businesses as well as households, the applicant should deduct the portion of the project costs that businesses would pay (either in user fees or surcharges) before calculating the average cost per household. The calculation of the costs that businesses would pay should reflect the rate structure that the service provider (e.g., PUD) will actually use to recover the capital and operating cost of the project. The calculation should reflect the rate structure currently in place, unless the service provider plans to change the structure of rates before or during the period over which the project will be paid. The applicant

should use **Worksheet D** in Appendix B to calculate the incremental annual cost of pollution control per household.

To calculate average annual costs per household, the applicant should multiply the per-unit rate by the average household consumption (e.g., kWh per year). The applicant should have information on average household consumption, including variations by jurisdiction if they are significant.

In estimating annual average household costs for electricity with the control project, the applicant should incorporate that higher prices will dampen demand for electricity (i.e., price elasticity, or sensitivity to price changes), and should also account for service provider assistance programs (e.g., low-income assistance programs).

Compare Cost Per Household to MHI

Next, the applicant should evaluate how the cost of services compares to the MHI of the affected jurisdiction(s). MHI is defined as the median of the total income received per household per year in a given area. Half of the households in the area have incomes lower than the MHI, and half have incomes higher than the MHI. For sources of MHI data, see **Appendix C**.

The applicant should use the steps on Worksheet D to compare:

- current cost of services to MHI of the affected jurisdictions
- new cost of services (i.e., with the project costs) to MHI of the affected jurisdictions.

In so doing, the applicant should also consider how the incremental cost compares to the current cost of providing the services provided by the dam. The smaller the incremental cost is compared to the current cost, the less likely are financial impacts. The applicant should use Worksheet D to document how incremental costs compare to current costs.

Note that there is no existing guidance regarding increases in utility rates that are likely to represent substantial financial impacts that would cause widespread social and economic impacts. However, a greater ratio of the cost of services to community MHI indicates a greater likelihood of financial impacts on the affected community due to the project. De minimis increases in electricity costs (e.g., those that result in average household electricity costs of less than 1% of MHI) are not likely to be indicative of economic infeasibility (however, note that this does not imply that electricity costs greater than 1% of MHI are necessarily infeasible).

Compare Service Costs to Costs for Other Geographic Areas

In addition to considering the current and incremental costs of the good or service the dam provides, the applicant should also evaluate how the current cost of the good or service compares to state, regional, and national rates for the same good or service. In the case of electricity provision, for example, the applicant should consider the cost of electricity (cents per kWh as well as average annual cost per household) for the affected community to the cost for the state, the region (e.g., Pacific Northwest), and the country. The applicant can show these calculations

on **Worksheet E** in Appendix B. The applicant may also present additional comparisons or indications of financial impact on Worksheet E.

It is important to note that neither the applicant nor Ecology should interpret the comparison of service costs simplistically. For example, if the comparison shows that electricity costs for the service area are lower than the national average, this does not necessarily imply that the service area can afford to pay costs up to the national average. This is especially true in the context of a changing power market (e.g., with imminent changes in many states related to price regulation, competition, and relationships between entities that generate, transmit, and distribute power). However, the comparison of service costs to that in other areas provides valuable perspective, for example, on the potential for community development.

4.3 Evaluating Costs on Business Customers

Increased costs for business customers as a result of increased rates may directly result in adverse financial impacts on these business. While some businesses may be able to pass on a portion of the costs to their customers, others may not.

If the applicant expects to pass on any costs to businesses, the applicant should document what types of businesses would be affected, and any estimates of impacts, using Worksheet E (Part D) in Appendix B. Such estimates might include:

- the percent increase in costs for the services provided by the dam, and the percent of total costs these costs represent for the business on average
- financial analysis to determine the potential for reduced business activity resulting from higher prices for goods or services provided by the dam
- economic modeling results of the impact of higher prices for services provided by the dam.

Note that the applicant and/or its business customers must provide adequate documentation of financial impacts (e.g., financial ratio analysis, as described in Section 5.5) in order to show that a prospective increase in electric rates may force the business to curtail operations, shut down, or relocate. In some cases, a business customer may prefer to submit information to document a claim directly to Ecology (e.g., if the documentation includes confidential information). If this is the case, Ecology recommends that the customer contact Ecology directly. As stated in Section 1, Ecology is sensitive to confidentiality issues, and will make every effort to preserve the confidentiality of information when businesses identify it as such.

4.4 Secondary Test

The applicant should also evaluate six indicators, which together describe precompliance debt, socioeconomic health, and financial management conditions in the community. The six indicators are:

Debt Indicators:

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- Bond Rating – a measure of a jurisdiction’s ability to repay its debt
- Overall Net Debt as a Percent of Full Market Value of Taxable Property – a measure of debt burden on residents within the jurisdiction

Community Economic Indicators:

- Unemployment Rate – a measure of the availability of jobs in the jurisdiction
- Median Household Income – a measure of the income of the jurisdiction

Financial Management Indicators:

- Property Tax Revenue as a Percent of Full Market Value of Taxable Property – a measure of the capacity to support debt based on the wealth of the jurisdiction
- Property Tax Collection Rate – a measure of the strength of the local government administration, and of the jurisdiction’s acceptance of property tax rates.

The indicators can be evaluated based on the comparison criteria shown in **Exhibit 2**. A more detailed description of the six indicators is presented below.

Exhibit 2. Indicators of Community Financial Health

Indicator	Weak	Mid-Range	Strong
Bond Rating	Below BBB (Standard and Poor’s) Below Baa (Mergent, Incorporated)	BBB (Standard and Poor’s) Baa (Mergent, Incorporated)	Above BBB (Standard and Poor’s) Above Baa (Mergent, Incorporated)
Overall Net Debt ¹ as Percent of Full Market Value of Taxable Property	Above 6%	3% – 6%	Below 3%
Unemployment	More than 1% above National average	National average	More than 1% below National average
Median Household Income	More than 10% below State median	State median	More than 10% above State median
Property Tax Revenues as a Percent of Full Market Value of Taxable Property	Above 2.5%	1.5% - 2.5%	Below 1.5%
Property Tax Collection	Below 94%	94% – 98%	Above 98%

1. Not including pension funding debt.

Bond Rating

The current bond rating for a local government (including a special government district, such as a PUD) reflects a third-party's (a bond rating agency's) assessment of credit worthiness, based on current financial conditions and the strength of financial and administrative management. If the entity has used security enhancements like bond insurance for the bond issue, however, the bond rating on a particular issue may be higher than local conditions justify. Therefore, the applicant should use only ratings for uninsured bonds for the financial analysis. Appendix C presents sources for information on bond ratings.

Some jurisdictions have not used debt financing for projects and, as a result, have no bond rating. The absence of a bond rating does not indicate strong or weak financial health; it simply indicates the jurisdiction has not issued a bond obligation in the past. When a bond rating is not available, the applicant should omit this indicator and evaluate the secondary test using the other five factors listed above.

When a bond rating is available, the applicant should use the rating for the most recent general obligation bond, if possible, or the most recent local utility district bond. The applicant should compare the bond rating with the thresholds in Exhibit 2. If ratings are available from more than one source, the applicant should use the more recent rating; if the ratings are equally recent and the thresholds would be different for each rating, the applicant should use the mid-range rating.

Overall Net Debt as a Percent of Full Market Value of Taxable Property

Overall net debt is debt that is repaid by property taxes, and includes the debt issued directly by the affected entity and debt of overlapping entities (i.e., "overlapping debt"), such as school districts. However, overall net debt excludes debt that is repaid by special user fees (e.g., revenue debt), including the user fees of public utilities. Overall net debt as a percentage of the full market value of taxable property provides a measure of the debt burden on residents within the affected community, and measures the ability of local jurisdictions to issue additional debt. Appendix C includes sources for debt and property value information.

Before calculating the ratio, both data items (overall net debt and full market value of taxable property) must be in the same dollar year. If necessary, the applicant should adjust different dollar years using the CPI (Section 3 describes how to use the CPI). After calculating the ratio, the applicant should compare the ratio to the thresholds in Exhibit 2.

Unemployment Rate

The unemployment rate is defined as the percent of a jurisdiction's labor force currently unemployed. If recent information on the unemployment rate in the service area is not available, the encompassing county's rate may be used as a substitute. Appendix C provides sources for data on local, regional, and national unemployment rates. The applicant should use the most recent average annual rates when comparing the local to national rate using the thresholds in Exhibit 2.

Median Household Income

MHI serves as an indicator of the jurisdiction's spending capacity. Appendix C describes sources for MHI data. The applicant should compare the MHI of the jurisdiction to the MHI for the entire state. If data are not available for the same dollar year, the applicant should use the CPI to convert one of the data items so they are in the same dollar year before comparing to the thresholds in Exhibit 2.

Property Tax Revenues as a Percent of Full Market Value of Taxable Property

Property tax revenues as a percent of full market value of taxable property can be referred to as the "property tax burden" because it reflects the funding capacity to support new expenditures, based on the wealth of the community. As described above in the section regarding overall net debt as a percent of full market value of taxable property, assessed value must be multiplied by the inverse of the assessment ratio in order to calculate full market value. Appendix C shows sources for property tax revenues and valuation. The applicant should compare the property tax burden to the thresholds in Exhibit 2.

Note that there is a legislative cap on the amount of property taxes that can be levied by all of the jurisdictions that overlap a particular area in Washington (RCW 84.52.043 and 84.52.050). Thus, this indicator will be strong for all communities until or unless the law is changed.

Property Tax Revenue Collection Rate

The property tax revenue collection rate is equal to the amount of property tax collected divided by the property taxes levied. As an indicator, this rate measures the efficiency of the tax collection system, the strength of the local government's administration, and the acceptance of tax levels by taxpayers. Appendix C provides sources for property tax revenue collection rate information.

Considering the Secondary Indicators

The applicant should use the six indicators described above to assess the affected jurisdiction's precompliance economic health and ability to obtain financing, using **Worksheet F** in Appendix B. If the applicant is not able to develop one or more of the six indicators, it must provide an explanation as to why the indicator is not appropriate or not available.

4.5 Issues of Scope and Timeframe

The analysis of financial impacts should consider the most recent data available as well as data for two years prior (e.g., ratios should be calculated for at least three years of operations). This will allow the applicant to differentiate long-term trends from short-term conditions. Ecology is concerned about concluding financial impacts based on short term conditions that are likely to be mitigated by future economic growth. Therefore, the applicant should fully document its

assumptions regarding future growth, and how future conditions may affect any financial impacts reported.

The financial analysis should also incorporate the appropriate geographic area of interest. The area of interest may include parts of more than one municipality, or a subset of a single municipality. If the project would affect households in more than one municipality, the applicant should conduct the analysis of financial impacts on a jurisdiction by jurisdiction basis once project costs are allocated to each jurisdiction served. In comparison, if the applicant would spread the cost over a subset of the households in the jurisdiction, the applicant should calculate the per-household cost using only the households that will actually bear the cost. It is possible that there would be financial impacts in some communities served by a dam but there would not be financial impacts on other communities in the service area (e.g., because of different income levels in the different areas served). In this case, it may be appropriate to consider a rate-relief program, such as a program to help low-income consumers pay their electric bills. In addition, the applicant should consider phasing in any rate increases to mitigate financial impacts on household impacts.

Note that multiple sources may affect the quality of the water body relative to WQS (e.g., POTWs and agricultural producers as well as dams). These entities may have different abilities to pay for controls that would allow the water body to meet WQS and attain a designated use. **However, a dam owner's analysis of feasibility should pertain only to its own permit requirements, financial situation, and the situation of the community it serves (as described in this guidance).**

4.6 Budgets and Financial Statements

Where the applicant is demonstrating in its application that it cannot afford to pay for the least cost or any alternative, Ecology must be able to adequately evaluate this claim. This requires that Ecology is able to understand the specific financial elements that place the applicant in this position. The applicant must therefore provide with its application the following:

- annual budget for the current and preceding fiscal years
- proposed budget for the next fiscal year
- complete financial statements for the current and prior two years – preferably audited
- an explanation of any current or proposed projects, including annual expenditures, and project starting and ending dates
- any change in the last three years in the applicant's borrowing ability (e.g., change in bond rating, debt ratio, etc.) - explain with supporting documents
- any denial by a financial institution to loan funds or underwrite a bond issue – provide supporting documents
- any other supporting documents, with explanation, that support the applicant's claim of economic infeasibility

4.6 Summary of Documentation

In summary, the applicant should complete:

- Worksheet C (once)
- Worksheets D, E, and F (once for each alternative analyzed).

In completing these worksheets, the applicant should be sure to clearly document, using additional sheets if necessary, all aspects of the analysis, including:

- who will bear the cost of the projects, and why (including funding sources, cost recovery methods, and other relevant information)
- method for adjusting prices
- units (e.g., year dollars)
- any assumptions relevant to analysis of impacts on nonresidential customers
- any assumptions regarding demand for services or future economic growth
- key uncertainties, and the potential impact on the analysis.

The applicant should also clearly document any additional information that it provides, including the source of the information, and any assumptions and uncertainties related to the additional information.

In addition, if the applicant is claiming economic infeasibility, then it must provide the budget and financial statements and other information enumerated in section 4.6.

5. Financial Analysis: Investor-Owned Companies

A variety of private owners operate dams in Washington. For example, there are investor-owned companies, such as PacifiCorp, Avista, and Puget Sound Energy, that operate hydropower dams. There are also private dam owners that include country clubs, resorts, community organizations, farms, and homeowners' associations.

This section provides guidance specifically for investor-owned companies (IOCs) for conducting the financial analysis that is part of the economic feasibility analysis used to determine whether the least cost control options are economically feasible. For private entities, the financial analysis involves demonstrating the applicant's inability to afford to pay for the project through an analysis of company direct financial elements, such as a cash flow analysis, a review of its specific non-essential assets, actual borrowing ability, etc., and the calculation and analysis of financial ratios, as well as evaluating impacts on customers.

Applicants should start by describing the dam, the goods and services it provides, the types of customers, and dam ownership structures, using **Worksheet C** in Appendix B. Note that investor-owned applicants should perform the financial analysis for the appropriate entity. Part B of Worksheet C provides guidance for determining the appropriate entity.

For dams that provide multiple goods or services, the applicant should analyze the financial impacts of different services individually.

5.1 Scenarios for Paying for the Project Costs

Note that the WUTC regulates rates for water or electricity that investor-owned dams sell to public customers. Since the WUTC generally allows power and water providers to fully recover costs, with an allowance for a return on investment, it is likely, though not certain, that the dam owner can pass through control costs to customers, thereby mitigating financial impacts on the entity itself. However, investor-owned dams could also absorb some of the costs (e.g., through reduced profits). While such an action would result in less impact on ratepayers, it could have adverse impacts on the business.

If there are impediments to passing through costs, the applicant should provide an explanation along with documentation of this claim (e.g., a letter from the WUTC advising that a request for rate increase due to project costs may be denied). If the applicant has more than one option available with respect to paying for the project costs (e.g., increase electricity rates and/or absorb higher costs), it should substantively describe the impacts of both scenarios, using the guidance in the sections that follow.

5.2 Estimating Annual Costs

After estimating the capital and O&M project costs (see Section 3), the applicant must also estimate annual costs (i.e., annualized capital plus annual O&M) for comparison to other annual measures, such as annual household or business income, or annual profits. Generally, calculating annual costs involves four steps:

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- determine how much of the capital cost needs to be financed
- determine the appropriate interest rate and period of time for which to annualize capital costs
- apply the resulting annualization factor to determine annualized capital costs
- add annual O&M costs.

Determine Capital Cost to be Financed

The applicant should estimate financing costs only for the portion of the project that must be financed. Thus, the applicant must document other available sources of funding for paying the capital costs of improvements. These may include:

- operating budget or cash flow
- available liquid assets
- nonessential assets that can be liquidated
- unallocated funds
- planned future expenditures that can be postponed in favor of implementing the project and meeting effluent limitations.

Applicants must document the assumptions regarding the funding for the improvements. (Note that projects that can be paid for by available funds are not likely to pose a feasibility issue.) Once the applicant has determined the capital costs that can be paid from other sources, it should deduct those costs from total capital costs. The result is the capital costs to be financed.

Note that even if the applicant could pay the upfront project cost from existing assets or cash flow, it may need to perform the financial tests under an alternative assumption of obtaining financing. This is because in some cases, paying capital costs from operating expenses or cash flow could leave an operator worse off than borrowing some or all of the capital. Thus, if the applicant submits an application indicating it would pay for the project from available funds but determines the project would then result in financial impacts, Ecology will require the applicant to also consider obtaining financing.

Determine Interest Rate and Time Period and Calculate Annualized Capital Cost

If investor owned companies need to borrow capital to pay upfront costs, their options for debt instruments may include:

- bonds, convertible securities, and other instruments issued by the corporation
- an existing or new line of credit
- commercial loans.

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The interest rate will depend on the type of debt instrument as well as the applicant's credit standing. For example, a corporation that is already heavily leveraged (i.e., already has sizable debt relative to its assets) may pay a higher interest rate on new debt than one that carries less debt. The applicant should note the likely source of funding and the interest rate on Worksheet B, and provide justification for the rate. For instance, if the applicant indicates it would use a commercial bank loan, it should explain why it could or would not issue a corporate bond instead. Similarly, the applicant should document why it assumes a particular rate for a debt instrument; for a bond issue, for instance, this might include the interest rate for the most recent bond issue and how credit market conditions and the applicant's credit status have changed since that issue.

The time period over which to annualize capital costs is the same as the repayment period for the loan or bond issue. Once it has determined the interest rate and term, the applicant can calculate the annualization factor using the formula on Worksheet B. The applicant can then calculate annualized capital costs as follows:

$$\text{Total Capital Costs} \times \text{Annualization Factor} = \text{Annualized Capital Costs}$$

Add O&M Costs

O&M costs include any recurring costs, such as for:

- monitoring
- inspection
- equipment repair or replacement
- administration (include only administration that is incremental to the project).

The applicant should identify all recurring costs and show the amount for each line item, in terms of dollars per year, on Worksheet B. If O&M costs would vary from year to year, the applicant should document that, and use an average cost. Next, the applicant should sum the O&M costs to obtain an annual estimate for a typical year, and add the total to the annualized capital cost. The sum of the annualized capital cost and total annual O&M costs is the total annual cost of the project.

Marginal Corporate Tax Rate

Private entities may be able to deduct interest payments from their corporate income taxes, which reduces the effective interest rate. If this is the case, then the applicant should calculate the effective interest rate by multiplying the nominal interest rate by one minus the marginal corporate tax rate. (The marginal tax rate rather than the average rate is appropriate because it applies to incremental changes in the firm's tax-deductible expenses and income.) Federal marginal corporate tax rates can be found in Internal Revenue Service Publication 542. State marginal corporate tax rates are provided by the Federation of Tax Administrators or state

departments of taxation or revenue (note that as of 2006, Washington has no state corporate income tax; however, other state tax rates may apply if the corporation sells power from operations inside Washington to operations outside Washington). For example, suppose that the nominal interest rate is 7.3%, the corporation's federal marginal tax rate is 34%, and no state corporate income tax applies to its operations in Washington. In this case, the overall marginal tax rate is 34% (if there were a state income tax rate, the applicant would add the marginal state rate to the federal rate), and the effective interest rate is 4.8% [= 7.3% x (1 - 34%)]. In this example, the applicant would annualize capital costs at a 4.8% interest rate.

Similarly, applicants that pay federal and/or state corporate income taxes should adjust O&M costs downward to account for tax offsets. Incremental O&M costs reduce earnings before taxes (EBT), which means that incremental O&M costs also decrease a firm's tax liability by an amount equal to the marginal tax rate times incremental O&M costs. Thus, the private applicant should multiply the project O&M costs by one minus the marginal corporate income tax rate; the product is the net O&M cost of the project.

In implementing the tests that are described in the remainder of this section, private entities should use the effective cost of pollution controls (i.e., adjusted for corporate tax deductions), rather than the actual cost of controls.

5.3 Evaluate Impacts on Households

For any costs that the applicant plans to pass on to household customers, it should evaluate the impacts of those costs on the community. This section describes how to evaluate costs on households.

Calculate Annualized Cost Per Household

To assess the burden that pollution control costs are expected to have on households, the applicant should calculate an average annualized pollution control cost per household for all households in the community that would bear project costs. Therefore, the applicant must determine what proportion of the costs will be borne by households, and which households will actually pay for pollution control. If the project would affect households in more than one municipality, the applicant should conduct the analysis of both financial and socioeconomic impacts on a municipality by municipality basis once project costs are allocated to each municipal jurisdiction served. In comparison, if the applicant would spread the cost over a subset of the households in the jurisdiction, the applicant should calculate the per-household cost using only the households that will actually bear costs.

For dams that provide goods and services to businesses as well as households, the applicant should deduct the portion of the project costs that businesses would pay (either in user fees or surcharges) before calculating the average cost per household. The calculation of the costs that businesses would pay should reflect the rate structure that the applicant will actually use to recover the capital and operating cost of the project. The calculation should reflect the rate structure currently in place, unless the service provider plans to change the structure of rates before or during the period over which the project will be paid. The applicant should use

Worksheet D in Appendix B to calculate the incremental annual cost of pollution control per household.

To calculate average annual costs per household, the applicant should multiply the per-unit rate by the average household consumption (e.g., kWh per year). The applicant should have information on average household consumption, including variations by jurisdiction if they are significant.

In estimating annual average household costs for electricity with the control project, the applicant should incorporate that higher prices will dampen demand for electricity (i.e., price elasticity, or sensitivity to price changes), and should also account for service provider assistance programs (e.g., low-income assistance programs).

Compare Cost Per Household to MHI

Next, the applicant should evaluate how the cost of services compares to the MHI of the affected jurisdictions. MHI is defined as the median of the total income received per household per year in a given area. Half of the households in the area have incomes lower than the MHI, and half have incomes higher than the MHI. For sources of MHI data, see **Appendix C**.

The applicant should use the steps on Worksheet D to compare:

- current cost of services to MHI of the affected jurisdiction(s)
- new cost of services (i.e., with the project costs) to MHI of the affected jurisdiction(s).

In so doing, the applicant should also consider how the incremental cost compares to the current cost of providing the services provided by the dam. The smaller the incremental cost is compared to the current cost, the less likely are financial impacts. The applicant should use Worksheet D to document how incremental costs compare to current costs.

Note that there is no existing guidance regarding increases in utility rates that are likely to represent substantial financial impacts that would cause widespread social and economic impacts. However, a greater ratio of the cost of services to community MHI indicates a greater likelihood of financial impacts on the affected community due to the project. De minimis increases in electricity costs (e.g., those that result in average household electricity costs of less than 1% of MHI) are not likely to be indicative of economic infeasibility (however, note that this does not imply that electricity costs greater than 1% of MHI are necessarily infeasible).

Compare Service Costs to Costs for Other Geographic Areas

In addition to considering the current and incremental costs of the good or service the dam provides, the applicant should also evaluate how the current cost of the good or service compares to state, regional, and national rates for the same good or service. In the case of electricity provision, for example, the applicant should consider the cost of electricity (cents per kWh as well as average annual cost per household) for the affected community to the cost for the state, the region (e.g., Pacific Northwest), and the country. The applicant can show these calculations

on **Worksheet E** in Appendix B. The applicant may also present additional comparisons or indications of financial impact on Worksheet E.

It is important to note that neither the applicant nor Ecology should interpret the comparison of service costs simplistically. For example, if the comparison shows that electricity costs for the service area are lower than the national average, this does not necessarily imply that the service area can afford to pay costs up to the national average. This is especially true in the context of a changing power market (e.g., with imminent changes in many states related to price regulation, competition, and relationships between entities that generate, transmit, and distribute power). However, the comparison of service costs to that in other areas provides valuable perspective, for example, on the potential for community development.

5.4 Evaluating Costs on Businesses

If the applicant will pass costs on to customers, it should be concerned about impacts on businesses. Increased costs for business customers may result in adverse financial impacts on these businesses. Some businesses may be able to pass on a portion of the costs to their customers, while others may not.

If the applicant expects to pass on any costs to businesses, the applicant should document what types of businesses would be affected and any estimates of impacts, using Worksheet E (Part D) in Appendix B. Such estimates might include:

- the percent increase in costs for the services provided by the dam, and the percent of total costs these costs represent for the business on average
- financial analysis to determine the potential for reduced business activity resulting from higher prices for goods or services provided by the dam
- economic modeling results of the impact of higher prices for services provided by the dam.

Note that the applicant and/or its business customers must provide adequate documentation of financial impacts (e.g., financial ratio analysis, as described in Section 5.5) in order to show that a prospective increase in electric rates may force the business to curtail operations, shut down, or relocate. In some cases, a business customer may prefer to submit information to document a claim directly to Ecology (e.g., if the documentation includes confidential information). If this is the case, Ecology recommends that the customer contact Ecology directly. As stated in Section 1, Ecology is sensitive to confidentiality issues, and will make every effort to preserve the confidentiality of information when businesses identify it as such.

5.5 Financial Analysis of the Applicant

Unlike public sector operators, which do not accumulate profits, investor owned operators can potentially absorb some or all of the project costs. In addition, investor owned operators may experience lower demand as a result of passing through any project costs by increasing rates. This section provides guidance on evaluating the impacts to the financial condition of the

applicant itself. The financial analysis of the applicant consists of evaluating tests on profitability, liquidity, solvency, and leverage.

Market Value of Electricity

In some cases, such as hydroelectric dams, the applicant may not sell its output directly, but may transmit the power to a grid or pool from which the power is then sold and distributed. In this case, the applicant's share of sales should be calculated by determining the market value of the output produced by the dam itself, using market prices for the year being analyzed. If the market price varies over the course of the year, the applicant should use the average price for the year for the power produced from the affected dam.

The average price for electricity sold by a particular firm over all of its generating facilities for a given fiscal or water year may not reflect the market value of electricity supplied by a specific hydropower plant. Dam operators typically use hydropower plants with little water storage capacity to produce power for the base load, since generation at these plants is proportional to water inflow, and electrical output is relatively constant over the day. Operators typically use power plants with more storage capacity to satisfy power demands during peak periods of the day, since these plants can change output levels more rapidly.

The average price for electricity sold over all of a firm's generating facilities reflects both baseload and peaking sources. However, because peaking sources allow power providers to avoid the cost of operating peaking units that may be more expensive to operate for short periods of the day (e.g., gas turbines), the market value of power produced by a peaking facility may be greater than the average value over all generating units. Conversely, the market value of power produced by a baseload facility may be less than the average value over all generating units. Applicants should use the actual market value of power produced by the affected dam in their analysis, to the degree possible.

Financial Ratio Tests

The use of financial ratio tests can be useful in evaluating various aspects of an IOC's financial health and operations. While the ratios may be forthright in their conclusion, that may not necessarily be the case. The ratios are also based on historical data, and do not take into account even known near term expenditures and that impact on short- and long-term assets and liabilities. Therefore, it is important to not only have an understanding of how to perform the ratio tests, but also as to how to interpret the results.

The financial analysis involves four types of tests, including a primary measure (profitability), and three secondary measures of financial impacts:

Primary measure:

- profit—how much will profits change due to changes in pollution control expenditures and customer prices?

Secondary measures:

- liquidity—how easily can the entity pay its short-term bills?
- solvency—how easily can the entity pay its fixed and long-term bills? How will this change due to changes in pollution control expenditures?
- leverage—how much money can the entity borrow?

The applicant should also include any additional information about its financial health that it feels is relevant. Note, however, that the tests described in this section are designed to indicate whether pollution control costs would result in significant financial impacts, not to determine the exact impact of pollution control costs. In general, the analysis of financial impacts should reflect the most recent data available as well as data for two years prior (e.g., ratios should be calculated for at least three years of operations) in order to highlight underlying trends.

Although there are several ratios that the applicant could use for each test, this guidance describes in detail only one ratio for each test. Jointly, the results of the four tests provide a picture of the economic health of the applicant and the impact of the WQS requirement on the applicant's health.

EPA's *Interim Economic Guidance* (U.S. EPA 1995) provides example calculations of the financial ratio tests, using hypothetical company data.

Profit Test

The Profit Test measures what will happen to the affected entity's earnings with the proposed project. The test consists of comparing the applicant's profit rate before the pollution control project to the profit rate after the project. The profit rate is defined as earnings before taxes (EBT; i.e., revenues minus costs, excluding income taxes from costs) divided by revenue:

$$\text{Profit Rate} = \frac{\text{Earnings Before Taxes}}{\text{Revenues}}$$

The applicant should calculate the profit rate first without the cost of pollution control and then with the control costs. **Worksheet G** in Appendix B provides a form for the applicant to calculate EBT with and without the control costs. **Worksheet H** in Appendix B provides a form to calculate the profit rate with and without control costs. The applicant should calculate EBT and the profit rate for at least the three previous fiscal years in order to identify any trends or atypical years. In calculating earnings with pollution control costs, the applicant should use the latest year with complete financial information.

Evaluating the Profit Test

If an entity is not profitable to start, it may not claim that compliance with WQBELs will cause financial impacts (see box below). If the entity is profitable now but would become unprofitable

with the pollution control, then there may be a risk to the viability of the business or a particular production line. Greatly reduced profits are of concern even if they are still positive.

The applicant should compare its profit rate with and without the project to those for facilities in similar lines of business. If the entity's ratio compares favorably with the median or upper quartile ratio for similar businesses, it is likely to be financially healthy relative to its peers. If the entity's current financial health is poor without the pollution control costs, and pro forma projections do not show improvement, then the entity cannot claim financial impacts due to the pollution control costs.

Ability to Raise Prices

Applicants selling goods or services at unregulated rates (e.g., a dam operated by an aluminum manufacturer, or a dam selling goods or services to other private businesses) should also discuss their ability to raise prices in order to cover some or all of the pollution control costs. In such a case, earnings would fall by an amount less than the costs of pollution control. The degree to

which the entity is able to raise prices may be difficult to predict, depending on factors such as the level of competition in the industry, the likelihood of competitors' facilities facing similar project costs, and the willingness of consumers to pay more for the product.

Applicants that can pass along costs to household or business customers can show the sensitivity of profit (or earnings per share) under the different alternatives and different prices for the good provided by the dam (e.g., electricity rates). **Worksheet I** in Appendix B provides a matrix for displaying such an analysis. The applicant can use this matrix to show the effects of absorbing some or all of the project costs rather than passing all of the cost through to customers. Note that the applicant should evaluate any costs passed through to customers following the guidance in Section 5.3.

Liquidity Test

Liquidity measures how easily an entity can pay its short-term bills. The applicant should use **Worksheet J** in Appendix B to document the liquidity test, which consists of calculating its own

The Requirement for Profitability

If Ecology were to grant a variance from WQS, or approve a water quality attainment plan for a dam that does not result in attaining standards, it would be allowing higher pollution loadings and social costs in order to avoid socioeconomic impacts within a local community. However, if a business is unprofitable, there is already a risk of widespread economic impacts (i.e., it may curtail or shut down operations anyway), and granting a variance imposes social costs (e.g., continued contribution toward the inability of the water to achieve the water quality criteria protective of the designated use) without eliminating the risk of business failure.

By definition, a business that has negative profits is one in which the market value of the resources it uses in production (e.g., labor, land, capital, energy, and raw materials) is less than the market value of goods or services it produces. Unprofitability is a signal that productive resources are misallocated in an economic sense, as well as a business sense, and should be reallocated to produce goods and services that have higher value. Granting a variance to an unprofitable business will compound this misallocation problem by allowing the unprofitable business to use more resources (i.e., the ability of the water to assimilate pollutant loadings).

Furthermore, allowing the unprofitable business to discharge excess loadings potentially passes costs on to other business and public entities that must reduce their loadings to preserve or achieve WQS. Thus, the relief from WQS would compound the misallocation problem. Finally, such relief would produce an uneven economic playing field where marginal or unprofitable businesses avoid costs to meet WQS that profitable ones must incur.

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liquidity ratio (Current Ratio and/or Quick Ratio) and comparing it to general and industry-specific benchmarks. (Worksheet J focuses on the Current Ratio; if the Quick Ratio is more applicable, the applicant should follow the general guidance on the worksheet, but calculate the Quick Ratio instead.)

Current Ratio and Quick Ratio

Measures of liquidity include the Current Ratio, which compares current assets with current liabilities, and the more stringent Quick Ratio (also known as the Acid Test), which compares current assets less inventories to current liabilities. The Quick Ratio is a more stringent test because it subtracts inventories from assets; inventories may take more time to convert to cash and may also be valued on the entity's books for more than they could actually be sold.

The applicant should calculate the Current Ratio by dividing current assets by current liabilities. If the applicant feels the Quick Ratio is a more appropriate test, it should calculate that ratio by dividing current assets less inventories by current liabilities:

$$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$$

$$\text{Quick Ratio} = \frac{(\text{Current Assets} - \text{Inventories})}{\text{Current Liabilities}}$$

The applicant should calculate the Current Ratio (and/or the Quick Ratio) for each of the last three full fiscal years for which there are data.

Current Assets and Current Liabilities

Current assets include cash as well as other assets that will or could readily be converted into cash during the current year. The following items on an entity's balance sheet are considered current assets:

- inventories (finished products, products in the process of being manufactured, raw materials, supplies, fuels, etc.)
- prepaid expenses (expenses paid in advance of use such as prepaid rent)
- short-term investments (savings accounts, certificates of deposit)
- accounts receivable (money due for services performed or goods sold on credit)
- marketable securities (certain bonds, Treasury bills, and other securities that can be sold after they are issued and before they mature)
- cash.

Current liabilities are expenses that must be paid within the current year. The following balance sheet items are considered current liabilities:

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- accounts payable (purchases of goods for resale and services received in the normal course of business)
- wages payable (wages owed to employees but not paid as of the close of the accounting period)
- short-term notes payable (any debt initially incurred and due in the current year)
- accrued expenses (expenses that have been incurred but have not yet been paid at the end of the accounting period)
- taxes
- current portion of any long-term debt.

Benchmark Values

The applicant should compare its Current or Quick Ratio to general and/or industry benchmark values. General benchmark values, if they apply, provide a basis for evaluating the implications of the applicant's solvency ratio relative to established accounting theory and practice (e.g., risk of bankruptcy based on studies over many years for many different types of firms). However, industry-specific benchmarks provide another and useful basis for evaluating the relevant ratios.

The general benchmark value for the Current Ratio is 2; for the Quick Ratio, it is 1. A general conclusion is that if the applicant's Current or Quick Ratios exceed the general benchmark values, then the applicant should be able to cover its short-term obligations. Frequently, lenders require this level of liquidity as a prerequisite for lending.

If the general benchmark value (2 for the Current Ratio, 1 for the Quick Ratio) is not appropriate for a specific applicant, then the applicant should compare the Current Ratio of the entity with ratios for other entities in the same line of business. It may not be possible, however, to compare the entity's ratio directly with other entities in the same line of business because this information frequently is unavailable at the facility level or is considered confidential. In cases where the applicant cannot make a direct comparison, the applicant should compare its Current or Quick Ratio with the ratio for firms that concentrate in similar businesses. Appendix C provides information about sources that provide comparison information.

Evaluating the Liquidity Test

A Current Ratio greater than 2, and/or a Quick Ratio greater than 1, suggests that the entity should be able to cover its short-term obligations. In addition, if the applicant's ratio compares favorably with the median or upper quartile ratio for similar businesses, it should be able to cover its short-term obligations as well as most other firms in its industry. However, the applicant must judge the impact of the pollution control project in conjunction with the other three financial tests described in this guidance.

Note that comparing the entity's ratio to the ratio for similar firms does not definitively show that the entity can or cannot meet its fixed and long-term obligations. If the entire industry is suffering and all firms in the industry have a Current Ratio below 2, the affected entity may still have problems with liquidity, regardless of how its Current Ratio compares to that for other firms. However, the comparison to other firms does provide useful insight into the performance of the affected entity relative to other firms in the industry.

Solvency Test

Solvency measures an entity's ability to meet its fixed and long-term obligations. These obligations are bills and debts that are owed on a regular basis for periods longer than one year. Solvency tests are commonly used to predict financial problems that could lead to bankruptcy within the next few years.

The applicant should calculate its solvency ratio (using Beaver's Ratio or another test of its choosing, as described immediately below), using **Worksheet K** in Appendix B.

Beaver's Ratio and Other Measures of Solvency

As with liquidity, there are several possible tests for solvency. One commonly used test is Beaver's Ratio, which compares cash flow to total debt:

$$\text{Beaver's Ratio} = \frac{\text{Cash Flow}}{\text{Total Debt}}$$

If the applicant feels another ratio provides a better measure of solvency given its industry or other considerations, it may use the other ratio provided that it documents why the other ratio is superior.

Cash flow is a measure of the cash the entity has available to it in a given year. Since depreciation is an accounting cost - a cost that does not use any currently available revenues - the applicant should add depreciation (along with any other noncash expenses) back to reported net income after taxes to get cash flow. Total debt consists of all long-term debt, including the current portion of long-term debt.

Benchmarks

As with the liquidity test, general benchmarks provide a basis for evaluating the implications of the applicant's solvency ratio relative to established accounting theory and practice (e.g., risk of bankruptcy based on studies over many years for many different types of firms). Industry-specific benchmarks provide a basis for evaluating the applicant's solvency ratio relative to other firms in the same industry at the current time.

If the Beaver's Ratio is greater than 0.20, the entity is likely solvent (i.e., able to continue covering its liabilities). If the ratio is less than 0.15, the entity may be insolvent (i.e., unable to

cover its liabilities and at risk of bankruptcy). If the ratio is between 0.15 and 0.20, then future solvency is uncertain.

In addition to comparing the Beaver's Ratio to the 0.15 and 0.20 benchmarks, the applicant should also compare the entity's Beaver's Ratio with the ratios of entities in the same industry at the same level of the corporate structure. Note that comparing the entity's ratio to the ratio for similar firms does not definitively show that the entity can or cannot meet its fixed and long-term obligations. If the entire industry is suffering and all firms in the industry have a Beaver's Ratio below the 0.15 benchmark, the affected entity may still be in danger of insolvency, regardless of how its Beaver's Ratio compares to that for other firms. However, the comparison to other firms does provide useful insight into the performance of the affected entity relative to other firms in the industry.

If the applicant chooses to use another solvency ratio instead of Beaver's Ratio, then it must document the general and industry benchmarks for the solvency ratio it provides, compare its ratio to the benchmarks, and summarize the implications.

Leverage Test

Leverage tests measure the extent to which a firm already has fixed financial obligations and thus indicate how much more money a firm is capable of borrowing. Firms that rely heavily on debt may find it difficult and expensive to borrow additional funds. Most leverage tests compare equity to some measure of debt or fixed assets.

The applicant should use **Worksheet L** in Appendix B to calculate its liquidity test and compare it to general and industry benchmarks. The applicant should calculate the ratio for at least three years of data (using the most recent data available).

Debt to Equity Ratio

The Debt to Equity Ratio is the most commonly used method of measuring leverage. The ratio measures how much the firm has borrowed (debt) relative to the amount of capital its stockholders own (equity). The Debt to Equity Ratio is equal to total liabilities (long-term debt such as bonds, debentures, and bank debt, and all other noncurrent liabilities like deferred income taxes plus current liabilities) divided by owners' equity. Owners' equity is the difference between total assets and total liabilities, including contributed or paid in capital and retained earnings. For publicly held firms, applicants should use net stockholders equity, which is the equivalent of total stockholder equity minus any treasury stock (i.e., stock that has been repurchased by the issuing company).

$$\text{Debt / Equity Ratio} = \frac{\text{Total Liabilities}}{\text{Owner's Equity}}$$

It may be difficult to calculate the debt to equity ratio for a single facility such as a dam; the applicant must typically calculate the debt to equity ratio for the firm, since it is usually the firm, not the facility, that borrows money.

Benchmarks

Since there are no generally accepted Debt to Equity Ratio values that apply to all types of economic activity, the applicant should compare the ratio with the ratio of firms in similar lines of business. Appendix C provides sources for financial information on individual firms and for specific industries. If the entity's ratio compares favorably with the median or upper quartile ratio for similar businesses, it should be able to borrow additional funds.

Special Sources of Funding

For entities with special sources of funding, the Debt to Equity Ratio may not be an appropriate measure of the entity's ability to raise capital. For example, some agricultural operators may have access to credit through federal or state loan programs with less stringent requirements for lending than a commercial bank loan. These loan programs may also permit the lender to forgive part or all of the principal for the loan without foreclosing assets. Thus, if the applicant has access to loan programs with less stringent requirements for borrowing or repaying funds, it should analyze its likelihood of receiving funding from such a loan program. If the likelihood is low, the applicant can analyze leverage using the test described above. If the likelihood is high, the applicant should note that on Worksheet M, and describe the anticipated effect of the special loan program on its ability to borrow funds both before and after the pollution control project.

5.6 Issues of Scope

The financial analysis should incorporate the appropriate geographic area of interest. The area of interest may include parts of more than one municipality, or a subset of a single municipality. If the project would affect households in more than one municipality, the applicant should conduct the analysis of financial impacts on a jurisdiction by jurisdiction basis once project costs are allocated to each jurisdiction served. In comparison, if the applicant would spread the cost over a subset of the households in the jurisdiction, the applicant should calculate the per-household cost using only the households that will actually bear the cost. It is possible that there would be financial impacts in some communities served by a dam but there would not be financial impacts on other communities in the service area (e.g., because of different income levels in the different areas served). In this case, it may be appropriate to consider a rate-relief program, such as a program to help low-income consumers pay their electric bills. In addition, the applicant should consider phasing in any rate increases to mitigate financial impacts on household impacts.

In addition, note that multiple sources may affect the quality of the water body relative to WQS (e.g., POTWs and agricultural producers as well as dams). These entities may have different abilities to pay for controls that would allow the water body to meet WQS and attain a designated use. However, a dam owner's analysis of feasibility should pertain only to its own permit requirements, financial situation, and the situation of the community it serves (as described in this guidance).

5.7 Summary of Documentation

In summary, the applicant should complete:

- Worksheet C (once)
- Worksheets D, E, and I (for entities passing on costs to households, once for each alternative analyzed)
- Worksheets G, H, J, K, and L (once for each alternative analyzed).

In completing these worksheets, the applicant should be sure to clearly document, using additional sheets if necessary, all aspects of the analysis, including:

- who will bear the cost of the projects, and why (including funding sources, cost recovery methods, and other relevant information)
- method for adjusting prices
- units (e.g., year dollars)
- any assumptions relevant to analysis of impacts on nonresidential customers
- any assumptions regarding demand for services or future economic growth
- key uncertainties, and the potential impact on the analysis.

The applicant should also clearly document any additional information that it provides, including the source of the information, and any assumptions and uncertainties related to the additional information.

6. Financial Analysis: Federal Entities

Federal government agencies, such as the U.S. Army Corps of Engineers, U.S. Bureau of Reclamation, U.S. Bureau of Indian Affairs, and U.S. Fish and Wildlife Service, own and operate dams in Washington. The Bonneville Power Administration (BPA) is another example of federal dam ownership (see box below).

Within Washington State the U.S. Army Corp of Engineers (USACE) and the U.S. Bureau of Reclamation (BOR) are the primary federal agencies that are potentially involved in attaining WQS. Although a federal agency cannot proceed with a project until it has authorization and funding from Congress, federal agencies can often proceed with initial feasibility type studies. However, these two federal agencies must follow specific guidelines when analyzing the feasibility of dam related environmental projects. For both the Corps and BOR, their water resource planning is based on the economic and environmental principles and guidelines (P&G) adopted by the Water Resources Council (WRC, 1983.) The Corps has taken this further and incorporated this P&G framework into its Engineer Regulation 1105-2-100, also known as the *Planning Guidance Notebook*.(USACE, 2000)

While the feasibility analyses conducted by these federal agencies may, by reason of their respective regulatory or policy requirements, be wider in scope than that required by Ecology, and may also differ in methodology, Ecology expects that these federal agencies will have little or no difficulty with providing the necessary information that Ecology requires in responding to its own economic feasibility analysis requirements. It should also be noted that the Clean Water Act requires federal agencies to meet state WQS (33 U.S.C. §1323), and following this Ecology guidance allows the federal applicant to comply with WAC 173-201A.

Bonneville Power Administration

BPA markets power from 31 federal dams, 1 nuclear plant, and several hydroelectric projects and wind energy generation facilities. BPA is a self-financed federal agency under the Department of Energy (it is not funded by taxpayers and receives no annual appropriations from Congress), that funds all ongoing operations and repays the federal investment in the Federal Columbia River Power System through the sale of wholesale electricity and transmission services. BPA is legally mandated to recover all of its costs in the rates it charges customers.

BPA sets its power rates according to Section 7(i) of the Northwest Power Act, which outlines procedures for rate hearings. The current five-year rate period runs from October 2001 through September 2006 (FY 2002-2006), and rates are adjusted every 6 months during this period to assure that BPA is maintaining full cost recovery.

When compared to privately or non-federal publicly owned dams, there are two significant differences in the economic feasibility analysis for federally owned dams. First, as alluded to in the beginning of this chapter, a federal dam owner/operator does not have to demonstrate that it cannot afford to pay for the WQS project, since any project funding must be authorized and allocated by Congress. And second, power generated by federally owned/operated dams is marketing by a separate and independent agency, the Bonneville Power Administration.

In proceeding with the balance of this section and section 7, the applicant should feel free to use its own worksheets that were developed as part of its own requirements in performing the

feasibility analysis, where the information in those worksheets provides Ecology with the same or similar information as outlined in the guidance's worksheets. Where there is a difference between the applicant's information and that requested by Ecology, the applicant should explain the reason for substituting its own information for that being requested.

As with the other types of dam owners, it is Ecology's expectation and desire that the federal dam applicant will approach the submission of its application as a collaborative process.

6.1 Estimating Annual Costs

After estimating the capital and O&M project costs for each alternative, the applicant must then estimate total annual costs (i.e., annualized capital plus annual O&M costs). Besides this being necessary for funding purposes, this is also necessary for application to other annual measures, such as annual household or business income. Generally, calculating annual costs involves four steps:

- determine how much of the capital cost needs to be financed
- determine the appropriate interest rate and period of time for which to annualize capital costs
- apply the resulting annualization factor to determine annualized capital costs
- add annual O&M costs.

Determine Capital Cost to be Financed

The applicant should estimate financing costs only for the portion of the project that must be financed. Thus, the applicant must document other available sources of funding for paying the capital costs of improvements. These may include:

- unallocated funds
- programmatic funding
- earmarked funding
- planned future expenditures that can be postponed in favor of implementing the project and meeting effluent limitations
- new source Congressional funding.

The applicant must document the assumptions regarding the funding for the improvements. (Note that projects that can be paid for by available funds are not likely to pose a feasibility issue.) Once the applicant has determined the capital costs that can be paid from other sources, it should deduct those costs from total capital costs. The result is the capital costs to be financed.

Federal applicants should also identify any issues associated with the timing of available funds and thus the likely timeframe for the project. For example, the applicant may have to seek Congressional funding for a project that it has determined to be technically and economically feasible. The applicant should explain the procedure for obtaining funding and, based on prior similar projects, the estimated timeframe for obtaining funding. As part of the collaborative process, the applicant should keep Ecology informed of any progress and changes in its request for Congressional funding.

Determine Interest Rate and Time Period and Calculate Annualized Capital Cost

A federal applicant should identify any issues related to the interest rate used to annualize capital costs justify the interest rate it uses. Once it has determined the interest rate and term, the applicant can calculate the annualization factor using the formula on Worksheet B and the annualized capital costs as follows:

$$\text{Total Capital Costs} \times \text{Annualization Factor} = \text{Annualized Capital Costs}$$

The applicant can substitute its own worksheets where they provide the same information shown in Worksheet B, and should identify that worksheet in lieu of Worksheet B...

Add O&M Costs

O&M costs include any recurring costs, such as for:

- monitoring
- inspection
- equipment repair or replacement
- administration (include only administration that is incremental to the project).

The applicant should identify all recurring costs and show the amount for each line item, in terms of dollars per year, on Worksheet B. If O&M costs would vary from year to year, the applicant should document that, and use an average cost. Next, the applicant should sum the O&M costs to obtain an annual estimate for a typical year, and add the total to the annualized capital cost. The sum of the annualized capital cost and total annual O&M costs is the total annual cost of the project.

Again, the applicant can substitute its own worksheets for this information, making sure the substituted worksheets are properly identified.

6.2 Evaluate Impacts on Households

Since the project is most likely entirely funded by federal funds authorized and granted by Congress, this section may not have direct applicability to determining how the project's costs impact households in the affected communities. However, where a project's costs are

recoverable through rate increases, the applicant should proceed in answering, as closely as possible the following in order to evaluate the anticipated impact of the project costs on their customers. Applicants should start by describing the dam, the goods and services it provides, the types of customers, and dam ownership structures, using **Worksheet C** in Appendix B. Also where applicable, for dams that provide multiple goods or services, the applicant should analyze the financial impacts of different services individually. This section describes how to evaluate costs on households.

Calculate Annualized Cost Per Household

To assess the burden that pollution control costs are expected to have on households, the applicant should calculate an average annualized pollution control cost per household for all households in the community that would bear project costs. Therefore, the applicant must determine what proportion of the costs will be borne by households, and which households will actually pay for pollution control. If the project would affect households in more than one municipality, the applicant should conduct the analysis of both financial and socioeconomic impacts on a municipality by municipality basis once project costs are allocated to each municipal jurisdiction served. In comparison, if the applicant would spread the cost over a subset of the households in the jurisdiction, the applicant should calculate the per-household cost using only the households that will actually bear costs.

For dams that provide goods and services to businesses as well as households, the applicant should deduct the portion of the project costs that businesses would pay (either in user fees or surcharges) before calculating the average cost per household. The calculation of the costs that businesses would pay should reflect the rate structure that the applicant will actually use to recover the capital and operating cost of the project. The calculation should reflect the rate structure currently in place, unless the service provider plans to change the structure of rates before or during the period over which the project will be paid. The applicant should use **Worksheet D** in Appendix B to calculate the incremental annual cost of pollution control per household.

To calculate average annual costs per household, the applicant should multiply the per-unit rate by the average household consumption (e.g., kWh per year). The applicant should have information on average household consumption, including variations by jurisdiction if they are significant.

In estimating annual average household costs for electricity with the control project, the applicant should incorporate that higher prices will dampen demand for electricity (i.e., price elasticity, or sensitivity to price changes), and should also account for service provider assistance programs (e.g., low-income assistance programs).

Compare Cost Per Household to MHI

Next, the applicant should evaluate how the cost of services compares to the MHI of the affected jurisdictions. MHI is defined as the median of the total income received per household per year

in a given area. Half of the households in the area have incomes lower than the MHI, and half have incomes higher than the MHI. For sources of MHI data, see **Appendix C**.

The applicant should use the steps on Worksheet D to compare:

- current cost of services to MHI of the affected jurisdiction(s)
- new cost of services (i.e., with the project costs) to MHI of the affected jurisdiction(s).

In so doing, the applicant should also consider how the incremental cost compares to the current cost of providing the services provided by the dam. The smaller the incremental cost is compared to the current cost, the less likely are financial impacts. The applicant should use Worksheet D to document how incremental costs compare to current costs.

Note that there is no existing guidance regarding increases in utility rates that are likely to represent substantial financial impacts that would cause widespread social and economic impacts. However, a greater ratio of the cost of services to community MHI indicates a greater likelihood of financial impacts on the affected community due to the project. De minimis increases in electricity costs (e.g., those that result in average household electricity costs of less than 1% of MHI) are not likely to be indicative of economic infeasibility (however, note that this does not imply that electricity costs greater than 1% of MHI are necessarily infeasible).

Compare Service Costs to Costs for Other Geographic Areas

In addition to considering the current and incremental costs of the good or service the dam provides, the applicant should also evaluate how the current cost of the good or service compares to state, regional, and national rates for the same good or service. In the case of electricity provision, for example, the applicant should consider the cost of electricity (cents per kWh as well as average annual cost per household) for the affected community to the cost for the state, the region (e.g., Pacific Northwest), and the country. The applicant can show these calculations on **Worksheet E** in Appendix B. The applicant may also present additional comparisons or indications of financial impact on Worksheet E.

It is important to note that neither the applicant nor Ecology should interpret the comparison of service costs simplistically. For example, if the comparison shows that electricity costs for the service area are lower than the national average, this does not necessarily imply that the service area can afford to pay costs up to the national average. This is especially true in the context of a changing power market (e.g., with imminent changes in many states related to price regulation, competition, and relationships between entities that generate, transmit, and distribute power). However, the comparison of service costs to that in other areas provides valuable perspective, for example, on the potential for community development.

6.3 Evaluating Impacts on Businesses

Increased costs for business customers may result in those businesses decreasing goods and services produced, as well as financial impacts on the business. Some businesses may be able to pass on a portion of the costs to their customers, while others may not.

If the applicant would pass on any costs to businesses, the applicant should document what types of businesses would be affected, and any estimates of impacts, using Worksheet E (Part D) in Appendix B. Such estimates might include:

- the percent increase in costs for the services provided by the dam, and the percent of total costs these costs represent for the business on average
- financial analysis to determine the potential for reduced business activity resulting from higher prices for goods or services provided by the dam
- economic modeling results of the impact of higher prices for services provided by the dam.

Note that the applicant and/or its business customers must provide adequate documentation of financial impacts (e.g., financial ratio analysis, as described in Section 5.5) in order to show that a prospective increase in electric rates may force the business to curtail operations, shut down, or relocate. In some cases, a business customer may prefer to submit information to document a claim directly to Ecology (e.g., if the documentation includes confidential information). If this is the case, Ecology recommends that the customer contact Ecology directly. As stated in Section 1, Ecology is sensitive to confidentiality issues, and will make every effort to preserve the confidentiality of information when businesses identify it as such.

6.4 Issues of Scope and Timeframe

The analysis of financial impacts should consider the most recent data available as well as data for two years prior (e.g., ratios should be calculated for at least three years of operations). This will allow the applicant to differentiate long-term trends from short-term conditions. Ecology is concerned about concluding financial impacts based on short term conditions that are likely to be mitigated by future economic growth. Therefore, the applicant should fully document its assumptions regarding future growth, and how future conditions may affect any financial impacts reported.

The financial analysis should also incorporate the appropriate geographic area of interest. The area of interest may include parts of more than one municipality, or a subset of a single municipality. If the project would affect households in more than one municipality, the applicant should conduct the analysis of financial impacts on a jurisdiction by jurisdiction basis once project costs are allocated to each jurisdiction served. In comparison, if the applicant would spread the cost over a subset of the households in the jurisdiction, the applicant should calculate the per-household cost using only the households that will actually bear the cost. It is possible that there would be financial impacts in some communities served by a dam but there would not be financial impacts on other communities in the service area (e.g., because of different income levels in the different areas served). In this case, it may be appropriate to consider a rate-relief program, such as a program to help low-income consumers pay their electric bills. In addition, the applicant should consider phasing in any rate increases to mitigate financial impacts on household impacts.

Note that multiple sources may affect the quality of the water body relative to WQS (e.g., POTWs and agricultural producers as well as dams). These entities may have different abilities to pay for controls that would allow the water body to meet WQS and attain a designated use. However, a dam owner's analysis of feasibility should pertain only to its own permit requirements, financial situation, and the situation of the community it serves (as described in this guidance).

6.5 Summary of Documentation

In summary, the applicant should complete:

- Worksheet C (once)
- Worksheets D and E (once for each alternative analyzed).

In completing these worksheets, the applicant should be sure to clearly document, using additional sheets if necessary, all aspects of the analysis, including:

- who will bear the cost of the projects, and why (including funding sources, cost recovery methods, and other relevant information)
- method for adjusting prices
- units (e.g., year dollars)
- any assumptions relevant to analysis of impacts on nonresidential customers
- any assumptions regarding demand for services or future economic growth
- key uncertainties, and the potential impact on the analysis.

The applicant should also clearly document any additional information that it provides, including the source of the information, and any assumptions and uncertainties related to the additional information.

7. Socioeconomic Analysis

This section provides guidance regarding socioeconomic analysis, or changes in indicators such as employment, household income, tax revenues, the poverty rate, and other indicator variables that are likely to occur as a result of the control costs. **Applicants should conduct a socioeconomic impact analysis of financially feasible control strategies to ensure that there are no adverse impacts on the local area.**

One issue the applicant should be aware of is that there may not be consistency across different data elements when it comes to the year that the data represents. For example, unemployment data may be for the first quarter of 2006, and Median Household Income may be for 2005. Where possible, the applicant should use the most recently available data, always indicate that date that data represents, and the source for that data. A reproduction of that data source (e.g., Internet printout or photocopy) should be included with the application. During the review of the application by Ecology, this will allow for easier verification.

7.1 Steps in the Analysis

The steps in the socioeconomic analysis are:

- define the affected community/communities
- estimate the baseline (“without project”) values of the indicator variables over the analysis period
- estimate the “with project” values of the indicator variables over the analysis period.

Note that the applicant may need to evaluate changes in socioeconomic indicators for more than one scenario of the incidence of project costs (e.g., for investor-owned dams, complete pass through of costs versus absorbing costs through reduced profitability). The following sections summarize these steps.

7.2 Define Relevant Geographic Area

An important factor in determining the magnitude of impacts is defining the geographic area in which they occur. The geographic area is the community in which affected households and businesses are located. Affected households include those directly or indirectly affected by power rate increases, changes in local or regional employment, changes in recreational amenities, or other changes due to the project. Similarly, affected businesses include those directly or indirectly affected by changes in production costs including energy prices and output demand (increases in energy prices may affect demand for other local goods and services). The relevant geographic area for socioeconomic impact analysis will encompass, at a minimum, the portion of the service area that will pay project costs. Thus, it may be as small as a single municipality, or may be a multi-county region.

The relevant geographic area may also include households and businesses outside the immediate service area. For instance, if business activity in the region is concentrated in the municipality

served by the applicant, but nearby jurisdictions depend on this municipality for employment, goods, and services, then the applicant should consider including these municipalities in the socioeconomic impact analysis. Another example is if the applicant can reasonably predict that a business will move as a result of the project. In this case, one area's loss may be another's gain, and the applicant should consider including the gaining as well as the losing community in the socioeconomic study area. The applicant should document the relevant geographic area for impacts on **Worksheet M** in Appendix B.

7.3 Estimate Baseline (Without Project) Conditions

After identifying the relevant geographic area for the analysis, the applicant should provide baseline estimates of indicator variables including household income, employment, tax revenues, poverty rate, and any other socioeconomic indicators that it considers relevant to evaluating economic feasibility on Worksheet M. Evaluation of baseline socioeconomic conditions is important because the extent to which estimated changes can be interpreted as significant depends on the health of the community before compliance, and changes that are likely to occur even without pollution controls. For example, if a community is in a weak condition before compliance but the evaluation of socioeconomic impacts suggests that all of the indicators listed above will remain virtually unchanged, then the applicant has not demonstrated socioeconomic impacts. Alternatively, if the community is very healthy, the estimated change in the socioeconomic indicators would have to be large to demonstrate economic infeasibility. The baseline forecast should reflect a time period sufficient for incorporating anticipated future growth.

Economic Models

If available to the applicant, a macroeconomic or regional economic model may be the best tool for producing a baseline forecast, as well as estimating the impact of control costs, because these models capture complex industrial and market relationships that are difficult to evaluate otherwise (see box below). Expenditures on pollution controls do not vanish from the economy, but become income for other businesses and households. In addition, producers and consumers will respond to changes in costs (e.g., producers will invest in other productive ventures), and dynamic forecasting models may be needed to predict the impact of such changes.

Other Sources of Information

Several organizations also provide baseline data and forecasts. For example, the Washington Department of Community, Trade, and Economic Development (<http://www.cted.wa.gov>), the Washington State Association of Counties (<http://www.wacounties.org>), and the Association of Washington Cities (<http://www.awcnet.org>) may provide information about anticipated economic activity and projected population growth. Similar information may be available in municipal, county, or regional comprehensive plans (available on the community's website, at the city or county building, or at the public library), or from the local or regional council of governments (e.g., Puget Sound Regional Council, <http://www.psrc.org/index.htm>, or other councils of governments).

Appendix C lists sources for information on the percent of households below the poverty line.

Economic Development Potential

Future economic development may be influenced by the price and availability of goods and services that dams in Washington provide. The applicant can compare the estimated costs of these goods and services in the affected area to those for nearby communities and comparable communities that are not necessarily nearby (e.g., communities with similar characteristics could be in another state or region). Note, however, that other communities may also experience comparable increases in costs such that realistic comparisons may be difficult to develop. The applicant must thoroughly document its assumptions in assessing economic development potential. If regional economic models are used the applicant should document the information used in the model, as well as the underlying assumptions in the model. Use of regional economic models can be expensive.

Level of Geographic Aggregation

If data or models are not available for the exact geographic area of project impacts, the applicant can evaluate impacts at a larger area of aggregation, and then use available quantitative and qualitative information to draw conclusions for the relevant area. For instance, if the relevant area is a single city and the applicant runs a macroeconomic model for the county that includes the affected city as well as other cities, the applicant could evaluate which economic sectors are most important for the model results and note how those economic sectors are spread between the affected city and the remainder of the county. In addition, the applicant could describe differences in the socioeconomic indicators between the city and the county, such as MHI, unemployment, and poverty.

7.4 Estimate Changes (With Project) in Indicator Variables

The applicant should provide forecasts of the impact of the project costs on key socioeconomic indicators for the affected area over the analysis period on **Worksheet N** in Appendix B. In some cases a dynamic economic model may be needed to capture and predict changes in the relationships between sectors affected by the project costs (see **Exhibit 3**, for example). Indeed, for significant and long term impacts, dynamic forecasting models may be the only way such changes can be defensibly estimated.

Exhibit 3. Potential Distributional Impacts from Expenditures on Pollution Controls for Dams

Expenditures	Revenues and Incomes ¹
<ul style="list-style-type: none"> • Environmental and engineering consulting and analytical service purchases • Capital expenses for structural modifications • Labor expenditures for operational modifications • Maintenance equipment purchases • Increased household and business expenditures for electricity (if rate increases) 	<ul style="list-style-type: none"> • Increased sales and incomes in sectors providing consulting and analytical services • Increased sales and incomes in construction and capital equipment sectors • Increased incomes for dam operator and related personnel • Increased sales and incomes in sectors providing maintenance equipment

Exhibit 3. Potential Distributional Impacts from Expenditures on Pollution Controls for Dams

Expenditures	Revenues and Incomes ¹
are passed on to customers) • Increased expenditures on social services (if rates are passed on to customers, and rate increases are unaffordable to low income households, or businesses cut employment to offset cost increases)	<ul style="list-style-type: none"> • Increased sales and incomes in sectors providing alternative (e.g., less energy-intensive) products and services • Increased infusion of federal/state funding (e.g., grant funding for pollution controls) • Reduced sales and incomes in sectors providing discretionary goods and services (if rates are passed on to customers)

1. Expenditures need to be matched with revenues to another sector, although these revenues may not always accrue within the project area. Controls may also result in an injection of funds into the project area without a corresponding cost, as in the case of federal or state grants, or may result in an injection of funds over a short timeframe with a corresponding cost that occurs over a long time period, as in the case of federal loans for capital investment that are repaid gradually.

The applicant must realistically model the socioeconomic impact that would result from the financial impacts, considering any options to avoid any widespread socioeconomic impacts. For example, applicants may need to evaluate the impacts of purchasing power from another source rather than implement costly controls that may cause adverse economic impacts.

Changes in Economic Development Potential

Affected communities may experience impaired development opportunities if project controls result in significantly higher costs for goods or services, or reduced business activity or closure. The applicant should therefore assess the potential for the loss of future jobs and personal income to the community if businesses would choose not to locate in the affected community. The applicant can judge potential for impaired development opportunities in part by comparing post-compliance costs to costs in neighboring and comparable communities. However, in this comparison, the applicant should take into account any controls neighboring communities may have to implement to comply with the same WQS, or comparable price increases due to other factors.

Changes in Property Values and Property Tax Revenues

Pollution control costs may affect property values. If the project would be financed through user fees, demand for property in the community may fall, thus decreasing the value of property in the community. Changes in user fees can be modeled using regional economic models. Conversely, improved environmental amenities may increase property values. However, economic modeling will not directly capture changes that stem from improvements in environmental quality; such changes should be discussed qualitatively on the worksheets.

Socioeconomic impacts may also include effects on local governments, such as loss of property tax base or increased expenditures on social services resulting from losses in employment and incomes. If the assessment of financial impacts suggests that an entity or entities will close, then the total assessed value of property, and perhaps property tax revenues, will fall. If the entity or entities are a major source of revenue for the affected community, this loss in tax revenue may be

significant. However, if the tax base declines, the affected community can increase the tax rate to maintain total revenue, unless such an action would cause an exceedance of the legislated cap on property tax rates (see RCW 84.52.043 and 84.52.050). If this is the case, then the applicant should compare the loss in property tax revenues to total property tax revenues in the affected community to determine the relative size of the loss.

Changes in Income and Employment

Through property taxes and employment, an affected business may be a key contributor to the economic base of the affected community. In this case, compliance with the WQS could cause reductions in employment and adverse socioeconomic impacts on the community if workers have no other employment opportunities nearby. Impacts may also be significant where an affected business is a primary producer of a particular product or service upon which the affected community depends.

The applicant must also account for any positive economic stimulus resulting from expenditures on pollution controls and federal or state cost-share funding, even if the applicant is not able to analyze impacts using a macroeconomic model. Ecology is also concerned about concluding economic infeasibility and potentially permanently altering aquatic environments without factoring in forecasts for robust economic growth in an area that may mitigate short-term effects.

The effects of increased unemployment, decreased personal income, and reductions in local expenditures by the entity or group of entities (public and private) will be compounded as money moves through the local economy. Some portion of the lost income would have been spent in the local economy for the purchase of other goods and services and thus for the salaries of other local employees. These local employees, in turn, would have spent some portion of their income in the local economy. This multiplier effect means that each dollar lost in wages results in the loss of more than one dollar to the local economy. However, as discussed above, the expenditures for pollution controls become household and business incomes with similar multiplier effects (i.e., a dollar spent on pollution control results in spending of more than one dollar in the local economy). These multiplier effects are best captured with the use of a regional macroeconomic model.

Improvements in Environmental Quality

In evaluating the potential for socioeconomic impacts, the applicant should consider any economic benefits that would accrue to the affected community from water that meets WQS. For example, although property values may fall in response to higher taxes, improved water quality may cause property values in the affected areas to rise as proximity to highly valued recreational resources draws a premium. The aggregate benefit from an increase in property values that result from improved water quality could far outweigh the aggregate cost to the community resulting from increased rates. As another example, restoring a cold-water fishery could draw recreational anglers to the area to fish, leading to new employment opportunities in industries that support recreation. The types of economic benefits that a community might realize will vary widely depending on the water body and the affected community, and it may not be possible to evaluate the benefits quantitatively, though a substantive qualitative discussion

can be useful. The applicant should document the effects of these benefits on the indicator variables shown on Worksheet N.

7.5 Summary of Documentation

In summary, the applicant must complete, for each alternative identified:

- Worksheet M
- Worksheet N.

Together, these worksheets document the geographic area of interest, current or baseline conditions in the regional economy, and projected future economic conditions with the project.

8. Summary and Determinations

As described in Section 1, WAC 173-201A-510(5) requires that dam operators identify all reasonable and feasible controls that could be used to meet WQS, or if attaining standards is not possible, to attain the highest possible level of water quality. This section summarizes Ecology's requirements for evaluating the economic aspects of feasibility, and how it will make determinations regarding the economic feasibility of controls.

8.1 Determining Feasibility

There are no specific numeric thresholds for the various financial indicators that establish a feasible level of control costs that applicants can bear, because every situation and community is different. However, the analyses described in this document will enable characterization of company and community financial health from which to judge the feasibility of expenditures for water quality improvements at dams. The financial analyses provide a starting point for selecting among potential control strategies and attaining WQS.

In reviewing financial analyses, additional information applicants supply in response to additional requests, or publicly available information, and making determinations regarding the feasibility of controls, Ecology will consider whether:

- both the applicant and the community can clearly afford the pollution controls
- the entity exhibits poor financial performance that is not related to proposed pollution controls
- short term impacts are likely to be mitigated by future economic growth
- impacts could be mitigated by financial assistance programs to help low-income households pay utility bills
- more cost-effective means exist to attain the level of water quality.

Thus, Ecology will evaluate the validity of the financial analyses, and whether the applicant adequately considered means of avoiding impacts.

In cases in which applicants can attain standards without economic impacts, Ecology requests a socioeconomic analysis to verify that the project would not result in adverse impacts on the broader community. Ecology will review the overall impact of the control costs over a number of years, and the potential for future growth and the positive impacts of the expenditures to offset these impacts.

8.2 Highest Water Quality Attainable

If attaining WQS is not feasible, from either a technological or economic perspective, applicants must document the highest level of water quality that is attainable. That is, the applicant must provide analysis of the alternative that results in the highest level of water quality but does not

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cause significant adverse financial impacts. In evaluating the attainable level of water quality, the applicant should consider:

- timing the modifications to achieve economies of scale (e.g., with other needed upgrades)
- timing of the modifications to ease financial impacts (e.g., phasing in rate increases)
- anticipated future economic growth in the community and surrounding areas that may offset estimated impacts.

8.3 Summary of Documentation

Exhibit 4 provides a summary of the worksheets applicable to different types of applicants, including municipalities and PUDs (public entities), investor owned operations (both those that will pass costs on to customers, and those that will not increase rates), and federal facilities.

Exhibit 4. Applicability of Worksheets

Worksheet	Title	Public	Investor Owned		Federal
			Pass-Through	No Pass-Through	
A	Pollution Control Projects – Summary Information	X	X	X	X
B	Total Annualized Project Costs	X ¹	X ¹	X ¹	X ¹
C	Description of Dam and Entity	X	X	X	X
D	Total Pollution Control Costs per Household	X ¹	X ¹	--	X ¹
E	Screening Level Household Cost Analysis	X ¹	X ¹	--	X ¹
F	Data Used in the Secondary Test	X ¹	--	--	--
G	EBT With and Without Control Costs and Cost Pass-Through	--	X ¹	X ¹	--
H	Profit Rate With and Without Control Costs and Cost Pass-Through	--	X ¹	X ¹	--
I	Sensitivity Analysis for Profit Rate Assuming Cost Pass-Through	--	X ¹	--	--
J	Current Ratio	--	X ¹	X ¹	--
K	Beaver's Ratio	--	X ¹	X ¹	--
L	Debt to Equity Ratio	--	X ¹	X ¹	--
M	Baseline Socioeconomic Indicators	X	X	X	X
N	Estimated Change in Socioeconomic Indicators Due to Pollution Control	X ¹	X ¹	X ¹	X ¹

X = applicant must fill out worksheet (some parts may not apply for some applicants, as indicated on individual worksheets)

-- = applicant does not need to fill out worksheet

1. The applicant must fill out this worksheet once for each alternative analyzed.

In addition, as discussed in Section 3, applicants should provide water quality estimates for the different control options so that Ecology can identify the alternative that is best overall for the waterbody.

9. References

U.S. Army Corps of Engineers (USACE). 2000. *Planning Guidance Notebook*. Washington, D.C. ER 1105-2-100. available at:

<http://www.usace.army.mil/inet/usace-docs/er/er1105-2-100/toc.htm>

U.S. EPA. 1995. *Interim Economic Guidance for Water Quality Standards Workbook*. Washington, D.C. EPA 823-B-95-002. available at:

<http://www.epa.gov/ost/econ/>

U.S. EPA. 2000. *Guidelines for Preparing Economic Analyses*. Washington, D.C. EPA 240-R-00-003. available at:

<http://yosemite.epa.gov/ee/epa/eed.nsf/webpages/guidelines.html>

U.S. Water Resources Council (WRC). 1983. *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies*.

Appendix A. Washington WQS: WAC 173-201A-510

(5) Compliance schedules for dams:

- (a) All dams in the state of Washington must comply with the provisions of this chapter.
- (b) For dams that cause or contribute to a violation of the water quality standards, the dam owner must develop a water quality attainment plan that provides a detailed strategy for achieving compliance. The plan must include:
 - (i) A compliance schedule that does not exceed ten years;
 - (ii) Identification of all reasonable and feasible improvements that could be used to meet standards, or if meeting the standards is not attainable, then to achieve the highest attainable level of improvement;
 - (iii) Any department-approved gas abatement plan as described in WAC 173-201A-200 (1)(f)(ii);
 - (iv) Analytical methods that will be used to evaluate all reasonable and feasible improvements;
 - (v) Water quality monitoring, which will be used by the department to track the progress in achieving compliance with the state water quality standards; and
 - (vi) Benchmarks and reporting sufficient for the department to track the applicant's progress toward implementing the plan within the designated time period.
- (c) The plan must ensure compliance with all applicable water quality criteria, as well as any other requirements established by the department (such as through a total maximum daily load, or TMDL, analysis).
- (d) If the department is acting on an application for a water quality certification, the approved water quality attainment plan may be used by the department in its determination that there is reasonable assurance that the dam will not cause or contribute to a violation of the water quality standards.
- (e) When evaluating compliance with the plan, the department will allow the use of models and engineering estimates to approximate design success in meeting the standards.
- (f) If reasonable progress toward implementing the plan is not occurring in accordance with the designated time frame, the department may declare the project in violation of the water quality standards and any associated water quality certification.

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(g) If an applicable water quality standard is not met by the end of the time provided in the attainment plan, or after completion of all reasonable and feasible improvements, the owner must take the following steps:

(i) Evaluate any new reasonable and feasible technologies that have been developed (such as new operational or structural modifications) to achieve compliance with the standards, and develop a new compliance schedule to evaluate and incorporate the new technology;

(ii) After this evaluation, if no new reasonable and feasible improvements have been identified, then propose an alternative to achieve compliance with the standards, such as site specific criteria (WAC 173-201A-430), a use attainability analysis (WAC 173-201A-440), or a water quality offset (WAC 173-201A-450).

(h) New dams, and any modifications to existing facilities that do not comply with a gas abatement or other pollution control plan established to meet criteria for the water body, must comply with the water quality standards at the time of project completion.

(i) Structural changes made as a part of a department approved gas abatement plan to aid fish passage, described in WAC 173-201A-200 (1)(f)(ii), may result in system performance limitations in meeting water quality criteria for that parameter at other times of the year.

Appendix B. Worksheets

This appendix provides the worksheets applicants should use to document their analysis. The worksheets are as follows:

- Worksheet A: Water Quality Improvement Projects – Summary Information
- Worksheet B: Total Annualized Project Costs
- Worksheet C: Description of Dam and Entity
- Worksheet D: Total Water Quality Improvement Project Costs per Household
- Worksheet E: Screening Level Household Cost Analysis
- Worksheet F: Data Used in the Secondary Test
- Worksheet G: EBT With and Without Project Costs and Cost Pass-Through
- Worksheet H: Profit Rate With and Without Project Costs and Cost Pass-Through
- Worksheet I: Sensitivity Analysis for Profit Rate Assuming Cost Pass-Through
- Worksheet J: Current Ratio
- Worksheet K: Beaver's Ratio
- Worksheet L: Debt to Equity Ratio
- Worksheet M: Baseline Socioeconomic Indicators
- Worksheet N: Estimated Change in Socioeconomic Indicators Due to the Water Quality Improvement Project

Worksheet A:
Water Quality Improvement Projects – Summary Information
(Attach additional pages if necessary)

Estimated project start date _____

Estimated project completion date _____

Please describe the preferred alternative. If the preferred alternative is not the least cost alternative, provide an explanation why the preferred alternative was selected.

Please describe other available water quality improvement alternatives and why they are less preferable (e.g., not most cost-effective option, would not achieve water quality standards).

Please describe water quality improvement controls that were considered and eliminated for reasons other than cost.

—

Worksheet B:
Total Annualized Project Costs
 (Attach additional pages if necessary)

Note: The applicant should fill out a separate worksheet for each alternative.

A. Capital Costs

Capital cost of project \$ _____

Other one-time costs of project (please list, if any):
 _____ \$ _____
 _____ \$ _____

Total capital costs (sum column) \$ _____ (1)

Portion of capital costs to be paid from grant monies or other available funds
 (see Part D of this Worksheet) \$ _____ (2)

Capital costs to be financed [(1)-(2)] \$ _____ (3)

Type of financing (e.g., utility district bond, SRF loan, commercial bank loan)

Nominal interest rate for financing (expressed as decimal) _____ (4)

If the applicant is a private corporation and can deduct interest payments for water quality improvement projects from its taxes (see Section 5.2):

Marginal income tax rate, including federal and (if applicable) state taxes
 (expressed as decimal) _____ (5)

Effective interest rate for financing [(4) × {1 - (5)} or, if (5) is blank, line (4)] _____ (i)

Time period of financing (in years) _____ (n)

Annualization Factor: $\frac{i}{(1+i)^n - 1} + i$ _____ (6)

Annualized capital cost [(3)×(6)] _____ (7)

B. Operating and Maintenance (O&M) and Other Annual Costs

Please list below: Annual costs including O&M (including but not limited to monitoring, inspection, permitting fees, waste disposal charges, repair, administration and replacement), as well as other annual costs (e.g., any replacement service costs related to long-term contracts).

_____	\$ _____
_____	\$ _____
_____	\$ _____
_____	\$ _____
_____	\$ _____
Total annual O&M costs (sum column)	\$ _____ (8)
Effective annual O&M costs [(8) × {1 – (5)} or, if (5) is blank, line (8)]	_____ (9)

C. Total Annual Cost of Water Quality Improvement Project

Total annual cost of water quality improvement project [(7)+(9)] \$ _____ (10)

D. Description of Funding and Financing Sources

Please describe funding and financing sources reflected in the calculations in Part A. For example, describe the availability of grant funds and funds that could be raised from liquidating nonessential assets or postponing other projects. If these sources are not available, document and describe why.

E. Assumptions and Uncertainties

Please describe any assumptions and uncertainties related to the estimates on this Worksheet.

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Worksheet C:
Description of Dam and Entity (i.e., Owner/Operator)
(Attach additional pages if necessary)

A. For all entities

Name of dam: _____

Location of dam: _____

Name of dam owner/operator: _____

Please provide a description of the dam (e.g., dam height, dam type, year constructed, purpose(s), location, and water withdrawals).

Please provide a description of the good(s) or service(s) the dam provides.

Please describe briefly the types of customers served by the dam (e.g., households and businesses, including subsidiaries) and the geographic service area. If possible, please provide a map.

If the dam provides multiple goods or services, describe how water quality improvement project costs would be apportioned among the users of the different goods and services.

Worksheet D:
Total Water Quality Improvement Project Costs per Household
 (Attach additional pages if necessary)

Note: The applicant should fill out a separate worksheet for each alternative. The applicant may also need to fill out this worksheet more than once per alternative if the dam provides more than one good or service to households and the proposed project would result in increased rates for more than one good or service.

A. Incremental Costs

Annual cost of proposed project [Worksheet B, (10)] \$ _____ (1)

Percent of proposed project that will be paid by households _____ % (2)

Amount of proposed project cost that will be paid by households [(1)×(2)] \$ _____ (3)

Number of households _____ (4)

Annual incremental cost per household [(3)/(4)] \$ _____ (5)

Average annual use of service per household, include units (e.g., kWh/yr); should reflect price elasticity of demand and service provider assistance programs _____ (6)

Incremental cost per unit [(5)/(6)] \$ _____ (7)

B. Current and Total Rate

Current per-unit cost for households for the service provided; include units [these units must match those in line (6)] \$ _____ (8)

Current average annual cost per household for the service provided [(8)×(6)] \$ _____ (9)

Percent increase of incremental to current costs per household [(5)/(9) × 100] _____ % (10)

Percent increase of incremental to current cost per unit [(7)/(8) × 100]; should reflect price elasticity of demand and service provider assistance programs _____ % (11)

Total per-unit cost for households for the service provided [(7)+(8)] \$ _____ (12)

Total average annual cost for households for the service provided [(5)+(9)] \$ _____ (13)

Worksheet E:
Household and Business Cost Analysis
(Attach additional pages if necessary)

Note: The applicant should fill out a separate worksheet for each alternative. The applicant may also need to fill out this worksheet more than once per alternative if the dam provides more than one good or service to households and the proposed project would result in increased rates for more than one good or service.

A. Screening-Level Comparison of Household Costs to Median Household Income (MHI)

Median household income (per year) \$ _____ (1)

Ratio of total annual cost per household to MHI [Worksheet D, (13)/(1) × 100] _____ % (2)

B. Compare Total Costs to Costs for Same Service in Other Areas

Total per-unit cost for households for the service provided [Worksheet D, (8)] \$ _____ (1)

Average per-unit cost for households in Washington for the service provided \$ _____ (2)

Average per-unit cost for households in Northwest for the service provided \$ _____ (3)

Average per-unit cost for households in United States for the service provided \$ _____ (4)

What is the source for the information about per-unit costs for households in other areas?

C. Other Information or Comparisons for Household Cost Analysis

Please provide description of any additional information or comparisons that may be appropriate.

D. Impacts on Business Customers

Please describe any known adverse financial impacts on business customers [see Section 4.3 (municipalities and PUDs), 5.4 (investor owned companies), or 6.3 (federal operators)]. Attach documentation if you are claiming that the financial impacts would be significant.

Worksheet F:
Data Used in the Secondary Test
 (Attach additional pages if necessary)

List the values describing the financial health of the community. Potential data sources are indicated in the text and on this Worksheet. Circle or write in the data source used, and provide values for the three most recent years for which data are available. Enter data for the most recent year in the far right column.

A. Data Collection

Data Item and Sources	Value in 20__	Value in 20__	Value in 20__
Bond rating (uninsured bonds only) (1) <ul style="list-style-type: none"> • Standard and Poor's • Mergent • Fitch 			
Direct net debt (2) <ul style="list-style-type: none"> • Community financial statements • Department of Revenue, state Auditor's Office 	\$	\$	\$
Overlapping debt (3) <ul style="list-style-type: none"> • Community financial statements • Department of Revenue, state Auditor's Office 	\$	\$	\$
Market value of property (4) <ul style="list-style-type: none"> • Community financial statements • Town or county assessor's office • Department of Revenue, state Auditor's Office 	\$	\$	\$
Community unemployment rate (5) <ul style="list-style-type: none"> • American Community Survey • Decennial Census of Population and Housing • Bureau of Labor Statistics (Local Area Unemployment) 	%	%	%
State unemployment rate (5a)	%	%	%
National unemployment rate (6) <ul style="list-style-type: none"> • Bureau of Labor Statistics 	%	%	%
Community MHI (7) <ul style="list-style-type: none"> • American Community Survey • Decennial Census of Population and Housing • Census Bureau Small Area Income and Poverty Estimates 	\$	\$	\$
State MHI (8) <ul style="list-style-type: none"> • American Community Survey • Decennial Census of Population and Housing 	\$	\$	\$
Property tax revenues (9) <ul style="list-style-type: none"> • Community financial statements • Town or county assessor's office • Department of Revenue, state Auditor's Office 	\$	\$	\$

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Data Item and Sources	Value in 20__	Value in 20__	Value in 20__
Property tax collection rate (10) <ul style="list-style-type: none"> • Community financial statements • Town or county assessor's office • Department of Revenue, state Auditor's Office 	%	%	%

B. Calculation of Indicators

1. Overall net debt as a percent of full market value of taxable property

Data Item	Value in 20__	Value in 20__	Value in 20__
Overall net debt [(2)+(3)] (11)	\$	\$	\$
Overall net debt as a percent of full market value of taxable property [(11)/(4)×100] (12)	%	%	%

2. Property tax revenues as a percent of full market value of taxable property

Data Item and Sources	Value in 20__	Value in 20__	Value in 20__
Property tax revenues as a percent of full market value of taxable property [(9)/(4)×100] (13)	%	%	%

**Worksheet G:
EBT With and Without Project Costs**

(Attach additional pages if necessary)

Note: The applicant should fill out a separate Part B and (if applicable) Part C of this worksheet for each alternative.

A. Earnings Without Water Quality Improvement Project Costs

$$EBT_0 = R_0 - VC_0 - FC_0$$

where:

- EBT₀ = Earnings before taxes without project
- R₀ = Revenues
- VC₀ = Variable cost of goods or services produced (e.g., cost of materials, direct labor)
- FC₀ = Fixed cost of goods or services produced [e.g., interest on capital investments (without the project), administrative overhead]

Three most recently completed fiscal years:

Item	20__	20__	20__	
R ₀ (1)	\$ _____	\$ _____	\$ _____	(1)
VC ₀ (2)	\$ _____	\$ _____	\$ _____	(2)
FC ₀ (3)	\$ _____	\$ _____	\$ _____	(3)
EBT ₀ [(1) – (2) – (3)]	\$ _____	\$ _____	\$ _____	(4)

Explain changes in EBT, quantifying the effects of any nonrecurring financial impacts.

B. Earnings With Water Quality Improvement Project Costs

$$EBT_{proj} = EBT_0 - AC$$

where:

- EBT_{proj} = Earnings with project costs
- EBT₀ = Earnings before taxes without project (4)
- AC = Total annual costs of water quality improvement project [Worksheet B, (10)]

EBT ₀ (4)	20__ *	
	\$ _____	(5)
AC	\$ _____	(6)
EBT _{proj} [(5)–(6)]	\$ _____	(7)

* The most recently completed fiscal year

How are earnings expected to change as a result of the annual cost of the proposed project?

C. Earnings With Water Quality Improvement Project Costs Under Cost Pass-Through

The general approach for calculating EBT with the project and partial or full cost pass-through is the same as above. However, cost pass-through results in increased prices and, therefore, lower quantity demanded.

$$EBT_{pass} = R_{pass} - VC_{pass} - FC_0 - AC_{notpassed}$$

$$AC_{notpassed} = AC - AC_{passed}$$

where:

- EBT_{pass} = Earnings with the project, passing some or all of costs to customers
- R_{pass} = Revenues with the project and cost pass-through (should reflect changes in quantity demanded and price)
- VC_{pass} = Variable cost of goods or services produced (e.g., cost of materials, direct labor), with the project and cost pass-through (should account for changes in demand, but not include the cost of the project, since that would double count the cost in the equation above)
- FC_0 = Fixed cost of goods or services produced [e.g., rent, interest on capital investments (without the project), administrative overhead]; note that adding the project and passing through costs should not change FC (do not add the capital cost of the project to FC)
- AC = Annual cost of the proposed water quality improvement project
- AC_{passed} = Portion of the annual cost of the project passed through to customers
- $AC_{notpassed}$ = Portion of the annual cost of the project not passed through to customers

Please fill out the following table. Note that the table reflects any costs passed through are passed through to households. If some costs will be passed through to businesses, then the references to Worksheet D and household demand would not apply, and the applicant will need to fill out a modified version of this table for its particular situation.

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Item	Value	Label
Annual cost of proposed project [Worksheet B, (10)]	\$	AC
Percent of proposed project cost that will be passed through to customers [Worksheet D, (2)]	%	(8)
Annual cost of project not passed through to customers [$AC_{proj} \times (1 - (8))$]	\$	$AC_{notpassed}$
Unit price of good or service for households (e.g., cents per kWh), after costs are passed through [Worksheet D, (12)]	\$	(9)
Quantity of good currently provided to households [Worksheet D, (6) \times Worksheet D, (4)] (include units)		(10)
Estimated average quantity of good demanded by households after costs are passed through ¹ (include units)		(11)
Revenue provided by household customers, after costs are passed through [(9) \times (11)]	\$	(12)
Total revenue, after costs are passed through	\$	R_{pass} (13)
Total quantity of good currently sold (include units)		(14)
Total quantity of good expected to be sold after costs are passed through (include units)		(15)
VC for quantity of good currently provided	\$	VC_0
VC for quantity of good expected to be provided after costs are passed through ²	\$	VC_{pass}
FC_0 (3)	\$	FC_0
$EBT_{pass} = [R_{pass} - VC_{pass} - FC_0 - AC_{notpassed}]$	\$	EBT_{pass} (16)

1. The applicant should be able to estimate the quantity of the good demanded by households after costs are passed through using a demand model, which electric power companies should have for predicting price-demand relationships for other purposes (e.g., the need for other price changes, such as to accommodate a rise in fuel costs). Note that the demand for electric power is generally inelastic; that is, the percentage change in quantity demanded will be less than the percentage change in price.
2. Variable cost of production (VC) will change if there is a decline in quantity demanded [line (11) minus line (10)]; the applicant must incorporate this change when calculating EBT under the scenario of passing through project costs. The applicant should be able to estimate this value readily from data on cost and the production process. If not, a rough estimate would be: $VC_{pass} = VC_0 \times (14) \div (15)$.

How are earnings expected to change as a result of the annual cost of the proposed water quality improvement project and the cost pass-through?

Worksheet H:
Profit Rate With and Without Project Costs and Cost Pass-Through
 (Attach additional pages if necessary)

Note: The applicant should fill out Part B and (if applicable) Part C of this worksheet for each alternative.

A. Pretax Profit Rate Without Project Costs

$$PR_0 = EBT_0 \div R_0$$

where:

- PR₀ = Pretax profit rate without proposed project
- EBT₀ = Earnings before taxes without proposed project
- R₀ = Revenues without proposed project

Three most recently completed fiscal years:

	20__	20__	20__	
EBT ₀ [Worksheet G, (4)]	\$ _____	\$ _____	\$ _____	(1)
R ₀ [Worksheet G, (1)]	\$ _____	\$ _____	\$ _____	(2)
PR ₀ [(1)/(2)]	_____	_____	_____	(3)
Profit rate for comparable firms or for industry	_____	_____	_____	

How have profit rates changed over the last three years?

Is the most recent year typical of the three years? ___ Yes ___ No (If not, you might want to use an earlier year or years for the analysis)

How do these profit rates compare with the profit rates for this line of business? Please discuss below.

B. Pretax Profit Rate With Proposed Project Costs and No Cost Pass-Through

$$PR_{proj} = EBT_{proj} \div R_0$$

where:

- PR_{proj} = Pretax profit rate with project costs
- EBT_{proj} = Before-tax earnings with project costs
- R₀ = Revenues (Note: revenues should not change due to the proposed project, assuming no cost pass-through.)

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The most recently completed fiscal year 20__

EBT_{proj} [Worksheet G, (7)] \$_____ (4)

R₀ [Worksheet G, (1)] _____ (5)

PR_{proj} [(4)/(5)] _____ (6)

What is the percentage change in the profit rate due to the proposed project costs? Calculate as follows: $(PR_{proj} - PR_0)/PR_0 \times 100$

How does the profit rate with the proposed project compare to the profit rate of this line of business, considering similar control measures that other firms in this line of business may be considering as well?

C. Pretax Profit Rate With Water Quality Improvement Project Costs and Cost Pass-Through

$$PR_{pass} = EBT_{pass} \div R_{pass}$$

where:

PR_{pass} = Pretax profit rate with project costs and cost pass-through

EBT_{pass} = Before-tax earnings with project costs and cost pass-through

R_{pass} = Revenues with project costs and cost pass-through

The most recently completed fiscal year 20__

EBT_{pass} [Worksheet G, (16)] \$_____ (7)

R_{pass} [Worksheet G, (13)] _____ (8)

PR_{pass} [(7)/(8)] _____ (9)

What is the percentage change in the profit rate due to project costs with cost pass-through? Calculate as follows: $(PR_{pass} - PR_0)/PR_0 \times 100$

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How does the profit rate with the proposed project compare to the profit rate of this line of business, considering similar control measures that other firms in this line of business may be considering as well?

Additional comments:

Worksheet I:
Sensitivity Analysis for Profit Rate Assuming Cost Pass-Through
 (Attach additional pages if necessary)

Private applicants that can pass through costs can use this worksheet to summarize the impacts on the profit rate under different scenarios of project cost and prices for the good they provide (e.g., electricity) after cost pass-through. Complete this worksheet after completing Worksheet G and Worksheet H for each alternative analyzed.

Line (9) from Worksheet H for each alternative analyzed shows the profit rate, assuming the price for households shown on line (9) of Worksheet G, and the annual cost for the alternative shown on line (10) of Worksheet B. You can fill in one cell in each row of the matrix below using the values already calculated. To fill in the remaining columns and cells in the table below, recalculate Part C of Worksheets G and H using a different assumption for the price for households (Worksheet G, [9]). Add additional rows and columns to the table if needed.

Short description of alternative	Cost for alternative	Profit rate under various unit prices		
		Unit price (Worksheet G, [9]) _____	Unit price (Worksheet G, [9]) _____	Unit price (Worksheet G, [9]) _____
<i>Alternative A</i>	[Worksheet B (10)]	[Worksheet H (9)]	[Worksheet H (9)] assuming different unit price in G (9)	[Worksheet H (9)] assuming different unit price in G (9)

Comments:

Note that you should evaluate any costs passed through to customers following Worksheets D and E and the relevant sections of the guidance document.

**Worksheet J:
Current Ratio**

(Attach additional pages if necessary)

Note: Although this worksheet focuses on the Current Ratio as a measure of solvency, the applicant may use the Quick Ratio if it is more applicable.

$$CR = CA \div CL$$

where:

CR = Current Ratio

CA = Current assets (the sum of cash, short-term investments, inventories, prepaid expenses, and accounts receivable)

CL = Current liabilities (the sum of accounts payable, accrued expenses, taxes, and the current portion of long-term debt)

Three most recently completed fiscal years:

	20__	20__	20__	
CA	\$ _____	\$ _____	\$ _____	(1)
CL	\$ _____	\$ _____	\$ _____	(2)
CR [(1)/(2)]	_____	_____	_____	(3)

From Section 5.5 of the guidance document:

The general benchmark value for the Current Ratio is 2; for the Quick Ratio it is 1. If the Current Ratio is greater than 2, then the entity should be able to cover its short-term obligations.

Is the 2.0 benchmark value applicable to this entity in terms of determining its ability to cover its short-term obligations? If not, please explain, and indicate what benchmarks should be used in its place.

How does the entity's Current Ratio compare with the Current Ratios for other firms in this line of business?

Are there any anomalies that would affect the interpretation of the Current Ratio in the table above?

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Worksheet K: Beaver's Ratio

(Attach additional pages if necessary)

Note: Although this worksheet focuses on Beaver's Ratio as a measure of solvency, the applicant may use another test if it is more applicable.

$$BR_0 = CF_0 \div TD_0$$

where:

BR_0 = Beaver's Ratio without water quality improvement project

CF_0 = Cash flow without project (net income after taxes plus depreciation and other noncash expenses)

TD_0 = Total long-term debt, including the current portion of long-term debt, without project costs

Please fill out this table for the three most recently completed fiscal years.

	20__	20__	20__	
CF:				
Cash flow provided by operating activities (CF_0)	\$ _____	\$ _____	\$ _____	(1)
TD:				
Current portion of long-term debt	\$ _____	\$ _____	\$ _____	(2)
Long-term debt (excluding current portion)	\$ _____	\$ _____	\$ _____	(3)
TD_0 [(2)+(3)]	\$ _____	\$ _____	\$ _____	(4)
BR_0 [(1)/(4)]	_____	_____	_____	(5)

Please explain and quantify the financial impacts of any nonrecurring events (that changed revenue or expenses) in the results above.

From Section 5.5 of the guidance document:

If the Beaver's Ratio is greater than 0.20, the entity is likely solvent (i.e., able to continue covering its liabilities). If the ratio is less than 0.15, the entity may be insolvent (i.e., unable to cover its liabilities and at risk of bankruptcy). If the ratio is between 0.15 and 0.20, then future solvency is uncertain.

Are the 0.15 and 0.20 benchmarks applicable to this entity in terms of determining its ability to cover its liabilities? If not, please explain.

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How does this ratio compare with the Beaver's Ratio for other firms in the same business?

Additional comments:

Worksheet L:
Debt to Equity Ratio
 (Attach additional pages if necessary)

$$DER_0 = TL_0 \div OE_0$$

where:

DER₀ = Debt/Equity Ratio without project costs

TL₀ = Total liabilities (long-term debt such as bonds, debentures, and bank debt, and all other noncurrent liabilities such as deferred income taxes, plus current liabilities) without project costs

OE₀ = Owner equity (the difference between total assets and total liabilities, including contributed or paid in capital and retained earnings) without project costs

Three most recently completed fiscal years:

	20__	20__	20__	
TL ₀	\$ _____	\$ _____	\$ _____	(1)
OE ₀	\$ _____	\$ _____	\$ _____	(2)
DER ₀ [(1)/(2)]	_____	_____	_____	(3)

Is the most recent year typical of the three years? Yes No (If not, you might want to use an earlier year or years for the analysis)

How does the Debt to Equity Ratio compare with the ratio for firms in the same business?

Additional comments:

Worksheet M:
Baseline Socioeconomic Indicators
(Attach additional pages if necessary)

Please describe and justify the relevant geographic area. If possible, include a map.

Please describe and justify the timeline applied to the socioeconomic analysis.

A. Current Conditions

Please provide the most current values available for the following indicators, documenting the source of the estimates and year the value reflects. Attach additional pages if necessary, or model output tables.

Median household income (MHI)

Unemployment rate

Percent of households below the poverty line

Community development potential

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Additional indicators (e.g., property tax revenues, property values)

B. Baseline Future Conditions Assuming No Project

Please describe the method used to estimate baseline future conditions, provide references to documentation of any models, and document any assumptions or uncertainties:

Please describe estimated baseline conditions for the following indicators. Attach model output tables if you used an economic model to estimate baseline conditions.

Median household income (MHI)

Unemployment rate

Percent of households below the poverty line

Community development potential

Additional indicators (e.g., property tax revenues, property values)

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Worksheet N:
Estimated Change in Socioeconomic Indicators Due to the
Water Quality Improvement Project
(Attach additional pages if necessary)

Note: You may need to submit more than one version of this worksheet to correspond to different project alternatives as well as different options for paying for project costs (e.g., different scenarios for how much of project costs the applicant passes on to customers). The description must address increased wages and revenues resulting from expenditures on the proposed project and any federal or state cost-share funds. Please attach model output tables if you used an economic model.

Please describe the method used to estimate changes in future conditions due to the proposed water quality improvement project costs, any assumptions, and uncertainties:

Please describe estimated changes for the following indicators.

Estimated change in median household income (MHI)

Estimated change in the unemployment rate

Estimated change in percent of households below the poverty line

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Impact on community development potential

Estimated changes in other indicators (e.g., property tax revenues, property values)

Appendix C. Data Sources

Median Household Income (MHI)

The primary source of MHI data is the U.S. Census Bureau (see <http://www.census.gov>). The Decennial Census of Population and Housing (e.g., the 2000 Census) provides the most comprehensive coverage with income data at almost any geographic level including for the nation, state, counties, and census block group and tract.

In years not covered by the Decennial Census, the Census Bureau's American Community Survey and the Census Bureau Small Area Income and Poverty Estimates program provide MHI estimates for some areas. Washington state data centers (see <http://www.census.gov/sdc/www/wasdc.html>) and some communities may also provide MHI data.

Unemployment Rate

Data for counties, metropolitan areas, and many cities are available from the BLS's Local Area Unemployment Statistics program; data for towns, cities, and other areas (including Census units that are subsets of incorporated and unincorporated areas, such as Census tracts) are also available from the Decennial Census (<http://www.census.gov/>) and the American Community Survey (<http://www.census.gov/acs/www/>). The national unemployment rate can be found on the BLS's website (<http://www.bls.gov>). The applicant should also check with the Washington State Employment Security Department (<http://www.wa.gov/esd>) for prospective local level unemployment and other labor force data.

Municipal Bond Rating

Recent bond ratings are included in municipal bond reports from rating agencies including:

- Standard and Poor's Corporation (see <http://www2.standardandpoors.com>, or Standard and Poor's Municipal Ratings Handbook)
- Mergent Financial Information Services (formerly Moody's Investors Service) (e.g., Mergent Municipal and Government Manual).

In addition, a financial statement or budget from the local government may report recent bond ratings.

Municipal or PUD Debt

Debt information should be available from the financial statement of each jurisdiction. In most cases, recent financial statements are on file with the state Department of Revenue (<http://dor.wa.gov>; Research Division at 360-570-6070) or the state Auditor's Office (<http://www.sao.wa.gov/>). In some cases, financial statements may be available on a

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jurisdiction's website. Overlapping debt may or may not be provided in a jurisdiction's financial statements.

Assessed Value of Taxable Property

Data on assessed value of taxable property may be available from the affected jurisdiction (e.g., town or county assessor's office), or from the Department of Revenue (http://dor.wa.gov/content/statistics/stats_proptaxstats_LevyDetail.aspx). Note that assessed value is equal to a percentage of full market value. Thus, if the applicant uses the assessed value to calculate the ratio, then the applicant should first multiply the assessed value by the inverse of the assessment ratio (the assessment ratio is assessed value divided by actual market value). Assessment ratio information is available from the local government or the state Department of Revenue (<http://dor.wa.gov/content/taxes/property/default.aspx>, or http://dor.wa.gov/content/statistics/stats_proptaxstats.aspx).

Property assessment data should be available from the community (e.g., town or county assessor's office), the state Department of Revenue (<http://dor.wa.gov>, http://dor.wa.gov/content/statistics/stats_proptaxstats.aspx, or 360-570-6070), or the state Auditor's Office (<http://www.sao.wa.gov/>). Property tax revenues are available in a community's annual financial statements (see website, if available, or local government telephone listings for contact numbers).

Property Tax Collection Rate

The property tax collection rate may be available directly from the jurisdiction, the state Auditor's Office, or the Department of Revenue. If the property tax collection rate is not available directly, the applicant may calculate the collection rate as property tax revenues divided by property taxes levied. The town or county assessor's office should be able to provide property tax revenues and property taxes levied, or this information may also be available from the state Department of Revenue (<http://dor.wa.gov>) or state Auditor's Office (<http://www.sao.wa.gov/>). The applicant can also calculate property taxes levied by multiplying the assessed value of real property by the property tax rate.

Financial Statements of Individual Firms

Financial statements and other detailed financial information for individual firms are available from:

- Mergent Industrial Manual
- similar Mergent Manuals (e.g., Mergent Transportation Manual)
- U.S. Securities and Exchange Commission (SEC), for publicly owned companies.

Financial Comparison Information by Industry Sector

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Several sources provide financial information and statistics (e.g., median and other percentiles of financial ratios such as the Current Ratio) for industry sectors. These sources include:

- RMA Annual Statement Studies
- Mergent Industry Review
- Dun and Bradstreet's Dun's Industry Norms.

Poverty Rate

Sources of information on the percent of households below the poverty line include:

- Census Bureau Decennial Census of Population and Housing
- Census Bureau American Community Survey
- Census Bureau Small Area Income and Poverty Estimates.