

# Appendix N

## CE/ICA

*Draft Feasibility Report with Integrated Environmental Assessment*  
*Harlow Island HREP*

INTENTIONALLY LEFT BLANK

*Draft Feasibility Report with Integrated Environmental Assessment*  
*Harlow Island HREP*

UPPER MISSISSIPPI RIVER RESTORATION SYSTEM  
DRAFT FEASIBILITY REPORT  
WITH INTEGRATED ENVIRONMENTAL ASSESSMENT

HARLOW ISLAND HABITAT REHABILITATION  
AND ENHANCEMENT PROJECT

MIDDLE MISSISSIPPI RIVER MILES 140.5 THROUGH 144.0  
JEFFERSON COUNTY, MISSOURI

**APPENDIX N**  
**CE/ICA**

*Draft Feasibility Report with Integrated Environmental Assessment*  
*Harlow Island HREP*

PAGE INTENTIONALLY LEFT BLANK

**TABLE OF CONTENTS**

CE/ICA Supplement ..... 3

**LIST OF FIGURES**

Figure 1. Cost effective analysis of Alternatives 7, 7B, 7C, and No Action..... 4  
Figure 2. Incremental cost per unit of output (net AAHU) for the Harlow Island HREP Best Buy optimized plans..... 5

**LIST OF TABLES**

Table 1. Results of CE/ICA for Alternative Plans sorted in order of decreasing output. 4

*Draft Feasibility Report with Integrated Environmental Assessment*  
*Harlow Island HREP*

PAGE INTENTIONALLY LEFT BLANK

## **CE/ICA SUPPLEMENT**

USACE guidance requires a cost effective and incremental cost analysis (CE/ICA) for determining which project features and design alternatives should be built based on comparison of quantified habitat benefits (outputs) and estimated costs of alternative designs. This process identifies alternative features or combinations of features that fully or partially meet the objectives of the project and at the same time are the most cost effective. A cost effective analysis is conducted to ensure that the least cost alternatives have been established, and subsequent incremental cost analysis is conducted to reveal and evaluate changes in cost for increasing levels of environmental output.

CE/ICA are two distinct analyses that must be conducted to evaluate the effects of alternative plans. First, it must be shown through cost effectiveness analysis that an alternative restoration plan's output cannot be produced more cost effectively by another alternative. "Cost effective" means that, for a given level of non-monetary output, no other plan costs less, and no other plan yields more output for less money. Subsequently, through incremental cost analysis, a variety of implementable alternatives and various-sized alternatives are evaluated to arrive at a "best" level of output within the limits of both the sponsor's and USACE' capabilities. The subset of cost effective plans are examined sequentially to ascertain which plans are most efficient in the production of environmental benefits. Those most efficient plans are called "Best Buys." They provide the greatest increase in output for the least increase in cost. They have the lowest incremental costs per unit of output. In most analyses, there will be a series of Best Buy plans. The results of the incremental analysis must be synthesized with other decision-making criteria (for example, significance of outputs, acceptability, completeness, effectiveness, risk and uncertainty, reasonableness of costs) to help the planning team select and recommend a particular plan.

Alternative 7 was the tentatively selected plan from the first iteration of alternatives analysis. The original alternative 7 was approximately \$32,000,000 with a total habitat output of 467. The first iteration of alternative analysis resulted in five best buy alternatives (No Action, Alternative 1, Alternative 2, Alternative 3, and Alternative 7). Alternative 7 was selected as the best plan to move forward with, with optimization of the ridge areas. The ridge habitat is critical to meeting the project objective and ensuring that the project will provide enough hard mast habitat to be self-sustaining.

Through optimization, two additional alternatives were developed (7B and 7C). These optimized iterations used Alternative 7 as the base plan and used the same features but increased the amount of ridge habitat from 46.9 acres to 59.8 acres (Alternative 7C) and 131.1 acres (Alternative 7B).

Table 1 shows the estimated outputs (in AAHUs) and annualized costs for each alternative. Costs were annualized at June 2016 (FY16) price level and include estimates for construction and OMRR&R. Costs were annualized over a 50 year period of analysis using the FY18 discount rate of 2.75%.

*Draft Feasibility Report with Integrated Environmental Assessment  
Harlow Island HREP*

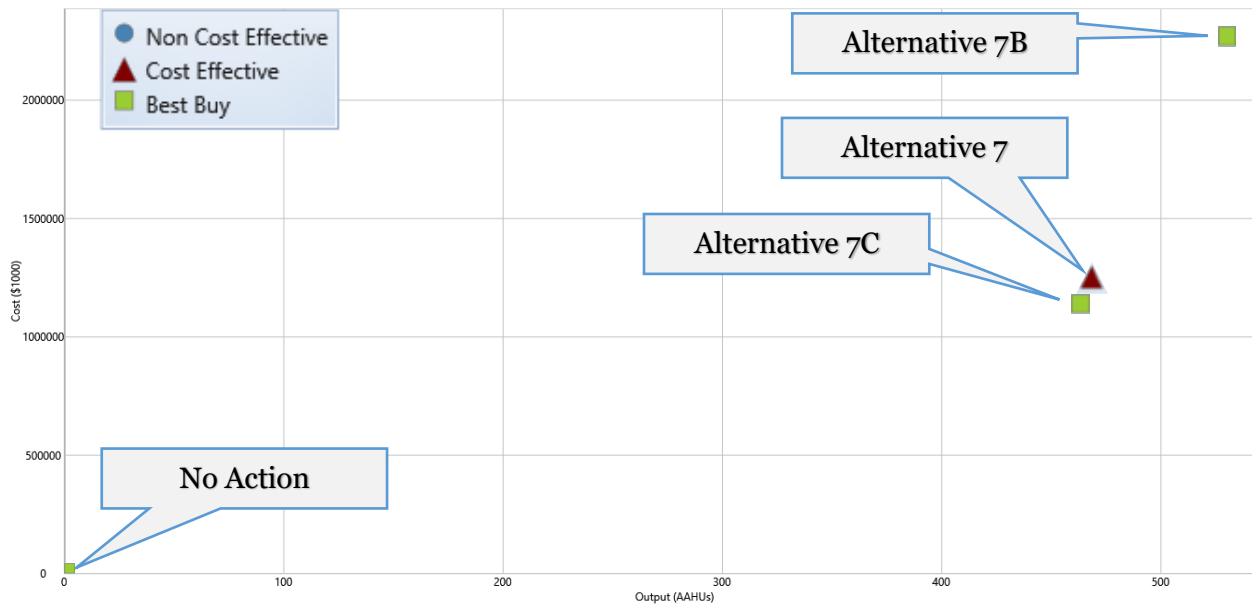


Figure 1. Cost effective analysis of Alternatives 7, 7B, 7C, and No Action.

Table 1. Results of CE/ICA for Alternative Plans sorted in order of decreasing output.

Alternative	Total Cost	Net HU Output	Annualized Cost	\$/AAHU	Cost Effective
<b>7B</b>	\$37,000,000	530	\$2,272,119	\$4,287	Best Buy
<b>7C</b>	\$27,500,000	462	\$1,134,005	\$2,455	Best Buy
<b>7</b>	\$32,000,000	467	\$1,227,368	\$2,628	No

Typically in the evaluation of best buy plans, ‘break points’ are identified in either the last column in Table 1, or in the stair-step progression from left to right in Figure 2. Break points are defined as significant increases or jumps in incremental cost per output, such that subsequent levels of output may not be considered “worth it”. Identification of such break points can be subjective. For Harlow Island HREP, the break point was identified between Alternative 7B and 7C.



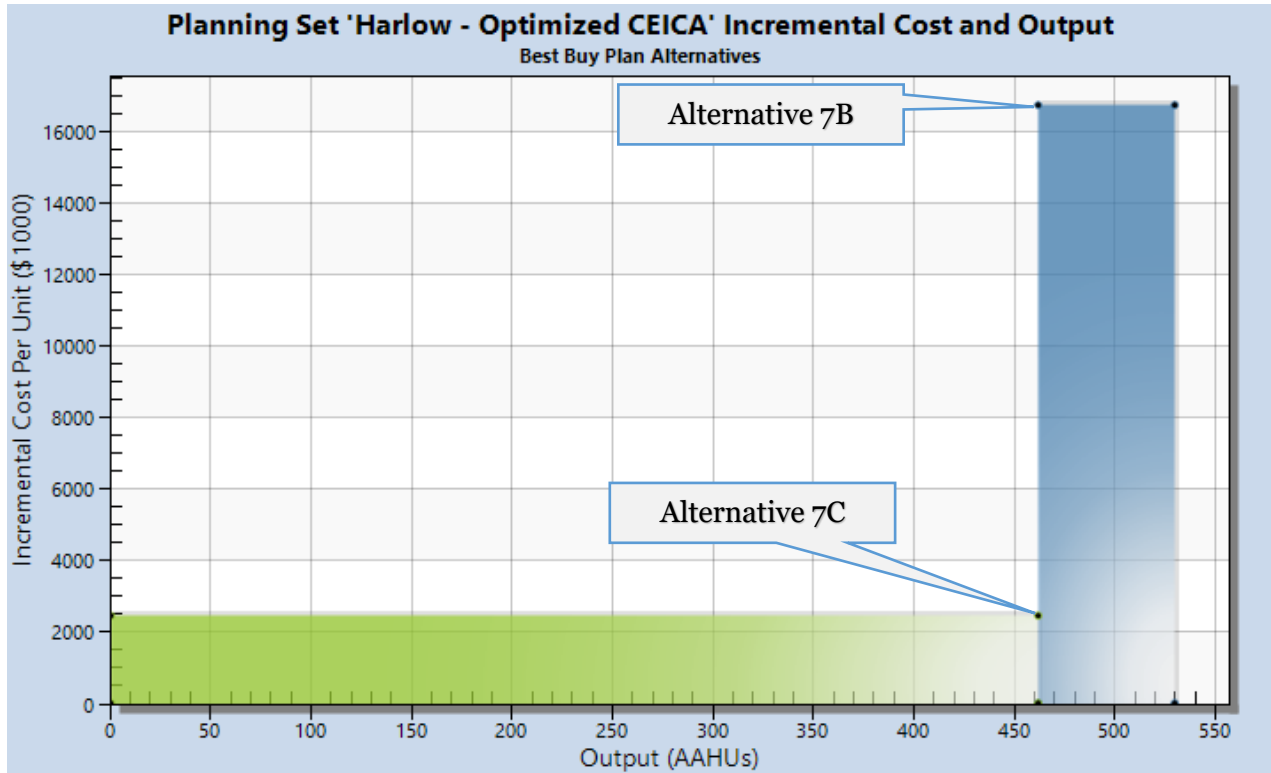


Figure 2. Incremental cost per unit of output (net AAHU) for the Harlow Island HREP Best Buy optimized plans.

This analysis was used to refine the amount of ridge habitat. Because all alternatives contained the R1R feature, this optimization would have a positive impact on all alternatives and would not have influenced the initial plan selection process. Therefore, Optimized Alternative 7 is referred to as Alternative 7 in further discussion in the main report.