Eastport Breakwater and Fish Pier – Benefit-Cost Analysis for the Maine Port Authority PIDP 2023

Intro

A BCA provides estimates of the benefits that are expected to accrue from a project over a specific period and compares them to the anticipated costs of the project. Estimated benefits are based on the projected impacts of the project on both users and non-users of the facility, valued in monetary terms.

Based on the 2023 version of the US DOT Guidance, this analysis uses the following methodology and principles:

- Establishing existing and future conditions under "Build" and "No-Build" scenarios.
- Measuring benefits in dollar terms, whenever possible, and expressing benefits and costs in a common unit of measurement. All dollar terms are presented in 2021 prices.
- Discounting future benefits and costs with the real discount rates recommended by USDOT of 7 percent.
- Conducting a sensitivity analysis to assess the impacts of changes in key estimating assumptions.
- Setting appraisal period to 25 years from first year of construction

The BCA measures benefits against costs throughout a period of analysis beginning at the start of project development and including 25 of operations.

Eastport Project BCA

Brief description

This project is comprised of two main elements. First, to create a safer harbour for the fishing fleet, the existing breakwater will be extended. In 2013, a grant application was submitted for this facility, and in 2015, a construction project was carried out to upgrade its structure. The proposed extension will involve the installation of a 97-ft long steel sheet pile bulkhead that will run from the southwestern corner of the Breakwater Terminal to an existing dolphin structure in a south-westerly direction. The primary purpose of this extension will be to provide a wave break for the berthing area within the Breakwater Terminal, while also providing longshoremen and dock workers with direct access to the dolphin, which is currently only accessible by boat.

The second element of the project is the fish pier which has been a part of the Eastport waterfront since it was originally built in 1981. Over time, routine maintenance has been carried out to make minor repairs and upgrades. Various structural inspections, including the most recent one in June 2015 by a structural-marine engineering team, have been conducted on the waterfront. According to the inspection results, the structure is approaching the end of its normal service life and requires significant upgrades within a reasonable time frame. The sheet pile cells have corrosion and minor section loss, which have led to a decrease in structural capacity, and the concrete deck has cracks and small voids throughout. Although the current structure is still usable, upgrades should be made before any serious deterioration occurs, which could result in failures. For this analysis we assumed that if no investment is made soon, the port will become unusable for local lobster fishermen from 2025.

Summary of benefits

Benefit	NPV 2021 $
Employment benefits	24,066,196

Construction Costs

Jacobs' estimators worked with MPA to estimate construction costs for the Eastport project, these are detailed below:

Table 1 - Project Schedule and Costs

VARIABLE	UNIT	VALUE
CONSTRUCTION START	Year	2023
CONSTRUCTION END	Year	2025
PROJECT OPENING	Year	2025
TOTAL CAPITAL COSTS	$M	12.9

The Economy of Eastport

When compared to the state of Maine, Eastport has a lower median household income and a relatively high unemployment rate of c. 10.5% compared to 6% in the US.

In 2010, the median household income in Eastport was $30,600, and per capita income was $21,360. These figures are lower than the state averages of $46,933 and $25,386, respectively. More households in Eastport rely on Social Security and retirement incomes compared to Maine and the country. In 2010, 12.4% of families and 19.4% of individuals in Eastport fell below the poverty threshold, which is higher than the state's figures of 8.4% and 12.6%, respectively. However, fewer households depend on food stamps. Elderly poverty rates are also high in Eastport, with 20.6% of all persons over 65 falling below the poverty line in 2010.

In 2021-22, there were 132 harvesters in Eastport, employing between 1 to 4 people, who produced an annual value of $3.6m.

Project Benefits

For this analysis we assumed that if no investment is made soon, the port will become unusable for local lobster fishermen from 2025. Therefore the main quantifiable benefit of the project is to maintain port related employment. Given that Eastport has high unemployment, increasing employment should be considered for net social benefits. When a region or a city is in full employment, additional jobs (or maintained jobs) attract employees from other jobs and therefore do not necessarily generate net economic benefits. However, if unemployment is high, jobs provide a social value in reducing unemployment.

A highly cited paper by Timothy J. Bartik from the W.E. Upjohn Institute for Employment Research,[1] shows that social benefits from employment range between 24% to 70% of increased earnings. In this analysis, we assumed that earnings equal the lobster harvesters' revenue of $3.6m. While not all revenues would be considered 'earnings' due to operational expenditure such as fuel, most expenses would be paid locally and therefore contribute to employment. In addition, there are several supporting businesses that enjoy the economic activity of the port. Any reduction in port-

[1] See: Including Jobs in Benefit-Cost Analysis, Timothy J. Bartik (2011)

related employment is likely to lead to higher unemployment among these supporting businesses. Therefore, the yearly benefit from maintained employment is estimated at $2.5m ($3.6m x 70%).

The project has other benefits which have not been quantified for this analysis, including improving operational efficiency improvements by allowing access to the dolphin by foot and allowing large vessels to berth at the port.

Summary of discounted costs and benefits

NPV 2021 $	EMPLOYMENT BENEFIT	COSTS
2024	0	5,265,121
2025	1,961,036	4,920,674
2026	1,832,744	0
2027	1,712,844	0
2028	1,600,789	0
2029	1,496,065	0
2030	1,398,191	0
2031	1,306,721	0
2032	1,221,234	0
2033	1,141,341	0
2034	1,066,673	0
2035	996,891	0
2036	931,674	0
2037	870,723	0
2038	813,760	0
2039	760,523	0
2040	710,770	0
2041	664,271	0
2042	620,814	0
2043	580,200	0
2044	542,243	0
2045	506,769	0
2046	473,616	0
2047	442,632	0
2048	413,674	0
TOTAL	**24,066,196**	**10,185,795**

Sensitivity Analysis

In the central scenario for this analysis, we assumed that 70% of increased earnings should be considered as social benefit. However, to further ensure the robustness of the analysis we also estimated the benefits using a 50% and 30% benefit to earnings ratio.

Table 2 - sensitivity analysis

	70%	50%	30%
BENEFITS PV (2021 $)	24,066,196	17,190,140	10,314,084
COSTS PV (2021 $)	10,185,795	10,185,795	10,185,795
BCR	2.36	1.69	1.01
NPV	13,880,401	7,004,345	128,289