

# Homework Assignment 3: Financial Assessment Tool – Viability Analysis

Thank you for participating in the P3-VALUE Financial Assessment webinar. To practice lessons learned from today's webinar, please follow the instructions below to complete a financial viability analysis for the hypothetical project presented at the webinar. The following assignment uses the financial assessment tool to assess the net present costs of a toll-based project.

Conducting a viability assessment (also known as "affordability assessment" or "financial feasibility assessment" when undertaken from the public agency's perspective) is useful in analyzing a project's overall viability, the level of public funding that may be required to deliver the project if its costs are greater than its revenues, and the associated financing costs of providing this level of funding. Please use the P3-VALUE Financial Assessment Tool in completing this assignment to assess the net present costs of a hypothetical toll-based project. Instructions for accessing the tool are provided below, as are the assumptions, which are highlighted in call-out boxes. You may find it useful to reference the Financial Assessment Tool User Manual, which is accessible

at: www.fhwa.dot.gov/ipd/pdfs/p3/p3\_value\_financialassessment\_manual\_v1.pdf.

If you have any questions about the assignment, please send them to <a href="mailto:P3-VALUE@dot.gov">P3-VALUE@dot.gov</a>.

#### Financial Assessment Tool - Viability Analysis - Instructions & Assumptions

#### 1. Accessing the PSC Tool

- 1. You may download the tool from: http://www.fhwa.dot.gov/ipd/pdfs/p3/p3\_value\_financialassessment\_tool.xlsm
- 2. Open the Financial Assessment Tool.
- 3. Click "Enable Editing" and/or "Enable Content" on the yellow bar across top of screen.
- 4. Read the disclaimer and Click "I accept."

#### 2. Managing the Input Fields

- 1. Navigate to the "Tool Index" Sheet.
- 2. Click the "Viability Assessment" button.
- 3. Navigate to the "Assumptions" Tab
- 4. Input data in the light blue cells.
  - a. Define the project.
    - i. Select "Example Scenario" from the "Project" drop down menu (cell D3).
    - ii. Select "Toll Scenario Template" from the "Traffic Scenario" drop-down menu.
    - iii. Check all of the boxes under "Project Delivery Structure" including "Toll Collection."

iv. Complete the "Timing" table with appropriate dates in 'YYYY' format or in number of years.

#### Use the following assumptions to define the project:

Traffic Scenario: Choose Toll Scenario Template

<u>Project Delivery Structure</u>: Design-Build-Finance-Operation-Maintenance-Toll Collection

#### Project Schedule

- Base Year: 2013 Concession Period (years): 30
- Construction Period: 2 years; Construction Start: 2014; Construction End:2015
- Operations Period: 28 years; Operations Start: 2016
- Tolling Period: 28; Tolling Start: 2016
- b. Estimate project costs.

**Note:** Enter operations phase costs in base year dollars (*not* current or year of expenditure dollars), consistent with the base year defined in step a) above. Note that construction costs are input in nominal dollars, consistent with the assumed 0% inflation rate assumed for the construction phase.

i. Enter "Design & Construction Costs" in line 1. Input a description of the "Asset Type" (in Column D), cost in dollars (in Column E), and a breakdown of the expenditure across the design and construction phase (up to 10 years) as a percentage.

**Note:** The "Year" columns will turn from light grey to blue as values are input. The "Check Sum" value (Column P) should equal 100% once the costs are allocated to year of expenditure.

ii. Input operations and maintenance costs in the "Operating Costs" table as a dollar figure (in Column F).

**Note:** If a user chooses to input O&M costs as dollar values, the adjacent cells in column E black out so that the inputs are only either dollar values or percentages.

#### Use the following assumptions to estimate project costs:

#### Other Project Costs:

• There are no other project costs – zero out any costs in this section

#### **Construction Costs**

- Asset Type: Road
- Construction Costs: \$100,000,000 (Year 1: 30%; Year 2: 70%; Years 3 to 10: 0%)
- Delete any other asset type and zero out its costs
- Annual Operations Costs: \$5,000,000
- Annual Maintenance Costs: \$5,000,000
- Periodic Maintenance Costs: 0% (do not zero out the years per period)

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c. Enter toll revenue assumptions.

**Note:** Cells regarding toll revenue leakage (percentage), revenue ramp-up, and value of additional revenues (in dollars) in the "Toll & Other Revenue" table should be available to be filled in if you selected the appropriate project delivery structure at the top of the assumptions sheet.

- i. Input "Toll Revenue Leakage" as a negative percentage.
- ii. Input Toll Revenue Ramp Up assumptions

#### Use the following assumptions for Toll & Other Revenue:

- Toll Revenue Leakage: -5%
- Revenue Ramp Up: Months Per Period: 12 (default value)
- Revenue Ramp Up Period 1: -67%; Period 2: -33%; Periods 3 to 6: 0%
  - d. Apply appropriate adjustments.
    - i. Zero out "Project Subsidy" values.
    - ii. Input inflation assumptions as percentages in the "Inflation" table.
    - iii. Input risk values of cost impacts in the "Risk Allocation" and "Risk Values" tables.
    - iv. Input the discount rate as a percentage.

## Use the following assumptions to apply appropriate adjustments:

#### **Funding**

Project Subsidy (Or \$ of Subsidy): \$0

#### Inflation

- CPI: 3%
- Other Index 2 Construction Phase: 0%
- Other Index 3- Operations Phase: 3%
- Other Index 4- Toll Rates: 3%
- Leave the other inflation rates blank

#### Risk Values

- Design-Build Cost Impact: (P10) \$10,000,000; (P70): \$20,000,000; (P90):
   \$30,000,000
- Operations Phase Cost Impact (P10): \$28,000,000; (P70): \$56,000,000;
   (P90): \$84,000,000 based on the 28-year operations phase
- Design-Build Schedule Impact: all values are \$0;
- Operations Phase Schedule Impact: all values are \$0

#### **Discount Rate**

- Nominal Discount Rate: 5%; Discount Rate Selected: 5% (the "Discount Rate Selected" is editable even though it is white)
- Navigate to the "Toll Scenario Template" worksheet
   Send questions and comments to P3-VALUE@dot.gov

- a. Enter a toll rate in base year dollars in Cell C3, 2 axle vehicles/Toll Section 1.
- Enter annual traffic figures in Row 36 for Year 1 Year 75.
   Note: You can use the Excel drag and drop function (or the copy and paste functions) to repeat the value in multiple years.

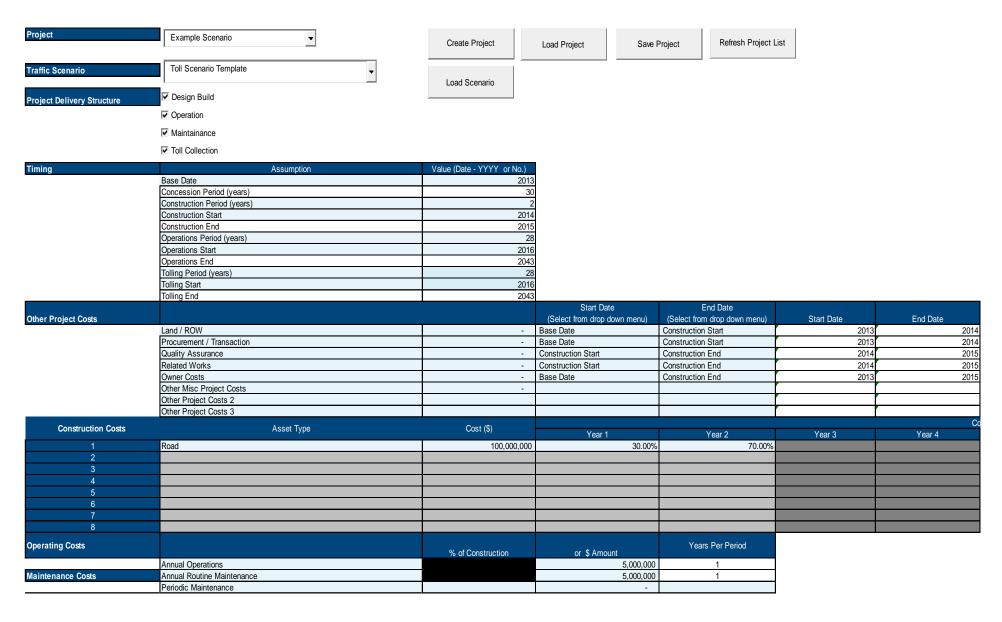
#### **Use the following assumptions for the Toll Scenario Template:**

- Toll Rate for 2 Axle Vehicles/Toll Section 1: \$2.00 (cell C3)
- Annual Traffic (000s) for 2 Axle Vehicles/Toll Section 1 (Years 1- 75): 7,884 (cells B36-BX36)
- 6. Return to the Assumptions Worksheet
  - a. Click on the "Traffic Scenario" drop down menu.
  - b. Select "Toll Scenario Template" to load the changes to the toll rate.
    Note: Even though "Toll Scenario Template" is already selected, it is necessary to re-select it to refresh the inputs and to update the outputs. Do not click the "Load Scenario" button.
- 7. Compare your inputs sheet and Toll Scenario Template sheet to the "Financial Assessment Tool Viability Assessment Assumptions Screenshots" and "Financial Assessment Tool Viability Assessment Toll Scenario Template Screenshot" below, respectively.

#### 3. Review the Outputs

- 1. Navigate to the Viability Disclaimer (the last tab on the right) and click "I ACCEPT"
- 2. Go to Scenario Analysis on the lower-right of the Viability Output sheet and select Financing Assumptions "Off" (cell I54). Do not click the "Load Scenario" button.
- 3. Review the 'Cash Flow Viability NPC Summary' table and compare your results to the "Financial Assessment Tool Viability NPC Results Screenshot (30 years, \$2.00 Toll)" Screenshot below.
- 4. Proceed to the scenario analysis on page 9.

#### Financial Assessment Tool - Viability Analysis - Assumptions Screenshots



# Financial Assessment Tool - Viability Analysis – Assumptions Screenshots (Cont.)

Toll & Other Revenue	Revenue Leakage	% Per Period		•
	Toll Revenue Leakage	-5.00%		
	Revenue Ramp Up	No. Mths Per Period	Period 1 (%)	Period 2 (%)
	Toll Revenue Ramp Up	12	-67.00%	-33.00%
	Annual Non-Road Pricing Revenue - Shared Resources	-		
	Other Revenue 1	-		
	Other Revenue 2	-		
Funding				
	Funding Type	% of Construction Cost	Or \$ of Subsidy	Year 1
	Project Subsidy	0.00%	-	0.00%
	Other Funding 1			
Inflation	Index	%		
	CPI	3.00%		
	Other Index 2- Construction Phase	0.00%		
	Other Index 3 - Operations Phase	3.00%		
	Other Index 4 - Toll Rates	3.00%		
Risk Values	Value (Real Dollars)	P10 (\$)	P70 (\$)	P90 (\$)
	Design Build Cost Impact	10,000,000	20,000,000	30,000,000
	Operations Phase Cost Impact	28,000,000	56,000,000	84,000,000
	Design Build Schedule Impact	-	-	-
	Operations Phase Schedule Impact	-	-	-
Discount Rate	Rate Type (Select From Drop Down Menu)	Rate (%)	Discount Rate Selected	
	Nominal Discount Rate	5.00%	5.00%	

# Financial Assessment Tool – Viability Assessment – Toll Scenario Template Screenshot

	_	2 axle	3 axle	4 or more																								
Toll Rates	Motorcycle	vehicles		axle																								
Toll Section 1		\$2.00	venicles	axic																								
Toll Section 2		Q2.00																										
Toll Section 3																												
Toll Section 4																												
Complete For Additional Rate Structures																												
Toll Section 1																												
Toll Section 2					1																							
Toll Section 3					1																							
Toll Section 4					1																							
Complete For Additional Rate Structures																												
Toll Section 1					1																							
Toll Section 2																												
Toll Section 3																												
Toll Section 4																												
Operating Year	1	2	3	4	5	6		8	9	10			13				17					22			25		27	
	2016	2017	2018	2019		2021							2028						2034			2037	2038	2039	2040		2042	
Motorcycles	('000s)	('000s)	('000s)	('000s)	('000s)	('000s)	('000s)	('000s)	('000s)	('000s)	('000s)	('000s)	('000s)	('000s)	('000s)	('000s)	('000s)	('000s)	('000s)	('000s)	('000s)	('000s)	('000s)	('000s)	('000s)	('000s)	('000s)	('000s)
Toll Section 1																												
Toll Section 2																												
Toll Section 3																												
Toll Section 4																												
Complete For Additional Rate Structures																												
Toll Section 1																												
Toll Section 2																												
Toll Section 3																												
Toll Section 4																												
Complete For Additional Rate Structures																												
Toll Section 1																												
Toll Section 2																												
Toll Section 3														-														
Toll Section 4																												
Toll Section 4 2 axle vehicles																												
Toll Section 4	7884	7884	7884	7884	7884	7884	7884	7884	7884	7884	7884	7884	7884	7884	7884	7884	7884	7884	7884	7884	7884	7884	7884	7884	7884	7884	7884	7884

# Financial Assessment Tool - Viability NPC Results Screenshot (30 years, \$2.00 Toll)

Cash Flow Viability - NPC Summary (\$)							
Nominal Discount Rate	Initial Project Estimate	P10	P70	P90			
5.00%	NPC	NPC	NPC	NPC			
Costs							
Construction Costs	88,762,142	88,762,142	88,762,142	88,762,142			
O&M	203,384,304	203,384,304	203,384,304	203,384,304			
Other Project Costs	-	-	-	-			
NPC of Life Cycle Costs	292,146,446	292,146,446	292,146,446	292,146,446			
Revenues and Funding							
Toll + Other Revenue	(290,082,714)	(290,082,714)	(290,082,714)	(290,082,714)			
Project Subsidy	-	-	-				
NPC of Revenues and Funding	(290,082,714)	(290,082,714)	(290,082,714)	(290,082,714)			
NPC of Risk Impacts	N/A	29,214,645	58,429,289	87,643,934			
•				0.,0.0,00.			
Net Project Cost (excluding financing)	2,063,732	31,278,376	60,493,021	89,707,666			
Cost of Financing (Interest & Fee)				-			
Net Project Cost (including financing)	2,063,732	31,278,376	60,493,021	89,707,666			

#### 4. Scenario Analysis: Changing the Toll Rate from \$2.00 to \$2.50

**Note:** Scenario analysis is an important aspect of financial viability analysis. It examines the impact of changes in key assumptions on the net present costs of a project. This exercise demonstrates how the Financial Assessment Tool can be used to conduct a scenario analysis by adjusting concession length and toll rate assumptions to see the effect of changing these assumptions on the outputs of the Viability Analysis.

- 1. Record the P70 NPV of Revenues and Net Project Cost (excluding financing) in the table below. Then navigate to the Toll Scenario Template.
- 2. Adjust the toll rate assumption to \$2.50.

#### **Use the following assumptions to adjust the Toll Scenario Template:**

- Toll Rate for 2 Axle Vehicles/Toll Section 1: \$2.50 (cell C3)
- 3. Navigate to the assumptions worksheet.
  - a. Click on the "Traffic Scenario" drop-down menu.
  - b. Select "Toll Scenario Template" to load the changes to the toll rate. Do not click the "Load Scenario" button.

**Note:** Even though "Toll Scenario Template" is already selected, it is necessary to re-select it to refresh the inputs and to update the outputs.

- 5. Navigate to the Viability Output worksheet.
- 6. Review the Viability Outputs and compare your results to the "Financial Assessment Tool Sensitivity Analysis Viability NPC Results Screenshot (30 years, \$2.50 Toll)" below. Record the P70 Revenues and Net Project Cost (excluding financing) in the Table below.

#### 5. Scenario Analysis: Changing the Toll Rate from \$2.50 to \$3.00

- 1. Repeat Steps 1 through 6 in Section 4 changing the toll rate to \$3.00, and record the change in P70 Revenues and the Net Project Cost (excluding financing) in the Table below.
- 2. Proceed to the Scenario Analysis to evaluate alternative Concession Periods on page 11.

	\$2.00 Toll	\$2.50 Toll	\$3.00 Toll
P70 NPV of Revenues			
P70 Net Project Cost (excluding financing)			

# Financial Assessment Tool – Sensitivity Analysis - Screenshot (30 years, \$2.50 Toll)

Cash Flow Viability - NPC Summary (\$)								
Nominal Discount Rate	Initial Project Estimate	P10	P70	P90				
5.00%	NPC	NPC	NPC	NPC				
Costs								
Construction Costs	88,762,142	88,762,142	88,762,142	88,762,142				
O&M	203,384,304	203,384,304	203,384,304	203,384,304				
Other Project Costs	-	-	-	-				
NPC of Life Cycle Costs	292,146,446	292,146,446	292,146,446	292,146,446				
Revenues and Funding								
Toll + Other Revenue	(362,603,393)	(362,603,393)	(362,603,393)	(362,603,393)				
Project Subsidy	-	-	-	-				
NPC of Revenues and Funding	(362,603,393)	(362,603,393)	(362,603,393)	(362,603,393)				
NPC of Risk Impacts	N/A	20.044.045	50 400 000	07.040.004				
NFC OI KISK IIIIPACIS	N/A	29,214,645	58,429,289	87,643,934				
Net Project Cost (excluding financing)	(70,456,947)	(41,242,302)	(12,027,658)	17,186,987				
Cost of Financing (Interest & Fee)	-	-	<u>-</u>					
Net Project Cost (including financing)	(70,456,947)	(41,242,302)	(12,027,658)	17,186,987				

# Financial Assessment Tool – Sensitivity Analysis - Screenshot (30 years, \$3.00 Toll)

Cash Flow Viability - NPC Summary (\$)							
Nominal Discount Rate	Initial Project Estimate	P10	P70	P90			
5.00%	NPC	NPC	NPC	NPC			
Costs							
Construction Costs	88,762,142	88,762,142	88,762,142	88,762,142			
O&M	203,384,304	203,384,304	203,384,304	203,384,304			
Other Project Costs	-	-	-	-			
NPC of Life Cycle Costs	292,146,446	292,146,446	292,146,446	292,146,446			
	T T						
Revenues and Funding							
Toll + Other Revenue	(435,124,071)	(435,124,071)	(435,124,071)	(435,124,071)			
Project Subsidy	-	-	-	-			
NPC of Revenues and Funding	(435,124,071)	(435,124,071)	(435,124,071)	(435,124,071)			
NPC of Risk Impacts	N/A	29,214,645	58,429,289	87,643,934			
-	<b>1</b>	-,,	,,				
Net Project Cost (excluding financing)	(142,977,625)	(113,762,981)	(84,548,336)	(55,333,692)			
Cost of Financing (Interest & Fee)	-	-		-			
Net Project Cost (including financing)	(142,977,625)	(113,762,981)	(84,548,336)	(55,333,692)			

#### 6. Scenario Analysis - Changing Concession Length from 30 years to 35 years

**Note:** Follow the instructions below. <u>Do not</u> use the Scenario Analysis buttons on the right side of the Output sheet.

- 1. Navigate to Toll Scenario Template.
- 2. Adjust the toll rate assumption back to \$2.00.

#### **Use the following assumptions to adjust the Toll Scenario Template:**

- Toll Rate for 2 Axle Vehicles/Toll Section 1: \$2.00 (cell C3)
- 3. Navigate to the assumptions worksheet.
  - a. Click on the "Traffic Scenario" drop down menu.
  - Select "Toll Scenario Template" to load the changes to the toll rate.
     Note: Even though "Toll Scenario Template" is already selected, it is necessary to re-select it to refresh the inputs and to update the outputs. Do not click the "Load Scenario" button.
  - c. Adjust the concession period and risk assumptions.
  - d. Compare your inputs to the "Financial Assessment Tool Scenario Analysis 35-Year Toll Project Assumptions Screenshots" below.

#### Use the following assumptions to redefine the project:

<u>Traffic Scenario:</u> Choose Toll Scenario Template from the drop down menu and click on it again

#### **Project Schedule**

- Concession Period (years): 35
- Operations Period: 33 years; Operations Start: 2016
- Tolling Period: 33; Tolling Start: 2016

#### Risk Values

- Operations Phase Cost Impact: (P10) \$33,000,000; (P70): \$66,000,000; (P90):
   \$99,000,000
- 4. Navigate to the Viability Output worksheet.
- 5. Review the Viability Outputs and compare your results to the "Financial Assessment Tool Scenario Analysis Viability NPC Results Screenshot (35 years, \$2.00 Toll)" below.
- 6. Record the P70 NPV of Revenues and Net Project Cost (excluding financing) in the table on the next page.

#### 7. Scenario Analysis – Changing Concession Length to 50 years and 75 years

 Repeat Steps 3 through 5 above for an alternative Concession Period of 50 years and record your answers in the table on the next page. Remember to change not just the Project Schedule assumptions, but also the Risk Values for the Operations Phase to match the longer operation periods.

#### Use the following assumptions to redefine the project:

<u>Traffic Scenario:</u> Choose Toll Scenario Template from the drop down menu and click on it again

#### **Project Schedule**

• Concession Period (years): 50

Operations Period: 48 years; Operations Start: 2016

• Tolling Period: 48; Tolling Start: 2016

#### Risk Values

Operations Phase Cost Impact: (P10) \$48,000,000; (P70): \$96,000,000; (P90):
 \$144,000,000 – based on the 48-year operations phase

2. Repeat Steps 3 through 5 above for an alternative Concession Period of 75 years and record your answers in the table. Remember to change not just the Project Schedule assumptions, but also the Risk Values for the Operations Phase to match the longer operation period of 73 years.

	35-Year Period	50-year Period	75-year Period
P70 NPV of Revenues			
P70 Net Project Cost (excluding financing)			

# Financial Assessment Tool – Scenario Analysis – 35-Year Toll Concession Assumptions Screenshots

## **Schedule Assumptions**

Assumption	Value (Date - YYYY or No.)
Base Date	2013
Concession Period (years)	35
Construction Period (years)	2
Construction Start	2014
Construction End	2015
Operations Period (years)	33
Operations Start	2016
Operations End	2048
Tolling Period (years)	33
Tolling Start	2016
Tolling End	2048

### Risk Assumptions

Value (Real Dollars)	P10 (\$)	P70 (\$)	P90 (\$)
Design Build Cost Impact	10,000,000	20,000,000	30,000,000
Operations Phase Cost Impact	33,000,000	66,000,000	99,000,000

# Financial Assessment Tool – Scenario Analysis – Viability NPC Results Screenshot (35 years, \$2.00 Toll)

VfM Viability - NPC Summary (\$)							
Nominal Discount Rate	Initial Project Estimate	P10	P70	P90			
5.00%	NPC	NPC	NPC	NPC			
Costs							
Construction Costs	88,762,142	88,762,142	88,762,142	88,762,142			
O&M	229,521,146	229,521,146	229,521,146	229,521,146			
Other Project Costs	-	-	-	-			
NPC of Life Cycle Costs	318,283,289	318,283,289	318,283,289	318,283,289			
Revenues and Funding							
Toll + Other Revenue	(329,234,659)	(329,234,659)	(329,234,659)	(329,234,659)			
Project Subsidy	-	-	-	-			
NPC of Revenues and Funding	(329,234,659)	(329,234,659)	(329,234,659)	(329,234,659)			
NPC of Risk Impacts	N/A	31,828,329	63,656,658	95,484,987			
Net Project Cost (excluding financing)	(10,951,370)	20,876,958	52,705,287	84,533,616			
Cost of Financing (Interest & Fee)	-	-	-	<u> </u>			
Net Project Cost (including financing)	(10,951,370)	20,876,958	52,705,287	84,533,616			

# Financial Assessment Tool – Scenario Analysis – Viability NPC Results Screenshot (50 years, \$2.00 Toll)

Cash Flow Viability - NPC Summary (\$)							
Nominal Discount Rate	Initial Project Estimate	P10	P70	P90			
5.00%	NPC	NPC	NPC	NPC			
Costs							
Construction Costs	88,762,142	88,762,142	88,762,142	88,762,142			
O&M	294,413,140	294,413,140	294,413,140	294,413,140			
Other Project Costs	-	-	-	-			
NPC of Life Cycle Costs	383,175,283	383,175,283	383,175,283	383,175,283			
Revenues and Funding							
Toll + Other Revenue	(426,440,270)	(426,440,270)	(426,440,270)	(426,440,270)			
Project Subsidy	-	-	-	-			
NPC of Revenues and Funding	(426,440,270)	(426,440,270)	(426,440,270)	(426,440,270)			
NPC of Risk Impacts	N/A	38,317,528	76,635,057	114,952,585			
		·	•				
Net Project Cost (excluding financing)	(43,264,988)	(4,947,459)	33,370,069	71,687,597			
Cost of Financing (Interest & Fee)	-	-	-	-			
Net Project Cost (including financing)	(43,264,988)	(4,947,459)	33,370,069	71,687,597			

# Financial Assessment Tool – Scenario Analysis – Viability NPC Results Screenshot (75 years, \$2.00 Toll)

Cash Flow Viability - NPC Summary (\$)							
Nominal Discount Rate	Initial Project Estimate	P10	P70	P90			
5.00%	NPC	NPC	NPC	NPC			
Costs							
Construction Costs	88,762,142	88,762,142	88,762,142	88,762,142			
O&M	368,487,588	368,487,588	368,487,588	368,487,588			
Other Project Costs	-	-	-	-			
NPC of Life Cycle Costs	457,249,731	457,249,731	457,249,731	457,249,731			
Revenues and Funding							
Toll + Other Revenue	(537,400,831)	(537,400,831)	(537,400,831)	(537,400,831)			
Project Subsidy	-	-	-	-			
NPC of Revenues and Funding	(537,400,831)	(537,400,831)	(537,400,831)	(537,400,831)			
NPC of Risk Impacts	N/A	45,724,973	91,449,946	137,174,919			
Net Project Cost (excluding financing)	(80,151,100)	(34,426,127)	11,298,846	57,023,819			
Cost of Financing (Interest & Fee)	-	-	-	-			
Net Project Cost (including financing)	(80,151,100)	(34,426,127)	11,298,846	57,023,819			