

## Evaluation of integrated water cycle management scenarios

*The objective of evaluating integrated water cycle management (IWCM) scenarios is to enable sound investment decisions for both build and non-build water supply, sewerage and stormwater solutions on a triple bottom line (TBL) basis. This involves identifying the scenario that provides the best value for money after taking full account of social, environmental and economic considerations.*

There are many evaluation tools and techniques available. NSW water utilities can use any of these tools as long as the adopted methodology is transparent, consistent, unbiased and is documented in the report.

The evaluation method set out in this document assists decision-makers by indicating the relative merits of each scenario. NSW water utilities should use this method in the absence of an alternative, for evaluating and comparing IWCM scenarios.

With this method you first determine the total environmental and social performance of each scenario. You then carry out an economic evaluation to determine the present value (PV) of each scenario. Finally, determine the environmental and social benefits per dollar of PV cost, as shown in Table 2.

## Environmental and social performance

Estimate the environmental and social performance of each scenario as outlined in the example in Table 1.

The steps necessary to estimate performance are to:

1. select up to six key indicators for each of the environmental and social impacts
2. assign a 'weighting'—representing the relative importance of each indicator for each of the environmental and social impacts
3. assign a relative performance score (0–10) for each indicator under each scenario
4. determine the total weighted performance by summing the product of the weighting and the relative performance for each indicator. The total weighted environmental performance is shown in (1) of Table 1 and the total weighted social performance is shown in (2) of Table 1

The total environmental and social score (ESS) for each scenario is shown in the final line of Table 1 and is the sum of (1) and (2).

**Table 1. Social and environmental performance of scenarios**

Criterion	Weighting	Scenario 1	Scenario 2	Scenario 3	Scenario 4
<b>Environmental Group</b>					
Impact on aquatic natural environment	0.4	6.2	7.7	7.9	2.9
Impact on land	0.05	4.3	6.7	1.3	5.6
Impact on heritage	0.05	5.0	6.9	2.4	9.0
Environmental risk	0.1	3.1	5.4	5.7	6.1
Use of Resources	0.2	8.7	9.1	0.0	8.2
<b>(1) Total weighted environmental</b>	<b>1</b>	<b>6.16<sup>3</sup></b>	<b>6.48</b>	<b>5.60</b>	<b>5.90</b>
<b>Social Group</b>					
Increase to bills (% step changes to bills)	0.2	4.1	3.5	8.0	5.7
Affect on community pride	0.1	6.0	6.8	0.7	5.0
Local environmental water quality	0.3	7.2	5.6	5.5	0.2
Risk of not meeting objectives	0.1	3.3	2.7	0.8	7.4
Awareness urban water issues	0.2	2.5	8.4	9.3	0.3
Risk on non-compliance with future legislation	0.1	4.9	0.3	5.6	4.1
<b>(2) Total weighted social</b>	<b>1</b>	<b>4.90</b>	<b>5.04</b>	<b>5.82</b>	<b>2.91</b>
<b>(3) Environmental and social score (ESS) (3) = (1) + (2)</b>		<b>11.06</b>	<b>11.52</b>	<b>11.42</b>	<b>8.81</b>

Table notes:

1. Example only—specific local criteria should be used.
2. A range 1 to 5 could be selected for each indicator, where 5 applies to a critical indicator and 1 applies to the least important indicator. To obtain the relevant weighting for each indicator so the sum of each indicator group adds up to 1, divide the selected value by the total for all group values.
3. The calculation is:  $6.16 = 0.4 \times 6.2 + 0.05 \times 4.3 + 0.05 \times 5.0 + 0.1 \times 3.1 + 0.2 \times 5.8 + 0.2 \times 8.7$ .

The environmental and social score (ESS) in (3) of Table 1 indicates the total environmental and social benefits of each scenario. To determine the relative merits of scenarios it is necessary to divide the ESS by the PV cost of each scenario, as shown in (6) of Table 2.

## Economic evaluation

Table 2 gives an example of performing an economic evaluation. For each scenario identified in the IWCM Strategy, determine the total works program cost (1), PV of works program cost (2), PV of operation and maintenance cost (3) and the total PV cost (4). For each scenario, this requires:

- a 30 year works program (both build and non-build) cost, including timing and cost of all components
- the annual operation and maintenance costs.

Using a discount rate of 7% per annum, the total PV of each scenario is then calculated as shown in (4) of Table 2.

Using the environmental and social score (ESS) of each scenario from (3) of Table 1, determine the ESS per dollar of PV cost (ESS/\$) as shown in (6) of Table 2. The ranking of scenarios is shown in (7) of Table 2.

**Table 2. PV cost of scenarios**

Criterion	Scenario 1	Scenario 2	Scenario3	Scenario 4
Estimated Costs (\$M) <b>(1)</b>	9	10	11	8
PV Works Program (\$M) <b>(2)</b>	5.4	6.6	8.1	4.9
PV Operation and Maintenance Cost (\$M) <b>(3)</b>	1.3	2.2	0.5	1.0
<b>Total PV (\$M)</b> <b>(4) = (2) + (3)</b>	<b>6.7</b>	<b>8.8</b>	<b>8.6</b>	<b>5.9</b>
Environmental and Social Score (ESS) (from (3) of Table 1) <b>(5)</b>	11.06	11.52	11.42	8.81
<b>ESS/\$M</b> <b>(6) = (5) ÷ (4)</b>	<b>1.65</b>	<b>1.31</b>	<b>1.33</b>	<b>1.49</b>
<b>Ranking (7)</b>	<b>1</b>	<b>4</b>	<b>3</b>	<b>2</b>

## Conclusion

For the example shown in Table 2, scenario 1 provides the best value for money, as it has the highest environmental and social benefits per dollar of PV cost (ESS/\$). The next best is scenario 4, which has the least PV cost, but does not yield as high environmental and social benefits per \$ as scenario 1. Scenarios 3 and 2 have lower ESS/\$ values and are therefore less attractive.

Where the ESS/\$ for the most attractive scenarios are within about 10%, the water utility may apply other considerations to determine its preferred scenario. However, if eligible for funding, any future state government funding towards the works program cost may be limited to the costs for the best scenario, i.e. the scenario with the highest ESS/\$ value.

## More information

For further information, or to discuss any aspect of the IWCM planning process, contact your regional water utilities representative from NSW Department of Industry.

Refer to [industry.nsw.gov.au/contact-us](http://industry.nsw.gov.au/contact-us) for contact details.