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Information sheet 6

Evaluation of Integrated Water Cycle Management scenarios

Overview

The objective of evaluating Integrated Water Cycle Management (IWCM) scenarios is to enable sound investment decisions for new water supply, sewerage and stormwater infrastructure and activities on a Triple Bottom Line (TBL) basis. This involves identifying the scenario which provides the best value for money after taking full account of the social, environmental and economic considerations. The evaluation method set out below will assist decision makers by indicating the relative merits of each scenario and is to be used by New South Wales water utilities for evaluating and comparing IWCM scenarios.

The method involves first determining the total environmental and social benefits of each scenario (section 2). An economic evaluation is then carried out to determine the Net Present Value (NPV) of each scenario, as shown in section 3. Finally, the environmental and social benefits per dollar of NPV cost are determined, as shown in Table 2.

Environmental and social performance

The environmental and social performance of each scenario need to be estimated, as outlined in the example in Table 1.

It should be noted these steps will comprise:

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 weighed 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
5. The total Environmental and Social Score (ESS) for each scenario is shown in the final line of Table 1 $\{(3) = (1) + (2)\}$.



Table 1 – Social and environmental performance of scenarios¹

Criterion	Weighting ²	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Environmental Group					
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	5.8	1.8	8.4	8.8
Sustainability	0.2	8.7	9.1	0.0	8.2
(1) Total weighted Environmental	1	6.16³	6.48	5.60	5.90
Social Group					
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 of urban water issues	0.2	2.5	8.4	9.3	0.3
Risk of non-compliance with future legislation	0.1	4.9	0.3	5.6	4.1
(2) Total weighted Social	1	4.90	5.04	5.82	2.91
(3) Environmental and Social Score (ESS) (3) = (1) + (2)		11.06	11.52	11.42	8.81

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 one, 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 NPV cost of each scenario as shown in (6) of Table 2.

Economic evaluation

An economic evaluation is required for each scenario identified in the IWCM Strategy, including the 'traditional' scenario. This involves determining the total capital cost (refer to (1) of the example shown in Table 2, NPV of capital cost (2) of Table 2), NPV of operation and maintenance cost ((3) of Table 2) and the total NPV cost ((4) of Table 2) for each scenario. For each scenario, this requires:

1. A 30 year capital works program including timing and cost of all components.
2. The annual operation and maintenance costs.

Using a discount rate of 7% pa, the total NPV 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, the ESS per dollar of NPV cost (ESS/\$) is then determined as shown in (6) of Table 2. The ranking of scenarios is shown in (7) of Table 2.

Table 2: NPV Cost of Scenarios

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

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 NPV cost (ESS/\$). The next best is Scenario 4, which has the least NPV 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 Country Towns Water Supply and Sewerage Program (CTWSS) funding towards the capital cost of backlog infrastructure will be limited to the capital costs for the best scenario, ie. the scenario with the highest ESS/\$ value.

Further information

For further information, or to discuss any aspect of the Integrated Water Cycle Management process, please contact your nearest regional Water Utility Officer of the Department of Water and Energy. Contact details can be found on the 'Contact Us' page of www.dwe.nsw.gov.au. For more general IWCM inquiries or information email watercycle@dwe.nsw.gov.au.

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