

MAA Scoring

MAA scoring & evaluation

The “score” achieved by each alternative is the product of the scaled values times the weighting. The cumulative “score” is obtained by adding the products of the scalar value and weight and normalizing by dividing the sum of the weights. The higher the score, the more favourable the alternative is in that category.

$$\text{Cumulative Score} = \frac{\text{Sum of Scalar Values} \times \text{Weights (for each indicator in the Sub-Account)}}{\text{Sum of Weights for the indicators in the Sub-Account}}$$

Similarly, account scores are calculated for each alternative by summing the products of the subaccount scores and their weights and normalizing by dividing by the sum of the sub-account weights within that account. The multiple account scores are calculated the same way using the account scores and weights.

In the MAA there are three levels of scoring; the first is the indicator (sub-account score). The second is the ‘sub account score’ which provides the relative score within a specific account such as soil or biodiversity. The third level of scoring is the ‘multiple account score’ which takes into consideration all the issues and provides for a final result.

The following weighting values and scaled factors were used in the MAA as shown in the tables below:

WEIGHTINGS		
Weighting	5	High value or important indicator
	4	
	3	
	2	
	1	Least value or least important indicator

WEIGHTINGS CONT.		
Scaled Factor	9	Best
	8	Very good
	7	Good
	6	Good'ish
	5	Intermediate
	4	Poor'ish
	3	Poor
	2	Very poor
	1	Worst

Impact Rating and Establishment of Confidence Limits

For purposes of assessment, comparison and the establishment of weights, the identified environmental and social issues are rated in accordance with Namibian Procedures and Guidelines for EIA and the South African Guideline Document on EIA Regulations, Department of Environmental Affairs and Tourism (DEAT, 1998). The main components of this matrix are tabulated below.

INTERACTIVE MATRIX	
Impact Intensity	The degree of alteration of the affected environmental receptor: typically very low; low; medium; high or very high.
Impact Extent	The geographical extent of the impact on a given environmental receptor: typically site (only); local (within specific activity area); regional (outside activity area but localized); national (within national scope) or international (across international boundaries/borders).
Ease of Mitigation	The subjective evaluation of the ease at implementing mitigation measures thereby reducing the impact: typically not possible; difficult; moderate; easy. Those impacts of positive character do not require mitigation and are therefore rated as 'Positive Impact'.
Impact Duration	The length of permanence of the impact on the environmental receptor: typically short-term (0-5 yrs); medium-term (5-15 yrs); long-term (ceases after operational life) and permanent.
Probability of Occurrence	The likelihood of an impact occurring in the absence of pertinent environmental management measures or mitigation: typically very high; high; moderate; low; very low.

The table below shows the numerical rating criteria used with the associated scores from 1 to 5.

NUMERICAL VALUES FOR RATING CRITERIA					
CRITERIA	SCORE 1	SCORE 2	SCORE 3	SCORE 4	SCORE 5
Impact Intensity	Low	Low – mod	Moderate	Mod – high	High
Impact Extent	Site only	Local	Regional	National	International
Impact mitigation	High	Mod – high	Moderate	Mod – low	Low
Impact Duration	Temporary	Short term	Medium term	Long term	Permanent
Probability of Occurrence	Improbable uncertain	Low	Probable	Highly probable	Definite

The overall significance of the impact is calculated using the formula below.

$$\text{Significance} = (\text{Intensity} + \text{Extent} + \text{Mitigation} + \text{Duration}) \times \text{Probability}$$

An issue can therefore have a maximum significance rating of 100 ($S = [5 + 5 + 5 + 5] \times 5$) and a minimum rating of 4 ($S = [1 + 1 + 1 + 1] \times 1$).

The significance rating numerical value is as in the table below.

SIGNIFICANCE RATING	
4 to 20	Very low (1)
21 to 40	Low (2)
41 to 60	Moderate (3)
61 to 80	High (4)
81 to 100	Very high (5)

The definition of significance in relation to the numerical value is detailed below:

- Very High (5) – for negative impacts, the decision should be not to proceed with the project.
- High (4) – for negative impacts, the decision should be not to proceed with the project without stringent mitigation measures. For positive impacts, the impact supports the implementation of the project.

- Moderate (3) – this impact will not be avoided unless mitigation measures are put in place and could require modification of the project design.
- Low (2) – this impact will be avoided with general mitigation measures.
- Very Low (1) – the impact will not affect the decision to proceed with the project and will not need to be considered in the project design.

Weighting and Assessment Criteria

The weighting and assessment criteria to be used in this study for environmental and socio-economic accounts are detailed below:

- **Intensity** for negative impacts, establishes whether it is expected to be:
 - Low (L)(1) – the impact has no effect on natural, cultural and social functions and processes beyond that of nuisance value;
 - Low to moderate (LM)(2) – natural processes and cultural and social functions continue, but in a slightly modified way;
 - Moderate (M)(3) – natural processes and cultural and social functions continue, but in a modified way;
 - High (H)(4) – natural processes or cultural or social functions are altered to the extent that they temporarily or permanently cease, resulting in severe deterioration of the impacted environment;
 - Very high (VH)(5) – environmental processes cease completely or societies are completely disrupted.
- **Extent assesses the geographical extent of the impact:**
 - Site only where construction is to take place (SO)(1);
 - Local (L)(2);
 - Regional (R)(3);
 - National (N)(4) or
 - International (I) (5).
- **Potential for mitigation/optimization:**
 - Low (L)(5) – the potential for mitigation/optimisation is highly/severely limited because of the severity of the impact and a lack of capacity/resources and coping mechanisms in the receiving environment.
 - Low to moderate (LM)(4) – the potential for mitigation/optimisation is limited because of the severity of the impact and a lack of capacity/resources and coping mechanisms in the receiving environment.
 - Moderate (M)(3) – the impact is moderate, and the receiving environment has some mechanisms to mitigate or optimize the impact, as well as resources that can be called upon.

- Moderate to high (MH)(2) – the intensity of the impact is low to moderate and the receiving environment has the capacity, resources and mechanisms to mitigate or optimize the impact.
 - High (H)(1) – the intensity of the impact is low and the receiving environment has the capacity, resources and mechanisms to mitigate or optimize the impact.
- **Duration indicates whether the lifetime of the impact will be:**
- Temporary (T) (1) – during construction only (can have temporary effects during operation as well);
 - Short term (S)(2) – 0-5 years, the effects can be reversed in a short time;
 - Medium term (M)(3) – 5-15 years, the effects could be reversed over a medium time period, possibly coinciding with the life of the project;
 - Long term (L)(4) – the impact will only cease after the operational life of the project;
 - Permanent (P) (5) – the impact on the receiving environment will effectively be irreversible.
- **Probability** describes the likelihood of the impact actually occurring, indicated as:
- Uncertain (U)(1) – insufficient information is available to determine probability;
 - Low (L)(2) – the possibility of the impact materialising is low to unlikely;
 - Probable (P)(3) – there is a distinct possibility that the impact will occur;
 - Highly probable (HP)(4) – it is most likely that the impact will occur, or
 - Definite (D)(5), where the impact will occur regardless of any preventative measures.

The following table illustrates an example of how the weightings were achieved:

WEIGHTING EXAMPLE					
Intensity	Extent	Mitigation	Duration	Probability	Significance
3	2	4	4	5	65

Using the table above, the weighing with regard to the significance score = 4