# **Appendices**

**Appendix 1: Summary of Variables, Definitions, States, Parents, and Rationale for the BNM Selection**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **No.** | **Variable Name** | **Short Definition** | **Possible Values** | **Parents** | **Explanation of Parent Relationships** |
| **Environmental & Climate Drivers (Root Nodes)** | | | | | |
| 1 | Temperature Extremes | Annual peak temperatures observed | Low (<40°C), Medium (40-45°C), High (>45°C) | None | Root climatic variable directly impacting infrastructure and comfort levels |
| 2 | Precipitation Patterns | Annual rainfall frequency/intensity | Low (Arid), Medium (Seasonal), High (Frequent) | None | Fundamental climatic driver influencing flood risk |
| 3 | Water Availability | Amount of renewable freshwater available | Critical (<500 m³/yr), Scarce (500-1000 m³/yr), Adequate (>1000 m³/yr) | None | Essential driver of water security outcomes |
| 4 | Groundwater Level | Depth and availability of groundwater resources | Low (Depleted), Medium, High (Shallow) | None | Crucial for water security assessment in GCC due to groundwater dependency |
| **Socio-economic & Governance Drivers (Root Nodes)** | | | | | |
| 5 | Population Density | Number of inhabitants per square kilometer | Low (<5000/km²), Medium (5000-10000/km²), High (>10000/km²) | None | Key driver of resource usage intensity and urban environmental impacts |
| 6 | Infrastructure Investment | Level of funding allocated to infrastructure | Low, Medium, High | None | Determines ability to implement and maintain infrastructure effectively |
| 7 | Environmental Awareness | Public understanding and support for sustainability initiatives | Low, Medium, High | None | Influences community acceptance and support of resilience measures |
| 8 | Governance Capacity | Institutional capability for planning, implementation, and management | Limited, Moderate, Strong | None | Central factor determining the effectiveness of urban planning and policy enforcement |
| 9 | Maintenance Regime | Quality and regularity of infrastructure maintenance | Inadequate, Adequate, Optimal | None | Directly affects infrastructure functionality and resilience outcomes |
| 10 | Adaptive Management | Capacity of governance to learn and adapt to changing conditions | Poor, Moderate, Strong | None | Enhances infrastructure responsiveness and long-term adaptability |
| **Intermediate Nodes** | | | | | |
| 11 | Urban Heat Island Intensity (UHII) | Degree to which urban areas experience elevated temperatures compared to rural areas | Low, Medium, High | Temperature Extremes, Population Density, Integration level | UHII is influenced by high temperature extremes and population density, which increase urban heating. High Integration Level significantly mitigates UHII impacts. |
| 12 | Community Acceptance | Level of public acceptance and participation in resilience projects | Low, Medium, High | Environmental Awareness, Governance Capacity | Awareness and strong governance promote community engagement and acceptance |
| 13 | Integration Level | Degree of integration between Nature-Based Solutions (NBS) and Gray Infrastructure (GrI) | None, Partial, Full | Governance Capacity, Infrastructure Investment | Effective governance and adequate funding drive the integration of infrastructure types |
| 14 | Nature-Based Solutions (NBS) Performance | Effectiveness of NBS in providing resilience benefits (e.g., cooling, flood mitigation) | Low Effectiveness, Moderate Effectiveness, High Effectiveness | Temperature Extremes, Water Availability, Integration Level, Maintenance Regime | NBS performance influenced by climatic conditions, water availability, integration with gray infrastructure, and maintenance |
| 15 | Gray Infrastructure (GrI) Performance | Performance of engineered infrastructure (e.g., drainage, flood barriers) | Poor Performance, Moderate Performance, Good Performance | Infrastructure Investment, Maintenance Regime, Adaptive Management | Quality and flexibility of infrastructure depend on adequate investment, regular maintenance, and adaptive management |
| **Resilience Outcome Nodes** | | | | | |
| 16 | Water Security | Reliability and adequacy of urban water supplies | Low, Medium, High | NBS Performance, GrI Performance, Groundwater Level | Water security outcomes depend on infrastructure performance, and availability of groundwater resources. Improved infrastructure performance and sustainable groundwater levels significantly enhance urban water security. |
| 17 | Thermal Comfort | Degree of livability concerning temperature and humidity | Low, Medium, High | UHII, NBS Performance | Comfort influenced by climate extremes and effectiveness of urban cooling strategies |
| 18 | Flood Protection | Effectiveness of urban areas in preventing and mitigating floods | Low, Medium, High | Precipitation Patterns, GrI Performance, Maintenance Regime | Flood protection influenced by climate (rainfall), the effectiveness of green/gray infrastructure, and maintenance quality |
| 19 | Ecosystem Services | Benefits from natural ecosystems (e.g., cooling, water filtration, biodiversity) | Low, Medium, High | NBS Performance, Integration Level | Quality and extent of NBS and its integration into urban planning directly impact ecosystem services |
| 20 | Resource Efficiency | Efficiency in using urban resources (water, energy, materials) | Low, Medium, High | NBS Performance, GrI Performance, Integration Level | Resource efficiency improves through better integrated and adaptive infrastructure management |
| 21 | Environmental Impact | Overall environmental footprint (e.g., pollution, ecological degradation) of urban areas | Negative, Moderate, Positive | Population Density, Resource Efficiency, Ecosystem Services | The environmental impact depends on urban density and effectiveness of integrated sustainability measures |
| 22 | Economic Viability | Economic sustainability and growth potential of resilience initiatives | Low, Medium, High | Infrastructure Investment, Resource Efficiency | Economic viability determined by investment effectiveness and resource efficiency |
| 23 | Social Equity | Fairness and inclusivity of resilience benefits distribution among urban populations | Low, Medium, High | Community Acceptance, Integration Level | Strong community acceptance and inclusive infrastructure planning ensure equitable benefits |
| 24 | Long-term Adaptability | Capacity for sustained resilience in response to future urban challenges | Low, Medium, High | Resource Efficiency, Governance Capacity | Enhanced by adaptive governance, integrated infrastructure, and efficient resource management |

**Appendix 2:** Detailed Conditional Probability Tables (CPTs) used for the BNM

**Table 1: Temperature Extremes**

|  |  |
| --- | --- |
| **State** | **Probability** |
| Low (<40°C) | 0.15 |
| Medium (40-45°C) | 0.45 |
| High (>45°C) | 0.40 |

**Table 2: Precipitation Patterns**

|  |  |
| --- | --- |
| **State** | **Probability** |
| Low (Arid) | 0.70 |
| Medium (Seasonal) | 0.25 |
| High (Frequent) | 0.05 |

**Table 3: Water Availability**

|  |  |
| --- | --- |
| **State** | **Probability** |
| Critical (<500 m³/yr) | 0.80 |
| Scarce (500-1000 m³/yr) | 0.15 |
| Adequate (>1000 m³/yr) | 0.05 |

**Table 4: Groundwater Level**

|  |  |
| --- | --- |
| **State** | **Probability** |
| Low (Depleted) | 0.70 |
| Medium | 0.25 |
| High (Shallow) | 0.05 |

**Table 5: Population Density**

|  |  |
| --- | --- |
| **State** | **Probability** |
| Low (<5000/km²) | 0.20 |
| Medium (5000-10000/km²) | 0.60 |
| High (>10000/km²) | 0.20 |

**Table 6: Infrastructure Investment**

|  |  |
| --- | --- |
| **State** | **Probability** |
| Low | 0.20 |
| Medium | 0.50 |
| High | 0.30 |

**Table 7: Environmental Awareness**

|  |  |
| --- | --- |
| **State** | **Probability** |
| Low | 0.30 |
| Medium | 0.50 |
| High | 0.20 |

**Table 8: Governance Capacity**

|  |  |
| --- | --- |
| **State** | **Probability** |
| Limited | 0.40 |
| Moderate | 0.50 |
| Strong | 0.10 |

**Table 9: Maintenance Regime**

|  |  |
| --- | --- |
| **State** | **Probability** |
| Inadequate | 0.30 |
| Adequate | 0.50 |
| Optimal | 0.20 |

**Table 10: Adaptive Management**

|  |  |
| --- | --- |
| **State** | **Probability** |
| Poor | 0.50 |
| Moderate | 0.40 |
| Strong | 0.10 |

**Table 11: Urban Heat Island Intensity (UHII)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Temperature Extremes** | **Population Density** | **Integration Level** | **Low UHII (%)** | **Medium UHII (%)** | **High UHII (%)** |
| **Low** | **Low** | **None** | **60** | **25** | **15** |
| **Low** | **Low** | **Partial** | **75** | **15** | **10** |
| **Low** | **Low** | **Full** | **85** | **10** | **5** |
| **Low** | **Medium** | **None** | **50** | **30** | **20** |
| **Low** | **Medium** | **Partial** | **65** | **25** | **10** |
| **Low** | **Medium** | **Full** | **70** | **20** | **10** |
| **Low** | **High** | **None** | **40** | **35** | **25** |
| **Low** | **High** | **Partial** | **55** | **30** | **15** |
| **Low** | **High** | **Full** | **60** | **25** | **15** |
| **Medium** | **Low** | **None** | **30** | **40** | **30** |
| **Medium** | **Low** | **Partial** | **50** | **35** | **15** |
| **Medium** | **Low** | **Full** | **60** | **30** | **10** |
| **Medium** | **Medium** | **None** | **20** | **50** | **30** |
| **Medium** | **Medium** | **Partial** | **40** | **40** | **20** |
| **Medium** | **Medium** | **Full** | **50** | **35** | **15** |
| **Medium** | **High** | **None** | **15** | **35** | **50** |
| **Medium** | **High** | **Partial** | **25** | **45** | **30** |
| **Medium** | **High** | **Full** | **40** | **40** | **20** |
| **High** | **Low** | **None** | **10** | **30** | **60** |
| **High** | **Low** | **Partial** | **20** | **40** | **40** |
| **High** | **Low** | **Full** | **30** | **45** | **25** |
| **High** | **Medium** | **None** | **5** | **25** | **70** |
| **High** | **Medium** | **Partial** | **10** | **40** | **50** |
| **High** | **Medium** | **Full** | **20** | **45** | **35** |
| **High** | **High** | **None** | **5** | **20** | **75** |
| **High** | **High** | **Partial** | **10** | **30** | **60** |
| **High** | **High** | **Full** | **15** | **40** | **45** |

**Table 12: Community Acceptance**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Environmental Awareness** | **Governance Capacity** | **Low Acceptance (%)** | **Medium Acceptance (%)** | **High Acceptance (%)** |
| **Low** | **Limited** | **80** | **15** | **5** |
| **Low** | **Moderate** | **60** | **30** | **10** |
| **Low** | **Strong** | **40** | **40** | **20** |
| **Medium** | **Limited** | **50** | **35** | **15** |
| **Medium** | **Moderate** | **35** | **45** | **20** |
| **Medium** | **Strong** | **15** | **40** | **45** |
| **High** | **Limited** | **30** | **45** | **25** |
| **High** | **Moderate** | **15** | **45** | **40** |
| **High** | **Strong** | **5** | **25** | **70** |

**Table 13: Integration Level**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Governance Capacity** | **Infrastructure Investment** | **None (%)** | **Partial (%)** | **Full (%)** |
| Limited | Low | 85 | 15 | 0 |
| Limited | Medium | 70 | 25 | 5 |
| Limited | High | 60 | 30 | 10 |
| Moderate | Low | 60 | 30 | 10 |
| Moderate | Medium | 45 | 45 | 10 |
| Moderate | High | 25 | 50 | 25 |
| Strong | Low | 30 | 50 | 20 |
| Strong | Medium | 20 | 50 | 30 |
| Strong | High | 10 | 20 | 70 |

**Table 14: NBS Performance**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Temperature** | **Water Availability** | **Maintenance** | **Integration** | **Low Effectiveness (%)** | **Moderate Effectiveness (%)** | **High Effectiveness (%)** |
| Low | Critical | Inadequate | None | 50.0 | 30.0 | 20.0 |
| Low | Critical | Inadequate | Partial | 30.0 | 40.0 | 30.0 |
| Low | Critical | Inadequate | Full | 10.0 | 40.0 | 50.0 |
| Low | Critical | Adequate | None | 40.0 | 35.0 | 25.0 |
| Low | Critical | Adequate | Partial | 25.0 | 40.0 | 35.0 |
| Low | Critical | Adequate | Full | 10.0 | 30.0 | 60.0 |
| Low | Critical | Optimal | None | 20.0 | 40.0 | 40.0 |
| Low | Critical | Optimal | Partial | 10.0 | 30.0 | 60.0 |
| Low | Critical | Optimal | Full | 0.0 | 15.0 | 85.0 |
| Low | Scarce | Inadequate | None | 35.0 | 35.0 | 30.0 |
| Low | Scarce | Inadequate | Partial | 25.0 | 40.0 | 35.0 |
| Low | Scarce | Inadequate | Full | 10.0 | 35.0 | 55.0 |
| Low | Scarce | Adequate | None | 25.0 | 40.0 | 35.0 |
| Low | Scarce | Adequate | Partial | 15.0 | 35.0 | 50.0 |
| Low | Scarce | Adequate | Full | 5.0 | 30.0 | 65.0 |
| Low | Scarce | Optimal | None | 20.0 | 35.0 | 45.0 |
| Low | Scarce | Optimal | Partial | 10.0 | 30.0 | 60.0 |
| Low | Scarce | Optimal | Full | 0.0 | 10.0 | 90.0 |
| Low | Adequate | Inadequate | None | 25.0 | 35.0 | 40.0 |
| Low | Adequate | Inadequate | Partial | 15.0 | 30.0 | 55.0 |
| Low | Adequate | Inadequate | Full | 5.0 | 25.0 | 70.0 |
| Low | Adequate | Adequate | None | 15.0 | 30.0 | 55.0 |
| Low | Adequate | Adequate | Partial | 10.0 | 25.0 | 65.0 |
| Low | Adequate | Adequate | Full | 0.0 | 15.0 | 85.0 |
| Low | Adequate | Optimal | None | 10.0 | 25.0 | 65.0 |
| Low | Adequate | Optimal | Partial | 5.0 | 20.0 | 75.0 |
| Low | Adequate | Optimal | Full | 0.0 | 5.0 | 95.0 |
| Medium | Critical | Inadequate | None | 65.0 | 25.0 | 10.0 |
| Medium | Critical | Inadequate | Partial | 40.0 | 40.0 | 20.0 |
| Medium | Critical | Inadequate | Full | 15.0 | 35.0 | 50.0 |
| Medium | Critical | Adequate | None | 50.0 | 30.0 | 20.0 |
| Medium | Critical | Adequate | Partial | 25.0 | 40.0 | 35.0 |
| Medium | Critical | Adequate | Full | 10.0 | 35.0 | 55.0 |
| Medium | Critical | Optimal | None | 40.0 | 30.0 | 30.0 |
| Medium | Critical | Optimal | Partial | 20.0 | 30.0 | 50.0 |
| Medium | Critical | Optimal | Full | 5.0 | 20.0 | 75.0 |
| Medium | Scarce | Inadequate | None | 50.0 | 30.0 | 20.0 |
| Medium | Scarce | Inadequate | Partial | 25.0 | 50.0 | 25.0 |
| Medium | Scarce | Inadequate | Full | 10.0 | 40.0 | 50.0 |
| Medium | Scarce | Adequate | None | 30.0 | 40.0 | 30.0 |
| Medium | Scarce | Adequate | Partial | 15.0 | 35.0 | 50.0 |
| Medium | Scarce | Adequate | Full | 5.0 | 25.0 | 70.0 |
| Medium | Scarce | Optimal | None | 20.0 | 40.0 | 40.0 |
| Medium | Scarce | Optimal | Partial | 10.0 | 30.0 | 60.0 |
| Medium | Scarce | Optimal | Full | 0.0 | 10.0 | 90.0 |
| Medium | Adequate | Inadequate | None | 30.0 | 30.0 | 40.0 |
| Medium | Adequate | Inadequate | Partial | 15.0 | 35.0 | 50.0 |
| Medium | Adequate | Inadequate | Full | 5.0 | 25.0 | 70.0 |
| Medium | Adequate | Adequate | None | 20.0 | 30.0 | 50.0 |
| Medium | Adequate | Adequate | Partial | 10.0 | 25.0 | 65.0 |
| Medium | Adequate | Adequate | Full | 0.0 | 15.0 | 85.0 |
| Medium | Adequate | Optimal | None | 10.0 | 25.0 | 65.0 |
| Medium | Adequate | Optimal | Partial | 5.0 | 20.0 | 75.0 |
| Medium | Adequate | Optimal | Full | 0.0 | 5.0 | 95.0 |
| High | Critical | Inadequate | None | 100.0 | 0.0 | 0.0 |
| High | Critical | Inadequate | Partial | 80.0 | 15.0 | 5.0 |
| High | Critical | Inadequate | Full | 65.0 | 25.0 | 10.0 |
| High | Critical | Adequate | None | 75.0 | 15.0 | 10.0 |
| High | Critical | Adequate | Partial | 50.0 | 35.0 | 15.0 |
| High | Critical | Adequate | Full | 30.0 | 45.0 | 25.0 |
| High | Critical | Optimal | None | 60.0 | 25.0 | 15.0 |
| High | Critical | Optimal | Partial | 40.0 | 40.0 | 20.0 |
| High | Critical | Optimal | Full | 20.0 | 50.0 | 30.0 |
| High | Scarce | Inadequate | None | 70.0 | 20.0 | 10.0 |
| High | Scarce | Inadequate | Partial | 50.0 | 35.0 | 15.0 |
| High | Scarce | Inadequate | Full | 30.0 | 45.0 | 25.0 |
| High | Scarce | Adequate | None | 50.0 | 30.0 | 20.0 |
| High | Scarce | Adequate | Partial | 40.0 | 50.0 | 10.0 |
| High | Scarce | Adequate | Full | 20.0 | 50.0 | 30.0 |
| High | Scarce | Optimal | None | 40.0 | 35.0 | 25.0 |
| High | Scarce | Optimal | Partial | 25.0 | 50.0 | 25.0 |
| High | Scarce | Optimal | Full | 10.0 | 40.0 | 50.0 |
| High | Adequate | Inadequate | None | 50.0 | 30.0 | 20.0 |
| High | Adequate | Inadequate | Partial | 30.0 | 40.0 | 30.0 |
| High | Adequate | Inadequate | Full | 15.0 | 35.0 | 50.0 |
| High | Adequate | Adequate | None | 35.0 | 35.0 | 30.0 |
| High | Adequate | Adequate | Partial | 20.0 | 45.0 | 35.0 |
| High | Adequate | Adequate | Full | 10.0 | 40.0 | 50.0 |
| High | Adequate | Optimal | None | 25.0 | 35.0 | 40.0 |
| High | Adequate | Optimal | Partial | 15.0 | 35.0 | 50.0 |
| High | Adequate | Optimal | Full | 5.0 | 25.0 | 70.0 |

**Table 15: GrI Performance**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Infrastructure Investment** | **Maintenance** | **Adaptive Management** | **Poor Performance (%)** | **Moderate Performance (%)** | **Good Performance (%)** |
| Low | Inadequate | Poor | 80.0 | 15.0 | 5.0 |
| Low | Inadequate | Moderate | 70.0 | 25.0 | 5.0 |
| Low | Inadequate | Strong | 60.0 | 30.0 | 10.0 |
| Low | Adequate | Poor | 65.0 | 25.0 | 10.0 |
| Low | Adequate | Moderate | 50.0 | 35.0 | 15.0 |
| Low | Adequate | Strong | 40.0 | 40.0 | 20.0 |
| Low | Optimal | Poor | 50.0 | 30.0 | 20.0 |
| Low | Optimal | Moderate | 35.0 | 40.0 | 25.0 |
| Low | Optimal | Strong | 25.0 | 45.0 | 30.0 |
| Medium | Inadequate | Poor | 50.0 | 35.0 | 15.0 |
| Medium | Inadequate | Moderate | 40.0 | 40.0 | 20.0 |
| Medium | Inadequate | Strong | 30.0 | 40.0 | 30.0 |
| Medium | Adequate | Poor | 40.0 | 40.0 | 20.0 |
| Medium | Adequate | Moderate | 25.0 | 50.0 | 25.0 |
| Medium | Adequate | Strong | 15.0 | 50.0 | 35.0 |
| Medium | Optimal | Poor | 25.0 | 45.0 | 30.0 |
| Medium | Optimal | Moderate | 15.0 | 50.0 | 35.0 |
| Medium | Optimal | Strong | 5.0 | 35.0 | 60.0 |
| High | Inadequate | Poor | 30.0 | 40.0 | 30.0 |
| High | Inadequate | Moderate | 20.0 | 45.0 | 35.0 |
| High | Inadequate | Strong | 15.0 | 35.0 | 50.0 |
| High | Adequate | Poor | 20.0 | 40.0 | 40.0 |
| High | Adequate | Moderate | 10.0 | 35.0 | 55.0 |
| High | Adequate | Strong | 5.0 | 25.0 | 70.0 |
| High | Optimal | Poor | 10.0 | 35.0 | 55.0 |
| High | Optimal | Moderate | 5.0 | 25.0 | 70.0 |
| High | Optimal | Strong | 0.0 | 10.0 | 90.0 |

**Table 16: Water Security**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **NBS Performance** | **GrI Performance** | **Groundwater Level** | **Low Security (%)** | **Medium Security (%)** | **High Security (%)** |
| Poor | Poor | Low | 95 | 5 | 0 |
| Poor | Poor | Medium | 90 | 10 | 0 |
| Poor | Poor | High | 85 | 15 | 0 |
| Poor | Moderate | Low | 80 | 15 | 5 |
| Poor | Moderate | Medium | 70 | 25 | 5 |
| Poor | Moderate | High | 60 | 30 | 10 |
| Poor | Good | Low | 60 | 30 | 10 |
| Poor | Good | Medium | 50 | 35 | 15 |
| Poor | Good | High | 40 | 40 | 20 |
| Moderate | Poor | Low | 70 | 25 | 5 |
| Moderate | Poor | Medium | 60 | 30 | 10 |
| Moderate | Poor | High | 50 | 35 | 15 |
| Moderate | Moderate | Low | 40 | 50 | 10 |
| Moderate | Moderate | Medium | 30 | 60 | 10 |
| Moderate | Moderate | High | 20 | 60 | 20 |
| Moderate | Good | Low | 25 | 50 | 25 |
| Moderate | Good | Medium | 15 | 50 | 35 |
| Moderate | Good | High | 10 | 40 | 50 |
| Good | Poor | Low | 50 | 40 | 10 |
| Good | Poor | Medium | 40 | 40 | 20 |
| Good | Poor | High | 30 | 40 | 30 |
| Good | Moderate | Low | 30 | 45 | 25 |
| Good | Moderate | Medium | 20 | 50 | 30 |
| Good | Moderate | High | 10 | 50 | 40 |
| Good | Good | Low | 10 | 40 | 50 |
| Good | Good | Medium | 5 | 25 | 70 |
| Good | Good | High | 0 | 20 | 80 |

## **Table 17: Thermal Comfort**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UHII** | **NBS Perf.** | **Low Comfort (%)** | **Moderate Comfort (%)** | **High Comfort (%)** |
| Low | Poor | 40 | 40 | 20 |
| Low | Moderate | 20 | 50 | 30 |
| Low | Good | 5 | 25 | 70 |
| Medium | Poor | 60 | 30 | 10 |
| Medium | Moderate | 40 | 45 | 15 |
| Medium | Good | 20 | 50 | 30 |
| High | Poor | 90 | 10 | 0 |
| High | Moderate | 70 | 25 | 5 |
| High | Good | 50 | 35 | 15 |

**Table 18: Flood Protection**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Precipitation Patterns** | **GrI Performance** | **Maintenance Regime** | **Low Protection (%)** | **Medium Protection (%)** | **High Protection (%)** |
| **Low** | Poor | Inadequate | 50 | 30 | 20 |
| **Low** | Poor | Adequate | 40 | 40 | 20 |
| **Low** | Poor | Optimal | 30 | 40 | 30 |
| **Low** | Moderate | Inadequate | 30 | 40 | 30 |
| **Low** | Moderate | Adequate | 15 | 45 | 40 |
| **Low** | Moderate | Optimal | 10 | 35 | 55 |
| **Low** | Good | Inadequate | 20 | 40 | 40 |
| **Low** | Good | Adequate | 10 | 30 | 60 |
| **Low** | Good | Optimal | 5 | 25 | 70 |
| **Medium** | Poor | Inadequate | 70 | 20 | 10 |
| **Medium** | Poor | Adequate | 60 | 25 | 15 |
| **Medium** | Poor | Optimal | 50 | 30 | 20 |
| **Medium** | Moderate | Inadequate | 55 | 30 | 15 |
| **Medium** | Moderate | Adequate | 40 | 40 | 20 |
| **Medium** | Moderate | Optimal | 20 | 45 | 35 |
| **Medium** | Good | Inadequate | 35 | 40 | 25 |
| **Medium** | Good | Adequate | 15 | 45 | 40 |
| **Medium** | Good | Optimal | 10 | 40 | 50 |
| **High** | Poor | Inadequate | 95 | 5 | 0 |
| **High** | Poor | Adequate | 85 | 10 | 5 |
| **High** | Poor | Optimal | 75 | 15 | 10 |
| **High** | Moderate | Inadequate | 75 | 20 | 5 |
| **High** | Moderate | Adequate | 60 | 30 | 10 |
| **High** | Moderate | Optimal | 40 | 40 | 20 |
| **High** | Good | Inadequate | 55 | 35 | 10 |
| **High** | Good | Adequate | 30 | 45 | 25 |
| **High** | Good | Optimal | 20 | 50 | 30 |

**Table 19: Ecosystem Services**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **NBS Perf.** | **Integration** | **Low Services (%)** | **Medium Services (%)** | **High Services (%)** |
| Poor | None | 85 | 10 | 5 |
| Poor | Partial | 60 | 30 | 10 |
| Poor | Full | 40 | 40 | 20 |
| Moderate | None | 50 | 35 | 15 |
| Moderate | Partial | 25 | 50 | 25 |
| Moderate | Full | 10 | 50 | 40 |
| Good | None | 30 | 40 | 30 |
| Good | Partial | 15 | 35 | 50 |
| Good | Full | 5 | 20 | 75 |

**Table 20: Resource Efficiency**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **NBS Performance** | **GrI Performance** | **Integration Level** | **Low Efficiency (%)** | **Medium Efficiency (%)** | **High Efficiency (%)** |
| Poor | Poor | None | 90 | 10 | 0 |
| Poor | Poor | Partial | 75 | 20 | 5 |
| Poor | Poor | Full | 60 | 30 | 10 |
| Poor | Moderate | None | 70 | 25 | 5 |
| Poor | Moderate | Partial | 60 | 30 | 10 |
| Poor | Moderate | Full | 40 | 40 | 20 |
| Poor | Good | None | 65 | 25 | 10 |
| Poor | Good | Partial | 50 | 30 | 20 |
| Poor | Good | Full | 40 | 40 | 20 |
| Moderate | Poor | None | 70 | 20 | 10 |
| Moderate | Poor | Partial | 55 | 35 | 10 |
| Moderate | Poor | Full | 40 | 40 | 20 |
| Moderate | Moderate | None | 50 | 40 | 10 |
| Moderate | Moderate | Partial | 30 | 50 | 20 |
| Moderate | Moderate | Full | 15 | 45 | 40 |
| Moderate | Good | None | 35 | 45 | 20 |
| Moderate | Good | Partial | 20 | 50 | 30 |
| Moderate | Good | Full | 10 | 40 | 50 |
| Good | Poor | None | 50 | 35 | 15 |
| Good | Poor | Partial | 35 | 40 | 25 |
| Good | Poor | Full | 20 | 45 | 35 |
| Good | Moderate | None | 30 | 45 | 25 |
| Good | Moderate | Partial | 20 | 45 | 35 |
| Good | Moderate | Full | 10 | 40 | 50 |
| Good | Good | None | 15 | 40 | 45 |
| Good | Good | Partial | 10 | 30 | 60 |
| Good | Good | Full | 5 | 15 | 80 |

**Table 21: Environmental Impact**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Population Density** | **Resource Efficiency** | **Ecosystem Services** | **Negative Impact (%)** | **Moderate Impact (%)** | **Positive Impact (%)** |
| Low | Low | Low | 60 | 30 | 10 |
| Low | Low | Medium | 50 | 35 | 15 |
| Low | Low | High | 40 | 40 | 20 |
| Low | Medium | Low | 45 | 40 | 15 |
| Low | Medium | Medium | 30 | 45 | 25 |
| Low | Medium | High | 20 | 40 | 40 |
| Low | High | Low | 30 | 45 | 25 |
| Low | High | Medium | 20 | 40 | 40 |
| Low | High | High | 10 | 25 | 65 |
| Medium | Low | Low | 75 | 20 | 5 |
| Medium | Low | Medium | 65 | 25 | 10 |
| Medium | Low | High | 50 | 35 | 15 |
| Medium | Medium | Low | 60 | 30 | 10 |
| Medium | Medium | Medium | 50 | 35 | 15 |
| Medium | Medium | High | 35 | 40 | 25 |
| Medium | High | Low | 40 | 40 | 20 |
| Medium | High | Medium | 25 | 45 | 30 |
| Medium | High | High | 15 | 40 | 45 |
| High | Low | Low | 95 | 5 | 0 |
| High | Low | Medium | 85 | 10 | 5 |
| High | Low | High | 70 | 20 | 10 |
| High | Medium | Low | 80 | 15 | 5 |
| High | Medium | Medium | 70 | 20 | 10 |
| High | Medium | High | 55 | 30 | 15 |
| High | High | Low | 65 | 25 | 10 |
| High | High | Medium | 50 | 35 | 15 |
| High | High | High | 40 | 40 | 20 |

**Table 22: Economic Viability**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Infrastructure Investment** | **Resource Efficiency** | **Low Viability (%)** | **Medium Viability (%)** | **High Viability (%)** |
| Low | Low | 85 | 10 | 5 |
| Low | Medium | 70 | 20 | 10 |
| Low | High | 55 | 30 | 15 |
| Medium | Low | 60 | 25 | 15 |
| Medium | Medium | 40 | 40 | 20 |
| Medium | High | 25 | 45 | 30 |
| High | Low | 35 | 35 | 30 |
| High | Medium | 15 | 35 | 50 |
| High | High | 5 | 20 | 75 |

**Table 23: Social Equity**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Community Acceptance** | **Integration Level** | **Low Equity (%)** | **Medium Equity (%)** | **High Equity (%)** |
| Low | None | 90.0 | 10.0 | 0.0 |
| Low | Partial | 70.0 | 25.0 | 5.0 |
| Low | Full | 50.0 | 30.0 | 20.0 |
| Medium | None | 70.0 | 20.0 | 10.0 |
| Medium | Partial | 55.0 | 30.0 | 15.0 |
| Medium | Full | 30.0 | 40.0 | 30.0 |
| High | None | 40.0 | 35.0 | 25.0 |
| High | Partial | 20.0 | 40.0 | 40.0 |
| High | Full | 5.0 | 25.0 | 70.0 |

## **Table 24: Long-term Adaptability**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Resource Efficiency** | **Integration Level** | **Low Adaptability (%)** | **Medium Adaptability (%)** | **High Adaptability (%)** |
| Low | None | 85.0 | 10.0 | 5.0 |
| Low | Partial | 70.0 | 20.0 | 10.0 |
| Low | Full | 50.0 | 30.0 | 20.0 |
| Medium | None | 60.0 | 25.0 | 15.0 |
| Medium | Partial | 30.0 | 50.0 | 20.0 |
| Medium | Full | 15.0 | 45.0 | 40.0 |
| High | None | 30.0 | 40.0 | 30.0 |
| High | Partial | 15.0 | 35.0 | 50.0 |
| High | Full | 5.0 | 20.0 | 75.0 |