Environmental and Utilities Requirements AHP Results

# Engineer 1

Pairwise Comparison Matrix:

|  |  |  |  |
| --- | --- | --- | --- |
| 1.0000 | 1.0000 | 3.0000 | 1.0000 |
| 1.0000 | 1.0000 | 3.0000 | 1.0000 |
| 0.3333 | 0.3333 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |

Weights:  
 [0.30885942 0.30885942 0.14157836 0.2407028 ]

Max Eigenvalue: 4.1545+0.0000j

Consistency Index (CI): 0.0515+0.0000j

Consistency Ratio (CR): 0.0572+0.0000j

Random Index (RI): 0.9000

# Engineer 2

Pairwise Comparison Matrix:

|  |  |  |  |
| --- | --- | --- | --- |
| 1.0000 | 3.0000 | 3.0000 | 5.0000 |
| 0.3333 | 1.0000 | 5.0000 | 3.0000 |
| 0.3333 | 0.2000 | 1.0000 | 5.0000 |
| 0.2000 | 0.3333 | 0.2000 | 1.0000 |

Weights:  
 [0.47573876 0.30929108 0.15106007 0.06391009]

Max Eigenvalue: 4.5747+0.0000j

Consistency Index (CI): 0.1916+0.0000j

Consistency Ratio (CR): 0.2128+0.0000j

Random Index (RI): 0.9000

# Engineer 3

Pairwise Comparison Matrix:

|  |  |  |  |
| --- | --- | --- | --- |
| 1.0000 | 1.0000 | 3.0000 | 3.0000 |
| 1.0000 | 1.0000 | 3.0000 | 5.0000 |
| 0.3333 | 0.3333 | 1.0000 | 7.0000 |
| 0.3333 | 0.2000 | 0.1429 | 1.0000 |

Weights:  
 [0.34990846 0.37950202 0.20541681 0.06517271]

Max Eigenvalue: 4.4045+0.0000j

Consistency Index (CI): 0.1348+0.0000j

Consistency Ratio (CR): 0.1498+0.0000j

Random Index (RI): 0.9000

# Engineer 4

Pairwise Comparison Matrix:

|  |  |  |  |
| --- | --- | --- | --- |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |

Weights:  
 [0.25 0.25 0.25 0.25]

Max Eigenvalue: 4.0000

Consistency Index (CI): -0.0000

Consistency Ratio (CR): -0.0000

Random Index (RI): 0.9000

# Engineer 5

Pairwise Comparison Matrix:

|  |  |  |  |
| --- | --- | --- | --- |
| 1.0000 | 1.0000 | 3.0000 | 1.0000 |
| 1.0000 | 1.0000 | 3.0000 | 1.0000 |
| 0.3333 | 0.3333 | 1.0000 | 0.3333 |
| 1.0000 | 1.0000 | 3.0003 | 1.0000 |

Weights:  
 [0.2999985 0.2999985 0.099997 0.300006 ]

Max Eigenvalue: 4.0000+0.0000j

Consistency Index (CI): 0.0000+0.0000j

Consistency Ratio (CR): 0.0000+0.0000j

Random Index (RI): 0.9000

# Engineer 6

Pairwise Comparison Matrix:

|  |  |  |  |
| --- | --- | --- | --- |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |

Weights:  
 [0.25 0.25 0.25 0.25]

Max Eigenvalue: 4.0000

Consistency Index (CI): -0.0000

Consistency Ratio (CR): -0.0000

Random Index (RI): 0.9000

# Engineer 7

Pairwise Comparison Matrix:

|  |  |  |  |
| --- | --- | --- | --- |
| 1.0000 | 1.0000 | 5.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 0.2000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |

Weights:  
 [0.378498 0.23042475 0.1606525 0.23042475]

Max Eigenvalue: 4.3398+0.0000j

Consistency Index (CI): 0.1133+0.0000j

Consistency Ratio (CR): 0.1259+0.0000j

Random Index (RI): 0.9000

# Engineer 8

Pairwise Comparison Matrix:

|  |  |  |  |
| --- | --- | --- | --- |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |

Weights:  
 [0.25 0.25 0.25 0.25]

Max Eigenvalue: 4.0000

Consistency Index (CI): -0.0000

Consistency Ratio (CR): -0.0000

Random Index (RI): 0.9000

# Engineer 9

Pairwise Comparison Matrix:

|  |  |  |  |
| --- | --- | --- | --- |
| 1.0000 | 1.0000 | 3.0000 | 5.0000 |
| 1.0000 | 1.0000 | 5.0000 | 3.0000 |
| 0.3333 | 0.2000 | 1.0000 | 5.0000 |
| 0.2000 | 0.3333 | 0.2000 | 1.0000 |

Weights:  
 [0.36323213 0.40472011 0.16184024 0.07020752]

Max Eigenvalue: 4.4173+0.0000j

Consistency Index (CI): 0.1391+0.0000j

Consistency Ratio (CR): 0.1546+0.0000j

Random Index (RI): 0.9000

# Engineer 10

Pairwise Comparison Matrix:

|  |  |  |  |
| --- | --- | --- | --- |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |

Weights:  
 [0.25 0.25 0.25 0.25]

Max Eigenvalue: 4.0000

Consistency Index (CI): -0.0000

Consistency Ratio (CR): -0.0000

Random Index (RI): 0.9000

# Engineer 11

Pairwise Comparison Matrix:

|  |  |  |  |
| --- | --- | --- | --- |
| 1.0000 | 1.0000 | 1.0000 | 5.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 3.0000 |
| 0.2000 | 1.0000 | 0.3333 | 1.0000 |

Weights:  
 [0.35004584 0.23452149 0.29228367 0.123149 ]

Max Eigenvalue: 4.2640+0.0000j

Consistency Index (CI): 0.0880+0.0000j

Consistency Ratio (CR): 0.0978+0.0000j

Random Index (RI): 0.9000

# Engineer 12

Pairwise Comparison Matrix:

|  |  |  |  |
| --- | --- | --- | --- |
| 1.0000 | 1.0000 | 0.1429 | 1.0000 |
| 1.0000 | 1.0000 | 0.2000 | 5.0000 |
| 6.9979 | 5.0000 | 1.0000 | 5.0000 |
| 1.0000 | 0.2000 | 0.2000 | 1.0000 |

Weights:  
 [0.10682435 0.18879669 0.62405948 0.08031948]

Max Eigenvalue: 4.3541+0.0000j

Consistency Index (CI): 0.1180+0.0000j

Consistency Ratio (CR): 0.1311+0.0000j

Random Index (RI): 0.9000

# Engineer 13

Pairwise Comparison Matrix:

|  |  |  |  |
| --- | --- | --- | --- |
| 1.0000 | 5.0000 | 3.0000 | 3.0000 |
| 0.2000 | 1.0000 | 5.0000 | 3.0000 |
| 0.3333 | 0.2000 | 1.0000 | 7.0000 |
| 0.3333 | 0.3333 | 0.1429 | 1.0000 |

Weights:  
 [0.49509519 0.2718176 0.16589815 0.06718906]

Max Eigenvalue: 5.1575+0.0000j

Consistency Index (CI): 0.3858+0.0000j

Consistency Ratio (CR): 0.4287+0.0000j

Random Index (RI): 0.9000

# Engineer 14

Pairwise Comparison Matrix:

|  |  |  |  |
| --- | --- | --- | --- |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 5.0000 | 1.0000 |
| 1.0000 | 0.2000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |

Weights:  
 [0.23042475 0.378498 0.1606525 0.23042475]

Max Eigenvalue: 4.3398+0.0000j

Consistency Index (CI): 0.1133+0.0000j

Consistency Ratio (CR): 0.1259+0.0000j

Random Index (RI): 0.9000

# Engineer 15

Pairwise Comparison Matrix:

|  |  |  |  |
| --- | --- | --- | --- |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 3.0000 |
| 1.0000 | 1.0000 | 1.0000 | 3.0000 |
| 1.0000 | 0.3333 | 0.3333 | 1.0000 |

Weights:  
 [0.2407028 0.30885942 0.30885942 0.14157836]

Max Eigenvalue: 4.1545+0.0000j

Consistency Index (CI): 0.0515+0.0000j

Consistency Ratio (CR): 0.0572+0.0000j

Random Index (RI): 0.9000

# Engineer 16

Pairwise Comparison Matrix:

|  |  |  |  |
| --- | --- | --- | --- |
| 1.0000 | 1.0000 | 1.0000 | 5.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 0.2000 | 1.0000 | 1.0000 | 1.0000 |

Weights:  
 [0.378498 0.23042475 0.23042475 0.1606525 ]

Max Eigenvalue: 4.3398+0.0000j

Consistency Index (CI): 0.1133+0.0000j

Consistency Ratio (CR): 0.1259+0.0000j

Random Index (RI): 0.9000

# Engineer 17

Pairwise Comparison Matrix:

|  |  |  |  |
| --- | --- | --- | --- |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |

Weights:  
 [0.25 0.25 0.25 0.25]

Max Eigenvalue: 4.0000

Consistency Index (CI): -0.0000

Consistency Ratio (CR): -0.0000

Random Index (RI): 0.9000

# Engineer 18

Pairwise Comparison Matrix:

|  |  |  |  |
| --- | --- | --- | --- |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |

Weights:  
 [0.25 0.25 0.25 0.25]

Max Eigenvalue: 4.0000

Consistency Index (CI): -0.0000

Consistency Ratio (CR): -0.0000

Random Index (RI): 0.9000

# Engineer 19

Pairwise Comparison Matrix:

|  |  |  |  |
| --- | --- | --- | --- |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |

Weights:  
 [0.25 0.25 0.25 0.25]

Max Eigenvalue: 4.0000

Consistency Index (CI): -0.0000

Consistency Ratio (CR): -0.0000

Random Index (RI): 0.9000

# Engineer 20

Pairwise Comparison Matrix:

|  |  |  |  |
| --- | --- | --- | --- |
| 1.0000 | 5.0000 | 1.0000 | 1.0000 |
| 0.2000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 3.0000 |
| 1.0000 | 1.0000 | 0.3333 | 1.0000 |

Weights:  
 [0.36290034 0.15786172 0.30150909 0.17772885]

Max Eigenvalue: 4.4956+0.0000j

Consistency Index (CI): 0.1652+0.0000j

Consistency Ratio (CR): 0.1835+0.0000j

Random Index (RI): 0.9000

# Engineer 21

Pairwise Comparison Matrix:

|  |  |  |  |
| --- | --- | --- | --- |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |

Weights:  
 [0.25 0.25 0.25 0.25]

Max Eigenvalue: 4.0000

Consistency Index (CI): -0.0000

Consistency Ratio (CR): -0.0000

Random Index (RI): 0.9000

# Engineer 22

Pairwise Comparison Matrix:

|  |  |  |  |
| --- | --- | --- | --- |
| 1.0000 | 0.1111 | 0.1429 | 0.1111 |
| 9.0009 | 1.0000 | 9.0000 | 0.1429 |
| 6.9979 | 0.1111 | 1.0000 | 0.1429 |
| 9.0009 | 6.9979 | 6.9979 | 1.0000 |

Weights:  
 [0.02739556 0.25606886 0.07722496 0.63931061]

Max Eigenvalue: 5.0339+0.0000j

Consistency Index (CI): 0.3446+0.0000j

Consistency Ratio (CR): 0.3829+0.0000j

Random Index (RI): 0.9000

# Engineer 23

Pairwise Comparison Matrix:

|  |  |  |  |
| --- | --- | --- | --- |
| 1.0000 | 3.0000 | 3.0000 | 5.0000 |
| 0.3333 | 1.0000 | 5.0000 | 5.0000 |
| 0.3333 | 0.2000 | 1.0000 | 3.0000 |
| 0.2000 | 0.2000 | 0.3333 | 1.0000 |

Weights:  
 [0.49191842 0.32400786 0.12305631 0.06101741]

Max Eigenvalue: 4.3467+0.0000j

Consistency Index (CI): 0.1156+0.0000j

Consistency Ratio (CR): 0.1284+0.0000j

Random Index (RI): 0.9000

# Engineer 24

Pairwise Comparison Matrix:

|  |  |  |  |
| --- | --- | --- | --- |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |

Weights:  
 [0.25 0.25 0.25 0.25]

Max Eigenvalue: 4.0000

Consistency Index (CI): -0.0000

Consistency Ratio (CR): -0.0000

Random Index (RI): 0.9000

# Engineer 25

Pairwise Comparison Matrix:

|  |  |  |  |
| --- | --- | --- | --- |
| 1.0000 | 1.0000 | 3.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 3.0000 |
| 0.3333 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 0.3333 | 1.0000 | 1.0000 |

Weights:  
 [0.3169873 0.3169873 0.1830127 0.1830127]

Max Eigenvalue: 4.3094+0.0000j

Consistency Index (CI): 0.1031+0.0000j

Consistency Ratio (CR): 0.1146+0.0000j

Random Index (RI): 0.9000

# Engineer 26

Pairwise Comparison Matrix:

|  |  |  |  |
| --- | --- | --- | --- |
| 1.0000 | 3.0000 | 3.0000 | 5.0000 |
| 0.3333 | 1.0000 | 3.0000 | 5.0000 |
| 0.3333 | 0.3333 | 1.0000 | 5.0000 |
| 0.2000 | 0.2000 | 0.2000 | 1.0000 |

Weights:  
 [0.49354598 0.28494891 0.16451533 0.05698978]

Max Eigenvalue: 4.3094+0.0000j

Consistency Index (CI): 0.1031+0.0000j

Consistency Ratio (CR): 0.1146+0.0000j

Random Index (RI): 0.9000

# Engineer 27

Pairwise Comparison Matrix:

|  |  |  |  |
| --- | --- | --- | --- |
| 1.0000 | 3.0000 | 3.0000 | 1.0000 |
| 0.3333 | 1.0000 | 1.0000 | 1.0000 |
| 0.3333 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |

Weights:  
 [0.40922805 0.17503458 0.17503458 0.2407028 ]

Max Eigenvalue: 4.1545+0.0000j

Consistency Index (CI): 0.0515+0.0000j

Consistency Ratio (CR): 0.0572+0.0000j

Random Index (RI): 0.9000

# Engineer 28

Pairwise Comparison Matrix:

|  |  |  |  |
| --- | --- | --- | --- |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |

Weights:  
 [0.25 0.25 0.25 0.25]

Max Eigenvalue: 4.0000

Consistency Index (CI): -0.0000

Consistency Ratio (CR): -0.0000

Random Index (RI): 0.9000

# Engineer 29

Pairwise Comparison Matrix:

|  |  |  |  |
| --- | --- | --- | --- |
| 1.0000 | 3.0000 | 1.0000 | 1.0000 |
| 0.3333 | 1.0000 | 3.0000 | 3.0000 |
| 1.0000 | 0.3333 | 1.0000 | 3.0000 |
| 1.0000 | 0.3333 | 0.3333 | 1.0000 |

Weights:  
 [0.33602235 0.30877548 0.2208092 0.13439298]

Max Eigenvalue: 4.8138+0.0000j

Consistency Index (CI): 0.2713+0.0000j

Consistency Ratio (CR): 0.3014+0.0000j

Random Index (RI): 0.9000

# Engineer 30

Pairwise Comparison Matrix:

|  |  |  |  |
| --- | --- | --- | --- |
| 1.0000 | 3.0000 | 1.0000 | 1.0000 |
| 0.3333 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |

Weights:  
 [0.33100796 0.18758644 0.2407028 0.2407028 ]

Max Eigenvalue: 4.1545+0.0000j

Consistency Index (CI): 0.0515+0.0000j

Consistency Ratio (CR): 0.0572+0.0000j

Random Index (RI): 0.9000

# Engineer 31

Pairwise Comparison Matrix:

|  |  |  |  |
| --- | --- | --- | --- |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |

Weights:  
 [0.25 0.25 0.25 0.25]

Max Eigenvalue: 4.0000

Consistency Index (CI): -0.0000

Consistency Ratio (CR): -0.0000

Random Index (RI): 0.9000

# Engineer 32

Pairwise Comparison Matrix:

|  |  |  |  |
| --- | --- | --- | --- |
| 1.0000 | 0.1429 | 1.0000 | 0.1111 |
| 6.9979 | 1.0000 | 0.1111 | 0.1111 |
| 1.0000 | 9.0009 | 1.0000 | 0.1111 |
| 9.0009 | 9.0009 | 9.0009 | 1.0000 |

Weights:  
 [0.05729141 0.098531 0.20225267 0.64192492]

Max Eigenvalue: 6.0208+0.0000j

Consistency Index (CI): 0.6736+0.0000j

Consistency Ratio (CR): 0.7485+0.0000j

Random Index (RI): 0.9000

# Engineer 33

Pairwise Comparison Matrix:

|  |  |  |  |
| --- | --- | --- | --- |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |

Weights:  
 [0.25 0.25 0.25 0.25]

Max Eigenvalue: 4.0000

Consistency Index (CI): -0.0000

Consistency Ratio (CR): -0.0000

Random Index (RI): 0.9000

# Engineer 34

Pairwise Comparison Matrix:

|  |  |  |  |
| --- | --- | --- | --- |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| 1.0000 | 1.0000 | 1.0000 | 1.0000 |

Weights:  
 [0.25 0.25 0.25 0.25]

Max Eigenvalue: 4.0000

Consistency Index (CI): -0.0000

Consistency Ratio (CR): -0.0000

Random Index (RI): 0.9000

# Engineer 35

Pairwise Comparison Matrix:

|  |  |  |  |
| --- | --- | --- | --- |
| 1.0000 | 1.0000 | 3.0000 | 1.0000 |
| 1.0000 | 1.0000 | 3.0000 | 3.0000 |
| 0.3333 | 0.3333 | 1.0000 | 7.0000 |
| 1.0000 | 0.3333 | 0.1429 | 1.0000 |

Weights:  
 [0.29817211 0.34265023 0.24765109 0.11152657]

Max Eigenvalue: 5.0149+0.0000j

Consistency Index (CI): 0.3383+0.0000j

Consistency Ratio (CR): 0.3759+0.0000j

Random Index (RI): 0.9000

# Aggregate Results

Aggregate Pairwise Comparison Matrix:

|  |  |  |  |
| --- | --- | --- | --- |
| 1.0000 | 1.1226 | 1.1894 | 1.0884 |
| 0.8908 | 1.0000 | 1.1226 | 1.0595 |
| 0.8407 | 0.8908 | 1.0000 | 1.0595 |
| 0.9188 | 0.9438 | 0.9438 | 1.0000 |

Aggregate Weights:  
 [0.27396037 0.25309026 0.23554585 0.23740352]

Aggregate Max Eigenvalue: 4.0029+0.0000j

Aggregate Consistency Index (CI): 0.0010+0.0000j

Aggregate Consistency Ratio (CR): 0.0011+0.0000j

Aggregate Random Index (RI): 0.9000