# Model Development and Evaluation

## Table 1: Evaluated Gamma Model Configurations

| Model | Description | AIC | RMSE [km/h] | MAE [km/h] | MAPE [%] |
|---|---|---|---|---|---|
| **0** | Constant | 508,549 | 3.71 | 2.91 | 18.9 |
| **1** | Constant + Infrastructure Type | 503,183 | 3.58 | 2.80 | 18.2 |
| **2** | Constant + Infrastructure Type + Surface Type | 502,794 | 3.57 | 2.78 | 18.1 |
| **3** | Constant + Infrastructure Type + Surface Type + Bidirectional Traffic allowed | 502,547 | 3.56 | 2.78 | 18.1 |
| **4** | Constant + Infrastructure Type + Surface Type + Bidirectional Traffic allowed (Interaction Effects) | 502,756 | 3.57 | 2.78 | 18.1 |
| **5** | Constant + Infrastructure Type + Surface Type + Bidirectional Traffic allowed (Interaction Effects) | 502,621 | 3.57 | 2.78 | 18.1 |
| **6** | Constant + Infrastructure Type + Surface Type + Bidirectional Traffic allowed (Interaction Effects) + Length of Cycling Net | 497,915 | 3.46 | 2.69 | 17.5 |
| **7** | Constant + Infrastructure Type + Surface Type + Bidirectional Traffic allowed (Interaction Effects) + Length of Cycling Network Segment+ Width | 497,865 | 3.46 | 2.69 | 17.5 |
| **8** | Constant + Infrastructure Type + Surface Type + Bidirectional Traffic allowed (Interaction Effects) + Length of Cycling Network Segment + Width (< 2 m, 2-4 m, > 4 m) | 497,682 | 3.45 | 2.69 | 17.5 |
| **9** | Constant + Infrastructure Type + Surface Type + Bidirectional Traffic allowed (Interaction Effects) + Length of Cycling Network Segment + Width (Interaction Effects) | 497,762 | 3.46 | 2.69 | 17.5 |
| **10** | Constant + Infrastructure Type + Surface Type + Bidirectional Traffic allowed (Interaction Effects) + Length of Cycling Network Segment + Width (Categorial with Interaction Effects) | 497,874 | 3.46 | 2.69 | 17.5 |
| **11** | Constant + Infrastructure Type + Surface Type + Bidirectional Traffic allowed (Interaction Effects) + Length of Cycling Network Segment + Width (Categorial with Interaction Effects) + Land Use | 495,442 | 3.40 | 2.64 | 17.2 |
| **12** | Constant + Infrastructure Type + Surface Type + Bidirectional Traffic allowed (Interaction Effects) + Length of Cycling Network Segment + Width (Categorial with Interaction Effects) + Land Use (Dummy Coded) | 495,442 | 3.40 | 2.64 | 17.2 |
| **13** | Constant + Infrastructure Type + Surface Type + Bidirectional Traffic allowed (Interaction Effects) + Length of Cycling Network Segment + Width (Categorial with Interaction Effects) + Land Use (Subset of Categories) | 495,452 | 3.40 | 2.64 | 17.2 |
| **14** | Constant + Infrastructure Type + Surface Type + Bidirectional Traffic allowed (Interaction Effects) + Length of Cycling Network Segment + Width (Categorial with Interaction Effects) + Land Use (Subset of Aggregated Categories) | 495,458 | 3.40 | 2.64 | 17.2 |
| **15** | **Constant + Infrastructure Type + Surface Type + Bidirectional Traffic allowed (Interaction Effects) + Length of Cycling Network Segment + Width (Categorial with Interaction Effects) + Land Use (Subset of further Aggregated Categories)** | **495,532** | **3.40** | **2.64** | **17.3** |
| **16** | Constant + Infrastructure Type + Surface Type + Bidirectional Traffic allowed (Interaction Effects) + Length of Cycling Network Segment + Width (Categorial with Interaction Effects) + Land Use (Subset of further Aggregated Categories) + Traffic Volumes | 493,255 | 3.36 | 2.60 | 16.9 |

Model 15 is presented in the paper for several reasons. During the model development process, the primary goal was to reduce the AIC. However, in addition to AIC, the statistical significance and interpretability of the estimated effects were also taken into account. As a result, a slight increase in AIC was deemed acceptable if it led to more plausible and interpretable outcomes. Model 16 shows a clear improvement over Model 15. As stated in the paper, higher speeds tend to lead to increased traffic volumes. Since our focus is on assessing the effects of infrastructure rather than on traffic assignment dynamics, we chose to limit the results to those derived from Model 15.

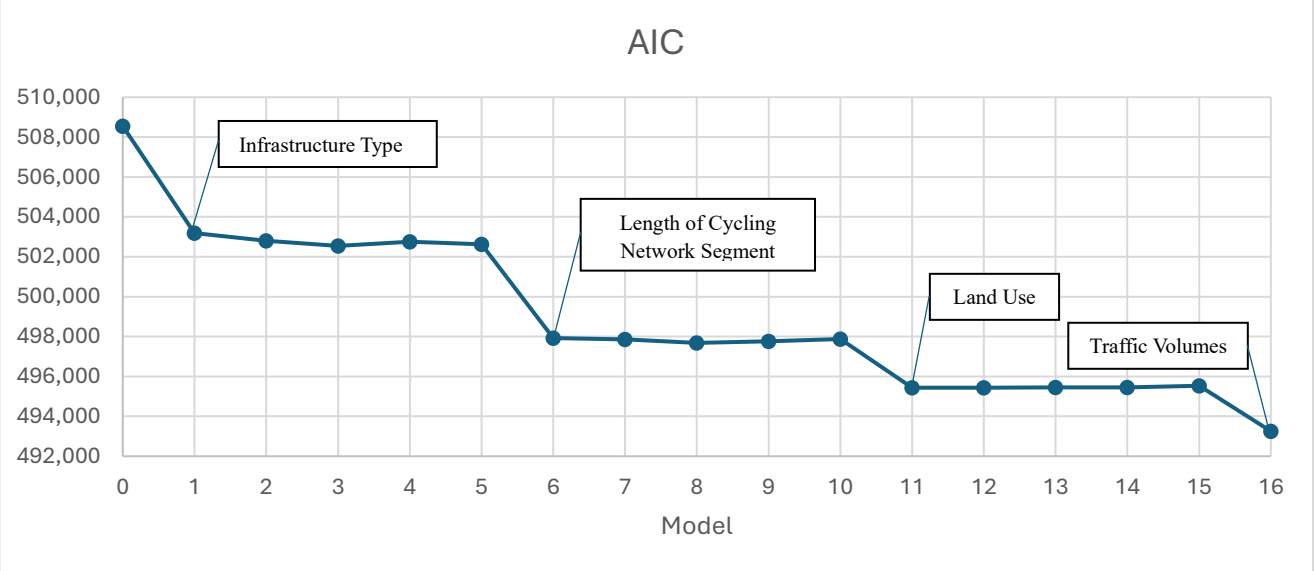


**Figure 1: Development of AIC**