

## **Identification of Impact Area, Critical Road Sections and Important Intersections for Traffic Impact Assessments**

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### **Abstract**

In conducting traffic impact assessments (TIA), there are limited guidelines available to identify the impact area for proposed property developments. A circular buffer of a pre-determined distance is very common in literature. In addition, the next major signalized intersection, the first center median opening, all roads and intersections where the development traffic exceeds 5% of the base traffic etc. are also being used. In Sri Lanka, Urban Development Authority defines the impact area as the project site and area covering 1km radius area from the boundary of the project site. However, the actual impacts will depend on the road network of the surrounding area and type of development and there is a need to identify the critical road links and intersections systematically. In addition, it is important to estimate the distribution of additional traffic due to the proposed development. This highlights the vast discrepancy in practice and a proper approach should be established for impact area identification. The study focusses on developing a model for the identification of a reasonable impact area. The methodology was developed under two stages to identify the critical road sections, important intersections and impact area for any property development. The proposed methodology considers all the main junctions which will have an impact due to the development without considering predefined buffer as existing method. The road network applicable for the impact assessment will be decided by the environment, type and the scale of the development. For developments focusing on national connectivity, A and B class road network will be selected whereas for developments targeting the local community local road network will be considered. To select critical road sections, a buffer will be identified based on major intersections beyond the mandatory local guidelines. Stage 1 focuses on the identification of critical road sections and important intersections. The main access road links within a 2 km radius from the proposed development were considered for the initial step. The radius can be varied according to the type and the size of the development. Further, the radius of the buffer was defined in this study, based on the regulations of the country regarding the TIA process and the distance to the closest main intersection. Later, the nodes where the main access roads intersect with the 2 km radius buffer were identified and the shortest distance and minimum travel time paths between the identified nodes at the 2km boundary and the proposed development are to be identified. The links in the shortest paths adjoining the site up to a major road intersection from all directions and those major road intersections are considered as the critical links and nodes respectively for the proposed development. To identify the catchment of each important intersection, which will be affected due to the proposed development, the study area was subdivided by allocating each location to its closest intersection. The catchment identification was done utilizing the Thiessen Polygon approach. In stage 2, the identification of the impact area of the proposed development was done. This study considered a 500m service area for analysis purposes. Based on that, the nodes were selected where the service area boundary intersects with all main access routes identified in Stage 1. Then a 5km service area from each of the identified nodes were considered as the possible catchment area

for the development. The service area demarcation radius can be varied according to the type and the magnitude of the development. The analysis was conducted utilizing the open street map data. The spatial analysis was done using Network Analysis Tools in ArcMap 10.8. The methodology was applied to evaluate two proposed developments; a mixed development and a residential development, located in Colombo Metropolitan Area. The impact areas for the two case studies were successfully identified using the developed methodology. In some situations, intersections beyond 1 km radius were identified as the critical intersections and also when short cuts are available catchment areas shift from the main corridors. Using the same model, a criterion could also be developed to identify the additional trip distributions from the proposed developments. This can be useful in identification of the impact to nearby road links and intersections, when the development is operational, allowing the designers to address the bottlenecks beforehand. The developed model can be further expanded to cater for other transportation areas such as catchment identification for bus stop locations, transit stations etc. in the future.

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