Article

A GIS-Based Evaluation of Environmental Sensitivity for an Urban Expressway in Shenzhen, China

Qian Li, Fengqing Guo, Yuntao Guan

PII: S2095-8099(18)30191-7
DOI: https://doi.org/10.1016/j.eng.2018.03.002
Reference: ENG 49

To appear in: *Engineering*

Received Date: 2 November 2017
Revised Date: 1 December 2017
Accepted Date: 3 January 2018

Please cite this article as: Q. Li, F. Guo, Y. Guan, A GIS-Based Evaluation of Environmental Sensitivity for an Urban Expressway in Shenzhen, China, *Engineering* (2018), doi: https://doi.org/10.1016/j.eng.2018.03.002

Engineering 4 (2018) xxx-xxx

Research
Sustainable Infrastructure—Article

A GIS-Based Evaluation of Environmental Sensitivity for an Urban Expressway in Shenzhen, China

Qian Li [a,b], Fengqing Guo [a,c], Yuntao Guan [a,b,*]
[a] *State Environmental Protection Key Laboratory of Microorganism Application and Risk Control, School of Environment, Tsinghua University, Beijing 100084, China*
[b] *Guangdong Provincial Engineering Technology Research Center for Urban Water Cycle and Water Environment Safety, Graduate School at Shenzhen, Tsinghua University, Shenzhen 518055, China*
[c] *College of Water Conservancy Engineering, Tianjin Agricultural University, Tianjin 300384, China*

* Corresponding author.
E-mail address: guanyt@tsinghua.edu.cn

ARTICLE INFO
Article history:
Received 2 November 2017
Revised 1 December 2017
Accepted 3 January 2018
Available online

Keywords:
Environmentally sensitive areas
Urban expressway
Geographic information system
Low-impact development

ABSTRACT
Urban eco-environmental degradation is becoming inevitable due to the extensive urbanization, population growth, and socioeconomic development in China. One of the traffic arteries in Shenzhen is an urban expressway that is under construction and that runs across environmentally sensitive areas (ESAs). The environmental pollution from urban expressways is critical, due to its characteristics of a high runoff coefficient, considerable contaminant accumulation, and complex pollutant ingredients. ESAs are vulnerable to anthropogenic disturbances and hence should be given special attention. In order to evaluate the environmental sensitivity along this urban expressway and minimize the influences of the ongoing road construction and future operation on the surrounding ecosystem, the environmental sensitivity of the relevant area was evaluated based on the application of a geographic information system (GIS). A final ESA map was classified into four environmental sensitivity levels; this classification indicates that a large proportion of the expressway passes through areas of high sensitivity, representing 11.93 km or 52.3% of the total expressway, and more than 90% of the total expressway passes through ESAs. This study provides beneficial information for optimal layout schemes of initial rainfall runoff treatment facilities developed from low-impact development (LID) techniques in order to minimize the impact of polluted road runoff on the surrounding ecological environment.

1. Introduction

The urban ecological environment provides people with clean water resources and a comfortable living environment, both of which are the foundation of urban economic, social, and cultural development. However, with the development