

# 02 SUMMARY

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## EFFECT OF PHRAGMITES AUSTRALIS GROWTH ON THE PERFORMANCE OF HORIZONTAL SUBSURFACE FLOW CONSTRUCTED WETLANDS DURING THE START-UP PHASE

Albuquerque, A.<sup>1</sup>; Mesquita, M. C.<sup>2</sup>; Amaral, L.<sup>3</sup>; Nogueira, R.<sup>4</sup>

<sup>1</sup>Department of Civil Engineering and Architectural, University of Beira Interior, Bloco II das Engenharias, Calçada do Lameiro, 6201-001 Covilha, Portugal, Tel.: +351- 275329981, Fax: +351-275329969. [ajca@ubi.pt](mailto:ajca@ubi.pt)

<sup>2</sup>Polytechnic Institute of Castelo Branco, University of Beira Interior, Covilhã, Portugal. [cmesquita@esa.ipcb.pt](mailto:cmesquita@esa.ipcb.pt)

<sup>3</sup>Department of Sciences and Environmental Engineering, Faculty of Sciences and Technology, New University of Lisbon, Monte de Caparica, 2829-516 Caparica, Portugal, Tel.: +351- 212948397. [Imma@fct.unl.pt](mailto:Imma@fct.unl.pt)

<sup>4</sup>Institute of Biotechnology and Bioengineering – Department of Biological Engineering, University of Minho, Campus de Gualtar, 4710-057 Braga, Portugal, Tel.: +351-253604400, Fax: +351- 253678986. [regina@deb.uminho.pt](mailto:regina@deb.uminho.pt)

### ABSTRACT

Constructed wetlands (CW) are a suitable solution for wastewater treatment and normally require low maintenance, provide a natural appearance and present high pollutant removal efficiencies. During the start-up, the operating conditions and the characteristics of the influent may affect the adhesion and the development of both the biofilm and the plants that may affect the stability and performance of the beds. *Phragmites australis* is very sensitive to changes in operation conditions during the growth phase and its role on the performance of a horizontal subsurface flow constructed wetlands (HSSF-CW) during the start-up phase was investigated. Five experiments were carried out in two mesocosms (vegetated and unvegetated), for different organic and nitrogen loads, in order to evaluate the removal of COD, NH<sub>4</sub>-N, NO<sub>2</sub>-N and NO<sub>3</sub>-N during the start-up (80 weeks of operation). The results showed that the development of *Phragmites australis* significantly affected the removal of organic matter during the first 11 weeks of operation, but there were observed steady-state conditions between weeks 11 and 16 and weeks 72 to 80. The removal of ammonia nitrogen was unstable during all the monitoring time, which would mean that mechanisms such as plant uptake and nitrification are more sensitive to changes in the operation conditions.