

Dissertation review

Author of the work: Mgr inž. Aleksandra Jakimiuk
Title of work: Impact of the technical cover systems and landfill reclamation works on selected environmental components
Field of study: Civil Engineering, Geodesy and Transport
Reviewer: prof. Ing. Martin Krejsa, Ph.D.
VSB - Technical University of Ostrava
Date of request for review: 11. 6. 2025

The currentness of the dissertation topic

The dissertation focuses on a comprehensive evaluation of reclamation methods for municipal solid waste landfills by comparing the two most commonly used cover systems: mineral and synthetic, recommended in Poland and the Czech Republic. The study was conducted on two partially reclaimed landfills in Zakroczy (Poland) and Zdounky (Czech Republic) using a comprehensive methodology integrating civil engineering, environmental geotechnical, hydrogeological, chemical and biological studies. The proposed concept fills a gap in publicly available guidelines and offers an interdisciplinary approach to safe and sustainable landfill closure management. For this reason, I assess **the topic of the dissertation as very actual and beneficial.**

Evaluation:

☒ excellent	☐ above average	☐ average	☐ below average	☐ poor
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Fulfillment of the objectives of the dissertation

The objectives of the dissertation and the definition of the research hypotheses are clearly defined and described in Chapter 1.2. The main objective of the work is to perform a comparative analysis of technical and biological reclamation at the MSW landfills in Zakroczy (Poland) and Zdounky (Czech Republic), mainly based on the monitoring tests of groundwater, leachates and CH4 in LFG. The subsequent analysis of the achieved results then leads to the identification of environmental risks and technical safety of landfills by creating predictive models of leachate production, LFG generation and performing an analysis of slope stability. The work also includes the development of recommendations for the use of selected foils in landfill reclamation. The individual defined tasks are solved and described in detail in Chapters 2-7. Chapter 8 contains a summary of the results achieved. After studying the dissertation, I can state that **the set objectives of the work were met to an extent that corresponds to the requirements set for a dissertation with a similar thematic focus.**

Evaluation:

☒ excellent	☐ above average	☐ average	☐ below average	☐ poor
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Problem solving procedure – processing methods

To evaluate the effectiveness of the landfill cover system, technical and biological reclamation treatments were compared using groundwater, leachate and landfill gas monitoring. Modeling was performed to predict the amount of leachate, landfill gas emissions and slope stability. The analysis was then supplemented with biomonitoring seeds of *Sinapis alba* L. and soil respiration, which demonstrated the effect of leachate on biological activity and plant growth. **The selected solution procedures and processing methods can be considered appropriately selected in view of the set goals.**

Evaluation:

☐ excellent	☒ above average	☐ average	☐ below average	☐ poor
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The importance of a dissertation for practice and for the development of a scientific field

The realization of the objectives of the diploma thesis showed, among other things, that the combination of field, laboratory and model studies allows to obtain a comprehensive overview of processes in landfills. The thesis contains a number of achieved results of monitoring studies, laboratory tests, model studies and biomonitoring. The data were analyzed and discussed in detail, including a comparison of various reclamation options and an examination of potential limitations of the methods used. These considerations then led to the formulation of conclusions and practical recommendations for the selection and application of cover systems for landfill closure, regarding technical, environmental, economic and social aspects. The conclusions of the thesis can provide engineers with valuable tools to support decision-making when choosing a landfill cover system and show them ways to minimize possible negative impacts on the environment. The thesis clearly expands the state of knowledge in the field of waste management. Therefore, I consider **the knowledge obtained within the framework of the submitted dissertation to be very beneficial for practical use, for the development of the scientific field and for the further research activities of the dissertation author.**

Evaluation:

☒ excellent	☐ above average	☐ average	☐ below average	☐ poor
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Formal adjustment of the dissertation and its language level

The dissertation is of a **high formal level**. Although I am not a native speaker and am therefore not able to assess the linguistic level of the work, I am nevertheless impressed by the linguistic aspect of the dissertation.

Evaluation:

☒ excellent	☐ above average	☐ average	☐ below average	☐ poor
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Evaluation of the doctoral student's publication and other activities

This dissertation is the result of scientific research carried out during three long-term foreign internships and intensive research and practical activities at the Department of Civil Engineering of the SGGW. I therefore evaluate the doctoral student's involvement in the

scientific activities of the training institution very positively. In the WOS database, I found a total of 22 contributions, the vast majority of which are articles in professional journals with an impact factor (h-index = 8, 216 citations without self-citations). The Scopus database lists 21 articles in professional journals (h-index = 9, 276 citations without self-citations). In all cases, these are publications with a close focus on the topic of the dissertation. The doctoral student's **publication activities** can therefore be assessed as **excellent** and exemplary.

Evaluation:

☒ excellent	☐ above average	☐ average	☐ below average	☐ poor
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Notes and comments on the text of the thesis

As already mentioned, the submitted dissertation is at a very good professional level. However, I would like to take the opportunity of a scientific debate and ask the dissertation candidate a few additional questions and comments, which the candidate could express during the defense:

- The work contains several examples of landfill cover compositions. One of their components is so-called HDPE – high-density polyethylene (HDPE with a thickness of 1 mm and more) or so-called PLASTPAPA foil. Can you specify the described material in more detail in terms of **mechanical properties**? What mechanical properties of insulating foils intended for landfills are important in your opinion?
- I positively evaluate the effort to use statistical analysis tools to evaluate some of the investigated indicators, e.g. to identify significant correlations among the landfill water balance components. Given the amount of data obtained through monitoring, it would be appropriate to use more advanced tools, e.g. **sensitivity analysis** to examine the effect of changes in input variables on the resulting value.

Conclusion

This is a very high-quality dissertation that undoubtedly contributes to the development of the issue being addressed.

I recommend that **the dissertation be accepted** for defense and that, if successfully defended, that

Mgr inž. Aleksandra Jakimiuk

be awarded a degree the academic title of "doctor" (abbreviated as "Ph.D.").

Date: August 10, 2025

Signature of thesis opponent: **prof. Ing. Martin Krejsa, Ph.D.**

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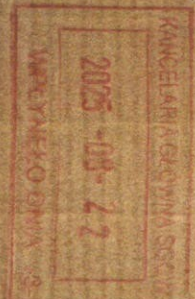


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